The status of UK SPAs in the 2000s: the Third Network Review

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Joint Nature Conservation Committee

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Editors:

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Contents

Executive Summary xii
1. Historical perspectives 1
1.1 The EU Birds Directive 1
1.2 Special Protection Areas and previous reviews 1
1.3 Implementation of Articles 4.1 and 4.2 in the UK 3
1.4 The UK SPA network 5
2. The development of the SPA network since 2001 9
2.1 The UK SPA and Ramsar Scientific Working Group 9
2.2 SPA classification progress since the second network Review 10
2.2.1 SPA classifications and extensions since 2001 10
2.2.2 SPAR SWG decisions regarding site-related issues since 2001 14
2.2.3 SPAR SWG decisions regarding species-related issues since 2001 15
2.3 European Court of Justice rulings 18
2.4 Climate change and SPAs 19
3. The third SPA network Review 22
3.1 Introduction and scope of the Review 22
3.2 Review phases 22
3.2.1 Phase 1: Review of species trends, status and site provision 22
3.2.2 Phase 2: Evaluation of the need for further SPA provision 23
3.2.3 Phase 3: Review of documentation 23
3.3 Review of the UK network of Ramsar Sites 23
3.4 Development of SPA provision in the marine environment 24
4. Methods: data used 26
4.1 National and international population estimates 26
4.2 Availability of new population estimates 27
4.3 Site population estimates 30
4.4 Calculation of SPA suite totals for non-breeding waterbirds 31
5. Assessment methodologies 33
5.1 Introduction and overall summary of approach 33

5.2 Site Provision Index 34
5.2.1 Background 34
5.2.2 Use of SPI in assessments 36
5.3 Decision Framework 37
5.3.1 Types of insufficiency 37
5.3.2 Additional conservation measures 37
5.4 Cropped habitats 41
5.5 Annex I species for which no SPAs have been classified 42
5.6 Marine SPAs 42
6. Summary and advice to government 43
6.1 Changes across the SPA network 43
6.1.1 Total network provision 46
6.1.2 Summary of findings 46
6.2 Species for which SPA insufficiencies were previously identified 51
6.3 Species accounts 51
6.4 Current scope and extent of SPA monitoring 53
6.4.1 Sources of data used to monitor and assess SPAs in the UK 54
6.4.2 Potential improvements 56
Overall adequacy of monitoring 56
Specific data deficiencies 56
Alignment of boundaries 57
Quality issues 57
Co-ordination processes: expectation and responsibility for SPA monitoring 57
6.5 Monitoring recommendations 58
6.5.1 Waterbird monitoring issues 59
6.5.2 Monitoring rare and scarce breeding birds 60
6.6 Future SPA network audit and review 61
7. Acknowledgements 62
8. References 64
Appendices 85
Appendix 1. Terms of Reference for the UK SPA and Ramsar Scientific Working Group 85
Appendix 2. Terms of Reference for the third SPA network Review 90

Appendix 3. Membership of the SPA & Ramsar Scientific Working Group 2001-2015 94

Appendix 4. Reference populations used..... 96

Appendix 5. Population coverage within SPA suites: comparison of 1990s with 2000s 111

Appendix 6. Guidelines for use of Decision Framework..... 127

Appendix 7. Summary of evaluations by species..... 132

Appendix 8. Annex I or migratory species for which no SPAs were previously selected and subsequent status change 155

Appendix 9. Species accounts 163

Red-throated Diver *Gavia stellata* (breeding) 164

Red-throated Diver *Gavia stellata* (non-breeding) 169

Black-throated Diver *Gavia arctica* (breeding) 174

Little Grebe *Tachybaptus ruficollis* (non-breeding) 180

Great Crested Grebe *Podiceps cristatus* (breeding) 185

Great Crested Grebe *Podiceps cristatus* (non-breeding) 190

Slavonian Grebe *Podiceps auritus* (breeding) 197

Slavonian Grebe *Podiceps auritus* (non-breeding) 202

Fulmar *Fulmarus glacialis* (breeding) 207

Manx Shearwater *Puffinus puffinus* 215

Storm Petrel *Hydrobates pelagicus* (breeding) 220

Leach's Petrel *Oceanodroma leucorhoa* (breeding) 226

Gannet *Morus bassanus* (breeding) 231

Cormorant *Phalacrocorax carbo carbo* (breeding) 236

Cormorant *Phalacrocorax carbo carbo* (non-breeding) 241

Shag *Phalacrocorax aristotelis* (breeding) 247

Bittern *Botaurus stellaris* (breeding) 252

Bittern *Botaurus stellaris* (non-breeding) 258

Little Egret *Egretta garzetta* (breeding) 264

Little Egret *Egretta garzetta* (non-breeding) 267

Spoonbill *Platalea falcinellus* (breeding) 272

Spoonbill *Platalea falcinellus* (non-breeding) 275

Bewick’s Swan *Cygnus columbianus bewickii* 278

Whooper Swan *Cygnus cygnus* 285

Bean Goose (Taiga race) *Anser fabalis fabalis* 292

Pink-footed Goose *Anser brachyrhynchus* 298

European White-fronted Goose *Anser albifrons albifrons* 305

Greenland White-fronted Goose *Anser albifrons flavirostris* 311

Icelandic Greylag Goose *Anser anser* 318

Greenland Barnacle Goose *Branta leucopsis* 325
Svalbard Barnacle Goose *Branta leucopsis* 333
Dark-bellied Brent Goose *Branta bernicla bernicla* 340
Canadian Light-bellied Brent Goose *Branta bernicla hrota* 348
Svalbard Light-bellied Brent Goose *Branta bernicla hrota* 355
Shelduck *Tadorna tadorna* (non-breeding) 361
Wigeon *Anas penelope* (breeding) 367
Wigeon *Anas penelope* (non-breeding) 372
Gadwall *Anas strepera* (breeding) 380
Gadwall *Anas strepera* (non-breeding) 385
Teal *Anas crecca* (non-breeding) 391
Mallard *Anas platyrhynchos* (non-breeding) 398
Pintail *Anas acuta* (non-breeding) 406
Shoveler *Anas clypeata* (breeding) 414
Shoveler *Anas clypeata* (non-breeding) 419
Pochard *Aythya ferina* (non-breeding) 425
Tufted Duck *Aythya fuligula* (non-breeding) 430
Scaup *Aythya marila* 435
Eider *Somateria m. mollissima* (non-breeding) 441
Eider *Somateria mollissima faeroeensis* (non-breeding) 446
Long-tailed Duck *Clangula hyemalis* 450
Common Scoter *Melanitta nigra* (breeding) 457
Common Scoter *Melanitta nigra* (non-breeding) 462
Velvet Scoter *Melanitta fusca* 468
Goldeneye *Bucephala clangula* (non-breeding) 474
Smew *Mergus albellus* 480
Red-breasted Merganser *Mergus serrator* (non-breeding) 483
Goosander *Mergus merganser* (non-breeding) 489
Honey Buzzard *Pernis apivorus* 495
Red Kite *Milvus milvus* (breeding) 502
Red Kite *Milvus milvus* (non-breeding) 508
White-tailed Eagle *Haliaeetus albicilla* 512
Marsh Harrier *Circus aeruginosus* 516
Hen Harrier *Circus cyaneus* (breeding) 521
Hen Harrier *Circus cyaneus* (non-breeding) 528
Montagu's Harrier *Circus pygargus* 535
Osprey *Pandion haliaetus* 544
Merlin *Falco columbarius* (breeding) 551
Merlin *Falco columbarius* (non-breeding) 558
Peregrine *Falco peregrinus* (breeding) 564
Capercaillie *Tetrao urogallus* 569
Spotted Crake *Porzana porzana* 576

Corncrake *Crex crex* 581
Coot *Fulica atra* (non-breeding) 588
Common Crane *Grus grus* (breeding) 593
Common Crane *Grus grus* (non-breeding) 596
Oystercatcher *Haematopus ostralegus* (breeding) 599
Oystercatcher *Haematopus ostralegus* (non-breeding) 605
Avocet *Recurvirostra avosetta* (breeding) 612
Avocet *Recurvirostra avosetta* (non-breeding) 617
Stone Curlew *Burhinus oedicnemus* 624
Ringed Plover *Charadrius hiaticula* (breeding) 630
Ringed Plover *Charadrius hiaticula* (non-breeding) 636
Dotterel *Charadrius morinellus* 643
Golden Plover *Pluvialis apricaria* (breeding) 648
Golden Plover *Pluvialis apricaria* (non-breeding) 656
Grey Plover *Pluvialis squatarola* 663
Lapwing *Vanellus vanellus* (non-breeding) 669
Knot *Calidris canutus* 677
Sanderling *Calidris alba* 684
Purple Sandpiper *Calidris maritima* 690
Dunlin *Calidris alpina schinzii* (breeding) 695
Dunlin *Calidris alpina alpina* (non-breeding) 702
Ruff *Philomachus pugnax* (breeding) 710
Ruff *Philomachus pugnax* (non-breeding) 715
Snipe *Gallinago gallinago* (non-breeding) 720
Black-tailed Godwit *Limosa limosa* (breeding) 726
Black-tailed Godwit *Limosa limosa islandica* (non-breeding) 732
Bar-tailed Godwit *Limosa lapponica* 738
Whimbrel *Numenius phaeopus* (breeding) 744
Whimbrel *Numenius phaeopus* (non-breeding) 750
Curlew *Numenius arquata* (breeding) 756
Curlew *Numenius arquata* (non-breeding) 765
Redshank *Tringa totanus* (breeding) 773
Redshank *Tringa totanus* (non-breeding) 779
Greenshank *Tringa nebularia* (breeding) 787
Greenshank *Tringa nebularia* (non-breeding) 792
Wood Sandpiper *Tringa glareola* (breeding) 797
Turnstone *Arenaria interpres* 802
Red-necked Phalarope *Phalaropus lobatus* 808
Arctic Skua *Stercorarius parasiticus* (breeding) 813
Great Skua *Catharacta skua* (breeding) 819
Mediterranean Gull *Larus melanocephalus* (breeding) 825
Mediterranean Gull *Larus melanocephalus* (non-breeding) 830

Little Gull *Hydrocoloeus minutus* (non-breeding) 833
Black-headed Gull *Larus ridibundus* (breeding) 838
Black-headed Gull *Larus ridibundus* (non-breeding) 844
Common Gull *Larus canus* (breeding) 848
Common Gull *Larus canus* (non-breeding) 854
Lesser Black-backed Gull *Larus fuscus* (breeding) 858
Lesser Black-backed Gull *Larus fuscus* (non-breeding) 863
Herring Gull *Larus argentatus* (breeding) 866
Herring Gull *Larus argentatus* (non-breeding) 872
Great Black-backed Gull *Larus marinus* (breeding) 875
Great Black-backed Gull *Larus marinus* (non-breeding) 880
Kittiwake *Rissa tridactyla* (breeding) 883
Sandwich Tern *Sterna sandvicensis* (breeding) 890
Sandwich Tern *Sterna sandvicensis* (passage) 896
Roseate Tern *Sterna dougallii* 901
Common Tern *Sterna hirundo* (breeding) 906
Common Tern *Sterna hirundo* (passage) 912
Arctic Tern *Sterna paradisaea* 917
Little Tern *Sterna albifrons* 923
Guillemot *Uria aalge albionis* 929
Guillemot *Uria aalge aalge* (breeding) 935
Razorbill *Alca torda* (breeding) 943
Puffin *Fratercula arctica* (breeding) 949
Short-eared Owl *Asio flammeus* (breeding) 956
Nightjar *Caprimulgus europaeus* 963
Kingfisher *Alcedo atthis* (breeding) 970
Kingfisher *Alcedo atthis* (non-breeding) 973
Woodlark *Lullula arborea* 976
Fair Isle Wren *Troglodytes troglodytes fridariensis* 982
Ring Ouzel *Turdus torquatus* 987
Aquatic Warbler *Acrocephalus paludicola* (passage) 991
Dartford Warbler *Sylvia undata* 997
Red-backed Shrike *Lanius collurio* 1002
Chough *Pyrrhocorax pyrrhocorax* (breeding) 1005
Chough *Pyrrhocorax pyrrhocorax* (non-breeding) 1014
Twite *Carduelis flavirostris* (breeding) 1023
Scottish Crossbill *Loxia scotica* 1028

Appendix 10. Summary table of key information drawn from species accounts 1035

Appendix 11 An assessment of the use of cropped habitats by bird species represented in the UK Special Protection Area Network..... 1042

Appendix [11.]1. Species review pro-forma: an example using the Greenland White-fronted Goose (*Anser albifrons flavirostris*) 1061

Appendix [11.]2. Summary of the CHIP species reviews 1068

Appendix [11.]3 References 1082

Executive Summary

Background

1. The third Review of the United Kingdom's network of Special Protection Areas (SPAs) classified under the EU Birds Directive comprises three parts (Phases). This report summarises the outcomes of Phase 1 – a gap analysis. It builds on the previous network assessments published by the Nature Conservancy Council (NCC) in 1989 and by the Joint Nature Conservation Committee (JNCC) in 2001, and places its findings in the wider context of supporting policies and activity to deliver the objectives of Article 4 of the EU Directive on the conservation of wild birds (2009/147/EC; the Birds Directive).

2. **Phase 1** of the Review

This report is structured as follows:

- **Chapter 1** introduces the Birds Directive and gives a historical perspective on its transposition and implementation in the UK, with particular emphasis on Article 4.
- **Chapter 2** summarises the development of the SPA network since the second Review published in 2001, especially with respect to new (or extended) SPA classifications and the work of the UK SPA and Ramsar Scientific Working Group (SPAR SWG; Appendix 1).
- **Chapter 3** presents the approach adopted by this third Review and explains how this relates to supporting activities.
- **Chapters 4 and 5** detail the methods adopted by the Review. Chapter 5 presents an innovative method used to assess the sufficiency of population provision for individual bird species.
- **Chapter 6** presents the SPAR SWG's advice to governments in the UK relating to the future development of the SPA network *i.e.* identifies potential gaps in meeting the responsibilities of the Birds Directive, especially to ensure it remains resilient to the environmental consequences of climate change.
- **Appendices 1 to 10** present supporting data and information.

3. **Phase 2** of the Review will include:

- whether new SPAs should be considered in the light of recommendations from the first Phase of the Review, and if so, their possible location and extent;
- similarly, whether existing SPAs should be extended either in spatial extent or through the addition of further qualifying species; and
- the establishment of a timetable to implement the findings of Phases 1 and 2 of the Review.

The timing of Phase 2 will be determined by each country within the UK but the aim will be to conclude this Phase as soon as possible. Some aspects are occurring in parallel with Phase 1. [Appendix 2]

4. **Phase 3** will comprise:

- for existing SPAs and following consultation and other statutory processes, revision of citations (as appropriate and necessary) by individual country agencies at those sites where qualifying species have been changed;
- consulting upon and classifying boundary amendments to existing SPAs;
- consulting upon and the classification of new SPAs as relevant; and
- revision by JNCC of relevant documentation summarising the extent of SPA suites for those species where further additions to species' suites have occurred consequent upon decisions made in the second phase.

The timing of **Phase 3** will also be determined by each country, but is anticipated, resources permitting, to be completed within a year from the conclusion of decisions taken in Phase 2. [Appendix 2]

5. **Appendix 9** comprises 151 detailed accounts for those Annex 1 and migratory species for which SPAs have either already been classified in the UK, or which have been the subject of detailed assessment by this Review. These present information (where available) on the status of species at individual SPAs alongside comparable data from the 1990s.

Geographical scope

6. The scope of the Review, as previously, is limited to the terrestrial and coastal environments of the UK. It excludes areas that are offshore and which are subject to other assessment processes. However species totals from the UK's three classified marine SPAs (as at 2015) have been included in the relevant species accounts. Assessments of sufficiency should be taken as applying to the geographical area covered by this Review only. Many seabird or seaduck species occur both in inshore/coastal areas and more widely offshore: coherent SPA provision for these species will need to integrate species requirements throughout the inshore and offshore marine areas used. [Sections 3.4 & 5.6]

Methods of assessment

7. The starting point for the audit of the SPA network and assessments of sufficiency were, for each species and/or population, the SPA suites agreed and published by JNCC's second SPA network Review. Although many of the relevant classifications have yet to occur, it is envisaged that these will occur in the next stages of this third Review, since their implementation is integral to the sufficiency conclusions reached. The third Review audits the state of the UK SPA network from that baseline after more than a decade of biological change, additional classifications and, for some species, substantial change in our understanding of the species' status. Statistical information on the extent of population coverage of each species' SPA suite in the 2000s is given in Appendix 5, alongside equivalent assessments from the 1990s. Changes at the individual site scale are considered in the context of wider national and international population changes for the species concerned.

8. In the light of the findings of the European Court of Justice (case C-418/04 Commission v Ireland), the Review has considered the need for SPA provision for the following regularly occurring Annex I species for which there are currently no UK SPAs: Spoonbill, Common Crane, Smew, White-tailed Eagle, Montagu's Harrier, Kingfisher and Red-backed Shrike. [Section 5.5 and Appendix 9]

Monitoring

9. Good progress has been made with respect to species for which the second Review had identified SPA suite insufficiencies. However, it remains the case that there are no reliable methods for monitoring and therefore almost no useable monitoring data for some non-breeding raptors. The current status of non-breeding Merlin and Hen Harrier on SPAs classified for these species remains unknown. [Section 6.2 and Appendix 9]

10. Contemporary assessments of species' populations are not available for all sites, and for a few species they are lacking completely. The species accounts in Appendix 9 consider issues of data deficiency and make recommendations for future monitoring. Key issues include:

    - that appropriate monitoring regimes are in place for all relevant species and sites;
    - that count data can be matched against site boundary information; and
    - that national surveys routinely supply not only national population estimates but also relevant site assessments. [Section 4.3]

11. The results of a review of the use of cropped habitats (as defined in section 5.4) by 43 species emphasised that each shows distinct patterns of use of cropped habitats, either solely or in combination with other habitats. Accordingly, the issue of SPA classification for birds using cropped habitats needs to be considered on a species by species basis rather than by adopting a general policy. Such a species-related approach has been adopted in this Review. [Section 5.4 and species accounts].

SPAR SWG advice to governments

12. In the context of the requirement that the SPA and Ramsar Scientific Working Group (SPAR SWG) (Appendix 1) should assist "...government to meet the scientific and technical requirements of the Birds Directive", and in the light of outcomes from Phase 1 of this Review, the Group provides UK governments with the following scientific advice:

    12.1 On the basis of the assessment methodology established by this Review (section 5), the SPA suites for 64 species/populations[1] are judged to be sufficient to meet the requirements of Article 4 of the Birds Directive.

    12.2 Using the same methodology, the SPA suites for 87 species/populations are considered to be insufficient to meet the requirements of Article 4 of the Birds Directive. These relate to 38 breeding species and 49 non-breeding species. These insufficiencies should be addressed through Phase 2 of this Review. [Section 6.1]

    12.3 Additionally, the SWG advises that reviews of the management and/or monitoring of relevant SPAs should be undertaken for 19 species by the relevant country agencies to address causes of declines of these species at these sites. [Section 6.1]

    12.4 Reviews of the boundaries of some or all of the SPAs for 17 species are needed to ensure sites adequately provide for the species' ecological functions. [Section 6.1]

    12.5 A separate assessment and review of SPA provision in both the inshore and offshore marine environment should be considered for at least 49 species. [Section 3.4]

    12.6 The Review would not have been possible without the data and information coming from a wide range of national and local bird surveillance and monitoring schemes, many co-funded by JNCC or the statutory nature conservation agencies. Future Reviews will not be possible without such data, and it is critical to at least maintain existing monitoring coverage. [Sections 6.4 & 6.5]

    12.7 The second Review (2001) drew attention to the lack of information on the status of non-breeding Merlin and Hen Harrier and the SPAs which have been classified for them. Fifteen years on, there are no further available data for these species, and the SWG highlights that this issue should be addressed as a priority. [Section 6.5]

    12.8 Specific advice in respect of future survey and monitoring needs is given in relevant species accounts [Appendix 9]

    12.9 The SPAR SWG draws attention to the identified need for additional conservation measures under Article 3(2)(b)-(d) of the Directive to be considered outwith the scope of this third network Review. [Section 5.3.2]

    12.10 Advice regarding SPA provision with respect to cropped habitats is given for 43 species. [Appendix 8]

[1] The term 'species' as used throughout this report includes those relevant biogeographical populations subject to separate evaluation and reporting (as for example for many geese).

12.11 There is need for a process to implement these recommendations during Stages 2 and 3 of this network Review.

12.12 There have been significant changes across the network in the decade since the second network Review and the extent of change is likely to continue not least due to the increasing impacts of climate change. There would be significant benefit in aligning future reviews of the SPA network with the six-yearly cycle of reporting required by Article 12 of the Birds Directive, noting that such an audit is required by that process anyway. [Section 6.6]

12.13 We consider the SPAR SWG has served a valuable function in its provision of advice to government on the wide-range of scientific and technical issues supporting the development of the UK SPA network and summarised in this report. It has also aided the development of common positions across multiple stakeholders. Its further work will be helpful in relation to many of the issues summarised in this Review. [Sections 2.1 & 6.6]

1. Historical perspectives

1.1 The EU Birds Directive

The Council Directive on the Conservation of Wild Birds is a wide-ranging European Directive addressing all aspects of bird conservation that provides a framework for the conservation and management of, and human interactions with, wild birds in Europe (Temple-Lang 1982; Donald *et al.* 2007; Evans 2012; Sanderson *et al.* 2015). It is the means by which the European Union (EU) meets its obligations for bird species under the Council of Europe's Convention on the conservation of European wildlife and natural habitats as well as being one of the principal means of delivering the objectives of the EU Biodiversity Strategy (European Commission 2011).

The Birds Directive was adopted on 2 April 1979 (as 79/409/EEC) with a two year deadline for implementation. Since its adoption, the suite of species listed in its Annexes has been expanded during the successive accession of new EU Member States, whilst the Habitats and Species Directive (HSD) brought the detail of the Birds Directive's requirements for the management of Special Protection Areas (SPAs) into line with those for Special Areas of Conservation (SAC). In 2009, a consolidated Birds Directive (2009/147/EC[2]) replaced the 1979 Directive.

For several central elements of the Directive, such as the establishment of a national network of SPAs under Article 4, the Directive provides either very limited or no guidance on the associated processes (such as selection criteria, or tests for network sufficiency). This is in contrast to the procedures detailed under the HSD for similar processes, and is one reason why, over three decades since it was adopted, aspects of the Directive's implementation remain incomplete.

The over-arching objective of the Directive is given by Article 2 which requires that *"Member States shall take the requisite measures to maintain the population of the species referred to in Article 1 at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level."*

The focus of this Review is Article 4 of the Birds Directive. Articles 4.1 and 4.2 require that species listed in Annex I, and regularly occurring migrants, should be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution. The Directive states that *"Member States shall classify in particular the most suitable territories in number and size as Special Protection Areas (SPA)"*.

With the adoption of the Habitats and Species Directive in 1992, SPAs were conceptually and legally brought, together with Special Areas of Conservation, into the over-arching Natura 2000 European network of protected areas (Romão *et al.* 2012; Evans 2012).

1.2 Special Protection Areas and previous reviews

For the last three decades, the requirements of the Birds Directive have been a major driver in UK bird conservation action. In particular, the programme of SPA identification and classification has evolved since the Birds Directive first came into force, with the progressive development of processes and procedures related to the identification of sites, their classification and subsequent management.

[2] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF

An initial assessment of the SPA network in Great Britain was published by the Nature Conservancy Council (Stroud *et al.* 1990). This was followed by an All-Ireland Review of SPAs (undertaken by JNCC, contracted jointly by the Irish National Parks and Wildlife Service and the Department of the Environment (Northern Ireland) (Way *et al.* 1993). Detailed descriptions of the species content of classified or proposed SPAs were published by the statutory agencies and Royal Society for the Protection of Birds (RSPB) in the inventory of *Important Bird Areas in the United Kingdom* (Pritchard *et al.* 1992).

These reviews recognised the limitation of information concerning birds at some possible SPAs, especially in upland (and some woodland) areas. Marine areas were not addressed at all, both because of the absence of survey information and because of the then lack of domestic legislative mechanisms for offshore SPA classification in the UK.

In 1993, the Department of the Environment[3] commissioned a 'definitive' review of the network. Intensive work was undertaken by JNCC and the country agencies[4], and following several discussions by the Joint Committee[5], led in 1999 to the JNCC's agreement of a formal approach to SPA selection, the guidelines for which were published (JNCC 1999). Following endorsement by Ministers, the final outcome of the second network Review was published in 2001 (Stroud *et al.* 2001).

The second Review was based on the best-available, most-recent data for sites and populations, (which were mostly from the first half of the 1990s) (Stroud *et al.* 2001). The Review was submitted to the European Commission by the Department for Environment, Transport and the Regions in July 2001 and published two months later. This second Review represented a major step for the UK in meeting the requirements of the Birds Directive.

The Review was innovative for being one of the first species-orientated assessments of a national SPA network undertaken by any Member State, following the pioneering assessment of Denmark's SPA network (Rasmussen 1999). It identified 'suites' of sites, selected for individual species[6], to fulfil the requirements of Article 4 of the Birds Directive. Collectively, these species' suites form the UK SPA network.

It also provided explicit justification of the reasons why no SPAs were selected for a number of species which were migratory yet common and widespread.

Additionally, the Review also identified a number of areas where further work was required to complete the SPA network in the UK. Several groupings of bird species were identified where SPA provision remained incomplete for a range of reasons, typically lack of data. These included:

- Species which had recently colonised the UK (such as Little Egret[7]);
- re-establishing and re-introduced raptors (such as Osprey, White-tailed Eagle and Red Kite);
- non-breeding gulls;
- non-breeding raptors especially in coastal areas;

[3] Now the Department for Environment, Food and Rural Affairs - DEFRA

[4] Currently Natural England, Natural Resources Wales, the Northern Ireland Environment Agency and Scottish Natural Heritage

[5] JNCC 97 P37, JNCC 98 N14, JNCC 99 P37 and JNCC 99 P21

[6] Throughout this report, use of the taxonomic unit 'species' is taken to include relevant races and/or populations unless otherwise stated.

[7] Taxonomy and nomenclature follows the British Ornithologist's Union's British List (as at 24 February 2015); Latin names are given in Appendices 7b and 9.

- passage waders and terns; and
- birds in the marine environment.

The second network Review has, since its publication, guided ornithological assessments (*e.g.* Pearce-Higgins *et al.* 2011; Cook *et al.* 2013), the setting of conservation objectives, and decision-making with respect to development control on the sites concerned.

Following its publication in 2001, the Department of Environment, Food and Rural Affairs (Defra) considered the means by which the further work identified above would be addressed. This led to the establishment of the UK Special Protection Areas and Ramsar Scientific Working Group (SPAR SWG: Appendix 1), whose role was to gather and assess the scientific evidence required to complete this process.

The need for the present network Review was identified in *The Framework for future updates of the UK SPA network* agreed by SPAR SWG at this time. In 2009, Ministerial approval was given for this Review's Terms of Reference of a review of the UK SPA Network (Appendix 2).

1.3 Implementation of Articles 4.1 and 4.2 in the UK

The requirements of the Birds Directive are transposed into UK legislation through a range of primary and secondary legislation. Table 1.1 summarises the main implementing legislation.

Table 1.1. Main legislation within the UK implementing the Birds Directive.

Legislation	Scotland	Wales	England	Northern Ireland	Offshore
Primarily terrestrial					
Wildlife & Countryside Act 1981 (as amended)	✓	✓	✓		
Wildlife (Northern Ireland) Order 1985				✓	
Nature Conservation and Amenity Lands (Northern Ireland) Order 1985				✓	
Conservation (Natural Habitats, &c.) Regulations 1994	✓	✓	✓		
The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995				✓	
Countryside and Rights of Way Act 2000		✓	✓		
Environment (Northern Ireland) Order 2002				✓	
Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004	✓				
Nature Conservation (Scotland) Act 2004	✓				
Natural Environment and Rural Communities Act 2006		✓	✓		
The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007	✓	✓	✓		
Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2007				✓	

Legislation	Scotland	Wales	England	Northern Ireland	Offshore
Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007	✓				
Conservation (Natural Habitats &c.) Amendment (No. 2) (Scotland) Regulations 2007	✓				
Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2008	✓				
Conservation (Natural Habitats &c.) Amendment (No. 2) (Scotland) Regulations 2008	✓				
The Conservation of Habitats and Species Regulations 2010	✓	✓	✓		
Conservation (Natural Habitats, &c.) Regulations 2010 (as amended)	✓	✓	✓		
Wildlife & Natural Environment (Scotland) Act 2010	✓				
Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2011	✓				
Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2011				✓	
The Conservation of Habitats and Species (Amendment) Regulations 2011		✓	✓		
Wildlife and Natural Environment Act (Northern Ireland) 2011				✓	
Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2012	✓				
Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland) 2012				✓	
Primarily marine					
Conservation (Natural Habitats, &c.) (Northern Ireland) Regulations 1995 (as amended)				✓	
Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001					✓
Offshore Petroleum Activities (Conservation of Habitats) (Amendment) Regulations 2007					✓
Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007	✓	✓	✓		✓
Marine and Coastal Access Act 2009		✓	✓		
Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010	✓				✓
Marine (Scotland) Act 2010	✓				
Conservation of Habitats and Species (Amendment) Regulations 2012	✓	✓	✓		
Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2012	✓	✓	✓		✓
Marine Act (Northern Ireland) 2013				✓	

A wide range of statutory policies and other activities by the UK government, the devolved administrations and their agencies also support the implementation of the Birds Directive. These have been outlined in the UK's triennial national reports to the European Commission under Article 12 related to Birds Directive implementation[8].

1.4 The UK SPA network

Summary statistics for the UK SPA network are presented in Table 1.2, whilst Figures 1.1 and 1.2 show its distribution and extent respectively.

Table 1.2. Summary of the number and extent of SPAs in the UK (as at 28 January 2016)[9].

	Classified SPAs		**Potential SPAs[v,vi]**	
Country	Number of sites[i]	Site area (ha)[ii, iii]	Number. pSPA extensions	Number new pSPAs
England	80	674,911	4	4
England/Scotland	1	43,710	0	0
England/Wales	3	209,192	0	0
England/Offshore	1	379,824	1	0
Northern Ireland	16	113,988	1	1
Scotland	152	1,205,368	0	0
Wales	17	172,345	0	2
Wales/Offshore	0	0	1	0
United Kingdom[iv]	**270**	**2,799,337**	**7**	**7**

Notes

i. These statistics exclude 12 listed sites that have been subsumed into larger sites since their original classification. These sites (totalling 14,530 hectares) are however retained in lists of SPAs maintained by the EU because they have never been formally declassified.

ii. These figures have been calculated to allow for overlapping SPAs such as those sites within the Cairngorms Massif in Scotland. There may therefore be slight discrepancies between these and the equivalent figures from previous estimates which were calculated from the SPA data forms.

iii. Note that site area figures for each country relate to both the terrestrial and inshore domain.

iv. Figures exclude two SPAs classified in the UK Territory of Gibraltar.

v. Potential Special Protection Areas are sites on which Government has initiated public consultation on the scientific case for designation as a Special Protection Area (Department for Communities and Local Government 2012).

vi. Potential SPAs as at February 2016 are:

England: Dungeness, Romney Marsh and Rye Bay pSPA; Falmouth Bay to St Austell Bay pSPA; Flamborough & Filey Coast SPA extension; Hamford Water SPA extension; Northumberland Marine pSPA; Solent & Dorset Coast pSPA; Morecambe Bay & Duddon Estuary SPA extension; Poole Harbour SPA extension

[8] http://jncc.Defra.gov.uk/default.aspx?page=6526

[9] See updates at http://jncc.defra.gov.uk/page-1399

England/Offshore: Outer Thames Estuary SPA extension

Northern Ireland: Carlingford Lough SPA extension; East Coast (Northern Ireland) Marine pSPA

Wales: Northern Cardigan Bay/Gogledd Bae Ceredigion pSPA; Anglesey Terns/ Morwenoliaid Ynys Môn pSPA

Wales/Offshore: Skomer, Skokholm and the seas off Pembrokeshire/Sgomer, Sgogwm a moroedd Benfro pSPA

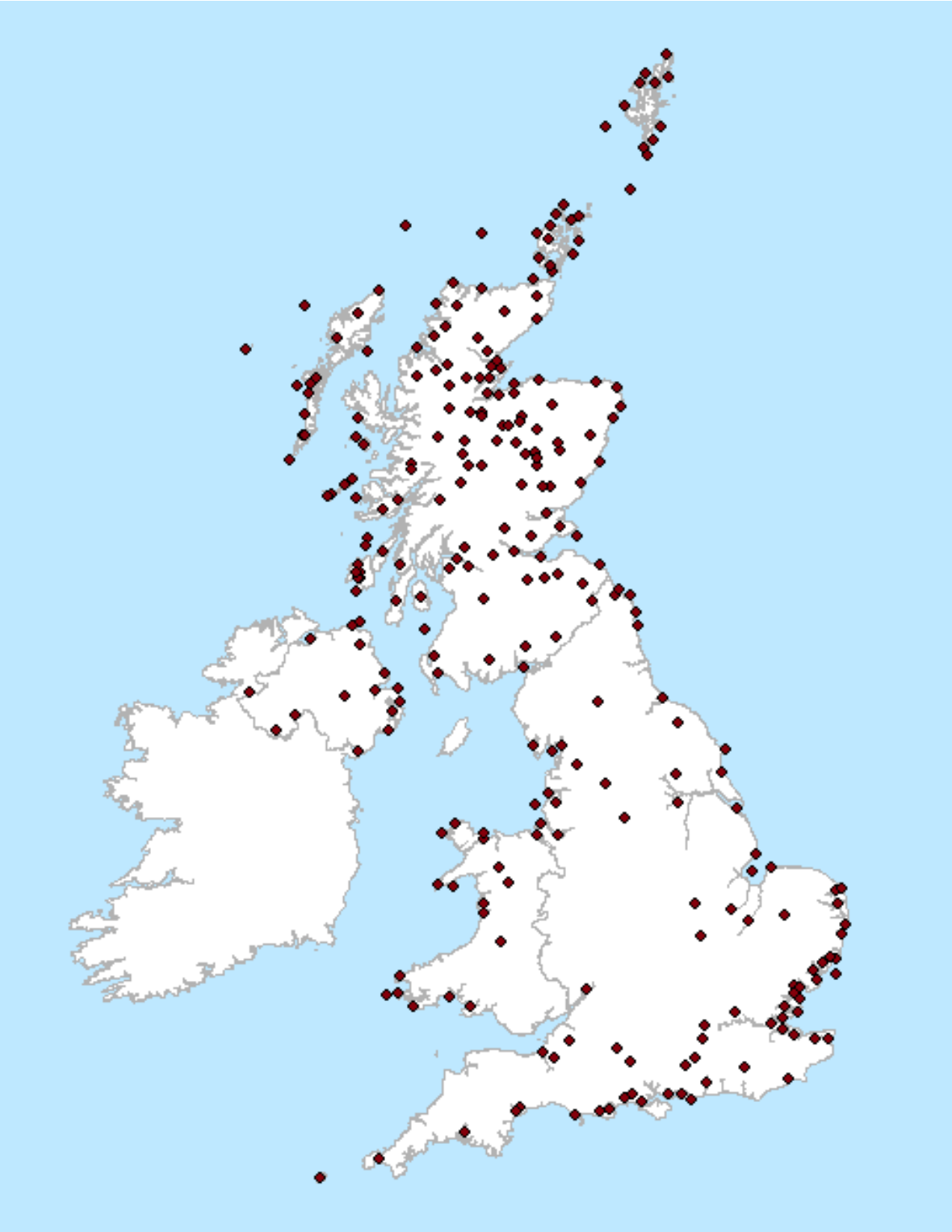

Figure 1.1. Map showing the distribution of Special Protection Areas in the UK, as at 31 March 2016.

Figure 1.2. Map showing the extent of Special Protection Areas in the UK, as at 31 March 2016.

2. The development of the SPA network since 2001

2.1 The UK SPA and Ramsar Scientific Working Group

In November 2001, DEFRA established the SPA and Ramsar Scientific Working Group[10] (SPAR SWG). Its role is to aid government administrations and their statutory agencies to develop scientific and technical issues regarding the SPA network in both the terrestrial and marine environments. Particular attention has been given to those groups of species which the second network Review reported as incompletely addressed (section 1.2 above). Its remit is also to assist in promoting the coherent management of the network and better site monitoring.

The Group's Terms of Reference (Appendix 1), together with an initial framework for discussions, were formalised in 2001 and revised in March 2004. JNCC provides the SPAR SWG Secretariat and hosts the Groups' web-page (http://jncc.DEFRA.gov.uk/page-1770), which holds briefings, minutes of meetings, as well as annual reports summarising the Group's work.

The membership of the SPAR SWG is drawn from UK Government, devolved administrations and their statutory conservation agencies, the voluntary conservation sector and other stakeholder groups (such as land-owners and managers, the water industry, marine and business sectors). A list of organisations represented on the Group is given in Appendix 3. The inclusive membership was intentionally drawn from a wide range of stakeholders to ensure transparency with regard to the scientific advice provided to governments on matters related to the development of the SPA network.

The SPAR SWG is one of several groups that consider the development and management of the UK's Natura 2000 network. Others include the:

- UK Natura 2000 & Ramsar Steering Committee (N2KSC);
- UK Marine Biodiversity Policy Steering Group (MBPSG);
- Marine Protected Areas Technical Group; and
- UK Natura 2000 & Ramsar Forum.

The Group has met on average three times a year since its initiation and has reported either annually or biennially to the N2KSC and to the MBPSG. It has served a very useful function to provide advice to government on the wide-range of scientific and technical issues supporting the development of the UK SPA network and summarised in this report, and in aiding the development of common positions across multiple stakeholders. There is also dialogue *ad hoc* between Defra, the devolved administrations, the statutory nature conservation agencies and non-government conservation organisations.

We consider that further work by SPAR SWG will be helpful in relation to progressing many of the issues summarised in this Review and providing relevant scientific and technical advice to government, so contributing to the future development of the SPA network (see also section 6.6).

[10] JNCC 03 D10 http://jncc.DEFRA.gov.uk/PDF/comm03D10.pdf

2.2 SPA classification progress since the second network Review

Government administrations and their country agencies have undertaken significant activity to further develop the SPA network since the publication of the second Review, including:

- Across England, Scotland, Wales and Northern Ireland, work to define boundaries and complete the classification of some of the proposed SPAs identified by the second Review.
- In Scotland, following discussions between the Scottish Government, SNH and RSPB, the identification and classification of further SPAs (not identified in the second Review), notably for Golden Eagle, Hen Harrier , Chough and Capercaillie.
- In Scotland and Wales, following JNCC research to support boundary justification, the extension of boundaries of terrestrial SPAs for breeding seabirds to include adjacent coastal waters of importance. In England, work has started to progress similar boundary extensions.
- In Northern Ireland, the identification and classification of SPAs for Hen Harrier and Merlin.
- Around the UK, survey work to identify and support scientific cases for the classification of marine SPAs, including in offshore areas.

2.2.1 SPA classifications and extensions since 2001

The work outlined above has led to many additions and changes to the SPA network since 2001. This section presents current information on network extent.

Details of SPAs that have been classified or extended since 2001 are provided in Table 2.1. Some sites have also been formally reclassified in order to update cartographic or other information. These sites have been included in this Review (see section 5.5).

Details of all current SPA classifications are at http://www.jncc.gov.uk/page-3517.

Suites of SPAs have been defined for 68 breeding species/populations[11] and 62 non-breeding species/populations as at 2015 (Appendix 5).

Table 2.1. SPAs classified or extended since the second Review.

Site name	Country	Date first classified	Extension date	Change since 2001
Ailsa Craig	Scotland	25/4/1990	9/10/2009	Extended
Anagach Woods	Scotland	16/3/2006		Classified
Antrim Hills	Northern Ireland	31/3/2006		Classified
Arran Moors	Scotland	7/3/2003		Classified
Bae Caerfyrddin/ Carmarthen Bay	Wales	10/6/2003		Classified
Belfast Lough Open Water	Northern Ireland	29/9/2009		Classified
Breckland	England	21/9/2006		Classified
Buchan Ness to Collieston Coast	Scotland	30/3/1998	9/10/2009	Extended
Cairngorms	Scotland	25/9/1997	7/3/2005	Extended
Cairngorms Massif	Scotland	1/10/2010	7/2/2011	Classified

[11] The term 'species' as used throughout this report includes those relevant biogeographical populations subject to separate evaluation and reporting (as for many geese, for example).

Site name	Country	Date first classified	Extension date	Change since 2001
Calf of Eday	Scotland	29/6/1998	9/10/2009	Extended
Canna and Sanday	Scotland	20/2/1998	7/2/2011	Extended
Cape Wrath	Scotland	15/3/1996	9/10/2009	Extended
Cnuic agus Cladach Mhuile	Scotland	20/12/2002		Classified
Copeland Islands	Northern Ireland	29/9/2009		Classified
Copinsay	Scotland	29/3/1994	9/10/2009	Extended
Craig yr Aderyn (Bird`s Rock)	Wales	29/6/2001	24/11/2008 cc	vs
Craigmore Wood	Scotland	30/10/2001		Classified
Cuillins	Scotland	20/12/2002		Classified
Darnaway and Lethen Forest	Scotland	21/4/2005		Classified
Dyfi Estuary / Aber Dyfi	Wales	29/6/2001	24/11/2008 cc	Updated base map
East Caithness Cliffs	Scotland	27/3/1996	9/10/2009	Extended
Fair Isle	Scotland	16/12/1994	7/2/2011	Extended
Fetlar	Scotland	29/3/1994	9/10/2009	Extended
Firth of Forth	Scotland	30/10/2001		Extended
Flannan Isles	Scotland	31/8/1992	9/10/2009	Extended
Foinaven	Scotland	1/10/2010	7/2/2011	Classified
Forest of Clunie	Scotland	13/8/2001		Classified
Forth Islands	Scotland	25/4/1990	9/10/2009	Extended
Foula	Scotland	27/11/1995	9/10/2009	Extended
Fowlsheugh	Scotland	31/8/1992	9/10/2009	Extended
Glannau Ynys Gybi/ Holy Island Coast	Wales	10/6/1992	29/5/2002	Extended
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island	Wales	10/6/1992	10/2014	Extended
Glen Affric to Strathconon	Scotland	1/10/2010	7/2/2011	Classified
Glen App and Galloway Moors	Scotland	7/3/2003		Classified
Glen Etive and Glen Fyne	Scotland	1/10/2010	7/2/2011	Classified
Grassholm	Wales	31/01/1986	10/2014	Extended
Gruinart Flats, Islay	Scotland	14/7/1988	1/9/2006	Extended
Handa	Scotland	25/4/1990	7/2/2011	Extended
Hermaness, Saxa Vord & Valla Field	Scotland	29/3/1994	7/2/2011	Extended
Hoy	Scotland	7/12/2000	9/10/2009	Extended
Humber Estuary (formerly Humber Flats, Marshes & Coast Part 1 SPA & Humber Flats, Marshes & Coast Part 2 pSPA)	England	31/8/2007	31/8/2007	Classified
Imperial Dock Lock, Leith	Scotland	23/9/2004		Classified
Isles of Scilly	England	10/8/2001		Classified
Jura, Scarba and the Garvellachs	Scotland	1/10/2010	7/2/2011	Classified
Killough Bay	Northern Ireland	23/3/2003		Classified
Knapdale Lochs	Scotland	30/10/2001		Classified
Langholm – Newcastleton Hills	Scotland	31/12/2001		Classified
Liverpool Bay / Bae Lerpwl	England/Wales	20/8/2011		Classified
Marazion Marsh	England	10/8/2001		Classified
Marwick Head	Scotland	16/12/1994	9/10/2009	Extended

Site name	Country	Date first classified	Extension date	Change since 2001
Mersey Estuary	England	20/12/1995	23/6/2004	Extended
Mersey Narrows and North Wirral Foreshore	England	7/2013		Classified
Migneint–Arenig–Dduallt	Wales	26/3/2003	New entry 17/3/2004	Classified
Mingulay and Berneray	Scotland	16/12/1994	9/10/2009	Extended
Moidart and Ardgour	Scotland	1/10/2010	7/2/2011	Classified
Morangie Forest	Scotland	30/10/2001		Classified
Muirkirk and North Lowther Uplands	Scotland	7/3/2003		Classified
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal	Wales	10/6/2003	17/3/2004 cc	vs
North Caithness Cliffs	Scotland	16/8/1996	9/10/2009	Extended
North Colonsay and Western Cliffs	Scotland	24/3/1997	7/2/2011	Extended
North Pennine Moors	England	9/2/2001		Classified
North Rona and Sula Sgeir	Scotland	30/10/2001	9/10/2009	Classified
Noss	Scotland	16/8/1996	9/10/2009	Extended
Novar	Scotland	7/3/2005		Classified
Orkney Mainland Moors	Scotland	13/10/2000	1/7/2008	Extended
Oronsay and South Colonsay	Scotland	1/12/2007		Classified
Otterswick and Graveland	Scotland	31/12/2001		Classified
Outer Ards	Northern Ireland	11/12/2002		Classified
Outer Thames Estuary	England/Offshore	9/8/2010	7/2/2011	Classified
Porton Down	England	3/7/1992	3/12/2007	Extended
Renfrewshire Heights	Scotland	1/12/2007		Classified
Ribble and Alt Estuaries	England	16/2/1995	28/11/2002	Extended
Rousay	Scotland	2/2/2000	9/10/2009	Extended
Rum	Scotland	31/8/1982	9/10/2009	Extended
Sandlings	England	10/8/2001		Classified
Skokholm and Skomer	Wales	31/8/1982	10/2014	Extended
Slamannan Plateau	Scotland	1/10/2008	5/8/2009	Classified
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands & Coast)	Scotland	30/10/2001		Classified
Slieve Beagh – Mullaghfad – Lisnaskea	Northern Ireland	28/3/2006		Classified
St Abb`s Head to Fast Castle	Scotland	11/8/1997	9/10/2009	Extended
St Kilda	Scotland	31/8/1992	9/10/2009	Extended
Stour and Orwell Estuaries	England	13/7/1994	19/5/2005	Extended
Strath Carnaig and Strath Fleet Moors	Scotland	1/7/2008		Classified
Sule Skerry and Sule Stack	Scotland	29/3/1994	7/2/2011	Extended
Sumburgh Head	Scotland	27/3/1996	9/10/2009	Extended
Thames Basin Heaths	England	9/3/2005		Extended
The Oa	Scotland	2/4/2007		Classified
The Shiant Isles	Scotland	31/8/1992	7/2/2011	Extended
Troup, Pennan and Lion`s Heads	Scotland	14/3/1997	7/2/2011	Extended
Upper Nene Valley Gravel Pits	England	1/4/2011		Classified
West Inverness-shire Lochs	Scotland	1/10/2009		Classified
West Westray	Scotland	16/8/1996	9/10/2009	Extended

Site name	Country	Date first classified	Extension date	Change since 2001
Ynys Feurig, Cemlyn Bay and The Skerries	Wales	10/6/1992	cc	vs
Ynys Seiriol / Puffin Island	Wales	1/2/2002		vs
The Dee Estuary	Wales/England	17/7/1985	10/12/2009	Extended

Notes

cc = Cartographic change to updated map

vs = Updated vulnerability statement and base map

At the time of the second Review, boundaries for many of the (then) proposed SPAs had still to be definitively established, and accordingly the assessments of the numbers of each of the qualifying species at these sites were provisional. The formal classification of these sites required definitive estimates of numbers of each qualifying species to be established. This has resulted in the revision of the second Review SPA suite totals for the species concerned. For some species these changes were trivial, for others they were more significant.

The revised totals for relevant SPA species suites are given in Table 2.2.

Table 2.2. Revised 1990s population totals for SPA suites following finalisation of SPA boundaries proposed at the time of the second Review. Units are pairs other than for Capercaillie (lekking males).

Species	Season	SPA suite total reported by 2001 Review	Post-classification definitive 1990s SPA suite totals
Red-throated Diver	Breeding	395 (42.2% GB)	397 (42.5% GB)
Hen Harrier	Breeding	229 (47.4% GB)	201 (41.6% GB)
Golden Eagle	Breeding	60 (15.0% GB)	62 (15.5%)
Osprey	Breeding	39 (39.4% GB)	38 (38.4% GB)
Merlin	Breeding	426 (32.8% GB)	425 (32.7% GB)
Peregrine	Breeding	112 (9.6% GB)	100 (8.6% GB)
Capercaillie	Breeding	364 (16.5% GB)	369 (16.8% GB)
Oystercatcher	Breeding	1,367 (4.1% GB)	1,358 (4.1% GB)
Stone Curlew	Breeding	184 (97.9% GB)	157 (83.5% GB)
Ringed Plover	Breeding	1,102 (13.0% GB)	1,038 (12.2% GB)
Golden Plover	Breeding	5,895 (26.1% GB)	5,874 (26.0% GB)
Dunlin	Breeding	6,812 (74.4% GB)	6,801 (74.3% GB)
Puffin	Breeding	460,761 ([100% GB])	461,661 ([100% GB])
Guillemot	Breeding	665,056 (94.5% GB)	671,121 (95.4% GB)
Razorbill	Breeding	75,357 (76.0% GB)	78,970 (79.6% GB)
Common Tern	Breeding	5,686 (46.2% GB)	5,801 (47.2% GB)
Little Tern	Breeding	1,616 (67.3% GB)	1,629 (67.9% GB)
Short-eared Owl	Breeding	131 (13.1% GB)	121 (12.1% GB)
Chough	Breeding	112 (32.9% GB)	122 (35.9% GB)

2.2.2 SPAR SWG decisions regarding site-related issues since 2001

The SPAR SWG's role in the development of the SPA network is to provide formal advice and recommendations on scientific issues related to SPAs to the Natura 2000 and Ramsar Steering Committee and latterly also to the Marine Biodiversity Policy Steering Group. This formal advice has been provided through Annual or Biennial Reports. The advice broadly falls into two categories; on the processes relating to the classification of sites and their boundaries, and on species' populations and their assessment.

The formal SPAR SWG advice and recommendations on the processes relating to the classification of sites and their boundaries is summarised below: the date of the report containing that advice is given in parentheses. All this advice has been acknowledged and adopted by the relevant Steering Group.

- That the SPA selection guidelines should continue to be used as a two stage process and not strict criteria. (2001)

- Several species of migratory waterbirds occur regularly during the non-breeding period in the UK, but in such small numbers that the benefit of protecting these populations through site designation would be negligible in an international context. However, some of these species, such as Smew, are listed in Annex I. To aid in identifying the 'most suitable' areas for both Annex I and migratory species, the 'minimum of 50' guidance was adopted for the SPA Review; that an area must hold on average 50 or more individuals to be considered for classification as an SPA. The guidance is now recognised as being inappropriate when the biogeographical population is small[12]. Individual cases will be reviewed to ensure appropriate application. (2001-2)

- Areas meeting **Stages 1.1 - 1.3** of the SPA Selection Guidelines should not automatically be classified as SPAs. Rather, Stage 2 judgements remain relevant for selection of the most suitable areas. The role of voluntary measures and network targets were highlighted as particular areas where additional consideration could be valuable. A mix of measures is implemented in the UK to meet the Birds Directive requirements in achieving desired conservation status of birds. (2004)

- In 2005, the SWG supported the **analytical techniques used for the waterbird aerial survey data** in the Greater Thames marine area, and agreed with the JNCC conclusion that this area supports a qualifying population of non-breeding Red-throated Divers and should be assessed further for SPA classification. The Outer Thames Estuary was classified in August 2010.

- **Lough Neagh.** In the light of waterfowl declines at Lough Neagh, the Department of the Environment, Northern Ireland (DoENI) commissioned an assessment of local ecological conditions and of the international context for the migratory species for which the Lough is classified. SPAR SWG concurred with the assessment that the condition of the Lough was favourable, and that the declines in some bird species were being driven by factors operating outside the local area. Evidence for re-distribution of birds to other areas within the flyway was inconclusive in 2007, largely due to low precision of population estimates at other sites, and national and flyway scales. Remedial action was not necessary given the good ecological status of the Lough and so it was unlikely that numbers of declining species would be recovered[13]. (2007)

- The European Court of Justice Case C-418/04 (EC Commission v Ireland) concluded that all Annex I species require assessment of whether or not 'most suitable areas' for classification exist, and found against Ireland, in that it had not been able to demonstrate robust special conservation measures for all its regularly-occurring Annex I species.

[12] http://jncc.DEFRA.gov.uk/pdf/sites_waterbirds.pdf

[13] Subsequent more detailed ecological research throws doubt on these conclusions. Evidence of redistribution has become more conclusive for Tufted Duck, whereas evidence also indicates that Pochard declines do not relate to redistribution (Tománková 2013, Tománková *et al.* 2013, 2014; Lehikoinen *et al*. 2013, Nagy *et al*. 2015).

This judgement has a bearing on the UK's network, in that there are regularly occurring Annex I species in the UK for which no SPAs have been selected for reasons outlined by the second Review[14]: Common Crane, Smew, Montagu's Harrier, White-tailed Eagle and Kingfisher. SPAR SWG advised that these species should be added to Phase 1 of the SPA Review. Since then, Red-backed Shrike[15] and Spoonbill[16] which have both bred in the UK on more than one occasion and have also been assessed. (2008-9)

2.2.3 SPAR SWG decisions regarding species-related issues since 2001

The 2001 Review also identified a number of issues related to species information. The SPAR SWG has progressed these issues and has also considered the significance of relevant new information published since 2001. Details of species considered, and conclusions reached, are listed below:

Twite[17]

- At the time of the second Review, no SPAs had been classified for Twite, as its migratory status had not been determined. The Group reviewed information on the species' movements and concluded that two biogeographical populations occur in the UK; a sedentary Scottish / Irish / Welsh population, and a migratory[18] English population. The Group agreed that the English biogeographical population should be assessed in accordance with the SPA selection guidelines. Twite has been assessed by Phase 1 of this Review. (2001-02)

Chough[19]

- **Non-breeding Chough**. Generic approaches to identifying the boundaries of suitable areas for non-breeding Chough were considered inappropriate given the understanding of the species' ecology. Therefore, a site-specific approach to boundary determination for any future SPA designated for non-breeding Chough was recommended. Boundaries should be based on the inclusion of suitable foraging habitat within an area under consideration known to be regularly used. (2001-2005)
- Groups of Chough may use a complex of sites throughout the year. Hence, composite sites which link key areas used by a group of birds may be the best approach for maintaining these populations. (2003)
- **Breeding Chough.** A generic approach to boundary determination for any future SPA designated for breeding Chough should be adopted. Boundaries should be based on the inclusion of all suitable foraging and nesting habitat occurring within a 1 km radius of a nesting location (the minimum core foraging area). If site-specific data show that areas beyond core areas are also used regularly, then these areas should also be considered for inclusion within the site. Oronsay and South Colonsay; The Oa, Islay; and Gruinart Flats, Islay were subsequently classified as additions to the SPA suite for Chough. (2005)

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[14] http://jncc.Defra.gov.uk/pdf/UKSPA/UKSPA-A6-106.pdf

[15] See recent status review by Davies & Lock (2016).

[16] Holling *et al.* (2015)

[17] http://jncc.Defra.gov.uk/pdf/twite.pdf

[18] As defined by the Convention on Migratory Species, i.e. species or populations that "...cyclically and predictably cross one or more national jurisdictional boundaries"

[19] http://www.jncc.gov.uk/pdf/chough.pdf

Ring Ouzel[20]

- **Biogeographical status**. The subspecies *Turdus torquatus torquatus* (found in the UK and Northwest Europe) should be regarded as a separate biogeographical population for the purpose of applying the UK SPA selection guidelines. (2001-02)
- **Biogeographical threshold population**. In 2004, the Group agreed that precision of the international population estimate for Ring Ouzel *T. t. torquatus* could not be improved based on existing data. The operational 1% biogeographical threshold for use in the UK should be 200 pairs (Appendix 4). Ring Ouzel has been assessed by Phase 1 of this Review.

Mute Swan

- Following publication of *Waterbird Population Estimates* 3, the treatment of biogeographical populations of Mute Swan was considered. The Group agreed that there was good evidence that the Mute Swan populations of Great Britain and Ireland were distinct and non-migratory. Accordingly the SPAR SWG recommended that the Mute Swan populations of Great Britain and Ireland should be treated as two separate biogeographical populations, both non-migratory. As a result there is no requirement to classify SPAs for this species. (2003)

Eider

- A study on Eiders using mitochondrial DNA analysis from Shetland, Argyll and north-west Europe revealed that Eiders from Shetland, the Faroes and southern Iceland form a closely related group, which should be recognised as a separate subspecies, *S. mollissima faeroeensis* (Furness *et al.* 2010). Eiders from northern Iceland were found to be a distinct subspecies *S. mollissima borealis*, with other populations in north-west Europe, including the rest of Scotland, belonging to the nominate subspecies *S. m. mollissima*. Further research is merited, including analyses from Orkney and a review of morphometric data and population estimates. .
- The **Northwest European Eider population** (*i.e.* the sum of the three *Somateria m. mollissima* populations in this region[21]) should, until more information becomes available, be used as the relevant biogeographical population for the UK, and this population be considered migratory. (2003)
- **Shetland Eider**. The SWG recommended the continued use of currently accepted population estimates for Eider for developing the UK SPA network. A short-term pragmatic approach, enabling consideration of Eider within the marine SPA programme, is that the currently accepted population estimates for Eider should be used for the UK SPA network, and that as part of the UK approach to any SPA provision for this species should consider greater representation in Shetland in recognition of the genetically-distinct population in these islands. (2008-09)

Little Egret

- The Little Egret population of the UK continues to increase in size and range at a rapid rate, with no signs of stabilising. Given the continued rapid rate of change in the species' status the Group agreed in 2003 that it would be difficult at present to apply the SPA guidelines to identify sites for the species. Recognising that the most-important breeding colonies are within existing SPAs and that these will receive a general level of protection despite the species not being a cited interest, the Group agreed to review the species in another four to six years and accordingly the species has been fully considered in the current Review. (2003)

[20] http://www.jncc.gov.uk/pdf/ring_ouzel.pdf & http://www.jncc.gov.uk/pdf/sparswg_ringouzel_update.pdf

[21] UK/Ireland (excluding Shetland and Orkney); Norway/Russia; and the Baltic

Goosander[22]

- **Goosander migratory status.** In 2004, evidence suggested that Goosander in the UK (breeding and wintering) should be considered migratory. Breeding Goosander has been assessed by Phase 1 of this Review.

Fulmar

- **Fulmar breeding colonies.** In 2004, the SWG endorsed a JNCC recommendation that SPAs should be extended 2 km into the marine environment in recognition of the need to protect waters used for maintenance behaviour. Extensions to relevant SPAs were made in 2009 (Table 2.2).

Manx Shearwater

- **SPA marine boundary extensions**. In 2005, the SWG endorsed a JNCC recommendation that boundary placement for marine extensions to provide protection for rafting Manx Shearwaters around breeding colony SPAs should be at a minimum generic distance of 4 km from shore. Where colony-specific data show use of marine waters beyond this generic distance, a greater extension distance should be considered and, in this respect, the data for Rum and Bardsey were adequate to derive specific boundaries. Extensions to relevant SPAs were made in 2009 in Scotland and 2014 in Wales (Table 2.2).

Spotted Crake[23]

- **Population size**. In 2002, in light of the 1999 national survey (Gilbert 2002) and new data, JNCC presented new information which indicated that the British population may be closed and appeared to be in rapid decline. (The comprehensive assessment was published as Stroud *et al.* 2012).
- In the course of undertaking this Review it was discovered that data used in the second Review for the Lower Derwent Valley was erroneous. Accordingly, relevant site and species totals have been corrected. See Spotted Crake species account in Appendix 9 for further details.

Short-eared Owl

- **Census methods**. This is one of the most difficult species to census and its status in the UK is poorly known. The SPA suite for this Annex I species held an estimated 12% of the GB population in 2001, but in 2008 it remained unclear whether this was adequate and whether numbers in existing SPAs were being maintained. The British Trust for Ornithology (BTO), with SNH funding, developed and piloted a new survey technique for Short-eared Owl during 2006-07 (Calladine *et al.* 2008). Using vantage-point surveys it was determined that there were specific times of the day and breeding season when individual owls were more easily detected. A simpler approach involving point counts from roads was tested, but registrations were few and this was not considered to be a promising approach. A pilot study potentially developed an objective survey method for breeding birds, but even with refinements, any survey would still be highly labour-intensive, require considerable resources and would likely result in estimates with wide error statistics. The SPAR SWG concluded that advice should be sought on the potential development of a national survey of Short-eared Owl as part of the Statutory Conservation Agencies RSPB Annual Breeding Birds Scheme (SCARABBS) framework. This remains outstanding. (2008-09)

[22] http://tinyurl.com/p3qdncv

[23] http://jncc.Defra.gov.uk/pdf/spotted_crakes.pdf

Re-establishing raptors

- **Red Kite and Osprey**. In 2004, the SWG reviewed the status of Red Kite and Osprey as part of consideration of the treatment of re-introduced/re-establishing species. Both species have been assessed by Phase 1 of this Review. (2004)
- **White-tailed Eagle**. The status of White-tailed Eagle was reviewed in 2006 and the SPAR SWG concluded that although the population is still growing, there are areas now occupied that are still likely to be of importance to the species in the long-term. The Group agreed that it would be advantageous to have a more detailed analysis of territory use for birds breeding on Mull and Skye and requested this from the Sea-eagle Project Team in 2007. Consideration of SPA provision for White-tailed Eagle has now been undertaken as part of this Review.

National bird population estimates

- The SPAR SWG agreed that the sole source of **national population estimates** for statutory uses should be those published by Avian Population Estimates Panel (APEP)[24]. New estimates published independently will not be adopted for use until incorporated into the subsequent APEP revision. A third collation by APEP was published by Musgrove *et al.* in 2013, and has been used in this Review.

Waterbird populations

- The source of biogeographical **waterbird population estimates** should be those published by Wetlands International. These *Waterbird Population Estimates* should be adopted as a matter of normal procedure. The fourth edition of *Waterbird Population Estimates* was used in this Review[25]. (2006)

Non-breeding waterfowl assemblages

- The process of calculation of non-breeding waterbird assemblages for SPAs was reviewed. On most old SPA citations and in the second Review site accounts, the waterfowl assemblage was described as being "over-winter". In practice, on many sites the largest numbers of some (largely wader) species occurs during autumn (August-October) and spring (April-June) passage periods. For more recent designations, Natural England has described the assemblage as "during the non-breeding season" and calculated it using counts from the spring and autumn passage periods, as well as winter (November-March). The five-year mean for a particular species could therefore be calculated potentially using yearly peaks from different seasons. The approach runs no risk of double counting between sites or between years and there is no problem with calculating the mean for individual species and summing them to reach an assemblage total. The SPAR SWG agreed on the scientific merits of this "during the non-breeding season" approach to calculating non-breeding waterbird assemblages and recommended this as a UK standard. (2010-11)

2.3 European Court of Justice rulings

In the last decade there have been numerous European Court of Justice rulings of relevance to the Birds Directive, and these were reviewed as background work for this Review. An index to key judgements relating to the selection, classification and management of SPAs under Article 4 of the EU Birds Directive was published on JNCC's website[26] in 2011[27]. This index does not provide any interpretation of judgements; it simply aims to enable access to the original Court Judgements via links to the Curia website.

[24] APEP is a multi-organisation partnership which publishes periodic collations of 'best' estimates for UK's birds. The first two APEP assessments were published by Stone *et al.* 1997 and Baker *et al.* 2006.

[25] http://wpe.wetlands.org

[26] http://jncc.Defra.gov.uk/docs/spa_ECJcasesindex.xls

The judgements can also be located at http://curia.europa.eu/jcms/jcms/Jo2_7045/ or searched via: http://curia.europa.eu/jurisp/cgi-bin/form.pl?lang=en.

The information is in three sections: the Case Index lists those cases, together with the main Articles of the Directive(s) for which the Judgement provides interpretation. The Key Word Index provides an index, for each subject, to paragraphs of the relevant cases where this topic arises. The index is arranged under different themes and there is a degree of deliberate duplication to facilitate search. Thus one paragraph may be referenced both under 'inadequate size of SPA' as well as under 'boundary delineation'. The last worksheet links to species.

2.4 Climate change and SPAs

In the period of this Review there have been many published analyses of the impact of climate change on protected area networks, and their role in facilitating bird (and other) species to adapt to the resulting environmental change. These include two major, multi-species analytical projects to model the effects of climate change on UK's birds.

The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current bird distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move or how birds adapt either evolutionarily or behaviourally (*e.g.* Clausen & Madsen 2016). For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of the lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas*.

Between 2009 and 2011 DEFRA funded a detailed study of the resilience of the UK SPA Network to climate change (Climate Change Impacts on Avian Interests of Protected Area Networks - CHAINSPAN) (Pearce-Higgins *et al.* 2011; Johnston *et al.* 2013). This work investigated the site- and network-scale implications of climate-related distribution shifts of SPA qualifying species. The models used were more sophisticated than those of Huntley *et al.* (2007), and related the present density of birds to recent climate with the aim of predicting bird density under future climate scenarios. This report also gives a number of interpretive caveats.

Many of the models had fairly low predictive power in describing the spatial patterns of bird density. This indicated that climate was less important in determining site-specific variation in species abundance than site-quality; there is therefore considerable potential for site-based management to increase the resilience of SPAs to climate change.

Species groups differed in terms of their projected vulnerability to climate change. The most vulnerable were northern-breeding seabirds and northern-breeding terrestrial species; the models predicted declines in many upland species – and the 2007-2011 breeding bird Atlas demonstrates such change to be occurring (Balmer *et al.* 2013; Fuller *et al.* 2013). Populations of many wintering waterbirds were predicted to increase as a result of milder winters; however, diving wintering waterfowl were more likely to decline in abundance. Many southerly-distributed species were predicted to increase, including heathland species. Significant latitudinal

[27] Additional relevant ECJ rulings not yet indexed in the spreadsheet include C-240/00 – Commission v Finland; C-209/02 – Commission v Austria (Wörsacher Moos); C-127/02 – (Waddenzee); C-239/04 – Commission v Portugal (Castro Verde); C-304/05 – Commission v Italy (Stelvio); C-226/08 – Stadt Papenberg v Germany; C-404/09 – Commission v Spain (Alto Sil); C-141/14 – Commission v Bulgaria (Kaliakra)

shifts in species composition were projected at many sites. Although intertidal and freshwater sites are likely to remain important, their species composition looks likely to change substantially.

Overall, the current SPA network appears to be relatively resilient to projected climate change. However, the spatial distribution, abundance and composition of species in the network will probably be different in the future, reinforcing the need for roughly decadal reviews of the UK SPA network. Three main policy implications were identified by Pearce-Higgins *et al.* (2011):

- the need for better (adaptive) management of SPAs;
- the need to create larger SPAs (focusing on habitat creation on, and restoration of existing sites); and
- the need for better connectivity between SPAs.

These issues have been repeatedly highlighted as of critical importance to ensure protected area networks sustain their values in a changing world (*e.g.* Lawton *et al.* 2010; Lausche *et al.* 2013) and to that end have been urged also by relevant multi-lateral environmental agreements (*e.g.* Convention on Biological Diversity 2004, 2010a, 2010b; Ramsar Convention 2012).

In general, predicted shifts from south to north within the UK were found by Pearce-Higgins *et al.* (2011) to be more important than east-west longitudinal shifts, though the results depended on the species in question. Given that the model fits were generally modest, it is important to highlight the caveats of the results so that the temptation to 'over-interpret' the results is minimised. Although overall trends could be treated with some confidence, changes at individual sites should be treated with caution. Headline messages from the CHAINSPAN analyses were that:

- most SPAs will remain important in the foreseeable future;
- there will be 'winners' and 'losers' amongst species involved; and
- there should be a focus on creation of suitable habitats so as to increase network resilience.

Similar findings were shown at larger, continental scale by Hole *et al.* (2009) who explored the consequences of climate change on the network of African Important Bird Areas.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al*. (2011) stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site quality as well as reduce the severity of other pressures on populations (Ausden *et al.* 2014, 2015) and aid the adaptive processes of colonisation and range expansion (Gillingham *et al.* 2015).

Hiley *et al.* (2013) explored patterns of settlement and establishment of wetland bird species that had recently colonised the UK. They found that "Protected Areas [PAs] have represented 'establishment centres' for wetland bird species colonising the UK since 1960. Colonising birds bred in these sites for the first time, establishing populations and then expanding into additional unprotected sites. Hence, PAs enable species to establish in new regions in addition to their benefits to species already established within them."

Thomas *et al.* (2012) further demonstrated the importance of protected areas for those established UK species with high ecological specialisation. Such areas were shown to provide refuges for population persistence as well as being critical 'stepping stones' aiding range expansion. Thomas & Gillingham (2015) noted "The 40-year track record of species responding to environmental change in PAs suggests that networks of PAs have been essential to biodiversity conservation and are likely to continue to fulfil this role in the future."

The studies listed above informed this Review and future change projections are included in relevant species accounts. Both the evidence for significant change across the network in the last decade (section 6.1), and the extent of future changes projected by the studies listed above highlight the need for regular future reviews of the UK SPA network to ensure it retains resilience to consequent environmental change. This is addressed in section 6.6.

3. The third SPA network Review

3.1 Introduction and scope of the Review

The main objective of this Review has been to assess the species' suites within the UK SPA network to ensure that obligations under Article 4 of the EU Birds Directive are fully met. Accordingly, assessments have been made of the Article 4 provision for all of the UK's breeding and wintering birds. Particular attention has been given to two groups of species:

1. Those species for which the second Review (and subsequent events such as European Court of Justice rulings) indicated that the UK may have insufficient SPA provision.
2. Species for which new data, analyses or SPAR SWG reviews since 2001 suggest that new or further SPA provision may be needed (*e.g.* White-tailed Eagle, Spotted Crake, Ring Ouzel, Twite – see section 2.2.3).

In addition, reviews have been undertaken of:

3. All other species which have existing SPA suites.
4. All other migratory and Annex I bird species for which there is no current SPA provision.

The geographical scope of the Review is limited to the terrestrial and inshore coastal environments of the UK and excludes Gibraltar. It does not cover SPA provision within the UK's offshore marine environment, as this is being developed in a separate process.

The Review has undertaken detailed assessments of 150 species/populations, including some for which there is currently no SPA provision. It has also reviewed again those migratory species for which SPA provision is considered inappropriate (mostly abundant and widely dispersed passerines, such as warblers, thrushes and finches).

The starting point for the audit of the SPA network and assessments of sufficiency were, for each species/population, the SPA suites agreed and published by JNCC's second SPA network Review. Although many of the relevant classifications have yet to occur, it is envisaged that these will occur in the next stages of this third Review, since their implementation is integral to the sufficiency conclusions reached.

3.2 Review phases

The Review is being taken forward in three phases as outlined in the Terms of Reference (ToR – Appendix 2).

3.2.1 Phase 1: Review of species trends, status and site provision

Phase 1 has assessed the sufficiency of the existing SPA network for relevant species and is the subject of this report.

Phase 1 has included a major exercise to draw together, process and review the most recent bird population data for all the relevant species/populations. Work has been supervised by the SPAR SWG involving the following key elements:

- A data gathering contract in 2009-2010 was let by DEFRA to BTO to collate data and information for a selection of species (section 3.3.1).

- An updated assessment of contemporary British, All-Ireland and biogeographic population sizes for all Annex 1 and migratory species (Musgrove *et al.* 2013; Appendix 4).
- Collation of contemporary assessments (as available) for all species at relevant SPA suites determined by the second network Review, undertaken by JNCC with assistance of country agency specialists and relevant data providers, notably BTO, the Wildfowl & Wetlands Trust (WWT) and RSPB (section 4.3).
- Work[28] to facilitate consideration of those species using cropped habitats where such areas were previously excluded from consideration (section 5.4).
- Development of a Site Provision Index and Decision Framework by the SPAR SWG (sections 5.3 and 5.5) to assess network sufficiency for individual species by the SPAR SWG. This assessment highlights those species for which further sites should be considered in Phase 2 of the Review – (see below).

An end point has been an audit of changes to populations of relevant bird species (or a change in our understanding of those populations), both within and beyond the existing SPA network since the 1990s and advice to government regarding the sufficiency of the SPA suites for the species/populations concerned.

3.2.2 Phase 2: Evaluation of the need for further SPA provision

Phase 2 will evaluate the details of further SPA provision for those species with SPA insufficiencies identified by this Review. It will primarily be undertaken by the relevant country conservation agencies with appropriate co-ordination where species requirements span more than one country. The country agencies will determine whether new sites will be proposed, and, if so, their location and extent. They will also decide whether existing SPAs should be extended, either geographically or through the addition of further qualifying species; and will determine the timetables to implement Review outcomes, although the ToR indicate “the aim will be to conclude this phase as soon as possible”.

3.2.3 Phase 3: Review of documentation

Phase 3 will comprise classification of new sites or extension to existing sites, and revision of citations at those sites where qualifying species have changed[29], a process that will also need to include the implementation of the second network Review (2001). The ToR (Appendix 2) states that “Phase three (formal revision of SPA citations as appropriate and necessary at individual sites) will also be determined by each country, but is anticipated, resources permitting, to be completed within a year from the conclusion of decisions taken in the second phase.”

3.3 Review of the UK network of Ramsar Sites

Whilst initial work has concentrated on the SPA network, the Terms of Reference note that a review of the avian aspects of the UK network of Ramsar Sites will be undertaken following a 2005 commitment made by the UK to the Ramsar Secretariat. This will be reported subsequently and will, amongst other things, be used to inform the 163 Ramsar Information Sheet (RIS) updates required under the Ramsar Convention (Resolutions VI.13[30] and XI.4[31]).

[28] The SPAR SWG’s Cropped Habitat Information Project (CHIP) – Baker & Stroud 2007.

[29] In Scotland this is being undertaken as part of Phase 2.

[30] http://www.ramsar.org/pdf/res/key_res_vi.13e.pdf

[31] http://www.ramsar.org/pdf/cop11/res/cop11-res04-e.pdf

The aim of this work will – as far as is possible given different criteria – harmonise the relevant qualifying species on both the Ramsar Site and SPA networks so as to facilitate common international reporting and site management by UK agencies.

3.4 Development of SPA provision in the marine environment

Marine habitats play a vital role in the life-cycles of many UK birds, including several species considered in this Review, supplying food, shelter and migration routes. Yet, in contrast to the long history of identification and classification of terrestrial and estuarine SPAs, it is only recently that wholly marine important areas for birds have been identified in UK territory. This reflects the greater technical and logistical challenges involved in obtaining sufficient data at sea compared with on land, and until recently, the lack of relevant legislation to allow offshore SPA classification. However, advances in marine bird survey techniques (*e.g.* Desholm 2006; Burger & Schaffer 2008; Kober *et al.* 2010; Soanes 2013) have resulted in progressive collation of relevant data, and new analytical and modelling techniques have also helped to identify key marine sites.

As a result of a JNCC-led programme of survey and analysis over many years, the UK Government and Devolved Administrations have made a commitment to the European Commission to identify a suite of marine SPAs by the end of 2015 and to classify as many of those as possible by that time. As at early 2016, this is being progressed by UK governments. They have also announced that they would undertake an assessment of the sufficiency of the resulting suite of sites at the culmination of that programme of identification. That assessment is underway and due to report in 2016.

The marine assessment will encompass some species which have also been considered within this Review (Table 3.1), including:

i) seabird species that breed terrestrially in the UK, most notably colonial seabirds. The marine review will consider marine areas used both during and outwith the breeding season; and

ii) waterbird species (seaduck, divers and grebes) that frequent estuarine, coastal and inland waters, particularly. The marine Review will consider wholly marine areas (*i.e.* below low water) used by these waterbirds, whereas the current Review considered their presence in estuarine, coastal and inland waters.

A third group of species will be unique to the marine assessment, namely those seabirds that are passage migrants or winter visitors to the UK and are essentially marine species within UK territories.

Table 3.1. Species addressed by current marine SPA assessment process.

	Species to be assessed
UK breeding seabirds	Fulmar, Manx Shearwater, Storm Petrel, Leach's Petrel, Gannet, Cormorant, Shag, Arctic Skua, Great Skua, Kittiwake, Black-headed Gull, Mediterranean Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Little Tern, Sandwich Tern, Common Tern, Arctic Tern, Roseate Tern, Guillemot, Razorbill & Puffin
Waterbirds	Scaup, Eider, Long-tailed Duck, Common Scoter, Velvet Scoter, Common Goldeneye, Red-breasted Merganser, Goosander, Red-throated Diver, Black-throated Diver, Great Northern Diver, Great Crested Grebe, Red-necked Grebe, Slavonian Grebe & Black-necked Grebe
Non-breeding or migrant seabirds	Cory's Shearwater, Great Shearwater, Sooty Shearwater, Balearic Shearwater, Pomarine Skua, Long-tailed Skua, Little Gull, Iceland Gull, Glaucous Gull & Little Auk

The methods for the marine assessment are yet to be finalised, but close coordination with this Review will be required, not least because the two assessments share a number of species. The particular ecological and dispersion characteristics of marine birds – often markedly different to those in terrestrial or estuarine habitats – will be addressed to ensure that Birds Directive requirements are fulfilled.

After this Review, the expectation is that future network Reviews will consider the terrestrial and marine elements of the current SPA Reviews as a single integrated network.

4. Methods: data used

4.1 National and international population estimates

The third Review required updated biogeographic, UK, Great Britain (GB), and All-Ireland, population estimates for all species/populations to be prepared (including separate estimates for breeding and non-breeding seasons as relevant). These have provided relevant national and international contexts for the review. The main sources of data are summarised in Table 4.1. Appendix 4 gives the derivation of each species' population estimate(s).

In the breeding season, for most species, the 'biogeographic' population estimates refer to the European breeding population, following *Birds in Europe 2* (BirdLife International 2004) and using conventions established by Stroud *et al.* (2001). In the non-breeding season, many species range more widely than Europe alone, and the biogeographic non-breeding population estimates refer to recognised population definitions presented by Rose & Scott (1997), Delaney *et al.* (2009) and *Waterbird Population Estimates* (Wetlands International 2012).

Throughout the Review we have used biogeographic population estimates that were as contemporary as possible to site-related data (section 4.2).

Neither GB nor UK population estimates include assessment of bird populations present on the Isle of Man or the Channel Islands, since in the context of Birds Directive obligations, these are not part of the EU.

Table 4.1. Summary of the main data sources used.

Species group	International estimates	UK & GB estimates	All-Ireland estimates
Non-breeding waterbirds	*Waterbird Population Estimates* 4 http://wpe.wetlands.org/	Wetland Bird Survey (WeBS) (including the Non-estuarine Coastal Waterbird Survey) and Goose & Swan Monitoring Programme (GSMP) (Musgrove *et al.* 2011)	Irish Wetland Bird Survey (I-WeBS) (Crowe 2005; Crowe *et al.* 2008)
Non-breeding gulls		BTO's decadal winter gull roost surveys (WinGS) (Burton *et al.* 2013)	Irish Wetland Bird Survey (I-WeBS) (Crowe 2005; Crowe *et al.* 2008)
Breeding seabirds	*Seabird populations of Britain & Ireland* (Mitchell *et al.* 2004)	*Seabird populations of Britain & Ireland* (Mitchell *et al.* 2004)	*Seabird populations of Britain & Ireland* (Mitchell *et al.* 2004)
Non-waterbirds	*Birds in Europe 2* (BirdLife International 2004) provided biogeographic population estimates for non-waterbirds (and breeding estimates for some waterbirds)	Avian Population Estimates Panel (Musgrove *et al*. 2013)	Following consultation with BirdWatch Ireland, new All-Ireland estimates were developed for breeding Hen Harrier and Chough by combining current totals from Northern Ireland and Ireland
Rare and scarce breeding birds		Rare Breeding Bird Panel (RBBP) (Holling *et al.*	Irish Rare Breeding Birds Panel (Hillis 2007, 2008,

Species group	International estimates	UK & GB estimates	All-Ireland estimates
		2010)	2009, 2010, 2011)
National single species surveys		Relevant Statutory Conservation Agency/ RSPB Annual Breeding Bird Survey (SCARABBS) datasets (*e.g.* Eaton *et al.* 2007a; Hayhow *et al.* 2015)	

4.2 Availability of new population estimates

At the time of the second network Review, there were a small number of species for which it was not possible to identify full SPA suites, because there were no suitable reference estimates against which to assess important sites. One aim of this third Review was to provide recent reference population estimates for these and other relevant species. These are listed in Table 4.2 together with a summary of the progress made to gather their population estimates.

Of 398 Great Britain, All-Ireland or international population estimates presented in the second Review, new, updated estimates (published since 2001) were obtained for 367 (92%) relevant to this Review indicating good availability of contemporary information. A further 46 estimates were derived for populations not assessed by the second Review (Appendix 4).

All but three species (eight populations) for which there were insufficient data at the time of the second Review now have adequate contextual data to enable an assessment of SPA requirements.

Table 4.3 lists those 31 populations for which there have been no new population estimates since the second Review in the 1990s or, in some cases, the first Review in the 1980s. Of these deficiencies, seven relate to populations in Great Britain and 24 to All-Ireland and largely concern breeding ducks and waders. There were new estimates for all international populations.

Table 4.2. Progress made to provide information for species for which no estimates of population or distribution were available in 2001.

Issue	Background and considerations from the second network Review	Progress since second network Review
Recent UK colonists – Little Egret	Little Egret was a regular vagrant in the UK until large influxes began in 1989 (Musgrove 2002). It bred in the UK for the first time in 1996.	Numbers continue to increase and the species now breeds in northern England and is found regularly at many sites as far north as southern Scotland (Holling *et al.* 2010). Recent population estimates are now available including for the biogeographic and All-Ireland populations. For sites, estimates of breeding pairs are available, but with some uncertainly at Norfolk sites.
Re-establishing raptors	White-tailed Eagle is undergoing significant expansion in numbers and range following re-establishment programmes in Scotland and Ireland since the late 1970s.	Recent population estimates include a first estimate for birds breeding in Ireland. Comprehensive data are available for all sites and years, although not all nesting attempts are now monitored each year.
	Red Kite is expanding in numbers and range following re-establishment	Recent population estimates include a first estimate for the breeding All-Ireland

Issue	Background and considerations from the second network Review	Progress since second network Review
	programmes in England, Scotland and Ireland since the 1980s, and natural population recovery in Wales.	population. Precision of the most recent estimates has become lower owing to the continued growth in the population and a subsequent reduction in the intensity of monitoring.
	Osprey is also increasing in numbers and distribution in Scotland, have colonised Wales and been re-established in England.	Precision of the recent estimates has become lower owing to the continued growth in the population.
Non-breeding gulls	Data were not available to undertake a comprehensive assessment of non-breeding gulls in the 2001 Review.	Burton *et al.* (2013) summarised the 2003/4 – 2005/6 winter gull roost survey (WinGS) and Banks *et al.* (2007) produced long term indices of trends in these populations. WeBS began collecting data on wintering gulls in 1993, now giving nearly two decades of counts for some wetlands. First population estimates are now available for most gull populations. Site counts for non-breeding Black-headed, Common, Lesser Black-backed, Herring and Great Black-backed Gulls are now available from WeBS and WinGS survey results.
Wintering raptors (especially in coastal areas)	Data on the winter distributions, aggregations and numbers of Hen Harrier and Merlin were not available in the 1990s.	Assessments for non-breeding Hen Harrier are still unavailable for most SPAs. Hen Harrier roost information remains incomplete, although some larger roosts are classified as SPAs.
		The wide-ranging and solitary nature of wintering Merlin means it will remain challenging to gather data on this species.
Passage waders	WeBS has collected passage wader data at some sites since 1993, but at the time of the second Review they were not published annually.	Recent population estimates are now available for non-breeding Sanderling, Ringed Plover, Redshank and Curlew. Comprehensive counts are available from well-monitored WeBS sites with sparser midwinter assessments from much of the UK's non-estuarine coastline derived from 2006/07 NEWS survey (Rehfisch *et al.* 2003; Burton *et al.* 2008a; Burton *et al.* 2008b).
Passage terns	Knowledge of the autumn (and spring) movements of terns was poor and the second Review gave likely incompletely assessed important sites.	More data on passage terns are now available via WeBS, but coverage remains incomplete.

Table 4.3. Populations for which there are no new estimates of population size published since the 1990s.

Species	Population	Season	Current best source
Great Crested Grebe	Great Britain	Breeding	Gibbons *et al.* 1993
Shelduck	Great Britain	Breeding	Sharrock 1976
Wigeon	Great Britain	Breeding	Sharrock 1976
Teal	Great Britain	Breeding	Gibbons *et al.* 1993

Species	Population	Season	Current best source
Merlin	Great Britain	Non-breeding	Stroud *et al.* 1990
Snipe *G. g. faeroeensis*	Great Britain	Breeding	BTO *in litt.* 2001
Greenshank	Great Britain	Breeding	Gibbons *et al.* 1993
Red-throated Diver	All-Ireland	Breeding	Gibbons *et al.* 1997
Great Northern Diver	All-Ireland	Non-breeding	Lack 1986
Great Crested Grebe	All-Ireland	Breeding	Gibbons *et al.* 1993
Slavonian Grebe	All-Ireland	Non-breeding	Lack 1986
Shelduck	All-Ireland	Breeding	Gibbons *et al.* 1993
Gadwall	All-Ireland	Breeding	Gibbons *et al.* 1993
Teal	All-Ireland	Breeding	Gibbons *et al.* 1993
Mallard	All-Ireland	Breeding	Gibbons *et al.* 1993
Pintail	All-Ireland	Breeding	Gibbons *et al.* 1993
Shoveler	All-Ireland	Breeding	Gibbons *et al.* 1993
Pochard	All-Ireland	Breeding	Gibbons *et al.* 1993
Eider	All-Ireland	Breeding	Gibbons *et al.* 1993
Merlin	All-Ireland	Breeding	Gibbons *et al.* 1993
Merlin	All-Ireland	Non-breeding	Lack 1986
Oystercatcher	All-Ireland	Breeding	Piersma 1986
Ringed Plover	All-Ireland	Breeding	Gibbons *et al.* 1993
Golden Plover	All-Ireland	Breeding	Gibbons *et al.* 1993
Lapwing	All-Ireland	Breeding	Gibbons *et al.* 1993
Dunlin	All-Ireland	Breeding	Gibbons *et al.* 1993
Snipe *G. g. gallinago*	All-Ireland	Breeding	Gibbons *et al.* 1993
Redshank	All-Ireland	Breeding	Gibbons *et al.* 1993
Common Gull	All-Ireland	Non-breeding	Lack 1986
Kingfisher	All-Ireland	Breeding	Gibbons *et al.* 1993
Kingfisher	All-Ireland	Non-breeding	Gibbons *et al.* 1993

Many scarce species are not adequately monitored by the annual schemes for commoner birds, yet are sufficiently widespread for the UK rare bird recording systems to give only an incomplete annual assessment of numbers and distribution. Such species are typically monitored by species-specific national surveys (often involving professional surveyors) undertaken once every 6 or 12 years, under the auspices of the Statutory Conservation Agency/RSPB Annual Breeding Bird Survey partnership (SCARABBS). These surveys often provide the only basis for assessing the relative importance of individual sites for these species, as they provide the only comprehensive 'snap-shot' of all sites. A summary of new surveys undertaken since 1999 (and which have provided data which were not available for the second network Review) is provided in Table 4.4.

Table 4.4. Scarce species for which periodic national surveys have been undertaken since the second Review.

Survey Year	Species	Comments	Reference
1999	Spotted Crake		Gilbert (2002)
1999	Twite		Langston *et al*. (2006)
1999	Dotterel		Whitfield (2002)
1999	Ring Ouzel		Wotton *et al.* (2002a)
2000	Red Kite	Most recent national survey	Wotton *et al.* (2002b)
2002	Chough	Most recent national survey	Johnstone *et al.* (2007)
2002	Peregrine		Banks *et al.* (2010)
2003	Corncrake		O'Brien *et al*. (2006)
2003/04	Capercaillie		Eaton *et al*. (2007b)
2003	Golden Eagle	Most recent national survey	Eaton *et al.* (2007a)
2004	Hen Harrier		Sim *et al*. (2007)
2004	Nightjar	Most recent national survey	Conway *et al*. (2007)
2005	Marsh Harrier	Most recent national survey	Eaton *et al.* (2006)
2006	Dartford Warbler	Most recent national survey	Wotton *et al.* (2009)
2006	Woodlark	Most recent national survey	Conway *et al.* (2009)
2006	Black-throated Diver	Most recent national survey	Eaton *et al.* (2007c)
2006	Red-throated Diver	Most recent national survey	Dillon *et al*. (2009)
2007	Common Scoter	Most recent national survey	Holling *et al.* (2010)
2008	Scottish Crossbill	Most recent national survey	Summers & Buckland (2010)
2008	Merlin	Most recent national survey	Ewing *et al*. (2011)
2008/09	Capercaillie	Most recent national survey	Ewing *et al*. (2012)
2009	Corncrake	Most recent national survey	Wotton *et al.* (2015)
2010	Hen Harrier	Most recent national survey	Hayhow *et al.* (2013)
2010	Crane	Most recent national survey	Stanbury & the UK Crane Working Group (2011)
2011	Dotterel	Most recent national survey	Hayhow *et al.* (2015)
2011	Snow Bunting	Most recent national survey	Hayhow *et al.* (in draft)
2012	Spotted Crake	Most recent national survey	Schmitt *et al.* (2015)
2012	Ring Ouzel	Most recent national survey	Wotton *et al.* (2016)
2013	Twite	Most recent national survey	Wilkinson *et al.* (in draft)
2014	Peregrine	Most recent national survey	unpublished
1999-2014	White-tailed Eagle	Annual survey of population	White-tailed Eagle Project Team /RSPB (Holling *et al.* 2015)

4.3 Site population estimates

The Review broadly covers the decade from 2001-2011, although we sought site-related count data for the second half of that period. Where possible, and especially for seabirds where there sometimes were multiple but not annual counts, we have tried to use data from a period that was as small as possible within the decade. The largest body of data – for non-breeding waterbirds – derived from the period 2005/06 – 2009/10.

The site-related data used by this Review derive largely from the following sources:

- Wetland Bird Survey (WeBS - for wintering waterbirds) for the period 2005/06 – 2009/10;

- Goose & Swan Monitoring Programme (GSMP) for the period 2005/06 – 2009/10;
- UK Seabird Monitoring Partnership including data from the *Seabird 2000* national census (breeding seabirds);
- Rare Breeding Birds Panel;
- Relevant SCARABBS national surveys (see Table 4.4);
- Raptor Study Groups including via the Scottish Raptor Monitoring Scheme;
- Site monitoring at WWT, RSPB or National Nature Reserves; and
- Relevant country agency survey or monitoring processes.

We used data from a national survey of Spotted Crake in 2012 – especially since the results of the previous national survey in 1999 were unavailable to the second Review.

Compiling data was the lengthiest part of the Review. No single source of these data was available and many key datasets (such as SCARABBS surveys and JNCC's seabird datasets) required matching against SPA boundaries. Contemporary assessments of species' populations are not available for all sites, and for a few species and sites they are lacking completely (section 6.4). Section 6.5 makes recommendations regarding improvement of processes related to data collation and information collection.

The final section in each of the species accounts provides a full audit of the data used at each of the sites concerned.

4.4 Calculation of SPA suite totals for non-breeding waterbirds

The standard statistic used to describe the importance of an individual site for wintering waterbirds is the 'five year peak mean' – this is the average of the five maximum annual counts for the species at the site (Stroud *et al.* 2001). This mean value is then also converted to a percentage of the total estimated population size.

To calculate the total number of birds contained on multiple sites (*e.g.* the suite of SPAs), summing site peak means would result in potential double-counting as the maximum values may derive from different months at different sites, as birds move between sites. For example, peak numbers of Pink-footed Geese occur in the autumn (and again in spring) in northern Scotland, but peak numbers occur later in winter at sites in Lancashire and Norfolk after the birds have moved further south. The simple addition of all of the site peak means for individual Pink-footed Goose SPAs gives a total in excess of the total British population, reflecting the double-counting of the same birds as they move within the UK.

The network totals[32] have therefore been derived from counts in the month in which the species shows peak occurrence within Great Britain (Table 4.5). In this month, the average of the five years' totals of the species within the suite is summed. (Note that the peak occurrence may not necessarily be the same month in Northern Ireland, although this generally is the case).

[32] Note that different months may have been used in the original selection of an SPA, since the month of peak national occurrence is not necessarily the case of peak occurrence at all individuals sites.

Table 4.5. Months in which total numbers within SPA suites for non-breeding waterbirds were determined. This is typically the month of peak occurrence in Great Britain as derived from WeBS/GSMP monitoring.

Month	Species/population
August	Goosander, Greenshank, Whimbrel
September	Black-tailed Godwit
October	Little Egret, Barnacle Goose (Svalbard population), Light-bellied Brent Goose (Canadian population)
November	Pink-footed Goose, Greylag Goose, Taiga Bean Goose, Coot, Knot, Oystercatcher
December	Mallard, Teal
January	Little Grebe, Great Crested Grebe, Slavonian Grebe, Cormorant, Bittern, Bewick's Swan, Whooper Swan, European White-fronted Goose, Dark-bellied Brent Goose, Light-bellied Brent Goose (Svalbard population), Shelduck, Wigeon, Gadwall, Pintail, Shoveler, Pochard, Tufted Duck, Scaup, Eider, Long-tailed Duck, Common Scoter, Velvet Scoter, Red-breasted Merganser, Avocet, Ringed Plover, Golden Plover, Lapwing, Purple Sandpiper, Dunlin, Ruff, Snipe, Redshank, Turnstone
February	Goldeneye, Grey Plover, Bar-tailed Godwit, Curlew
March	Greenland White-fronted Goose, Barnacle Goose (Greenland population)
April	Whimbrel[33]
May	Sanderling

Where counts were missing or are flagged in the WeBS/GSMP database as undercounts, the following rules were used to derive assessments in a year:

- When a count in a month was missing, the count for the same month in the previous year was substituted (other than for 2005/06 when, because of data availability, the subsequent year's count of 2006/07 was used);
- If a reported undercount was less than the average of the (remaining) complete counts for the period, the count for the same month in the previous year was substituted (other than for 2005/06 when, because of data availability, the subsequent year's count of 2006/07 was used).
- If a reported undercount was greater than the average of the (remaining) complete counts for the period, it was retained in line with standard WeBS treatment of undercounts.

SPA suites for some geese (notably Greenland Barnacle Geese and the Greenland White-fronted Geese) include both daytime feeding areas and nocturnal roosts. Since these are often used by the same birds, it is inappropriate to sum totals. For these species, separate totals have been derived for roosts and feeding areas.

[33] As knowledge of Whimbrel numbers on migration through the UK is very poor, it is recommended that assessments of numbers on the SPA suite are made in both spring and autumn.

5. Assessment methodologies

5.1 Introduction and overall summary of approach

This section gives an overview of the approach to assessing the sufficiency of the suite of SPAs classified for a species. Further sections below provide more detailed explanations of particular elements of the methodology.

Article 4.1 of the Directive requires Member States to take "*special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution*." In particular, "*Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species in the geographical sea and land area where this Directive applies*."

However, the Directive itself provides no further guidance as to how 'sufficiency' should be assessed, nor has the European Commission provided guidance to this end. An early contribution by Bezzel (1980) for the Commission focused on species range, evenness of distribution, population size, and population trends, and this was developed further in the UK by NCC (Stroud *et al.* 1990).

A major element of this Review has therefore been the development, testing and application of an objective, science-based methodology to assess network sufficiency at the scale of individual species. We have called this the Decision Framework for species assessment.

The data and information required for each species were:

		Source of data/information
1.	Past total numbers of a species on the suite of SPAs previously selected/classified	Second network Review (Stroud *et al.* 2001)
2.	Current total numbers of species on SPA suite	Section 4.2
3.	Proportion of GB population contained within the SPA suite at last Review	Second network Review (Stroud *et al.* 2001)
4.	Proportion of All-Ireland population contained within the SPA suite at last Review	Second network Review (Stroud *et al.* 2001)
5.	Proportion of international population contained within the SPA suite at last Review	Second network Review (Stroud *et al.* 2001)
6.	Contemporary proportion of the current GB population on the SPA suite	Derived from Musgrove *et al. (*2013). Section 4.1.
7.	Contemporary proportion of the current All-Ireland population on the SPA suite	Derived for this Review from Musgrove et al. (2013) and Irish sources. Section 4.1.
8.	Contemporary proportion of the international population on the SPA suite	Section 4.1.
9.	Site Provision Index – an index indicating the suitability of species for site-based conservation measures which integrates multiple elements of ecological and demographical information.	Section 5.3 and Williams *et al.* (2016)
10.	Information on the significance of cropped habitats in the	Section 5.4

	Source of data/information
ecology of relevant species.	

The Decision Framework (section 5.3) integrates the information elements listed above into a logical framework for assessing SPA suite sufficiency for individual species/populations, thus aiding consistent decision making.

The starting point is a comparison of the total number of a species within its SPA suite and the proportions of populations this represents between the past and the present. There are many reasons why change may have occurred. For example, total number of a species within a suite of SPAs may have stayed the same, but there has been overall population growth elsewhere – hence the proportion of the total population represented in the SPAs declines. Alternatively, numbers within SPAs may have grown (perhaps due to good habitat management) or remained stable, yet numbers elsewhere have fallen – resulting an increased proportion of the total population being found within the SPA suite. Or a third scenario might simply be that the total number and the proportion this represents has increased as a result of further SPA classifications. In reviewing the SPA suite it is important to understand the (likely) reasons for such changes. Section 6.1 gives further information on the range of possible change scenarios and their implications for SPA suites.

Understanding whether or not a suite of SPAs is providing a sufficient contribution to the overall conservation of a species depends on information about the ecology and distribution of a species. For example, one would expect protected areas to be of more significance for colonial seabirds, where most of a population gathers in large densities at just a few sites, compared to a widely distributed farmland bird that never aggregates in high densities. This issue is explored in section 5.2 and is fundamental to assessing sufficiency.

An important element of this methodology has been an assessment of the role that cropped habitats (especially managed grasslands and commercial forestry plantations) play in the ecology of relevant species. This informs decisions as to the extent to which cropped habitats should be included within SPAs. This issue is explored further in section 5.4.

The Decision Framework operates in the same way as a decision tree and suggests an outcome for each species (see section 5.3). It was developed by progressive iterative testing to ensure that its addresses all possible outcomes. These different outcomes and their implications are presented in section 6.1.

5.2 Site Provision Index

5.2.1 Background

The second network Review noted that "*conservation science theory and practice suggests that those species where highest proportions of species' populations should be located within a protected area network are those which:*

- *occur locally in high densities (congregatory species);*
- *occur, to a large extent, on natural or semi-natural habitats;*
- *show predictable occurrence at particular sites regularly between years (i.e. species that are not irregular or dispersive);*
- *have restricted national or international ranges; or*
- *have small national or international population sizes*."

Thus, there would be an expectation that species which are nationally and/or internationally rare, have limited national and/or international distributions, and which congregate predictably in high densities at defined locations should have high proportions of their populations within a protected site network (in this case the SPA network). This is in contrast to the situation of widespread, abundant and non-congregatory species for which protected areas may contribute little to their conservation.

Responding to this logic, a multi-element index was developed (called the Site Provision Index or SPI) which integrates these data and information elements to indicate the potential suitability of a species for site-based conservation. Many of these factors also relate to criteria given in Article 4.1 of the Birds Directive.

The conceptual elements of the SPI are summarised in Table 5.1 and the detailed methodology is presented in Williams *et al.* (2016).

Table 5.1. Birds Directive criteria, conceptual objectives and their relationship to index elements.

Criteria from Birds Directive Article 4.1	Factor identified in 2001 Special Protection Area Review	Factor from UK SPA selection guidelines (JNCC 1999)	Site Provision Index element	Relevant underpinning conservation science
Species vulnerable to specific changes in their habitat	Local occurrence in high densities (congregatory species)	Stage 2: Population size and density	Local occurrence in high densities	High density presence increases the proportion of populations which may be impacted by loss or degradation of individual important sites, and conversely conservation of these areas facilitates protection of significant population components at these few locations (Heath & Evans 2000; Langhammer *et al*. 2007; Ramsar Convention 2012).
	Occurrence, to a large extent, on natural or semi-natural habitats	Stage 2: Naturalness	Occurrence on natural/semi-natural habitats	Typically, many natural and semi-natural habitats have unfavourable conservation status *cf.* agricultural or other highly /intensively managed habitats *e.g.* European Commission (2015).
	Predictable occurrence at particular sites regularly between years (*i.e.* species that are not irregular or dispersive)	Stage 2: History of occupancy	Predictable occurrence	Occurrence that is predicable at specific locations increases risk when that location is subject to adverse change (Gilpin & Soulé 1986) but facilitates the protection of populations that regularly use those sites. Regular (predictable) use is the basis of established criteria for identification of sites of international importance (Heath & Evans 2000 for Important Bird Areas; Stroud *et al.* 2001 for SPAs in UK; Ramsar Convention 2012 for Ramsar Sites; Langhammer *et al.* 2007 for IUCN's Key Biodiversity Areas).
Species considered rare because of restricted local distribution	Restricted national or international ranges		Restricted national and international ranges	Restricted range is a well-established extinction risk factor (Mace & Lande 1991; Committee on Scientific Issues in the Endangered Species Act 1995; Soulé 1987, IUCN 2001 and others).
Species in danger of extinction Species considered rare	Small national or international population sizes		Restricted national and international population	Small population size is a well-established extinction risk factor (Mace & Lande 1991; Mace 1994, Committee on Scientific Issues in the Endangered Species Act 1995; Soulé

Criteria from Birds Directive Article 4.1	Factor identified in 2001 Special Protection Area Review	Factor from UK SPA selection guidelines (JNCC 1999)	Site Provision Index element	Relevant underpinning conservation science
because of small populations...			sizes	1987, IUCN 2001, and others).
Article 4.2 specifically highlights the importance of staging areas for migratory species	Flyway scale connectivity of site networks: the degree to which species depend on linked networks of definable sites along an international flyway		Predictable occurrence Local occurrence in high densities	The sequential use of key sites through the annual cycle is critical to the conservation of many migratory birds (Piersma & Lindström 2004; Boere *et al.* 2006; Delany *et al.* 2009, and others). Predictable occurrence of a species at a location is important if that site is to be subject to conservation measures

These Index values allow the comparison of individual species against 'average' values calculated for species with similar ecology, population size and distribution. This allows identification of those species which have an unusually low representation of their populations in the SPA network and thus merit closer scrutiny and potentially additional conservation action.

Williams *et al.* (2016) developed the methodology using data and information from the second network Review (data from the 1990s). The relevant index elements were updated using data and information from the 2000s for this Review. SPI values were calculated separately for breeding and non-breeding species.

The index values are summarised in the species accounts (Appendix 9) and given in Appendix 8 for those species where no SPA provision has been made.

5.2.2 Use of SPI in assessments

Rather than providing prescriptive 'target' values, the SPI should be used as a decision support tool, to provide a more objective, biological foundation for discussions of the sufficiency of species' SPA suites. It helps identify where there are significant differences between current site provision, and the level of provision that might be expected relative to other species with similar ecological characteristics. The degree of deviation of any Index value from the regression[34] (which gives information on 'average' SPA provision for species of similar ecology) indicates the degree of consideration needed in assessing the sufficiency of the SPA suite for that species.

In species accounts, SPI values have been summarised as follows:

Index values	Anticipated population provision within UK SPA network
0.0 – 29.9%	Low
30.0 – 65.9%	Medium
66.0 – 100%	High

The interpretation of Index values for many species fits well against current relevant conservation policy and practice (as shown by a separate survey of conservation practitioners documented by Williams *et al.* 2016), whilst for others it has raised issues worthy of further exploration and these are documented elsewhere in this Review.

[34] The relationship between proportion of a species' national population within its SPA suite, and its SPI

5.3 Decision Framework

Assessment of sufficiency is complex and involves other factors as well as the Site Provision Index. The Decision Framework was established to provide a structured means of aiding consistent evaluation and decision-making regarding review of SPA suites. This is structured as a decision tree (Figure 5.1) which integrates much of the conceptual thinking of the SPAR SWG since the second network Review.

The starting point of the Decision Framework is the proportion of populations contained by SPAs at the second and third Reviews in the context of the SPI value for the species or population concerned. The framework also helps to assess options for considering whether the inclusion of cropped habitats within SPAs would be an appropriate and useful conservation measure (see section 5.4 below). Further guidance for the application of the Decision Framework is given in Appendix 6.

The Decision Framework was applied to all species or populations considered in this Review (*i.e*. for which species accounts have been prepared). The detailed assessments for each species are available at http://jncc.Defra.gov.uk/page-1770.

5.3.1 Types of insufficiency

The assessment outcomes identify three forms of potential insufficiency in SPA provision. These are:

- **population numbers** – where it is considered that there is too small a proportion of the species' population within the SPA suite;
- **range coverage** – irrespective of population coverage within SPAs, where significant parts of the distributional range of the species are not covered by the SPA suite – thus limiting the scope of the suite to conserve species "*in their area of distribution*"; and
- **ecological provision** – irrespective of population and range coverage, ecological provision is judged as insufficient where it is known that the boundaries of existing SPAs currently exclude areas important for key ecological needs (for example farmland areas used for feeding adjacent to the breeding areas of upland waders).

The different types of insufficiency (as relevant) are listed by species in Appendix 10 and in the species accounts (Appendix 9).

5.3.2 Additional conservation measures

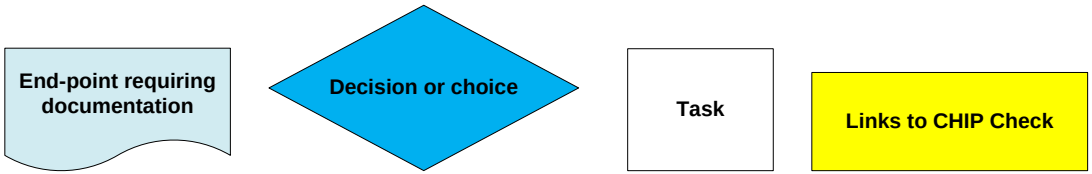
Article 3 of the Directive requires that "*Member States shall take the requisite measures to preserve, maintain or re-establish a sufficient diversity and area of habitats for all the species of birds referred to in Article I*". Whilst, for Annex I and migratory birds, the UK SPA network contributes to requirements which arise under Article 3(2)(a) (creation of protected areas), other measures may be required for such species as well as the classification of SPAs in order to preserve, maintain or re-establish a sufficient diversity and area of habitats for them, in accordance with Article 3(1) and 3(2)(b)-(d).

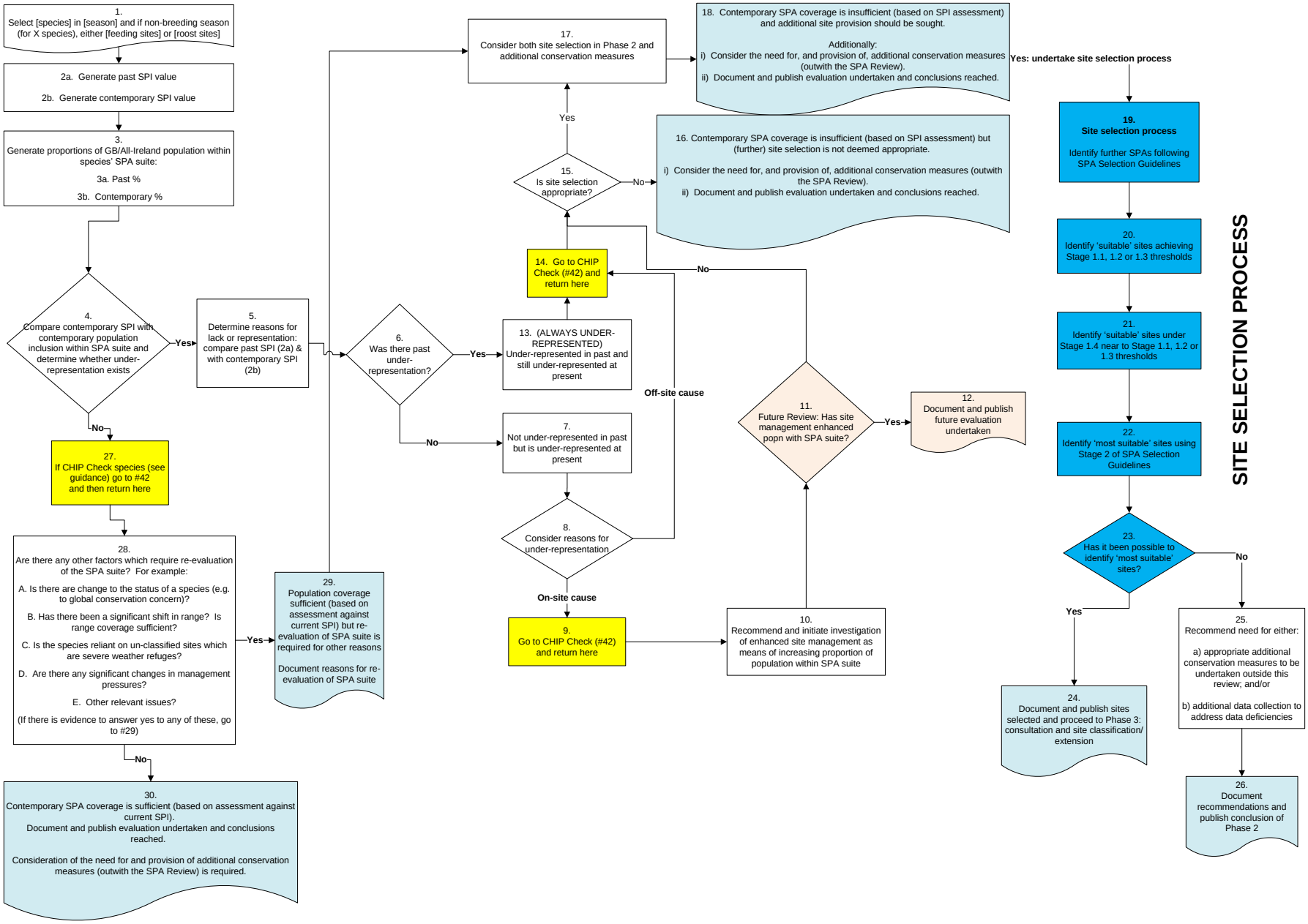
The assessment of such measures is not part of this Review but nonetheless is an important element in the delivery of obligations under Article 3(2)(b)-(d) and achieving the objectives of Article 2 of the Directive for Annex I and migratory species. This is especially the case where such species also occur widely away from SPAs.

As appropriate, the Decision Framework captures general recommendations for additional conservation measures to be progressed as part of other processes, and such conclusions are included in relevant species accounts for future elaboration.

Figure 5.1. Decision making framework for the third UK SPA Review.

Key: Symbols in pink relate to future review actions; symbols in dark blue relate to Phase 2 of third SPA Review. CHIP = Cropped Habitats Information Project (see section 5.4).




SITE SELECTION PROCESS
1. Select [species] in [season] and if non-breeding season (for X species), either [feeding sites] or [roost sites]
2a. Generate past SPI value
2b. Generate contemporary SPI value
3. Generate proportions of GB/All-Ireland population within species' SPA suite:
3a. Past %
3b. Contemporary %
4. Compare contemporary SPI with contemporary population inclusion within SPA suite and determine whether under-representation exists
Yes
No
5. Determine reasons for lack or representation: compare past SPI (2a) & with contemporary SPI (2b)
27. If CHIP Check species (see guidance) go to #42 and then return here
28. Are there any other factors which require re-evaluation of the SPA suite? For example:
A. Is there are change to the status of a species (e.g. to global conservation concern)?
B. Has there been a significant shift in range? Is range coverage sufficient?
C. Is the species reliant on un-classified sites which are severe weather refuges?
D. Are there any significant changes in management pressures?
E. Other relevant issues?
(If there is evidence to answer yes to any of these, go to #29)
Yes
No
29. Population coverage sufficient (based on assessment against current SPI) but re-evaluation of SPA suite is required for other reasons
Document reasons for re-evaluation of SPA suite
30. Contemporary SPA coverage is sufficient (based on assessment against current SPI).
Document and publish evaluation undertaken and conclusions reached.
Consideration of the need for and provision of additional conservation measures (outwith the SPA Review) is required.
6. Was there past under-representation?
Yes
No
13. (ALWAYS UNDER-REPRESENTED) Under-represented in past and still under-represented at present
7. Not under-represented in past but is under-represented at present
8. Consider reasons for under-representation
Off-site cause
On-site cause
14. Go to CHIP Check (#42) and return here
15. Is site selection appropriate?
Yes
No
9. Go to CHIP Check (#42) and return here
10. Recommend and initiate investigation of enhanced site management as means of increasing proportion of population within SPA suite
11. Future Review: Has site management enhanced popn with SPA suite?
Yes
No
12. Document and publish future evaluation undertaken
16. Contemporary SPA coverage is insufficient (based on SPI assessment) but (further) site selection is not deemed appropriate.
i) Consider the need for, and provision of, additional conservation measures (outwith the SPA Review).
ii) Document and publish evaluation undertaken and conclusions reached.
17. Consider both site selection in Phase 2 and additional conservation measures
18. Contemporary SPA coverage is insufficient (based on SPI assessment) and additional site provision should be sought.
Additionally:
i) Consider the need for, and provision of, additional conservation measures (outwith the SPA Review).
ii) Document and publish evaluation undertaken and conclusions reached.
Yes: undertake site selection process
19. Site selection process
Identify further SPAs following SPA Selection Guidelines
20. Identify 'suitable' sites achieving Stage 1.1, 1.2 or 1.3 thresholds
21. Identify 'suitable' sites under Stage 1.4 near to Stage 1.1, 1.2 or 1.3 thresholds
22. Identify 'most suitable' sites using Stage 2 of SPA Selection Guidelines
23. Has it been possible to identify 'most suitable' sites?
Yes
No
24. Document and publish sites selected and proceed to Phase 3: consultation and site classification/ extension
25. Recommend need for either:
a) appropriate additional conservation measures to be undertaken outside this review; and/or
b) additional data collection to address data deficiencies
26. Document recommendations and publish conclusion of Phase 2

Box 42
CHIP CHECK
DECISION-MAKING BOX

Define the importance of cropped habitats for the species: What function does the habitat perform? Feeding, roosting or breeding?

A. If the use of cropped habitats is necessary to meet the ecological requirements of the species, then:

A1. Does the species use the same sites each year when exploiting cropped habitats?	High / Medium / Low
A2. Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	High / Medium / Low
A3. Does the species show fidelity to specific locations (e.g. specific fields)?	High / Medium / Low
A4. Is the use of cropped habitats determined by crop type?	High / Medium / Low

B. Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?

Using the above judgements and associated guidance, consider and assess the need for classification of cropped habitats, then:

i) If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes [with or without additional conservation measures for cropped habitats]); or SPAs with a rotational management regime [with or without additional conservation measures for cropped habitats]

ii) If sites are not appropriate: consider (outside the SPA Review process) the nature of additional conservation measures outside the species' SPA suite. Document and publish conclusions reached, and if additional conservation measures recommended, then document the nature of these

5.4 Cropped habitats

Many species of bird are ecologically dependent in a number of ways on cropped habitats such as arable fields, grasslands and planted tree crops. The Birds Directive and relevant case-law from the European Court of Justice makes no distinction between man-made, semi-natural and natural habitats in their potential as SPAs, selection of these sites being dependent upon their being "…*most suitable territories*". Whilst there is no presumption against classification of such areas as SPA, within the UK, as in many other countries, the inclusion of cropped habitats within protected sites is considered carefully and critically, the *Guidelines for the Selection of Biological SSSIs* (Nature Conservancy Council 1989) (which provided the first rationale for SSSI designation in Great Britain, placed for birds. As SSSIs underpin most terrestrial SPAs, the designation of cropped habitats has consequently been a relatively rare occurrence in the contemporary SPA suite.

UK SPAs have been selected according to principles laid out in the Selection Guidelines for Special Protection Areas (JNCC 1999; http://jncc.DEFRA.gov.uk/page-1405). This guidance, which built on the SSSI guidance, suggests that 'more natural' habitats should be favoured for selection, resulting in a UK SPA network that comprises largely semi-natural habitats with little coverage of cropped habitats overall. However, given the importance of cropped habitats in the ecology of some species (notably Greenland Barnacle Geese, Corncrake, Stone-curlew, Capercaillie, Nightjar and Woodlark) there have been a significant number of SPA classifications for these species that have included such habitats.

The second network Review included only limited areas of cropped habitats within the SPA suite. For example, SPAs for non-breeding geese were focussed on roost sites and often did not include feeding areas that were in cropped habitats. Consequently, the current UK SPA provision for many of these species typically does not include such cropped habitats.

In 2002, the SPAR SWG identified the need to review knowledge of the ecological requirements of a range of species that make significant use of cropped habitats leading to the establishment of the Cropped Habitats Information Project (CHIP). This summarised our knowledge of the ecological importance of cropped habitats for species that use these habitats, and explored the implications for the conservation management of 43 species[35,36].

The SPAR SWG adopted a working definition of cropped habitat as follows:

> A cropped habitat is one used for harvesting seeds, roots, leaves, or other plant parts that are of commercial value to humans, *inter alia* formed by the planting of plants in cultivated (prepared) ground, by the regular application of fertilisers, manures or through other management. Such habitats include semi-improved and reseeded grasslands, cereals, brassicas, potatoes, other root crops, fruit and forestry (deciduous and conifer), as well as set-aside.

The results emphasised that each species has distinct patterns of use of cropped habitats, either solely or in combination with other habitats. Accordingly, the issue of SPA classification for birds using cropped habitats

[35] Bewick's Swan, Whooper Swan, Bean Goose, Pink-footed Goose, European White-fronted Goose, Greenland White-fronted Goose, Greylag Goose (Iceland population), Barnacle Goose (Greenland and Svalbard populations), Dark-bellied Brent Goose, Light-bellied Brent Goose (East Canadian High Arctic and East Atlantic populations), Wigeon, Teal, Mallard, Pintail, Honey-buzzard, Red Kite, Marsh Harrier, Hen Harrier, Montagu's Harrier, Osprey, Merlin, Capercaillie, Corncrake, Oystercatcher, Stone-curlew, Ringed Plover, Golden Plover, Lapwing, Dunlin, Snipe, Whimbrel, Curlew, Redshank, Black-headed Gull, Common Gull, Short-eared Owl, Twite, Nightjar, Woodlark, Ring Ouzel, Chough and Scottish Crossbill.

[36] Other species used cropped habitats – for example White-tailed Eagles can nest in forestry plantations (Kortland *et al.* 2011) but these were not included within the scope of CHIP.

needs to be considered on a species by species basis rather than through the development of a general policy.

Conclusions from the project were reported by the SPAR SWG in 2007 (Baker & Stroud 2007[37]) and have been incorporated into the Decision Framework (section 5.3) as part of the overall evaluation process for SPA selection and assessment. The summary of cropped habitat requirements and suggested management measures are incorporated into the relevant species accounts (Appendix 9).

5.5 Annex I species for which no SPAs have been classified

The second network Review noted five regularly occurring Annex I species[38] for which no SPAs had been selected in the UK, and offered reasons for this (Stroud *et al.* 2001). Since then, Spoonbill and Red-backed Shrike, also Annex I species, now also occur regularly, and have bred in the UK.

In 2004, the European Court of Justice ruled (case C-418/04 Commission v Ireland) that Member States are obliged to classify SPAs for *all* regularly occurring Annex 1 species. Consequently these seven species have been fully addressed in the current Review.

Reports on the status of these species were prepared by the BTO summarising information on the current UK status of the species and identifying key sites. This information is being considered in Phase 2 of this Review.

5.6 Marine SPAs

This Review covers to the 'terrestrial' component of the UK SPA network which includes estuarine and coastal SPAs. It covers all species which have *both* a terrestrial and a marine presence in the UK (*i.e.* it considers breeding seabirds, including marine extensions to seabird colony SPAs). It does not include consideration of species which occur solely in the marine environment or of SPAs that are wholly marine (offshore), the assessment of which is subject to separate processes (section 3.4).

However, given the differing timescales of this Review, the separate processes dealing with marine (offshore) SPAs, and the benefits of ensuring that the assessments of sufficiency in this Review are as comprehensive as possible, data from the three classified marine (offshore) SPAs have been included in relevant accounts for Red-throated Diver and Common Scoter. Furthermore, for those species occurring in both offshore marine and terrestrial environments (including at different times of the year) there will be a continuing need for liaison and co-ordination between relevant staff of the statutory agencies to ensure consistency of advice for agencies and relevant government departments. This is particularly important in ensuring consistent approaches for the same species in different seasons and/or environments, while at the same time accounting for significant differences in ecology or dispersion characteristics.

[37] http://jncc.Defra.gov.uk/pdf/N2KRSC_CHIP_PAPER_May2007%20web.pdf

[38] Common Crane, Smew, White-tailed Eagle, Montagu's Harrier and Kingfisher

6. Summary and advice to government

6.1 Changes across the SPA network

The UK SPA network has been the subject of significant change since 1999. This change has not been solely biological: changes have occurred in the numbers and distribution of relevant bird species, but there have also been changes in the legal understanding of the requirements of the Birds Directive (section 5.5) and also changes in the extent of suite coverage as further sites have been classified for particular species. There has also been growth in knowledge of bird distributions, not just through the 2007-2011 *Bird Atlas* (Balmer *et al.* 2013), but also – and especially for marine species – as new survey techniques and technologies have become available.

Biological changes have reflected both the increase and decrease of different species' populations, and the expansion and contraction of distributional ranges. Some of these changes are clearly attributable to the consequences of a changing climate and are in line with predicted modelled change (*e.g.* Pearce-Higgins *et al*. 2011; Johnston *et al.* 2013; Ausden *et al.* 2015). Other types of change reflect growth of knowledge, and changed national and international contexts.

Table 6.1 uses the 16 potential types of change (derived from potential outcomes from the Decision Framework) as an organising framework to summarise the conclusions of the 152 detailed assessments made[39]. The categorisation of species against change factor is given in Appendices 7a & 7b, noting that it is possible for a species to qualify against more than one type of change (*e.g*. changed legal status *and* changed biological status).

Appendix 8 lists those species for which the second Review recommended that no SPAs should be selected, and updates those assessments. For most species, the recommendation remains that SPAs are inappropriate, although for a few – especially Annex I listed-species – the SPAR SWG's advice is that they should be considered in Phase 2.

Appendix 9 gives advice related to 151 species/populations subject to detailed assessment.

[39] The detail of individual species assessments is given in the accompanying spreadsheet Phase 1 combined Proforma v11.xlsx.

Table 6.1. Summary of different potential change categories between network Reviews.

Notes:

- 'Contemporary' relates to the status as determined in this third network Review.
- Totals for 'species' here and elsewhere (Appendix 7) relates to seasonally specific suites of SPAs. The suite of SPAs classified for a species in the breeding season is assessed (and audited) separately from those SPAs classified for the same species in the non-breeding season, not least as different populations (*e.g.* Dunlin) or habitats (*e.g.* Hen Harrier) may be involved.
- See Appendix 7a for further details of species in each category.

Category of change	SWG's scientific advice to government on SPA suites in relevant change category	Total assessments
No further action required in the third SPA Review process		
No change of status	Contemporary SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.	**55**
Increase in numbers and/or range of non-aggregating species (low SPI)	In the context of increasing numbers and/or distribution, contemporary SPA coverage is sufficient for the requirements of the species.	**0**
Change of status at particular sites suggesting need to review management and/or monitoring regimes	Contemporary SPA coverage of numbers and distribution sufficient, and no other factors suggesting the need to revise the previously identified suite of SPAs for the species, but specific management and/or monitoring needs at particular SPAs.	**11**
Decline in numbers and/or contractions of range where additional site provision unlikely to reverse negative trends	Notwithstanding declines in numbers and/or distribution of relevant species, the sites within the SPA suite remain the "most suitable" UK territories but need to be subject to priority management and, as appropriate, enhanced monitoring in order to address those factors causing reduced numbers.	**1**
Geographic redistribution from the UK leading to a decline in overall national numbers. Proportion of (smaller) national population on SPA suite may or may not have declined. [= 'short stopping']	Notwithstanding their international redistribution, the sites within the SPA suite remain the "most suitable" UK territories but need to be subject to priority management and, where appropriate, enhanced monitoring in order to ameliorate factors causing reduced numbers.	**1**
Phase 2		
Change of status at particular sites indicating a need to review adequacy of functional provision at particular SPAs	Contemporary SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and no other factors suggest the need to revise the previously identified suite of SPAs for the species, but review of site boundaries of particular SPAs needed, *inter alia* for areas used for feeding or other functional needs.	**17**
Always under-represented within SPA suite based on contemporary assessments, with a significant deviation from expected provision as assessed by SPI both in the past and currently	In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.	**29**
Geographic redistribution within the UK but without a decrease in national numbers, leading to a decline in	In the context of changed distribution, the contemporary SPA provision is no longer sufficient for the	**1**

Category of change	SWG's scientific advice to government on SPA suites in relevant change category	Total assessments
% within existing SPAs	requirements of the species, and additional SPA provision should be sought.	
Increase in numbers and/or range of aggregating species (high SPI)	In the context of increasing numbers and/or distribution, contemporary SPA coverage is no longer sufficient for the requirements of the species, and additional SPA provision should be sought.	**11**
Change in understanding of legal or policy requirements	Classification of a suite of SPAs should be sought for relevant species as a regularly occurring Annex I species for which no such UK provision currently exists.	**13**
Proportional change as a result of change in contexts, including for example changed taxonomic status and/or revised knowledge of biogeographic populations	Appropriate changes to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution of the species.	**3**
Change following a previously identified lack of data and information which has since been resolved	Use newly acquired data and information to establish a suite of SPAs covering sufficient numbers and distribution for the species.	**8**
Actions following a previously identified lack of data and information, which however, remains lacking	Highlight a priority need for data collection to ensure that adequate SPA provision can be made for relevant species at least by the next national SPA network review.	**2**
Decline in numbers and/or contractions of range where additional site provision may be a positive conservation measure	In the context of decreasing numbers and/or distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of relevant species, and additional SPA provision should be considered.	**13**
Additional SPA provision should be considered to ensure suite fully represents species' range	To adequately represent species range, additional SPA provision should be considered in parts of distribution without SPA coverage.	**7**
Marine SPAs		
Species under consideration in marine SPA Review	The marine assessment will encompass some species which have also been considered within this Review including seabird species that breed terrestrially in the UK, most notably colonial seabirds. The marine Review will consider marine areas used both during and outwith the breeding season; and waterbird species (seaduck, divers and grebes) that frequent estuarine, coastal and inland waters, particularly. The marine Review will consider wholly marine areas (*i.e.* below low water) used by these waterbirds, whereas the current Review considered their presence in estuarine, coastal and inland waters.	**48**

6.1.1 Total network provision

The total network provision in the 1990s and 2000s is summarised in Table 6.2. Change in total numbers contained by the network between the 1990s and 2000s reflect the dual influences of changes to population sizes within the network, and the size of the network itself (*i.e.* the consequence of additional classifications).

Whilst total numbers of breeding seabirds and waterbirds, and of non-breeding waterbirds, have increased overall, total numbers of breeding birds of prey have declined. This reflects major declines in Merlin and Peregrine within SPAs – numbers of other raptors have either been stable or increased.

Table 6.2. Total SPA network provision in the UK in the 1990s and 2000s.

	Total in SPA suites in 1990s	Total in SPA suites in 2000s	Total of relevant UK populations in 2000s	Overall % of populations in 2000s
Breeding seabirds (pairs), including	2,725,744	2,471,260	3,522,176	70%
Petrels, Gannet, Cormorant & Shag	831,560	838,951	1,140,000	74%
Gulls & skuas	612,248	305,675	848,315	36%
Auks	1,244,579	1,297,613	1,454,875	89%
Terns	37,357	29,021	78,986	37%
Non-breeding waterbirds (individuals), including	2,279,545	2,487,993	6,639,846	37%
Divers, grebes and seaducks	7,048	144,706	158,100	92%
Geese and swans	392,539	470,703	699,804	67%
Ducks	499,726	470,108	1,820,180	26%
Waders	1,363,541	1,381,751	3,725,590	37%
Breeding waterbirds (pairs), including	43,957	41,668	327,153	13%
Waders	22,400	28,171	281,397	10%
Breeding raptors (pairs)	1,092	970	7,256	13%
Other breeding species (pairs)	5,391	5,276	38,430	

Notes:

i. Totals relate to total occurrence within SPA suites identified in the second network Review and subsequent classified additions to those suites (Table 2.2).

ii. Totals relate to 'qualifying' occurrences only and make no allowance for occurrence of species elsewhere within the network in non-qualifying numbers. It is known that for many species such aggregated numbers are very significant.

iii. Totals relate to the UK.

6.1.2 Summary of findings

On the basis of the assessment methodology established by this Review:

- SPA suites for 64 species/populations[40] are judged to be sufficient to meet the requirements of Article 4 of the Birds Directive.

- SPA suites for 87 species/populations are considered to be insufficient to meet the requirements of Article 4 of the Birds Directive in some way. These relate to 38 breeding species[41] and 49 non-breeding species[42]. It is planned that these insufficiencies will be addressed through Phase 2 of this Review.

- Reviews of the management of relevant SPAs should be undertaken by the relevant country agencies to address causes of declines at sites for 15 species (Table 6.3).

- Review of the boundaries of some or all of the SPAs for 17 species is needed to ensure sites adequately provide for the species' ecological functions (Table 6.4).

- Review of SPA provision in the marine environment is needed for at least 49 species (Table 3.1).

Table 6.3. Summary of recommended management reviews, status reviews and/or site monitoring needs. Breeding = br, non-breeding = nb.

Species	Sites with management review needs	Site monitoring needs
Black-throated Diver (br)	Review management at six sites (Assynt Lochs; Wester Ross Lochs; Loch Maree[43]; Loch Shiel; Inverpolly, Loch Urigill and Nearby Lochs; and Lairg/Strathbrora Lochs) where numbers are now less than in 1990s – counter to the increasing national trend – and take remedial actions.	
Great Crested Grebe (br)	Review management at Loughs Neagh and Beg to understand the causes of significant decline running counter to increasing national trend.	Enhance monitoring at Lough Neagh and Lough Beg.

[40] Great Crested Grebe (breeding - br); Fulmar (br); Manx Shearwater (br); Storm Petrel (br); Leach's Petrel (br); Gannet (br); Shag (br); Bewick's Swan (& management review needed); Taiga Bean Goose; Pink-footed Goose (roosts); European White-fronted Goose; Greenland Barnacle Goose (roost & feeding); Canadian Light-bellied Brent Geese; Svalbard Light-bellied Brent Geese; Shelduck (non-breeding - nb); Wigeon (br & nb); Gadwall (br & nb); Teal (nb); Mallard (nb); Pintail (nb); Shoveler (br & nb); Tufted Duck (nb); Scaup (nb); Common Scoter (br); Honey-buzzard; Marsh Harrier; Golden Eagle; Capercaillie; Corncrake; Coot (nb); Oystercatcher (br & nb); Avocet (nb); Stone Curlew; Ringed Plover (br); Grey Plover (nb); Knot; Dunlin (nb); Ruff (br); Black-tailed Godwit (br & nb); Bar-tailed Godwit; Whimbrel (nb); Redshank (nb); Greenshank (br); Wood Sandpiper (br); Great Skua (br); Black-headed Gull (br); Lesser Black-backed Gull (br); Herring Gull (br); Kittiwake (br); Sandwich Tern (br); Roseate Tern (br); Common Tern (br); Little Tern (br); Guillemot (br – *U. a. aalge* & *U. a. albionis*); Razorbill (br); Puffin (br); Short-eared Owl; Fair Isle Wren.

[41] Red-throated Diver (breeding- br); Black-throated Diver (br); Slavonian Grebe (br); Cormorant (br); Bittern (br); Little Egret (br); Spoonbill (br); Red Kite (br); White-tailed Eagle; Montagu's Harrier; Hen Harrier (br); Osprey; Merlin (br); Peregrine (br); Spotted Crake; Common Crane (br); Avocet (br); Dotterel (br); Golden Plover (br); Dunlin (br); Whimbrel (br); Curlew (br); Redshank (br); Red-necked Phalarope (br); Arctic Skua (br); Mediterranean Gull (br); Common Gull (br); Great Black-backed Gull (br); Arctic Tern; Nightjar; Kingfisher (br); Woodlark; Ring Ouzel; Dartford Warbler; Red-backed Shrike; Chough (br); Twite (br); Scottish Crossbill

[42] Red-throated Diver (non-breeding – nb); Little Grebe (nb); Great Crested Grebe (nb); Slavonian Grebe (nb); Cormorant (nb); Bittern (nb); Little Egret (nb); Spoonbill (nb); Whooper Swan (nb); Greenland White-fronted Goose; Icelandic Greylag Goose (roosts); Svalbard Barnacle Goose; Dark-bellied Brent Goose; Pochard (nb); Eider (*S. m. mollissima*. & *S. m. faeroeensis* nb); Long-tailed Duck; Common Scoter (nb); Velvet Scoter; Goldeneye (nb); Smew; Red-breasted Merganser (nb); Goosander (nb); Red Kite (nb); Hen Harrier (nb); Merlin (nb); Common Crane (nb); Ringed Plover (nb); Golden Plover (nb); Lapwing (nb); Sanderling; Purple Sandpiper (nb); Ruff (nb); Snipe (nb); Curlew (nb); Greenshank (nb); Turnstone (nb); Mediterranean Gull (nb); Little Gull (nb); Black-headed Gull (nb); Common Gull (nb); Lesser Black-backed Gull (nb); Herring Gull (nb); Great Black-backed Gull (nb); Sandwich Tern (passage); Common Tern (passage); Aquatic Warbler (passage); Kingfisher (nb); Chough (nb)

[43] Note that a thorough review for the period 2006-2009 has already been undertaken by Brown (2010) for Loch Maree. This provides a model for similar reviews at other sites.

Species	Sites with management review needs	Site monitoring needs
Slavonian Grebe (br)	In view of the small size of the national population and declining trend within and outwith SPAs, the conservation management of all regularly used breeding sites should be subject to urgent review.	
Fulmar (br)		The proportion of GB population within the SPA network has declined by *c.*7% between 1990s and 2000s with significant declines across most SPAs, some being very large (*e.g.* an apparent loss of 13,000 pairs on Fair Isle). The widespread nature of the declines suggests a wider 'off-site' issue. Research should be undertaken to investigate whether the population has moved to other non-SPA sites or been lost to inform possible conservation responses.
Storm Petrel (br)		Determine, on a site specific basis, monitoring protocols (including correction factors) that will allow comparison with past surveys as well as enhanced understanding of current numbers for future comparisons
Cormorant (br)		Ensure use of standard methods for future counts at Ynys Seiriol/Puffin Island SPA to ensure comparability.
Cormorant (nb)		Ensure complete coverage of Medway Estuary and Marshes, and Upper Nene Valley Gravel Pits SPAs in future WeBS counts.
Bewick's Swan	Both geographic redistribution within the UK and an overall population decline have lead to a decrease in overall national numbers. A more-detailed review of the data for all sites is recommended, and, as appropriate, enhanced management at some sites considered in order to ameliorate factors causing reduced numbers as is best possible.	
European White-fronted Goose		Ensure complete coverage of Broadland SPA in future WeBS counts (Heigham Holmes and possibly other areas currently not included). Enhance collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.
Greenland White-fronted Goose		Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites. Ensure monitoring regime established that can assess population numbers at the roost sites at Eilean na Muice Duibhe/Duich Moss, Islay and Rinns of Islay, either directly or through research to demonstrate reliability of assumptions concerning the relationship between roost sites and feeding areas currently giving indirect assessments with potentially significant error. Undertake survey of roost sites on Coll to assess whether the SPA is still used by roosting geese.
Greenland Barnacle Goose (roost – monitoring needs)		Ensure monitoring regime established that can assess population numbers at the roost sites at Gruinart Flats and Bridgend, Islay, either directly or through research to demonstrate reliability of assumptions concerning the relationship between roost sites and feeding areas currently giving indirect assessments.

Species	Sites with management review needs	Site monitoring needs
		Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.
Wigeon (br)		Ensure monitoring protocols in place to assess status of species on the two SPAs, focussing priority attention on the Peatlands of Caithness and Sutherland for which no contemporary site assessments exist.
Ruff (br)	Assess site condition, current management and potential for enhancement of key sites given the extinction of breeding Ruff from three of the four SPAs used in the 1990s.	
Sandwich Tern (br)	Site condition and management should be considered at those sites where numbers have shown major decreases	
Short-eared Owl		In the light of lack of contemporary data for four of the six SPAs, ensure monitoring regimes are developed and in place and reporting at the Peatlands of Caithness and Sutherland, Muirkirk and North Lowther Uplands, Orkney Mainland Moors and South Pennine Moors by the next SPA Network review. Standardise methods between these and the other two SPAs (Forest of Clunie, and Skomer and Skokholm) where monitoring does occur. Continue work to develop appropriate survey methodologies applicable at wide-scales although noting that work undertaken so far (Calladine *et al.* 2008) has shown the development of such methods to be especially challenging.

Table 6.4. Summary of species whose SPA suites need boundary review to ensure they provide ecological sufficiency. Sites listed are existing SPAs. Note this list excludes other species using cropped habitats (section 5.4) where there may also be a need to consider inclusion of feeding areas within sites.

Species	Sites with boundary review needs
Red-throated Diver (br)	Caithness and Sutherland Peatlands, Foula, Hermaness, Saxa Vord and Valla Field, Hoy, Lewis Peatlands, Mointeach Scadabhaig, Orkney Mainland Moors, Otterswick and Graveland, Ronas Hill – North Roe and Tingon, Rum
Icelandic Greylag Goose (feeding)	Caithness Lochs, Cromarty Firth, Din Moss – Hoselaw Loch, Dornoch Firth and Loch Fleet, Firth of Tay and Eden Estuary, Holburn Lake and Moss, Inner Moray Firth, Lindisfarne, Loch Eye, Loch Ken and River Dee Marshes, Loch of Kinnordy, Loch of Lintrathen, Loch of Skene, Loch of Strathbeg, Loch Spynie, Montrose Basin, Moray and Nairn Coast, Muir of Dinnet, South Tayside Goose Roosts Lough Foyle, Lough Neagh and Lough Beg, Strangford Lough
Pink-footed Goose (feeding)	Broadland, Cameron Reservoir, Castle Loch, Lochmaben, Din Moss – Hoselaw Loch, Fala Flow, Firth of Forth, Firth of Tay and Eden Estuary, Gladhouse Reservoir, Greenlaw Moor, Lindisfarne, Loch Leven, Loch of Kinnordy, Loch of Strathbeg, Martin Mere, Montrose Basin, Moray and Nairn Coast, Morecambe Bay, North Norfolk Coast, Ribble and Alt Estuaries (Phase 2), South Tayside Goose Roosts, The Wash, Upper Solway Flats and Marshes, Westwater, Ythan Estuary, Sands of Forvie and Meikle Loch
European White-fronted Goose	Alde-Ore Estuary, Breydon Water, Broadland, North Norfolk Coast, Severn Estuary, Thames Estuary and Marshes, The Swale, The Wash
Svalbard Barnacle Geese	Loch of Strathbeg, Upper Solway Flats and Marshes

Species	Sites with boundary review needs
Dark-bellied Brent Geese	Benfleet and Southend Marshes, Blackwater Estuary (Mid-Essex Coast Phase 4), Chesil Beach and The Fleet, Chichester and Langstone Harbours, Colne Estuary (Mid-Essex Coast Phase 2), Crouch and Roach Estuaries (Mid-Essex Coast Phase 3), Dengie (Mid-Essex Coast Phase 1), Exe Estuary, Foulness (Mid-Essex Coast Phase 5), Hamford Water, Humber Flats, Marshes and Coast (Phase 1), Medway Estuary and Marshes, North Norfolk Coast, Poole Harbour, Portsmouth Harbour, Solent and Southampton Water, Stour and Orwell Estuaries, The Swale, The Wash
Osprey	Abernethy Forest, Cairngorms, Cromarty Firth, Dornoch Firth and Loch Fleet, Forest of Clunie, Glen Tanar, Inner Moray Firth, Moray and Nairn Coast, River Spey – Insh Marshes
Golden Plover (br)	Caithness and Sutherland Peatlands, Lewis Peatlands, Muirkirk and North Lowther Uplands, North Pennine Moors, North York Moors, South Pennine Moors Pettigoe Plateau
Golden Plover (nb)	Abberton Reservoir, Blackwater Estuary, Breydon Water, Colne Estuary, Firth of Forth, Foulness, Hamford Water, Humber Estuary, Lindisfarne, Lower Derwent Valley, Mersey Estuary, Morecambe Bay, North Norfolk Coast, Ribble and Alt Estuaries, Somerset Levels and Moors, The Swale, The Wash, Upper Nene Valley Gravel Pits, Upper Solway Flats and Marshes Lough Foyle, Lough Neagh and Lough Beg, Outer Ards, Strangford Lough
Lapwing (nb)	Abberton Reservoir, Alde-Ore Estuary, Blackwater Estuary, Breydon Water, Chichester and Langstone Harbours, Colne Estuary, Dengie, Exe Estuary, Firth of Forth, Foulness, Hamford Water, Humber Estuary, Lindisfarne, Lower Derwent Valley, Medway Estuary and Marshes, Mersey Estuary, Morecambe Bay, Nene Washes, North Norfolk Coast, Ouse Washes, Poole Harbour, Ribble and Alt Estuaries, Rutland Water, Severn Estuary, Solent and Southampton Water, Somerset Levels and Moors, Stour and Orwell Estuaries, Teesmouth & Cleveland Coast, Thames Estuary and Marshes, The Dee Estuary, The Swale, The Wash, Upper Nene Valley Gravel Pits, Upper Solway Flats and Marshes, Ythan Estuary Sands of Forvie and Meikle Loch, Belfast Lough, Lough Foyle, Lough Neagh and Lough Beg, Strangford Lough
Dunlin (br)	Caithness and Sutherland Peatlands, Fetlar, Lewis Peatlands, North Pennine Moors, North Uist Machair and Islands, South Pennine Moors, Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast), South Uist Machair and Lochs
Curlew (br)	North Pennine Moors
Curlew (nb)	Blackwater Estuary (Mid-Essex Coast Phase 4), Burry Inlet, Chichester and Langstone Harbours, Cromarty Firth, Dornoch Firth and Loch Fleet, Duddon Estuary, Firth of Forth, Foulness (Mid-Essex Coast Phase 5), Humber Estuary, Inner Moray Firth, Medway Estuary and Marshes, Mersey Estuary, Morecambe Bay, Poole Harbour, Ribble and Alt Estuaries (Phase 2), Severn Estuary, Solent and Southampton Water, Stour and Orwell Estuaries, The Dee Estuary, The Swale, The Wash, Upper Solway Flats and Marshes Belfast Lough, Lough Foyle, Strangford Lough
Nightjar	Ashdown Forest, Breckland, Dorset Heathlands, East Devon Heaths, Minsmere – Walberswick, New Forest, Sandlings, Thames Basin Heaths, Thorne and Hatfield Moors, Wealden Heaths
Woodlark	Breckland, Dorset Heathlands, Minsmere-Walberswick, New Forest, Sandlings, Thames Basin Heaths, Wealden Heaths
Chough (br)	Castlemartin Coast, Craig yr Aderyn, Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island, Glannau Ynys Gybi/Holy Island Coast, Gruinart Flats, Islay, North Colonsay and Western Cliffs, Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal/Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands, Oronsay and South Colonsay, Ramsey and St David's Peninsula Coast, Rinns of Islay, Skomer and Skokholm, The Oa, Islay
Chough (nb)	Castlemartin Coast, Craig yr Aderyn, Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island, Glannau Ynys Gybi/Holy Island Coast, Gruinart Flats, Islay, Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal/Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands, North Colonsay and Western Cliffs, Oronsay and South Colonsay, Ramsey and St David's Peninsula Coast, Rinns of Islay, The Oa, Islay

6.2 Species for which SPA insufficiencies were previously identified

Section 1.2 documented various migratory or Annex I species for which the second network Review (Stroud *et al.* 2001) had concluded that it has "not yet been possible to identify full SPA suites" and for which further review would be required.

The main reasons identified for this were that:

- it was too early to assess 'most suitable' sites for species that were actively expanding in range and population size in the UK;
- there was a lack of suitable data and information with which to identify important sites;
- the protection requirements of birds in the offshore marine environment were outside the scope of the 2001 Review.

Broad outcomes with respect to these groups are summarised in Table 6.5, with further detail for the species concerned given in Table 6.5 (and in the relevant species accounts).

Table 6.5. Progress towards sufficient SPA suites for species previously identified as insufficient.

Groups for which the second network Review identified SPA suite insufficiency	**Broad conclusions from third network Review**
Recent UK colonists (*e.g.* Little Egret)	For relevant species, Phase 2 will assess whether it is possible to identify qualifying sites. If that is not possible, these species will be re-assessed by the next Review by which time UK populations may have further consolidated.
Re-establishing raptors (*e.g.* White-tailed Eagle, Osprey and Red Kite)	All relevant species have been formally categorised as 'insufficient' with sites to be identified in Phase 2.
Non-breeding gulls	All relevant species have been formally categorised as 'insufficient' with sites to be identified in Phase 2.
Wintering raptors in coastal areas	No new information has become available since the second review, and indeed, there is no accessible monitoring data from most existing SPAs for wintering Merlin and Hen Harrier. The Review recommends that the continuing deficiency of information for relevant species be addressed as a matter of priority.
Passage waders and terns	Conclusions for individual species are given in Appendix 7b.
Marine species	Subject to a separate, JNCC co-ordinated, review process.

6.3 Species accounts

Species accounts for all species subject to detailed assessment are presented in Appendix 9. These give the detailed site-related and other data and information collated by this Review. These accounts summarise the current population status, size, trends, distribution of SPAs, and also summarise the reasons why the particular suite of SPAs was selected for that species following Stroud *et al.* (2001). A map of the UK shows the location of selected sites and a table summarises population data at each SPA within the species' suite.

Each species account is presented in a standard format as follows:

- **Section 1** summarises the legal status, and legislative or conservation status changes of the species (or sub-species or population) since 2001. In this section:
  - migratory status follows the assessments made in the second network Review (Stroud *et al.* 2001);
  - Birds of Conservation Concern (BOCC) categorisations are taken from Gregory *et al.* (2002) for BOCC 2, Eaton *et al.* (2009) for BOCC 3, and Eaton *et al.* (2015) for BOCC 4; and
  - IUCN Red List categorisations are as at the 2015 release (http://www.iucnredlist.org).

- **Section 2** presents information on population size (including 1% thresholds), population trends and information about the Site Provision Index (section 5.2). It shows the total number of individuals occurring within the SPA suite in the 2000s for the species concerned, and also expresses this number as a proportion of relevant populations. (Relevant international/ biogeographic populations[44] are defined in Appendix 4, and sources for this information given). Note that it is possible to have large numbers of a species occurring within the biogeographic entity of the island of Ireland, although – through features of dispersal – low numbers in Northern Ireland (and thus limited occurrence within SPAs there).

- For waterbird populations greater than 2,000,000 individuals, a 1% threshold of 20,000 applies in line with guidance from the Ramsar Convention (Ramsar Convention 2012). These instances are indicated by a double asterix thus - 20,000**.

- For non-breeding waterbird populations where the 1% threshold is less than 50, then a threshold of 50 applies for reasons outlined by Stroud *et al.* (2001). These thresholds are square bracketed. This does not apply to Slavonian Grebe, Bittern, Spoonbill, Smew or Crane[45].

- **Section 3** summarises changes to the SPA suite – typically through new classifications – since the second network Review.

- **Section 4** records any relevant national or international Action Plans for the species and presents relevant published actions relevant to protected areas and their management.

- **Section 5** summarises projected impacts of climate change for the species drawing on the major analyses of Huntley *et al.* (2007) and Pearce-Higgins *et al.* (2011). Section 2.4 presents further information on climate change and notes other relevant studies since the second network Review.

- **Section 6** presents the assessment of the SPA suite undertaken by this Review. For relevant species, it summarises information drawn from the Cropped Habitats Information project (Baker & Stroud 2007; section 5.4). This section gives the outcomes of the assessment of the three types of sufficiency described in section 5.3.1, and well as noting the need for further special conservation measures (section 5.3.2) as relevant.

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[44] Note that in the species accounts and elsewhere, the term 'international population' is used synonymously to refer to the relevant biogeographical population of the species concerned. It does not refer to the total world population for which the terms 'global population' or 'global numbers' are used where they are relevant.

[45] See http://jncc.defra.gov.uk/pdf/Minimum%20threshold%20guidance%202014%20update%20v3.pdf for further information.

- **Section 7** gives the SPAR SWG's scientific advice concerning the SPA suite.

- **Section 8** presents recommendations regarding survey and monitoring arising from the collation of data and information for this third network Review.

- **Section 9** presents a map showing the location of sites within the species' SPA suite. In these maps, closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines (JNCC 1999; Stroud *et al.* 2001). Sites for species selected under Guidelines 1.1, 1.2 and 1.4 are indicated by a diamond symbol (◆). Sites where the species forms an important component of an assemblage identified under Guideline 1.3 are shown by a square (■). Note that the symbols used are not proportionate to the size of the site.

- **Section 10** gives sources cited in the account.

- The final **section 11** of the account is a table listing the sites selected. This shows for each site:
  - the guideline by which each site was selected;
  - the date of classification;
  - numbers at the time of the second network Review (1990s);
  - numbers in the 2000s collated by this Review;
  - the data period for contemporary data; and
  - the source of contemporary data for the site.

  The table also gives summary statistics for the SPA suite presented as proportions of Great Britain, All-Ireland and biogeographic populations. For non-breeding waterbirds, the total presented against each site is (generally) the five year peak mean count, whilst the suite total presented at the bottom of the table derives from a 'snapshot' assessment of the suite in January or another relevant month as explained in section 4.4. This is in order to ensure no double-counting of birds through the use of inappropriate statistics (see Stroud *et al.* 2001 section A5.4 for further information).

6.4 Current scope and extent of SPA monitoring

Monitoring is fundamental to the management of protected sites, both individually and as networks at a range of scales. The monitoring process provides site managers and others with information concerning how effective protected sites, both individually and collectively, are being in sustaining the species (or habitats) for which the sites have been legally protected.

Monitoring is a central element of the adaptive management of individual SPAs, giving information on changing bird numbers which, when linked to other ecological information, can inform potential changes in habitat management needed to sustain the conservation interests of the sites concerned. At larger scales, monitoring of populations on sites provides essential information about whether a site network is delivering the policy objectives for which it was established, and thus ensuring benefits for the public good.

The UK SPA network is generally very well-monitored through a number of schemes and processes. The following section outlines how this is monitoring is undertaken and the sources of the data used in this Review.

6.4.1 Sources of data used to monitor and assess SPAs in the UK

This Review addresses issues related to 270 SPAs across the UK which are classified for 130 species/populations, thus currently the network has 1,516 interest 'features' (a combination of qualifying species X at classified site Y). Information about the site-related, and the wider population status, of these interest features is necessary for any network assessment.

The Third Review sought information from the 2000s about all 1,516 of these interest features as outlined in section 4 above.

The data used were derived from multiple monitoring schemes, some funded or co-funded by the statutory agencies, others funded or co-funded by non-governmental organisations, with most dependent on significant inputs of volunteer time and resources to collect data. This section summarises the key findings from an analysis of sources of data as background to the recommendations on monitoring (section 6.5).

Figure 6.1 summarises the sources of data by their scheme, with the following points arising:

- At least one site count from the 2000s was located for over 96% of the SPA interest features on the network indicating an overall excellent level of coverage from existing surveillance schemes or recent surveys.
- Five schemes and surveys provided 87% of all the data used. These are the Wetland Bird Survey (WeBS); the UK Seabird Monitoring Programme (SMP); the Seabird 2000 Census; periodic national surveys organised by the Statutory Conservation Agency / RSPB Annual Breeding Bird Survey partnership (SCARABBS); and the Goose and Swan Monitoring Scheme (GSMP).
- The remaining 9% of data related to interest features derived from other sources, including bespoke species surveys organised by a range of statutory and non-statutory organisations; reserve monitoring; and volunteer records collated by the Rare Breeding Birds Panel (RBBP). For many species of high conservation status, such *'ad hoc'* records provide the only monitoring data available for SPAs.
- Seabird monitoring is co-ordinated by the Seabird Monitoring Programme which collates records on an annual basis for as many sites as possible, with complete censuses of Britain and Ireland at roughly fifteen year intervals. The last of these was the Seabird 2000 Census in 1998-2002. Most seabird data (71% of seabird interest features) were derived from SMP, *i.e.* from 2003 or later. However the remaining (totalling 90, or 29% of seabird interest features) assessments for 18 species derive from Seabird 2000. These relate mostly to remoter seabird colonies especially in northern and western Scotland, where logistical considerations mean that counts are only made during national surveys.
- Considering who collects the data, about 85% of all records were collected by volunteers, typically organised through national schemes, but also submitting records directly to RBBP, or participating in species-specific SCARABBS or other surveys. However, this total is indicative since it is not feasible to determine exactly who collected each record: at least some professional staff will contribute records from their nature reserves to WeBS and seabird monitoring schemes.

- The remaining 15% of records were collected by professional staff or field workers organised typically through species surveys such as those organised under the SCARABBS partnership (see Table 4.4 for summary of relevant surveys).

Figure 6.1. Sources of data used in the third SPA Review by source (n = 1,516 interest features)[46].

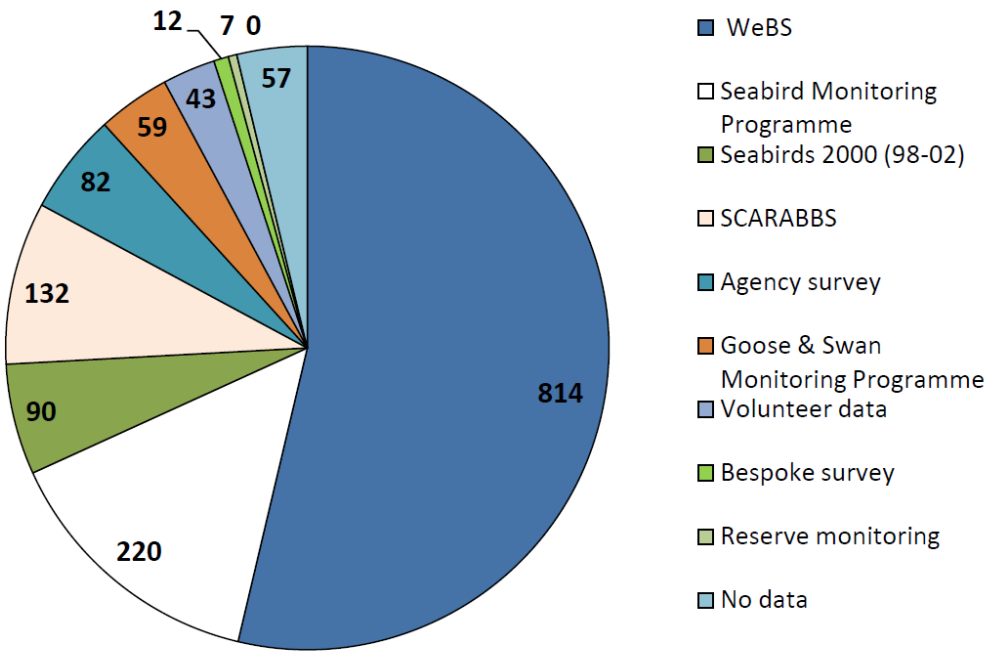

Table 6.6 shows the extent of monitoring coverage of each species/population's SPA suite made by the different national surveillance schemes.

- All the data on the status of some species / populations on sites within relevant SPA suites derive typically from a single national source. This is the case in 92 instances. Thus just five schemes provide all the monitoring data for most SPA assessments.
- The importance of these schemes also implies that their absence would affect the totality of monitoring for the species concerned.
- The assessment of SPA suites for most breeding seabirds thus depends both on the Seabird Monitoring Programme (for more accessible colonies), and periodic national censuses (in this Review, Seabird 2000 for example) for more remote sites. Only five species of breeding seabirds are wholly monitored by the SMP alone.

[46] Agency surveys include a wide range of commissioned surveys either at single SPAs, or wider scales undertaken on an irregular basis. It includes data collected for Common Standards Monitoring purposes by agency staff.

Reserve monitoring includes data collected by country agencies, RSPB or WWT on National Nature Reserves or other reserves as a part of route annual monitoring. Where national (SCARABBS) or country agency surveys include these reserves such annual monitoring will be included within the wider surveys.

Volunteer data includes a wide range of counts typically collated through RBBP or contributed to national surveys otherwise undertaken by professional fieldworkers. Note of course, that most data collected by the major surveillance schemes (such as WeBS) are also collected by volunteers.

Bespoke surveys include surveys organised by species-orientated Study Groups at scales wider than single sites.

Table 6.6. The numbers of qualifying species/populations for which organised monitoring schemes provide all or most SPA data.

	Number of species/populations for which scheme provides data			
Scheme	**for all SPAs**	**for 50% or more of SPAs**	**for less than 50% of SPAs**	**Total**
WeBS	50	2	2	54
SMP	5	15	3	23
Seabird 2000		8	10	18
GSMP	3	2		5
SCARABBS	13	2	2	17

6.4.2 Potential improvements

One of the Terms of Reference for the Third Review (Appendix 2) was to report to government on "gaps in data availability for certain species/groups of species and recommendations on measures to address these in the medium and long-terms consequent upon any guidance and recommendations proposed".

A number of issues arise from our review of the current monitoring provision as outlined below. Section 6.5 below makes a number of recommendations to improve the quality and scope of future monitoring provision[47]. The background to these is as follows.

Overall adequacy of monitoring

Overall the network is subject to extensive and well-targeted monitoring of qualifying and other occurring species.

Many sites are monitored annually (especially SPAs for breeding seabirds and non-breeding waterbirds). For non-breeding waterbirds many sites are counted monthly giving fine-scale data and information that can be used to direct habitat management and inform other aspects of site conservation.

Specific data deficiencies

Whilst overall 96.2% of the SPA interest features had at least one site estimate from the 2000s, coverage was not consistent across species. There was 100% coverage for many species, whilst in contrast, estimates exist for just three of 20 sites for non-breeding Hen Harrier (15% of SPAs). Overall 85% of species had complete assessments, though 15% were lacking data related to at least one site.

For 114 species/populations (88%) there were data for three quarters of UK sites within their SPA suites. In contrast 16 species/populations (12%) lacked site data for at least a quarter of relevant SPAs. Two species had no site-related data at all from the 2000s. When considered at a country scale, a larger number of species lacked the data necessary to allow country-level assessments (although only UK-scale assessments are made in this third UK Review).

[47] Such enhancements will also aid Common Standards Monitoring for SPAs (and their underpinning SSSIs - as relevant) at minimal additional cost.

Although data were lacking from the 2000s for some species, for many of these there were older data from schemes such as WeBS (16 sites), GSMP (three), and SMP (three), indicating that monitoring did previously occur. Further recommendations concern the need for future scheme planning to include these sites where this is feasible (but see below).

Alignment of boundaries

At most SPAs, boundaries of survey and monitoring areas are correctly aligned with those of relevant SPAs so that monitoring assessments derive accurate estimates for the sites concerned. However, at a minority of sites, boundaries of count units are misaligned leading to poor quality data and the potential risk of challenge. This affects 16 seabird sites and one WeBS site.

The Review has made recommendations to address this issue and it should be feasible to deliver this as part of the continued management of the schemes concerned without additional cost.

Quality issues

Whilst boundary misalignment is one example of low quality data, there are 45 other instances of data being of low quality. Whilst it can be considered that some data, albeit of low quality, are better than nothing, the Review's recommendations highlight the means to improve this situation.

Most (32) of these cases involve SPAs which are large wetland complexes and where monitoring does not currently encompass the whole site. This results in underestimation of the totals for the relevant species on the sites concerned. Similarly as for boundary misalignment, it should be feasible to improve this situation through the future development of WeBS without additional cost.

Remaining quality issues largely relate to a range of survey design issues and again it should be feasible to address these through better initial planning of future surveys.

A specific issue relates to Capercaillie where the methods used to monitor the 11 individual SPAs (lek counts) differ from those used to derive the national population estimate (winter transect surveys). Without an analytical technique to relate these two metrics to each other it is currently not possible to assess the proportion of Capercaillie within the SPA network.

Co-ordination processes: expectation and responsibility for SPA monitoring

There is general expectation that monitoring for certain species will be undertaken through relevant national schemes (for example for non-breeding waterbirds via WeBS). Yet many instances of missing data relate to SPAs that are remote, away from centres of population, and thus are difficult, unsuitable or impossible to cover through volunteer-based monitoring schemes due to access or health and safety issues. In such instances professionally undertaken surveys may be periodically needed instead to supplement largely volunteer coverage.

One of the Review's recommendations is addressed to the relevant schemes in order to gain clarity as to the potential for future coverage of such sites via volunteer inputs. That will give important information for relevant country agencies and provide clarity as to where the responsibility for monitoring these sites lies if volunteer coverage remains infeasible.

6.5 Monitoring recommendations

The individual species accounts consider issues of data deficiency and make recommendations for future monitoring for relevant species. The following recommendations relate however, to issues of general importance:

National surveillance schemes and organisational

- Maintenance of national surveillance programmes which supply site-related data used for SPA assessment processes and relevant national contexts is critical. This includes, but is not restricted to:
  - BTO/JNCC/RSPB Wetland Bird Survey http://www.bto.org/volunteer-surveys/webs
  - WWT/JNCC/SNH Goose & Swan Monitoring Programme http://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme
  - Rare Breeding Birds Panel (including enhanced potential for spatial analysis of data-holdings) http://www.rbbp.org.uk
  - Seabird Monitoring Programme (including periodic national censuses) http://jncc.Defra.gov.uk/page-1550
  - SCARABBS programme of national surveys for relevant species
  - BTO/RSPB/JNCC Breeding Bird Survey http://www.bto.org/volunteer-surveys/bbs
  - BTO Waterways Breeding Bird Survey http://www.bto.org/volunteer-surveys/wbbs
- Periodically revised national population estimates used for regular assessments of the UK SPA Network as well as for UK Article 12 reports (*e.g.* JNCC 2013) should be delivered through the Avian Population Estimates Panel.
- The SWG should continue to advise on relevant UK monitoring schemes and needs, to ensure that appropriate monitoring regimes are in place for all relevant species and sites.
- It should be a fundamental requirement for all relevant national monitoring schemes that count units or other survey areas are matched against SPA boundaries.
- The objectives of all future national surveys (such as those undertaken via SCARABBS partnership) should be to supply not only national population estimates but also relevant site population assessments. Survey methodology should be such as to clearly allow matching of survey areas against SPA boundaries.

Marine environment and seabirds

- Any monitoring recommendations included in the SPA Review that apply to the marine environment will be taken forward and reviewed as part of a wider programme to develop a UK monitoring and surveillance strategy for marine biodiversity.

  JNCC's advice on monitoring options for marine birds is anticipated to include:

  1. A summary of existing monitoring schemes which provide annual trends in abundance and breeding success of seabirds; and trends in the number of waterbirds using coastal sites to breed, stopover on migration or to over-winter; along with options to improve their precision;
  2. Options for monitoring and surveillance of inshore and offshore aggregations of seabirds and waterbirds at sea and how these options can best be integrated with the above existing surveillance schemes (including whether coordinated monitoring of the existing/proposed marine SPA network can contribute to these);
  3. Integration with indicator development work for Marine Strategy Framework Directive.
- There is an important need for enhanced and standardised methodologies for counting burrowing seabirds at their breeding colonies (Storm Petrel, Leach's Petrel, Manx Shearwater and Puffin).

When methodologies are changed, it is critical to ensure back-ward compatibility with earlier census methods. Petrel trends are unknown at many sites as more-recent improved census techniques are not compatible with earlier assessments.

- For Guillemots and razorbills, the issue of deriving contemporary correction factors related to count units highlighted by Harris *et al.* (2015b) and Harris et al. (2015b) respectively needs to be addressed to ensure that monitoring data are correctly interpreted.

Raptors

- Working in partnership with existing country- and regional-scale raptor monitoring initiatives, SWG should promote UK approaches to enhance the collation and availability of data and information perhaps using a UK model similar to that of the Scottish Raptor Monitoring Scheme.

- Priority should be given to improving the quality and extent of data and information on non-breeding Hen Harriers within their SPA suite. The SPAR SWG should review current activity and, in consultation with relevant organisations, consider how this may be best developed.

- Data and information on non-breeding Merlin should be reviewed and monitoring protocols developed at relevant SPAs.

- Advice should be sought on the potential development of a national survey of Short-eared Owl as part of the SCARABBS framework.

Non-breeding waterbirds

- The assessments of UK distribution through breeding and winter bird atlases, as well as analysis of existing distributional data and information from other surveys such as the Breeding Bird Survey and Wetland Bird Survey should be maintained.

- For goose and swan populations information concerning knowledge of feeding areas and their relationship with roosting sites needs to be enhanced.

- There is a need to enhance monitoring of wildfowl moult sites, where feasible, in order to ensure these crucially important sites are better represented within protected sites networks.

6.5.1 Waterbird monitoring issues

Monitoring data for non-breeding waterbirds are central to any review of the UK SPA network. The scope of the data and information available from the Wetland Bird Survey and Goose & Swan Monitoring Programme is outstanding. However, we make a number of recommendations that would further improve the already excellent annual coverage. These are detailed in the species accounts but Table 6.7 provides a high-level summary of the principal issues related to sites.

Table 6.7. Summary of principal issues where there remains scope for further improving monitoring of non-breeding waterbirds through the Wetland Bird Survey and/or Goose & Swan Monitoring Programme.

Issue	Sites or species relevant
Incomplete coverage of all parts of SPA	Alde-Ore Estuary; Arun Valley; Avon Valley; Blackwater Estuary; Broadland; Caithness Lochs; Colne Estuary; Dornoch Firth and Loch Fleet; Duddon Estuary; Firth of Forth; Firth of Tay and Eden Estuary; Humber Estuary; Inner Moray Firth; Lough Foyle; Martin Mere; Medway Estuary and Marshes;

Issue	Sites or species relevant
	Moray and Nairn Coast; Morecambe Bay; Nene Washes; North Norfolk Coast; Northumbria Coast; North Uist Machair and Islands; Ribble and Alt Estuaries; Severn Estuary; Solent and Southampton Water; South Uist Machair and Lochs; South-west London Water Bodies; Strangford Lough; Thames Estuary and Marshes; The Swale; The Wash; Tiree Wetlands and Coast; Upper Nene Valley Gravel Pits; Upper Solway Flats and Marshes
Promote the counting of relevant sites in the month of peak occurrence to facilitate assessment of SPA suites	See Table 4.5
Ensure monitoring is undertaken periodically at important roost sites	Greenland White-fronted Geese (Caithness Lochs, Islay & Coll); Greenland Barnacle Geese (Islay)
Enhance late autumn counting protocols to aid differentiation between migratory and resident populations	Greylag Geese at Lough Foyle, Lough Neagh and Lough Beg, and Strangford Lough

For species such as divers, grebes and seaducks there are significant methodological limitations to the extent that existing WeBS coverage can provide robust data on their marine population components. Accordingly there will be a need to establish programmes that adequately monitor marine numbers, distributions and trends. This will need to include initial collation of existing information, and analysis of gaps where additional and continuing surveys are needed. New boat and other surveys will need to be initiated as appropriate, noting the dependency to undertake such surveys in calm weather, *i.e.* surveys may possibly not be coincident with the fixed monthly WeBS count dates.

WeBS volunteer coverage of some marine SPAs is never going to be feasible, and professional surveys will be needed instead. It would be helpful for WeBS to assess the scale of this issue.

There is a general need for improvement of national population estimates for more dispersed species through enhanced coverage of small and/or linear wetlands (such as canals, rivers and non-estuarine coasts) by WeBS for non-breeding waterbirds, and of inland and urban colonies for breeding gulls and terns.

6.5.2 Monitoring rare and scarce breeding birds

Detailed recommendations are made for many breeding birds in the relevant species accounts. Table 6.8 provides a summary of issues affecting multiple species.

This Review encountered a number of data issues relating to rare breeding birds. Many were similar to issues highlighted by Stroud *et al.* (2012) in the specific case of monitoring of Spotted Crakes (a study initiated in the context of the Review). These included:

- Lack of locational information such as six or four figure grid references for a significant number of records, greatly restricting their value.
- In some years, missing data in runs of counts from sites with no information as to whether this reflected zero presence or just lack of survey (null counts). Assumptions made as to whether birds were present in those years lacking data introduced (sometimes significant) uncertainty to some of the conclusions about specific sites and species.
- Lack of data for whole sites – typically for some large sites classified for species such as Greenshank and other widely-dispersed upland species.

Table 6.8. Summary of main issues in relation to rare and scarce breeding bird monitoring.

Issue	Species relevant
Establish relevant monitoring regimes at Lewis Peatlands, Muirkirk, and North Lowther Uplands (for which no contemporary assessments exist), and sustain monitoring at Caithness and Sutherland Peatlands, North York Moors and South Pennine Moors SPAs to ensure that population numbers on all sites within the terrestrial SPA suite and surrounding areas can be assessed by the time of the next national review.	Golden Plover, Greenshank, Dunlin
Review site and national monitoring protocols to ensure monitoring provides reliable estimates of numbers within the North Pennine Moors SPA so that trends there can be better assessed by the time of the next national review.	Curlew
The need for monitoring data on rare breeding birds to be accompanied by accurate locational information is critical for their conservation. The statutory conservation agencies should continue to strongly promote this need with volunteer bird recorders to ensure that all data collected can be effectively used for SPA monitoring purposes.	All rare breeding birds

6.6 Future SPA network audit and review

The current Review has demonstrated significant changes across the network in the decade since the second network Review. Pearce-Higgins *et al.* (2011) modelled the implications of climate change for the UK SPA network (section 2.4), and concluded that:

> "...the current SPA network will be relatively resilient to future climate change. However, we project that the spatial distribution, abundance and composition of species within the SPA network could be significantly different to the present day and that this will be exacerbated in the event of increasing severity of climate change. The UK SPA network will not be static. This has significant implications for management of the SPA network at a UK level and suggests the need for periodic review in light of relevant monitoring data and scientific evidence on the impacts of climate change on UK bird populations. In order to take account of the emerging effects of climate change in the future management of the SPA network, it would seem appropriate to continue with the roughly decadal reviews of the UK SPA network."

We agree with this conclusion and note that there would be significant benefit in aligning future reviews of the SPA network with the six-yearly cycle of reporting required by Article 12 of the Birds Directive, given that such an audit is anyway required by that process.

7. Acknowledgements

This document reports on work undertaken over a 15 year period, during the early years of which much of the conceptual thinking was developed for the third network Review. The Review itself was undertaken from 2008-2015. We are grateful to all those who have contributed to this work especially all the SPAR SWG and ESG members listed in Appendix 3.

DEFRA provided funding for an initial data-gathering contract.

It is important at the outset to acknowledge that this SPA network assessment would simply not have been possible without the massive voluntary efforts of many tens of thousands of volunteers who have given their time (and resources) to participate in systematic surveys and monitoring of UK birds since the 1960s. We acknowledge their huge input and interest, without which knowledge of the UK's changing bird populations would be immeasurably poorer.

We thank all those who have provided data and information for the Review assessments, including:

- Stuart Benn (RSPB) for supply of Slavonian Grebe data;
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- Andy Musgrove and Heidi Mellan (BTO) for collation of much supporting data and information;
- Allan Drewitt (NE) for supply of Avocet and Merlin data;
- Craig Ralston (NE) for answering site-related queries;
- Gavin Siriwardena (BTO) for providing advice and analyses on cropped habitat issues;
- Mark Eaton (RSPB) for supply of SCARABBS data;
- Tony Fox and Ian Francis (GWGS) for help with Greenland White-fronted Goose data interpretation;
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- Mark Holling for supply of Rare Breeding Bird Panel data;
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Appendices

Appendix 1. Terms of Reference for the UK SPA and Ramsar Scientific Working Group

Aims

The SPA Scientific Working Group is a consultative group established by Department for Environment, Food and Rural Affairs to assist government administrations and the statutory conservation agencies in taking forward the further development of the SPA network within the UK, in particular looking forward to the coherent management of the network and monitoring of sites.

The Group will consider UK-scale scientific and technical issues regarding the SPA network in the terrestrial and marine environment. In particular, it will consider a range of issues raised in the context of the 2001 SPA review, *inter alia*:

- issues in respect of those species where the 2001 SPA review has indicated that there may be future cases for additional SPA provision, in particular, in the light of new national surveys, analyses, and conservation needs;
- consider those issues which the 2001 SPA review indicated as outstanding;
- the development of understanding of broader European contexts as relevant to informing the evolution of the SPA network within the UK;
- the implications of revisions of estimates of the sizes of bird populations, both nationally and internationally;
- the development of understanding of data needs for SPA classification and management, and the further development of systems and processes to ensure the timely delivery of such information; and
- the application of processes to monitor the SPAs individually and collectively.

There is a significant range of potential issues to be addressed by the UK SPA Scientific Working Group. The attached Annex seeks to outline the principal activities and orders these into short, medium and long-term priorities. An initial task for the Group will be to develop a more detailed work programme, with key ‘milestones’, based on this Annex.

The activities of the Working Group in assisting government to meet the scientific and technical requirements of the Birds Directive will be complemented by discussions taking place within each of the countries. It will work closely with the UK Natura 2000 Steering Group. A UK Natura 2000 Liaison Group will provide an opportunity for stakeholders to consider broader issues regarding the development and management of the Natura 2000 network.

Composition

The Group will be representative of the Government departments/devolved administrations and their statutory agencies across the UK, Joint Nature Conservation Committee (JNCC), and representation from the voluntary conservation sector as well as other stakeholder groups. The Group will thus comprise representatives of: Department of the Environment, Food and Rural Affairs; Scottish Executive; National Assembly of Wales; English Nature; Scottish Natural Heritage; Countryside Council for Wales; Environment and Heritage Service; JNCC; and a representative selection of voluntary conservation agencies plus other stakeholder groups, such as those

representing land-owning, land management, water industry, marine and business sectors, with the necessary scientific expertise.

On occasion, representatives from other organisations may be asked to attend where there is the need for information of a specific nature to be discussed by the Group.

Method of operation

It is anticipated that the Group will hold about three meetings per year, with actions between these periods being taken forward by electronic communications.

Chair and Secretariat

The Chair will be appointed by government prior to the first meeting. The Secretariat will be provided by JNCC who will convene and support the Group.

Sub-groups

It may, from time-to-time, be desirable to establish smaller sub-groups to resolve certain issues. These will be time-limited and will focus on concluding specific tasks on behalf of the Working Group as a whole.

Reporting

The Scientific Working Group will provide regular updates of its activity to the UK Natura 2000 Steering Group.

Issues for attention

The Scientific Group will develop a work programme with priority given to the following issues:

1. Appraisal of any further sites/boundaries/species which may qualify on the basis of high quality data from the 1992/97 data window of the 2001 network review.
2. Development of a strategic approach to further work to resolve issues outstanding from the 2001 Review.
3. Appraisal of further sites based on substantial high quality datasets collected during 1997-2000, and later 2001-2004.
4. Development of a strategic approach to the collection and interpretation of new data, information on population sizes, and site monitoring.
5. ‘Sweep-up’ review of outstanding network needs commencing with data window concluding 2005/6 (*i.e.* review starting in autumn 2006) informed by outcomes of monitoring processes.

Framework for future update of UK SPA network

	Bilateral contact at country level	UK SPA Scientific Working Group	UK Natura 2000 NGO Liaison Group	UK Natura 2000 Steering Group
Lead organisation Geographic scope Objective Issues for resolution and timescale	***Country agencies*** *Country* Detailed consideration of site-related issues within countries	***JNCC*** *UK* Consideration of UK-scale scientific issues related to the SPA network (note not policy issues)	***DEFRA*** *UK* Government to disseminate key messages regarding the future development of the *Natura 2000* network in the UK, and Liaison Group to be a sounding board for relevant advice and opinion. Includes broad range of non-conservation stakeholders and sectors	***DEFRA*** *UK* Government to consider and decide upon policy and management issues, including those raised that the Scientific Working Group
Immediate (by end 2001) Issues for attention (see above) = 1	• Consideration of additional SPA provision for Capercaillie (any data up to 2001)	• Establishment of SPA Scientific Working Group and determination of timetabled workplan based on items listed below: • Confirmation of issues outstanding from the 2001 SPA Review		
Short-term (by end of March 2003) Issues for attention (see above) = 1 & 2 Commence 3	• Consideration of SPA provision for wintering Smew • Possible cases for boundary extensions • Initiate discussion on sharing knowledge of site management regimes for SPAs	• Consideration of SPA provision for species where major new national surveys or existing data are already available since SPA review data window (*i.e.* 1997-2000: *e.g.* Spotted Crake, Ring Ouzel, Twite?) • Consider broad implications of new population estimates nationally (Avian Population Estimates Panel 2 in early 2002) and internationally (waders in 2002) • Planning of national survey timetables to align with SPA reporting timetable	• The context of UK network of Natura 2000 sites and its contribution to conserving UK wildlife and habitats in relation to obligations under the Birds and Habitats Directives • Sustainable development in relation to SPAs and the wider countryside • The SAC network	• Consider the views of the scientific working group and offer it and the Liaison Group opinions and reactions.

	Bilateral contact at country level	UK SPA Scientific Working Group	UK Natura 2000 NGO Liaison Group	UK Natura 2000 Steering Group
		• Review specific cases of site/species rejection at Stage 2 • Review specific "sites no longer qualifying" • Develop shared understanding of use of data in site selection processes, and advise on new or supplementary data collection, and data collection standards • Commence processes to monitor site series and its performance in national and site contexts (including alerts processes, and to guide management) • Issues surrounding treatment of sites for waterbirds on passage and on rocky shores • Look at policies in other EU Member States regarding the scientific basis for incorporation of cropped habitats within SPAs		
Medium-term (2003/4 to end March 2005) Issues for attention (see above) = conclude 1, continue 3, commence 4 & 5	• Consideration of additional SPA provision under Stage 1.4 where additional high-quality data are currently available • Site specific management issues	• Consideration of SPA provision for species where major new national surveys have become available since SPA review data window (2001-2004: *e.g.* Chough, Red Kite, Golden Eagle, Peregrine, Nightjar, Merlin). Consideration of implications of Seabird 2000 results for seabird colonies. Overall priorities to be discussed and agreed.	Continued discussion of issues listed above and any other topical issues arising from the issues of the day	Consideration of respective roles of site-based as contrasted with wider-countryside measures for conserving UK wildlife and habitats in relation to obligations under the Birds Directives

	Bilateral contact at country level	UK SPA Scientific Working Group	UK Natura 2000 NGO Liaison Group	UK Natura 2000 Steering Group
		• Continue to consider, if necessary, issues regarding incorporation of cropped habitats within SPAs • Monitoring and reporting protocols for the UK SPA network including consideration of Common Standards Monitoring and WeBS Alerts scheme • Generic Site management issues at UK level • Develop site selection approach for rare Annex I non-breeding birds • Consideration of data issues surrounding possible SPA provision for wintering gulls and wintering raptors (especially on coasts) • Possible SPA provision for re-establishing raptors (Red Kite & Sea Eagle) • Review needs for longer term research requirements to determine movements of birds between component parts of composite sites		
Long-term (2005/6 to end March 2008) Issues for attention (see above) = conclude 3, 4 & 5		• Consideration of SPA provision for relevant species as major new national surveys become available • 'Sweep-up' review of outstanding network needs commencing with data window concluding 2005/6 (*i.e.* review starting in autumn 2006) informed by outcomes of monitoring processes	Ditto	Ditto

Appendix 2. Terms of Reference for the third SPA network Review

2009-10 SPA Review Terms of Reference

Objective

- To undertake a targeted review of selected elements of the current UK network of terrestrial and coastal Special Protection Areas (SPAs) in order to ensure that UK obligations under Article 4 of the European Union's Directive on the conservation of wild birds (Council Directive 79/409/EEC, as amended) ('the Birds Directive') are met.

Scope of the Review

- The Review will examine the adequacy of SPA network in view of the requirements of the Birds Directive and make recommendations to the 4 Country Administrations.

- The geographical scope of the Review is limited to the terrestrial and coastal environments of the UK [and Gibraltar].

- The Review will consider relevant policy and legal implications of relevant judgments from the European Court of Justice.

NB: The offshore marine environment is excluded from the scope of the Review as marine SPAs are being considered by other work. However, the final report of the Review will cross link to progress on marine SPAs so as to present a complete overview of relevant activity to implement the UK SPA network.

Outcomes

The Review will be delivered in three phases.

- **The first phase** will consider and develop further guidance and principles to assist in the application of the UK SPA selection guidelines. This phase will build on work undertaken by the UK SPA and Ramsar Scientific Working Group (SPAR SWG), in particular with respect to the issues outlined in Appendix 1. Specific subjects to be considered in this phase are:

  a) the adequacy of existing SPA network for species listed in Appendix 2 (attached), where appropriate using insights provided by the SPAR SWG's Site Provision Index (when finalised);

  b) gaps in data availability for certain species/groups of species and recommendations on measures to address these in the medium and long-terms consequent upon any guidance and recommendations proposed;

  c) the potential for, and implications of, inclusion of cropped habitats in SPAs following from work already undertaken by the SPAR SWG and reported to the Natura 2000 and Ramsar Steering Committee in 2007;

  d) any additional measures necessary to ensure UK compliance with European case law relevant to the legal interpretation of the Birds Directive;

  e) completion of an audit and updating of the documentation (related to both sites and species) summarising the extent of SPA suites for those species where modifications to species' suites have occurred since the publication of the 2001 Review.

Issues a) (on the Site Provision Index) and c) (related to the Cropped Habitats Information Project) will be progressed as first priority.

- Other tasks may be agreed by the Executive Steering Group if these can be undertaken without significant implications for time/budget.[48]

- **The second phase** will be undertaken by the 4 Country Administrations [and Gibraltar] in conjunction with the relevant countryside agencies. It will involve the consideration and application of the principles and further SPA selection guidelines established in phase one, subject to Ministerial approval. Issues considered in the second phase will include:

  g) whether new SPAs should be considered in the light of recommendations from the first phase of the review, and if so, their location and extent;

  h) similarly, whether existing SPAs should be extended either in spatial extent or through the addition of further qualifying species; and

  i) the establishment of a timetable to implement the findings of the review.

- **The third phase** will comprise:

  j) revision of citations (as appropriate and necessary) by individual country agencies [and Gibraltar] at those sites where qualifying species have been changed; and

  k) revision by JNCC of relevant documentation summarising the extent of SPA suites for those species where further additions to species' suites have occurred consequent upon decisions made in the second phase.

Timing

- The first phase of the review will start, resources permitting, in June 2009 and will aim to be completed by March 2011. A detailed project plan will be the responsibility of the Executive Steering Group and will be developed within the first month of the project.

- The timing of the second phase of the review will be determined by each country but the aim will be to conclude this phase as soon as possible. Aspects may occur in parallel with phase one.

- Phase three (formal revision of SPA citations as appropriate and necessary at individual sites) will also be determined by each country, but is anticipated, resources permitting, to be completed within a year from the conclusion of decisions taken in the second phase.

Linked studies

- The Review will also examine the avian aspects of the UK Ramsar network within the geographical scope of the review following a commitment given to the Ramsar Secretariat in 2005. This aspect of the review will be presented in a separate document to the UK 4 Countries and will, amongst other things, be used to inform Ramsar Information Sheet (RIS) updates required in 2012 under the Ramsar Convention (Resolution VI.13).

- The aim of this work will – as far as is possible given different criteria –harmonise the relevant qualifying interests of both international site series so as to facilitate common reporting and management.

[48] Whilst the original Terms of Reference envisaged a partial review of SPA suites for 94 species, in 2012 the ESG agreed, on the advice of the SWG, to extend the review to the remaining species to ensure a complete review of the whole network.

- The outputs from the Review will aim to contribute to work being funded by DEFRA assessing the resilience of the SPA network in the light of climate change and consequent distribution shifts of birds which are qualifying interests on SPAs. Appropriate liaison between the DEFRA project and the SPA Review will be established to this end.

Outputs

- Outputs of the review will include:
  a) a report including an executive summary and supporting data; and
  b) a series of annexes containing key scientific issues and findings in relation to particular species, or groups of species. It is probable that these will relate to the issues identified in Appendix 1.

Governance: Phase 1

a. Executive Steering Group:
The SPA Review will be overseen by an Executive Steering Group comprising representatives of the 4 Country Administrations and their statutory conservation agencies across the UK, together with the Joint Nature Conservation Committee and the Chair of the Technical Advisory Group.

DEFRA will provide the chair, and JNCC will provide the Secretariat function. The Executive Steering Group shall communicate as appropriate with the Natura 2000 and Ramsar Forum and Steering Committee.

Role:
- to commission and receive advice and recommendations from the Technical Advisory Group and take final decisions on issues arising in Phase 1;

- to meet as necessary to review progress, consider risks and to provide feedback to the JNCC Support Co. on emerging issues;

- in liaison with the Natura 2000 and Ramsar Steering Committee, to ensure that the UK SPA network is comprehensive and coherent, and to provide guidance on relevant policy and legal issues.

b. Technical Advisory Group:
The Technical Advisory Group will comprise members of the SPAR SWG and will utilise the same Chair and Secretariat. Current membership is at Appendix 3.

Role:
- to provide scientific advice and recommendations to the Executive Steering Group and JNCC.

c. Lead co-ordinator:
Joint Nature Conservation Committee Support Company.

Role:
- to undertake project management responsibilities and provide a secretariat function to the Executive Steering Group;

- co-ordinate contact between the Technical Advisory Group and the Executive Steering Group.

d. Joint Committee:
The outcomes of Phase 1 of the review will be provided as formal advice from the Joint Nature Conservation Committee to the 4 Countries Group [and Gibraltar].

Role:

- to take account of technical/scientific advice from the Technical Advisory Group and make *recommendations* to the 4 Countries Group [and Gibraltar] on the further guidelines and principles needed to assist in the application of existing SPA selection guidelines.

Peer review

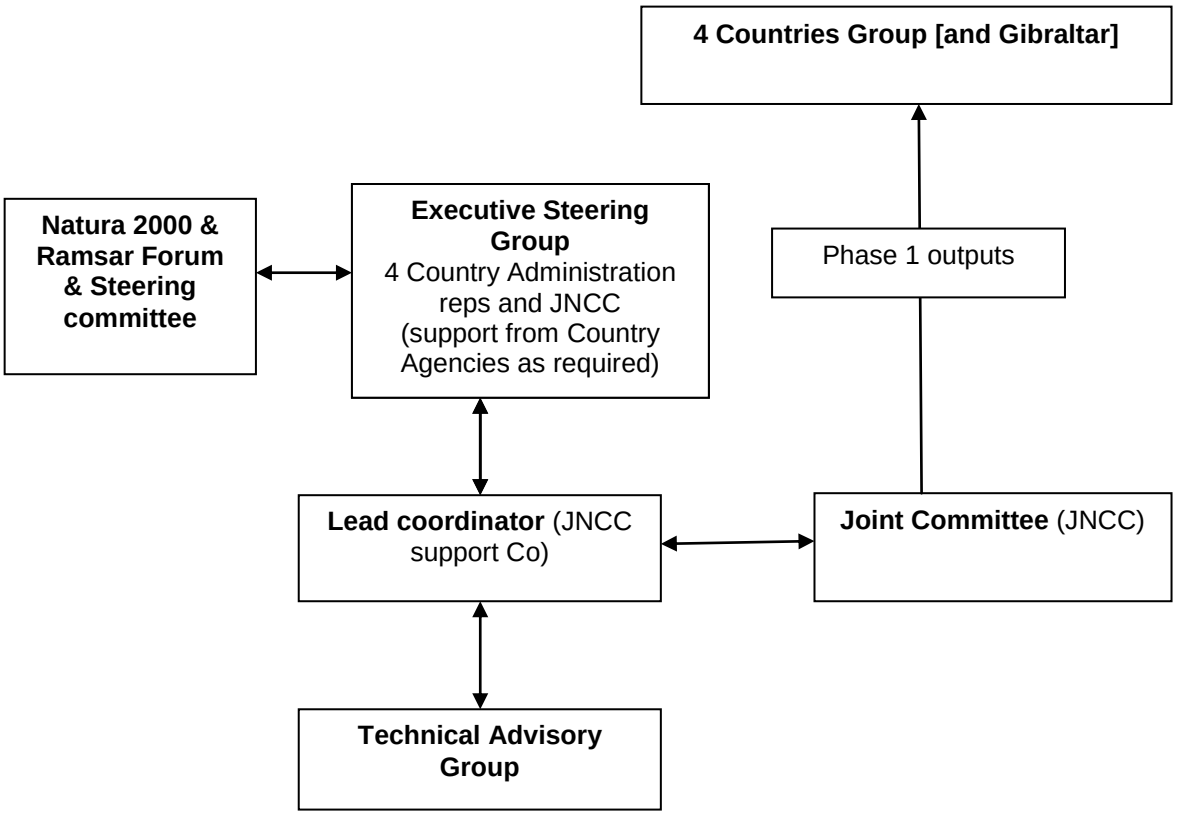
Relevant results of Phase 1 will be subject to scientific peer-review according to arrangements to be agreed by the Executive Steering Group.

Governance: Phase 2 (implementation)

e. 4 Country Administrations [and Gibraltar]

Implementation (either in terms of classification of new sites, or revision of existing site citations to reflect new qualifying species; together with any associated consultations with the owners and occupiers of sites) will be delivered by the 4 Country Administrations [and Gibraltar] in liaison with the relevant country conservation agencies (NE, SNH, CCW, NIEA)

Governance organisation chart (Phase 1)



Appendix 3. Membership of the SPA & Ramsar Scientific Working Group 2001-2015

The following individuals have represented their respective organisations on the Working Group at some time during 2001-2015.

SPAR SWG members

Chair: Ian Bainbridge

ABP Research & Consultancy Ltd./ABP Marine Environment Research Ltd.: Lucy Adams, Steven Hull, Don Morrisey, Andy Murdock, Andrew Pearson

Country Land & Business Association: Megan Cameron, Claire Collyer, Sue Evans, Colin Hedley, Tanya Olmeda-Hodge

Countryside Council for Wales/Natural Resources Wales: Catherine Gray, Adam Cole-King, Sian Whitehead

Department for Environment, Food and Rural Affairs (DEFRA): Geoff Audcent, Steve Lee-Bapty, Herran Buhecha, John Clorley, Bob Ford, Simon Hopkinson, Louise Leighton, Emily Musson, Trevor Salmon, David Smallshire, Andy Swash, Andy Tully, Louise Vall

English Nature/Natural England: Sarah Anthony, Peter Clement, Allan Drewitt, Ben Fraser, Anthony Mould

Environment & Heritage Service Northern Ireland/Department of the Environment Northern Ireland: Gregor Watson, Ian Enlander, Ken Bradley

Farmers' Union of Wales/Undeb Amaethwyr Cymru: Rhian Nowell-Phillips

Forestry Commission: Sallie Bailey, Jason Hubert

Joint Nature Conservation Committee: Helen Baker (Secretariat), Jessa Battersby, Chris Bingham, Julie Black, Nichola Burnett (Secretariat), Ben Dean, Richard Ferris, Charlotte Johnston, Kerstin Kober, Ant Maddock (Secretariat), Ian McLean, Claire McSorley, Ed Mountford (Secretariat), Sue O'Brien, Matt Parsons, Jim Reid, David Stroud, Andy Webb, Linda Wilson

National Assembly of Wales/Welsh Government: Nicola Donlon, Trish Fretten, Louise George, Diana Reynolds, Jill Thomas, Wendy Twell, Chris Worker

National Farmers Union (representing also Undeb Amaethwyr Cymru/Farmer's Union of Wales and NFU Scotland): Andrew Clark, Andrea Graham, Claire Robinson

National Federation of Fishermen's Organisations (on behalf also of the Scottish Fishermen's Federation): Barrie Deas

Royal Society for the Protection of Birds (and on behalf of Wildlife & Countryside Link): Richard Evans, Richard Gregory, Kate Jennings, Gwyn Williams

Scottish Executive Environment and Rural Affairs Department/Scottish Government: Phil Alcock, Bob Bryson, Steven Dora, Daniel Hall, David Mallon, Liam Mathers, Connor McKinney, Michael McLeod

Scottish Natural Heritage: Nigel Buxton, Greg Mudge

Scottish Environment Link: Richard Evans, Jeremy Wilson

UK Offshore Operators Association: Mick Borwell

Water UK: Miranda Cooper (Northumbria Water), Chris Spray (Northumbria Water)

Wildfowl & Wetlands Trust: Peter Cranswick, Richard Hearn, James Robinson

World Wide Fund for Nature-UK: Dave Burges

Executive Steering Group members

DEFRA: Herran Buhecha, Simon Hopkinson, Louise Leighton, Andy Tully

Environment & Heritage Service Northern Ireland: Ian Enlander

Joint Nature Conservation Committee: Ant Maddock, David Stroud, Cherry-Ann Vickery (Secretariat)

Natural England: Sarah Anthony

Natural Resources Wales: Adam Cole-King

Scottish Government: Steven Dora

Scottish Natural Heritage: Nigel Buxton

Welsh Government: Chris Worker

Ian Bainbridge, SPAR SWG Chair

Appendix 4. Reference populations used

This Appendix summarises the standardised national (*i.e.* GB or all-Ireland) or biogeographic population figures used in this Review. These data have been used to calculate proportions of Annex I or migratory species within the SPA suites for each of the qualifying species. Usually only those species qualifying on at least one UK SPA are included.

Points regarding derivations:

1. Where figures have been taken directly from source, these are shown as originally cited.
2. Where population ranges have required the selection of a single population figure, the minimum has normally been taken following Stroud *et al.* (2001).
3. The rounding of large population figures follows the protocol of Stroud *et al.* 2004, *e.g.* 1,000-10,000 to the nearest 100, 10,000-100,000 to the nearest 1,000, 100,000-1,000,000 to the nearest 10,000, *etc.*
4. For a number non-Annex I migratory species, particularly ducks, breeding populations (as pairs) were derived by dividing the wintering figure by three, following Meininger *et al.* (1995), Rose & Scott (1994,1997) and as undertaken by Stroud *et al.* (2001).
5. Breeding populations of Guillemot, Razorbill and Puffin have been converted from individual birds to breeding pairs, using the methodology of Lloyd *et al.* (1991).
6. Biogeographical populations derived from data in BirdLife International (2004) and defined here as 'European' exclude Turkey and European Russia.
7. Wherever possible, biogeographical populations adopted do not include mixed races. Racial distinctiveness indicates lack of inter-breeding, thus – and by definition – a combination of two races logically cannot be considered as a single 'population'.

B = breeding; NB = non-breeding; F = individual females; M = calling males; P = pairs; I = individuals; A = individual adults; AOS = Apparently Occupied Sites

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Red-throated Diver	B	1,300	P	Dillon *et al.* 2009		<10	P	Gibbons *et al.* 1997		27,000 Europe	P	BirdLife International 2004	12,000-42,000 prs = midpoint
Red-throated Diver	NB	17,000	I	O'Brien et al. 2008		2,000	I	Crowe *et al.* 2008		300,000 NW Europe (non-br)	I	Wetlands International 2012	150,000-450,000 = mid-point
Black-throated Diver	B	220	P	Eaton *et al.* 2007c						19,000 Europe	P	BirdLife International 2004	16,000-22,000 prs = midpoint
Black-throated Diver	NB	560	I	Musgrove *et al.* 2011		<10	I	Crowe *et al.* 2008		375,000 *arctica*	I	Wetlands International 2012	250,000-500,000 = midpoint
Great Northern Diver	NB	2,500	I	Musgrove *et al.* 2011		1,000	I	Lack 1986	1,000-1,500 = minimum	5,000 Europe (non-br)	I	Wetlands International 2012	
Little Grebe	NB	16.000	I	Musgrove *et al.* 2011		2,500	I	Crowe *et al.* 2008		405,000 *ruficollis*	I	Wetlands International 2012	300,000-510,000 = midpoint
Great Crested Grebe	B	4,600	P	Gibbons *et al.* 1993		2,074	P	Gibbons *et al.* 1993	4,150 adults divided by two	248,000 Europe	P	BirdLife International 2004	204,000-292,000 prs = midpoint
Great Crested Grebe	NB	19,000	I	Musgrove *et al.* 2011		5,500	I	Crowe *et al.* 2008		355,000 *cristatus,* NW & W	I	BirdLife International	290,000-420,000 = midpoint

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
										Europe		2004; Wetlands International 2012	
Slavonian Grebe	B	30	P	Holling *et al.* 2012						6,400 Europe	P	BirdLife International 2004	4,800-8,000 prs = midpoint
Slavonian Grebe	NB	1,100	I	Musgrove *et al.* 2011		30	I	Lack 1986	30-40 = minimum	5,500 NW Europe	I	Wetlands International 2012	4,600-6,800 inds = rounded mid-point
Fulmar	B	500,000	P	Tasker 2004a		38,900	P	Tasker 2004a		3,400,000 Atlantic; total *glacialis*	P	Tasker 2004a	2,700,000-4,100,000 prs = midpoint Total popn. of *F. g. glacialis*
Manx Shearwater	B	300,000	P	Newton *et al.* 2004	280,000-310,000	27,269	P	Newton *et al.* 2004		374,500 World	P	Newton *et al.* 2004	338,000-411,000 prs = midpoint
Storm Petrel	B	26,000	AOS	Mitchell & Newton 2004	21,000-33,000	99,000	AOS	Mitchell & Newton 2004		490,000 NE Atlantic; total *pelagicus*	P	Mitchell & Newton 2004	300,000-680,000 prs = midpoint Total popn. of *H. p. pelagicus*
Leach's Petrel	B	48,000	P	Mitchell 2004	36,000-65,000	310	P	Mitchell 2004		227,000 North-east Atlantic *leucorhoa*	P	Mitchell 2004	118,410-217,310 prs = midpoint
Gannet	B	220,000	N	Wanless *et al.* 2005		33,000	P	Wanless & Harris 2004a		390,000 World	P	Wanless & Harris 2004a	
Cormorant	B	8,400	P	Sellers 2004	combination of *carbo* and *sinensis*	5,200	P	Sellers 2004		52,500 Total European *P. c. carbo*	P	Sellers 2004	52,000-53,000 prs = midpoint Total European popn. of *P. c. carbo*
Cormorant	NB	35,500	I	Musgrove *et al.* 2011	combination of *carbo* and *sinensis*	14,000	I	Crowe *et al.* 2008		120,000 Total *carbo,* NW Europe	I	Wetlands International 2012	
Shag	B	27,000	P	Wanless & Harris 2004b		3,700	P	Wanless & Harris 2004b		69,500 *aristotelis,* NE Atlantic	P	Wanless & Harris 2004b	66,000-73,000 prs = midpoint Total popn. of *P. a. aristotelis*
Bittern	B	80	M	Holling *et al.* 2012; RSPB data						44,000 Europe	P	BirdLife International 2004	34,000-54,000 = midpoint
Bittern	NB	600	I	Wotton *et al.* 2011		<10	I	Crowe 2005		6,275 *stellaris,* W Europe, NW Africa (bre)	I	Wetlands International 2012	5,850-6,700 = midpoint
Little Egret	B	660-740	P	Holling *et al.* 2012	Increasingly under-reported as population increases	187	P	Hillis 2007		68,000-94,000 *garzetta,* Europe	B	BirdLife International 2004	
Little Egret	NB	4,500	I	Musgrove *et al.*	Excludes					134,000	I	Wetlands	125,000-143,000 =

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
				2011	unknown numbers in wider countryside					W Europe, NW Africa		International 2012	midpoint
Spoonbill	B	2	P	Holling *et al.* 2012	Subsequent increase					8,300 Europe	P	BirdLife International 2004	5,800-10,800 prs = midpoint
Spoonbill	NB	20	I	Musgrove *et al.* 2011						11,300 W Europe/W Mediterranean & W Africa	I	Wetlands International 2012	
Bewick's Swan	NB	7,000	I	Worden *et al.* 2006		2,000	I	Crowe *et al.* 2008		21,500 W Siberia & NE Europe/NW Europe	I	Wetlands International 2012	
Whooper Swan	P & NB	11,658	I	Hall *et al.* 2012		15,068	I	Hall *et al.* 2012		29,232 Iceland/UK & Ireland	I	Hall *et al.* 2012	
Bean Goose	NB	730	I	Musgrove *et al.* 2011						42,500 *fabalis*, NE Europe/NW Europe	I	Wetlands International 2012	40,000-45,000 = midpoint
Pink-footed Goose	NB	360,000	I	Mitchell 2010						360,000 E Greenland & Iceland/UK	I	Mitchell 2010	
European White-fronted Goose	NB	2,400	I	Musgrove *et al.* 2011						1,200,000 *albifrons*, NW Siberia & NE Europe/NW Europe	I	Wetlands International 2012	
Greenland White-fronted Goose	NB	13,000	I	Musgrove *et al.* 2011		11,000	I	Crowe *et al.* 2008		24,000 total *flavirostris*	I	Wetlands International 2012	Total popn. of *A. a. flavirostris*
Greylag Goose (Iceland)	NB	85,000	I	Musgrove *et al.* 2011		5,030	I	Crowe *et al.* 2008		98,000 Iceland/UK & Ireland	I	Wetlands International 2012	
Barnacle Goose (Greenland)	NB	58,000	I	Mitchell *et al.* 2008		9,035	I	Crowe *et al.* 2008		70,500 E Greenland/ Scotland & Ireland	I	Wetlands International 2012	
Barnacle Goose (Svalbard)	NB	33,000	I	Musgrove *et al.* 2011; Griffin 2010						33,000 Svalbard/SW Scotland	I	Musgrove *et al.* 2011; Griffin 2010	National total used in preference to Wetlands International 2012 to ensure alignment
Dark-bellied Brent Goose	NB	91,000	I	Musgrove *et al.* 2011						240,000 total *bernicla*	I	Wetlands International 2012	200,000–280,000 = midpoint Total popn. of *B. b. bernicla*
Light-bellied Brent Goose (Canada/Ireland)	NB	710	I	Musgrove *et al.* 2011		40,000	I	Fox *et al.* 2010; Wetlands		40,000 *hrota*, Canada &	I	Fox *et al.* 2010; Wetlands	

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
								International 2012		Greenland/Ireland		International 2012	
Light-bellied Brent Goose (Svalbard)	NB	3,400	I	Musgrove *et al.* 2011						7,600 Svalbard/Denmark & UK	I	Fox *et al.* 2010; Wetlands International 2012	
Shelduck	B	10,600	P	Gibbons *et al.* 1993		1,100	P	Gibbons *et al.* 1993		100,000 NW Europe	P	Wetlands International 2012	Winter popn. divided by three
Shelduck	NB	61,000	I	Musgrove *et al.* 2011		14,600	I	Crowe *et al.* 2008		300,000 NW Europe	I	Wetlands International 2012	
Wigeon	B	300	P	Sharrock 1976	300-500 prs = minimum					500,000 W Siberia & NE Europe/NW Europe	P	Wetlands International 2012	Winter popn. divided by three & rounded to nearest 10,000
Wigeon	NB	440,000	I	Musgrove *et al.* 2011		82,400	I	Crowe *et al.* 2008		1,500,000 W Siberia & NE Europe/NW Europe	I	Wetlands International 2012	
Gadwall	B	670	P	Holling *et al.* 2012	670-1,710 prs = minimum	30	P	Gibbons *et al.* 1993		20,000 NW Europe	P	Wetlands International 2012	Winter popn. divided by three
Gadwall	NB	25,000	I	Musgrove *et al.* 2011		2,000	I	Crowe *et al.* 2008		60,000 NW Europe	I	Wetlands International 2012	
Teal	B	1,500	P	Gibbons *et al.* 1993	1,500-2,600 prs = minimum	400	P	Gibbons *et al.* 1993	400-675 = minimum	170,000 NW Europe	P	Wetlands International 2012	Winter popn. divided by three & rounded to nearest 10,000
Teal	NB	210,000	I	Musgrove *et al.* 2011		45,000	I	Crowe *et al.* 2008		500,000 NW Europe	I	Wetlands International 2012	
Mallard	B	100,500	P	Baker *et al.* 2006	59,000-142,000 prs = midpoint. Likely under-estimate	23,000	P	Gibbons *et al.* 1993	By extrapolation from GB total	1,500,000 NW Europe	P	Wetlands International 2012	Winter popn. divided by three & rounded to nearest 100,000
Mallard	NB	680,000	I	Musgrove *et al.* 2011		38,500	I	Crowe *et al.* 2008		4,500,000 NW Europe	I	Wetlands International 2012	
Pintail	B	9	P	Holling *et al.* 2012	9-33 prs = minimum	1	P	Gibbons *et al.* 1993		20,000 NW Europe	P	Wetlands International 2012	Winter popn. divided by three
Pintail	NB	29,000	I	Musgrove *et al.* 2011		1,235	I	Crowe *et al.* 2008		60,000 NW Europe	I	Wetlands International 2012	
Shoveler	B	310	P	Holling *et al.* 2012	310-1,010 prs = minimum	100	P	Gibbons *et al.* 1993		13,300 NW & C Europe	P	Wetlands International 2012	Winter popn. divided by three & rounded to nearest 100
Shoveler	NB	18,000	I	Musgrove *et al.* 2011		2,545	I	Crowe *et al.* 2008		40,000 NW & C Europe	I	Wetlands International 2012	
Pochard	B	330	P	Holling *et al.* 2012	330-610 prs = minimum	30	P	Gibbons *et al.* 1993		100,000 NW & NE Europe	P	Wetlands International 2012	Winter popn. divided by three
Pochard	NB	38,000	I	Musgrove *et al.* 2011		37,780	I	Crowe *et al.* 2008		300,000 NE Europe/NW Europe	I	Wetlands International 2012	

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Tufted Duck	NB	110,000	I	Musgrove *et al.* 2011		36,610	I	Crowe *et al.* 2008		1,200,000 NW Europe	I	Wetlands International 2012	
Scaup	NB	5,200	I	Musgrove *et al.* 2011		4,430	I	Crowe *et al.* 2008		310,000 N Europe/W Europe	I	Wetlands International 2012	
Eider *S. m. mollissima*	B	26,000	P	Musgrove *et al.* 2011, Gibbons *et al.* 1993	Estimate derived from winter estimates as per Gibbons *et al.* 1993	600	P	Gibbons *et al.* 1993		345,000 Europe	P	Wetlands International 2012	Winter popn. divided by three
Eider *S. m. mollissima*	NB	55,000	I	Musgrove *et al.* 2011		2,890	I	Crowe *et al.* 2008		1,033,800 *mollissima,* W European	I	Derived from Wetlands International 2012	Combined totals of Britain & Ireland, and Baltic, Denmark & Netherlands wintering groups 1,033,800-1,033,900 = minimum
Eider *S. mollissima faeroeensis*	NB	5,500	I	Musgrove *et al.* 2011	Mean of Shetland WeBS totals for 2005, 2006 & 2009					5,500 *faeroeensis,* Shetland	I	Musgrove *et al.* 2011	Mean of Shetland WeBS totals for 2005, 2006 & 2009
Long-tailed Duck	NB	11,000	I	Musgrove *et al.* 2011		Unknown	I	Crowe *et al.* 2008	Threshold of 50 adopted	1,600,000 W Siberia/N Europe	I	Wetlands International 2012	
Common Scoter	B	52	P	Holling *et al.* 2010		<20	P	IRBBP annual reports 2003-2007; Hillis 2007, 2008		183,000 *nigra,* W Siberia & N Europe/W Europe & NW Africa	P	Wetlands International 2012	Winter popn. divided by three
Common Scoter	NB	100,000	I	Musgrove *et al.* 2011		23,190	I	Crowe *et al.* 2008		550,000 *nigra,* W Siberia & N Europe/W Europe & NW Africa	I	Wetlands International 2012	
Velvet Scoter	NB	2,500	I	Musgrove *et al.* 2011	Significant recent declines					450,000 W Siberia & N Europe/NW Europe	I	Wetlands International 2012	
Goldeneye	B	200	P	Holling *et al.* 2012						383,000 NW & C Europe	P	Wetlands International 2012	Winter popn. divided by three
Goldeneye	NB	20,000	I	Musgrove *et al.* 2011		9,665	I	Crowe *et al.* 2008		1,150,000 NW & C Europe	I	Wetlands International 2012	1,000,000-1,300,000 = midpoint
Smew	NB	180	I	Musgrove *et al.* 2011		<10	I	Crowe *et al.* 2008		40,000 NW & C Europe	I	Wetlands International 2012	
Red-breasted Merganser	NB	8,400	I	Musgrove *et al.* 2011		3,390	I	Crowe *et al.* 2008		170,000 NW & C Europe	I	Wetlands International 2012	
Goosander	NB	12,000	I	Musgrove *et al.* 2011						266,000 NW & C Europe	I	Wetlands International 2012	

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Honey-buzzard	B	33-69	P	Batten 2001; Ogilvie 2003						64,000 Europe	P	BirdLife International 2004	49,500-79,200 prs = midpoint
Red Kite	B	1,600	P	Holling *et al.* 2012						22,000 Europe	P	BirdLife International 2004	19,000-25,000 prs = midpoint
Red Kite	NB	4,800	I	Holling *et al.* 2012	Breeding population x 3					66,000 Europe	I	Derived from BirdLife International 2004	Breeding popn. x three
White-tailed Eagle	B	44	P	Holling *et al.* 2012; Evans in litt.	37 – 44 prs = maximum (	0	P	IRBBP reports; Hillis 2007, 2008	2003-2007	4,300 Europe	P	BirdLife International 2004	4,000-4,600 prs = midpoint
Marsh Harrier	B	320	P	Holling *et al.* 2012	320 - 380 prs = minimum					65,000 Europe	P	BirdLife International 2004	51,500-78,000 prs = midpoint
Hen Harrier	B	570	P	Holling *et al.* 2012		180	P	Barton *et al.* 2006; Sim *et al.* 2007		15,500 Europe	P	BirdLife International 2004	12,000-19,000 prs = midpoint
Hen Harrier	NB	1,710	I	Holling *et al.* 2012	Breeding population x 3	540	I	Derived from Barton *et al.* 2006; Sim *et al.* 2007	Breeding population x 3	46,500 Europe	I	Derived from BirdLife International 2004	Breeding popn. x three
Montagu's Harrier	B	12	P	Holling *et al.* 2012	12 - 16 = minimum					21,500 Europe	P	BirdLife International 2004	14,200-28,800 prs = midpoint
Golden Eagle	B	442	P	Eaton *et al.* 2007a		4	P	Hillis 2011	2008	5,100 European *A. c. chrysaetos*	P	Derived from Cramp & Simmons 1980 & BirdLife International 2004	4,550-5,650 prs = midpoint European *A. c. chrysaetos*[49]
Osprey	B	200-250	P	Holling *et al.* 2012						6,300 Europe	P	BirdLife International 2004	5,600-7,000 prs = midpoint
Merlin	B	1,000	P	Ewing *et al.* 2011		110	P	Gibbons *et al.* 1993	110-130 = minimum	13,500 European *F. c. aesalon*	P	Derived from Cramp & Simmons 1980 & BirdLife International 2004	10,000-17,000 prs = midpoint European *F. c. aesalon*[50]
Merlin	NB	1,500	I	Stroud *et al.* 1990	1,500-2,500 = minimum	416	I	Derived from data in Lack 1986 (2-3 birds/ occupied square)	416-624 = minimum	40,500 Europe	I	Derived from Cramp & Simmons 1980 & BirdLife International 2004	Breeding estimate x three

[49] Europe other than Portugal, Spain & Andorra (= *A. c. homeyri*); and Russia & Turkey

[50] Europe other than Iceland (= *F. c. subaesalon*); and Russia

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Peregrine	B	1,400	P	Banks *et al.* 2010		477	P	Madden *et al.* 2009		14,900 European *F. p. peregrinus*	P	Derived from Cramp & Simmons 1980 & BirdLife International 2004	9,310-20,510 prs = midpoint European *F. p. peregrinus*[51]
Capercaillie	NB	1,300	I	Ewing *et al.* 2012						446,000 European *T. u. urogallus*	P	Derived from Cramp & Simmons 1980 & BirdLife International 2004	352,000-540,000 prs = midpoint European *T. u. urogallus*[52]
Spotted Crake	B	28	M	Schmitt & Eaton 2015						90,000 Europe	P	BirdLife International 2004	70,000-110,000 prs = midpoint
Corncrake	B	1,200	M	Holling *et al.* 2012		153	M	Hillis 2007, 2008; BirdWatch Ireland data (Anita Donaghy pers. comm.)	2003-2007	400,000 Europe	M	BirdLife International 2004	300,000-500,000 males = midpoint
Coot	NB	180,000	I	Musgrove *et al.* 2011		33,160	I	Crowe *et al.* 2008		1,750,000 NW Europe	I	Wetlands International 2012	
Common Crane	B	9-14	P	Stanbury *et al.* 2011	2006-2010					59,500 Europe	P	BirdLife International 2004	49,000-70,000 prs = midpoint
Common Crane	NB	52	I	Stanbury *et al.* 2011	2009/10					240,000 NW Europe/Iberia & Morocco	I	Wetlands International 2012	
Oystercatcher	B	110,000	P	O'Brien 2004		3,000	P	Piersma 1986	3,000-4,000 = minimum	273,000 *ostralegus,* Europe/S & W Europe & N Africa	P	Wetlands International 2012	Winter popn. divided by three & rounded to nearest 1,000
Oystercatcher	NB	320,000	I	Musgrove *et al.* 2011		67,620	I	Crowe *et al.* 2008		820,000 *ostralegus,* Europe/S & W Europe & N Africa (East Atlantic Flyway)	I	Wetlands International 2012	
Avocet	B	1,500	P	Holling *et al.* 2012						30,300 W Europe	P	Stroud *et al.* 2004	28,670-32,031 prs = midpoint
Avocet	NB	7,500	I	Musgrove *et al.* 2011						73,000 W Europe & NW Africa	I	Wetlands International 2012	
Stone-curlew	B	350	P	Holling *et al.* 2012						46,400 *oedicnemus*, W	P	Thorup 2006	34,465-58,384 prs = midpoint

[51] Europe other than Russia, Turkey, Finland, 50-100 prs Norway and 20-40 prs Sweden (= *F. p. calidus*)

[52] non-Russian Europe other than Spain, Andorra and 650-1500 prs France (= *T. u. aquitanicus*); and Albania, Bulgaria, Greece, Macedonia, Romania, Serbia & Montenegro (= *T. u. rudolfi*)

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
										Europe			
Ringed Plover	B	5,300	P	Conway *et al.* in prep.		1,250	P	Gibbons *et al.* 1993		24,000 *hiaticula,* N Europe/Europe & N Africa	I	Stroud *et al.* 2004; Wetlands International 2012	Winter popn. divided by three & rounded to nearest 1,000. Total popn. of *C. h. hiaticula*
Ringed Plover	NB	34,000	I	Musgrove *et al.* 2011		14,580	I	Crowe *et al.* 2008		73,000 *hiaticula,* N Europe/Europe & N Africa	I	Stroud *et al.* 2004; Wetlands International 2012	Total popn. of *C. h. hiaticula*
Dotterel	B	630	P	Whitfield 2002						25,000 Europe	P	Stroud *et al.* 2004	13,000-36,600 prs = midpoint
Golden Plover	B	38,400	P	Thorup 2006	38,400-59,400 prs = minimum	400	P	Gibbons *et al.* 1993		59,500 *apricaria,* Britain, Ireland, Germany, Denmark & Baltic	P	Delany *et al.* 2009	47,700-71,200 prs = midpoint
Golden Plover	NB	400,000	I	Gillings & Fuller 2009		166,700	I	Crowe *et al.* 2008		930,000 *altifrons*, Iceland & Faeroes/East Atlantic coast[53]	I	Stroud *et al.* 2004; Wetlands International 2012	
Grey Plover	NB	43,000	I	Musgrove *et al.* 2011		6,315	I	Crowe *et al.* 2008		247,000 W Siberia & Canada/ W Europe & W Africa	I	Stroud *et al.* 2004	
Lapwing	B	130,000	P	O'Brien 2004		21,500	P	Gibbons *et al.* 1993		1,385,000 Europe	P	BirdLife International 2004	1,090,000-1,680,000 prs = midpoint
Lapwing	NB	620,000	I	Gillings & Fuller 2009		207,700	I	Crowe *et al.* 2008		7,500,000 W Asia/ SW Asia, Europe & W Asia	I	Delany *et al.* 2009	5,500,000-9,500,00 = midpoint
Knot	NB	320,000	I	Musgrove *et al.* 2011	= *C. c. islandica*	18,970	I	Crowe *et al.* 2008	= *C. c. islandica*	450,000 *islandica,* NE Canada & Greenland/W Europe	I	Stroud *et al.* 2004; Wetlands International 2012	Total popn. of *C. c. islandica*
Sanderling	NB	16,000	I	Musgrove *et al.* 2011		6,680	I	Crowe *et al.* 2008		120,000 *alba,* East Atlantic Europe, W & S Africa (win)	I	Delany *et al.* 2009; Wetlands International 2012	

[53] Three Golden Plover populations winter in UK: *P. a. altifrons* (Iceland & Faeroes - br.), *altifrons* (N Europe - br.) and *apricaria*. Ramsar guidance indicates the largest threshold (*i.e.* that of *altifrons* Iceland & Faeroes - br.) be used for site selection purposes.

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Purple Sandpiper	NB	13,000	I	Musgrove *et al.* 2011		3,330	I	Crowe *et al.* 2008		25,000 *maritima,* NE Canada & N Greenland	I	Delany *et al.* 2009; Wetlands International 2012	20,000-30,000 = midpoint. Note that about 25% of British wintering *C. maritima* derive from the more numerous N Europe, W Siberia breeding popn. (Nicoll *et al.* 1988)
Dunlin (*C. a. schinzii*)	B	8,600	P	Forrester & Andrews 2007; Brown & Grice 2005; Johnstone *et al.* 2008	8,600-10,600 prs = minimum *C. a. schinzii*	175	P	Hutchinson 1989	= *C. a. schinzii*	8,800 *. schinzii,* Britain & Ireland (breeding)	P	Forrester & Andrews 2007; Brown & Grice 2005; Johnstone *et al.* 2008; Hutchinson 1989 (see also Stroud *et al.* 2004)	8,780-10,7800 prs = minimum Summed current estimates for Britain and Ireland
Dunlin	NB	350,000	I	Musgrove *et al.* 2011		88,480	I	Crowe *et al.* 2008		1,333,000 total *alpina*,	I	Stroud *et al.* 2004; Wetlands International 2012	Total popn. of *C. a. alpina*
Ruff	B	6	F	Holling *et al.* 2012	1-11 = midpoint					105,000 Europe	P	Thorup 2006	100,000-111,000 prs = midpoint
Ruff	NB	800	I	Musgrove *et al.* 2011		<20	I	Crowe 2005		1,250,000 N Europe & W Siberia/W Africa	I	Delany *et al.* 2009; Wetlands International 2012	1,000,000-1,500,000 = midpoint
Snipe (*G. g. gallinago*)	B	69,100	P	O'Brien 2004	76,000 reduced to exclude *G. g. faeroeensis*	10,000	P	Piersma 1986	Minimum estimate	1,040,000 European *G. g. gallinago*	P	Stroud *et al.* 2004	786,000-1,297,000 prs = midpoint European *G. g. gallinago*
Snipe (*G. g. faeroeensis*)	B	6,900	P	BTO *in litt.* 2001						190,000 total. *faeroeensis*	P	Stroud *et al.* 2004	Total popn. of *G. g. faeroeensis*
Snipe	NB	1,000,000	I	Musgrove *et al.* 2011		Unknown		Crowe *et al.* 2008		2,500,000 Europe/SW Europe & NW Africa	I	Delany *et al.* 2009; Wetlands International 2012	
Black-tailed Godwit (*L. l. limosa*)	B	54	P	Holling *et al.* 2012	54-57 prs = minimum					84,000 *limosa,* W Europe/NW & W Africa	P	Stroud *et al.* 2004 updated with data from Jensen *et al.* 2008	79,000-89,000 prs = midpoint European *L. l. limosa* (excl. Russia)
Black-tailed Godwit (*L. l. islandica*)	B	7	P	Holling *et al.* 2012	7-9 prs = minimum	1	P	Hillis 2007, 2008, 2009, 2010, 2011		20,800 *islandica*, Iceland/W Europe	P	Gill *et al.* 2007; Wetlands International 2012	Midpoint of winter estimate divided by three Total popn. of *L. l. islandica*

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Black-tailed Godwit (*L. l. islandica*)	NB	43,000	I	Musgrove *et al.* 2011		13,880	I	Crowe *et al.* 2008		61,000 *islandica*, Iceland/W Europe	I	Gill *et al.* 2007; Wetlands International 2012	50,000-75,000 = midpoint Total popn. of *L. l. islandica*
Bar-tailed Godwit	NB	38,000	I	Musgrove *et al.* 2011		16,280	I	Crowe *et al.* 2008		120,000 *L. l. lapponica*	I	Stroud *et al.* 2004; Wetlands International 2012	Total popn. of *L. l, lapponica*
Whimbrel	B	310	P	Jackson 2009	400-500 prs = minimum					225,000 *N. p. islandicus*	P	Delany *et al.* 2009; Wetlands International 2012	200,000-250,000 prs = midpoint Total popn. of *N. p. islandicus*
Whimbrel	NB (passage)	670,000	I	SPA Scientific Working Group; Wetlands International 2012	Icelandic non-breeding population, mid point 600,000-750,000	<10	I	Crowe 2005		670,000 *islandicus*, Iceland, Faroes & Scotland/ West Africa	I	Delany *et al.* 2009; Wetlands International 2012	600,000-750,000 = midpoint
Curlew	B	66,000	P	O'Brien 2004		625	P	Colhoun *et al.* 2014 & Ireland Article 12 report	Combined estimates from Northern Ireland (526 in 2013) & Ireland (98 – 2008-2012) & rounded to 625	205,000 European *arquata*	P	Stroud *et al.* 2004	200,000-210,000 prs = midpoint European *N. a. arquata*
Curlew	NB	140,000	I	Musgrove *et al.* 2011		54,650	I	Crowe *et al.* 2008		850,000 Europe/Europe, N & W Africa	I	Delany *et al.* 2009; Wetlands International 2012	700,000-1,000,000 = midpoint
Redshank	B	24,000	P	O'Brien 2004		4,400	P	Gibbons *et al.* 1993	4,400-5,000 = minimum	28,400 Total *britannica*	P	O'Brien 2004; Gibbons *et al.* 1993	Total popn. of *T. t. britannica* Stroud *et al.* 2004
Redshank	NB	120,000	I	Musgrove *et al.* 2011		31,090	I	Crowe *et al.* 2008		275,000 *robusta*, Iceland & Faeroes/W Europe	I	Delany *et al.* 2009; Wetlands International 2012	150,000-400,000 = midpoint Total popn. of *T. t. robusta*[54]
Greenshank	B	1,100	P	Hancock *et al.* 1997						76,600 NW Europe	P	Delany *et al.* 2009	63,000-90,000 prs = mid-point
Greenshank	NB	610	I	Musgrove *et al.* 2011		1,265	I	Crowe *et al.* 2008		230,000 N Europe/SW Europe, NW & W Africa	I	Delany *et al.* 2009; Wetlands International 2012	190,000-270,000 = midpoint
Wood Sandpiper	B	11	P	Holling *et al.* 2010	11-27 prs = minimum					350,000 Europe	P	Delany *et al.* 2009; Wetlands	300,000-400,000 prs = midpoint

[54] Three Redshank populations winter in UK: *T. t. totanus* (E Atlantic, non-br), *robusta* & *britannica*. Ramsar guidance indicates the largest threshold (*i.e.* that of *robusta*) be used for site selection purposes.

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												International 2012	
Turnstone	NB	48,000	I	Musgrove *et al.* 2011		11,810	I	Crowe *et al.* 2008		150,000 *interpres*, NE Canada & Greenland/W Europe & NW Africa	I	Delany *et al.* 2009; Wetlands International 2012	100,000-200,000 = midpoint
Red-necked Phalarope	B	20	M	Holling *et al.* 2012	20-24 prs = minimum	0	P	Hillis 2007, 2008, 2009, 2010, 2011		112,500 Europe	P	BirdLife International 2004	75,000-150,000 prs = midpoint
Arctic Skua	B	2,100	P	Furness & Ratcliffe 2004a						25,000 NE Atlantic	P	Furness & Ratcliffe 2004a	15,000-35,000 = midpoint
Great Skua	B	9,600	P	Furness & Ratcliffe 2004b						16,000 World	P	Furness & Ratcliffe 2004b	Total species popn.
Mediterranean Gull	B	600	P	Holling *et al.* 2012	600-630 prs = minimum	5	P	Parsons 2004		81,000 Europe	P	Parsons 2004	
Mediterranean Gull	NB	1,800	I	Musgrove *et al.* 2011						50,000-120,000 Europe (excl. Russia & Turkey)	I	Wetlands International 2012	
Little Gull	NB	unknown	I	Musgrove *et al.* 2011		100	I	Crowe 2005		123,000 C & E Europe/SW Europe & W Mediterranean	I	BirdLife International 2004; Wetlands International 2012	72,000-174,000 = midpoint
Black-headed Gull	B	130,000	P	Dunn 2004		14,000	P	Dunn 2004		2,450,000 World	P	Dunn 2004	2,100,00-2,800,000 prs = midpoint
Black-headed Gull	NB	2,200,000	I	Banks *et al.* 2007		100,000	I	Crowe 2005	1994/95 - 1998/99	4,250,000 W Europe/W Europe, W Mediterranean & W Africa	I	BirdLife International 2004; Wetlands International 2012	3,700,000-4,800,000 = midpoint
Common Gull	B	48,000	P	Tasker 2004b		1,600	P	Tasker 2004b		525,000 *canus*, NW & C Europe/ Atlantic/ Mediterranean	P	Tasker 2004b	360,000-590,000 prs = midpoint Total popn. of *L. c. canus* (excl. unknown nos. in Russia)
Common Gull	NB	700,000	I	Banks *et al.* 2007		67,500	I	Lack 1986; Crowe 2005		1,725,000 *canus*, NW & C Europe/ Atlantic/ Mediterranean	I	BirdLife International 2004; Wetlands International 2012	1,200,000-2,250,000 = midpoint
Lesser Black-backed Gull	B	110,000	P	Calladine 2004		4,800	P	Calladine 2004		179,000 total *graellsii*	P	Calladine 2004	Total popn. of *L. f. graellsii*
Lesser Black-backed Gull	NB	120,000	I	Banks *et al.* 2007		10,000	I	Crowe 2005	*graellsii* 1994/95 - 1998/99	550,000 *total graellsii*	I	BirdLife International 2004; Wetlands International 2012	530,000-570,000 = midpoint. Total popn. of *L. f. graellsii*

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Herring Gull	B	130,000	P	Madden & Newton 2004		6,500	P	Madden & Newton 2004	*argenteus*	752,000 NW European & Iceland/W Europe	P	Madden & Newton 2004	Includes both *L. a. argentatus* and *L. a. argenteus*
Herring Gull	NB	730,000	I	Banks *et al.* 2007		30,000	I	Crowe 2005	*argenteus* 1994/95 - 1998/99	3,030,00 *L. a. argenteus* (1,020,000) & *L. a. argentatus* (2,010,000)	I	Wetlands International 2012	3,030,000
Great Black-backed Gull	B	17,000	P	Reid 2004		2,300	P	Reid 2004		105,000 Europe	P	Reid 2004	100,000-110,000 = midpoint (Excl. Russia)
Great Black-backed Gull	NB	76,000	I	Banks *et al.* 2007		9,000	I	Crowe 2005	NW Atlantic 9,000-10,000 = minimum 1994/95 - 1998/99	435,000 N & W Europe	I	BirdLife International 2004; Wetlands International 2012	330,000-540,000 = midpoint
Kittiwake	B	370,000	P	Heubeck 2004		49,000	P	Heubeck 2004		2,750,000 North Atlantic = total *tridactyla*	P	Heubeck 2004	2,500,000-3,000,000 = midpoint Total popn. of *R. t. tridactyla*
Sandwich Tern	B	11,000	P	Ratcliffe 2004a		3,700	P	Ratcliffe 2004a		74,000 *sandvicensis,* Europe	P	Ratcliffe 2004a	69,000-79,000 = midpoint Total popn. of *S. s. sandvicensis*
Sandwich Tern	P	32,000	I	derived from Ratcliffe 2004a	GB total = 10,526 prs x 3 = 31,578, rounded = 32,000; 1% = 320	11,100	I	Derived from Ratcliffe 2004a	breeding popn. x 3	220,000 *sandvicensis,* Europe	I	Derived from Ratcliffe 2004a	Breeding popn. x 3 Total popn. of *S. s. sandvicensis*
Roseate Tern	B	86	P	Holling *et al.* 2012		738	P	Newton 2004		2,150 *dougallii,* Europe	P	Newton 2004	1,900-2,400 = midpoint European *S. d. dougallii*
Common Tern	B	10,000	P	Ratcliffe 2004b		4,200	P	Ratcliffe 2004b		280,000 *hirundo,* Europe	P	Ratcliffe 2004b	220,000-340,000 = midpoint
Common Tern	P	30,000	I	Ratcliffe 2004b	Prs x 3	12,600	I	Ratcliffe 2004b	Prs x 3	840,000 *hirundo,* Europe	I	Ratcliffe 2004b	Prs x 3
Arctic Tern	B	53,000	P	Ratcliffe 2004c		3,500	P	Ratcliffe 2004c		629,000 Europe	P	Ratcliffe 2004c	471,000-788,000 = midpoint
Little Tern	B	1,900	P	Pickerill 2004		210	P	Pickerill 2004		19,500 *albifrons,* Europe	P	Pickerill 2004	17,000-22,000 = midpoint European *S. a. albifrons*

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Guillemot *U. a. aalge*	B	792,000 [1,182,000]	P [I]	Harris & Wanless 2004a, 2007	Prs = inds x 0.67 N, W, E & SE Scotland & Northumberland	0	P	Harris & Wanless 2004a, 2007		2,110,000 [3,150,000] *aalge,* NE Atlantic	P [I]	Harris & Wanless 2004a, 2007	Prs = inds x 0.67 NE Atlantic *U. a. aalge*
Guillemot *U. a. albionis*	B	94,000 [141,000]	P [I]	Harris & Wanless 2004a, 2007	Prs = inds x 0.67 Total Wales, England minus Northumberland , & SW Scotland	158,500 [236,600]	P [I]	Harris & Wanless 2004a, 2007	Total All-Ireland	256,000 [382,000] *U. a. albionis*	P [I]	Harris & Wanless 2004a, 2007	Prs = inds x 0.67 Total popn. of *U. a. albionis*
Razorbill	B	110,000	P	Merne & Mitchell 2004	Pairs derived by multiplying total estimated individuals by 0.67	35,000	P	Merne & Mitchell 2004		530,000 *islandica*, NW Europe	P	Merne & Mitchell 2004	Total popn. of *A. t. islandica* Conversion of 0.67 used between AOSs and individuals
Puffin	B	580,000	P	Harris & Wanless 2004b		21,000	P	Harris & Wanless 2004b		5,676,000 *arctica,* NE Atlantic (UK, Ireland, Faeroes, Iceland, France, Norway, Russia)	P	Harris & Wanless 2004b	NE Atlantic *F. a. arctica* 5,170,000-6,170,000 = midpoint Conversion of 0.5 used between AOSs and individuals
Short-eared Owl	B	610	P	Gibbons *et al.* 1993; Musgrove *et al.* 2013	610 – 2,140 = minimum					19,000 Europe	P	BirdLife International 2004	8,000-30,000 prs = midpoint
Nightjar	B	4,600	M	Conway *et al.* 2007						202,000 European *C. e. europaeus*	P	Derived from Cramp 1985 & BirdLife International 2004	121,000-283,000 prs = midpoint European *C. e. europaeus*[55]
Kingfisher	B	3,600	P	Gibbons *et al.* 1993; Musgrove *et al.* 2013	3,600-6,100 = minimum	1,300	P	Gibbons *et al.* 1993	1,300-2,100 = minimum	51,000 *A. a. ispida*	P	Derived from Cramp 1985 & BirdLife International 2004	32,000-70,000 prs = midpoint Total popn. of *A. a. ispida*[56]
Kingfisher	NB	10,800	I	Derived from Gibbons *et al.* 1993; Musgrove	Breeding estimate x 3	3,900	I	Derived from Gibbons *et al.* 1993	Breeding estimate x 3	153,000 *A.. a. ispida*	I	Derived from Cramp 1985 & BirdLife	Breeding estimate x 3

[55] Europe other than Albania, Andorra, Armenia, Azerbaijan, Bulgaria, Croatia, Cyprus, Georgia, Greece, Hungary, 50% of Italian popn. (4,000-10,000 prs.) , Macedonia, Portugal, Romania, Russia, Serbia & Montenegro, Slovenia, Spain, Turkey & Ukraine (= *C. e. meridionalis*)

[56] Europe other than Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Georgia, Greece, 50% of Italian popn. (2,500-5,000 prs.), Macedonia, Moldova, Portugal, Romania, Russia, Serbia & Montenegro, Slovenia, 50% of Spanish popn. (1,800-3,500), Turkey & Ukraine (= *A. a. atthis*)

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
				et al. 2013								International 2004	
Woodlark	B	3,100	P	Conway *et al.* 2009						1,556,000 *L. a. arborea*	P	Derived from Cramp 1988 & BirdLife International 2004	821,000-2,291,000 prs = midpoint Total popn. of *L. a. arborea*[57]
Fair Isle Wren	B	29	P	Aspinall & Aspinall 2011	Mean 2007-2011					29 World	P	Aspinall & Aspinall 2011	Mean 2007-2011 Total popn. of *T. t. fridariensis*
Aquatic Warbler	P	10	I	Musgrove *et al.* 2013	2006-2010					37,500 World	I	Derived from Flade & Lachmann 2008	Midpoint of 10,500-14,200 calling males x 3 Total popn. of species
Dartford Warbler	B	3,200	P	Wotton *et al.* 2009						654,000 *S. u. dartfordiensis*	P	Derived from BirdLife International 2004	Total popn. of *S. u. dartfordiensis*[58] Midpoint of 376,600 – 931,900
Ring Ouzel	B	6,200[59]	P	Wootton *et al.* 2002	6,200-7,500 prs = minimum	<20	P	IRBBP annual reports 2003-2007; Hillis 2007, 2008		19,500 *T. t. torquatus*	P	Derived from BirdLife International 2004	19,567-118,199 prs = minimum. Total popn. of *T. t. torquatus,*
Red-backed Shrike	B	1-3	P	Holling *et al.* 2012	1 = minimum	0	P			5,550,000	P	Derived from BirdLife International 2004 (excluding Russia & Turkey)	3,900,000 – 7,200,000 prs = midpoint
Chough	B	300	P	Finney & Jardine 2003; Thorpe & Johnstone 2003	230-350 prs = midpoint	838	P	Gray *et al.* 2003		1,290 *P. p. pyrrhocorax*	P	Finney & Jardine 2003; Thorpe & Johnstone 2003; Gray *et al.* 2003; Moore 2004	1,288-1,330 = minimum Total popn. of *P. p. pyrrhocorax* (UK, Isle of Man & Ireland)
Chough	NB	930	I	Finney & Jardine 2003; Thorpe & Johnstone 2003	930 – 940 breeding inds = non-breeding season min.	2,432	I	Gray *et al.* 2003	Total prs + non-breeding flock birds in breeding season	3,800 *P. p. pyrrhocorax*	I	Finney & Jardine 2003; Thorpe & Johnstone 2003; Gray *et al.* 2003; Moore 2004	Total popn. of *P. p. pyrrhocorax* (UK & Ireland)

[57] Europe other than Albania, Armenia, Azerbaijan, Bulgaria, Croatia, Cyprus, Georgia, Greece, Italy, Macedonia, Moldova, Romania, Russia, Serbia & Montenegro, Slovenia, Turkey & Ukraine (= *L. a. pallida*)

[58] Range of *S. u. dartfordiensis* based on Snow & Perrins (1998) and del Hoyo *et al.* (2006), and population calculated as whole of UK population + 80% of French population + 15% of Spanish population

[59] As this Review was published, Wotton *et al.* (2016) published a new UK estimate of 5,332 pairs (range 4,096 - 6,875) from a national survey in 2012.

Species/population	Season	GB population	GB population unit	GB population source	GB population derivation	All-Ireland population	All-Ireland population unit	All-Ireland population source	All-Ireland population derivation	Bio-geographic population and name	Bio-geographic population unit	Bio-geographic population source	Bio-geographic population derivation
Twite	B	<600	P	English uplands popn. of *C. f. pipilans;* Baker *et al.* 2002; Langston *et al.* 2006						<600 English uplands popn. of *C. f. pipilans.*	P	Baker *et al.* 2002; Langston *et al.* 2006	
Scottish Crossbill	B	6,800	P	Summers & Buckland 2010						6,800 World	P	Summers & Buckland 2010	Total species popn.

Appendix 5. Population coverage within SPA suites: comparison of 1990s with 2000s

This Appendix lists the changed status of all regularly occurring migratory species of birds in the UK (and species listed in Annex I of the Directive where these are regularly occurring within the UK) with the UK SPA network as assessed in the 1990s (by Stroud *et al.* 2001) and in the 2000s (by this Review).

Notes:

All solely resident species have been excluded from these tables (unless the UK breeding population is tiny in comparison with the number of immigrants).

Partial migrants (*i.e.* UK breeding species where a significant, but lower, proportion of birds cross national boundaries) have been indicated in the comment field.

Medium shading indicates that, although the species/population is present in the UK during the relevant season, no corresponding SPAs have been selected for the reasons outlined in the text (section 6) (*i.e.* present but no SPAs).

Black indicates that, for some migrants, the species does not regularly occur in the UK during the season concerned (*i.e.* not present thus no SPAs).

Light shading indicates that the species/population is listed on Annex I. Where these are not also migratory, this is shown in the status column.

For a few species, the breeding totals reported by Stroud *et al.* (2001) have been amended to reflect revised totals for then proposed SPAs which were classified shortly after that review, and which had different site totals on final boundary determination. This affects totals for breeding Red-throated Diver, Hen Harrier, Golden Eagle, Osprey, Merlin, Peregrine, Capercaillie, Oystercatcher, Stone Curlew, Ringed Plover, Golden Plover, Dunlin, Common Tern, Little Tern, Puffin, Guillemot, Razorbill, Short-eared Owl and Chough. 1990s totals for Spotted Crake have been amended for reasons given in the species account.

Breeding season

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Red-throated Diver	Partial migrant	10	397	42.5%		5.6%	10	397	30.5%		1.5%
Black-throated Diver	Partial migrant	11	95	61%		0.5%	12	100	45.5%		0.5%1
Great Northern Diver											
Little Grebe	Partial migrant										
Great Crested Grebe	Partial migrant	1	500		24.1%	1.0%	1	311		15.0%	0.1%
Red-necked Grebe											
Slavonian Grebe	Partial migrant	6	37	53%		0.6%	6	14	60.9%		0.2%
Black-necked Grebe	Partial migrant										
Fulmar	Partial migrant	25	310,279	57.3%	4.7%	4.1%	25	249,870	49.7%	3.9%	7.3%
Cory's Shearwater											

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Great Shearwater											
Sooty Shearwater											
Manx Shearwater		4	219,898	100%		82.9%	5	294,373	96.2%		78.6%
Balearic Shearwater											
Storm Petrel		9	29,356	34.5%		11.4%	9	25,729	99.0%		5.3%
Leach's Petrel		6	55,000	100%		5.8%	6	47,606	99.2%		21.0%
Gannet	Partial migrant	10	197,127	98.1%		75.0%	10	210,911	95.9%		54.1%
Cormorant	Partial migrant	7	2,316	29.5%	5.3%	5.6%	7	1,427	14.8%	3.5%	2.7%
Shag	Partial migrant	13	17,584	46.9%		14.1%	13	9,217	34.1%		13.3%
Bittern	Partial migrant	5	18	90%		0.2%	6	45	56.3%		0.1%
Little Egret											
Grey Heron	Partial migrant										
White Stork											
Spoonbill											
Bewick's Swan											
Whooper Swan											
Bean Goose											
Pink-footed Goose											
European White-fronted Goose											
Greenland White-fronted Goose											
Greylag Goose (Iceland population)											
Snow Goose	Partial migrant										
Barnacle Goose (Greenland popn)											
Barnacle Goose (Svalbard popn)											
Dark-bellied Brent Goose											
Light-bellied Brent Goose (Svalbard popn)											
Light-bellied Brent Goose (Canada/Ireland popn)											
Shelduck	Partial migrant										
Wigeon	Partial migrant	2	80	27%		<0.1%	2	60	20.0%		<0.1%
Gadwall	Partial migrant	1	111	14.4%		1.1%	1	148	22.1%		0.7%
Teal	Partial migrant										
Mallard	Partial migrant										

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Pintail	Partial migrant										
Garganey											
Shoveler		1	155	15.5%		1.6%	1	169	54.5%		1.3%
Red-crested Pochard											
Pochard	Partial migrant										
Ring-necked Duck											
Ferruginous Duck											
Tufted Duck	Partial migrant										
Scaup											
Eider *Somateria m. mollissima*	Partial migrant										
Long-tailed Duck											
Common Scoter	Partial migrant	2	37	49%		<0.1%	3	50	96%		<0.1%
Surf Scoter											
Velvet Scoter											
Goldeneye	Partial migrant										
Smew											
Red-breasted Merganser	Partial migrant										
Goosander	Partial migrant										
Honey-buzzard		1	2	13%		<0.1%	1	4	12.1%		<0.1%
Red Kite	Partial migrant	1	15	9.3%		<0.1%	1	18	1.1%		<0.1%
White-tailed Eagle	Not migratory										
Marsh Harrier	Partial migrant	10	116	74%		0.4%	10	164	51.3%		0.3%
Hen Harrier	Partial migrant	14	201	41.6%		2.4%	17	203	29.6%	18.9%	1.3%
Montagu's Harrier											
Goshawk	Partial migrant										
Sparrowhawk	Partial migrant										
Buzzard	Partial migrant										
Rough-legged Buzzard											
Golden Eagle	Partial migrant	8	62	15.5%		1.2%	12	125	28.3%		2.4%
Osprey (feeding)		9	38[60]	38.4%		1.0%	9	76	38.0%		1.2%
Osprey (nesting)							9	17	8.5%		0.3%

[60] Total is not comparable with the total for 2000s since the latter combined sites used for feeding and nesting

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Kestrel	Partial migrant										
Merlin	Partial migrant	14	425	32.7%		4.2%	15	246	21.7%	6.4%	1.8%
Hobby											
Peregrine	Partial migrant	10	106	9.6%	1.9%	1.9%	11	72	4.8%	1.0%	0.5%
Capercaillie	Not migratory	6	369	16.8%		0.1%	11	125	Unknown		<0.1%
Quail											
Water Rail	Partial migrant										
Spotted Crake		4	23	27.0%		<0.1%	4	11	39%		<0.1%
Corncrake		10	204	42.5%		0.2%	11	350	29.2%		<0.1%
Moorhen	Partial migrant										
Coot	Partial migrant										
Crane											
Oystercatcher	Partial migrant	3	1,358	4.1%		0.5%	3	1,420	1.3%		0.5%8
Avocet	Partial migrant	6	549	92.7%		2.1%	8	885	59.0%		2.9%
Stone-curlew		3	157	83.5%		0.5%	3	230	65.7%		0.5%
Little Ringed Plover											
Ringed Plover	Partial migrant	5	1,038	12.2%		6.5%	5	1,023	19.3%		4.3%
Kentish Plover											
Dotterel		8	469	55.8%		2.6%	8	241	38.3%		1.0%
Golden Plover	Partial migrant	7	5,874	26.0%	3.0%	1.2%	7	10,059	20.6%	1.0%	16.9%
Grey Plover											
Lapwing	Partial migrant										
Knot											
Sanderling											
Little Stint											
Temminck's Stint											
Pectoral Sandpiper											
Curlew Sandpiper											
Purple Sandpiper											
Dunlin		8	6,801	74.3%		61.8%	8	6,108	71.0%		69.4%
Buff-breasted Sandpiper											
Ruff		4	10	91%		<0.1%	4	2	33%		<0.1%
Jack Snipe											
Snipe	Partial migrant										

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Woodcock	Partial migrant										
Black-tailed Godwit		2	42	100%		<0.1%	2	47	87%		<0.1%
Bar-tailed Godwit											
Whimbrel		1	65	12.3%		<0.1%	20	20	6.5%		<0.1%
Curlew	Partial migrant	1	3,930	11.9%		3.3%	1	5,454	8.3%		2.7%
Spotted Redshank											
Redshank	Partial migrant	4	1,659	5.4%		2.8%	4	1,838	7.7%		6.5%
Greenshank	Partial migrant	2	408	28.3%		0.7%	2	824	74.9%		1.1%
Green Sandpiper											
Wood Sandpiper		3	10	100%		<0.1%	3	9	82%		<0.1%
Common Sandpiper											
Turnstone											
Red-necked Phalarope		1	30	83%		<0.1%	1	11	55%		<0.1%
Grey Phalarope											
Pomarine Skua											
Arctic Skua		7	780	24.4%		2.6%	7	343	16.3%		1.4%
Long-tailed Skua											
Great Skua		9	6,262	73.7%		46.0%	9	7,063	73.6%		44.1%
Mediterranean Gull		5	23	74%		<0.1%	5	145	24.2%		0.2%
Little Gull											
Sabine's Gull											
Black-headed Gull	Partial migrant	4	48,582	9.3%	61.3%	2.9%	4	12,761	7.3%	23.4%	0.5%
Ring-billed Gull											
Common Gull	Partial migrant	3	18,264	26.4%	7.3%	14.7%	3	6,270	13.0%	1.9%	1.2%
Lesser Black-backed Gull	Partial migrant	10	88,633	100%	11.6%	71.4%	10	42,895	38.5%	12.5%	24.0%
Herring Gull	Partial migrant	12	54,650	31.6%	9.0%	5.8%	12	16,330	12.5%	0.4%	2.2%
Iceland Gull											
Glaucous Gull											
Great Black-backed Gull	Partial migrant	6	4,457	23.4%		4.7%	6	2,863	16.8%		2.7%
Kittiwake	Partial migrant	33	390,547	78.3%	13.6%	12.3%	33	217,005	56.5%	16.2%	7.9%
Sandwich Tern		16	11,440	72.2%	30.3%	8.7%	16	9, 234	72.1%	35.2%	12.5%
Roseate Tern		7	56	88%	1%	3.2%	7	81	94%	0%	3.8%
Common Tern		22	5,801	47.2%	42.2%	3.6%	23	5,760	45.6%	28.7%	2.1%
Arctic Tern		17	17,124	37.9%	16.7%	1.9%	18	12,967	20.6%	58.0%	2.1%

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Little Tern		27	1,629	67.9%		7.9%	27	1,156	60.8%		5.9%
Black Tern											
Guillemot *U. a. aalge*	Partial migrant	30	644,554				30	578,643	73.1%		27.4%
Guillemot *U. a. albionis*	Partial migrant	4	54,631				4	151,232	67.2%	55.1%	59.1%
Razorbill	Partial migrant	19	75,357	79.0%	26.2%	14.1%	19	83,849	62.2%	44.0%	15.8%
Black Guillemot	Partial migrant										
Little Auk											
Puffin	Partial migrant	21	461,661	c. 100%	11.7%	51.5%	21	483,889	83.3%	3.5%	8.5%
Stock Dove	Partial migrant										
Woodpigeon	Partial migrant										
Turtle Dove											
Cuckoo											
Snowy Owl	Not migratory										
Long-eared Owl	Partial migrant										
Short-eared Owl	Partial migrant	6	127	12.1%		0.9%	6	121	18.2%		0.6%
Nightjar		10	1,785	52.5%		0.8%	10	2,124	46.2%		1.1%
Swift											
Kingfisher	Not migratory										
Bee-eater											
Hoopoe											
Wryneck											
Short-toed Lark											
Woodlark	Partial migrant	7	1,102	73.4%		0.1%	7	960	31.0%		0.1%
Skylark	Partial migrant										
Shore Lark											
Sand Martin											
Swallow											
Red-rumped Swallow											
House Martin											
Richard's Pipit											
Tawny Pipit											
Tree Pipit											
Meadow Pipit	Partial migrant										
Rock Pipit	Partial migrant										

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Water Pipit											
Yellow Wagtail											
Grey Wagtail	Partial migrant										
Pied (White) Wagtail	Partial migrant										
Waxwing											
Fair Isle Wren	Not migratory	1	37	100%		100%	1	29	100%		100%
Robin	Partial migrant										
Nightingale											
Bluethroat											
Black Redstart	Partial migrant										
Redstart											
Whinchat											
Stonechat	Partial migrant										
Wheatear											
Ring Ouzel											
Blackbird	Partial migrant										
Fieldfare											
Song Thrush	Partial migrant										
Redwing											
Grasshopper Warbler											
Savi's Warbler											
Aquatic Warbler											
Sedge Warbler											
Marsh Warbler											
Reed Warbler											
Icterine Warbler											
Melodious Warbler											
Dartford Warbler	Not migratory	6	1,681	c. 100%		<0.1%	6	1,654	51.7%		0.3%
Barred Warbler											
Lesser Whitethroat											
Whitethroat											
Garden Warbler											
Blackcap											
Pallas's Warbler											

Name	Migratory status	Breeding season (1990s)					Breeding season (2000s)				
		Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population	Number of breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (pairs)	% British (GB) breeding population	% all-Ireland breeding population in N Ireland	% international population
Yellow-browed Warbler											
Wood Warbler											
Chiffchaff											
Willow Warbler											
Goldcrest	Partial migrant										
Firecrest	Partial migrant										
Spotted Flycatcher											
Red-breasted Flycatcher											
Pied Flycatcher											
Bearded Tit	Partial migrant										
Golden Oriole											
Red-backed Shrike											
Great Grey Shrike											
Woodchat Shrike											
Chough	Not migratory	9	122	35.9%		1.0%	12	149	49.7%		11.6%
Rook	Partial migrant										
Starling	Partial migrant										
Chaffinch	Partial migrant										
Brambling											
Serin											
Greenfinch	Partial migrant										
Goldfinch	Partial migrant										
Siskin	Partial migrant										
Linnet	Partial migrant										
Redpoll	Partial migrant										
Crossbill	Partial migrant										
Scottish Crossbill	Not migratory	5	295	98%		98%	5	235	3.5%		3.5%
Common Rosefinch											
Lapland Bunting											
Snow Bunting	Partial migrant										
Ortolan Bunting											
Little Bunting											
Reed Bunting	Partial migrant										

Non-breeding season

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Red-throated Diver	Partial migrant	1	88	1.8%		0.1%	3	7,475	44.0%		2.5%
Black-throated Diver	Partial migrant										
Great Northern Diver											
Little Grebe	Partial migrant	10	828	14.8%	7.6%	0.2%	10	944	4.2%	10.7%	0.2%
Great Crested Grebe	Partial migrant	17	2,679	13.8%	43.2%	1.8%	19	4,135	6.2%	53.6%	1.2%
Red-necked Grebe											
Slavonian Grebe	Partial migrant	3	31	7.8%		0.6%	3	17	1.6%		0.3%
Black-necked Grebe	Partial migrant										
Fulmar	Partial migrant										
Cory's Shearwater											
Great Shearwater											
Sooty Shearwater											
Manx Shearwater											
Mediterranean Shearwater											
Storm Petrel											
Leach's Petrel											
Gannet	Partial migrant										
Cormorant	Partial migrant	32	4,986	34.1%	5.3%	4.2%	33	6,377	14.6%	8.5%	5.3%
Shag	Partial migrant										
Bittern	Partial migrant	10	50	50%		0.2%	11	95	15.8%		1.5%
Little Egret		3	225	45%		0.2%	3	210	4.7%		0.2%
Grey Heron	Partial migrant										
White Stork											
Spoonbill											
Bewick's Swan		15	7,072	99.1%	5.4%	41.6%	15	4,921	70.2%	0.2%	22.9%
Whooper Swan		20	4,247	43.5%	18.5%	26.5%	20	8,083	51.4%	13.9%	27.6%
Bean Goose		1	207	51.8%		0.3%	2	402	55.1%		0.9%
Pink-footed Goose		24	155,582	81.9%		69.1%	24	252,821	70.2%		70.2%
European White-fronted Goose		8	4,586	76.4%		0.8%	8	1,547	64.5%		0.1%
Greenland White-fronted Goose (roosting)		12 (10)	8,243	60.2%		27.5%	12 (10)	5,394	41.5%		22.5%

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Greenland White-fronted Goose (feeding)		12 (5)	2,814	20.5%		9.4%	12 (5)	1,087	8.4%		4.5%
Greylag Goose (Iceland popn) (roost provision only)		22	57,519	57.0%	18.2%	57.5%	22	20,290	23.3%	9.6%	20.7%
Snow Goose	Partial migrant										
Barnacle Goose (Greenland popn) (roosting)		11 (9)	31,654				11(9)	43,536	75.1%		45.3%
Barnacle Goose (Greenland popn) (feeding)		11 (7)	24,725				11 (7)	31,928	55.0%		61.8%
Barnacle Goose (Svalbard popn)		2	13,821	100%		100%	2	30,103	91.2%		91.2%
Dark-bellied Brent Goose		19	93,677	93.7%		31.2%	19	73,532	80.8%		30.6%
Light-bellied Brent Goose (Svalbard popn)		1	1,844	100%		54.2%	1	3,551	100%		46.7%
Light-bellied Brent Goose (Canada/Ireland popn)		6	14,087		70.4%	70.4%	7	26,522		66.3%	66.3%
Shelduck	Partial migrant	32	65,472	83.7%	38.0%	21.8%	32	46,356	70.4%	23.5%	15.5%
Wigeon	Partial migrant	38	224,338	78.7%	3.1%	17.9%	39	239,915	53.9%	3.1%	16.0%
Gadwall	Partial migrant	(18) 19[61]	3,580	42.8%	25.9%	11.9%	20	5,148	20.3%	3.6%	8.6%
Teal	Partial migrant	30	68,433	46.7%	4.8%	17.1%	30	77,689	35.1%	8.6%	15.5%
Mallard	Partial migrant	14	29,137	4.9%	9.5%	0.6%	15	22,074	2.6%	12.3%	0.5%
Pintail	Partial migrant	25	19,021	67.4%	2.4%	31.7%	25	17,226	58.2%	27.8%	28.7%
Garganey											
Shoveler		26	3,582	34.6%	1.9%	9.0%	27	4,761	25.9%	4.0%	11.9%
Red-crested Pochard											
Pochard	Partial migrant	12	32,489	19.6%	59.6%	9.3%	13	12,534	11.3%	21.8%	4.2%
Ring-necked Duck											
Ferruginous Duck											
Tufted Duck	Partial migrant	7	24,947	7.5%	51.2%	2.5%	8	13,183	5.7%	18.8%	1.1%
Scaup		(6) 7[62]	3,229	15.2%	51.9%	1.0%	8	7,230	33.0%	*c.*100%	2.3%
Eider	Partial migrant	8	9,023	11.5%	18.3%	0.5%	8	14,616	22.3%	41.8%	1.4%
Long-tailed Duck		3	796	3.5%		<0.1%	3	718	6.5%		<0.1%
Common Scoter	Partial migrant	6	3,422	12.4%		0.2%	8	132,135	*c.*100%		24.0%

[61] The published second SPA network review erroneously omitted Stour and Orwell SPA for non-breeding Gadwall

[62] The published second SPA network review erroneously omitted Ribble and Alt Estuaries SPA for non-breeding Scaup

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Surf Scoter											
Velvet Scoter		4	639	21.3%		<0.1%	4	607	24.3%		0.1%
Goldeneye	Partial migrant	15	12,788	25.6%	76.7%	4.3%	15	6,153	11.5%	39.9%	0.5%
Smew											
Red-breasted Merganser	Partial migrant	15	2,177	19.3%	12.2%	1.7%	15	1,461	14.2%	8.0%	0.9%
Goosander	Partial migrant	2	75	0.8%		<0.1%	2	437	3.6%		<0.1%
Honey-buzzard											
Red Kite	Partial migrant										
White-tailed Eagle	Not migratory										
Marsh Harrier	Partial migrant										
Hen Harrier	Partial migrant	20	244	32.5%		1.0%	20	249	14.6%		0.5%
Montagu's Harrier											
Goshawk	Partial migrant										
Sparrowhawk	Partial migrant										
Buzzard	Partial migrant										
Rough-legged Buzzard											
Golden Eagle	Partial migrant	Largely resident on breeding areas					Largely resident on breeding areas				
Osprey											
Kestrel	Partial migrant										
Merlin	Partial migrant	1	15	1.2%		<0.1%	1	15	1.2%		<0.1%
Hobby											
Peregrine	Partial migrant										
Capercaillie	Not migratory	Largely resident on breeding areas					Largely resident on breeding areas				
Quail											
Water Rail	Partial migrant										
Spotted Crake											
Corncrake											
Moorhen	Partial migrant										
Coot	Partial migrant	6	19,050	13.7%	15.9%	1.3%	7	13,413	6.7%	4.0%	0.8%
Crane											
Oystercatcher	Partial migrant	30	194,898	50.8%	23.7%	21.7%	30	209,046	61.4%	18.5%	25.5%
Avocet	Partial migrant	16	2,225	100%		3.2%	17	6,396	85.3%		8.8%
Stone-curlew											
Little Ringed Plover											

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Ringed Plover	Partial migrant	28	6,812	21.3%	5.1%	13.6%	28	4,605	12.4%	2.7%	6.3%
Kentish Plover											
Dotterel											
Golden Plover	Partial migrant	22	67,233	21.8%	6.4%	3.7%	23	130,128	29.7%	6.9%	14.0%
Grey Plover		28	38,842	90.0%	4.0%	25.9%	28	36,022	83.6%	1.4%	14.6%
Lapwing	Partial migrant	38	212,834	9.8%	6.3%	3.0%	39	224,120	34.3%	5.5%	3.0%
Knot		25	245,902	83.5%	10.3%	70.3%	25	284,658	88.4%	9.5%	63.3%
Sanderling		11	3,535	15.4%		3.5%	12	9,878[63]	61.9%		8.2%
Little Stint											
Temminck's Stint											
Pectoral Sandpiper											
Curlew Sandpiper											
Purple Sandpiper		3	1,973	9.3%		3.9%	3	745	5.7%		3.0%
Dunlin		38	420,758	77.8%	6.6%	30.1%	38	302,965	85.1%	5.7%	22.7%
Buff-breasted Sandpiper											
Ruff		8	316	45%		<0.1%	9	242	30.2%		<0.1%
Jack Snipe											
Snipe	Partial migrant	1	2,097	2.1%		0.1%	1	1,094	0.1%		<0.1%
Woodcock	Partial migrant										
Black-tailed Godwit		27	8,973	100%	3.2%	12.8%	27	29,723	67.4%	5.2%	48.7%
Bar-tailed Godwit		23	39,386	70.1%	12.7%	39.4%	24	35,702	87.0%	16.3%	29.8%
Whimbrel		11	612	12.2%		<0.1%	12	622[64]	0.1%		0.1%
Curlew	Partial migrant	25	50,206	38.3%	4.8%	14.3%	25	49,255	32.8%	6.0%	5.8%
Spotted Redshank											
Redshank	Partial migrant	36	56,739	48.4%	14.1%	37.8%	36	49,973	38.8%	10.9%	18.2%
Greenshank	Partial migrant						1	37	6.1%		<0.1%
Green Sandpiper											
Wood Sandpiper											
Common Sandpiper											
Turnstone		13	10,200	13.4%	7.1%	14.6%	14	6,541	10.2%	13.8%	4.4%

[63] on spring passage in May

[64] on autumn passage in August

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Red-necked Phalarope											
Grey Phalarope											
Pomarine Skua											
Arctic Skua											
Long-tailed Skua											
Great Skua											
Mediterranean Gull											
Little Gull							1	213	unknown		0.2%
Sabine's Gull											
Black-headed Gull	Partial migrant										
Ring-billed Gull											
Common Gull	Partial migrant										
Lesser Black-backed Gull	Partial migrant										
Herring Gull	Partial migrant										
Iceland Gull											
Glaucous Gull											
Great Black-backed Gull	Partial migrant										
Kittiwake	Partial migrant										
Sandwich Tern (passage)		3	4,619	11.0%		1.2%	3	1,746	5.5%		0.4%
Roseate Tern											
Common Tern (passage)							1	1,475	4.9%		0.2%
Arctic Tern											
Little Tern											
Black Tern											
Guillemot	Partial migrant										
Razorbill	Partial migrant										
Black Guillemot	Partial migrant										
Little Auk											
Puffin	Partial migrant										
Stock Dove	Partial migrant										
Woodpigeon	Partial migrant										
Turtle Dove											
Cuckoo											
Snowy Owl	Not migratory										

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Long-eared Owl	Partial migrant										
Short-eared Owl	Partial migrant										
Nightjar											
Swift											
Kingfisher	Not migratory										
Bee-eater											
Hoopoe											
Wryneck											
Short-toed Lark											
Woodlark	Partial migrant										
Skylark	Partial migrant										
Shore Lark											
Sand Martin											
Swallow											
Red-rumped Swallow											
House Martin											
Richard's Pipit											
Tawny Pipit											
Tree Pipit											
Meadow Pipit	Partial migrant										
Rock Pipit	Partial migrant										
Water Pipit											
Yellow Wagtail											
Grey Wagtail	Partial migrant										
Pied (White) Wagtail	Partial migrant										
Waxwing											
Fair Isle Wren	Not migratory	Largely resident on breeding areas					Largely resident on breeding areas				
Robin	Partial migrant										
Nightingale											
Bluethroat											
Black Redstart	Partial migrant										
Redstart											
Whinchat											
Stonechat	Partial migrant										

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Wheatear											
Ring Ouzel											
Blackbird	Partial migrant										
Fieldfare											
Song Thrush	Partial migrant										
Redwing											
Grasshopper Warbler											
Savi's Warbler											
Aquatic Warbler		3	47 (during passage)	70%		0.4%	3	25 (during passage)	21.4%		0.1%
Sedge Warbler											
Marsh Warbler											
Reed Warbler											
Icterine Warbler											
Melodious Warbler											
Dartford Warbler	Not migratory	Largely resident on breeding areas					Largely resident on breeding areas				
Barred Warbler											
Lesser Whitethroat											
Whitethroat											
Garden Warbler											
Blackcap											
Pallas's Warbler											
Yellow-browed Warbler											
Wood Warbler											
Chiffchaff											
Willow Warbler											
Goldcrest	Partial migrant										
Firecrest	Partial migrant										
Spotted Flycatcher											
Red-breasted Flycatcher											
Pied Flycatcher											
Bearded Tit	Partial migrant										
Golden Oriole											
Red-backed Shrike											

Name	Migratory status	Non-breeding season (1990s)					Non-breeding season (2000s)				
		Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population	Number of non-breeding sites in species' UK SPA suite	Total numbers in species' UK SPA suite (individuals)	% British (GB) non-breeding population	% all-Ireland non-breeding population in Northern Ireland	% international population
Great Grey Shrike											
Woodchat Shrike											
Chough	Not migratory	8	241	35.0%		0.7%	11	371	39.9%		9.8%
Rook	Partial migrant										
Starling	Partial migrant										
Chaffinch	Partial migrant										
Brambling											
Serin											
Greenfinch	Partial migrant										
Goldfinch	Partial migrant										
Siskin	Partial migrant										
Linnet	Partial migrant										
Redpoll	Partial migrant										
Crossbill	Partial migrant										
Scottish Crossbill	Not migratory	Largely resident on breeding areas					Largely resident on breeding areas				
Common Rosefinch											
Lapland Bunting											
Snow Bunting	Partial migrant										
Ortolan Bunting											
Little Bunting											
Reed Bunting	Partial migrant										

Appendix 6. Guidelines for use of Decision Framework

The following guidelines were developed to assist the use of the Decision Framework (Figure 5.1) as described in section 5.

The first two columns give the contents of each of the numbered steps of the decision tree. The third column gives further explanation and guidance to outline the information being assessed and choice options.

Steps #2 - #4 are critical to assessing potential under-representation in the SPA network. The rest of the Framework considers the causes of any under-representation, the need for cropped habitats to be considered for each species, and guiding conclusions on the potential need for new SPA classifications or extensions to existing SPAs.

Step (#)	Description	Commentary and guidance
1	*Select [species] in [season] and if non-breeding season (for X species) either [feeding sites] or [roost sites]*	This refers to either the Annex I or regularly occurring migratory species in either the breeding or non-breeding season. For some species (*e.g.* geese) an evaluation of the non-breeding population on both feeding and roost sites can be undertaken.
2	*Site Provision Index*	This step gives understanding of any changes in the status of the species since the previous network Review and provides a consistent baseline for further consideration. For example if the species had adequate provision as indicated by the SPI at the second Review but inadequate provision at this third Review - this requires an appraisal of the reasons for such change. Such a situation could, for example, be connected with inappropriate site management at existing SPAs and, in such situations, an assessment of the site condition for that species across SPAs should be undertaken. Alternatively it could arise as the result of influences external to the site such as increase of the national population since the 1990s, or national or international redistribution.
2a	*Generate past SPI value*	
2b	*Generate contemporary SPI value*	This value is then used in conjunction with the figure which indicates the proportion of the population that is within the SPA suite in order to understand if SPA provision for a particular species is within acceptable limits.
3	*Generate proportions of GB/All-Ireland population within species' SPA suite*	
3a	*Past %*	Proportion of population derived from the past SPA Review, to be assessed against past Review SPI value (#2a).
3b	*Contemporary %*	Proportion of contemporary population, to be assessed against contemporary SPI value. (see #4)
4	*Compare contemporary SPI value with contemporary population coverage of*	This is to determine whether or not there is current insufficiency in SPA provision for a particular species as

Step (#)	Description	Commentary and guidance
	the SPA suite and determine whether under-representation exists	determined by current SPI values (#2b). See Williams *et al.* (2016) for further explanation of the methodology. If the answer is 'yes' then the reasons need to be determined.
5	*Determine reasons for lack of representation: compare past SPI (#2a) with contemporary SPI (#2b)*	As indicated under #2a, this is to gain a better understanding of reasons behind deficiency in representation. It may be that site condition at existing sites has declined which has led to a lower proportion of individuals within SPAs. Or, there may have been wider shifts in distribution which has led to broader changes in distribution (*e.g.* short stopping of migratory waterbird species in continental Europe).
6	*Was there past under-representation?* *If no, go to #7* *If yes, go to #13*	
7	*Not under-represented in past but is under-represented at present*	See comments for #5 above
8	*Consider reasons for under-representation* *If due to an on-site cause, go to #9* *If due to an off-site cause, go to #14*	This links to earlier considerations where a comparison of past and contemporary SPI values was undertaken. Is the under-representation due to an on-site cause? This relates to issues around, for example, site management such as ensuring that the habitat supporting the relevant species is in favourable condition or that other factors such as disturbance are not having an adverse impact on the population.
9	*Go to CHIP check (#42) and return here*	
10	*Recommend and initiate investigation of enhanced site management as a means of increasing the proportion of the population within SPA suite*	To be undertaken by the relevant country agency.
11	*Future Review: Has site management enhanced the population within the SPA suite?* *If no, go to #15* *If yes, go to #12*	
12	*Document and publish future evaluation undertaken*	
13	*Always under-represented. Under-represented in past and still under-represented at present*	This then implies that potential new sites for this species should be considered.
14	*Go to CHIP check (#42) and return here*	A CHIP check is undertaken for relevant species. The purpose of the CHIP check is to assist with decision making regarding any considerations to propose cropped areas as SPA. This is explained further at #42.
15	*Is site selection appropriate?*	If so, undertake selection process - #17-#26 are part of Phase 2 of the third Review and the UK SPA site selection guidelines will be used to identify the most

Step (#)	Description	Commentary and guidance
		suitable territories.
16	*Contemporary SPA coverage is insufficient (based on SPI assessment) but (further) site selection is not deemed appropriate.* *i) Consider the need for, and provision of, additional conservation measures (outwith the SPA Review).* *ii) Document and publish evaluation undertaken and conclusions reached.*	If sites are not considered appropriate for CHIP species then consideration of appropriate special conservation measures should be undertaken to achieve the objectives of the Directive.
17	*Consider both site selection in Phase 2 and additional conservation measures*	Country Agencies use UK SPA site selection guidelines to identify the most suitable territories.
18-26	*Select SPAs and determine or amend boundaries of existing SPAs*	Self explanatory - however there may be a number of new actions required at existing sites supporting CHIP species. If sites are determined as appropriate for a CHIP species then where it is a feature of an existing SPA extensions/additional areas should be considered. It may also be that this is only applicable at certain sites/situations. A CHIP species may use cropped habitats at one site but they may not /it may not be requisite to its ecological requirements at another site. Also important to note is that there is likely to be a significant gap in data/knowledge about distributions of CHIP species in the wider countryside using cropped habitats (which may then be considered as wholly new SPAs).
18	*Contemporary SPA coverage is insufficient (based on SPI assessment) and additional site provision should be sought.* *Additionally:* *i) Consider the need for, and provision of, additional conservation measures (outwith the SPA Review).* *ii) Document and publish evaluation undertaken and conclusions reached.*	
28	*Are there any other factors which require re-evaluation of the SPA suite? For example:* *A. Is there are change to the status of a species (*e.g. *to global conservation concern)?* *B. Has there been a significant shift in range? Is range coverage sufficient?* *C. Is the species reliant on un-classified sites which are severe weather refuges?* *D. Are there any significant changes in management pressures?*	This step is a 'safety net' and allows for the consideration of other factors where re-evaluation may be required at the UK level, examples may include: Regularly occurring Annex I species with no SPAs; a change in status of a species (*i.e.* of global conservation concern); a significant shift in range; insufficient range coverage, the species concerned is a CHIP species; a known change in development pressure (renewable development in the uplands *etc*.); or a need to amend boundaries of existing sites to take account of CHIP check requirements.

Step (#)	Description	Commentary and guidance
	E. Other relevant issues? *(If there is evidence to answer yes to any of these, go to #29)*	
29	*Population coverage sufficient (based on assessment against current SPI) but re-evaluation of SPA suite is required for other reasons* *Document reasons for re-evaluation of SPA suite* *Then go to #17*	
30	*Contemporary SPA coverage is sufficient (based on assessment against current SPI).* *Document and publish evaluation undertaken and conclusions reached.* *Consideration of the need for and provision of additional conservation measures (outwith the SPA Review) is required.*	Article 4 of the Birds Directive states that: *"The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution*". Part of this requirement is the classification of SPAs for Annex I species and regularly occurring migratory species, however, other measures may be required as well as the classification of SPAs to ensure survival and reproduction. SPAs alone are not necessarily enough. Such measures may be positive habitat management in the wider countryside encouraged as part of agri-environment schemes for example, forestry management plans, or protection through national legislation such as SSSI designation or even new legislation.
42	***CHIP check box*** *Define the importance of cropped habitats for the species: What function does the habitat perform? Feeding, roosting or breeding*?	There is a need to understand the specific ecological function which the cropped habitat provides for the species in question.
42A	*If the use of cropped habitats is necessary to meet the ecological requirements of the species, then:*	This indicates that, in further consideration of the use of cropped habitats (in the additional series of questions to follow), the assumption is that the cropped habitat is core to the ecological requirements of the species and not merely utilised infrequently or opportunistically.
42 A1	*Does the species use the same sites each year when exploiting cropped habitats?*	Does the species use the cropped habitat consistently between years - *i.e.* it is a long term ecological requirement/strategy.
42 A2	*Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?*	Does the species demonstrate consistent use of the particular cropped habitat?
42 A3	*Does the species show fidelity to specific locations (e.g. specific fields)?*	This will allow a consideration of whether there is something intrinsic about that particular location that determines use. It may relate to proximity to other habitats utilised by the species - *e.g.* feeding or roosting areas, or to the physical nature of the area *e.g.* prospect/slope *etc.*
42 A4	*Is the use of cropped habitats determined by crop type?*	This will allow determination of whether use of the site is fixed to a specific habitat/ crop type as opposed to factors relating to the physical location of the site.
42B	*Are there any other reasons why*	

Step (#)	Description	Commentary and guidance
	classification of cropped habitats is necessary for the ecological requirements of the species?	
	Using the above judgements and associated guidance, consider and assess the need for classification of cropped habitats, then:	To secure the necessary requirements for the species in question a combination of SPAs and special conservation measures may be necessary.
	***i) If sites are appropriate**: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes [with or without additional conservation measures for cropped habitats]); or SPAs with a rotational management regime [with or without additional conservation measures for cropped habitats]*	This indicates the type of site - *i.e*. the habitat utilised by the species is fixed between years in a defined location. An example of this scenario may be in-bye land used annually by Golden Plovers prior to nesting in upland moorland locations.
	***ii) If sites are not appropriate:** consider (outside the SPA Review process) the nature of additional conservation measures outside the species' SPA suite. Document and publish conclusions reached, and if additional conservation measures recommended, then document the nature of these*	An example could be habitat which supports the species may change location between years within a wider rotational management unit. This is most likely to relate to arable cropping regimes but could, for example, relate to clear fell areas within a forestry plantation - a proportion of the overall area will provide suitable habitat and although this area will remain constant through the clear fell management regime, its location will change over time through the rotational management.

Appendix 7. Summary of evaluations by species

Notes:

- br = breeding; nb = non-breeding.
- All evaluations relate to terrestrial (including estuarine) SPAs only. Category 16 records those species subject to the development of SPA provision in the marine environment.
- 'Phase 2' indicates the identification of relevant sites and/or review of boundaries of existing sites as part of the second phase of the 2013 SPA Review.

Part a. Summary of change categories by species/season

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
1. No change of status	Contemporary (2013) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.	**No further action required in the 2013 SPA Review process**	Manx Shearwater (br); Leach's Petrel (br); Gannet (br); Shag (br); Taiga Bean Goose; Pink-footed Goose (roosts); Greenland Barnacle Goose (feeding); Canadian Light-bellied Brent Geese; Svalbard Light-bellied Brent Geese; Shelduck (nb); Wigeon (nb); Gadwall (br & nb); Teal (nb); Mallard (nb); Pintail (nb); Shoveler (br & nb); Tufted Duck (nb); Scaup (nb); Common Scoter (br); Honey-buzzard; Marsh Harrier; Golden Eagle; Corncrake; Coot (nb); Oystercatcher (br & nb); Avocet (nb); Stone Curlew; Ringed Plover (br); Grey Plover (nb); Knot; Dunlin (nb); Ruff (br); Black-tailed Godwit (br & nb); Bar-tailed Godwit; Whimbrel (nb); Redshank (nb); Greenshank (br); Wood Sandpiper (br); Great Skua (br); Black-headed Gull (br); Lesser Black-backed Gull (br); Herring Gull (br); Kittiwake (br); Sandwich tern (br); Roseate Tern (br); Common Tern (br); Little Tern (br); Guillemot (br – *U. a. aalge* & *U. a. albionis*); Razorbill (br); Puffin (br); Fair Isle Wren	55
2. Change of status at particular sites suggesting need to review management and/or monitoring regimes	Contemporary (2013) SPA coverage of numbers and distribution sufficient, and no other factors suggesting the need to revise the previously identified suite of SPAs for the species, but specific	**No further action required in the 2013 SPA Review process but management and/or monitoring**	Black-throated Diver (br - management review needed at some sites); Great Crested Grebe (br – management & monitoring recommendations); Fulmar (br – monitoring & management recommendations); Storm Petrel (br – monitoring recommendations); Bewick's Swan (& management review needed); European White-fronted Goose; Greenland Barnacle Goose (roost – monitoring needs); Wigeon (br); Ruff (br – management review of key sites); Sandwich Tern (br – management review of sites with	11

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
	management and/or monitoring needs at particular SPAs.	**recommendations**	major declines); Short-eared Owl (monitoring recommendations)	
3. Change of status at particular sites indicating a need to review adequacy of functional provision at particular SPAs	Contemporary (2013) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and no other factors suggesting the need to revise the previously identified suite of SPAs for species, but review of site boundaries of particular SPAs needed, *inter alia* for areas used for feeding or other functional needs.	**No further site selection but recommendation to review boundaries in Phase 2 to ensure functionality of sites**	Red-throated Diver (br – marine feeding areas for breeding sites); Icelandic Greylag Goose (feeding); Pink-footed Goose (feeding); European White-fronted Goose; Svalbard Barnacle Geese; Dark-bellied Brent Geese; Osprey; Golden Plover (br & nb); Lapwing (nb); Dunlin (br); Curlew (br & nb); Nightjar; Woodlark, Chough (br & nb – feeding areas)	17
4. Always under-represented within SPA suite based on contemporary assessments, with a significant deviation from expected provision as assessed by SPI both in the past and currently	In the context of current knowledge, contemporary (2013) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.	**Assessment in Phase 2**	Little Grebe (nb); Great Crested Grebe (nb); Whooper Swan (& management recommendations); Pochard (nb); Eider (*S. m. mollissima*. nb); Goldenye (nb); Red Kite (br & nb); Merlin (nb); Peregrine (br); Spotted Crake; Ringed Plover (nb); Purple Sandpiper (nb); Ruff (nb); Snipe (nb); Whimbrel (br & management recommendations); Curlew (br); Redshank (br); Greenshank (nb); Turnstone (nb); Arctic Skua (br); Sandwich Tern (passage); Common Tern (passage); Ring Ouzel; Aquatic Warbler (passage); Chough (br & nb), Twite, Scottish Crossbill	29

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
5. Geographic redistribution within the UK but without a decrease in national numbers, leading to a decline in % within existing SPAs	In the context of changed distribution, the contemporary (2013) SPA provision is no longer sufficient for the requirements of the species, and additional SPA provision should be sought.	**Assessment in Phase 2**	Icelandic Greylag Goose (roosts)	1
6. Geographic redistribution from the UK leading to a decline in overall national numbers. Proportion of (smaller) national population on SPA suite may or may not have declined. [= 'short stopping']	Notwithstanding their international redistribution, the sites within the SPA suite remain the "most suitable" UK territories but need to be subject to priority management and, as appropriate, enhance monitoring in order to ameliorate factors causing reduced numbers.	**No further action required in the third SPA Review process but site management recommendations made**	Bewick's Swan (& management review needed)	1
7. Increase in numbers and/or range of aggregating species (high SPI)	In the context of increasing numbers and/or distribution, contemporary SPA coverage is no longer sufficient for the requirements of the species, and additional SPA provision should be sought.	**Assessment in Phase 2**	Black-throated Diver (br); Bittern (br & nb); Little Egret (br & nb); Spoonbill (br & nb); Avocet (br); Mediterranean Gull (br), Chough (br & nb)	11

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
8. Increase in numbers and/or range of non-aggregating species (low SPI)	In the context of increasing numbers and/or distribution, contemporary SPA coverage is sufficient for the requirements of the species.	**No further action required in the third SPA Review process**		
9. Change in understanding of legal or policy requirements	Classification of a suite of SPAs should be sought for relevant species as a regularly occurring Annex I species for which no such UK provision currently exists.	**Assessment in Phase 2**	Little Egret (br); Spoonbill (br & nb); Smew; White-tailed Eagle; Montagu's Harrier; Common Crane (br & nb); Mediterranean Gull (nb); Little Gull (nb); Kingfisher (br & nb); Red-backed Shrike	13
Change in knowledge				
10. Proportional change as a result of change in contexts, including for example changed taxonomic status and/or revised knowledge of biogeographic populations	Appropriate changes to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution of species.	**Assessment in Phase 2 as appropriate**	Eider (*S. m. faeroeensis* nb); Hen Harrier (nb); Scottish Crossbill	3
11. Change following a previously identified lack of data and information which has since been resolved	Use newly acquired data and information to establish a suite of SPAs covering sufficient numbers and distribution for species.	**Assessment in Phase 2**	Mediterranean Gull (nb); Little Gull (nb); Black-headed Gull (nb); Common Gull (br & nb); Lesser Black-backed Gull (nb); Herring Gull (nb); Great Black-backed Gull (nb)	8

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
12. Actions following a previously identified lack of data and information, which however, remains lacking	Highlight a priority need for data collection to ensure that adequate SPA provision can be made for [species] at least by the next national SPA network review.	**Assessment in Phase 2**	Hen Harrier (nb); Merlin (nb)	2
13. Decline in numbers and/or contractions of range where additional site provision may be a positive conservation measure	In the context of decreasing numbers and/or distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of relevant species, and additional SPA provision should be considered.	**Assessment in Phase 2**	Slavonian Grebe (br & management recommendations); Cormorant (br - & management recommendations); Cormorant (nb & monitoring recommendations); Greenland White-fronted Goose (roosts & feeding sites; monitoring recommendations); Red-breasted Merganser (nb); Goosander (nb & monitoring recommendations); Hen Harrier (br) (range considerations); Merlin (br & population decline); Spotted Crake (& management recommendations); Dotterel (br); Red-necked Phalarope (br & management review); Great Black-backed Gull (br)	13
14. Decline in numbers and/or contractions of range where additional site provision unlikely to reverse negative trends	Notwithstanding declines in numbers and/or distribution of relevant species, the sites within the SPA suite remain the “most suitable” UK territories but need to be subject to priority management and, as appropriate, enhanced monitoring in order to address those factors causing reduced numbers.	**No further action required in the third SPA Review process but site management recommendations**	Capercaillie	1

Category of change	Scientific advice on SPA suite	Next actions	Species applying	Total species
15. Additional SPA provision should be considered to ensure suite fully represents species' range	To adequately represent species range, additional SPA provision should be considered in parts of distributional without SPA coverage.	**Assessment in Phase 2**	Osprey; Golden Plover (br); Sanderling; Arctic Tern; Nightjar; Woodlark; Dartford Warbler	7
16. Species under consideration in marine SPA review	SPA provision in the marine environment should be evaluated.	**Review of marine SPAs**	Red-throated Diver (br – marine feeding areas in the breeding season); Red-throated Diver (nb); Black-throated Diver (nb); Great Northern Diver (nb); Little Grebe (nb); Great Crested Grebe (nb); Slavonian Grebe (nb); Shag (nb); Eider *S. m. mollissima & faeroeensis* (nb); Long-tailed Duck (nb); Common Scoter (nb); Velvet Scoter (nb); Goldeneye (nb); Red-breasted Merganser (nb); Goosander (nb); Mediterranean Gull (nb); Little Gull (nb); Black-headed Gull (nb); Common Gull (nb); Lesser Black-backed Gull (nb); Herring Gull (nb); Great Black-backed Gull (nb); Sandwich Tern (passage). See also Table 3.1. Additional species that will be considered include: Red-necked Grebe, Black-necked Grebe, Fulmar, Manx Shearwater, Cory's Shearwater, Great Shearwater, Sooty Shearwater, Balearic Shearwater, Pomarine Skua, Long-tailed Skua, Storm Petrel, Leach's Petrel, Gannet, Cormorant, Shag, Scaup, Arctic Skua, Great Skua, Iceland Gull, Glaucous Gull, Kittiwake, Little Tern, Common Tern, Arctic Tern, Roseate Tern, Guillemot, Razorbill, Puffin & Little Auk.	24

Part b. Summary of evaluations by species

Change categories relate to Table 6.1 and Appendix 6a which further elaborates column headings. Each species entry starts with a cross-reference to a change category given in Part a.

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Red-throated Diver *Gavia stellata* (breeding)		3. Sufficient – but possible provision for marine feeding areas also needed			16. Insufficient – needing assessment in marine environment)	
Red-throated Diver *Gavia stellata* (non-breeding)					16. Insufficient – needing assessment in marine environment)	
Black-throated Diver *Gavia arctica* (breeding)	2. Management review at some sites needed			7. Insufficient		
Black-throated Diver *Gavia arctica* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Great Northern Diver *Gavia immer* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Little Grebe *Tachybaptus ruficollis* (non-breeding)				4. Insufficient	16. Insufficient – needing assessment in marine environment	

[65] Amendments to site boundaries may still, however, be required at individual sites in the light of further, site-related review

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Great Crested Grebe *Podiceps cristatus* (breeding)	2. Sufficient; site management review/enhanced monitoring needed					
Great Crested Grebe *Podiceps cristatus* (non-breeding)				4. Insufficient	16. Insufficient – needing assessment in marine environment	
Slavonian Grebe *Podiceps auritus* (breeding)				13. Insufficient: evaluate if further viable sites; consider management at all remaining unclassified key sites		
Slavonian Grebe *Podiceps auritus* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Fulmar *Fulmarus glacialis* (breeding)	2. Sufficient; research & monitoring needs					
Manx Shearwater *Puffinus puffinus*	1. Sufficient					
Storm Petrel *Hydrobates pelagicus* (breeding)	2. Sufficient; recommend further status review at some sites					
Leach's Petrel *Oceanodroma leucorhoa* (breeding)	1. Sufficient					

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Gannet *Morus bassanus* (breeding)	1. Sufficient					
Cormorant *Phalacrocorax carbo carbo* (breeding)				13. Insufficient; management recommendations		
Cormorant *Phalacrocorax carbo carbo* (non-breeding)				13. Insufficient; monitoring recommendations		
Shag *Phalacrocorax aristotelis* (breeding)	1. Sufficient					
Shag *Phalacrocorax aristotelis* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Bittern *Botaurus stellaris* (breeding)				7. Insufficient		
Bittern *Botaurus stellaris* (non-breeding)				7. Insufficient		
Little Egret *Egretta garzetta* (breeding)				7 & 9. Insufficient – no SPAs		
Little Egret *Egretta garzetta* (non-breeding)				7. Insufficient		
Spoonbill *Platalea leucorodia* (breeding)				7 & 9. Insufficient – no SPAs		
Spoonbill *Platalea leucorodia* (non-breeding)				7 & 9. Insufficient – no SPAs		

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Bewick's Swan *Cygnus columbianus bewickii* (non-breeding)	2 & 6. Sufficient; site management review needed					
Whooper Swan *Cygnus cygnus* (non-breeding)				4. Insufficient; site management review also needed		
Icelandic Greylag Goose *Anser anser* (roosts)				5. Insufficient		
Icelandic Greylag Goose *Anser anser* (feeding sites)		3. Review functional provision at particular sites				
Bean Goose *Anser fabalis fabalis* (Taiga race)	1. Sufficient					
Pink-footed Goose *Anser brachyrhynchus* (roosts)	1. Sufficient					
Pink-footed Goose *Anser brachyrhynchus* (feeding sites)		3. Review functional provision at particular sites				
European White-fronted Goose *Anser albifrons albifrons*	2. Sufficient; site management review needed	3. Review functional provision at particular sites				
Greenland White-fronted Goose *Anser albifrons flavirostris* (roosting sites)				13. Insufficient; & monitoring recommendations		

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Greenland White-fronted Goose *Anser albifrons flavirostris* (feeding sites)				13. Insufficient		
Barnacle Goose *Branta leucopsis* (Greenland population) (roost sites)	2. Sufficient – monitoring needs					
Barnacle Goose *Branta leucopsis* (Greenland population) (feeding sites)	1. Sufficient					
Barnacle Goose *Branta leucopsis* (Svalbard population)		3. Review functional provision at particular sites				
Dark-bellied Brent Goose *Branta b. bernicla*		3. Review functional provision at particular sites				
Canadian Light-bellied Brent Goose *Branta bernicla hrota*	1. Sufficient					
Svalbard Light-bellied Brent Goose *Branta bernicla hrota*	1. Sufficient					
Shelduck *Tadorna tadorna* (non-breeding)	1. Sufficient					
Wigeon *Anas penelope* (breeding)	2. Sufficient – monitoring needs					

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Wigeon *Anas penelope* (non-breeding)	1. Sufficient					
Gadwall *Anas strepera* (breeding)	1. Sufficient					
Gadwall *Anas strepera* (non-breeding)	1. Sufficient					
Teal *Anas crecca* (non-breeding)	1. Sufficient					
Mallard *Anas platyrhynchos* (non-breeding)	1. Sufficient					
Pintail *Anas strepera* (non-breeding)	1. Sufficient					
Shoveler *Anas clypeata* (breeding)	1. Sufficient					
Shoveler *Anas clypeata* (non-breeding)	1. Sufficient					
Pochard *Aythya ferina* (non-breeding)				4. Insufficient		
Tufted Duck *Aythya fuligula* (non-breeding)	1. Sufficient					
Scaup *Aythya marila*	1. Sufficient					

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Eider *Somateria m. mollissima* (non-breeding)				4. Insufficient	16. Insufficient – needing assessment in marine environment	
Eider *Somateria m. faeroeensis* (non-breeding)				10. Insufficient	16. Insufficient – needing assessment in marine environment	
Long-tailed Duck *Clangula hyemalis* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Common Scoter *Melanitta nigra* (breeding)	1. Sufficient					
Common Scoter *Melanitta nigra* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Velvet Scoter *Melanitta fusca* (non-breeding)					16. Insufficient – needing assessment in marine environment	
Goldeneye *Bucephala clangula* (non-breeding)				4. Insufficient	16. Insufficient – needing assessment in marine environment	
Smew *Mergus albellus*				9. Insufficient – no SPAs		
Red-breasted Merganser *Mergus serrator* (non-breeding)				13. Insufficient	16. Insufficient – needing assessment in marine environment	

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Goosander *Mergus merganser* (non-breeding)				13. Insufficient	16. Insufficient – needing assessment in marine environment	
Honey-buzzard *Pernis apivorus*	1. Sufficient					
Red Kite *Milvus milvus* (breeding)				4. Insufficient – range provision		
Red Kite *Milvus milvus* (non-breeding)				4. Insufficient: evaluate if any roost sites qualify		
White-tailed Eagle *Haliaeetus albicilla*				9. Insufficient – no SPAs		
Marsh Harrier *Circus aeruginosus*	1. Sufficient					
Montagu's Harrier *Circus pygargus*				9. Insufficient – no SPAs		
Hen Harrier *Circus cyaneus* (breeding)				13. Insufficient on basis of range		
Hen Harrier *Circus cyaneus* (non-breeding)				10. – Insufficient – proportional change		12. Data to assess classified SPAs remains lacking – monitoring needs
Golden Eagle *Aquila chrysaetos*	1. Sufficient					
Osprey *Pandion haliaetus*		3. Review functional provision at particular sites	15. Insufficient range coverage			

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Merlin *Falco columbarius* (breeding)				13. Insufficient		
Merlin *Falco columbarius* (non-breeding)				4. Insufficient		12. Data for site selection remains lacking
Peregrine *Falco peregrinus*				4. Insufficient		
Capercaillie *Tetrao urogallus*	14. Sufficient					
Spotted Crake *Porzana porzana*				4 & 13. Insufficient; management recommendations		
Corncrake *Crex crex*	1. Sufficient					
Common Crane *Grus grus* (breeding)				9. Insufficient – no SPAs		
Common Crane *Grus grus* (non-breeding)				9. Insufficient – no SPAs		
Coot *Fulica atra* (non-breeding)	1. Sufficient					
Oystercatcher *Haematopus ostralegus* (breeding)	1. Sufficient					
Oystercatcher *Haematopus ostralegus* (non-breeding)	1. Sufficient					

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Avocet *Recurvirostra avosetta* (breeding)				7. Insufficient		
Avocet *Recurvirostra avosetta* (non-breeding)	1. Sufficient					
Stone-curlew *Burhinus oedicnemus*	1. Sufficient					
Ringed Plover *Charadrius hiaticula* (breeding)	1. Sufficient					
Ringed Plover *Charadrius hiaticula* (non-breeding)				4. Insufficient		
Dotterel *Charadrius morinellus*				13. Insufficient		
Golden Plover *Pluvialis apricaria* (breeding)		3. Review functional provision at particular sites	15. Insufficient range coverage			
Golden Plover *Pluvialis apricaria* (non-breeding)		3. Review functional provision at particular sites				
Grey Plover *Pluvialis squatarola*	1. Sufficient					
Lapwing *Vanellus vanellus* (non-breeding)		3. Review functional provision at particular sites				
Knot *Calidris canutus*	1. Sufficient					

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Sanderling *Calidris alba*			15. Insufficient range coverage			
Purple Sandpiper *Calidris maritima* (non-breeding)				4. Insufficient		
Dunlin *Calidris alpina schinzii* (breeding[66])		3. Review functional provision at particular sites				
Dunlin *Calidris alpina alpina* (non-breeding)	1. Sufficient					
Ruff *Philomachus pugnax* (breeding)	2. Sufficient; recommend management review of SPA suite					
Ruff *Philomachus pugnax* (non-breeding)				4. Insufficient		
Snipe *Gallinago gallinago* (non-breeding)				4. Insufficient		
Black-tailed Godwit *Limosa limosa islandica* (breeding)	1. Sufficient					
Black-tailed Godwit *Limosa limosa islandica* (non-breeding)	1. Sufficient					

[66] See species account regarding occurrence on SPAs of this race in the non-breeding season.

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Bar-tailed Godwit *Limosa lapponica*	1. Sufficient					
Whimbrel *Numenius phaeopus* (breeding)				4. Insufficient; site management review needed		
Whimbrel *Numenius phaeopus* (non-breeding)	1. Sufficient					
Curlew *Numenius arquata* (breeding)		3. Review functional provision at particular sites		4. Insufficient		
Curlew *Numenius arquata* (non-breeding)		3. Review functional provision at particular sites				
Redshank *Tringa totanus* (breeding)				4. Insufficient		
Redshank *Tringa totanus* (non-breeding)	1. Sufficient					
Greenshank *Tringa nebularia* (breeding)	1. Sufficient					
Greenshank *Tringa nebularia* (non-breeding)				4. Insufficient		
Wood Sandpiper *Tringa glareola* (breeding)	1. Sufficient					
Turnstone *Arenaria interpres*				4. Insufficient		

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Red-necked Phalarope *Phalaropus lobatus*				13. Insufficient: evaluate if any further viable sites		
Arctic Skua *Stercorarius parasiticus* (breeding)				4. Insufficient		
Great Skua *Catharacta skua* (breeding)	1. Sufficient					
Mediterranean Gull *Larus melanocephalus* (breeding)				7. Insufficient		
Mediterranean Gull *Larus melanocephalus* (non-breeding)				9 & 11. Insufficient	16. Insufficient – needing assessment in marine environment	
Little Gull *Larus minutus* (non-breeding)				9 & 11. Insufficient	16. Insufficient – needing assessment in marine environment	
Black-headed Gull *Larus ridibundus* (breeding)	1. Sufficient					
Black-headed Gull *Larus ridibundus* (non-breeding)				11. Insufficient	16. Insufficient – needing assessment in marine environment	
Common Gull *Larus canus* (breeding)				11. Insufficient		
Common Gull *Larus canus* (non-breeding)				11. Insufficient	16. Insufficient – needing assessment in marine environment	

	NOT PHASE 2	PHASE 2			MARINE SPA REVIEW	SURVEY AND MONITORING NEEDS
Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Lesser Black-backed Gull *Larus fuscus* (breeding)	1. Sufficient					
Lesser Black-backed Gull *Larus fuscus* (non-breeding)				11. Insufficient	16. Insufficient – needing assessment in marine environment	
Herring Gull *Larus argentatus* (breeding)	1. Sufficient					
Herring Gull *Larus argentatus* (non-breeding)				11. Insufficient	16. Insufficient – needing assessment in marine environment	
Great Black-backed Gull *Larus marinus* (breeding)				13. Insufficient		
Great Black-backed Gull *Larus marinus* (non-breeding)				11. Insufficient	16. Insufficient – needing assessment in marine environment	
Kittiwake *Rissa tridactyla* (breeding)	1. Sufficient					
Sandwich Tern *Sterna sandvicensis* (breeding)	2. Sufficient; recommend management review of sites with major declines					
Sandwich Tern *Sterna sandvicensis* (passage)				4. Insufficient	16. Insufficient – needing assessment in marine environment	

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Roseate Tern *Sterna dougallii*	1. Sufficient					
Common Tern *Sterna hirundo* (breeding)	1. Sufficient					
Common Tern *Sterna hirundo* (passage)				4. Insufficient		
Arctic Tern *Sterna paradisaea*			15. Insufficient range coverage			
Little Tern *Sterna albifrons*	1. Sufficient					
Guillemot *Uria a. aalge* (breeding)	1. Sufficient					
Guillemot *Uria a. albionis* (breeding)	1. Sufficient					
Razorbill *Alca torda* (breeding)	1. Sufficient					
Puffin *Fratercula arctica* (breeding)	1. Sufficient					
Short-eared Owl *Asio flammea* (breeding)	2. Sufficient; research & monitoring needs					
Nightjar *Caprimulgus europaeus*		3. Review functional provision at particular sites	15. Insufficient range coverage			
Kingfisher *Alcedo atthis* (breeding)				9. Insufficient – no SPAs		

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Kingfisher *Alcedo atthis* (non-breeding)				9. Insufficient – no SPAs		
Woodlark *Lullula arborea*		3. Review functional provision at particular sites	15. Insufficient range coverage			
Ring Ouzel *Turdus torquatus*				4. Insufficient: evaluate if any viable sites		
Fair Isle Wren *Troglodytes troglodytes fridariensis*	1. Sufficient					
Aquatic Warbler *Acrocephalus paludicola* (passage)				4. Insufficient		
Dartford Warbler *Sylvia undata*			15. Insufficient range coverage			
Red-backed Shrike *Lanius collurio*				9. Insufficient – no SPAs		
Chough *Pyrrhocorax pyrrhocorax* (breeding)		3. Review functional provision at particular sites		4. Insufficient – previously under-represented 7. Insufficient range coverage		
Chough *Pyrrhocorax pyrrhocorax* (non-breeding)		3. Review functional provision at particular sites		4. Insufficient – previously under-represented 7. Insufficient range coverage		
Twite *Carduelis flavirostris*				4. Insufficient		

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Species	**Terrestrial SPA provision is sufficient ([65]), although there may be possible management and/or monitoring needs** **Change categories 1, 2, 6. 8 & 14**	**Overall terrestrial SPA provision is sufficient, although need to review adequacy of functional provision at particular sites** **Change category 3**	**Terrestrial SPA provision is sufficient (when compared to SPI) but review of SPA suite required due to other factors** **Change category 15**	**Terrestrial SPA provision is insufficient (including when compared to SPI) for the reasons stated** **Change categories 4, 5, 7, 9, 10, 11 & 13**	**Review of possible SPA provision in marine environment required** **Change category 16**	**Terrestrial SPA provision is insufficient but data and information remains inadequate to address: survey and monitoring recommendations** **Change category 12**
Scottish Crossbill *Loxia scotica*				4. Insufficient – previously under-represented 10. Insufficient – changed contexts and knowledge		

Appendix 8. Annex I or migratory species for which no SPAs were previously selected and subsequent status change

This Appendix outlines the reasons why SPAs have not been selected for certain species that are either migrants (or partial migrants) and/or are listed on Annex I of the Directive.

- All solely resident species have been excluded (unless the UK breeding population is tiny in comparison with the number of immigrants).
- Partial migrants (*i.e.* UK breeding species where a significant, but lower, proportion of birds cross national boundaries) have been indicated in the Migratory status field.
- Annex I species are indicated by grey shading. Where these are not also migratory, this is shown in the status column.
- Site Provision Index values are a percentage of the maximum possible index score – **not a target population proportion for the SPA suite**. See Williams *et al.* (submitted) for further information.
- br = breeding season; nb = non-breeding season; nc = not calculated

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Great Northern Diver nb		Subject to review of SPA needs in marine environment	Marine SPA suite will be required in line with European Court of Justice ruling in C-418/04	nc
Red-necked Grebe br		No internationally significant concentrations	No internationally or other significant concentrations	67%
Red-necked Grebe nb			No internationally or other significant concentrations	nc
Black-necked Grebe br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	79%
Black-necked Grebe nb			No internationally or other significant concentrations	nc
Cory's Shearwater		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Great Shearwater		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Sooty Shearwater		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Balearic Shearwater nb		Subject to review of SPA needs in marine environment	Marine SPA suite will be required in line with European Court of Justice ruling in C-418/04	nc
Little Bittern br			Occurs irregularly. May be a future colonist, with confirmed breeding in 2010 and subsequent years.	nc
Cattle Egret br			Occurs irregularly. May be a future colonist, with breeding in 2008, although not since	nc

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Great White Egret br			First confirmed breeding in 2012, with two pairs in Somerset. Status should be evaluated at next SPA network review as this may presage more regular occurrence in UK	nc
Grey Heron br	Partial migrant	No internationally significant concentrations	No internationally significant concentrations	40%
Grey Heron nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	38%
Purple Heron br		Vagrant	First successful breeding in UK in 2010	nc
White Stork nb		Vagrant	Occurs irregularly	nc
Spoonbill br		Vagrant	Incipient colonisation as a breeding species: one pair bred in Scotland in 2008; a colony established in Norfolk in 2010 with six pairs producing 10 young. Need to assess implications of C-418/04. Consider in Phase 2 of the Review.	13%
Spoonbill nb		Vagrant	Now regularly wintering in England. Need to assess implications of C-418/04, especially regularity of wintering. Consider in Phase 2 of the Review.	81%
Snow Goose nb	Partial migrant	Vagrant	Occurs irregularly	nc
Garganey br		No internationally significant concentrations	No internationally or other significant concentrations	50%
Red-crested Pochard		Most of UK population is non-native. Otherwise irregular	Most of UK population is non-native. Otherwise irregular	nc
Ring-necked Duck		Vagrant	Occurs irregularly	nc
Ferruginous Duck		Occurs irregularly	Occurs irregularly	nc
Surf Scoter		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Smew nb		As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	67%
Goosander br		Not considered – thought to be non-migratory	No internationally significant concentrations	44%
White-tailed Eagle br	Not migratory	As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	71%
Montagu's Harrier br		As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	48%
Goshawk br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	38%
Goshawk nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	27%
Sparrowhawk br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Sparrowhawk nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Buzzard br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	29%
Buzzard nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	23%
Rough-legged Buzzard nb		Vagrant	Occurs irregularly	nc
Kestrel br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%
Kestrel nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Hobby br		No internationally significant concentrations	No internationally or other significant concentrations	48%
Quail br		No internationally significant concentrations	No internationally or other significant concentrations	42%
Water Rail br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	44%
Water Rail nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	35%
Baillion's Crake br			Major apparent influx in 2012. Status should be evaluated at next SPA network review as this may presage more regular occurrence in UK	nc
Moorhen br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Moorhen nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Coot br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Crane br		As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	67%
Crane nb		As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	73%
Black-winged Stilt br		No nationally significant concentrations	Irregular but more frequent breeding. Status should be evaluated at next SPA network review as this may presage more regular occurrence in UK	nc
Little Ringed Plover br		No internationally significant concentrations	No internationally or other significant concentrations	40%
Kentish Plover br		No recent breeding records	No recent breeding records	nc
Little Stint nb		No predictable internationally significant concentrations	No internationally or other significant concentrations	nc
Temminck's Stint nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Pectoral Sandpiper nb		Vagrant	Occurs irregularly	nc
Curlew Sandpiper nb		No predictable internationally significant concentrations	No internationally or other significant concentrations	nc

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Purple Sandpiper br			No internationally or other significant concentrations	75%
Buff-breasted Sandpiper br		Vagrant	Occurs irregularly	nc
Jack Snipe nb		No known concentrations	No internationally or other significant concentrations	33%
Woodcock br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%
Woodcock nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Spotted Redshank nb		No predictable internationally significant concentrations	No internationally or other significant concentrations	88%
Green Sandpiper nb		No predictable internationally significant concentrations	No internationally or other significant concentrations	nc
Common Sandpiper br		No internationally significant concentrations	No internationally or other significant concentrations	44%
Grey Phalarope nb		No predictable internationally significant concentrations	No predictable internationally significant concentrations	nc
Pomarine Skua nb		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Long-tailed Skua nb		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Little Gull nb		Subject to review of SPA needs in marine environment	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	nc
Sabine's Gull nb		Subject to review of SPA needs in marine environment	No internationally or other significant concentrations	nc
Iceland Gull nb		Subject to review of SPA needs in marine environment	No internationally or other significant concentrations	nc
Glaucous Gull nb		Subject to review of SPA needs in marine environment	No internationally or other significant concentrations	nc
Black Tern br			Extinct	nc
Black Tern nb		Subject to review of SPA needs in marine environment	Occurs irregularly	nc
Black Guillemot br	Partial migrant	Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Little Auk nb		Subject to review of SPA needs in marine environment	Subject to review of SPA needs in marine environment	nc
Stock Dove br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Stock Dove nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	23%
Woodpigeon br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	4%
Woodpigeon nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Turtle Dove br		No internationally significant concentrations	No internationally or other significant concentrations	25%
Cuckoo br		No internationally significant concentrations	No internationally or other significant concentrations	21%
Snowy Owl br	Not migratory	No population: no breeding attempts since 1975	No population: no breeding attempts since 1975	nc
Long-eared Owl br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	31%

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Long-eared Owl nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	33%
Swift br		No internationally significant concentrations	No internationally or other significant concentrations	19%
Kingfisher br	Not migratory	As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	38%
Kingfisher nb	Not migratory	As outlined by Stroud *et al.* 2001	SPA suite will be required in line with European Court of Justice ruling in C-418/04. Consider in Phase 2 of the Review.	40%
Bee-eater nb		Vagrant	Occurs irregularly	nc
Hoopoe nb		Vagrant	Occurs irregularly	nc
Wryneck br		No internationally significant concentrations	No internationally or other significant concentrations	46%
Short-toed Lark nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Skylark br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	10%
Skylark nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%
Shore Lark nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Sand Martin br		No internationally significant concentrations	No internationally or other significant concentrations	35%
Swallow br		No internationally significant concentrations	No internationally or other significant concentrations	13%
House Martin br		No internationally significant concentrations	No internationally or other significant concentrations	13%
Tree Pipit br		No internationally significant concentrations	No internationally or other significant concentrations	27%
Meadow Pipit br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Meadow Pipit nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Rock Pipit br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	31%
Rock Pipit nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	27%
Water Pipit nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Yellow Wagtail br		No internationally significant concentrations	No internationally or other significant concentrations	25%
Grey Wagtail br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Grey Wagtail nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%
Pied (White) Wagtail br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Pied (White) Wagtail nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Waxwing nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Robin br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	4%

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Robin nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Nightingale br		No internationally significant concentrations	No internationally or other significant concentrations	44%
Bluethroat nb		Vagrant	Occurs irregularly. Last confirmed breeding was 1995	nc
Black Redstart br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	40%
Redstart br		No internationally significant concentrations	No internationally or other significant concentrations	27%
Whinchat br		No internationally significant concentrations	No internationally or other significant concentrations	25%
Stonechat br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	29%
Stonechat nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	31%
Wheatear br		No internationally significant concentrations	No internationally or other significant concentrations	27%
Blackbird br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	4%
Blackbird nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	6%
Fieldfare br		No internationally significant concentrations	No internationally or other significant concentrations	46%
Fieldfare nb		No internationally significant concentrations	No internationally or other significant concentrations	25%
Song Thrush br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	4%
Song Thrush nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	10%
Redwing br		No internationally significant concentrations	No internationally or other significant concentrations	44%
Redwing nb		No internationally significant concentrations	No internationally or other significant concentrations	19%
Grasshopper Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	38%
Savi's Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	50%
Sedge Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	27%
Marsh Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	65%
Reed Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	38%
Icterine Warbler nb		Vagrant	Occurs irregularly	nc
Melodious Warbler nb		Vagrant	Occurs irregularly	nc
Barred Warbler nb		Vagrant	Occurs irregularly	nc
Lesser Whitethroat br		No internationally significant concentrations	No internationally or other significant concentrations	31%
Whitethroat br		No internationally significant concentrations	No internationally or other significant concentrations	21%
Garden Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	23%

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Blackcap br		No internationally significant concentrations	No internationally or other significant concentrations	13%
Blackcap nb		No internationally significant concentrations	No internationally or other significant concentrations	25%
Pallas's Warbler nb		Vagrant	Occurs irregularly	nc
Yellow-browed Warbler nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Wood Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	35%
Chiffchaff br		No internationally significant concentrations	No internationally or other significant concentrations	19%
Willow Warbler br		No internationally significant concentrations	No internationally or other significant concentrations	19%
Goldcrest br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Goldcrest nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Firecrest br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	46%
Firecrest nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	48%
Spotted Flycatcher br		No internationally significant concentrations	No internationally or other significant concentrations	19%
Red-breasted Flycatcher nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Pied Flycatcher br		No internationally significant concentrations	No internationally or other significant concentrations	38%
Bearded Tit br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	65%
Golden Oriole br		No internationally significant concentrations	No internationally or other significant concentrations	56%
Red-backed Shrike br		*[Extinct in the UK in the 1990s]*	Natural re-establishment of population in UK in last decade. Need to assess implications of C-418/04. Consider in Phase 2 of the Review.	nc
Great Grey Shrike nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Woodchat Shrike nb		Vagrant	Occurs irregularly	nc
Rook br	Partial migrant	No internationally significant concentrations	No internationally significant concentrations	31%
Rook nb	Partial migrant	No internationally significant concentrations	No internationally significant concentrations	25%
Starling br	Partial migrant	No internationally significant concentrations	No internationally significant concentrations	6%
Starling nb	Partial migrant	No internationally significant concentrations	No internationally significant concentrations	6%
Chaffinch br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	5%
Chaffinch nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	4%
Brambling br		No internationally significant concentrations	No internationally or other significant concentrations	50%

Name	Migratory status	Justification of lack for (terrestrial) SPA suite in 1990s (Stroud *et al.* 2001)	Current advice and material change of status since 1990s Review	Site Provision Index
Brambling nb		No internationally significant concentrations	No internationally or other significant concentrations	25%
Serin br		No internationally significant concentrations	No internationally or other significant concentrations	44%
Greenfinch br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Greenfinch nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	8%
Goldfinch br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	13%
Goldfinch nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	nc
Siskin br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	27%
Siskin nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Linnet br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	13%
Linnet nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	15%
Redpoll br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	nc
Redpoll nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%
Common Crossbill br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	23%
Common Crossbill nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	27%
Common Rosefinch		No internationally significant concentrations	No internationally or other significant concentrations	nc
Lapland Bunting br		No internationally significant concentrations	No internationally or other significant concentrations	13%
Lapland Bunting nb		No internationally significant concentrations	No internationally or other significant concentrations	65%
Snow Bunting br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	67%
Snow Bunting nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	58%
Ortolan Bunting nb		Vagrant	Occurs irregularly	nc
Little Bunting nb		No internationally significant concentrations	No internationally or other significant concentrations	nc
Reed Bunting br	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	21%
Reed Bunting nb	Partial migrant	No internationally significant concentrations	No internationally or other significant concentrations	17%

Appendix 9. Species accounts

Red-throated Diver *Gavia stellata* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I and migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,300	Dillon *et al.* 2009	13	397	30.5%
All-Ireland	<10	Gibbons *et al.* 1993	1	0	No SPAs selected in Northern Ireland
Biogeographic -Europe	27,000	BirdLife International 2004	270	397	1.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1983 to 2006	-4%	Gomersall *et al.* 1984; Dillon *et al.* 2009
Short-term UK trend	1994 to 2006	-10%	Gibbons *et al.* 1997; Dillon *et al.* 2009

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Red-throated Diver, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-1A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Red-throated Diver, the *Atlas* predicts virtual extinction in the UK, a finding at variance with that of CHAINSPAN.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Red-throated Diver, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and no other factors suggesting the need to revise the previously identified suite of SPAs for species, but consideration of SPAs for feeding by breeding birds is needed in the marine environment.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a national survey prior to the next network review.

Give focus to management of water-levels that might impact on SPAs.

Ensure adequate survey and monitoring of feeding areas in the marine environment used by breeding birds within relevant SPAs and elsewhere.

9. Distribution map for breeding Red-throated Diver SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.1	2 February 1999	89	46	2006	SCARABBS survey (Confidence intervals = 22-69)	
Foula	1.1	27 November 1995	11	8	2006	SCARABBS survey	
Hermaness, Saxa Vord and Valla Field	1.1	29 March 1994	28	22	2006	SCARABBS survey	
Hoy	1.1	7 December 2000	56	46	2006	SCARABBS survey	
Lewis Peatlands	1.1	7 December 2000	60	80	2006	SCARABBS survey (Confidence intervals = 41-128)	
Mointeach Scadabhaig	1.1	2 February 1999	48	17	2006	SCARABBS survey	
Orkney Mainland Moors	1.1	13 October 2000	15	24	2006	SCARABBS survey	
Otterswick and Graveland	1.1	13 December 2001	27	23	2006	SCARABBS survey	
Ronas Hill – North Roe and Tingon	1.1	11 August 1997	50	50	2006	SCARABBS survey	
Rum	1.1	31 August 1982	11	13	2006	SCARABBS survey	
		Total for SPAs in GB	395	**397**			
		GB population	935	**1,300**			
		thus GB SPAs hold	42.2% GB	**30.5% GB**			
		Total for SPAs in UK	395	**397**			
		Biogeographic population	7,158	**27,000**			
		thus SPAs hold	5.6% international	**1.5% international**			

Red-throated Diver *Gavia stellata* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	17,000	O'Brien *et al.* 2008	170	7,475	44.0%
All-Ireland	2,000	Crowe *et al.* 2008	20 [50]	0	No SPAs selected in Northern Ireland
Biogeographic – NW Europe (non-breeding)	300,000	Wetlands International 2012	2,600	7,475	2.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	Unknown	JNCC 2013
Short-term UK trend	1999/2000 to 2010/11	+19.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Red-throated Diver, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-1B.pdf.

Liverpool Bay / Bae Lerpwl and the Outer Thames have been identified as an addition to the SPA suite for Red-throated Diver since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Red-throated Divers were not assessed by the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Red-throated Diver, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with moderate confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Noting the significant limitations of monitoring through existing WeBS coverage, establish programme that adequately monitors distribution and trends of non-breeding population, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

9. Distribution map for non-breeding Red-throated Diver SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Liverpool Bay / Bae Lerpwl	1.1	9 August 2010	Not classified	922	2001/02-2006/07	SPA citation	Insufficient data 2003/2004
Outer Thames Estuary	1.1	9 August 2010	Not classified	6,466	1989–2006/07	SPA citation	
Firth of Forth	1.1	30 October 2001	88	87	2001/02-2006/07	SPA citation	
		Total for SPAs in GB	88	**7,475**			
		GB population	4,850	**17,000**			
		thus GB SPAs hold	1.8 % GB	**44.0% GB**			
		Total for SPAs in UK	88	**7,475**			
		Biogeographic population	75,000	**300,000**			
		thus SPAs hold	0.1% international	**2.5% international**			

Black-throated Diver *Gavia arctica* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	220	Eaton *et al.* 2007b	2	100	45.5%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	19,000	BirdLife International 2004	190	100	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985 to 2006	+46%	Campbell & Talbot 1987; Eaton *et al.* 2007c
Short-term UK trend	1994 to 2006	+16%	Whyte *et al.* 1995; Eaton *et al.* 2007c

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Black-throated Diver, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-2.pdf.

West Inverness-shire Lochs have been classified as an addition to the SPA suite for Black-throated Diver since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Identify and designate important wintering areas."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Black-throated Diver, the *Climatic Atlas* predicts virtual extinction in the UK, a finding at variance with that of CHAINSPAN.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Black-throated Diver, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of the species, and additional SPA provision should be sought.

There is also a need to review management at six sites (Assynt Lochs; Wester Ross Lochs; Loch Maree[67]; Loch Shiel; Inverpolly, Loch Urigill and Nearby Lochs; and Lairg/Strathbrora Lochs) where numbers are now less than in 1990s - counter to the increasing national trend – and take remedial actions.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Give focus to management of water-levels and recreation levels that might impact on SPAs.

[67] Note that a thorough review for the period 2006-2009 has already been undertaken by Brown (2010) for Loch Maree. This provides a model for similar reviews at other sites.

9. Distribution map for breeding Black-throated Diver SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Assynt Lochs	1.1	15 December 2000	7	6	2006	SCARABBS national survey: occupied territories	
Caithness and Sutherland Peatlands	1.1	2 February 1999	26	29	2006	SCARABBS national survey: occupied territories	
Wester Ross Lochs	1.1	7 December 2000	8	7	2006	SCARABBS national survey: occupied territories	
Inverpolly, Loch Urigill and Nearby Lochs	1.1	31 May 2000	9	8	2006	SCARABBS national survey: occupied territories	
Knapdale Lochs	1.1	30 October 2001	4	4	2006	SCARABBS national survey: occupied territories	
Lairg/Strathbrora Lochs	1.1	13 October 2000	6	5	2006	SCARABBS national survey: occupied territories	
Lewis Peatlands	1.1	7 December 2000	11	15	2006	SCARABBS national survey: occupied territories	
Loch Maree	1.1	19 September 1994	10	7	2006	SCARABBS national survey: occupied territories	2006-2010 average = 6
Loch Shiel	1.1	2 February 2000	4	3	2006	SCARABBS national survey: occupied territories	
Mointeach Scadabhaigh	1.1	2 February 1999	3	5	2006	SCARABBS national survey: occupied territories	
Rannoch Lochs	1.1	7 December 2000	7	8	2006	SCARABBS national survey: occupied territories	
West Inverness-shire Lochs	1.1	1 October 2009	n/a	3	2006	SCARABBS national survey: occupied territories	
		Total for SPAs in GB	95	**100**			
		GB population	155	**220**			
		thus GB SPAs hold	61.0% GB	**45.5% GB**			
		Total for SPAs in UK	95	**100**			
		Biogeographic population	19,196	**19,000**			
		thus SPAs hold	0.5% international	**0.5% international**			

Little Grebe *Tachybaptus ruficollis* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	16,000	Musgrove *et al.* 2011	160	676	4.2%
All-Ireland	2,500	Crowe *et al.* 2008	25 [50]	268	10.7%
Biogeographic - *ruficollis*	405,000	Wetlands International 2012	3,900	944	0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1989/90 to 2010/11	+63.9%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-13.8%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Little Grebe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-3.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current

distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Little Grebe were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Little Grebe were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS. Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Develop appropriate monitoring of marine components of population.

Ensure complete coverage of Medway Estuary and Marshes SPA in future WeBS counts.

9. Distribution map for non-breeding Little Grebe SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Chichester and Langstone Harbours	1.3	Not yet classified	68	103	2004/5-209/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.3	Not yet classified	52	128	2004/5-209/10	WeBS	
Medway Estuary and Marshes	1.3	Not yet classified	53	71	2004/5-209/10	WeBS	Incomplete count coverage
Rutland Water	1.3	Not yet classified	51	108	2004/5-209/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	91	127	2004/5-209/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	209	334	2004/5-209/10	WeBS	
The Swale	1.3	Not yet classified	126	62	2004/5-209/10	WeBS	
The Wash	1.3	Not yet classified	93	76	2004/5-209/10	WeBS	
		Total for SPAs in GB	445	**676**			
		GB population	3,290	**16,000**			
		thus GB SPAs hold	14.8%	**4.2% GB**	**in January**		
Lough Neagh and Lough Beg	1.3	Not yet classified	465	347	2004/5-209/10	WeBS	
Strangford Lough	1.3	Not yet classified	127	81	2004/5-209/10	WeBS	
		Total for SPAs in Northern Ireland	382	**268**			
		All-Ireland population	5,000	**2,500**			
		thus NI SPAs hold	7.6% All-Ireland	**10.7% All-Ireland**	**in January**		
		Total for SPAs in UK	828	**944**			
		Biogeographic population	550,000	**405,000**			
		thus SPAs hold	**0.2% international**	**0.2% international**	**in January**		

Great Crested Grebe *Podiceps cristatus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	4,600	Gibbons *et al.* 1993	45	0	No SPAs selected in Great Britain
All-Ireland	2,074	Gibbons *et al.* 1993	21	311	15.0%
Biogeographic - Europe	248,000	BirdLife International 2004	2,500	311	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1975 to 2009	-31.0%	Hughes *et al.* 1979; Musgrove *et al.* 2013
Short-term UK trend	1998 to 2010	+22.40	Risely *et al.* 2012

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Great Crested Grebe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-4A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Great Crested Grebe, the *Atlas* predicts that the potential distribution will extend northwards in Scotland but become more patchily distributed through England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

This species was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and no other factors suggesting the need to revise the previously identified suite of SPAs for species.

In view of a significant decline in numbers at the single SPA: Loughs Neagh and Beg, there is a need to review management at the site to understand the causes of the decline, which runs counter to an increasing national trend.

8. Recommendations regarding survey and monitoring

Continue to assess population and enhance monitoring at the single SPA through site condition assessment processes.

9. Distribution map for breeding Great Crested Grebe SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Lough Neagh and Lough Beg	1.2	Not yet classified	500	311	2011	EHS commissioned survey	
		Total for SPAs in Northern Ireland	500	**311**			
		All-Ireland population	2,074	**2,074**			
		thus NI SPAs hold	24.1% All-Ireland	**15.0% All-Ireland**			
		Total for SPAs in UK	500	**311**			
		Biogeographic population	50,000	**248,000**			
		thus SPAs hold	1.0% international	**0.1% international**			

Great Crested Grebe *Podiceps cristatus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	19,000	Musgrove *et al.* 2011	190	1,185	6.2%
All-Ireland	5,500	Crowe *et al.* 2008	55	2,950	53.6%
Biogeographic – *cristatus* NW & W Europe	355,000	BirdLife International 2004; Wetlands International 2012	3,500	4,062	1.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1984/85 to 2010/11	+81%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-18.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Great Crested Grebe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-4B.pdf.

Belfast Lough Open Water (Marine SPA) and the Upper Nene Valley Gravel Pits have been identified as an addition to the SPA suite for Great Crested Grebe since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Great Crested Grebe were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Great Crested Grebe, modelled impacts are as follows: by 2050, under a medium emissions scenario, autumn passage numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%, and wintering numbers to decrease by up to 25% (with low confidence).

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

Appropriate SPA provision in the marine environment is also separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS. Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Establish and implement a monitoring protocol for the Belfast Lough Open Water SPA, reporting data to WeBS.

Ensure complete coverage of Medway Estuary and Marshes, and Upper Nene Valley Gravel Pits SPAs in future WeBS counts.

9. Distribution map for non-breeding Great Crested Grebe SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	132	81	2004/5-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	277	113	2004/5-2009/10	WeBS	
Broadland	1.3	Not yet classified	146	87	2004/5-2009/10	WeBS	
Colne Estuary (Mid-Essex Coast Phase 2)	1.3	Not yet classified	205	95	2004/5-2009/10	WeBS	
Dengie (Mid-Essex Coast Phase 1)	1.3	Not yet classified	119	24	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	632	113	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	116	41	2004/5-2009/10	WeBS	
Mersey Estuary	1.3	20 December 1995	126	7	2004/5-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	318	113	2004/5-2009/10	WeBS	
Rutland Water	1.3	4 October 1991	762	685	2004/5-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	113	359	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	260	198	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.3	Not yet classified	176	243	2004/5-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	7 April 2011	n/a	139	2004/5-2009/10	WeBS	
		Total for SPAs in GB	1,383	**1,185**			
		GB population	9,800	**19,000**			
		thus GB SPAs hold	13.8%	**6.2% GB**	in January		

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Belfast Lough	1.3	Not yet classified	1,385	1612	2004/5-2009/10	WeBS	
Belfast Lough Open Water	1.3	29 September 2009	n/a	1,677	Mean 1996/97–2000/01	SPA citation	
Lough Foyle	1.3	Not yet classified	220	122	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.2	Not yet classified	1821	862	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	90	145	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	1,296	**2,950**			
		All-Ireland population	3,500	**5,500**			
		thus NI SPAs hold	43.2% All-Ireland	**53.6% All-Ireland**	in January		
		Total for SPAs in UK	2,679	**4,135**			
		Biogeographic population	150,000	**355,000**			
		thus SPAs hold	1.8% international	**1.2% international**	in January		

Slavonian Grebe *Podiceps auritus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	23	Holling *et al.* 2012	1	14	61%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	6,400	BirdLife International 2004	65	14	0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	-56.0%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	-47.0%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Slavonian Grebe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-5A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Slavonian Grebe, the *Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Slavonian Grebe was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing numbers, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Slavonian Grebe, and additional SPA provision should be considered. Existing SPAs hold most of the population and a first step should be an evaluation as to whether there are any viable sites not currently subject to conservation management.

In view of the small size of the national population and declining trend within and outwith SPAs, the conservation management of all regularly used breeding sites should be subject to urgent review.

8. Recommendations regarding survey and monitoring

Continue annual monitoring of whole population (all regularly and previously used sites) and report via Rare Breeding Birds Panel including all negative data.

9. Distribution map for breeding Slavonian Grebe SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Loch Ashie	1.1	11 August 1997	1	0	2009	National survey per RSPB & RBBP	
Loch Flemington	1.1	14 March 1997	5	0	2009	National survey per RSPB & RBBP	
Loch Knockie and Nearby Lochs	1.1	11 August 1997	5	2	2009	National survey per RSPB & RBBP	
Loch Ruthven	1.1	16 August 1996	14	9	2009	National survey per RSPB & RBBP	
Loch Vaa	1.1	19 September 1994	5	0	2009	National survey per RSPB & RBBP	
North Inverness Lochs	1.1	14 March 1997	7	3	2009	National survey per RSPB & RBBP	
		Total for SPAs in GB	37	**14**			
		GB population	70	**23**			
		thus GB SPAs hold	53% GB	**61% GB**			
		Total for SPAs in UK	37	**14**			
		Biogeographic population	6,058	**6,400**			
		thus SPAs hold	0.6% international	**0.2% international**			

Slavonian Grebe *Podiceps auritus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,100	Musgrove *et al.* 2011	10	17	1.6%
All-Ireland	30	Lack 1986	1	0	No SPAs selected in Northern Ireland
Biogeographic – NW Europe	5,500	Musgrove *et al.* 2011	55	17	0.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Unknown	JNCC 2013
Short-term UK trend	1999/2000 to 2010/11	-5.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Slavonian Grebe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-5B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Slavonian Grebe were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Slavonian Grebe, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Enhance national population monitoring and coverage of key sites through WeBS or other targeted programmes especially in Northern Ireland and Scotland where recent surveys have detected significant concentrations not subject to regular monitoring.
However, noting the significant limitations of monitoring marine components of population through existing WeBS coverage, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiate new boat and other surveys as appropriate, noting the dependency to undertake such surveys in calm weather, *i.e.* possibly not coincident with the fixed monthly WeBS count dates.

9. Distribution map for non-breeding Slavonian Grebe SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Loch Ashie	1.1	Not yet classified	44	Unknown	2004/5-2009/10	WeBS	Spring gathering area
Exe Estuary	1.1	11 March 1992	20	5	2004/5-2009/10	WeBS	
Firth of Forth	1.1	30 October 2001	71	29	2004/5-2009/10	WeBS	
		Total for SPAs in GB	31	**17**			
		GB population	400	**1,100**			
		thus GB SPAs hold	7.8% GB	**1.6% GB**	in January		
		Total for SPAs in UK	31	**17**			
		Biogeographic population	5,000	**5,500**			
		thus SPAs hold	0.6% international	**0.3% international**	in January		

Fulmar *Fulmarus glacialis* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	500,000	Tasker 2004a	5,000	248,352	49.7%
All-Ireland	38,900	Tasker 2004a	390	1,518	3.9%
Biogeographic Atlantic; total *glacialis*	3,400,000	Tasker 2004a	20,000**	249,870	7.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-3.0%	Lloyd *et al.* 1991; Tasker 2004a
Short-term UK trend	1999 to 2011	-38.5%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Fulmar, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-6.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Fulmar, the *Atlas* predicts absence from the south and east coasts of England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Fulmar, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for, and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species, however, a more detailed review of the data for some sites is recommended.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds, in particular for North Rona and Sula Sgeir SPA for which there are no counts since the

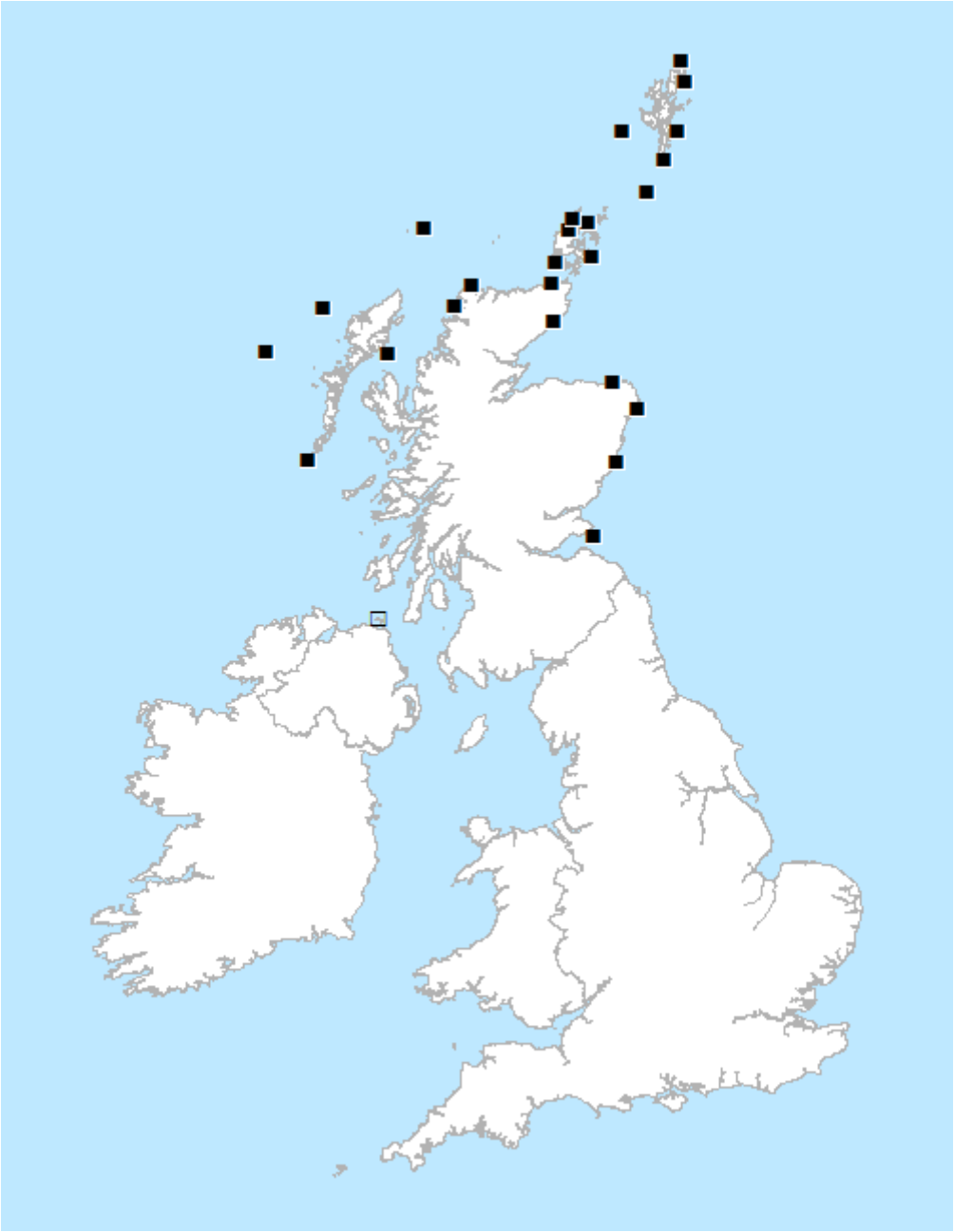
1990s. However, survey methods for Sula Sgeir will need to be modified from previous (*e.g.* by undertaking aerial counts and/or more reliance on counts from sea) to avoid significant disturbance, as the colony has increased in density to a point which prevents extensive land-based counts.

In future monitoring, align boundaries of count units with SPA boundaries e.g. Cape Wrath, and North Caithness Cliffs SPAs.

The proportion of the GB breeding population within the SPA network has declined by *c.*7% between the 1990s and the 2000s. There have also been significant declines across most SPAs, some being very large (*e.g.* an apparent loss of 13,000 pairs on Fair Isle). The widespread nature of the declines suggests these may be linked to a wider 'off-site' issue. Research should be undertaken to investigate whether the population has moved to other non-SPA sites or been lost, and to inform possible conservation responses.

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

9. Distribution map for breeding Fulmar SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Buchan Ness to Collieston Coast	1.3	30 March 1998	1,765	1,389	2007	UK Seabird Monitoring Programme	
Calf of Eday	1.3	29 June 1998	1,955	1,842	2002	UK Seabird Monitoring Programme	
Cape Wrath	1.3	15 March 1996	2,300	2,115	2000	UK Seabird Monitoring Programme	Includes c.1 km of coastline outwith SPA
Copinsay	1.3	29 March 1994	1,615	1,630	2008	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	27 March 1996	15,000	14,202	1999	UK Seabird Monitoring Programme	
Fair Isle	1.3	16 December 1994	43,320	29,649	2011	UK Seabird Monitoring Programme	
Fetlar	1.3	29 March 1994	9,800	8,912	1999-2002	UK Seabird Monitoring Programme	
Flannan Isles	1.3	31 August 1992	4,700	8,143	1998	UK Seabird Monitoring Programme	
Forth Islands	1.3	25 April 1990	1,600	676	2005-2009	UK Seabird Monitoring Programme	per SNH
Foula	1.3	27 November 1995	46,800	21,106	2000	UK Seabird Monitoring Programme	
Fowlsheugh	1.3	31 August 1992	1,170	193	2009	UK Seabird Monitoring Programme	
Handa	1.3	25 April 1990	3,500	1,915	2008	UK Seabird Monitoring Programme	
Hermaness, Saxa Vord and Valla Field	1.3	29 March 1994	14,890	21,079	1999	UK Seabird Monitoring Programme	Later updates for Hermaness only
Hoy	1.3	7 December 2000	35,000	19,586	2007	UK Seabird Monitoring Programme	
Mingulay and Berneray	1.3	16 December 1994	12,500	9,046	2009	UK Seabird Monitoring Programme	
North Caithness Cliffs	1.3	16 August 1996	16,310	14,250	1999-2000	UK Seabird Monitoring Programme	Includes all of Stroma (*i.e.* some coastline outside SPA boundary)

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
North Rona and Sula Sgeir	1.3	1 October 2001	11,500	11,500	1985 & 1986	SPA citation	No recent update. Sula Sgeir not counted during Seabird 2000. Unrealistically, this Review assumes no change in numbers since 1980s.
Noss	1.3	16 August 1996	5,870	5,248	2011	UK Seabird Monitoring Programme	
Rousay	1.3	2 February 2000	1,240	535	1999	UK Seabird Monitoring Programme	
Shiant Isles	1.3	31 August 1992	6,820	4,387	1999	UK Seabird Monitoring Programme	
St Kilda	1.3	31 August 1992	62,800	66,055	1999	UK Seabird Monitoring Programme	
Sumburgh Head	1.3	27 March 1996	2,542	2,444	1999	UK Seabird Monitoring Programme	Later updates for part of Sumburgh Head only
Troup, Pennan and Lion's Heads	1.3	14 March 1997	4,400	1,795	2007	UK Seabird Monitoring Programme	
West Westray	1.3	16 August 1996	1,400	677	2007	UK Seabird Monitoring Programme	
		Total for SPAs in GB	308,797	**248,352**			
		GB population	539,000	**500,000**			
		thus GB SPAs hold	57% GB	**49.7% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Rathlin Island	1.3	Not yet classified	1,482	1,518	2011	UK Seabird Monitoring Programme	AOS
		Total for SPAs in Northern Ireland	1,482	**1,518**			
		All-Ireland population	31,300	**38,900**			
		thus NI SPAs hold	5% All-Ireland	**3.9% All-Ireland**			
		Total for SPAs in UK	310,279	**249,870**			
		Biogeographic population	7,540,000	**3,400,000**			
		thus SPAs hold	4% international	**7.3% international**			

Manx Shearwater *Puffinus puffinus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	300,000	Newton *et al.* 2004	3,000	288,450	96.2%
All-Ireland	37,000	Newton *et al.* 2004	370	5,923	16.0%
Biogeographic World	374,500	Newton *et al.* 2004	3,700	294,373	78.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Unknown	JNCC 2013a
Short-term UK trend	1999 to 2011	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Manx Shearwater, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-7.pdf.

Copeland Islands have been identified as an addition to the SPA suite for Manx Shearwater since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Manx Shearwater, the *Atlas* predicts a more northerly distribution and absence from its south Wales stronghold.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Manx Shearwater was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

Develop low-cost survey methodologies to allow greater frequency of assessments at key sites.

Given lack of population trends nationally and at some sites, determine, on a site specific basis, monitoring protocols (including correction factors) that will allow comparision with past surveys as well as enhanced understanding of current numbers for future comparisons.

9. Distribution map for Manx Shearwater SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island	1.2	10 June 1992	6,930	16,183	2001	UK Seabird Monitoring Programme	Data from Bardsey only
Rum	1.2	31 August 1982	61,000	120,000	2001	UK Seabird Monitoring Programme	
Skomer, Skokholm and Middleholm	1.2	31 August 1982	150,968	150,968	1998	UK Seabird Monitoring Programme	
St Kilda	1.3	31 August 1992	1,000	1,299	1999	UK Seabird Monitoring Programme	
		Total for SPAs in GB	219,898	**288,450**			
		GB population	220,000	**300,000**			
		thus GB SPAs hold	100.0% GB	**96.2% GB**			
Copeland Islands	1.2	September 2009	Not classified	5,923			
		Total for SPAs in Northern Ireland	0	**5,923**			
		All-Ireland population	30,000	**37,000**			
		thus NI SPAs hold	0.0% All-Ireland	**16.0% All-Ireland**			
		Total for SPAs in UK	219,898	**294,373**			
		Biogeographic population	265,100	**374,500**			
		thus SPAs hold	82.9% international	**78.6% international**			

Storm Petrel *Hydrobates pelagicus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	26,000	Mitchell & Newton. 2004	260	25,729	99.0%
All-Ireland	99,000	Mitchell & Newton. 2004	990	0	Species does not occur in Northern Ireland
Biogeographic – NE Atlantic: total *pelagicus*	490,000	Mitchell & Newton. 2004	4,900	25,729	5.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Unknown	JNCC 2013a,b
Short-term UK trend	1999 to 2011	Increase	Bolton *et al.* 2013; Mitchell & Newton 2004

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Storm Petrel, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-8.pdf.

4. Relevant site-related recommendations within international and national action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Storm Petrel, the *Atlas* predicts absence from its Orkney and Shetland strongholds.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Storm Petrel was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

The data for this species has low overall reliability reflecting the logistical and methodological challenges involved in surveying Storm Petrels. The large apparent increase in population representation within the SPA suite is probably an artefact of the different dates of site and national surveys.

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species, however, a more detailed review of the data for some all sites is recommended.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds, in particular for Treshnish Islands SPA for which there are no counts since the 1990s.

Develop low-cost survey methodologies to allow greater frequency of assessments at key sites.

Determine, on a site specific basis, monitoring protocols (including correction factors) that will allow comparison with past surveys as well as enhanced understanding of current numbers for future comparisons.

In future monitoring, align boundaries of count units with SPA boundaries at Isles of Scilly and Mousa SPAs.

9. Distribution map for breeding Storm Petrel SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Bolton, M., Brown, J.G, Moncrieff, H., Ratcliffe, N. & Okill, J.D. 2010. Playback re-survey and demographic modelling indicate a substantial increase in breeding European Storm-petrel *Hydrobates pelagicus* at the largest UK colony, Mousa, Shetland. *Seabird* 23: 14-24.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Auskerry	1.1	29 June 1998	3,600	994	2001	UK Seabird Monitoring Programme	
Isles of Scilly	1.1	1 August 2001	5,406	1,398	2006	UK Seabird Monitoring Programme	Whole archipelago
Mousa	1.1	27 November 1995	6,760	11,781	2008	UK Seabird Monitoring Programme	Range of estimate 8,100-17,728 AOS. Comprised of 5,733 AOS in wall habitats and 6,048 AOS in natural habitats. Future assessments need to be directly related to SPA
North Rona and Sula Sgeir	1.1	October 2001	1,000	358	2009	Murray & Wilson 2013	Extrapolation from partial census
Priest Island (Summer Isles)	1.1	1 October 1986	2,200	2,168	2009	UK Seabird Monitoring Programme	
Skomer, Skokholm and Middleholm	1.1	31 August 1982	3,500	2,560	2000-2001	UK Seabird Monitoring Programme	2450 Skokholm, 110 Skomer, no data from Middleholm
St Kilda	1.1	31 August 1992	850	1,121	1999	UK Seabird Monitoring Programme	Counts from Dun, Hirta, Soay & Boreray, & Stacs
Sule Skerry and Sule Stack	1.1	29 March 1994	1,000	309	2001	UK Seabird Monitoring Programme	Sule Skerry whole island only
Treshnish Isles	1.1	30 August 1994	5,040	5,040	1996	UK Seabird Monitoring Programme	No recent update
		Total for SPAs in GB	29,356	**25,729**			
		GB population	85,000	**26,000**			
		thus GB SPAs hold	34.5% GB	**99.0% GB**			
		Total for SPAs in UK	29,356	**25,729**			
		Biogeographic population	257,000	**490,000**			
		thus SPAs hold	11.4% international	**5.3% international**			

Leach's Petrel *Oceanodroma leucorhoa* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	48,000	Mitchell 2004	480	47,606	99.2%
All-Ireland	310	Mitchell 2004	3	0	Species does not occur in Northern Ireland
Biogeographic – NE. Atlantic *leucorhoa*	227,000	Mitchell 2004	2,300	47,606	21.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Unknown	JNCC 2013a
Short-term UK trend	1999 to 2011	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Leach's Petrel, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-9.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Leach's Petrel, the *Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Leach's Petrel was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

Develop low-cost survey methodologies to allow greater frequency of assessments at key sites.

Determine, on a site specific basis, monitoring protocols (including correction factors) that will allow comparision with past surveys as well as enhanced understanding of current numbers for future comparisons.

9. Distribution map for breeding Leach's Petrel SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Flannan Isles	1.4	31 August 1992	100	1,425	2001	UK Seabird Monitoring Programme	
Foula	1.4	27 November 1992	50	15	2001	UK Seabird Monitoring Programme	
North Rona and Sula Sgeir	1.1	1 October 2001	2,750	713	2009	UK Seabird Monitoring Programme	
Ramna Stacks and Gruney	1.4	15 March 1996	22	20	2000	UK Seabird Monitoring Programme	13 responses from burrows in 2011 (suggesting 30 AOS after applying correction factor derived at North Rona) although some responses attributed to non-breeders
St Kilda	1.1	31 August 1992	52,073	45,433	1999-2000	UK Seabird Monitoring Programme	Updates only for Dun in 2003 and 2006 showing declining population from 27,811 to 12,770
Sule Skerry and Sule Stack	1.4	29 March 1994	5	0	2001	UK Seabird Monitoring Programme	
		Total for SPAs in GB	55,000	**47,606**			
		GB population	55,000	**48,000**			
		thus GB SPAs hold	100% GB	**99.2% GB**			
		Total for SPAs in UK	55,000	**47,606**			
		Biogeographic population	955,000	**227,000**			
		thus SPAs hold	5.8% international	**21.0% international**			

Gannet *Morus bassanus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	220,000	Wanless *et al.* 2005	2,200	210,911	95.9%
All-Ireland	33,000	Wanless & Harris 2004a	330	0	Species does not occur in Northern Ireland
Biogeographic - World	390,000	Wanless & Harris 2004a	3,900	210,911	54.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 2003-04	+39.0%	Lloyd *et al.* 1991; Wanless *et al.* 2005
Short-term UK trend	1994-1995 to 2003-2005	+11.0%	Thompson *et al.* 1996; Wanless *et al.* 2005

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Gannet, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-10.pdf.

4. Relevant site-related recommendations within international and national action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Gannet, the *Atlas* predicts a more north-westerly distribution and absence from the North Sea coast and Shetland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Gannet was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

Appropriate SPA provision in the marine environment is separately under review for this species.

9. Distribution map for breeding Gannet SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ailsa Craig	1.2	25 April 1990	32,460	27,130	2004	UK Seabird Monitoring Programme	
Fair Isle	1.3	10 December 1994	1,166	1,875	2004	UK Seabird Monitoring Programme	4,085 in 2011
Firth of Forth Islands	1.2	25 April 1990	34,400	48,065	2004	UK Seabird Monitoring Programme	55,482 in 2009
Flamborough Head and Bempton Cliffs	1.3	Not yet classified	2,501	3,940	2004	UK Seabird Monitoring Programme	7,859 in 2009
Grassholm	1.2	31 January 1986	33,000	32,094	2004	UK Seabird Monitoring Programme	39,292 in 2009
Hermaness, Saxa Vord and Valla Field	1.2	29 March 1994	12,000	15,633	2003	UK Seabird Monitoring Programme	24,353 in 2008
North Rona and Sula Sgeir	1.2	October 2001	9,000	9,225	2004	UK Seabird Monitoring Programme	
Noss	1.2	16 August 1996	7,310	8,652	2003	UK Seabird Monitoring Programme	9,767 in 2008
St Kilda	1.2	31 August 1992	60,400	59,622	2004	UK Seabird Monitoring Programme	
Sule Skerry and Sule Stack	1.2	29 March 1994	4,890	4,675	2004	UK Seabird Monitoring Programme	Big increase at Sule Skerry since 2004; from 57 to 1,100 in 2011
		Total for SPAs in GB	197,127	**210,911**			
		GB population	201,000	**220,000**			
		thus GB SPAs hold	98.1% GB	**95.9% GB**			
		Total for SPAs in UK	197,127	**210,911**			
		Biogeographic population	263,000	**390,000**			
		thus UK SPAs hold	75.0% international	**54.1% international**			

Cormorant *Phalacrocorax carbo carbo* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	8,400	Sellers 2004	85	1,245	14.8%
All-Ireland	5,200	Sellers 2004	50	182	3.5%
Biogeographic – Total European *P.c. carbo*	52,500	Sellers 2004	520	1,427	2.7%

2b. Population trend

	Period of trend	UK trend[68]	Source
Long-term UK trend*	1985-88 to 1998-2002	+9.5%[69]	Lloyd *et al.* 1991; Sellers 2004
Short-term UK trend*	1999 to 2011	-14.4%	JNCC 2012

* includes a small but unknown number of *sinensis*

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Cormorant, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-11A.pdf.

[68] Both trends include a small but unknown number of *P. carbo sinensis*.
[69] Coastal populations only

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Cormorant, the *Atlas* predicts a more northerly distribution and absence from the south of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Cormorant, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient – south-western Britain, East Anglia and SW Scotland
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing numbers, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Cormorants, and additional SPA provision should be considered, especially in south-western Britain.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial (both coastal and inland) SPAs within forthcoming periodic national census of breeding seabirds.

Ensure use of standard methods for future counts at Ynys Seiriol/Puffin Island SPA to ensure comparability.

9. Distribution map for breeding Cormorant SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Abberton Reservoir	1.2	5 December 1991	490	216	2005	UK Seabird Monitoring Programme	
Calf of Eday	1.3	29 June 1998	223	195	2003	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	27 March 1996	144	81	2010	UK Seabird Monitoring Programme	
Farne Islands	1.3	Not yet classified	194	121	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.3	25 April 1990	240	148	2005-2009	per SNH	
Ynys Seiriol/Puffin Island	1.2	February 2002	776	484	2011		Note that 1996 & 2011 counts are not directly comparable owing to differing survey methods
		Total for SPAs in GB	2,067	**1,245**			
		GB population	7,000	**8,400**			
		thus GB SPAs hold	29.5% GB	**14.8% GB**			
Sheep Island	1.4	21 December 1992	249	182		UK Seabird Monitoring Programme. Partial desertion from SPA with new colony established nearby	
		Total for SPAs in Northern Ireland	249	**182**			
		All-Ireland population	4,700	**5,200**			
		thus NI SPAs hold	5.3% All-Ireland	**3.5% All-Ireland**			
		Total for SPAs in UK	2,316	**1,427**			
		Biogeographic population	41,200	**52,500**			
		thus SPAs hold	5.6% international	**2.7% international**			

Cormorant *Phalacrocorax carbo carbo* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	35,500	Musgrove *et al.* 2011	350	5,186	14.6%
Ireland	14,000	Crowe *et al.* 2008	140	1,191	8.5%
Biogeographic –Total *carbo*, NW Europe	120,000	Wetlands International 2012	1,200	6,377	5.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1987/88 to 2010/11	+61.3%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-2.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Cormorant, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-11B.pdf.

The Upper Nene Valley Gravel Pits, and Mersey Narrows and North Wirral Foreshore have been identified as additions to the SPA suite for Cormorant since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Cormorant was not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Cormorant was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of the long-term trend of increasing numbers and distribution (Balmer *et al.* 2013), contemporary SPA coverage is no longer sufficient for the requirements of non-breeding Cormorant, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS (especially enhancing information on roost sites). Promote the counting of all sites within SPA suite

during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Medway Estuary and Marshes, and Upper Nene Valley Gravel Pits SPAs in future WeBS counts.

9. Distribution map for non-breeding Cormorant SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	Not yet classified	400	606	2004/5-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	555	352	2004/5-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	139	39	2004/5-2009/10	WeBS	
Broadland	1.3	Not yet classified	366	189	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	Not yet classified	155	133	2004/5-2009/10	WeBS	
Colne Estuary (Mid-Essex Coast Phase 2)	1.3	Not yet classified	313	262	2004/5-2009/10	WeBS	
Dengie (Mid-Essex Coast Phase 1)	1.3	Not yet classified	200	24	2004/5-2009/10	WeBS	
Exe Estuary	1.3	Not yet classified	138	147	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	697	615	2004/5-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	230	225	2004/5-2009/10	WeBS	
Humber Flats, Marshes and Coast	1.3	Not yet classified	130	261	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	22 March 1999	418	30	2004/5-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	374	177	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	231	97	2004/5-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	289	125	2004/5-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	879	802	2004/5-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	140	282	2004/5-2009/10	WeBS	
Ouse Washes	1.3	Not yet classified	259	110	2004/5-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	348	413	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.3	16 February 1995	296	1,347	2004/5-2009/10	WeBS	
Rutland Water	1.3	Not yet classified	619	587	2004/5-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	214	224	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	225	167	2004/5-2009/10	WeBS	
Teesmouth & Cleveland Coast	1.3	15 August 1995	191	362	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Dee Estuary	1.3	17 July 1985	238	1,049	2004/5-2009/10	WeBS	
The Swale	1.3	Not yet classified	187	89	2004/5-2009/10	WeBS	
The Wash	1.3	Not yet classified	256	389	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.3	Not yet classified	502	210	2004/5-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	7 April 2011	Not classified	514	2004/5-2009/10	WeBS	
		Total for SPAs in GB	4,434	**5,186**			
		GB population	13,200	**35,000**			
		thus GB SPAs hold	34.1% GB	**14.6% GB**			
Belfast Lough	1.3	Not yet classified	346	319	2004/5-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	118	74	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	728	1,368	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	183	402	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	551	**1,191**			
		All-Ireland population	5,000	**14,000**			
		thus NI SPAs hold	5.3% All-Ireland	**8.5% All-Ireland**			
		Total for SPAs in UK	4,986	**6,377**			
		Biogeographic population	120,000	**120,000**			
		thus SPAs hold	4.2% international	**5.3% international**			

Shag *Phalacrocorax aristotelis* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	27,000	Wanless & Harris 2004b	270	9,230	34.2%
All-Ireland	3,700	Wanless & Harris 2004b	35	0	No SPAs selected in Northern Ireland
Biogeographic –NE Atlantic	69,500	Wanless & Harris 2004b	690	9,230	13.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-26.8%	Lloyd *et al.* 1991; Wanless & Harris 2004b
Short-term UK trend	1990 to 2011	-15.1%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Shag, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-12.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Shag, the *Atlas* predicts a more north-westerly distribution and absence from much of the south coast of England and North Sea coast.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Shag, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Shag SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Buchan Ness to Collieston Coast	1.3	30 March 1998	1,045	344	2007	Seabird Monitoring Programme	
Canna and Sanday	1.3	20 February 1998	1,140	226	2011	Seabird Monitoring Programme	
East Caithness Cliffs	1.2	27 March 1996	2,345	1,056	1999	Seabird Monitoring Programme	
Fair Isle	1.3	10 December 1994	1,099	235	2008	Seabird Monitoring Programme	
Farne Islands	1.3	Not yet classified	994	926	2011	Seabird Monitoring Programme	
Firth of Forth Islands	1.2	25 April 1990	2,887	876	2005-2009	Seabird Monitoring Programme per SNH	
Foula	1.2	27 November 1995	2,400	2,300	2000	Seabird Monitoring Programme	
Hermaness, Saxa Vord and Valla Field	1.3	29 March 1994	540	82	1999	Seabird Monitoring Programme	Later updates for Hermaness only
Isles of Scilly	1.3	August 2001	1,108	1,296	2006	Seabird Monitoring Programme	
Mingulay and Berneray	1.3	16 December 1994	721	330	2003	Seabird Monitoring Programme	
Shiant Isles	1.2	August 1992	1,780	506	1999	Seabird Monitoring Programme	
St Abb's Head to Fast Castle	1.3	11 August 1997	651	329	2000	Seabird Monitoring Programme	Later updates for St Abb's Head NNR only
Sule Skerry and Sule Stack	1.3	29 March 1994	874	724	1998	Seabird Monitoring Programme	
		Total for SPAs in GB	17,584	**9,230**			
		GB population	37,500	**27,000**			
		thus GB SPAs hold	46.9% GB	**34.2% GB**			
		Total for SPAs in UK	17,584	**9,230**			
		Biogeographic population	125,000	**69,500**			
		thus SPAs hold	14.1% international	**13.3% international**			

Bittern *Botaurus stellaris* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (booming males)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	80	Holling *et al.* 2012; RSPB data	1	45	56.3%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic Europe	44,000	BirdLife International 2004	440	45	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+76%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+403%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Bittern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-13A.pdf.

Humber Estuary SPA was classified as an SPA for breeding Bittern in 2007.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union for this species (Newbery *et al.* 1999). Relevant objectives are as follows:

- *"*Identify and designate the most important areas for Bitterns, and undertake sample counts to investigate trends in numbers."

- "In all countries with Bittern populations, ensure that the main breeding and wintering localities are given statutory protection."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Ensure appropriate management of existing reedbeds, including maintaining water levels and healthy fish populations."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Bittern, the *Atlas* predicts almost total extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Bittern was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of breeding Bittern, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Undertake regular national surveys of UK breeding population (next in 2017) and encourage reporting via Rare Breeding Birds Panel including all negative data.

9. Distribution map for breeding Bittern SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (booming males)	Assessment of UK SPA suite in 2000s (booming males)	Data period	Data source	Comment
Benacre to Easton Bavents	1.1	4 October 1996	1	4	mean 2005-2009	RSPB	
Broadland	1.1	21 September 1994	3	16	mean 2005-2009	RSPB	
Humber Estuary	1.1	31 August 2007	Not classified	5	mean 2005-2009	RSPB	
Leighton Moss	1.1	28 November 1985	4	1	mean 2005-2009	RSPB	
Minsmere – Walberswick	1.1	19 May 1992	7	16	mean 2005-2009	RSPB	
North Norfolk Coast	1.1	20 January 1989	3	3	mean 2005-2009	RSPB	
		Total for SPAs in GB	18	**45**			
		GB population	20	**80**			
		thus GB SPAs hold	90.0% GB	**56.3% GB**			
		Total for SPAs in UK	18	**45**			
		Biogeographic population	10,044	**44,000**			
		thus SPAs hold	0.2% international	**0.1% international**			

Bittern *Botaurus stellaris* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	600	Wotton *et al.* 2011	6	95	15.8%
All-Ireland	<10	Crowe 2005	1	0	No SPAs selected in Northern Ireland
Biogeographic – *stellaris*, W Europe, NW Africa (bre)	6,275	Wetlands International 2012	65	95	1.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Increase	Wotton *et al.* 2011
Short-term UK trend	1999 to 2011	Increase	Wotton *et al.* 2011

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Bittern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-13B.pdf.

The Upper Nene Valley Gravel Pits have been identified as an addition to the SPA suite for Bittern since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union for this species (Newbery *et al.* 1999). Relevant objectives are as follows:

- *"*Identify and designate the most important areas for Bitterns, and undertake sample counts to investigate trends in numbers."

- "In all countries with Bittern populations, ensure that the main breeding and wintering localities are given statutory protection."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Ensure appropriate management of existing reedbeds, including maintaining water levels and healthy fish populations."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Bittern was not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Bittern was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of non-breeding Bittern, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Assess the efficacy of current WeBS monitoring protocol, especially with respect to how representative are the data collected, and in the light of that review, make any adjustments to existing methodologies, or devise new methods as necessary, to ensure adequate monitoring of the SPA suite and other key sites.

Promote the counting of all sites within SPA suite during January each year, using the revised or new methodologies (as above), so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

9. Distribution map for non-breeding Bittern SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benacre to Easton Bavents	1.1	Not yet classified	1				Site total not available
Broadland	1.1	Not yet classified	6				Site total not available
Humber Flats, Marshes and Coast	1.1	31 August 2007	1				Site total not available
Lee Valley	1.1	22 September 2000	6				Site total not available
Leighton Moss	1.1	Not yet classified	8				Site total not available
Lower Derwent Valley	1.1	Not yet classified	3				Site total not available
Marazion Marsh	1.1	10 August 2001	2				Site total not available
Minsmere – Walberswick	1.1	Not yet classified	14				Site total not available
North Norfolk Coast	1.1	Not yet classified	5				Site total not available
Stodmarsh	1.1	15 December 1993	2				Site total not available
Upper Nene Valley Gravel Pits	1.1	7 April 2011	Not classified				Site total not available
		Total for SPAs in GB	50	**95**	2009/10	Wootton *et al.* 2011	
		GB population	100	**600**			
		thus GB SPAs hold	50.0% GB	**15.8% GB**			
		Total for SPAs in UK	50	**95**	2009/10	Wootton *et al.* 2011	
		Biogeographic population	25,000	**6,275**			
		thus SPAs hold	0.2% international	**1.5% international**			

Little Egret *Egretta garzetta* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	660-740	RBBP; Holling *et al.* 2012	7	0	0%
All-Ireland	187	Hillis 2007	2		No SPAs selected in Northern Ireland
Biogeographic – *E. g. garzetta,* Europe	68,000-94,000	BirdLife International 2004	450	0	0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2008	+35,750%	RBBP; Holling *et al.* 2012
Short-term UK trend	1993 to 2008	+7,528%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to calculate an index for breeding Little Egret.

3. Changes to the SPA suite since the 2001 Review

Breeding Little Egrets were not assessed in the 2001 SPA Review.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Little Egret, the *Atlas* predicts a scattered population in south and west England and Wales.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Little Egrets were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

SPA provision should be sought for breeding Little Egret.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel.

9. Distribution map for breeding Little Egret SPA suite

No SPAs have previously been selected for breeding Little Egret.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

BirdLife International 2004. *Birds in Europe: population estimates, trends and conservation status.* Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

Hillis, J.P. 2007. Rare breeding birds in Ireland. *Irish Birds* 8: 249-262.

Holling, M. & the Rare Breeding Birds Panel. 2012. Rare breeding birds in the United Kingdom in 2010. *British Birds* 105: 352–416.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

11. SPA suite

No SPAs have previously been selected for breeding Little Egret.

Little Egret *Egretta garzetta* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	4,500	Musgrove *et al.* 2011	45 [50]	85	4.7%
All-Ireland	0				No SPAs selected in Northern Ireland
Biogeographic – W Europe, NW Africa	134,000	Wetlands International 2012	1,300	85	0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+426%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+178%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Little Egret, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-14.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Little Egret were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Little Egrets were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient, especially in northern parts of the range.
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of non-breeding Little Egret, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS in particular ensuring that coverage of small or linear wetlands is adequate to give meaningful overall trends and population estimates.

Promote the counting of all sites within SPA suite during January each year so as to enhance the quality of assessment of numbers within the SPA suite using numbers from that month.

9. Distribution map for non-breeding Little Egret SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Chichester and Langstone Harbours	1.1	Not yet classified	100	**324**	2004/5-2009/10	WeBS	
Poole Harbour	1.1	Not yet classified	83	**146**	2004/5-2009/10	WeBS	
Tamar Estuaries Complex	1.1	26 June 1997	42	**110**	2004/5-2009/10	WeBS	
		Total for SPAs in GB	225	**210**			
		GB population	500	**4,500**			
		thus GB SPAs hold	45.0% GB	**4.7% GB**	in October		
		Total for SPAs in UK	225	**210**			
		Biogeographic population	125,000	**134,000**			
		thus SPAs hold	0.2% international	**0.2% international**			

Spoonbill *Platalea falcinellus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	2	Holling *et al*. 2012	1	0	No SPAs selected in GB
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic – Europe	8,300	BirdLife International 2004	85	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1995 to 2006/10	+10%	RBBP; Holling *et al*. 2012
Short-term UK trend	1995-98 to 2006-10	+76%	RBBP; Holling *et al*. 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for breeding Spoonbill in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for Spoonbill by the African-Eurasian Waterbirds Agreement (Triplet *et al.* 2008). Relevant objectives are as follows:

- “Designate and maintain key breeding, feeding and stop-over sites as Protected Areas (European Union Special Protection Areas in EU countries) and Ramsar sites.”
- “Develop management plans for key breeding, feeding and stop-over sites.”
- “Develop management plans for key feeding and stop-over sites addressing offsite threats at basin-level (*e.g.* pollution, water regime).”
- “Protect colonies threatened by flooding.”

  Applicable to: **All Range States**

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Spoonbill, the Climatic Atlas predicts a more northerly but still patchy breeding distribution in eastern Europe with extinction from western Europe.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Spoonbill were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel including all negative data.

9. Distribution map for breeding Spoonbill SPA suite

No SPAs have previously been selected for breeding Spoonbill.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Triplet, P., Overdijk, O., Smart, M., Nagy, S., Schneider-Jacoby, M., Karauz, E.S., Pigniczki, Cs., Baha El Din, S., Kralj, J., Sandor, A., Navedo, J.G. (Compilers). 2008. *International Single Species Action Plan for the Conservation of the Eurasian Spoonbill* Platalea leucorodia. *AEWA Technical Series* No. 35. Bonn, Germany. Available at: http://www.unep-aewa.org/sites/default/files/publication/ssap_eurasian_spoonbill_ts35_complete_0.pdf

11. SPA suite

No SPAs have previously been selected for breeding Spoonbill.

Spoonbill *Platalea falcinellus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	20	Musgrove *et al*. 2011	1	0	No SPAs selected in GB
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic – W Europe/W Mediterranean & W Africa	11,300	Wetlands International 2012	115	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Increasing	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+400%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Spoonbill in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for Spoonbill by the African-Eurasian Waterbirds Agreement (Triplet *et al.* 2008). Relevant objectives are as follows:

- “Designate and maintain key breeding, feeding and stop-over sites as Protected Areas (European Union Special Protection Areas in EU countries) and Ramsar sites.”
- “Develop management plans for key breeding, feeding and stop-over sites.”
- “Develop management plans for key feeding and stop-over sites addressing offsite threats at basin-level (*e.g.* pollution, water regime).”

  Applicable to: **All Range States**

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Spoonbill were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Spoonbill were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS in particular ensuring that coverage of small or linear wetlands is adequate to give meaningful overall trends and population estimates.

Promote the counting of all sites within SPA suite during January each year so as to enhance the quality of assessment of numbers within the SPA suite using numbers from that month.

9. Distribution map for non-breeding Spoonbill SPA suite

No SPAs have previously been selected for non-breeding Spoonbill.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

No SPAs have previously been selected for non-breeding Spoonbill.

Bewick's Swan *Cygnus columbianus bewickii*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	7,000	Worden *et al.* 2006	70	4,917	70.2%
All-Ireland	380[70]	Crowe *et al.* 2008	4 [50]	5	0.2%
Biogeographic	21,500	Wetlands International 2012	220	4,921	22.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-32.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-54.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Bewick's Swan, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-15.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for Bewick's Swan by the African-Eurasian Waterbirds Agreement (Nagy *et al.* 2012). Relevant objectives are as follows:

[70] Most recent estimate is 150 (Crowe, O. & Holt, C.A. 2013. Estimates of waterbird numbers wintering in Ireland, 2006/07 to 2010/11. *Irish Birds* 9: 545-552.)

- “Endeavour to maintain favourable conditions at key foraging and roosting sites through appropriate management and/or protection measures according to the species requirements with special emphasis on the ones listed in [the Action Plan’s Annex 2]. **(Range States with important wintering and staging populations)**”

- “Maintain and, if necessary, restore suitable aquatic macrophyta availability at key stop over and wintering sites through managing water level and water quality**. (Range States with important wintering and staging populations)**”

- “Endeavour to reduce or prevent disturbance at key sites by farming, hunting, reindeer herding, oil and other mineral exploitation activities, fishing and recreational activities through zoning, compensatory payments and other site management measures. **(All Range States)**”

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- “Ensure the protection and management of all internationally important wintering, passage and breeding sites in NW Europe.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Bewick’s Swans were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Bewick’s Swans were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil seed rape. Feed within 10 km of roost, but no other spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 10 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes -high. Whereas some birds, notably immature and unpaired birds, tend to be less faithful to a site, about two-thirds of experienced birds return to the same area each year (Evans 1979).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – high fidelity to cropped habitats such as improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil seed rape. Feed within 10 km of roost, but no other spatial information.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity to specific fields.
Is the use of cropped habitats determined by crop type?	Yes – to a high degree. Cropland feeding swans use seasonally available food: move to stubble in autumn, then use sugar beet and potato fields. In late winter and spring, move to growing cereals, until start of migration in March.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

However, both and international redistribution of the population away from the UK (Balmer *et al.* 2013) and an overall population decline (Rees & Beekman 2010) have lead to a decrease in overall national numbers. Notwithstanding these factors, the sites within the SPA suite remain the “most suitable” UK territories but need to be subject to priority management. A more detailed review of the data for all sites is recommended, and, as appropriate, enhanced management at some sites considered in order to ameliorate factors causing reduced numbers as is best possible.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through the periodic international swan census (undertaken within the Goose and Swan Monitoring Programme), as well as coverage of key sites at other times via WeBS.

Promote the counting of all sites within the SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Avon Valley SPA in future WeBS counts.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Bewick's Swan SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Rees, E.C. & Beekman, J.H. 2010. Northwest European Bewick's Swan: a population in decline. *British Birds* 103: 640-650.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

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Worden, J., Cranswick, P.A., Crowe, O., McElwaine, G. & Rees, E.C. 2006. Numbers and distribution of Bewick's Swan *Cygnus columbianus bewickii* wintering in Britain and Ireland: results of the International Censuses, January 1995, 2000 and 2005. *Wildfowl* 56: 3-22.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Arun Valley	1.1	3 December 1999	115	43	2004/5-2009/10	WeBS	
Avon Valley	1.1	2 February 1998	135	24	2004/5-2009/10	WeBS	
Breydon Water	1.1	29 March 1996	391	49	2004/5-2009/10	WeBS	
Broadland	1.1	21 September 1994	320	3	2004/5-2009/10	WeBS	
Dungeness to Pett Level	1.1	2 August 1999	179	7	2004/5-2009/10	WeBS	
Lower Derwent Valley	1.1	8 June 1993	72	1	2004/5-2009/10	WeBS	
Martin Mere	1.1	28 November 1985	449	1	2004/5-2009/10	WeBS	
Nene Washes	1.1	5 March 1993	1,718	853	2004/5-2009/10	WeBS	
Ouse Washes	1.1	5 March 1993	4,639	4,076	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.1	16 February1995	229	38	2004/5-2009/10	WeBS	
Severn Estuary	1.1	13 July 1995	280	229	2004/5-2009/10	WeBS	
Somerset Levels and Moors	1.1	26 June 1997	191	17	2004/5-2009/10	WeBS	
Walmore Common	1.1	5 December1991	104	23	2004/5-2009/10	WeBS	
		Total for SPAs in GB	6,937	**4,917**	in January		
		GB population	7,200	**7,000**			
		thus GB SPAs hold	99.1% GB	**70.2% GB**			
Lough Foyle	1.1	Not yet classified	78	6	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.1	1 April 1996	136	1	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	136	**5**	in January		
		All-Ireland population	2,500	**2,000**			
		thus NI SPAs hold	5.4% All-Ireland	**0.2% All-Ireland**			
		Total for SPAs in UK	7,072	**4,921**	in January		
		Biogeographic population	17,000	**21,500**			
		thus SPAs hold	41.6% international	**22.9% international**			

Whooper Swan *Cygnus cygnus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	11,658	Hall *et al.* 2012	120	5,989	51.4%
All-Ireland	15,068	Hall *et al.* 2012	150	2,094	13.9%
Biogeographic – Iceland/UK & Ireland	29,232	Hall *et al.* 2012	290	8,083	30.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+317.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+56.3%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Whooper Swan, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-16.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Whooper Swan, the *Climatic Atlas* predicts a more restricted breeding distribution in Iceland but did not model non-breeding distributions.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Whooper Swan, modelled impacts were that by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil-seed rape. Feed within 3-5 km of roost, but no other spatial information.	Maintain open, mixed pastoral / arable landscape close to roost areas.	Maintain suitable feeding habitat within 5 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – medium extent. Whooper Swans feeding on cropped habitats generally feed on stubble in the autumn, moving on to root-crops in midwinter (November-January) and to growing cereals in February and March. Improved pasture is used to some extent throughout the season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – high fidelity.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity.
Is the use of cropped habitats determined by crop type?	Yes – to a high degree. Improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil-seed rape. Feed within 3-5 km of roost, but no other spatial information available.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Cropped habitats form a significant resource for Whooper Swans and food gleaned from these are probably vital for the survival of the Icelandic population, especially at current population level.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

With increasing concentration of the wintering population on just two SPAs and seeming abandonment of other sites, the management of sites within the SPA suite should be reviewed to ensure that management of these areas is favourable for the species needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through the periodic international swan census (undertaken within the Goose and Swan Monitoring Programme), as well as coverage of key sites at other time via WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month. Ensure complete coverage of Upper Solway Flats and Marshes, Caithness Lochs, and Martin Mere SPAs in future WeBS counts. Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Whooper Swan SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Black Cart	1.1	7 December 2000	220	95	2004/5-2009/10	WeBS	See also Harding (2010)
Broadland	1.1	21 September 1994	133	2	2004/5-2009/10	WeBS	
Caithness Lochs	1.1	2 February 1998	250	340	2004/5-2009/10	WeBS	
Cromarty Firth	1.1	22 March 1999	55	105	2004/5-2009/10	WeBS	
Lindisfarne	1.1	11 March 1992	79	101	2004/5-2009/10	WeBS	
Loch Eye	1.1	1 October 1986	213	137	2004/5-2009/10	WeBS	
Loch Leven	1.1	27 March 2000	101	202	2004/5-2009/10	WeBS	
Loch of Skene	1.1	Not yet classified	203	6	2004/5-2009/10	WeBS	
Loch of Strathbeg	1.1	27 November 1995	183	299	2004/5-2009/10	WeBS	
Lochs of Spiggie and Brow	1.1	2 February 1997	143	61	2004/5-2009/10	WeBS	
Martin Mere	1.1	28 November 1985	621	639	2004/5-2009/10	WeBS	
Ouse Washes	1.1	5 March 1993	963	4,264	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.1	16 February 1995	159	300	2004/5-2009/10	WeBS	
Rinns of Islay	1.1	27 November 1995	140	7	2004/5-2009/10	WeBS	
River Spey - Insh Marshes	1.1	2 February 1997	190	93	2004/5-2009/10	WeBS	
The Wash	1.1	Not yet classified	68	36	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.1	30 November 1992	117	424	2004/5-2009/10	WeBS	
		Total for SPAs in GB	2,394	**5,989**	in January		
		GB population	5,600	**11,658**			
		thus GB SPAs hold	43.5% GB	**51.4% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lough Foyle	1.1	27 January 1999	890	1,303	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.1	1 April 1996	1,031	1,504	2004/5-2009/10	WeBS	
Upper Lough Erne	1.1	4 March 1997	352	779	2004/5-2009/10	WeBS	
	Total for SPAs in Northern Ireland		1,853	**2,094**	in January		
		All-Ireland population	10,320	**15,068**			
		thus NI SPAs hold	18.5% All-Ireland	**13.9% All-Ireland**			
		Total for SPAs in UK	4,247	**8,083**	in January		
		Biogeographic population	16,000	**29,232**			
		thus SPAs hold	26.5% international	**27.6% international**			

Bean Goose (Taiga race) *Anser fabalis fabalis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Vulnerable** (for *A. f. fabalis* - Eaton *et al.* 2009)
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	410	Musgrove *et al.* 2011	4 [50]	402	98.0%
All-Ireland			+		Species does not occur in Northern Ireland
Biogeographic – *fabalis*, NE Europe/NW Europe	42,500	Wetlands International 2012	420	402	0.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/12	+2,400%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/12	-25.9%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Bean Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-17.pdf.

Slamannan Plateau has been classified as an addition to the SPA suite for Bean Goose since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for this race of Bean Geese by the African-Eurasian Waterbirds Agreement (Marjakangas *et al.* 2015). Relevant objectives are as follows:

- "Stop ongoing loss, fragmentation and degradation of habitats, and restore lost, fragmented and degraded habitats."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Bean Geese were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Bean Geese were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Wet and damp pastures. Field choice highly variable.	Maintain open, pastoral landscape.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a medium extent. Wet and damp pastures are favoured. Field choice highly variable.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – medium fidelity.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – medium fidelity.
Is the use of cropped habitats determined by crop type?	Yes – high fidelity.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

At Slamannan Plateau, virtually all the habitat used for feeding and the major roosts are included within the SPA.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS and Goose and Swan Monitoring Programme.

Promote the counting of all sites within SPA suite during November each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Bean Goose SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Broadland	1.3	Not yet classified	277	126	2004/5-2009/10	WeBS	
Slamannan Plateau	1.4	1 October 2008	Not classified	276	2004/5-2009/10	WeBS	
		Total for SPAs in GB	207	**402**	in January		
		GB population	450	**730**			
		thus GB SPAs hold	51.8% GB	**98.0% GB**			
		Total for SPAs in UK	207	**402**	in January		
		Biogeographic population	80,000	**42,500**			
		thus SPAs hold	0.3% international	**0.9% international**			

Pink-footed Goose *Anser brachyrhynchus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	360,000	Mitchell 2010	3,600	252,821	70.2%
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic – E Greenland & Iceland/UK	360,000	Mitchell 2010	3,600	252,821	70.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+112.8%	WeBS*; Holt et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+47.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network for roost (with lower provision for feeding areas).

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Pink-footed Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-18.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Pink-footed Goose the *Climatic Atlas* predicts a more restricted breeding distribution in Iceland but did not model non-breeding distributions.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Pink-footed Goose, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Large, open, rough pasture for resting. Improved pasture, over-wintered stubbles, autumn-sown cereals, waste root crops for feeding. Complex pattern of field usage.	Maintain open, mixed pastoral/ arable landscape close to roost areas.	Maintain suitable feeding and resting habitat associated with roosts based on local evidence of regular field usage.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient, but see advice below concerning site boundaries
Range coverage: Sufficient, but see advice below concerning site boundaries
Ecological sufficiency: Sufficient, but see advice below concerning site boundaries

Additional conservation measures recommended?

Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution of roost sites is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species but review of site boundaries of particular SPAs is needed, *inter alia* for areas used for feeding or other functional needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through the annual Icelandic-breeding Goose Census (undertaken within the Goose and Swan Monitoring Programme), as well as undertaking periodic roost counts at SPAs at other times of the year, especially during the spring.

Enhance coverage of roost counts so complete coverage achieved at the Upper Solway Flats and Marshes SPA.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Pink-footed Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Broadland	1.2	Not yet classified	3,290	5,352	2005/6-2009/10	WWT IGC[71]	
Cameron Reservoir	1.2	14 March 1994	16,233	0	2005/6-2009/10	WWT IGC	
Castle Loch, Lochmaben	1.2	15 March 1996	5,450	42	2005/6-2009/10	WWT IGC	
Din Moss - Hoselaw Loch	1.4[72]	14 July 1988	1,180	20	2005/6-2009/10	WWT IGC	
Fala Flow	1.2	25 April 1990	6,719	3,092	2005/6-2009/10	WWT IGC	
Firth of Forth	1.2	30 October 2001	12,400	15,098	2005/6-2009/10	WWT IGC	
Firth of Tay and Eden Estuary	1.2	2 February 2000	3,769	2,084	2005/6-2009/10	WWT IGC	
Gladhouse Reservoir	1.2	14 July 1988	3,068	360	2005/6-2009/10	WWT IGC	
Greenlaw Moor	1.2	15 March 1996	5,450	6,850	2005/6-2009/10	WWT IGC	
Lindisfarne	1.3	Not yet classified	1,984	3,646	2005/6-2009/10	WWT IGC	
Loch Leven	1.2	27 March 2000	18,230	15,992	2005/6-2009/10	WWT IGC	
Loch of Kinnordy	1.2	29 March 1994	4,760	0	2005/6-2009/10	WWT IGC	
Loch of Strathbeg	1.2	27 November 1995	39,924	32,415	2005/6-2009/10	WWT IGC	
Martin Mere	1.2	28 November 1985	25,779	20,100	2005/6-2009/10	WWT IGC	
Montrose Basin	1.2	3 February 1995	31,622	27,663	2005/6-2009/10	WWT IGC	
Moray and Nairn Coast	1.2	2 February 1997	139[73]	3,526	2005/6-2009/10	WWT IGC	
Morecambe Bay	1.2	4 October 1996	2,475	21,405	2005/6-2009/10	WWT IGC	
North Norfolk Coast	1.2	20 January 1989	23,802	24,979	2005/6-2009/10	WWT IGC	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	23,860	12,012	2005/6-2009/10	WWT IGC	

[71] Icelandic-breeding Goose Census http://monitoring.wwt.org.uk/our-work/goose-swan-monitoring-programme/abundance/igc/

[72] Classified in July 1988 when it met Stage 1.2 with just over 1% of the then population.

[73] Numbers have declined to low levels following classification.

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
South Tayside Goose Roosts	1.2	22 April 1993	43,300	11,725	2005/6-2009/10	WWT IGC	
The Wash	1.2	30 March1988	33,265	8,534	2005/6-2009/10	WWT IGC	
Upper Solway Flats and Marshes	1.2	30 November 1992	15,983	3,797	2005/6-2009/10	WWT IGC	
Westwater	1.2	27 November 1995	31,127	32,666	2005/6-2009/10	WWT IGC	
Ythan Estuary, Sands of Forvie and Meikle Loch	1.2	30 March 1998	17,213	12,680	2005/6-2009/10	WWT IGC	
		Total for SPAs in GB	155,582	**252,821**	in November		
		GB population	192,000	**360,000**			
		thus GB SPAs hold	81.9% GB	**70.2% GB**			
		Total for SPAs in UK	155,582	**252,821**	in November		
		Biogeographic population	225,000	**360,000**			
		thus SPAs hold	69.1% international	**70.2% international**			

European White-fronted Goose *Anser albifrons albifrons*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Not evaluated BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	2,400	Musgrove *et al.* 2011	25 [50]	1,547	64.5%
All-Ireland	0			0	Race does not occur in Northern Ireland
Biogeographic - *albifrons*, NW Siberia & NE Europe/NW Europe	1,200,000	Wetlands International 2012	12,000	1,547	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-61.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-40.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of European White-fronted Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-19.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Ensure the protection and management of all important wintering and passage sites (note – no internationally important sites in the UK).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

European White-fronted Goose was not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

European White-fronted Goose was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Wet and damp pastures. Feeds within 10 km of roost, but no other spatial information except at Slimbridge, where flock feeds within 1 km of roost.	Maintain open pasture landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a high degree. European White-fronted Geese are generally traditional in habits and return to the same wintering

Cropped habitats assessment from SPA Review Decision Framework	
	areas repeatedly (Owen 1972), though, over time traditional attachments can break down and birds will desert areas less favourable for feeding, as has happened in the more westerly parts of the range.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – high fidelity with wet and damp pastures favoured. Feeds within 10 km of roost, but no other spatial information except at Slimbridge (Owen 1972), where flock feeds within 1 km of roost.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity.
Is the use of cropped habitats determined by crop type?	Yes – high fidelity. There is little seasonal difference in the use of cropped habitats unless stubbles are available, when these are used in autumn.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (2013) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and there are no other factors suggesting a need to revise the previously identified suite of SPAs. Site boundaries of particular SPAs however, should be reviewed especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Broadland SPA in future WeBS counts (Heigham Holmes and possibly other areas currently not included).

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for European White-fronted Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Alde-Ore Estuary	1.3	Not yet classified	97	68	2005/6-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	164	76	2005/6-2009/10	WeBS	
Broadland	1.3	Not yet classified	746	100	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	352	241	2005/6-2009/10	WeBS	
Severn Estuary	1.3	13 July 1995	2,664	495	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	88	5	2005/6-2009/10	WeBS	
The Swale	1.3	Not yet classified	1,309	357	2005/6-2009/10	WeBS	
The Wash	1.3	Not yet classified	100	1	2005/6-2009/10	WeBS	
		Total for SPAs in GB	4,586	**1,547**	in January		
		GB population	6,100	**2,400**			
		thus GB SPAs hold	76.4% GB	**64.5% GB**			
		Total for SPAs in UK	4,586	**1,547**	in January		
		Biogeographic population	600,000	**1,200,000**			
		thus SPAs hold	0.8% international	**0.1% international**			

Greenland White-fronted Goose *Anser albifrons flavirostris*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	**Endangered**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Not evaluated BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	13,000	Musgrove *et al.* 2011	130	5,394 (roosting)	41.5%
				1,087 (feeding)	8.4%
All-Ireland	11,000	Crowe *et al.* 2008	110		No SPAs selected in Northern Ireland
Biogeographic – total *flavirostris*	24,000	Wetlands International 2012	240	5,394 (roosting)	22.5%
				1,087 (feeding)	8.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1982/3 to 2010/11	+81.9%	Greenland White-fronted Goose Study; Stroud *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-30.3%	Greenland White-fronted Goose Study; Stroud *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network for both roost sites and feeding areas.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Greenland White-fronted Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-20.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for Greenland White-fronted Geese by the African-Eurasian Waterbirds Agreement (Stroud *et al.* 2012). Relevant objectives are as follows:

- "Designate all wetlands of international importance for Greenland White-fronted Geese under the Ramsar Convention and/or the EU Birds Directive as appropriate, promoting especially the conservation of sites necessary to maintain range and encouraging the restoration of habitat at sites which were previously of similar importance. Applicable to: **All Range States"**

- "At designated sites of importance (including Ramsar Sites, SPAs and SACs):
    - Inform central and local government of the importance and location of protected sites;
    - Enhance knowledge of sites and requirements among user-groups (e.g. hunters, farmers); and
    - Use sites wisely *sensu* Ramsar Convention, and fulfil legal obligations under the Birds and Habitats Directives (Annex 7), through the preparation and implementation of management plans for each site.

  Applicable to: **All Range States"**

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Ensure the protection and management of all internationally important wintering and passage sites in NW Europe, with particular reference to satellite populations, the loss of which would contribute significant range contractions."

- "Ensure effective measures for managing potential conflict with agriculture (local goose management schemes) are retained and extended as appropriate."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Greenland White-fronted Geese were not included in the *Climatic atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Greenland White-fronted Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pasture, over-wintered stubble, waste root crops. Highly faithful to feeding areas.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes - very high degree of site fidelity demonstrated by 40 years of individual marking. Greenland White-fronted Geese are highly site-faithful within and between years both on wintering areas. Site-fidelity between winters has been estimated at 80% on Islay and 85% at Wexford (Fox & Stroud 2002).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes - very high. Analysis of patterns of changes in flock size shows that size, number and quality of feeding areas, level of disturbance, flock size and latitude all influence flock status. Those flocks occurring in areas with fewest, poor quality, limited feeding ranges have shown the most serious declines and also now tend to be the smallest flocks (Fox & Stroud 2002).
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity. Radio-tracking of marked geese on Islay in the 1980s showed discrete home –ranges of limited extent. Specific grass fields used for feeding within these ranges were linked to regularly used roost sites in a predictable manner. Cluster analysis of resightings of individually

Cropped habitats assessment from SPA Review Decision Framework	
	marked birds on Islay in 1991/2 and 1992/3 indicated an average home range extent of 195.7 ha and 488.3 ha respectively. However, some 80% of resightings occurred in areas of only 13.3 ha and 20.1 ha in the two winters. The 80% utilisation level is thought to represent core areas of the home ranges, with occasional resightings elsewhere representing some limited excursive activity.
Is the use of cropped habitats determined by crop type?	Yes. See extensive published literature summarised by Fox & Stroud (2002).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient especially in NW Scotland
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of decreasing numbers and that maintenance of the current range depends on the continued survival of a small number of small, declining flocks with low productivity (Stroud *et al.* 2012), existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of Greenland White-fronted Geese, and additional SPA provision should be considered for both feeding areas and for roosting sites.

8. Recommendations regarding survey and monitoring

Ensure continued support of late autumn and spring international censuses co-ordinated by Greenland White-fronted Goose Study (within the WWT/JNCC/SNH Goose and Swan Monitoring Programme) and annual reporting of data.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

Ensure monitoring regime established that can assess population numbers at the roost sites at Eilean na Muice Duibhe/Duich Moss, Islay and Rinns of Islay, either directly or through research to demonstrate reliability of assumptions concerning the relationship between roost sites and feeding areas currently giving indirect assessments with potentially significant error.

Undertake survey of roost sites on Coll to assess whether the SPA is still used by roosting geese.

Enhance monitoring at Caithness Lochs SPA.

9. Distribution map for Greenland White-fronted Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Caithness Lochs	1.1	2 February 1998	183	338	March 2012	GWGS	Roosting only
Coll	1.1	31 March 1995	789	50	March 2012	GWGS	Roosting only. Island flock size = 204, but only limited use of roost lochs
Dyfi Estuary	1.1	29 June 2001	144	48	March 2012	GWGS	Roosting and feeding
Eilean na Muice Duibhe/Duich Moss, Islay	1.1	14 July 1988	1,300	223	March 2012	per SNH	Roosting only. Total calculated from an assumed catchment
Gruinart Flats, Islay	1.1	14 July 1988	1,000	414	March 2012	GWGS	Feeding only
Kintyre Goose Roosts	1.1	28 October 1998	2,323	2,350	March 2012	GWGS	Roosting only
Laggan, Islay	1.1	14 July 1988	300	300	March 2012	per SNH	Feeding only
Loch of Inch and Torrs Warren	1.1	2 February 1999	534	244	March 2012	GWGS	Roosting only
Loch Ken and River Dee Marshes	1.1	31 August 1992	350	173	March 2012	GWGS	Roosting and feeding
Loch Lomond	1.1	24 March 1997	237	152	March 2012	GWGS	Roosting and feeding
Rinns of Islay	1.1	27 November 1995	1,600	868	March 2012	per SNH	Roosting only. Total calculated from an assumed catchment
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.1	30 October 2001	783	948	March 2012	GWGS	Almost wholly roost
	Total for SPAs in GB (roosting)		8,243	**5,394**	in March		
	Total for SPAs in GB (feeding)		2,814	**1,087**	in March		
	GB population		13,700	**13,000**	in March		
	thus GB SPAs hold (roosting)		58.9% GB	**41.5% GB**			
	thus GB SPAs hold (feeding)		20.5% GB	**8.4% GB**			
	Total for SPAs in UK (roosting)		8,243	**5,394**	in March		
	Total for SPAs in UK (feeding)		2,814	**1,087**	in March		
	Biogeographic population		30,000	**24,000**	in March		
	thus SPAs hold (roosting)		27.5% international	**22.5% international**			
	thus SPAs hold (feeding)		9.4% international	**4.5% international**			

Icelandic Greylag Goose *Anser anser*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	85,000	Mitchell 2010	850	19,809	23.3%
All-Ireland	5,030	Crowe *et al.* 2008	50	481	9.6%
Biogeographic – Iceland/UK & Ireland	98,000	Wetlands International 2012	980	20,290	20.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-48.2%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-12.3%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network for roosts with lower provision for feeding areas.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Icelandic Greylag Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-21.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Icelandic Greylag Geese, the *Climatic Atlas* predicts an essentially unchanged breeding distribution in Iceland but did not model non-breeding distributions.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Icelandic Greylag Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, over-wintered stubbles, autumn-sown cereals, waste root crops. Feeding areas at variable distances from roosts.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 3 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Broadly, although the Greylag Goose is an adaptable species, which has demonstrated, both within a season and over decades, an ability to adapt to various food sources and to use different feeding areas. Maintaining a generally mixed arable cropping system, with intensive grassland management is particularly important.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes - medium
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Variable. Specificity of use is greatest closest to roosts.
Is the use of cropped habitats determined by crop type?	Yes - improved pasture, over-wintered stubbles, autumn-sown cereals, waste root crops are all important. Feeding areas typically are within 2-3 km of roost. Need to maintain suitable feeding habitat within 3 km of roost based on local evidence of regular field usage.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient roost site provision
Range coverage: Insufficient with respect to changed distribution since 1990s
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of the significantly changed distribution (a northwards shift), contemporary SPA provision is no longer sufficient for the requirements of the species, and additional SPA provision for roost sites should be sought.

With respect to feeding areas, review of site boundaries of particular SPAs is needed, *inter alia* for areas used for feeding or other functional needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through the annual Icelandic-breeding Goose Census undertaken (within the WWT/JNCC/SNH Goose and Swan Monitoring

Programme), as well as undertaking periodic roost counts at SPAs at other times of the year, especially during the spring.

Enhance protocols for monitoring Greylag Geese at SPAs and other key sites in Northern Ireland in particular with respect to separate assessment of migratory from resident Greylag Geese. Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Icelandic Greylag Goose SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Caithness Lochs	1.2	2 February 1998	6,872	9,105	2005/06-2009/10	WWT IGC	
Cromarty Firth	1.2	22 March 1999	1,777	736	2005/06-2009/10	WWT IGC	
Din Moss – Hoselaw Loch	1.2	14 July1988	1,081	132	2005/06-2009/10	WWT IGC	
Dornoch Firth and Loch Fleet	1.2	24 March 1997	2,079	2,823	2005/06-2009/10	WWT IGC	
Firth of Tay and Eden Estuary	1.2	2 February 2000	1,355	734	2005/06-2009/10	WWT IGC	
Holburn Lake and Moss	1.2	17 July 1985	2,150	0	2005/06-2009/10	WWT IGC	
Inner Moray Firth	1.2	22 March 1999	1731	5	2005/06-2009/10	WWT IGC	
Lindisfarne	1.2	11 March 1992	1,416	200	2005/06-2009/10	WWT IGC	
Loch Eye	1.2	1 October 1986	11,321	2,427	2005/06-2009/10	WWT IGC	
Loch Ken and River Dee Marshes	1.2	31 August 1992	1,000	397	2005/06-2009/10	WWT IGC	
Loch of Kinnordy	1.2	29 March 1994	1,000	0	2005/06-2009/10	WWT IGC	
Loch of Lintrathen	1.2	31 August 1992	3,098	340	2005/06-2009/10	WWT IGC	
Loch of Skene	1.2	1 October 1986	10,840	1,265	2005/06-2009/10	WWT IGC	
Loch of Strathbeg	1.2	27 November 1995	3,325	237	2005/06-2009/10	WWT IGC	
Loch Spynie	1.2	31 August 1992	3,360	580	2005/06-2009/10	WWT IGC	
Montrose Basin	1.2	3 February 1995	1,080	26	2005/06-2009/10	WWT IGC	
Moray and Nairn Coast	1.2	2 February 1997	2,679	535	2005/06-2009/10	WWT IGC	
Muir of Dinnet	1.2	10 May1999	29,458	81	2005/06-2009/10	WWT IGC	
South Tayside Goose Roosts	1.2	22 April 1993	3,667	186	2005/06-2009/10	WWT IGC	
		Total for SPAs in GB	56,972	**19,809**	in November		
		GB population	100,000	**85,000**			
		thus GB SPAs hold	57.5% GB	**23.3% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lough Foyle	1.3	Not yet classified	67	753	2005/06-2009/10	WeBS	Total may include an unknown number of resident birds
Lough Neagh and Lough Beg	1.3	Not yet classified	176	1,080	2005/06-2009/10	WeBS	Total may include an unknown number of resident birds
Strangford Lough	1.3	Not yet classified	419	408	2005/06-2009/10	WeBS	Total may include an unknown number of resident birds
		Total for SPAs in Northern Ireland	547	**481**	in November		
		All-Ireland population	3,800	**5,030**			
		thus NI SPAs hold	18.2%	**9.6% All-Ireland**			
		Total SPAs in UK	57,519	**20,290**	in November		
		Biogeographic population	100,000	**98,000**			
		thus SPAs hold	57.5% international	**20.7% international**			

Greenland Barnacle Goose *Branta leucopsis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	58,000	Mitchell *et al.* 2008	580	31,928 (feeding) 43,536 (roosting)	55.0% (feeding) 75.1% (roosting)
All-Ireland	9,035	Crowe *et al.* 2008	90	0	No SPAs selected in Northern Ireland
Biogeographic – E Greenland/ Scotland & Ireland	70,500	Wetlands International 2012	700	31,928 (feeding) 43,536 (roosting)	45.3% (feeding) 61.8% (roosting)

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1982/3 to 2007/8	+179.9%	Ogilvie 1983; Mitchell *et al.* 2008
Short-term UK trend	1998/9 to 2007/8	+29.0%	Cranswick *et al.* 2000; Mitchell *et al.* 2008

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network for roosts with lower provision for feeding areas.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Greenland Barnacle Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-22.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Greenland Barnacle Geese were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Greenland Barnacle Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, over-wintered stubbles and autumn-sown cereals. Highly faithful to feeding areas; travel 2-5 km from roost depending on location.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a very great extent (Percival 1988, 1993). Most of the Greenland population of Barnacle Geese rely on cropped habitats, predominantly improved grassland. Although the cropping of individual fields may vary between years, overall the proportion of land devoted to grass and arable crops on the main wintering area of Islay remains very similar from year to year, with more than 90% of the area comprising improved grassland. The farming system is generally based on cattle and sheep rearing and, barring a major change in the agricultural economy, this pattern is likely to remain for the foreseeable future.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, to a high fidelity. Barnacle Geese are extremely faithful to different feeding areas, visiting the same fields or group of fields repeatedly. In autumn, waste grain from stubbles or clover stolons from maritime swards are favoured. However, stubbles are ploughed up soon after harvest and the clover stocks become depleted, so the diet for the majority of the winter and spring is grass from improved pasture and traditional island swards.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity shown.
Is the use of cropped habitats determined by crop type?	Yes to a great extent.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the population.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through the periodic international Greenland Barnacle Goose Census (undertaken within the Goose and Swan Monitoring Programme and next in spring 2018), as well as annual coverage of key sites via GSMP, WeBS and SNH surveys.

Ensure monitoring regime established that can assess population numbers at the roost sites at Gruinart Flats and Bridgend, Islay, either directly or through research to demonstrate reliability of assumptions concerning the relationship between roost sites and feeding areas currently giving indirect assessments.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Greenland Barnacle Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1900s (individuals)[74]	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Bridgend Flats, Islay	1.1	14 July 1988	6,700	14,551	March 2008	Data from SNH[75]	Roosting only
Coll	1.1	31 March 1995	1,029	167	March 2008	Mitchell *et al*. 2008	Roosting only (includes birds that feed on Tiree)
Gruinart Flats, Islay	1.1	14 July 1988	20,000	24,468	March 2008	Data from SNH[76]	Roosting and feeding
Laggan, Islay	1.1	14 July 1988	1,800	4,722	March 2008	Data from SNH[77]	Feeding only
Monach Isles	1.1	19 September 1994	540	520	March 2008	Mitchell *et al*. 2008	Roosting and feeding
North Sutherland Coastal Islands	1.1	2 February 1999	631	1,037	March 2008	Mitchell *et al*. 2008	Roosting and feeding
North Uist Machair and Islands	1.1	29 March 1999	1,500	750	March 2008	Mitchell *et al*. 2008	Boreray 750; Lingay 0 Roosting and feeding

[74] Note that 2001 data are not snapshot counts from the March 1994 international census and so are not additive. Thus network totals for feeding and roost provision are over-inflated as a consequence of double-counting of the same individuals.

[75] **Bridgend Flats, Islay**

Codes for Islay SPAs relate to SNH's definitive maps of goose count units on Islay, as used for Islay Local Goose Management Scheme since 2000, and are held as paper copies in their Bowmore office or as the geoview layer 'Islay Goose Management Scheme Field Boundary'.

AL Not In (12,13,19,20,21)
LN Not In (26,22,25,24,23,20,18,21,19,27,16,17,15,14,13,12,35,7,6,31,28,30,1,2,29,3,4,8,9,5,10,11,32,33)
CT Not In (22,23)
CY Not In (27,10,9,8,26,11,12,13,7,24,6,5,4,1,2,3,25,29)
TL Not In (38,39,40,46)
IH Not In (1,2,3,4,5,24,20,12,22,6,7,8,14,15,16,9,19,10,17,15,11,18)
DU Not In (29,19,28,20,24,21,25,23,22,26,27,2,1,12,10,4,11,5,9,7,6,3,15,14,16,17,18)
Route D (Kilmeny) - In ("gm", "gc", "my", "kg", "nb", "cg", "cn", "ng", "ko", "lt")

[76] **Gruinart Flats, Islay**

Route C (Gruinart); Route E (Gorm); Route F (Rhinns)

[77] **Laggan, Islay**

In ("ih", "ln", "Du", "rm")
CY Not In (14,15,16,17,23,18,19,22,21,20)
CT In (23,22)
AL In (18,11,19,12,14,13,20,21)
In ("kt", "lr", "gd", "bv")

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1900s (individuals)[74]	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.1	30 October 2001	959	0	March 2008	Mitchell *et al.* 2008	Feeding only
Switha	1.1	27 March 2000	1,000	1,612	March 2008	Mitchell *et al.* 2008	Roosting only
The Shiant Isles	1.1	31 August 1992	172	224	March 2008	Mitchell *et al.* 2008	Roosting and feeding
Treshnish Isles	1.1	30 August 1994	82	207	March 2008	Mitchell *et al.* 2008	Roosting and feeding
	Total for SPAs in GB (feeding)		See footnote 1	**31,928**	in March		
	Total for SPAs in GB (roosting)		See footnote 1	**43,536**	in March		
	GB population		26,950	**58,000**	in March		
	thus GB SPAs hold (feeding)		63.2%	**55.0% GB**			See footnote 1 for 2001
	thus GB SPAs hold (roosting			**75.1% GB**			
	Total for SPAs in UK (feeding)		See footnote 1	**31,928**	in March		
	Total for SPAs in UK (roosting)		See footnote 1	**43,536**	in March		
	Biogeographic population		32,000	**70,500**	in March		See footnote 1 for 2001
	thus SPAs hold (feeding)		49.8% international	**45.3% international**			
	thus SPAs hold (roosting)		See footnote 1	**61.8% international**			

Svalbard Barnacle Goose *Branta leucopsis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	33,000	Musgrove *et al.* 2011; Griffin 2010	330	30,103	91.2%
All-Ireland					Population does not occur in Northern Ireland
Biogeographic – Svalbard/SW Scotland	33,000	Musgrove *et al.* 2011; Griffin 2010	330	30,103	91.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+13.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-48.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Svalbard Barnacle Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-23.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Svalbard Barnacle Geese, the *Climatic Atlas* predicts a much more restricted breeding distribution in Svalbard but did not model non-breeding distributions.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Svalbard Barnacle Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, over-wintered stubbles and autumn-sown cereals. Highly faithful to feeding areas; travel 2-5 km from roost depending on location.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – this population is highly dependent on croplands, though it still uses semi-natural saltmarsh habitats to a considerable extent (Black *et al.* 2014). Although the cropping of individual fields may vary between years, overall the proportion of land devoted to grass and arable crops remains very similar from year to year, with more than 90% of the area down to improved grassland. The area is predominantly dairy farming and store

Cropped habitats assessment from SPA Review Decision Framework	
	cattle rearing and, barring a major change in the agricultural economy, this pattern is likely to remain for the foreseeable future.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, with high fidelity. Barnacle geese are extremely faithful to different feeding areas, visiting the same fields repeatedly. The pattern is reinforced by the reserve systems set up and managed by Wildfowl & Wetlands Trust and RSPB to favour the geese. Notably the lack of disturbance on these areas makes them very attractive to geese. There are indications that groups of geese favour one area over another, though all the geese are probably found in the Caerlaverock area sometime during the winter.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, high fidelity shown (Black *et al.* 2014).
Is the use of cropped habitats determined by crop type?	Yes, to a great extent (Black *et al.* 2014).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	This population is concentrated in a very small area and has now grown much larger than the semi-natural merses can support, however well managed. It is vital for the maintenance of this population in a healthy state that the management of the croplands within the range be maintained so that sufficient suitable habitat remains. The goose management and stewardship schemes currently in operation in core parts of the range are well accepted by farmers and conservation interests so the long-term extension of these schemes is highly desirable in order to conserve the population in harmony with the commercial use of the land.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, a review of boundaries of the existing SPA is needed to ensure that important areas used for feeding or other functional needs are included.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through the Goose and Swan Monitoring Programme.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Svalbard Barnacle Goose SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Loch of Strathbeg	1.1	Not yet classified	226	520	2005/06-2009/10	WeBS	
Upper Solway Flats and Marshes	1.1	30 November 1992	13,595	29,583	2005/06-2009/10	WWT/WeBS	
		Total for SPAs in GB	13,821	**30,103**	in October		
		GB population	17,450	**33,000**			
		thus GB SPAs hold	c. 100% GB	**91.2% GB**			
		Total for SPAs in UK	13,821	**30,103**	in October		
		Biogeographic population	12,000	**33,000**			
		thus SPAs hold	c. 100% international	**91.2% international**			

Dark-bellied Brent Goose *Branta bernicla bernicla*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	91,000	Musgrove *et al.* 2011	910	73,532	80.8%
All-Ireland	0			0	Population not present in Northern Ireland
Biogeographic – total *bernicla*	240,000	Wetlands International 2012	2,400	73,532	30.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+44.9%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-18.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Dark-bellied Brent Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-24.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives are as follows:

- “Ensure the protection and management of all internationally important wintering, passage and breeding sites in NW Europe (amended)”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Dark-bellied Brent Geese were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Dark-bellied Brent Geese, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved pasture, autumn-sown cereals and oil-seed rape. Feed within 5 km of roost.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 5 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a high degree. Site-faithfulness examined in detail using individually marked birds. Birds are faithful to the same areas both in winter and in spring on migration. They return not only to the same estuary,

Cropped habitats assessment from SPA Review Decision Framework	
	but also to the same section of coast within it. It is presumed that they select the same cropped habitats from year to year since these are immediately adjacent to their mudflat roosts.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – to a high degree although the extent of use varies within the non-breeding season. They initially feed on inter-tidal *Zostera* but when these stocks are depleted, the birds move to cropped habitats. However, as this grassland-feeding habit became common after the 1970s, geese have tended to feed on croplands throughout the season, particularly when a high tide renders the mudflats unavailable for feeding. In spring, nearly all the feeding is on grassland and growing winter cereals, with a little saltmarsh grazing.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – high fidelity. Site-faithfulness has been examined in detail in this species using individually marked birds. Birds are faithful to the same areas both in winter and in spring on migration. They return not only to the same estuary, but also to the same section of coast within it. It is presumed that they select the same cropped habitats from year to year since these are immediately adjacent to their mudflat roosts (St. Joseph 1979; Summers & Critchley 1990).
Is the use of cropped habitats determined by crop type?	Yes - high. Brent Geese generally feed on winter cereals and improved grassland, which are generally abundant in the areas next to their estuarine roosts. The exact cropping of fields will vary from year to year but generally crops will always be available. Recreational grounds and areas set aside for informal activities generally remain constant from year to year.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	There are no accurate estimates of the degree of dependence of these geese on winter cereals and improved grasslands nowadays, but it is clear that in all areas (perhaps excluding the Exe Estuary and the Burry Inlet, where the geese stay on the intertidal areas and saltmarsh throughout the winter), cropped habitats are vital to the birds' survival, particularly in late winter and spring. Recreational areas (golf courses

Cropped habitats assessment from SPA Review Decision Framework	
	and playing fields) are also important overflow areas in some sites.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, a review of boundaries of existing SPAs is needed to ensure that important areas used for feeding or other functional needs are included.

8. Recommendations regarding survey and monitoring

Continue to ensure national population assessment and monitoring through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Colne Estuary (Mid-Essex Coast Phase 2), Humber Flats and Marshes, and Medway Estuary and Marshes SPAs in future WeBS counts.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Dark-bellied Brent Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benfleet and Southend Marshes	1.2	14 February 1994	3,819	4,083	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.2	12 May 1995	15,392	7,155	2005/6-2009/10	WeBS	
Chesil Beach and The Fleet	1.2	17 July 1985	3,182	1,755	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	28 October 1987	17,119	13,729	2005/6-2009/10	WeBS	
Colne Estuary (Mid-Essex Coast Phase 2)	1.2	28 July 1994	4,907	2,839	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3)	1.2	29 June 1998	3,074	4,416	2005/6-2009/10	WeBS	
Dengie (Mid-Essex Coast Phase 1)	1.3	24 March 1994	2,308	3,029	2005/6-2009/10	WeBS	
Exe Estuary	1.3	11 March 1992	1,905	1,532	2005/6-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.2	4 October 1996	13,075	9,966	2005/6-2009/10	WeBS	
Hamford Water	1.2	8 June 1993	6,892	4,515	2005/6-2009/10	WeBS	
Humber Flats, Marshes and Coast (Phase 1)	1.3	31 August 2007	2,553	3,218	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	3,205	1,515	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
North Norfolk Coast	1.2	20 January 1989	11,512	7,196	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	1,480	1,153	2005/6-2009/10	WeBS	
Portsmouth Harbour	1.2	28 February 1995	2,847	2,772	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.2	1 October 1998	7,506	5,773	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	2,711	2,451	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Swale	1.3	31 August 1982	1,961	2,036	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	22,248	18,841	2005/6-2009/10	WeBS	
		Total for SPAs in GB	93,677	**73,532**	in January		
		GB population	103,300	**91,000**			
		thus GB SPAs hold	93.7% GB	**80.8% GB**			
		Total for SPAs in UK	93,677	**73,532**	in January		
		Biogeographic population	300,000	**240,000**			
		thus SPAs hold	31.2% international	**30.6% international**			

Canadian Light-bellied Brent Goose *Branta bernicla hrota*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	710	Musgrove *et al* 2011	7 [50]	6	0.8%
All-Ireland	40,000	Fox *et al.* 2010; Wetlands International 2012	400	26,516	66.3%
Biogeographic – *hrota*, Canada & Greenland/Ireland	40,000	Fox *et al.* 2010; Wetlands International 2012	400	26,522	66.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81-1984/85 to 2004/05-2008/09	+80.1%	Merne *et al.* 1999; Musgrove *et al.* 2011
Short-term UK trend	1999/2000 to 2010/11	+88.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Canadian Light-bellied Brent Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-25.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for the East Canadian High Arctic (ECHA) population of Light-bellied Brent Geese by the African-Eurasian Waterbirds Agreement (Robinson & Colhoun 2006). Relevant objectives are as follows:

- To provide protection and management of sufficient habitat across the range to support 25,000 birds by 2014:
    - By 2014, all existing IBAs identified for ECHA Light-bellied Brent Geese protected and adequately managed;
    - By 2008, an improved knowledge of IBAs and their importance to ECHA Light-bellied Brent Geese, particularly in Greenland, Iceland and Canada;
    - By 2008, data on migratory movements and key sites in remote areas used to inform future IBA identification;
    - By 2011, data on habitat requirements and feeding ecology used to inform site management plans; and
    - By 2011, national strategies and policies promoting the conservation management of important areas outside the IBA network.

  Applicable to: **All Range States"**

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Canadian Light-bellied Brent Geese were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Canadian Light-bellied Brent Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved and unimproved pasture and autumn-sown cereals. No spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a high degree. Since most cropped habitat use is of long-established grassland (47 of 49 fields used in 1992-96 – 96%), there is little change between years (Andrews *et al.* 1996).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – medium. In the autumn, when most geese are in Northern Ireland, the vast majority (93% in the 1980s) use *Zostera* beds for feeding, and when these are depleted move on to the algae (*Enteromorpha* and *Ulva*), also on intertidal habitats (Ó Briain & Healy 1991). However, a substantial amount of cropland feeding takes place along the shores of Strangford Lough. The habit began in 1992, a particularly poor year for *Zostera*, but has persisted since despite the recovery of *Zostera* (K. Mackie, pers. comm.). The birds remain largely on intertidal habitats during October and November, and move progressively on to cropland as the winter progresses. Proportions of the population around Strangford Lough using cropped habitats were 5% in December, 26% in January, 53% in February and 55% in March (Andrews *et al.* 1996).
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – to a medium extent. Since the areas are very well chosen, on the basis of the characteristics of the site, the birds return to the exact same locations year after year. Andrews *et al.* (1996) demonstrated great site loyalty, though geese expanded into new areas as numbers using cropped habitats increased. In the 1990s, an estimated 25% of the Irish population spent much of its time feeding on managed grasslands (Andrews *et al.* 1996).
Is the use of cropped habitats determined by crop	Yes – to a high degree.

Cropped habitats assessment from SPA Review Decision Framework	
type?	
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	With increased numbers of geese in recent decades, cropped habitats have increased in their significance, though this population is largely an intertidal feeding one. Since there is little conflict with farmers and the habitats used are mostly grassland, it seems unlikely that this situation will change in the short or medium term.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the population.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through the annual international census coordinated by the Irish Brent Goose Research Group (within the Goose and Swan Monitoring Programme).

Promote the counting of all sites within SPA suite during October each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Review the use of Killough Bay and Outer Ards SPAs.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Canadian Light-bellied Brent Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Loch Gruinart, Islay	1.2	14 July 1988	Not classified	16	2005/6-2009/10	WeBS	
		Total for SPAs in GB	0	**6**			
		GP population		**710**			
		thus GB SPAs hold		**0.8% GB**			
Carlingford Lough	1.2	9 March 1998	319	540	2005/6-2009/10	WeBS	
Killough Bay	1.2	23 March 2003	354	399	2005/6-2009/10	WeBS	
Larne Lough	1.2	4 March 1997	227	344	2005/6-2009/10	WeBS	
Lough Foyle	1.2	27 January 1999	3,730	3,162	2005/6-2009/10	WeBS	
Outer Ards	1.2	11 December 2002	245	701	2005/6-2009/10	WeBS	
Strangford Lough	1.2	9 March 1998	10,527	23,170	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	14,087	**26,516**	in October		
		All-Ireland population	20,000	**40,000**			
		thus NI SPAs hold	70.4% All-Ireland	**66.3% All-Ireland**			
		Total for SPAs in UK	14,087	**26,522**	in October		
		Biogeographic population	20,000	**40,000**			
		thus SPAs hold	70.4% international	**66.3% international**			

Svalbard Light-bellied Brent Goose *Branta bernicla hrota*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	3,400	Musgrove *et al.* 2011	35 [50]	3,551	100%
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic – Svalbard/Denmark & UK	7,600	Fox *et al*. 2010; Wetlands International 2012	75	3,551	46.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+1,150.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+300.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Svalbard Light-bellied Brent Goose, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-26.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Svalbard Brent Geese, the *Climatic Atlas* predicts a much more restricted breeding distribution in Svalbard but did not model non-breeding distributions.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Svalbard Brent Geese were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved and unimproved pasture, autumn-sown cereals. Field choice has been studied at the single UK site.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	No. There is no evidence that the Svalbard geese wintering at Lindisfarne use cropped habitats, though they do graze on saltmarshes, especially at high tide. When *Zostera* resources become depleted in late

Cropped habitats assessment from SPA Review Decision Framework	
	winter, the birds switch to saltmarsh and/or hasten their migration to spring staging areas in Denmark (Clausen *et al.* 1999).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Not applicable.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Not applicable.
Is the use of cropped habitats determined by crop type?	Not applicable.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	There are three factors, however, that makes it likely that these birds will have to resort to cropped habitats in future: 1. The birds wintering in Denmark are increasingly using cropped habitats in winter and spring; 2. The number of Dark-belled geese, which are used to feeding on cropped habitats further south, are increasing and they may start a learned trend in field feeding; 3. Continuing high numbers of geese and a hard winter, precluding early migration to Denmark, may force a move to cropped habitats.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Not appropriate at this time.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage (in January each year) of the single SPA through WeBS.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for Svalbard Light-bellied Brent Goose SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lindisfarne	1.2	11 March 1992	1,844	3,551	2005/6-2009/10	WeBS	
		Total for SPAs in GB	1,844	**3,551**	in November		
		GB population	2,430	**3,400**			
		thus GB SPAs hold	75.9% GB	**100% GB**			
		Total for SPAs in UK	1,844	**3,551**	in November		
		Biogeographic population	5,000	**7,600**			
		thus SPAs hold	36.9% international	**46.7% international**			

Shelduck *Tadorna tadorna* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	61,000	Musgrove *et al.* 2011	610	42,926	70.4%
All-Ireland	14,600	Crowe *et al.* 2008	150	3,430	23.5%
Biogeographic NW Europe	300,000	Wetlands International 2012	3,000	46,356	15.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-10.7%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-16.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Shelduck, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-27.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current

distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

The *Climatic Atlas* did not model the distribution on non-breeding Shelduck.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Shelduck, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Blackwater Estuary (Mid-Essex Coast Phase 4), Colne Estuary (Mid-Essex Coast Phase 2), Humber Flats and Marshes, Medway Estuary and Marshes, Severn Estuary, The Wash, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Shelduck SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Alde-Ore Estuary	1.3	Not yet classified	1,059	1,107	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.2	Not yet classified	4,594	2,633	2005/6-2009/10	WeBS	
Burry Inlet	1.3	14 July1992	968	766	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	2,410	1,114	2005/6-2009/10	WeBS	
Colne Estuary (Mid-Essex Coast Phase 2)	1.3	Not yet classified	1,773	813	2005/6-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	1,108	660	2005/6-2009/10	WeBS	
Firth of Forth	1.2	30 October 2001	3,586	3,343	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	1,144	318	2005/6-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.3	Not yet classified	1,024	792	2005/6-2009/10	WeBS	
Hamford Water	1.3	8 June 1993	1,629	1,796	2005/6-2009/10	WeBS	
Humber Flats Marshes and Coast (Phase 1)	1.2	31 August 2007	4,083	5,284	2005/6-2009/10	WeBS	
Lindisfarne	1.3	11 March 1992	899	1,626	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	4,465	1,949	2005/6-2009/10	WeBS	
Mersey Estuary	1.2	20 December 1995	5,039	16,163	2005/6-2009/10	WeBS	
Montrose Basin	1.3	Not yet classified	753	1,069	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	6,372	7,865	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	1,016	1,154	2005/6-2009/10	WeBS	
Poole Harbour	1.2	31 March 1999	3,569	1,857	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	4,103	2,817	2005/6-2009/10	WeBS	
Severn Estuary	1.2	13 July 1995	3,330	4,480	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	1,476	580	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	3,672	2,489	2005/6-2009/10	WeBS	
Teesmouth & Cleveland Coast	1.3	15 August 1995	1,139	621	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	1,625	1,112	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	6,827	10,360	2005/6-2009/10	WeBS	
The Swale	1.3	Not yet classified	2,609	1,823	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Wash	1.2	30 March 1988	15,981	6,466	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.3	30 November 1992	2,196	1,854	2005/6-2009/10	WeBS	
		Total for SPAs in GB	62,810	**42,926**	in January		
		GP population	73,500	**61,000**			
		thus GB SPAs hold	83.7% GB	**70.4% GB**			
Belfast Lough	1.3	Not yet classified	589	519	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	287	293	2005/6-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	159	140	2005/6-2009/10	WeBS	
Strangford Lough	1.2	Not yet classified	3,871	3,483	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	2,663	**3,430**	in January		
		All-Ireland population	7,000	**14,600**			
		thus NI SPAs hold	38.0% All Ireland	**23.5% All-Ireland**			
		Total for SPAs in UK	65,472	**46,356**	in January		
		Biogeographic population	300,000	**300,000**			
		thus SPAs hold	21.8% international	**15.5% international**			

Wigeon *Anas penelope* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	300	Sharrock 1976	3	60	20.0%
All-Ireland					No SPAs selected in Northern Ireland
Biogeographic – W Siberia & NE Europe/NW Europe	500,000	Wetlands International 2012	5,000	60	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	Unknown	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+64%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Wigeon, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-28A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Wigeon, the *Atlas* predicts virtual extinction in the UK except for the northern Highlands of Scotland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Wigeon were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the population.

8. Recommendations regarding survey and monitoring

Ensure monitoring protocols in place to assess status of species on the two SPAs, focussing priority attention on the Peatlands of Caithness and Sutherland for which no contemporary site assessments exist.

9. Distribution map for breeding Wigeon SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.4	Not yet classified	43	[43]	Mid 1990s	SPA citation	No monitoring. Assumed no change in population since mid 1990s
River Spey – Insh Marshes	1.4	Not yet classified	37	17	Mean 2006-2010	per RSPB via SNH	
		Total for SPAs in GB	80	**60**			
		GB population	300	**300**			
		thus GB SPAs hold	27.0% GB	**20.0% GB**			
		Total UK	80	**60**			
		1% biogeographic	420,000	**500,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Wigeon *Anas penelope* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	440,000	Musgrove *et al.* 2011	4,400	237,336	53.9%
All-Ireland	82,400	Crowe *et al.* 2008	820	2,579	3.1%
Biogeographic – W Siberia & NE Europe/NW Europe	1,500,000	Wetlands International 2012	15,000	239,915	16.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+78.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	0.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Wigeon, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-28B.pdf.

The Upper Nene Valley Gravel Pits SPA has been classified as an addition to the SPA suite for Wigeon since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Wigeon were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Wigeon, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Wet and damp pasture, autumn-sown cereals. Feed typically within 2 km of roost, but no other spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 2 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes. Wigeon closely associated with cropped habitats. They are sensitive to disturbance and feed close to water or in partially flooded fields, both during the day and at night (Mayhew & Houston 1989;

Cropped habitats assessment from SPA Review Decision Framework	
	Mudge 1989). Preferred feeding habitat is short-sward, improved grassland, although unimproved grasslands are also important. In addition, the use of autumn sown cereals, especially wheat, has become common during December to February.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes. Birds show a high degree of roost site fidelity and may return repeatedly to specific feeding fields (Mayhew & Houston 1989).
Is the use of cropped habitats determined by crop type?	Yes, feeds on wet and damp pasture and autumn-sown cereals. Feeds typically within 2 km of roost, but no other spatial information.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Not known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats where closely associated with important roosting sites.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month. Ensure complete coverage of Arun Valley, Firth of Forth, Humber Flats and Marshes, Medway Estuary and Marshes SPAs in future WeBS counts.

Within monitoring programmes, enhance the collection and availability of information concerning location and extent of feeding areas and their relationship with (generally better known) roosting sites.

9. Distribution map for non-breeding Wigeon SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	2,888	6,381	2005/6-2009/10	WeBS	
Alde-Ore Estuary	1.3	Not yet classified	4,366	7,273	2005/6-2009/10	WeBS	
Arun Valley	1.3	Not yet classified	3,329	3,348	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	3,280	5,920	2005/6-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	4,320	16,349	2005/6-2009/10	WeBS	
Broadland	1.3	21 September 1994	6,435	8,264	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	2,055	3,400	2005/6-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	10,476	9,082	2005/6-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.2	24 March 1997	15,304	11,451	2005/6-2009/10	WeBS	
Exe Estuary	1.3	Not yet classified	2,379	3,463	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	2,139	1,976	2005/6-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.3	Not yet classified	2,026	2,655	2005/6-2009/10	WeBS	
Hamford Water	1.3	Not yet classified	2,314	2,583	2005/6-2009/10	WeBS	
Humber Flats Marshes and Coast (Phase 1)	1.3	31 August 2007	4,941	3,578	2005/6-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	6,800	4,442	2005/6-2009/10	WeBS	
Lindisfarne	1.2	11 March 1992	13,375	11,662	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.3	8 June 1993	9,323	12,908	2005/6-2009/10	WeBS	
Martin Mere	1.3	28 November 1985	9,062	1,038	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	4,346	2,393	2005/6-2009/10	WeBS	
Mersey Estuary	1.3	20 December 1995	11,752	1,107	2005/6-2009/10	WeBS	
Montrose Basin	1.3	Not yet classified	4,340	3,839	2005/6-2009/10	WeBS	
Moray and Nairn Coast	1.3	Not yet classified	2,600	2,753	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Morecambe Bay	1.3	Not yet classified	5,838	8,406	2005/6-2009/10	WeBS	
Nene Washes	1.3	5 March 1993	8,292	6,774	2005/6-2009/10	WeBS	
North Norfolk Coast	1.2	20 January 1989	14,039	13,007	2005/6-2009/10	WeBS	
Ouse Washes	1.2	5 March 1993	29,713	13,096	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	84,699	82,963	2005/6-2009/10	WeBS	
Rutland Water	1.3	4 October 1991	4,236	3,406	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	4,667	8,173	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	5,717	7,116	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.2	Not yet classified	13,661	24,335	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	4,101	3,792	2005/6-2009/10	WeBS	
The Dee Estuary	1.3	Not yet classified	3,624	4,445	2005/6-2009/10	WeBS	
The Swale	1.3	Not yet classified	11,929	14,647	2005/6-2009/10	WeBS	
The Wash	1.3	30 March 1988	3,241	9,380	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	7 April 2011	Not classified	3,081	2005/6-2009/10	WeBS	
		Total for SPAs in GB	220,475	**237,336**	in January		
		GP population	277,800	**440,000**			
		thus GB SPAs hold	78.7% GB	**53.9% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lough Foyle	1.3	Not yet classified	8,107	3,839	2005/6-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	3,117	1,830	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	1,921	2,159	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	3,863	**2,579**	in January		
		All-Ireland population	125,000	**82,400**			
		thus NI SPAs hold	3.1% All-Ireland	**3.1% All-Ireland**			
		Total for SPAs in UK	224,338	**239,915**	in January		
		Biogeographic population	1,250,000	**1,500,000**			
		thus SPAs hold	17.9% international	**16.0% international**			

Gadwall *Anas strepera* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	670	Holling *et al.* 2012	7	148	22.1%
All-Ireland	30	Gibbons *et al.* 1993	1		No SPAs selected in Northern Ireland
Biogeographic – NW Europe	20,000	Wetlands International 2012	200	148	0.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1973 to 2006-10	+562%	Parslow 1973; Musgrove *et al.* 2013
Short-term UK trend	1996-98 to 2006-09	+191%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Gadwall, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-29A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Gadwall, the *Atlas* predicts a more northerly distribution with absence from much of the south of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Gadwall were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue monitoring and reporting the species' status at the single SPA.

9. Distribution map for breeding Gadwall SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ouse Washes	1.2	5 March 1993	111	148	2007-11 mean	WWT & RSPB data	
		Total for SPAs in GB	111	**148**			
		GB population	770	**670**			
		thus GB SPAs hold	14.4% GB	**22.1% GB**			
		Total for SPAs in UK	111	**148**			
		Biogeographic population	10,000	**20,000**			
		thus SPAs hold	1.1% international	**0.7% international**			

Gadwall *Anas strepera* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	25,000	Musgrove *et al.* 2011	250	5,076	20.3%
All-Ireland	2,000	Crowe *et al.* 2008	20	72	3.6%
Biogeographic – NW Europe	60,000	Wetlands International 2012	600	5,148	8.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+525%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+12.4%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Gadwall, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-29B.pdf.

The Upper Nene Valley Gravel Pits SPA has been added to the SPA suite for Gadwall since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Gadwall were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Gadwall were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Solent and Southampton Water, South-west London Water Bodies and Upper Nene Valley Gravel Pits SPAs in future WeBS counts.

9. Distribution map for non-breeding Gadwall SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.2	5 December 1991	518	700	2005/6-2009/10	WeBS	
Avon Valley	1.2	2 February 1998	667	768	2005/6-2009/10	WeBS	
Broadland	1.2	21 September 1994	605	424	2005/6-2009/10	WeBS	
Hornsea Mere	1.2	5 March 1993	300	204	2005/6-2009/10	WeBS	
Lee Valley	1.2	22 September 2000	515	488	2005/6-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	236	340	2005/6-2009/10	WeBS	
Nene Washes	1.3	5 March 1993	206	167	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	177	314	2005/6-2009/10	WeBS	
Ouse Washes	1.2	5 March 1993	342	674	2005/6-2009/10	WeBS	
Rutland Water	1.2	4 October 1991	1,156	1241	2005/6-2009/10	WeBS	
Severn Estuary	1.3	13 July 1995	282	243	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	119	133	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.3	Not yet classified	143	587	2005/6-2009/10	WeBS	
South-west London Water Bodies	1.2	22 September 2000	786	190	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Stour and Orwell Estuary	1.3	13 July1994	See comment	412	2005/6-2009/10	WeBS	Site erroneously omitted from 2001 Review
Thames Estuary and Marshes	1.3	31 March 2000	136	412	2005/6-2009/10	WeBS	
The Swale	1.3	31 August 1982	86	133	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	7 April 2011	Not classified	748	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
		Total for SPAs in GB	3,425	**5,076**	in January		
		GB population	8,200	**25,000**			
		thus GB SPAs hold	42.8% GB	**20.3% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lough Neagh and Lough Beg	1.3	Not yet classified	166	**151**	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	108	**45**	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	156	**72**	in January		
		All-Ireland population	600	**2,000**			
		thus NI SPAs hold	25.9% All-Ireland	**3.6% All-Ireland**			
		Total for SPAs in UK	3,580	**5,148**	in January		
		Biogeographic population	30,000	**60,000**			
		thus SPAs hold	11.9% international	**8.6% international**			

Teal *Anas crecca* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	210,000	Musgrove *et al.* 2011	2,100	73,809	35.1%
All-Ireland	45,000	Crowe *et al.* 2008	450	3,880	8.6%
Biogeographic – NW Europe	500,000	Wetlands International 2012	5,000	77,689	15.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+53.8%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+7.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Teal, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-30.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current

distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Teal were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Teal, modelled impacts are that, by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Over-wintered stubbles, autumn-sown cereal, waste root crops, especially flooded fields. No spatial information.	Maintain open arable landscape close to roost areas.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Poorly known. Most of Britain's Teal occur at the coast, but the species is widespread inland using a wide range of wetland habitats and have been recorded foraging in arable fields close to wetlands. They feed primarily at dusk, during the night and at dawn, making it difficult to quantify feeding habits, but have been recorded during the day in cereal stubbles, potatoes and winter wheat, especially if flooded (Thomas 1982).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Unknown.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown. Field use is most likely opportunistic and related to patterns of flooding.
Is the use of cropped habitats determined by crop type?	Unknown.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Low priority.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during December each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Broadland, Humber Flats and Marshes, Medway Estuary and Marshes, Morecambe Bay, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Teal SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.2	5 December 1991	5,326	3,932	2004/5-2009/10	WeBS	
Alde-Ore Estuary	1.3	Not yet classified	1,931	3,961	2004/5-2009/10	WeBS	
Arun Valley	1.3	Not yet classified	1,849	2,212	2004/5-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	2,963	2,896	2004/5-2009/10	WeBS	
Broadland	1.3	Not yet classified	3,869	4,198	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	1,824	1,601	2004/5-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.3	Not yet classified	1,462	1,713	2004/5-2009/10	WeBS	
Hamford Water	1.2	8 June 1993	4,206	4,104	2004/5-2009/10	WeBS	
Humber Flats, Marshes and Coast (Phase 1)	1.3	31 August 2007	1,652	2,938	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	1,849	1,502	2004/5-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	2,483	4,340	2004/5-2009/10	WeBS	
Loch of Strathbeg	1.3	27 November 1995	1,898	1,247	2004/5-2009/10	WeBS	
Lower Derwent Valley	1.2	8 June 1993	5,853	4,444	2004/5-2009/10	WeBS	
Martin Mere	1.3	Not yet classified	3,282	2,215	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	1,824	1,455	2004/5-2009/10	WeBS	Incomplete count coverage
Mersey Estuary	1.2	20 December 1995	11,667	4,841	2004/5-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	2,163	4,202	2004/5-2009/10	WeBS	
Nene Washes	1.3	5 March 1993	2,179	2,360	2004/5-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	2,837	4,222	2004/5-2009/10	WeBS	
Ouse Washes	1.3	5 March 1993	3,085	2,460	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	7,641	8,925	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Rutland Water	1.3	4 October 1991	1,420	1,417	2004/5-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	3,276	4,710	2004/5-2009/10	WeBS	
Solent and Southampton Water	1.2	1 October 1998	4,400	3,868	2004/5-2009/10	WeBS	
Somerset Levels and Moors	1.2	26 June 1997	13,307	17,135	2004/5-2009/10	WeBS	
The Dee Estuary	1.2	17 June 1985	5,918	3,194	2004/5-2009/10	WeBS	
The Swale	1.3	31 August 1982	2,969	5,692	2004/5-2009/10	WeBS	
		Total for SPAs in GB	65,335	**73,809**	in December		
		GB population	135,800	**210,000**			
		thus GB SPAs hold	46.7% GB	**35.1% GB**			
Lough Foyle	1.3	Not yet classified	751	1,581	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	1,596	1,202	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	1,435	1,838	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	3,098	**3,880**	in December		
		All-Ireland population	65,000	**45,000**			
		thus NI SPAs hold	4.8% All-Ireland	**8.6% All-Ireland**			
		Total for SPAs in UK	68,433	**77,689**	in December		
		Biogeographic population	400,000	**500,000**			
		thus SPAs hold	17.1% international	**15.5% international**			

Mallard *Anas platyrhynchos* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	680,000	Musgrove *et al.* 2011	6,800	17,345	2.6%
All-Ireland	38,500	Crowe *et al.* 2008	380	4,729	12.3%
Biogeographic – NW Europe	4,500,000	Wetlands International 2012	20,000**	22,074	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-32.4%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-16.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Mallard, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-31.pdf.

The Upper Nene Valley Gravel Pits SPA has been added to the SPA suite for Mallard since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Mallard were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Mallard, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Over-wintered stubbles, autumn-sown cereal, waste root crops. Feed typically within 2 km of roost, but no other spatial information.	Maintain open arable landscape close to roost areas.	Maintain suitable feeding habitat within 2 km of roost based on local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes. There are few detailed studies on site fidelity but, in the Ouse Washes, for example, the fields closest to the roost are used provided they have suitable crops (Thomas 1981). The same is probably true of other sites, so there is incidental site loyalty because of the distance from the roost.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes. Feeding on cropped habitats is regular.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Use relates to cropping patterns and seasonal availability of food. Mallard cropland feeding areas are quite diverse. In September, when stubble wheat and barley are available, Mallard prefer wheat stubble, before moving on to barley stubble in October. Stubble feeding continues into November but potatoes then come into the diet. Potatoes remain the main staple in December and January and there is some grazing of winter wheat leaves in late winter (Thomas 1981).
Is the use of cropped habitats determined by crop type?	Yes. Typically cereal stubbles are used at the start of the winter until these have been ploughed up before they move onto potatoes and a more varied diet. There is some grazing of spring cereals and invertebrates are eaten to some extent (presumably from ploughed potato fields) in late winter.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	The Mallard is a generalist and is well able to survive on natural and semi-natural habitats and small numbers do inhabit such habitats throughout the year. However, the high densities supported by cropped habitats could probably not be sustained on natural areas alone.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Low priority.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during December each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Flats and Marshes, Upper Nene Valley Gravel Pits and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Mallard SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Firth of Forth	1.3	30 October 2001	2,564	1,115	2005/6-2009/10	WeBS	
Humber Flats, Marshes and Coast (Phase 1)	1.3	31 August 2007	3,207	1,989	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.3	Not yet classified	2,625	1,934	2005/6-2009/10	WeBS	
Martin Mere	1.3	Not yet classified	3,109	2,256	2005/6-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	3,237	1,787	2005/6-2009/10	WeBS	
Ouse Washes	1.3	Not yet classified	4,123	1,710	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	3,154	3,431	2005/6-2009/10	WeBS	
The Dee Estuary	1.3	Not yet classified	2,014	1,108	2005/6-2009/10	WeBS	
The Wash	1.3	Not yet classified	3,357	2,518	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	11 April 2011	Not classified	2,372	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Upper Solway Flats and Marshes	1.3	Not yet classified	2,566	670	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
		Total for SPAs in GB	24,389	**17,345**	in December		
		GB population	500,000	**680,000**			
		thus GB SPAs hold	4.9% GB	**2.6% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Belfast Lough	1.3	Not yet classified	613	418	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	1694	992	2005/6-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	5,256	3,786	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	1,633	1,960	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	4,748	**4,729**	in December		
		All-Ireland population	50,000	**38,500**			
		thus NI SPAs hold	9.5% All-Ireland	**12.3% All-Ireland**			
		Total for SPAs in UK	29,137	**22,074**	in December		
		Biogeographic population	5,000,000	**4,500,000**			
		thus SPAs hold	0.6% international	**0.5% international**			

Pintail *Anas acuta* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	29,000	Musgrove *et al.* 2011	290	16,883	58.2%
All-Ireland	1,235	Crowe *et al.* 2008	10	343	27.8%
Biogeographic – NW Europe	60,000	Wetlands International 2012	600	17,226	28.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-32.4%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-12.3%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Pintail, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-32.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen & Lutz 2007a). Relevant objectives are as follows:

- "Ensure that all staging and wintering sites supporting more than 1% of the relevant population of Pintail within their country are designated SPAs."

- “Ensure that SPAs of international importance as staging and wintering resorts for Pintails are managed in a way that stops habitat degradation and secures access to feeding opportunities.”

- “Establish by 2008 in all Member States with SPAs of international importance for staging and/or wintering Pintail a minimum of two disturbance-free areas within such SPAs.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Pintail were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Pintail, modelled impacts are that, by 2050, under a medium emissions scenario, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Only a single study – probably similar behaviour to Mallard.	Maintain open arable landscape close to roost areas.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Use of crops is varied according to cropping regime. Pintail cropland feeding areas are quite diverse. In September, when stubble wheat and barley are available, they prefer

Cropped habitats assessment from SPA Review Decision Framework	
	wheat stubble, before moving on to barley stubble in October. Stubble feeding continues into November but potatoes then come into the diet. Potatoes remain the main staple in December and January. Two of 89 Pintail guts examined from the Ouse Washes contained winter wheat leaves (Thomas 1978), and this may be more important in late winter. The habit of field feeding by Pintail around the Washes seems to have become less common in recent years; the reason for this is unknown (J. Kemp pers. comm.).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Probably. There are no detailed studies on site fidelity but, in the Ouse Washes, for example, the fields closest to the roost are used provided they have suitable crops (Thomas 1978, 1981). The same is probably true of other sites, so there is incidental site loyalty because of the distance from the roost. There is little information from other Pintail haunts, but it is probable that cropped habitats are used extensively, especially in the autumn, when stubbles are available, as the species does in North America (Bellrose 1976). For example, the large flocks gathering in the autumn on the Solway Firth feed by day on stubbles around the Caerlaverock reserve or the mouth of the River Nith.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown.
Is the use of cropped habitats determined by crop type?	Yes.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	The Pintail is a very mobile species and a generalist and is well able to survive on natural and semi-natural habitats. Large numbers do inhabit such habitats throughout the year, though it is difficult to say how dependent the species is on croplands for feeding. However, the high densities supported by cropped habitats could probably not be sustained on natural areas in Britain, especially in the autumn when the birds feed on stubbles.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Blackwater Estuary (Mid-Essex Coast Phase 4), Duddon Estuary, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Pintail SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	Not yet classified	323	126	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	358	488	2005/6-2009/10	WeBS	
Burry Inlet	1.2	14 July 1992	1,772	3,873	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	330	336	2005/6-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	266	204	2005/6-2009/10	WeBS	
Duddon Estuary	1.2	16 March 1998	1,636	2,481	2005/6-2009/10	WeBS	
Martin Mere	1.2	28 November 1985	978	592	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	697	602	2005/6-2009/10	WeBS	
Mersey Estuary	1.2	20 December 1995	2,744	72	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	2,804	2,796	2005/6-2009/10	WeBS	
Nene Washes	1.2	5 March 1993	1,435	736	2005/6-2009/10	WeBS	
North Norfolk Coast	1.2	Not yet classified	1,139	570	2005/6-2009/10	WeBS	
Ouse Washes	1.2	5 March 1993	1,755	723	2005/6-2009/10	WeBS	
Pagham Harbour	1.2	Not yet classified	628	599	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	3,333	3,132	2005/6-2009/10	WeBS	
Severn Estuary	1.2	Not yet classified	599	824	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	282	574	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.3	Not yet classified	322	613	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	878	487	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	282	108	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	6,498	4,849	2005/6-2009/10	WeBS	
The Swale	1.2	Not yet classified	966	584	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Wash	1.2	30 March 1988	923	721	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	30 November 1992	2,253	2,429	2005/6-2009/10	WeBS	Incomplete count coverage
		Total for SPAs in GB	18,879	**16,883**	in January		
		GB population	27,800	**29,000**			
		thus GB SPAs hold	67.4% GB	**58.2% GB**			
Strangford Lough	1.3	Not yet classified	209	470	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	142	**343**	in January		
		All-Ireland population	6,000	**1,235**			
		thus NI SPAs hold	2.4% All-Ireland	**27.8% All-Ireland**			
		Total for SPAs in UK	19,021	17,226	in January		
		Biogeographic population	60,000	**60,000**			
		thus SPAs hold	31.7% international	**28.7% international**			

Shoveler *Anas clypeata* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	310	Holling *et al.* 2012	3	169	54.5%
All-Ireland	100	Gibbons *et al.* 1993	1		No SPAs selected in Northern Ireland
Biogeographic – NW & C Europe	13,300	Wetlands International 2012	15	169	1.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1989-1991 to 2006-10	+13%	Sharrock 1976; Holling *et al.* 2012
Short-term UK trend	1968-72 to 2006-10	-19%	Gibbons *et al.* 1993; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Shoveler, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-33A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Shoveler, the *Atlas* predicts a more northerly breeding distribution with virtual absence from central areas of England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Shoveler was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue monitoring and reporting the species' status at the single SPA.

9. Distribution map for breeding Shoveler SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ouse Washes	1.2	5 March 1993	155	169	2007-11 mean	WWT & RSPB data	
		Total for SPAs in GB	155	**169**			
		GB population	1,000	**310**			
		thus GB SPAs hold	15.5% GB	**54.5% GB**			
		Total for SPAs in UK	155	**169**			
		Biogeographic population	13,300	**13,300**			
		thus SPAs hold	1.6% international	**1.3% international**			

Shoveler *Anas clypeata* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	18,000	Musgrove *et al.* 2011	180	4,659	25.9%
All-Ireland	2,545	Crowe *et al.* 2008	25	102	4.0%
Biogeographic – NW & C Europe	40,000	Wetlands International 2012	400	4,761	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+51.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-2.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Shoveler, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-33B.pdf.

The Upper Nene Valley Gravel Pits SPA has been added to the SPA suite for Shoveler since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Shoveler were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Shoveler was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of South-west London Waterbodies, Upper Nene Valley Gravel Pits and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Shoveler SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.2	5 December 1991	654	613	2005/6-2009/10	WeBS	
Alde-Ore Estuary	1.3	Not yet classified	106	288	2005/6-2009/10	WeBS	
Arun Valley	1.3	Not yet classified	199	201	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	132	124	2005/6-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	140	505	2005/6-2009/10	WeBS	
Broadland	1.2	21 September 1994	401	317	2005/6-2009/10	WeBS	
Burry Inlet	1.3	14 July 1992	356	237	2005/6-2009/10	WeBS	
Chew Valley Lake	1.2	17 July 1985	503	366	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	100	121	2005/6-2009/10	WeBS	
Dungeness to Pett Level	1.2	2 August 1999	419	574	2005/6-2009/10	WeBS	
Lee Valley	1.2	22 September 2000	784	146	2005/6-2009/10	WeBS	
Loch Leven	1.2	27 March 2000	520	192	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.3	Not yet classified	109	339	2005/6-2009/10	WeBS	
Nene Washes	1.2	5 March 1993	413	186	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	180	305	2005/6-2009/10	WeBS	
Ouse Washes	1.2	5 March 1993	681	765	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	154	115	2005/6-2009/10	WeBS	
Rutland Water	1.2	4 October 1991	526	619	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	153	608	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	212	281	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.2	Not yet classified	501	1,171	2005/6-2009/10	WeBS	
South West London Waterbodies	1.2	22 September 2000	1,075	422	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	165	170	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Swale	1,2	Not yet classified	471	330	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.2	11 April 2011	Not classified	214	2005/6-2009/10	WeBS	Incomplete count coverage of SPA
		Total for SPAs in GB	3,461	**4,659**	in January		
		GB population	10,000	**18,000**			
		thus GB SPAs hold	34.6%	**25.9% GB**			
Lough Neagh and Lough Beg	1.3	Not yet classified	148	54	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	147	96	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	**120**	**102**	in January		
		All-Ireland population	6,500	**2,545**			
		thus NI SPAs hold	1.9% All-Ireland	**4.0% All-Ireland**			
		Total for SPAs in UK	3,582	**4,761**	in January		
		Biogeographic population	40,000	**40,000**			
		thus SPAs hold	9.0% international	**11.9% international**			

Pochard *Aythya ferina* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	38,000	Musgrove *et al.* 2011	380	4,284	11.3%
All-Ireland	37,780	Crowe *et al.* 2008	380	8,250	21.8%
Biogeographic – NE Europe/ NW Europe	300,000	Wetlands International 2012	3,000	12,534	4.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-35.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-55.4%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Pochard, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-34.pdf.

The Upper Nene Valley Gravel Pits SPA has been added to the SPA suite for Pochard since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Pochard were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Pochard was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month. Ensure complete coverage of Humber Flats and Marshes, Upper Nene Valley Gravel Pits in future WeBS counts.

9. Distribution map for non-breeding Pochard SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	1,901	2,072	2005/6-2009/10	WeBS	
Broadland	1.3	Not yet classified	1,230	220	2005/6-2009/10	WeBS	
Humber Flats Marshes and Coast (Phase 1)	1.3	31 August 2007	1,009	317	2005/6-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	1,050	2,528	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.3	Not yet classified	1,628	156	2005/6-2009/10	WeBS	
Martin Mere	1.3	Not yet classified	516	308	2005/6-2009/10	WeBS	
Nene Washes	1.3	Not yet classified	1,079	122	2005/6-2009/10	WeBS	
Ouse Washes	1.2	5 March 1993	3,590	1,118	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	691	279	2005/6-2009/10	WeBS	
Rutland Water	1.3	Not yet classified	1,112	369	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	1,622	668	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	11 April 2011	Not classified	400	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
		Total for SPAs in GB	8,645	**4,284**	in January		
		GB population	43,700	**38,000**			
		thus GB SPAs hold	19.6% GB	**11.3% GB**			
Lough Neagh and Lough Beg	1.2	1 April 1996	26,341	8,250	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	23,845	**8,250**	in January		
		All-Ireland population	40,000	**37,780**			
		thus NI SPAs hold	59.6%	**21.8% All-Ireland**			
		Total for SPAs in UK	32,489	**12,534**	in January		
		Biogeographic population	350,000	**300,000**			
		thus SPAs hold	9.3% international	**4.2% international**			

Tufted Duck *Aythya fuligula* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	110,000	Musgrove *et al.* 2011	1,100	6,286	5.7%
All-Ireland	36,610	Crowe *et al.* 2008	370	6,897	18.8%
Biogeographic – NW Europe	1,200,000	Wetlands International 2012	12,000	13,183	1.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+26.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-28.6%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Tufted Duck, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-35.pdf.

The Upper Nene Valley Gravel Pits SPA has been added to the SPA suite for Tufted Duck since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Tufted Duck were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Tufted Duck, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Upper Nene Valley Gravel Pits SPA in future WeBS counts.

9. Distribution map for non-breeding Tufted Duck SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	1,864	3,770	2004/5-2009/10	WeBS	
Broadland	1.3	Not yet classified	1,336	347	2004/5-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	3,362	3,742	2004/5-2009/10	WeBS	
Ouse Washes	1.3	5 March 1993	986	1,265	2004/5-2009/10	WeBS	
Rutland Water	1.3	4 October 1991	2,289	6,855	2004/5-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	796	639	2004/5-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	11 April 2011	Not classified	1,164	2004/5-2009/10	WeBS	Incomplete count coverage of SPA
		Total for SPAs in GB	4,476	**6,286**	in January		
		GB population	60,600	**110,000**			
		thus GB SPAs hold	7.5% GB	**5.7% GB**			
Lough Neagh and Lough Beg	1.2	1 April 1996	22,372	**6,897**	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	**20,471**	**6,897**	in January		
		All-Ireland population	40,000	**36,610**			
		thus NI SPAs hold	51.2% All-Ireland	**18.8% All-Ireland**			
		Total for SPAs in UK	24,947	**13,183**	in January		
		Biogeographic population	1,000,000	**1,200,000**			
		thus SPAs hold	2.5% international	**1.1% international**			

Scaup *Aythya marila*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	5,200	Musgrove *et al.* 2011	50	1,675	33.0%
All-Ireland	4,430	Crowe *et al.* 2008	44 [50]	5,515	c.100%
Biogeographic – N Europe/W Europe	310,000	Wetlands International 2012	3,100	7,191	2.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+22.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-28.6%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Scaup, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-36.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen & Lutz 2009). Relevant objectives are as follows:

- "All major wintering, staging and moult ing sites are protected, both the roosts and feeding areas, as SPAs with management plans that focus on the needs of Scaup."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "If internationally important wintering aggregations are identified, seek appropriate site designations."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Scaup were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Scaup, modelled impacts are that, by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Flats and Marshes, Upper Solway Flats and Marshes and Belfast Lough SPAs in future WeBS counts.

Noting the significant limitations of existing, shore-based WeBS monitoring for this largely marine species, establish programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

9. Distribution map for Scaup SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Cromarty Firth	1.3	Not yet classified	302	389	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	220	40	2004/5-2009/10	WeBS	
Humber Flats and Marshes	1.2	31 August 2007	n/a	4	2004/5-2009/10	WeBS	
Inner Moray Firth	1.4	Not yet classified	97	452	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries	1.3	16 February 1995	See comment	50	2004/5-2009/10	WeBS	Site erroneously omitted from 2001 Review
Upper Solway Flats and Marshes	1.3	30 November 1992	1,544	4,000	2004/5-2009/10	WeBS	
		Total for SPAs in GB	1,671	**1,715**	in January		
		GB population	11,000	**5,200**			
		thus GB SPAs hold	15.2% GB	**33.0% GB**			
Belfast Lough	1.3	Not yet classified	146	1,560	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.2	Not yet classified	3,798	5,019	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	1,558	**5,515**	in January		
		All-Ireland population	3,000	**4,430**			
		thus NI SPAs hold	51.9% All-Ireland	**c. 100% All-Ireland**			
		Total for SPAs in UK	3,229	**7,230**	in January		
		Biogeographic population	310,000	**310,000**			
		thus SPAs hold	1.0% international	**2.3% international**			

Eider *Somateria m. mollissima* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001[78]

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	55,000	Musgrove *et al.* 2011	550	13,409	24.4%
All-Ireland	2,890	Crowe *et al.* 2008	29 [50]	1,207	41.8%
Biogeographic	1,033,800[79]	Wetlands International 2012	10,300	14,616	1.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-27.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-10.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Eider, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-37.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

[78] Since the second network Review, new understanding of the genetics of Eiders in the UK (Furness *et al.* 2010) has resulted in separate treatment of the *races S. m. mollissima* and *S. mollissima faeroeensis.*

[79] Minimum of combined totals of Britain & Ireland, and Baltic, Denmark & Netherlands wintering groups 1,033,800-1,033,900.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Eiders were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Eiders of both races, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Noting the significant limitations of existing, shore-based WeBS monitoring for this marine species, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure periodic complete assessments of the population including surveys in areas not routinely monitored by WeBS, *inter alia* through the Non-Estuarine Waterbird Survey.

9. Distribution map for non-breeding Eider SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

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Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Firth of Forth	1.3	30 October 2001	7,887	5,298	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	2,061	7,552	2005/6-2009/10	WeBS	
Lindisfarne	1.3	11 March 1992	1,568	812	2005/6-2009/10	WeBS	
Montrose Basin	1.3	Not yet classified	1,794	2,377	2005/6-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	6,400	4,243	2005/6-2009/10	WeBS	
Ythan Estuary, Sands of Forvie and Meikle Loch	1.3	Not yet classified	1,778	3,352	2005/6-2009/10	WeBS	
		Total for SPAs in GB	6,657	**13,409**	in January		
		GB population	77,500	**55,000**			
		thus GB SPAs hold	11.5% GB	**24.4% GB**			
Belfast Lough	1.3	Not yet classified	685	1,835	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	50	318	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	366	**1,207**	in January		
		All-Ireland population	2,000	**2,890**			
		thus NI SPAs hold	18.3% All-Ireland	**41.8% All-Ireland**			
		Total for SPAs in UK	9,023	**14,616**	in January		
		Biogeographic population	1,500,000	**1,033,800**			
		thus SPAs hold	0.5% international	**1.4% international**			

Eider *Somateria mollissima faeroeensis* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001[80]

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	5,500	Musgrove *et al.* 2011	55	0	0%
All-Ireland	0			0	Race does not occur in Northern Ireland
Biogeographic *S. m. faeroeensis* - Shetland population	5,500	Musgrove *et al.* 2011	55	0	0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1977 to 2005-2009	-68%	Pennington *et al.* 2004; Musgrove *et al.* 2011
Short-term UK trend	2000 to 2012	Unknown	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Eider, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-37.pdf

[80] Since the second network Review, new understanding of the genetics of Eiders in the UK (Furness *et al.* 2010) has resulted in separate treatment of the *races S. m. mollissima* and *S. mollissima faeroeensis.*

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Eiders were not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Eiders of both races, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

JNCC on behalf of the SPA SWG previously commissioned research into the genetic identity of Eiders in Shetland (Furness *et al.* 2010).

The results of that study revealed that Eiders from Shetland formed a closely-related group with those from the Faroes and southern Iceland. Eiders from northern Iceland were distinct from this group,

whilst other populations which occur across north-west Europe, including the rest of Scotland, formed a third discrete group belonging to nominate subspecies *mollissima*. This evidence strongly supports the identification of the southern Iceland/Faroe/Shetland Eiders as a separate subspecies, *i.e. Somateria mollissima faeroeensis*.

Following the recommendations of Scott & Rose (1996) and Furness *et al.* (2010), Eiders on Shetland have been treated as a separate population from those elsewhere in the UK e.g. since winter 2008/09 by WeBS (Calbrade *et al.* 2009) and by Musgrove *et al*. (2011).

The SPAR SWG concluded in 2009 that although further research was merited, including analysis of samples from Orkney and review of morphometric data and population estimates, a short-term pragmatic approach was needed to enable consideration of Eider within the marine SPA programme and that as part of the UK approach to any SPA provision for this species greater representation in Shetland should be considered in recognition of the genetically-distinct population in these islands.

Appropriate SPA provision for *faeroeensis* Eiders in the marine environment is separately under review.

8. Recommendations regarding survey and monitoring

Noting the significant limitations of existing, shore-based WeBS monitoring for this marine species, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Ensure periodic complete assessments of the population including surveys in areas not routinely monitored by WeBS, *inter alia* through the Non-Estuarine Waterbird Survey.

9. Distribution map for non-breeding *faeroeensis* Eider SPA suite

No SPAs have previously been selected for non-breeding *faeroeensis* Eiders.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

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11. SPA suite

No SPAs have previously been selected for non-breeding *faeroeensis* Eiders.

Long-tailed Duck *Clangula hyemalis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Vulnerable**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Green BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	11,000	Musgrove *et al.* 2011	110	718	6.5%
All-Ireland	Unknown	Crowe *et al.* 2008			No SPAs selected in Northern Ireland
Biogeographic – W Siberia/N Europe[81]	1,600,000	Wetlands International 2012	16,000	718	0.04%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-72.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-74.2%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

[81] Five biogeographic populations of Long-tailed Duck are recognised (Scott & Rose 1997), two of which occur in Europe. The Iceland/Greenland breeding population comprises some 150,000 birds, and winters around Iceland as well as northern and western Britain and Ireland. The western Siberia/north-west Europe population numbers approximately 4,600,000 individuals (Rose & Scott 1997; Pihl & Laursen 1996) and winters primarily in the Baltic. There is some evidence to suggest that the non-breeding ranges of these two populations may overlap. Therefore, it is possible that birds from both of these populations overwinter in Britain and northern Ireland, although for the purposes of this review, and until further information is available, UK wintering birds are treated as belong to the Iceland/Greenland population.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Long-tailed Duck, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-38.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed for Long-tailed Duck by the African-Eurasian Waterbirds Agreement (Hearn *et al.* 2015). Relevant objectives are as follows:

- "1.4. A network of protected areas, covering all important sites throughout the lifecycle, is designated and maintained."

Action		Priority	Timescale	Organisations
1.4.1.	Revise the IBA list for Long-tailed Duck, taking into account the carrying capacity and stability of food resources between years	High	By 2018	BirdLife partners
1.4.2.	Evaluate the adequacy of existing SPAs and other site protection designations and designate as appropriate	High	Evaluation by 2018; designation by 2021	Range States
1.4.3.	Ensure that management plans for SPAs and other protected sites include measures for Long-tailed Duck, and develop management plans for sites where these are currently lacking	High	By 2021	Range States
1.4.4.	Undertake surveys of marine distribution, including hitherto unsurveyed potential wintering and staging grounds	High	Every 6 years, combined with national monitoring programs	Range States, HELCOM, OSPAR, CAFF, Wetlands International, National monitoring scheme coordinators
1.4.5.	Locate and survey moult sites to assess their importance[82]	High	By 2021	Range States, HELCOM, OSPAR, CAFF, Wetlands International
1.4.6.	Identify and designate key staging areas for the species[83]	Medium	By 2021	Range States, HELCOM, OSPAR, CAFF, Wetlands International

[82] Surveys would ideally assess importance for all seaducks, not just Long-tailed Duck. Data may be available from previous surveys. May require a combination of surveys and telemetry studies.

Action		Priority	Timescale	Organisations
1.4.7.	Produce sensitivity map to inform marine spatial planning, to minimise effects of offshore marine industries and other potentially damaging activities on important Long-tailed Duck concentrations[84]	High	By 2021	Range States
1.4.8.	Ensure that appropriate Strategic Environmental Assessments and/or Cumulative Impact Assessments are undertaken for major developments that may together have a potential impact on Long-tailed Ducks and which may not be obvious when undertaking single project assessments	High	Ongoing	Range States

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Long-tailed Ducks were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Long-tailed Ducks, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by between 25-50%.

[83] Using coordinated surveys or telemetry studies.

[84] Respond to potential negative impacts using Ramsar's Avoid-Minimise-Compensate planning framework. Also, ensure that appropriate data are provided to other bodies undertaking similar exercises, *e.g.* HELCOM.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Firth of Tay and Eden Estuary SPA in future WeBS counts, if necessary assessing the need for additional monitoring in marine areas.

Noting the significant limitations of existing, shore-based WeBS monitoring for this largely marine species, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

9. Distribution map for Long-tailed Duck SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Firth of Forth	1.3	30 October 2001	716	193	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	560	13	2005/6-2009/10	WeBS	
Moray and Nairn Coast (Moray Firths and Bays)	1.3	Not yet classified	277	1,290	2005/6-2009/10	WeBS	
		Total for SPAs in GB	796	**718**	in January		
		GB population	23,500	**11,000**			
		thus GB SPAs hold	3.5% GB	**6.5% GB**			
		Total UK	796	**718**	in January		
		Biogeographic population	150,000	**1,600,000**			
		thus SPAs hold	<0.1% international	**0.04% international**			

Common Scoter *Melanitta nigra* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	52	Holling *et al.* 2010	1	50	96%
All-Ireland	<20	IRBBP annual reports 2003-2007; Hillis 2007, 2008	1		No SPAs selected in Northern Ireland
Biogeographic – *nigra*, W Siberia & N Europe/W Europe & NW Africa	183,000	Wetlands International 2012	1,800	50	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	-74%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	-50%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Common Scoter, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-39A.pdf.

West Inverness-shire Lochs has been added to the SPA suite for Bean Goose since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Common Scoter, the *Climatic Atlas* predicts extinction in UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Common Scoter was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next SPA Network Review.

9. Distribution map for breeding Common Scoter SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.4	Not yet classified	27	21	2007	SCARABBS survey	
Rinns of Islay	1.4	27 November 1995	10	1	2007	SCARABBS survey	
West Inverness-shire Lochs	1.4	1 October 2009	Not classified	18	2007	SCARABBS survey	
		Total for SPAs in GB	37	**50**			
		GB population	75	**52**			
		thus GB SPAs hold	49.0% GB	**96% GB**			
		Total for SPAs in UK	37	**50**			
		Biogeographic	530,000	**183,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Common Scoter *Melanitta nigra* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	100,000	Musgrove *et al.* 2011	1,000	*[132,135]*[85]	Unknown
All-Ireland	23,190	Crowe *et al.* 2008	230	0	No SPAs selected in Northern Ireland
Biogeographic – *nigra*, W Siberia & N Europe/W Europe & NW Africa	550,000	Wetlands International 2012	5,500	*[132,135]*	Unknown

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+525.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+85.2%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

[85] Site totals are a mix of types, from different periods, and so data is of low quality for suite assessment purposes

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Common Scoter, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-39B.pdf.
Carmarthen Bay and Liverpool Bay (marine SPAs) have been identified as additions to the SPA suite for Common Scoter since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Common Scoter were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Common Scoter, modelled impacts are that, by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Unable to assess in detail owing to site data being a mix of types from different periods, although on the basis of existing survey the largest known sites have been classified most probably containing a significant proportion of the total population
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Noting the significant limitations of existing, shore-based WeBS monitoring for this marine species, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Review and implement monitoring protocol for the monitoring of Bae Caerfyrddin/ Carmarthen Bay SPA.

Establish and implement monitoring protocols (via aerial survey) for the monitoring of Liverpool Bay/ Bae Lerpwl (marine) SPA.

9. Distribution map for non-breeding Common Scoter SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Bae Caerfyrddin/Carmarthen Bay	1.2	10 June 2003	Not classified	16,946	1997/98-2001/2	SPA citation	
Firth of Forth	1.3	30 October 2001	2,653	1,393	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	1,444	108	2005/6-2009/10	WeBS	
Lindisfarne	1.3	11 March 1992	654	500	2005/6-2009/10	WeBS	
Liverpool Bay / Bae Lerpwl	1.2	9 August 2010	Not classified	54,675	2001/2 - 2006/7	SPA citation	
Moray and Nairn Coast	1.3	Not yet classified	531	1,254	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	2,909	4,808	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.3	16 February 1995	582	2,449	2005/6-2009/10	WeBS	
		Total for SPAs in GB	3,422	**[132,135]**	in January		Site data is a mix of types from different periods, and so is of low quality for overall SPA suite assessment purposes
		GB population	27,350	**100,000**			
		thus GB SPAs hold	12.4% GB	**[132.1% GB]**			See above
		Total for SPAs in UK	3,422	**[132,135]**	in January		See above
		Biogeographic Population	1,600,000	**550,000**			
		thus SPAs hold	0.2% international	**[24.0% international]**			See above

Velvet Scoter *Melanitta fusca*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Endangered**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	2,500	Musgrove *et al.* 2011	25 [50]	607	24.3%
All-Ireland				0	Species does not regularly occur in Northern Ireland
Biogeographic	450,000	Wetlands International 2012	4,500	607	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+222.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-58.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Velvet Scoter, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-40.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen & Lutz 2007b). Relevant objectives are as follows:

- “Identify and designate as SPAs all off shore moulting, staging and wintering areas of international importance for Velvet Scoter within the EU.”

- “Establish hunting and disturbance-free areas in a minimum of two SPAs of international importance for wintering and/or staging Velvet Scoter in all Member States with sites of international importance for this species and/or regulation of hunting period.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Velvet Scoter were not modelled by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Velvet Scoter was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Noting the significant limitations of existing, shore-based WeBS monitoring for this marine species, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Firth of Tay and Eden Estuary and North Norfolk Coast SPAs in future WeBS counts, if necessary assessing the need for additional monitoring in marine areas.

Review status of species at Firth of Tay and Eden Estuary and North Norfolk Coast SPAs.

9. Distribution map for Velvet Scoter SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Firth of Forth	1.3	30 October 2001	356	652	2004/5-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	256	1	2004/5-2009/10	WeBS	
Moray and Nairn Coast	1.3	Not yet classified	133	504	2004/5-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	78	14	2004/5-2009/10	WeBS	
		Total for SPAs in GB	639	**607**	in January		
		GB population	3,000	**2,500**			
		thus GB SPAs hold	21.3% GB	**24.3% GB**			
		Total for SPAs in UK	639	**607**	in January		
		Biogeographic population	1,000,000	**450,000**			
		thus SPAs hold	<0.1% International	**<0.1% international**			

Goldeneye *Bucephala clangula* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	20,000	Musgrove *et al.* 2011	200	2,294	11.5%
All-Ireland	9,665	Crowe *et al.* 2008	95	3,859	39.9%
Biogeographic – NW & C Europe	1,150,000	Wetlands International 2012	11,500	6,153	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+4.2%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-39.4%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Goldeneye, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-41.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Goldeneye were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Goldeneye, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered (including in the marine environment) to ensure that it continues to provide adequate coverage of population numbers and distribution.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during February each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Noting the significant limitations of existing, shore-based WeBS monitoring for this species in the marine environment, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Ensure complete coverage of Humber Flats and Marshes, Upper Solway Flats and Marshes, and Firth of Tay and Eden Estuary SPA in future WeBS counts, if necessary assessing the need for additional monitoring in marine areas.

Appropriate SPA provision in the marine environment is separately under review for this species.

9. Distribution map for non-breeding Goldeneye SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	463	422	2004/5-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	391	112	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	2,267	768	2004/5-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	255	125	2004/5-2009/10	WeBS	Incomplete count coverage
Humber Estuary	1.3	31 August 2007	272	372	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	199	67	2004/5-2009/10	WeBS	
Loch Leven	1.3	27 March 2000	338	442	2004/5-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	445	290	2004/5-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	195	97	2004/5-2009/10	WeBS	
Rutland Water	1.3	4 October 1991	399	412	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	215	150	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.3	30 November 1992	190	124	2004/5-2009/10	WeBS	
		Total for SPAs in GB	4,352	**2,294**	in February		
		GB population	17,000	**20,000**			
		thus GB SPAs hold	25.6% GB	**11.5% GB**			
Belfast Lough	1.3	Not yet classified	540	237	2004/5-2009/10	WeBS	
Lough Neagh and Lough Beg	1.2	1 April 1996	10,776	3,961	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	335	186	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	8,436	**3,859**	in February		
		All-Ireland population	11,000	**9,665**			
		thus NI SPAs hold	76.7% All-Ireland	**39.9% All-Ireland**			
		Total for SPAs in UK	12,788	**6,153**	in February		
		Biogeographic population	300,000	**1,150,000**			
		thus SPAs hold	4.3% international	**0.5% international**			

Smew *Mergus albellus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	180	Musgrove *et al.* 2011	2	0	No SPAs selected in GB
All-Ireland	<10	Crowe *et al.* 2008	1	0	No SPAs selected in Northern Ireland
Biogeographic NW & C Europe	40,000	Wetlands International 2012	400	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+284.6%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-31.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for Smew in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Smew were not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Smew were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for, and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote counting during January each year so as to enhance quality of assessment of numbers at key sites using numbers from that month.

Noting the significant limitations of existing, shore-based WeBS monitoring for this species in the marine environment, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

9. Distribution map for Smew SPA suite

No SPAs have previously been selected for Smew.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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11. SPA suite

No SPAs have previously been selected for Smew.

Red-breasted Merganser *Mergus serrator* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	8,400	Musgrove *et al.* 2011	85	1,190	14.2%
All-Ireland	3,390	Crowe *et al.* 2008	35	271	8.0%
Biogeographic – NW & C Europe	170,000	Wetlands International 2012	1,700	1,461	0.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-10.7%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-38.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Red-breasted Merganser, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-42.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Red-breasted Merganser were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Red-breasted Merganser, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing numbers and distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of non-breeding Red-breasted Merganser, and additional SPA provision (including in the marine environment) should be considered.

8. Recommendations regarding survey and monitoring

Enhance the coverage of national population monitoring and counting of key and other sites through WeBS and the Non-Estuarine Waterbird Survey (NEWS).

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Firth of Forth and Firth of Tay and Eden Estuary SPAs in future WeBS/NEWS counts, if necessary assessing the need for additional monitoring in marine areas of these sites.

Noting the significant limitations of existing, shore-based WeBS monitoring for this species in the marine environment, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information and analysis of gaps.

9. Distribution map for non-breeding Red-breasted Merganser SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	114	87	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	297	346	2005/6-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	194	87	2005/6-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	342	117	2005/6-2009/10	WeBS	
Exe Estuary	1.3	Not yet classified	128	105	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	650	336	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	Not yet classified	470	117	2005/6-2009/10	WeBS	
Inner Moray Firth	1.2	22 March 1999	1,731	22	2005/6-2009/10	WeBS	
Moray and Nairn Coast	1.3	Not yet classified	216	158	2005/6-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	292	230	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	381	235	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	128	113	2005/6-2009/10	WeBS	
		Total for SPAs in GB	1,936	**1,190**	in January		
		GB population	10,000	**8,400**			
		thus GB SPAs hold	19.3% GB	**14.2% GB**			
Belfast Lough	1.3	Not yet classified	175	150	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	73	124	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	328	248	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	243	**271**	in January		
		All-Ireland population	2,000	**3,390**			
		thus NI SPAs hold	12.2% All-Ireland	**8.0% All-Ireland**			
		Total for SPAs in UK	2,177	**1,461**	in January		
		Biogeographic population	125,000	**170,000**			
		thus SPAs hold	1.7% international	**0.9% international**			

Goosander *Mergus merganser* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	12,000	Musgrove *et al.* 2011	120	239–636 [435]	2.0 - 5.3% [3.6%]
All-Ireland				0	No SPAs selected in Northern Ireland
Biogeographic – NW & C Europe	266,000	Wetlands International 2012	2,700	239–636 [435]	0.1 - 0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+25.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-8.3%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Goosander, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-43.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Goosander were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Goosander, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of recent decreases in numbers, existing site-based conservation provision provided by the current SPA suite is not adequate for the requirements of non-breeding Goosander, and additional SPA provision (including in the marine environment) should be considered.

8. Recommendations regarding survey and monitoring

The 2001 SPA suite assessment used January data but peak numbers in Firth of Tay and Eden Estuary SPA occur in August (moulting site?). There is currently no information on the status of the species in the Inner Moray Firth SPA apparently the site with largest numbers in the UK and important as a moulting site too.

Develop and implement an adequate programme of national population monitoring and coverage of key sites through WeBS, and promote the counting of all sites within SPA suite during both January and August each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from those months.

Noting the significant limitations of existing, shore-based WeBS monitoring for this species in the marine environment, establish a programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Appropriate SPA provision in the marine environment is separately under review for this species.

9. Distribution map for non-breeding Goosander SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (Individuals)	Assessment of UK SPA suite in 2012 (individuals)	Data period	Data source	Comment
Firth of Tay and Eden Estuary	1.3	Not yet classified	195	239	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	397	397	1991/92-1995/6	Stroud *et al.* 2001	No recent assessment of numbers available. Assumed no change since early 1990s
		Total for SPAs in GB	75	**239–636 [437]**	in August		2001 SPA suite assessment was in January, peak numbers occur Firth of Tay and Eden Estuary in August (moulting site?). There is no information on patterns of seasonal occurrence in Inner Moray Firth.
		GB population	8,900	**12,000**			
		thus GB SPAs hold	0.8% GB	**2.0-5.3% GB**			
		Total for SPAs in UK	75	**239–636**	in August		
		Biogeographic population	200,000	**266,000**			
		thus SPAs hold	<0.1% international	**0.1-0.2% international**			

Honey Buzzard *Pernis apivorus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	33	Batten 2001; Ogilvie 2003	1	4	12.1%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	64,000	BirdLife International 2004	640	4	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+21%	RBBP; Holling *et al*. 2012
Short-term UK trend	1994-98 to 2006-10	+577%	RBBP; Holling *et al*. 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Honey Buzzard, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-44.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Honey Buzzard, the *Climatic Atlas* predicts an expanded distribution over southern half of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Honey Buzzard was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Mature conifer and mixed forest. Territories used in successive years. Males feed up to 2 km and females 1 km from nest.	Maintain mature conifer and mixed forests used regularly.	Maintain mature woodlands used regularly, including all woodland within 2 km of each nest site.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a significant extent. Territories are traditional.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes. Studies in Continental Europe suggest that Honey-buzzards have a distinct preference for nesting in mature conifers within mature mixed woodland, and in close

Cropped habitats assessment from SPA Review Decision Framework	
	proximity to water (Bijlsma 1986; Amcoff *et al*. 1994; Gamauf 1999). In the UK, nests were located in conifer woodlands at a similar frequency to other types, but in the uplands the majority of nests were in conifer forests, probably in response to availability (Roberts *et al*. 1999). Choice of woodland may be correlated with the abundance of small passerines, which are important prey early in the breeding season (Amcoff *et al*. 1994).
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Nest sites tend to be traditional (or at least regularly used). Information on nest-site fidelity is lacking, although a large proportion of territories was occupied each year and some nests were re-used between years (Bijlsma 1986).
Is the use of cropped habitats determined by crop type?	Not known. Home ranges in continental Europe are small and correlated with abundance of wasps (Hymenoptera); males are territorial and foraged mainly within 2 km of the nest, while females are not territorial and foraged much closer to the nest (typically within 1 km). Most foraging took place within woodland, arable areas were avoided, and the main prey was small passerines and wasps, especially *Vespula* spp. (Gamauf 1999).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known. The loss of mature woodland may be detrimental to Honey-buzzards, but the greatest vulnerability probably relates to mature conifer forests in the uplands, some of which may be under commercial management.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Seek to enhance the survey and reporting to the Rare Breeding Birds Panel of Honey Buzzards both within relevant SPAs and more widely, noting the several previous national assessments (*e.g.* Raptor Working Group 2000) which have previously highlighted the poor data availability for this species – a situation which continues.

Wiseman (2012) recently reviewed numbers and distribution of Honey Buzzards in the New Forest area over a period of 58 years since 1954.

9. Distribution map for Honey Buzzard SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Amcoff, M., Tjernberg, M. & Berg, A. 1994. Bivrakens *Pernis apivorus* boplatsval. *Ornis Svecica* 4: 145-158.

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Wiseman, E. 2012. Honey-buzzards in southern England. *British Birds* 105: 23-28.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
New Forest	1.1	22 September 1993	2	4	Mean 2004-2006	RBBP	See also Wiseman 2012
		Total for SPAs in GB	2	**4**			
		GB population	16	**33**			
		thus GB SPAs hold	13% GB	**12.1% GB**			
		Total for SPAs in UK	2	**4**			
		Biogeographic population	41,200	**64,000**			
		thus SPAs hold	<0.1% International	**<0.1% international**			

Red Kite *Milvus milvus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,600	Holling *et al.* 2012	15	18	1.1%
All-Ireland				0	No SPAs selected in Northern Ireland
Biogeographic - Europe	22,000	BirdLife International 2004	220	18	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+2,303%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+532%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Red Kite, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-45.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species Action Plan has been developed by the European Union for this species (Knott *et al.* 2010).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Red Kite, the *Climatic Atlas* predicts virtual extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Red Kite was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Woodland – mature for nesting and young plantings for foraging. Forages over wide variety of cropped and other habitats. Home ranges used in successive years. Most foraging within 3 km of nest.	Maintain mature woodland used regularly for nesting.	Maintain mature woodland used regularly for nesting. Insufficient information to identify regularly used important feeding areas outside of breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a significant extent. Territories are traditional and used in successive years.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Nest sites tend to be traditional (or at least regularly used).
Is the use of cropped habitats determined by crop type?	Not known.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Potential further SPA provision for Red Kites was reviewed by the SPAR SWG in 2004 in the context of the continuing consolidation of the range of this re-establishment in England, Scotland and Northern Ireland. In the context of current knowledge, contemporary (2013) SPA provision is insufficient for the requirements of Red Kite, and additional SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and review the need for a further national survey prior to the next SPA network review.

9. Distribution map for breeding Red Kite SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Elenydd-Mallaen	1.1	12 January 1996	15	18	2011	RSPB survey for CCW (Vanstone *et al.* 2011)	
		Total for SPAs in GB	15	**18**			
		GB population	161	**1,600**			
		thus GB SPAs hold	9.3% GB	**1.1%% GB**			
		Total for SPAs in UK	15	**18**			
		Biogeographic population	17,400	**22,000**			
		thus SPAs hold	<0.1% International	**0.1% international**			

Red Kite *Milvus milvus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	4,800	Holling *et al.* 2012	50	0	0%
All-Ireland				0	No SPAs selected in Northern Ireland
Biogeographic - Europe	66,000	BirdLife International 2004	660	0	0%

2b. Population trend[86]

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+2,303%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+532%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Red Kite in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species Action Plan has been developed by the European Union for this species (Knott *et al.* 2010).

[86] Trend information relates to the breeding season of this essentially non-migratory species in the UK

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Red Kite, the *Climatic Atlas* predicts virtual extinction in the UK based on information from the breeding season.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Red Kite was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Woodland – mature trees for roosting and young plantings for foraging. Forages over wide variety of cropped and other habitats.	Maintain mature woodland used regularly.	Insufficient information to identify regularly used important feeding areas outside of breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Unknown in the non-breeding season.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Unknown in the non-breeding season.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown in the non-breeding season.
Is the use of cropped habitats determined by crop type?	Unknown in the non-breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Unknown in the non-breeding season.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be considered in the non-breeding season, as feasible. The species is still in its establishment phase in some areas. Until populations become fully established in such regions it would be premature to assess the potential for SPA selection there.

8. Recommendations regarding survey and monitoring

Consideration of monitoring needs in the non-breeding season is needed.

9. Distribution map for non-breeding Red Kite SPA suite

No SPAs have previously been selected for non-breeding Red Kite.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

BirdLife International 2004. *Birds in Europe: population estimates, trends and conservation status.* Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

Holling, M. & the Rare Breeding Birds Panel. 2012. Rare breeding birds in the United Kingdom in 2010. *British Birds* 105: 352–416.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

No SPAs have previously been selected for non-breeding Red Kite.

White-tailed Eagle *Haliaeetus albicilla*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	44[87]	Holling *et al.* 2012; Evans in litt.	1	0	No SPAs selected in GB
All-Ireland	0	IRBBP reports; Hillis 2007, 2008		0	Species does not occur in Northern Ireland
Biogeographic - Europe	4,300	BirdLife International 2004	45	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985 to 2006-10	+529%[88]	RBBP; Holling *et al.* 2012; Evans in litt.
Short-term UK trend	1994-98 to 2006-10	+238%[2]	RBBP; Holling *et al.* 2012; Evans *et al.* 2009

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for White-tailed Eagle in the UK.

[87] Population increased to 80 territorial pairs in 2013

[88] based on territorial pairs

4. Relevant site-related recommendations within international and national (BAP) action plans

An international action plan was been developed for White-tailed Eagle by the Bern Convention in 2003 (Helander & Stjernberg 2003). This includes the following action:

> *"3.2.2.2. Establishment of protected areas*
>
> The establishment of nature reserves to ensure full protection for the most important breeding and wintering areas should be promoted in all range states. Such protected areas should also include important feeding grounds to ensure the long-term possibilities for successful reproduction. A network of the most important breeding sites in each state should be preserved as nature reserves and bird sanctuaries in order to ensure the long-term survival of a minimum population. The creation of protected areas can involve the action both from non-governmental organisations and national and international authorities and should be promoted generally.
>
> Priority: *High* Time-scale: *Long"*

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For White-tailed Eagle, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

White-tailed Eagle was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) although a significant proportion of nests now occur in commercial forestry plantations. Accordingly, Forestry Commission Scotland has issued management guidance (Kortland *et al.* 2011).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue frequent monitoring of whole population (through sample annual monitoring for the west coast of Scotland with a periodic full national SCARABBS survey) and report via Rare Breeding Birds Panel including all negative data.

9. Distribution map for White-tailed Eagle SPA suite

No SPAs have previously been selected for White-tailed Eagle.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

No SPAs have previously been selected for White-tailed Eagle.

Marsh Harrier *Circus aeruginosus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	320	Holling *et al.* 2012	3	164	51.3%
All-Ireland					No SPAs selected in Northern Ireland
Biogeographic - Europe	65,000	BirdLife International 2004	650	164	0.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term trend	1978-82 to 2006-10	+1,661%	RBBP; Holling *et al.* 2012
Short-term trend	1994-98 to 2006-10	+178%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Marsh Harrier, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-46.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Marsh Harrier, the *Climatic Atlas* predicts an extended distribution across southern areas of England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Marsh Harrier was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Open cropped habitats within 2 km of nest used for foraging.	Maintain open, mixed pastoral/ arable landscape adjacent to nesting areas.	Maintain open cropped habitats within 2 km of nesting areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Marsh Harriers breed primarily in marsh habitats – nesting typically in *Phragmites communis* reedbeds, and rarely in salt-marsh and cereals (Underhill-Day 1984). There is no detailed published information on nest-site choice, nest use or home range use.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes. The same reedbed areas are traditionally used.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown.

Cropped habitats assessment from SPA Review Decision Framework	
Is the use of cropped habitats determined by crop type?	Unknown.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Not known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats such as commercially managed reedbeds.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Assess current status at Alde-Ore Estuary, Benacre to Easton Bavents, The Wash, and Firth of Tay and Eden Estuary SPAs for which apparently no contemporary data exist, and ensure the inclusion of these sites in future national surveys.

9. Distribution map for Marsh Harrier SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

BirdLife International 2004. *Birds in Europe: population estimates, trends and conservation status.* Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

Holling, M. & the Rare Breeding Birds Panel. 2012. Rare breeding birds in the United Kingdom in 2010. *British Birds* 105: 352–416.

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Underhill-Day, J.C. 1984. Population and breeding biology of Marsh Harriers in Britain since 1900. *Journal of Applied Ecology* 21: 773-787.

Hen Harrier *Circus cyaneus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	570	Holling *et al.* 2012	6	169	29.6%
All-Ireland	180	Barton *et al.* 2006; Sim *et al.* 2007	2	34	18.9%
Biogeographic - Europe	15,500	BirdLife International 2004	150	203	1.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1988 to 2010	0%	Bibby &Etheridge 1993; Hayhow *et al.* 2013
Short-term UK trend	1998 to 2010	+21%	Sim *et al.* 2001; Hayhow *et al.* 2013

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Hen Harrier, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-47A.pdf.

Antrim Hills; Slieve Beagh – Mullaghfad – Lisnaskea; Renfrewshire Heights; Strath Carnaig; and Strath Fleet Moors SPAs have been added to the Hen Harrier SPA suite since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Hen Harrier, the *Climatic Atlas* predicts a wide distribution across southern and northern UK but virtual absence from northern England, Ireland and southern Scotland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Hen Harrier was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Young plantations for nesting and foraging. Rough grasslands for foraging. Home ranges used in successive years. Most foraging is within 3 km of nest and roost.	Maintain open moorland/pasture interface and pasture type.	Maintain heather moorland and other open ground used regularly, including all relevant favoured habitat within 2 km of each nest site.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a great extent. Hen Harriers breed in upland moorlands and associated forestry throughout the UK and forage over

Cropped habitats assessment from SPA Review Decision Framework	
	moorland and associated habitats, such as rough pastures, moorland rides in forests, clear-felled areas and young forestry. Some moorland supports relatively high densities of birds, but across much of the suitable habitat area nesting is more dispersed. While territories may be used year after year, nest sites are infrequently used more than once. Whilst much of the prey is taken from moorland habitats, small mammals and other prey are also taken from pasture and young forestry.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, to a great extent. Forestry habitats used by Hen Harriers during the breeding season become unsuitable with canopy closure (at 10-15 years old for first rotation and 6-9 years for second rotation), although larger open rides within mature forestry may still be used for both nesting and foraging (Scottish Raptor Study Group unpublished).
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, to a great extent.
Is the use of cropped habitats determined by crop type?	Yes, to a moderate extent.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

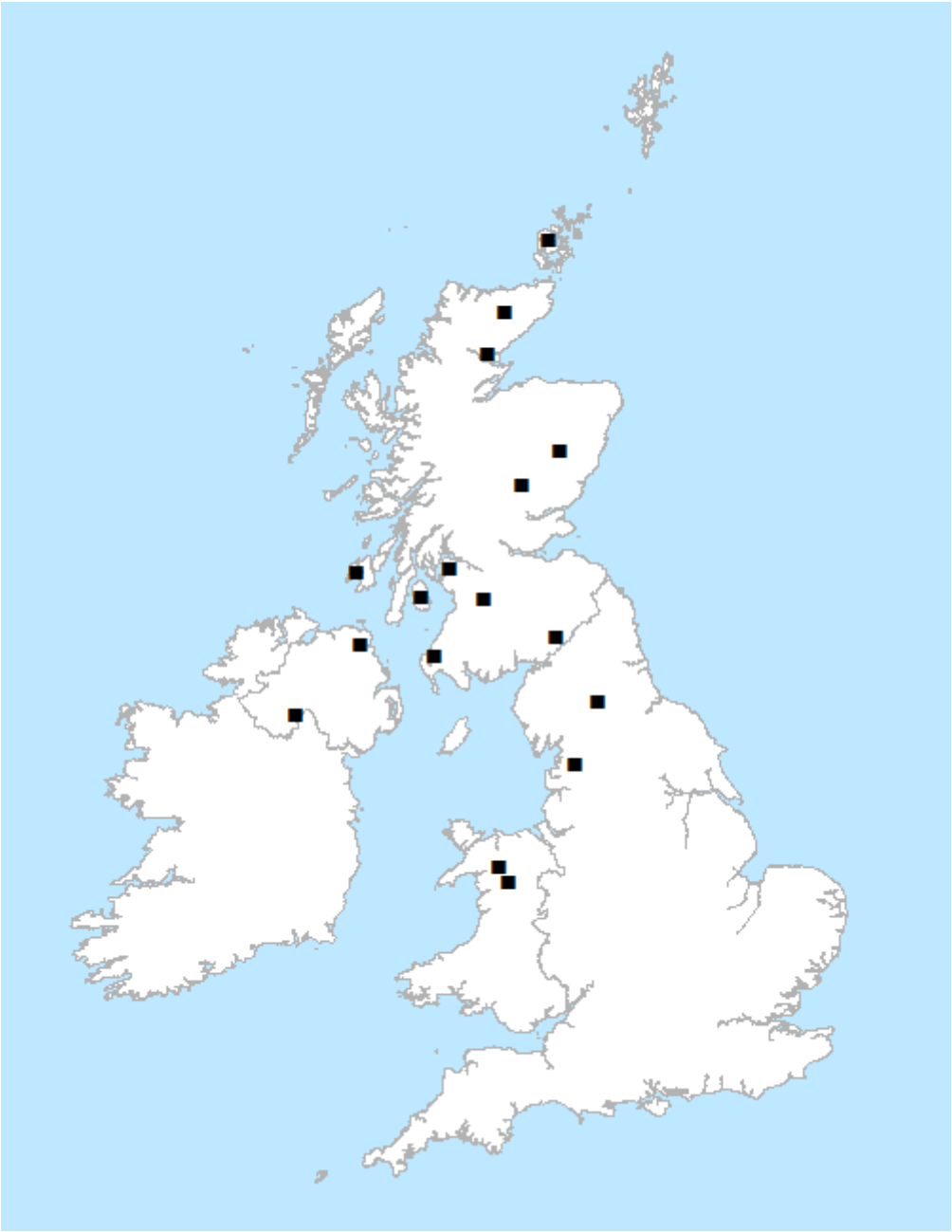
7. Scientific advice regarding SPA suite

In the light of decreasing numbers, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Hen Harrier, and additional SPA provision should be considered.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for breeding Hen Harrier SPA suite



Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Arran Moors	1.1	7 July 2003	21	12	2009	per SNH	
Berwyn	1.1	16 January 1998	14	20	2010	per CCW	
Bowland Fells	1.1	16 December 1993	13	6	2011	per NE	
Caithness and Sutherland Peatlands	1.1	2 February 1999	14	19	2003	per SNH	
Forest of Clunie	1.1	13 August 2001	20	11	2011	per SNH	
Glen App-Galloway Moors	1.1	7 March 2003	10	10	2008	per SNH	
Glen Tanar	1.4	19 September 1994	2	1	2010	per SNH	
[Ladder Hills]	[1.1]	See comment	9	***0***	2010	per SNH	Site now formally deselected; no occupation since 2001 Review
Langholm – Newcastleton Hills	1.1	31 December 2001	13	3	2010	per SNH	
Migneint – Arenig – Dduallt	1.1	26 March 2003	10	14	2010	per CCW	
Muirkirk and North Lowther Uplands	1.1	7 March 2003	29	7	2011	per SNH	
North Pennine Moors	1.1	9 February 2001	11	0	2004	per NE	
Orkney Mainland Moors	1.1	13 October 2000	28	41	2006	per SNH	
Renfrewshire Heights	1.1	1 December 2007	Not classified	1	2011	per SNH	
Rinns of Islay	1.1	27 November 1995	7	19	2006	per SNH	
Strath Carnaig and Strath Fleet Moors	1.1	1 July 2008	Not classified	5	2010	per SNH	
		Total for SPAs in GB	201	**169**			
		GB population	483	**570**			
		thus GB SPAs hold	41.6% GB	**29.6% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Antrim Hills	1.1	31 March 2006	Not classified	25	2004	[14 in 2010]	
Slieve Beagh – Mullaghfad - Lisnaskea	1.1	28 March 2006	Not classified	9	2004	[9 in 2010]	
		Total for SPAs in Northern Ireland	0	**34**			
		All-Ireland population	180	**180**			
		thus NI SPAs hold	0% All-Ireland	**18.9%% All-Ireland**			
		Total for SPAs in UK	201	**203**			
		Biogeographic population	8,332	**15,500**			
		thus SPAs hold	2.4% international	**1.3% international**			

Hen Harrier *Circus cyaneus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,710	Derived from Holling *et al*. 2012	15	[249][89]	[14.6%]
All-Ireland	540	Derived from Barton *et al.* 2006; Sim *et al.* 2007	5	0	No SPAs selected in Northern Ireland
Biogeographic - Europe	46,500	Derived from BirdLife International 2004	460	[249]	[0.5%]

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1999 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Hen Harrier, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-47B.pdf.

[89] Note that this total is highly unreliable in the absence of contemporary site assessments

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Hen Harrier was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Hen Harrier was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Heather moorland, upland grasslands and young conifer plantations for foraging.	Maintain open moorland/ pasture interface and pasture type.	Maintain open moorland/ pasture interface and pasture type.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Outside the breeding season Hen Harriers occur in coastal and lowland habitats as well as moorlands, and make significant use of cropped habitats for foraging (including salt-marshes) and in some cases for roosting. Roosts are communal and tend to be traditional, although the numbers of birds at

Cropped habitats assessment from SPA Review Decision Framework	
	each fluctuates widely within and between years, and may be located in a variety of different habitats including marshes, rough grassland, heaths, conifer plantations and, rarely, arable crops (Clarke & Watson 1990).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – roosts tend to be traditional.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – see above.
Is the use of cropped habitats determined by crop type?	Not applicable.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

When data on the current status of non-breeding Hen Harrier become available (below), appropriate changes to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution of species.

8. Recommendations regarding survey and monitoring

In the context of the lack of data for 19 of 22 SPAs, and noting the recommendation from the 2001 SPA Review, urgently establish monitoring site- and population-related monitoring regimes (including development of appropriate methodologies) to ensure that population numbers on sites within the SPA suite can be assessed by the time of the next national Review.

9. Distribution map for non-breeding Hen Harrier SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Barton, C., Pollock, C., Norriss, D. W., Nagle, T., Oliver, G. A. & Newton, S. 2006. The second national survey of breeding Hen Harriers *Circus cyaneus* in Ireland 2005. *Irish Birds* 8: 1-20.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Blackwater Estuary	1.4	12 May 1995	4	4	1993/4-1994/5, 1996/7-1998/9	No contemporary data	Assumed status unchanged since 1990s
Broadland	1.1	21 September 1994	22	22	1987/8-1991/2	No contemporary data	Assumed status unchanged since 1980s
Colne Estuary	1.4	28 July 1994	4	4	1994/5-1998/9	No contemporary data	Assumed status unchanged since 1990s
Dengie	1.4	24 March 1994	5	5	1994/5-1998/9	No contemporary data	Assumed status unchanged since 1990s
Dorset Heathlands	1.1	1 October 1998	20	20	1991/2	No contemporary data	Assumed status unchanged since 1990s
Foulness	1.4	4 October 1996	6	6	1994/5-1996/7	No contemporary data	Assumed status unchanged since 1990s
Humber Flats, Marshes and Coast	1.1	31 August 2007	20	20	1984/5-1988/9	No contemporary data	Assumed status unchanged since 1980s
Loch of Inch and Torrs Warren	1.1	2 February 1999	8	8	1991/2-1995/6	No contemporary data	Assumed status unchanged since 1990s
Minsmere – Walberswick	1.1	19 May 1992	15	15	1985/6-1989/90	No contemporary data	Assumed status unchanged since 1980s
Muirkirk and North Lowther Uplands	1.1	7 March 2003	10	4	2007/8-2011/2	Five year peak mean roost counts per SNH	
New Forest	1.1	22 September 1993	15	15	Unknown – 1980s?	No contemporary data	Assumed status unchanged since 1980s
North Norfolk Coast	1.1	Not yet classified	16	16	1993/4-1997/8	No contemporary data	Assumed status unchanged since 1990s
Orkney Mainland Moors	1.1	13 October 2000	13	31	2005/6 - 2009/10	Five year peak mean of monthly, non-comprehensive, roost counts per *Orkney Bird Reports*	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Ouse Washes	1.1	5 March 1993	12	12	1982-1987	No contemporary data	Assumed status unchanged since 1980s
River Spey - Insh Marshes	1.1	2 February 1997	11	4	2007/8-2011/2	Five year peak mean roost counts per SNH	
Salisbury Plain	1.1	3 November 1993	14	14	1996/7	No contemporary data	Assumed status unchanged since 1990s
Stodmarsh	1.1	16 December 1993	9	9	1987/8-1991/2	No contemporary data	Assumed status unchanged since 1980s
Stour and Orwell Estuaries	1.1	13 July 1994	10	10	1996/7	No contemporary data	Assumed status unchanged since 1990s
Thames Estuary and Marshes	1.1	Not yet classified	7	7	1993/4-1997/8	No contemporary data	Assumed status unchanged since 1990s
The Swale	1.1	Not yet classified	23	23	1996/8	No contemporary data	Assumed status unchanged since 1990s
		Total for SPAs in GB	244	**[249]**			**Note that this total is highly unreliable in the absence of contemporary site assessments**
		GB population	750	**1,710**			
		thus GB SPAs hold	32.5% GB	**[14.6% GB]**			See above
		Total for SPAs in UK	244	**[249]**			
		Biogeographic population	24,996	**46,500**			
		thus SPAs hold	1.0% international	**[0.5% international]**			See above

Montagu's Harrier *Circus pygargus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	12	Holling *et al.* 2012	1	0	No SPAs selected in GB
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	21,500	BirdLife International 2004	210	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+119%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+39%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for this species in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Montagu's Harrier, the *Climatic Atlas* predicts a significant contracted distribution in Britain to just a few sites in southern and eastern England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Montagu's Harrier was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Nests in arable habitats, and grasslands. Not site-faithful. Females forage within 2 km of nest, males up to 12 km.	Maintain open arable landscape featuring some low-intensity open habitats.	Not possible to identify regularly used important feeding areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	The small population of Montagu's Harrier (*Circus pygargus*) in the UK nests primarily in arable habitats (winter wheat, barley and oils seed rape), but has used a wide range of other habitats including rough and improved grasslands, reedbeds, marsh, dune, heathland and young conifer forest (Brown & Grice 2005). A new nest site is selected each year, with

Cropped habitats assessment from SPA Review Decision Framework	
	semi-colonial breeding in some locations. Relocation of 'colonies' often takes place from one year to the next, often over considerable distances.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – shows fidelity to cropped fields but not necessarily to specific locations.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	No. Factors influencing settlement of pairs in nesting locations include prey abundance, vegetation height and previous success (Arroyo *et al*. 2002).
Is the use of cropped habitats determined by crop type?	Not necessarily – see above.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel including all negative data.

9. Distribution map for Montagu's Harrier SPA suite

No SPAs have previously been selected for this species.

10. References

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11. SPA suite

No SPAs have previously been selected for this species.

Golden Eagle *Aquila chrysaetos*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	442	Eaton *et al.* 2007a	4	125	28.3%
All-Ireland	4	Hillis 2011			No sites selected in Northern Ireland
Biogeographic European *A. c. chrysaetos*[90]	5,100	Derived from Cramp & Simmons 1980 & BirdLife International 2004	50	125	2.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1992 to 2003	+11%	Green 1996; Eaton *et al.* 2007a
Short-term UK trend	1982 to 2003	+5%	Dennis *et al.* 1984; Eaton *et al*. 2007a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Golden Eagle, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-48.pdf.

[90] Europe other than Portugal, Spain & Andorra (= *A. c. homeyri*); and Russia & Turkey

Cairngorms Massif; Foinaven; Glen Affric to Strathconon; Glen Etive and Glen Fyne; Jura, Scarba and the Garvellachs; Moidart and Ardgour SPAs have been added to the Golden Eagle SPA suite since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Golden Eagle, the *Climatic Atlas* predicts virtual extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Golden Eagle was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for Golden Eagle SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caenlochan	1.1	25 September 1997	6	Site subsumed			Site now subsumed within Cairngorms Massif SPA
Cairngorms	1.1	25 September 1997	12	Site subsumed			Site now subsumed within Cairngorms Massif SPA
Cairngorms Massif	1.1	28 October 2010	Not classified	26	2003	Eaton *et al.* 2007a	
Caithness and Sutherland Peatlands	1.1	2 February 1999	5	4	2003	Eaton *et al.* 2007a	
Cnuic agus Cladach Mhuile (Mull Coast and Hills)	1.1	20 December 2002	9	15	2003	Eaton *et al.* 2007a	
Cuillins	1.1	20 December 2002	11	8	2003	Eaton *et al.* 2007a	
Foinaven	1.1	28 October 2010	Not classified	6	2003	Eaton *et al.* 2007a	
Glen Affric to Strathconon	1.1	28 October 2010	Not classified	10	2003	Eaton *et al.* 2007a	
Glen Etive and Glen Fyne	1.1	28 October 2010	Not classified	19	2003	Eaton *et al.* 2007a	
Jura, Scarba and the Garvellachs	1.1	28 October 2010	Not classified	9	2003	Eaton *et al.* 2007a	
Lewis Peatlands	1.1	7 December 2000	6	7	2003	Eaton *et al.* 2007a	
Moidart and Ardgour	1.1	28 October 2010	Not classified	11	2003	Eaton *et al.* 2007a	
North Harris Mountains	1.1	14 March 1997	7	7	2003	Eaton *et al.* 2007a	
Rum	1.1	31 August 1982	4	3	2003	Eaton *et al.* 2007a	
		Total for SPAs in GB	60	**125**			
		GB population	400	**442**			
		thus GB SPAs hold	15.0% GB	**28.3% GB**			
		Total for SPAs in UK	60	**125**			
		Biogeographic population	5,239	**5,100**			
		thus SPAs hold	1.2% international	**2.4% international**			

Osprey *Pandion haliaetus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	200	Holling *et al.* 2012	2	76	38.0%[91]
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	6,300	BirdLife International 2004	65	76	1.2%[92]

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+629%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+71%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Osprey, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-49.pdf.

[91] Largely feeding – 8.5% nesting

[92] 0.3% nesting

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Osprey, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Osprey was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Mature forests for nesting. Nests re-used over long period and adopted by successive pairs. No information on required nesting woodland characteristics and disturbance limits.	Maintain nest sites and surrounding forest character.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a significant extent. Territories are traditional. Ospreys make use of planted forestry, in which many of the UK's nests are located. Nest-site fidelity is high and young birds show a preference for using existing nests

Cropped habitats assessment from SPA Review Decision Framework	
	(Dennis 1987).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes.
Is the use of cropped habitats determined by crop type?	Nest tree choice is influenced by the characteristics of the forestry around the site, but several tree species have been used (Dennis 1987).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient

The 2001 Review presented data on the Osprey SPA suite that largely represented numbers nesting with SPA site boundaries although it acknowledged the particular importance of The Dornoch Firth and Loch Fleet as a feeding site for birds nesting in the vicinity of that site. More recent study has demonstrated that in the breeding season, territorial birds can range up to 30 km to feeding sites. Two measures of the importance of Osprey SPAs are presented in Section 11 below.

The first is the total of nest sites within each site. Other than for Dornoch Firth and Loch Fleet, these are largely comparable to 2001 Review totals.

Additionally, a GIS analysis assessed the number of territories within 20 km of each SPA – a distance that expert opinion considered realistic as the potential foraging range for Ospreys in the nesting period (Dennis pers. comm.).

Range coverage: Insufficient given continued expansion of range.

Ecological sufficiency: Insufficient

Additional conservation measures recommended?

Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage. Further, site boundaries of particular SPAs should be reviewed, especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Continue frequent monitoring all regularly and previously used sites and encourage full reporting via Rare Breeding Birds Panel including all negative data.

Ensure procedures are in place for regular assessment of national population size and trend.

Establish monitoring regimes to ensure that population numbers on sites within the SPA suite can be assessed by the time of the next national review, and ensure such data are reported to relevant national monitoring schemes.

9. Distribution map for Osprey SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s: nesting pairs	Assessment of UK SPA suite in 2000s: feeding territories	Data period	Data source	Comment
Abernethy Forest	1.1	25 March 1990	2	1	9	Mean 2008-2012	R. Dennis in litt.	See Section 6 above
Cairngorms	1.1	25 September 1997	2	2	8	Mean 2008-2012	R. Dennis in litt.	See Section 6 above
Cromarty Firth	1.1	22 March 1999	1	2	25	Mean 2008-2012	SRMG data	See Section 6 above
Dornoch Firth and Loch Fleet	1.1	24 March 1997	10[93]	5	14	Mean 2008-2012	SRMG data	See Section 6 above
Forest of Clunie	1.1	13 August 2001	7	1	2	Mean 2008-2012	SRMG data	See Section 6 above
Glen Tanar	1.1	19 September 1994	2	No data	2	Mean 2008-2012	SRMG data	See Section 6 above
Inner Moray Firth	1.1	22 March 1999	4	5	25	Mean 2008-2012	SRMG data	See Section 6 above
Moray and Nairn Coast	1.1	2 February 1997	7	0	9	Mean 2008-2012	R. Dennis in litt.	See Section 6 above
River Spey – Insh Marshes	1.1	2 February 1997	4	1	10	Mean 2008-2012	R. Dennis in litt.	See Section 6 above
		Total for SPAs in GB	39	**17**	**76**			
		GB population	99	**200**	**200**			
		thus GB SPAs hold	39.0% GB	**8.5% GB**	**38.0% GB**			See text for interpretation of totals
		Total for SPAs in UK	39	**17**	**76**			
		Biogeographic population	4,732	**6,300**				
		thus SPAs hold	0.8% international	**0.3% international**	**1.2% international**			See text for interpretation of totals

[93] largely feeding birds

Merlin *Falco columbarius* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,100	Ewing *et al.* 2011	10	239	21.7%
All-Ireland	110	Gibbons *et al*. 1993	1	7	6.4%
Biogeographic – European *F. c. aesalon*[94]	13,500	Derived from Cramp % Simmons 1980 & BirdLife International 2004	130	246	1.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+71%	Sharrock 1976; Ewing *et al.* 2011
Short-term UK trend	1993-94 to 2008	-8%	Rebecca & Bainbridge 1998; Ewing *et al.* 2011

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Merlin, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-50A.pdf.

[94] Europe other than Iceland (= *F. c. subaesalon*); and Russia

Antrim Hills SPA has been added to the SPA suite for breeding Merlin since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Merlin, the *Climatic Atlas* predicts a more northerly distribution with virtual absence from England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Merlin was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Young plantations for nesting and foraging. Rough grasslands for foraging. Home ranges used in successive years. No spatial information.	Maintain open moorland/pasture interface and pasture type.	Maintain grassland feeding habitats within 2 km of nests in regularly used home ranges (based on minimum Hen Harrier requirements). Insufficient information for identifying important feeding areas outside of breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes. However, a large proportion of nesting areas are unoccupied each year, but some are occupied in successive years over long periods and individuals are relatively area-faithful.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, although Merlins are short-lived raptors, and nesting area occupancy may rarely exceed four years for any individual and typically much shorter periods for females. In addition to survival, land-use change and disturbance may be key factors in determining whether nesting areas remain occupied.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Nest-site fidelity is only moderate; many females use alternative nest-sites in the same nesting area between years.
Is the use of cropped habitats determined by crop type?	Not applicable.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing numbers and distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Merlin, and additional SPA provision should be considered.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for breeding Merlin SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Berwyn	1.1	16 January 1998	14	2	2011	RSPB survey for CCW (Vanstone *et al.* 2011)	
Bowland Fells	1.1	16 December 1993	20	16	2008	Ewing *et al.* 2011	
Cairngorms	1.1	25 September 1997	14	5	2008	Ewing *et al.* 2011	
Caithness and Sutherland Peatlands	1.1	2 February 1999	54	11	2008	Ewing *et al.* 2011	
Drumochter Hills	1.4	25 September 1997	7	4	2004-07	Haworth & Fielding 2012	
Elenydd-Mallaen	1.4	12 January 1996	7	2	2008	Ewing *et al.* 2011	
Forest of Clunie	1.4	13 August 2001	12	9	2008	per SNH	
Lewis Peatlands	1.1	7 December 2000	20	28	2004	Haworth & Fielding 2012	
Migneint – Arenig – Dduallt	1.4	26 March 2003	7	7	2008	Ewing *et al.* 2011	
Muirkirk and North Lowther Uplands	1.4	7 March 2003	12	5	2009-10	Haworth & Fielding 2012	
North Pennine Moors	1.1	9 February 2001	136	84	2008	Ewing *et al.* 2011	Extrapolated total based on 38% decline in areas within the SPA covered in both 1998 & 2008 national surveys
North York Moors	1.1	12 May 2000	40	19	2008	Ewing *et al.* 2011	Complete SPA coverage
Ronas Hill – North Roe and Tingon	1.4	Not yet classified	6	2	2010	Haworth & Fielding 2012	
South Pennine Moors	1.1	Not yet classified	77	45	2008	Ewing *et al.* 2011	Extrapolated total based on 42% decline in territories in areas with the SPA covered in both 1998 & 2008 national surveys
		Total for SPAs in GB	426	**239**			
		GB population	1,300	**1,100**			
		thus GB SPAs hold	32.8% GB	**21.7% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Antrim Hills	1.1	31 March 2006	Not classified	7	2008		Complete SPA coverage
		Total for SPAs in Northern Ireland	0	**7**			
		All-Ireland population	110	**110**			
		thus NI SPAs hold	0% All-Ireland	**6.4% All-Ireland**			
		Total for SPAs in UK	426	**246**			
		Biogeographic population	10,200	**13,500**			
		thus SPAs hold	4.2% international	**1.8% international**			

Merlin *Falco columbarius* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,500	Stroud *et al*. 1990	15	15	1.2%
All-Ireland	416	Derived from data in Lack 1986 (2-3 birds/occupied square)	4		No SPAs selected in Northern Ireland
Biogeographic -Europe	40,500	Derived from Cramp & Simmons 1980 & BirdLife International 2004	400	15	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1999 to 2011	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Merlin, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-50B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Merlin were not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Merlins were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Rough grasslands for foraging. No spatial information in the non-breeding season.	Maintain open moorland /pasture interface and pasture type.	Insufficient information for identifying important feeding areas outside of breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Not known. In winter, Merlins move to lowland and coastal areas and may occupy communal roosts (Lack 1986; Dickson 1973, 1988). Birds forage over open habitats and probably avoid woodland, but there is very little information on the behaviour of the species in winter is available. A study in SW Scotland showed that favoured habitats were lowland farmland, including pasture and cropped habitats, and associated

Cropped habitats assessment from SPA Review Decision Framework	
	marginal habitats, such as rough pastures. Relatively little use of coastal habitats or upland habitats (rough pasture and moorland) was observed for birds roosting near the coast
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Not known.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Not known.
Is the use of cropped habitats determined by crop type?	Not applicable.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

In the context of the continuing lack of data for the single SPA, and noting the recommendation from the 2001 SPA Review, urgently establish site- and population-related monitoring regimes (including development of appropriate methodologies) to ensure that population numbers on this SPA can be assessed by the time of the next national review.

9. Distribution map for non-breeding Merlin SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Dorset Heathlands	1.1	1 October 1998	15	15	1991/92	SPA Citation	No contemporary data available. Assumed that total unchanged since1991/92
		Total for SPAs in GB	15	**15**			
		GB population	1,500	**1,500**			
		thus GB SPAs hold	1.0% GB	**1.2% GB**			
		Total for SPAs in UK	15	**15**			
		Biogeographic population	30,600	**40,500**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Peregrine *Falco peregrinus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,400	Banks *et al.* 2010	14	67	4.8%
All-Ireland	477	Madden *et al.* 2009	5	5	1.0%
Biogeographic – European *F. p. peregrinus*	14,900	Derived from Cramp & Simmons 1980 & BirdLife International 2004	150	72	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1981 to 2002	+106%	Ratcliffe 1984; Banks *et al.* 2010
Short-term UK trend	1991 to 2002	+17%	Crick & Ratcliffe 1995; Banks *et al.* 2010

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Peregrine, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-51.pdf.

Migneint-Arenig-Dduallt was added to the SPA suite for Peregrine in 2003.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Peregrine, the *Climatic Atlas* predicts a more northerly distribution with virtual absence from the southern half of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Peregrine was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (2013) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought. However, given that this is an extremely widely dispersed species, with few concentrations, the identification of additional sites will be problematic.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for breeding Peregrine SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Berwyn	1.1	16 January 1998	18	7	2002	Banks *et al.* 2010	
Cairngorms	1.1	25 September 1997	12	7	2002	Banks *et al.* 2010	
East Caithness Cliffs	1.4	27 March 1996	6	2	2002	Banks *et al.* 2010	
Elenydd-Mallaen	1.1	Not yet classified	15	11	2002	Banks *et al.* 2010	
Hoy	1.4	7 December 2000	6	9	2002	Banks *et al.* 2010	
Migneint–Arenig–Dduallt	1.4	26 March 2003	Not classified	8	2002	Banks *et al.* 2010	
Muirkirk and North Lowther Uplands	1.4	7 March 2003	9	3	2002	Banks *et al.* 2010	
North Caithness Cliffs	1.1	16 August 1996	6	4	2002	Banks *et al.* 2010	
North Pennine Moors	1.1	9 February 2001	15	13	2002	Banks *et al.* 2010	
South Pennine Moors	1.1	Not yet classified	16	3	2002	Banks *et al.* 2010	
		Total for SPAs in GB	103	**67**			
		GB population	1,167	**1,400**			
		thus GB SPAs hold	8.8% GB	**4.8% GB**			
Rathlin Island	1.1	25 February 1999	6	5	2002	Banks *et al.* 2010	5 in 2011 - NIEA survey
		Total for SPAs in Northern Ireland	6	**5**			
		All-Ireland population	365	**477**			
		thus NI SPAs hold	1.6% All-Ireland	**1.0% All-Ireland**			
		Total for SPAs in UK	109	**72**			
		Biogeographic population	5,663	**14,900**			
		thus SPAs hold	1.9% international	**0.5% international**			

Capercaillie *Tetrao urogallus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,300 individuals	Ewing *et al.* 2012	13 individuals	125 lekking males	Unknown[95]
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – European *T. u. urogallus*	446,000 pairs	Derived from Cramp & Simmons 1980 & BirdLife International 2004	4,460 pairs	125 lekking males	<0.1

2b. Population trend

	Period of trend	Trend	Source
Long-term trend	1980 to 2010	-42%	Catt *et al.* 1998; Ewing *et al.* 2012
Short-term trend	1998/99 to 2009/10	Stable	Wilkinson *et al* 2002; Ewing *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

[95] It is not possible to calculate a proportion of the UK population in SPAs since SPA site assessments (Section 11 below) use a different methodology and units from the assessments of the national population. There is, as yet, no agreed conversion factor between the two methodologies.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Capercaillie, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-52.pdf.

Anagach Woods, Craigmore Wood, Darnaway and Lethen Forest, Morangie Forest and Novar SPAs have added to the SPA suite for Capercaillie since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Support coordinated management of networks of sites."

- "Manage sites appropriately. This management should include: long-term retentions of key habitat; appropriate thinning regimes; retention and creation of cover; creation of brood habitat; removal or marking of fences; appropriate deer and predator management; monitoring of results. New research findings should be incorporated."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Capercaillie, the *Climatic Atlas* predicts virtual extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Capercaillie was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Mature conifer forest. Leks and home ranges used in successive years. Complex spatial ecology.	Maintain mature regularly used forestry.	Maintain mature conifer plantation based on evidence of regular presence.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes – to a great extent.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes – to a great extent. Males show high fidelity to both a lek and spring home range. Females use the same nesting area in successive years and in some circumstances may be territorial (Storch 2001). See Baker & Stroud 2007 for further information.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes – to a great extent as outlined above.
Is the use of cropped habitats determined by crop type?	Yes. Suitable forest is mature with at least 40% canopy cover and 500-800 trees per hectare, although areas of very dense canopy cover (over 70%) are avoided by males (Gjerde 1991a). Managed forests that are thinned to less than 500 trees per hectare are abandoned, as are those from which pine trees were removed (Gjerde 1991b). The denser cover afforded by spruce (*Picea* spp.) is favoured by males seeking roost sites and removal of mature spruce from mixed woodland made it less attractive to males (Gjerde 1991a & 1991b).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Notwithstanding declines in numbers and/or distribution of Capercaillie, the sites within the SPA suite remain the “most suitable” UK territories but need to be subject to priority management and, as appropriate, enhanced monitoring in order to address those factors causing reduced numbers.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Review whether continuation of existing winter-counts or change to lek monitoring is the most appropriate site and national monitoring regime.

Undertake work to calibrate the different survey methodologies used in the past (winter counts of individuals vs. numbers of displaying males at leks) to allow generation of trends based on historic survey data.

9. Distribution map for Capercaillie SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (lekking males)	Assessment of UK SPA suite in 2000s (lekking males)	Data period	Data source	Comment
Abernethy Forest	1.1	25 April 1990	45	28	mean 2006-2010	per SNH	
Anagach Woods	1.1	16 March 2006	Not classified	8	mean 2006-2010	per SNH	
Ballochbuie	1.1	12 June 1998	36	2	mean 2006-2010	per SNH	
Cairngorms	1.1	25 September 1997	125	28	mean 2006-2010	per SNH	
Craigmore Woods	1.1	21 April 2005	Not classified	9	mean 2006-2010	per SNH	
Darnaway and Lethen Forest	1.1	25 April 1990	Not classified	6	mean 2006-2010	per SNH	
Glen Tanar	1.1	19 September 1994	85	4	mean 2006-2010	per SNH	
Kinveachy	1.1	2 February 2000	40	14	mean 2006-2010	per SNH	
Loch Lomond	1.1	24 March 1997	33	1	*mean 2008-2012*	per SNH	
Morangie Forest	1.1	3 October 2001	Not classified	18	mean 2006-2010	per SNH	
Novar	1.1	7 March 2005	Not classified	7	mean 2006-2010	per SNH	
		Total for SPAs in GB	364	**125**	lekking males		
		GB population	2,200	**1,300**	individuals		
		thus GB SPAs hold	16.5% GB	**Unknown % GB**	It is not possible to express the SPA suite total as a proportion of national population owing to lack of a conversion factor between survey methodologies		
		Total for SPAs in UK	364	**125**			
		Biogeographic population	419,000	**446,000**	pairs		
		thus SPAs hold	<0.1% international	**<0.1% international**			

Spotted Crake *Porzana porzana*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (calling males)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	28	Schmitt *et al.* 2015	1	11	39%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	90,000	BirdLife International 2004	900	11	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+362%	Stroud *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+70%	Stroud *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Spotted Crake, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-53.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Spotted Crake, the *Climatic Atlas* predicts extinction in the UK except for the extreme south-west of England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Spotted Crakes were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2006).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of decreasing numbers and distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of Spotted Crake, and additional SPA provision should be considered.

In light of major declines at all SPAs, habitat management at these sites should be subject to priority review.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel.

Promote enhanced and more regular monitoring of Spotted Crakes at sites within the SPA suite and any sites with a past history of occupancy (*inter alia* via further SCARABBS national surveys), ensuring a further national survey prior to the next network review.

9. Distribution map for Spotted Crake SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (calling males)	Assessment of UK SPA suite in 2000s (calling males)	Data period	Data source	Comment
Lower Derwent Valley	1.1	Not yet classified	12[96]	8	2012	RSPB & NE, SCARABBS survey – Schmitt *et al.* 2015	See footnote
Nene Washes	1.1	Not yet classified	5	3	2012	RSPB & NE, SCARABBS survey – Schmitt *et al.* 2015	
Ouse Washes	1.1	Not yet classified	3	0	2012	RSPB & NE, SCARABBS survey – Schmitt *et al.* 2015	
River Spey – Insh Marshes	1.1	2 February 1997	3	0	2012	RSPB & NE, SCARABBS survey – Schmitt *et al.* 2015	
		Total for SPAs in GB	23	**11**			
		GB population	50	**28**			
		thus GB SPAs hold	46% GB	**39% GB**			
		Total for SPAs in UK	23	**11**			
		Biogeographic population	48,800	**90,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

[96] The estimate of numbers in the Lower Derwent Valley SPA (31 singing males) which was included in the second SPA Review in good faith, turned out to have been erroneous, with the survey data not subject to normal assessment and review processes. The estimate was subsequently withdrawn by English Nature and a revised, significantly lower, estimate (12 singing males) re-submitted to the Rare Breeding Birds Panel to be part of the national record. This was published by English Nature (Ralston 2005) following normal review and assessment processes.

Corncrake *Crex crex*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (calling males)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,200[97]	Holling *et al.* 2012	12	350	29.2%
All-Ireland	153	Hillis 2007, 2008; BirdWatch Ireland data (Anita Donaghy pers. comm.)	2		No SPAs selected in Northern Ireland
Biogeographic - Europe	400,000	BirdLife International 2004	4,000	350	<0.1

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-79 to 2006-10	+63%	Cadbury 1980; RBBP; Holling *et al*. 2012
Short-term UK trend	1994-98 to 2006-10	+112%	RBBP; Holling *et al*. 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Corncrake, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-54.pdf.

[97] Final 2009 survey results indicate UK total as 829-1,166 singing males (Wotton *et al.* 2015)

Oronsay and South Colonsay SPA has been classified as an addition to the SPA suite for Corncrake since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union, the African-Eurasian Waterbirds Agreement and the Convention on Migratory Species for this species (Koffijberg & Schaffer 2010). Relevant objectives are as follows:

- "Take into account habitat requirements of the species in management of Special Protection Areas and other protected areas. Apply compensatory payments according to Art. 16 of the Council Regulation 1257/1999 and a comparable strengthened measure in the new regulation."

- "Identify and designate the most suitable areas with >20 singing males, but at least the five most important sites at appropriate geographic level (*e.g.* NUTs regions) if there is no site supporting >20 singing males, as SPA and (where appropriate) implement national legislation for protection."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Promote the instigation of appropriate corncrake management in areas with potential for high recolonisation and continue re-introduction to past range outside of areas where natural recolonisation is likely."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Corncrake, the *Climatic Atlas* predicts loss from Iberia and France and a generally more northerly (though also more fragmented) European breeding distribution with a contraction in the north and west of the UK and an expansion in southern England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Corncrakes were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Meadows and rough, low-intensity pastures. Home ranges very variable: males 4 to 50 ha, females up to 30 ha.	Maintain mixture of low-intensity grassland types.	Maintain suitable feeding habitat within regularly occupied ranges, either based on a generic 30 ha range size or on basis of local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes to a great extent. See Cramp & Simmons 1980; Stowe & Hudson 1988 and Stowe & Hudson 1991.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes to a great extent.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	To some degree. Territorial males occupy ranges of varying size from 4 ha to over 50 ha, wandering through neighbouring territories while foraging, and some may be faithful to ranges between years. Females are non-territorial and will use feeding areas some distance from nest (up to 6.5 km once young can fly), but occupy ranges typically of less than 30 ha.
Is the use of cropped habitats determined by crop type?	Yes to a great extent. Male Corncrakes call from cover in meadows and pastures; early in the season *Iris pseudoacorus* beds in wetter pastures, along field margins, and in other marshy areas are used, but as the season progresses meadows and field margins become important as the vegetation height increases. Birds have also been recorded occasionally calling in cereals and potatoes. Birds occupy home ranges, which are varied in size, and utilise areas of taller vegetation within these ranges for foraging. Areas of short-vegetation, such as close-grazed improved grassland, are avoided.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.

Cropped habitats assessment from SPA Review Decision Framework	
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for Corncrake SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (calling males)	Assessment of UK SPA suite in 2000s (calling males)	Data period	Data source	Comment
Aird & Borve, Benbecula	1.1	28 October 1999	19	7	2009	SCARABBS survey	
Coll (corncrake)	1.1	27 March 2000	24	57	2009	SCARABBS survey	
Eoligarry, Barra	1.1	29 March 1999	28	28	2009	SCARABBS survey	
Kilpheder to Smerclate, South Uist	1.1	29 March 1999	20	16	2009	SCARABBS survey	
Lower Derwent Valley	1.1	Not yet classified	6	0	2009	SCARABBS survey	
Ness & Barvas, Lewis	1.1	29 March 1999	18	6	2009	SCARABBS survey	
North Uist Machair and Islands	1.1	29 March 1999	25	49	2009	SCARABBS survey	
Oronsay and South Colonsay	1.1	1 December 2007	Not classified	28	2009	SCARABBS survey	
Rinns of Islay	1.4	27 November 1995	2	18	2009	SCARABBS survey	
South Uist Machair and Lochs	1.1	1 December 1997	15	19	2009	SCARABBS survey	
Tiree (corncrake)	1.1	27 March 2000	47	122	2009	SCARABBS survey	
		Total for SPAs in GB	204	**350**			
		GB population	480	**1,200**			
		thus GB SPAs hold	42.5% GB	**29.2% GB**			
		Total for SPAs in UK	204	**350**			
		Biogeographic population	87,500	**400,000**			
		thus SPAs hold	0.2% international	**<0.1% international**			

Coot *Fulica atra* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	180,000	Musgrove *et al.* 2011	1,800	12,097	6.7%
All-Ireland	33,160	Crowe *et al.* 2008	330	1,316	4.0%
Biogeographic – NW Europe	1,750,000	Wetlands International 2012	17,500	13,413	0.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1984/85 to 2010/11	+19.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-16.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Coot, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-55.pdf.

The Upper Nene Valley Gravel Pits SPA has been classified as an addition to the SPA suite for Coot since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Coot were not modelled by the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Coot, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with good confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during November each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Upper Nene Valley Gravel Pits SPA in future WeBS counts.

9. Distribution map for non-breeding Coot SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	5 December 1991	12,602	10,618	2004/5-2009/10	WeBS	
Broadland	1.3	Not yet classified	5,747	740	2004/5-2009/10	WeBS	
Ouse Washes	1.3	5 March 1993	2,201	2,567	2004/5-2009/10	WeBS	
Rutland Water	1.3	4 October 1991	3,962	5,016	2004/5-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	11 April 2011	N	2,269	2004/5-2009/10	WeBS	Incomplete count coverage of SPA
		Total for SPAs in GB	15,070	**12,097**	in November		
		GB population	114,100	**180,000**			
		thus GB SPAs hold	13.7% GB	**6.7% GB**			
Lough Neagh and Lough Beg	1.3	Not yet classified	6,993	**1,895**	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	392	**263**	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	3,980	**1,316**	in November		
		All-Ireland population	25,000	**33,160**			
		thus NI SPAs hold	15.9% All-Ireland	**4.0% All-Ireland**			
		Total for SPAs in UK	19,050	**13,413**	in November		
		Biogeographic population	1,500,000	**1,750,000**			
		thus SPAs hold	1.3% international	**0.8% international**			

Common Crane *Grus grus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	9-14	Stanbury *et al.* 2011	1	0	No SPAs selected in GB
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	59,500	BirdLife International 2004	590	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+1,340%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+350%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for breeding Common Crane in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Common Crane, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

This species was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Cranes were not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) - owing to their scarcity at that time) - although they use cropped marshland habitat (notably reedbeds).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel.

9. Distribution map for breeding Common Crane SPA suite

No SPAs have previously been selected for breeding Common Crane.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stanbury, A. & the UK Crane Working Group. 2011. The changing status of the Common Crane in the UK. *British Birds* 104: 432–447.

11. SPA suite

No SPAs have previously been selected for breeding Common Crane.

Common Crane *Grus grus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	52	Stanbury *et al.* 2011	1	0	No SPAs selected in GB
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – NW Europe/Iberia & Morocco	240,000	Wetlands International 2012	2,400	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/12	Increase	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/12	Increase	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Common Crane in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Common Crane were not modelled by the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Common Cranes were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Cranes were not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2006) - owing to their scarcity at that time) - although they use cropped marshland habitat (notably reedbeds).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote counting during January each year so as to enhance quality of assessment of numbers at key sites using numbers from that month.

9. Distribution map for non-breeding Common Crane SPA suite

No SPAs have previously been selected for this species.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

No SPAs have previously been selected for non-breeding Common Crane.

Oystercatcher *Haematopus ostralegus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	110,000	O'Brien 2004	1,100	1,420	1.3%
All-Ireland	3,000	Piersma 1986	30		No SPAs selected in Northern Ireland
Biogeographic – *ostralegus* Europe/S & W Europe & N Africa	273,000	Wetlands International 2012	2,700	1,420	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1970 to 2009	+340.0%	Sharrock 1976; O'Brien *et al.* 2004; Musgrove *et al.* 2012
Short-term UK trend	1998 to 2010	-8.0%	BBS: Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Oystercatcher, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-56A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Oystercatcher, the *Climatic Atlas* predicts a more northern and western distribution and absence from much of the south and east England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

This species was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pastures (rough and improved). No spatial information.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes to a significant extent. It nests in diverse habitats, including a number of cropped habitats, reaching its highest breeding density in the machair of the Western Isles (Galbraith *et al*. 1984). Both unimproved and improved grasslands are utilised, and birds nesting in adjacent

Cropped habitats assessment from SPA Review Decision Framework	
	habitats will feed in pastures, feeding primarily on earthworms.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes to a significant extent. Site use is traditional at locations used.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes to a significant extent.
Is the use of cropped habitats determined by crop type?	Poorly understood.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient (although needs are poorly understood – above)

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure sites within the SPA suite are periodically counted on a co-ordinated basis, and with an assessment undertaken prior to the next SPA network review.

9. Distribution map for breeding Oystercatcher SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
North Uist Machair and Islands	1.4	29 March 1999	630	599	2007	Conway *et al.* 2008	
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.4	30 October 2001	160	192	2007	Conway *et al.* 2008	
South Uist Machair and Lochs	1.4	1 December 1997	577	629	2007	Conway *et al.* 2008	
		Total for SPAs in GB	1,367	**1,420**			
		GB population	33,000	**110,000**			
		thus GB SPAs hold	4.1% GB	**1.3% GB**			
		Total for SPAs in UK	1,367	**1,420**			
		Biogeographic population	290,000	**273,000**			
		thus SPAs hold	0.5% international	**0.5% international**			

Oystercatcher *Haematopus ostralegus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	320,000	Musgrove *et al.* 2011	3,200	196,541	61.4%
All-Ireland	67,620	Crowe *et al.* 2008	680	12,505	18.5%
Biogeographic – *ostralegus*, Europe/S & W Europe & N Africa (East Atlantic Flyway)	820,000	Wetlands International 2012	8,200	209,046	25.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	0.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-16.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Oystercatcher, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-56B.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Oystercatcher since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Oystercatcher were not modelled by the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Oystercatcher, modelled impacts are that, by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during November each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Dornoch Firth and Loch Fleet, Duddon Estuary, Humber Flats and Marshes, Inner Moray Firth, Moray and Nairn Coast, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for non-breeding Oystercatcher SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benfleet and Southend Marshes	1.3	Not yet classified	2,484	1,932	2004/5-2009/10	WeBS	
Burry Inlet	1.2	14 July 1992	13,590	12,841	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	Not yet classified	2,595	3,506	2004/5-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	2,509	2,702	2004/5-2009/10	WeBS	
Dengie (Mid-Essex Coast Phase 1)	1.3	Not yet classified	2,193	2,148	2004/5-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.3	Not yet classified	3,270	2,459	2004/5-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	6,463	6,211	2004/5-2009/10	WeBS	
Exe Estuary	1.3	11 March 1992	4,265	1,810	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	8,931	7,212	2004/5-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	4,215	3,184	2004/5-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.2	4 October 1996	11,756	24,851	2004/5-2009/10	WeBS	
Gibraltar Point	1.3	Not yet classified	3,951	5,815	2004/5-2009/10	WeBS	
Humber Flats Marshes and Coast (Phase 1)	1.3	31 August 2007	5,149	3,684	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	3,063	1,791	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	3,672	2,937	2004/5-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	3,452	3,213	2004/5-2009/10	WeBS	
Moray and Nairn Coast	1.3	Not yet classified	2,171	2,047	2004/5-2009/10	WeBS	
Montrose Basin	1.3	3 February 1995	2,368	2,715	2004/5-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	47,572	55,389	2004/5-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	3,048	3,990	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	16,159	12,674	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 February 1994	2,176	2,706	2004/5-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	28,434	20,791	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Swale	1.3	31 August 1982	3,731	4,320	2004/5-2009/10	WeBS	
The Wash	1.2	30 March 1988	25,651	17,241	2004/5-2009/10	WeBS	
Traeth Lafan/Lavan Sands	1.4	10 June 1992	4,931	6,608	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	30 November 1992	34,694	30,103	2004/5-2009/10	WeBS	
		Total for SPAs in GB	183,049	**196,541**	in November		
		GB population	359,000	**320,000**			
		thus GB SPAs hold	50.8% GB	**61.4% GB**			
Belfast Lough	1.3	Not yet classified	5,963	4,034	2004/5-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	2,028	3,371	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	5,243	8,410	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	11,849	**12,505**	in November		
		All-Ireland population	50,000	**67,620**			
		thus NI SPAs hold	23.7% All-Ireland	**18.5% All-Ireland**			
		Total for SPAs in UK	194,898	**209,046**	in November		
		Biogeographic population	874,000	**820,000**			
		thus SPAs hold	21.7% international	**25.5% international**			

Avocet *Recurvirostra avosetta* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,500	Holling *et al.* 2012	15	885	59.0%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – W Europe	30,300	Stroud *et al*. 2004	300	885	2.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+113%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+784%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Avocet, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-57A.pdf.

Stour and Orwell, and Humber Estuary were added to the SPA suite in the 2005 and 2007 respectively. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Avocet, the *Atlas* predicts almost total extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Avocets were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient, especially in northern parts of the range.
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of breeding Avocet, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Review annual monitoring protocols at each SPA to ensure coverage is complete and that any zero counts are reported also to Rare Breeding Birds Panel.

9. Distribution map for breeding Avocet SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Holling, M. & the Rare Breeding Birds Panel. 2012. Rare breeding birds in the United Kingdom in 2010. *British Birds* 105: 352–416.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Alde-Ore Estuary	1.1	4 October 1996	104	64	Mean 2005-2009	RBBP	
Foulness	1.1	4 October 1996	46	31	Mean 2005-2009	RBBP	
Humber Estuary	1.1	31 August 2007	Not classified	168	Mean 2005-2009	RBBP	
Medway Estuary and Marshes	1.1	15 December 1993	28	75	Mean 2005-2009	RBBP	
Minsmere – Walberswick	1.1	19 May 1992	91	126	Mean 2005-2009	RBBP	
North Norfolk Coast	1.1	20 January 1989	177	276	Mean 2005-2009	RBBP	
Stour and Orwell	1.1	13 July 1994	Not classified	7	Mean 2005-2009	RBBP	
The Swale	1.1	Not yet classified	103	138	Mean 2005-2009	RBBP	
		Total for SPAs in GB	549	**885**			
		GB population	592	**1,500**			
		thus GB SPAs hold	92.7% GB	**59.0% GB**			
		Total for SPAs in UK	549	**885**			
		Biogeographic population	26,800	**30,300**			
		thus SPAs hold	2.1% international	**2.9% international**			

Avocet *Recurvirostra avosetta* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	7,500	Musgrove *et al.* 2011	75	6,396	85.3%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – W Europe & NW Africa	73,000	Wetlands International 2012	730	6,396	8.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+4,900%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+56.3%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Avocet, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-57B.pdf.

The Humber Estuary has been added to the SPA suite for non-breeding Avocet since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Avocet was not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Avocet, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with moderate confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Colne Estuary (Mid-Essex Coast Phase 2), and Humber Estuary SPAs in future WeBS counts.

9. Distribution map for non-breeding Avocet SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Alde-Ore Estuary	1.1	4 October 1996	766	1,410	2004/5-2009/10	WeBS	
Blackwater Estuary	1.1	Not yet classified	76	501	2004/5-2009/10	WeBS	
Breydon Water	1.1	29 March 1996	33	673	2004/5-2009/10	WeBS	
Colne Estuary	1.1	Not yet classified	75	630	2004/5-2009/10	WeBS	
Deben Estuary	1.1	11 March 1996	95	285	2004/5-2009/10	WeBS	
Exe Estuary	1.1	11 March 1992	359	447	2004/5-2009/10	WeBS	
Foulness	1.1	4 October 1996	100	338	2004/5-2009/10	WeBS	
Hamford Water	1.1	8 June1993	317	571	2004/5-2009/10	WeBS	
Humber Estuary	1.1	31 August 2007	Not classified	639	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.1	15 December 1993	314	1,027	2004/5-2009/10	WeBS	
Minsmere-Walberswick	1.1	Not yet classified	278	542	2004/5-2009/10	WeBS	
North Norfolk Coast	1.1	20 January 1989	153	606	2004/5-2009/10	WeBS	
Poole Harbour	1.1	31 March 1999	459	1,289	2004/5-2009/10	WeBS	
Tamar Estuaries Complex	1.1	26 June 1997	201	471	2004/5-2009/10	WeBS	
Thames Estuary and Marshes	1.1	31 March 2000	276	1,410	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Swale	1.1	Not yet classified	89	502	2004/5-2009/10	WeBS	
The Wash	1.1	Not yet classified	110	583	2004/5-2009/10	WeBS	
		Total for SPAs in GB	2,225	**6,396**	in January		
		GB population	1,270	**7,500**			
		thus GB SPAs hold	c. 100% GB	**85.3% GB**			
		Total for SPAs in UK	2,225	**6,396**	in January		
		Biogeographic population	67,000	**73,000**			
		thus SPAs hold	3.2% international	**8.8% international**			

Stone Curlew *Burhinus oedicnemus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	350	Holling *et al.* 2012	3	230	65.7%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – *oedicnemus*, W Europe	46,400	Thorup 2006	45	230	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+533%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+84%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Stone Curlew, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-58.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Protect important sites for this species from damaging developments."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Stone Curlew, the *Climatic Atlas* predicts an extended breeding distribution in south and east England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Stone Curlew, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Close-grazed, unimproved pasture and spring-sown arable crops. Feed within 3 km of nest, but no other spatial information.	Maintain close-grazed, low-input pastures and suitable crop sowing regimes.	Maintain suitable feeding habitat within 3 km of nesting areas, either by generic approach or on basis of local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Low fidelity
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Probably low fidelity
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Low fidelity
Is the use of cropped habitats determined by crop type?	Yes, significantly so
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No
Assessment outcome: [If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats); or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats).]	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Review current monitoring to ensure the necessary programmes for long-term monitoring of SPAs and the national population is put in place.

9. Distribution map for Stone Curlew SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Breckland	1.1	21 September 2006	142	195	2011	Assessment from RSPB (T. Cowan in litt.)	
Porton Down	1.1	3 July 1992	20	12	2011	per NE	
Salisbury Plain	1.1	3 November 1993	22	23	2011	per NE	
		Total for SPAs in GB	184	**230**			
		GB population	188	**350**			
		thus GB SPAs hold	98.0% GB	**65.7% GB**			
		Total for SPAs in UK	184	**230**			
		Biogeographic population	32,690	**46,400**			
		thus SPAs hold	0.6% international	**0.5% international**			

Ringed Plover *Charadrius hiaticula* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	5,300	Conway *et al.* in prep.	55	1,023	19.3%
All-Ireland	1,250	Gibbons *et al.* 1993	10	0	No SPAs selected in Northern Ireland
Biogeographic – *hiaticula*, N Europe/Europe & N Africa	24,000	Stroud *et al*. 2004; Wetlands International 2012	240	1,023	4.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1973-74 to 2009	-6.0%	Prater 1976; Conway *et al.* in prep.
Short-term UK trend	1998 to 2010	Unquantified decline	Conway *et al.* in prep.

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Ringed Plover, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-59A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Ringed Plovers, the *Climatic Atlas* predicts a more north-westerly distribution and absence from the south and east of England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Ringed Plovers were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Dry, cultivated machair. No spatial information.	Insufficient information.	Insufficient information for identifying important feeding areas away from nesting areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes
Is the use of cropped habitats determined by crop type?	Yes
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats); or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats).	Whilst site selection in principle is an appropriate strategy for concentrations of this species in cropped habitats, at this time the species suite is considered sufficient. However, there is insufficient information for identifying important feeding areas away from nesting areas.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure all sites within SPA suite are periodically counted on a co-ordinated basis, and with an assessment undertaken prior to the next SPA Network review.

Given that there is insufficient information for identifying important feeding areas away from nesting areas in the breeding season, further relevant surveys and studies to this end would be valuable.

9. Distribution map for breeding Ringed Plover SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
North Norfolk Coast	1.2	Not yet classified	220	198	2007	Conway *et al.* 2008	
North Uist Machair and Islands	1.2	29 March 1999	240	225	2007	Conway *et al.* 2008	
Papa Stour	1.4	Not yet classified	89	69	2007	Conway *et al.* 2008	
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.2	30 October 2001	160	156	2007	Conway *et al.* 2008	
South Uist Machair and Lochs	1.2	1 December 1997	393	375	2007	Conway *et al.* 2008	
		Total for SPAs in GB	1,102	**1,023**			
		GB population	8,500	**5,300**			
		thus GB SPAs hold	13.0% GB	**19.3% GB**			
		Total for SPAs in UK	1,102	**1,023**			
		Biogeographic population	16,000	**24,000**			
		thus SPAs hold	6.9% international	**4.3% international**			

Ringed Plover *Charadrius hiaticula* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	34,000	Musgrove *et al.* 2011	340	4,206	12.4%
All-Ireland	14,580	Crowe *et al.* 2008	150	399	2.7%
Biogeographic – *hiaticula*, N Europe/Europe & N Africa	73,000	Stroud *et al*. 2004; Wetlands International 2012	730	4,605	6.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-37.1%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-44.4%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Ringed Plover, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-59b.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Ringed Plover was not included in the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Ringed Plover, modelled impacts are as follows: by 2050, under a medium emissions scenario, autumn passage and wintering numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%, and for spring passage numbers to increase by up to 25% (with moderate confidence).

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

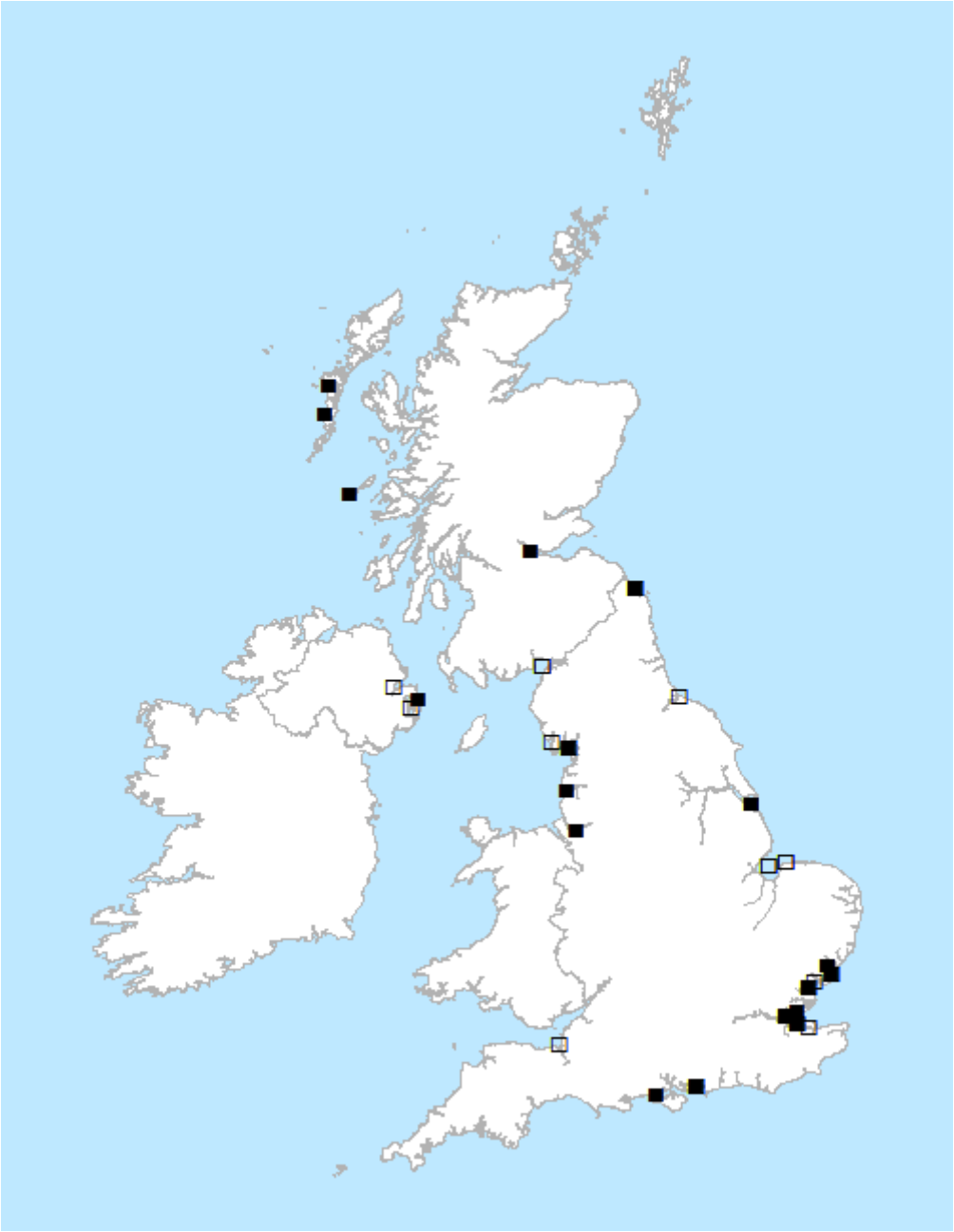
Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Duddon Estuary, Humber Estuary, Medway Estuary and Marshes, Tiree Wetlands and Coast, and Upper Solway Flats and Marshes SPAs in future WeBS counts. Numbers during the spring passage period are poorly known at WeBS sites in the north of Scotland, in particular those SPAs around the Moray Firth.

Undertake and report on numbers on Tiree Wetlands and Coast in the absence of January data from the 2000s.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for non-breeding Ringed Plover SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benfleet and Southend Marshes	1.2	14 February 1994	800	431	2005/6-2009/10	WeBS	
Blackwater Estuary	1.2	12 May 1995	955	555	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	28 October 1987	2,471	426	2005/6-2009/10	WeBS	
Colne Estuary	1.3	Not yet classified	370	292	2005/6-2009/10	WeBS	
Duddon Estuary	1.2	Not yet classified	628	375	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	413	619	2005/6-2009/10	WeBS	
Hamford Water	1.2	8 June 1993	1,572	325	2005/6-2009/10	WeBS	
Humber Estuary	1.3	31 August 2007	762	2,505	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Lindisfarne	1.2	11 March 1992	527	577	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	1,337	181	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Mersey Estuary	1.2	20 December 1995	1,453	435	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Morecambe Bay	1.2	4 October 1996	693	797	2005/6-2009/10	WeBS	
North Norfolk Coast	1.2	Not yet classified	1,256	1,991	2005/6-2009/10	WeBS	
North Uist Machair and Islands	1.2	29 March 1999	590	116	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries	1.2	16 February 1995	995	3,479	2005/6-2009/10	WeBS	
Severn Estuary	1.2	Not yet classified	655	1,455	2005/6-2009/10	WeBS	
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.2	30 October 2001	475	[475]	1995, 1998 & 1999	RSPB	No more recent counts. Assumed numbers unchanged from the 1990s
Solent and Southampton Water	1.2	1 October 1998	552	437	2005/6-2009/10	WeBS	
South Uist Machair and Lochs	1.2	1 December 1997	490	107	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	578	721	2005/6-2009/10	WeBS	
Teesmouth & Cleveland Coast	1.2	Not yet classified	634	257	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Thames Estuary and Marshes	1.2	31 March 2000	559	577	2005/6-2009/10	WeBS	
The Swale	1.2	Not yet classified	683	830	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
The Wash	1.2	Not yet classified	1,185	1,404	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	Not yet classified	729	1,644	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
		Total for SPAs in GB	6,169	**4,206**	in January		
		GB population	28,600	**34,000**			
		thus GB SPAs hold	21.3% GB	**12.4% GB**			
Belfast Lough	1.3	Not yet classified	148	**183**	2005/6-2009/10	WeBS	
Outer Ards	1.2	11 December 2002	545	**264**	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	291	**194**	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	643	**399**	in January		
		All-Ireland population	12,500	**14,580**			
		thus NI SPAs hold	5.1% GB	**2.7% All-Ireland**			
		Total for SPAs in UK	6,812	**4,605**	in January		
		Biogeographic population	47,500	**73,000**			
		thus SPAs hold	13.6% international	**6.3% international**			

Dotterel *Charadrius morinellus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	630	Whitfield 2002	6	241	38.3%
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic - Europe	25,000	Stroud *et al*. 2004	250	241	1.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	168-72 to 2011	+504%	Whitfield 2002; Hayhow *et al.* 2015
Short-term UK trend	1999 to 2011	-43%	Sharrock 1976; Hayhow *et al.* 2015

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Dotterel, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-60.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Dotterel, the *Climatic Atlas* predicts virtual extinction in the UK with a significant range contraction into the Scottish highlands, especially the Cairngorms where the high altitude terrain is likely to retain the climate 'envelope' for longest.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Dotterel, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with good confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient – sites in south of range should be reviewed
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

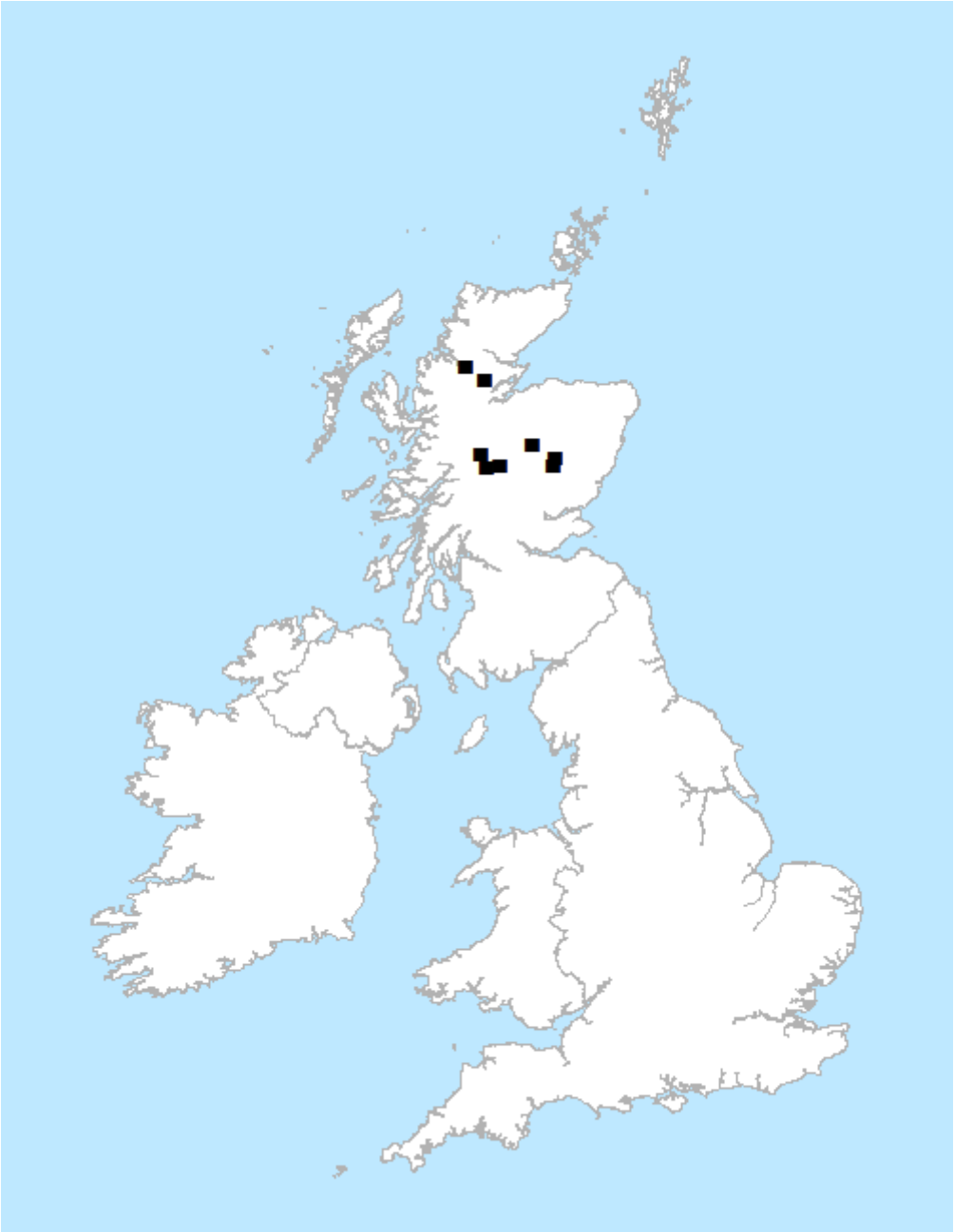
7. Scientific advice regarding SPA suite

In the light of decreasing numbers, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Dotterel, and additional SPA provision should be considered.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for Dotterel SPA suite



Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Davidson, N.C., West, R., Scott, D.A., Hanstra, L., Thorup, O., Ganter, B. & Delany, S. (compilers) on behalf of the International Wader Study Group 2004. *Status of migratory wader populations in Africa and Western Eurasia in the 1990s.* International Wader Studies 15: 1-259. Available at: http://www.waderstudygroup.org/pubs/iws15.php

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Beinn Dearg	1.1	30 March 1998	22	16	2011	SCARABBS; Hayhow *et al.* 2015	
Ben Alder	1.1	2 February 2000	26	26	2011	SCARABBS; Hayhow *et al.* 2015	
Ben Wyvis	1.1	28 October 1998	20	2	2011	SCARABBS; Hayhow *et al.* 2015	
Caenlochan	1.1	25 September 1997	40	19	2011	SCARABBS; Hayhow *et al.* 2015	
Cairngorms	1.1	25 September 1997	240	156	2011	SCARABBS; Hayhow *et al.* 2015	
Creag Meagaidh	1.1	30 March 1998	23	2	2011	SCARABBS; Hayhow *et al.* 2015	
Drumochter Hills	1.1	25 September 1997	70	18	2011	SCARABBS; Hayhow *et al.* 2015	
Lochnagar	1.1	12 June 1998	28	2	2011	SCARABBS; Hayhow *et al.* 2015	
		Total for SPAs in GB	469	**241**			
		GB population	840	**630**			
		thus GB SPAs hold	55.8% GB	**38.3% GB**			
		Total for SPAs in UK	469	**241**			
		Biogeographic population	17,922	**25,000**			
		thus SPAs hold	2.6% international	**1.0% international**			

Golden Plover *Pluvialis apricaria* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	48,900	O'Brien 2004	490	10,055[98]	20.6%
All-Ireland	400	Gibbons *et al.* 1993	4	4	1.0%
Biogeographic – *apricaria*, Britain, Ireland, Germany, Denmark & Baltic	59,500	Delany *et al*. 2009	600	10,059	16.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1968-72 to 1980-2000	+64.0%	Sharrock 1976; O'Brien 2004
Short-term UK trend	1998 to 2010	-5.7%[99]	BBS; Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Golden Plover, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-61A.pdf.

[98] Note a high degree of uncertainly is attached to this total – see Section 11

[99] See also Sim *et al.* (2005) for recent assessments of population trends in the British uplands

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Béchet 2009). Relevant objectives are as follows:

- "Golden Plover breeding habitat is managed where appropriate according to scientific empirical and experimental evidence favouring breeding productivity."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Golden Plover, the *Climatic Atlas* predicts virtual extinction in England, Wales and Ireland and an absence in much of southern and central Scotland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Golden Plover was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved, close-grazed pastures, 2 km from moorland edge.	Maintain open moorland/pasture interface.	Maintain improved pastures within 2 km of moorland edge, either by generic approach or on basis of local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes to a significant extent. Golden Plovers nest on short-sward moorland, but adults forage primarily in pastures close to nesting

Cropped habitats assessment from SPA Review Decision Framework	
	areas during incubation. Improved, closely grazed pastures are favoured, and arable fields may also be used for foraging.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes to a significant extent.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes. Individual birds show a high degree of fidelity to feeding areas, even if these change slightly in quality over time, although birds from the same pair may use a different selection of fields. Most fields used are within 4 km of the nest and 2 km from the moorland edge. In one study, travel distance to feeding areas was on average 2.7 km, but some birds foraged up to10 km from the nest.
Is the use of cropped habitats determined by crop type?	Yes. Field choice is related to number of molehills (an indicator of earthworm abundance), distance from roads and uneveness of ground, and larger fields may be selected. Diet includes a variety of soil and ground living invertebrates, and earthworms and Tipulidae larvae are important.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats such as inbye adjacent to moorland breeding areas.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage. Further, site boundaries of particular SPAs should be reviewed, especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Establish monitoring regimes at Caithness and Sutherland Peatlands, Lewis Peatlands, Muirkirk and North Lowther Uplands, North York Moors and South Pennine Moors SPAs (for which no contemporary assessments exist) to ensure that population numbers on all sites within the terrestrial SPA suite and surrounding areas can be assessed by the time of the next national review. (Monitoring can be linked to surveys of breeding Dunlin and Greenshank on the same sites).

9. Distribution map for breeding Golden Plover SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.1	2 February 1999	1,064	1,992	2009	Bellamy & Eaton 2010	
Lewis Peatlands	1.1	7 December 2000	1,978	1,578	See comment		In absence of new whole site census, a site total was derived from the BBS trend for Scotland of -20.2% over the period 1995–2010 based on 38 BBS squares
Muirkirk and North Lowther Uplands	1.1	7 March 2003	175	123	See comment		In absence of new whole site census, a site total was derived from the BBS trend for Scotland of -20.2% over the period 1995–2010 based on 38 BBS squares
North Pennine Moors	1.1	9 February 2001	1,400	4,171	2005-07	Shepherd 2008	
North York Moors	1.1	12 May 2000	526	902	See comment		In absence of new whole site census, a site total was derived from the BBS trend for England of 71.5% over the period 1995–2010 based on 21 BBS squares
South Pennine Moors	1.1	2 February 1999	752	1,289	See comment		In absence of new whole site census, a site total was derived from the BBS trend for England of 71.5% over the period 1995–2010 based on 21 BBS squares
		Total for SPAs in GB	5,895	**10,055**			**Note a high degree of uncertainty is attached to this total**
		GB population	22,600	**48,900**			
		thus GB SPAs hold	26.1% GB	**20.6% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Pettigoe Plateau	1.1	12 June 1996	12	4			
		Total for SPAs in Northern Ireland	12	**4**			
		All-Ireland population	400	**400**			
		thus NI SPAs hold	3.0% All-Ireland	**1.0% All-Ireland**			
		Total for SPAs in UK	5,907	**10,059**			**Note a high degree of uncertainty is attached to this total**
		Biogeographic population	474,900	**59,500**			
		thus SPAs hold	1.2% international	**16.9% international**			

Golden Plover *Pluvialis apricaria* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	400,000	Gillings & Fuller 2009	4,000	118,612	29.7%
All-Ireland	166,700	Crowe *et al.* 2008	1,700	11,516	6.9%
Biogeographic - *altifrons*, Iceland & Faroes/ E Atlantic Coast	930,000	Stroud *et al.* 2004; Wetlands International 2012	9,300	130,128	14.0%

2b. Population trend

	Period of trend	Trend	Source
Long-term trend	1980/81 to 2010/11	+150.0%	WeBS; Holt *et al.* 2012
Short-term trend	1999/2000 to 2010/11	-45.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Golden Plover, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-61b.pdf.

The Upper Nene Valley Gravel Pits have been added to the SPA suite for Golden Plover since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Béchet 2009). Relevant objectives are as follows:

- “Golden Plovers wintering habitat is managed according to scientific empirical and experimental evidence favouring winter survival. In particular, nature-friendly agriculture is encouraged to maintain soil earthworms (and other invertebrates) biodiversity.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Golden Plover was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Golden Plover, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Roost on ploughed fields. Feed primarily in improved pasture. No spatial information available.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	High site fidelity
Does the species show between-year fidelity to cropped habitats as part of its ecological	Yes, high fidelity to sites with cropped habitats

Cropped habitats assessment from SPA Review Decision Framework	
requirements?	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, moderate fidelity. (High fidelity at a coarse scale, lower fidelity at the field scale, due to crop/ley rotations).
Is the use of cropped habitats determined by crop type?	Moderately so (permanent pasture preferred, but will use other crops)
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required including wider countryside measures to preserve and promote permanent pasture as feeding and roosting habitat for the species.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and there are no other factors suggesting a need to revise the previously identified suite of SPAs. Site boundaries of particular SPAs however, should be reviewed especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring is informed by WeBS. Ensure coverage of key and other WeBS count sites including any additional areas added to existing SPAs as a consequence of any boundary revisions (see Section 7).

Promote the counting of all sites within SPA suite (and surrounding, linked areas) during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, Upper Nene Valley Gravel Pits, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for non-breeding Golden Plover SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.1	Not yet classified	3,714	133	2005/6-2009/10	WeBS	
Blackwater Estuary	1.1	Not yet classified	7,247	11,659	2005/6-2009/10	WeBS	
Breydon Water	1.1	29/03/1996	5,040	13,286	2005/6-2009/10	WeBS	
Colne Estuary	1.1	Not yet classified	2,530	5,093	2005/6-2009/10	WeBS	
Firth of Forth	1.1	30 October 2001	2,970	2,664	2005/6-2009/10	WeBS	
Foulness	1.1	Not yet classified	3,359	3,412	2005/6-2009/10	WeBS	
Hamford Water	1.1	Not yet classified	4,118	7,124	2005/6-2009/10	WeBS	
Humber Estuary	1.1	31 August 2007	29,235	40,278	2005/6-2009/10	WeBS	
Lindisfarne	1.1	11 March 1992	5,300	5,655	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.1	8 June 1993	6,000	5,887	2005/6-2009/10	WeBS	
Mersey Estuary	1.1	20 December 1995	3,070	1,420	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Morecambe Bay	1.1	Not yet classified	4,097	5,768	2005/6-2009/10	WeBS	
North Norfolk Coast	1.1	Not yet classified	2,667	4,893	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries	1.1	16 February 1995	4,277	5,578	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.1	26 June 1997	3,029	10,967	2005/6-2009/10	WeBS	
The Swale	1.1	Not yet classified	2,862	11,818	2005/6-2009/10	WeBS	
The Wash	1.1	Not yet classified	11,037	28,253	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.1	11 April 2011	Not classified	5,147	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Upper Solway Flats and Marshes	1.1	30 November 1992	6,121	4,430	2005/6-2009/10	WeBS	
		Total for SPAs in GB	54,439	**118,612**	in January		
		GB population	250,000	**400,000**			
		thus GB SPAs hold	21.8% GB	**29.7% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Lough Foyle	1.1	Not yet classified	4,891	7,993	2005/6-2009/10	WeBS	
Lough Neagh and Lough Beg	1.1	Not yet classified	5,298	6,550	2005/6-2009/10	WeBS	
Outer Ards	1.1	11 December 2002	2,079	734	2005/6-2009/10	WeBS	
Strangford Lough	1.1	Not yet classified	6,526	4,786	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	12,794	**11,516**	in January		
		All-Ireland population	200,000	**166,700**			
		thus NI SPAs hold	6.4% All-Ireland	**6.9% All-Ireland**			
		Total for SPAs in UK	67,233	**130,128**	in January		
		Biogeographic population	1,800,000	**930,000**			
		thus SPAs hold	3.7% international	**14.0% international**			

Grey Plover *Pluvialis squatarola*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	43,000	Musgrove *et al.* 2011	430	35,931	83.6%
All-Ireland	6,315	Crowe *et al.* 2008	65	91	1.4%
Biogeographic - W Siberia & Canada/W Europe & W Africa	247,000	Stroud *et al*. 2004	2,500	36,022	14.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term trend	1980/81 to 2010/11	+66.7%	WeBS; Holt *et al.* 2012
Short-term trend	1999/2000 to 2010/11	-9.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Grey Plover, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-62.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Grey Plover since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Grey Plover was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Grey Plover, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with moderate confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during February each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Colne Estuary (Mid-Essex Coast Phase 2), Humber Estuary, Medway Estuary and Marshes, Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for Grey Plover SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benfleet and Southend Marshes	1.2	14 February 1994	3,789	1,394	2005/6-2009/10	WeBS	
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.2	12 May 1995	5,090	4,323	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	28 October 1987	3,825	2,291	2005/6-2009/10	WeBS	
Colne Estuary (Mid-Essex Coast Phase 2)	1.3	Not yet classified	1,100	840	2005/6-2009/10	WeBS	Incomplete count coverage of SPA
Dengie (Mid-Essex Coast Phase 1)	1.2	24 March 1994	2,411	8,862	2005/6-2009/10	WeBS	
Exe Estuary	1.2	11 March 1992	471	278	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	704	396	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	933	701	2005/6-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.2	4 October 1996	4,209	4,208	2005/6-2009/10	WeBS	
Gibraltar Point	1.2	5 March 1993	2,017	1,538	2005/6-2009/10	WeBS	
Hamford Water	1.2	8 June 1993	3,251	2,672	2005/6-2009/10	WeBS	
Humber Flats and Marshes	1.3	31 August 2007	1,338	2,879	2005/6-2009/10	WeBS	
Lindisfarne	1.2	11 March 1992	1,570	1,864	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	3,406	1,302	2005/6-2009/10	WeBS	
Mersey Estuary	1.2	20 December 1995	1,013	296	2005/6-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	525	787	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	24 September 1999	1,813	991	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	1,187	1,624	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	6,073	4,642	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	625	410	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	1,426	1,078	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Stour and Orwell Estuaries	1.2	13 July 1994	3,660	2,655	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.2	31 March 2000	1,245	911	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	2,193	1,083	2005/6-2009/10	WeBS	
The Swale	1.2	31 August 1982	2,021	1,817	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	9,708	10,666	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	30 November 1992	1,036	354	2005/6-2009/10	WeBS	
		Total for SPAs in GB	38,684	**35,931**	in February		
		GB population	43,200	**43,000**			
		thus GB SPAs hold	90.0% GB	**83.6% GB**			
Strangford Lough	1.3	Not yet classified	194	130	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	158	**91**	in February		
		All-Ireland population	4,000	**6,315**			
		thus NI SPAs hold	4.0% All-Ireland	**1.4% All-Ireland**			
		Total for SPAs in UK	38,842	**36,022**	in February		
		Biogeographic population	168,000	**247,000**			
		thus SPAs hold	25.9% international	**14.6% international**			

Lapwing *Vanellus vanellus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	620,000	Gillings & Fuller 2009	6,200	212,726	34.3%
All-Ireland	207,700	Crowe *et al.* 2008	2,100	11,394	5.5%
Biogeographic – W Asia/SW Asia, Europe & W Asia	7,500,000	Delany *et al*. 2009	20,000**	224,120	3.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+96.1%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-47.4%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Lapwing, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-63.pdf.

The Upper Nene Valley Gravel Pits have been added to the SPA suite for Lapwing since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Petersen 2009).

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Lapwing was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Lapwing, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with good confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Roost on ploughed fields. Feed primarily in improved pasture – old pasture preferred. No spatial information available.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	High site fidelity
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, high fidelity to sites with cropped habitats

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, moderate fidelity. (High fidelity to wider area, but use of individual fields may change both between years and during a single non-breeding season).
Is the use of cropped habitats determined by crop type?	Moderately so (permanent pasture preferred, but will use other crops)
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and there are no other factors suggesting a need to revise the previously identified suite of SPAs. Site boundaries of particular SPAs however, should be reviewed especially in the context of feeding areas or other functional needs.

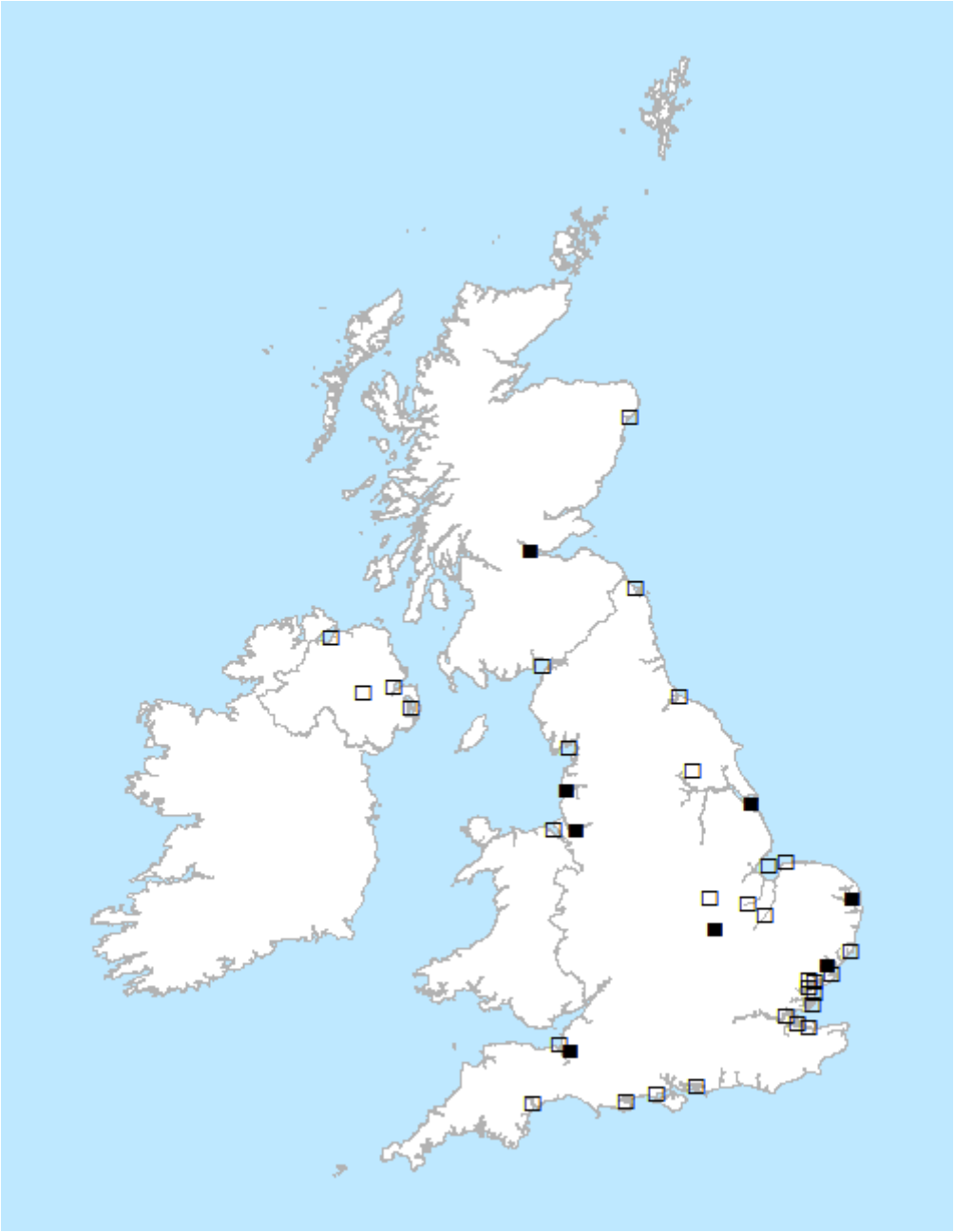
8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring informed by WeBS. Ensure coverage of key and other WeBS count sites including any additional areas added to existing SPAs as a consequence of any boundary revisions (see Section 7).

Promote the counting of all sites within SPA suite (and surrounding, linked areas) during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Colne Estuary (Mid-Essex Coast Phase 2), Humber Estuary, Thames Estuary and Marshes, Upper Nene Valley Gravel Pits, and Lough Foyle SPAs in future WeBS counts.

9. Distribution map for non-breeding Lapwing SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	Not yet classified	7,295	1,933	2005/6-2009/10	WeBS	
Alde-Ore Estuary	1.3	Not yet classified	4,879	5,048	2005/6-2009/10	WeBS	
Blackwater Estuary	1.3	Not yet classified	21,335	7,745	2005/6-2009/10	WeBS	
Breydon Water	1.3	29 March 1996	24,940	15,663	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	Not yet classified	4,510	2,550	2005/6-2009/10	WeBS	
Colne Estuary	1.3	Not yet classified	8,187	3,814	2005/6-2009/10	WeBS	Incomplete count coverage of SPA
Dengie	1.3	Not yet classified	2,539	2,025	2005/6-2009/10	WeBS	
Exe Estuary	1.3	Not yet classified	2,250	905	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	4,148	4,717	2005/6-2009/10	WeBS	
Foulness	1.3	Not yet classified	7,687	5,101	2005/6-2009/10	WeBS	
Hamford Water	1.3	Not yet classified	6,367	3,869	2005/6-2009/10	WeBS	
Humber Estuary	1.3	31 August 2007	36,403	17,919	2005/6-2009/10	WeBS	
Lindisfarne	1.3	Not yet classified	2,148	2,608	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.3	Not yet classified	9,711	5,267	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.3	Not yet classified	5,040	5,995	2005/6-2009/10	WeBS	
Mersey Estuary	1.3	20 December 1995	11,680	7,154	2005/6-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	17,669	17,109	2005/6-2009/10	WeBS	
Nene Washes	1.3	Not yet classified	6,512	5,943	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	4,351	11,187	2005/6-2009/10	WeBS	
Ouse Washes	1.3	Not yet classified	8,589	13,505	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	5,258	400	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries	1.2	16 February 1995	21,674	18,721	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Rutland Water	1.3	Not yet classified	3,744	2,820	2005/6-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	7,953	12,057	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	7,768	5,398	2005/6-2009/10	WeBS	
Somerset Levels and Moors	1.2	26 June 1997	36,316	40,723	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	6,122	3,865	2005/6-2009/10	WeBS	
Teesmouth & Cleveland Coast	1.3	Not yet classified	4,037	4,420	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	5,552	3,444	2005/6-2009/10	WeBS	
The Dee Estuary	1.3	Not yet classified	5,478	6,738	2005/6-2009/10	WeBS	
The Swale	1.3	Not yet classified	8,077	14,283	2005/6-2009/10	WeBS	
The Wash	1.3	Not yet classified	28,433	25,422	2005/6-2009/10	WeBS	
Upper Nene Valley Gravel Pits	1.3	11 April 2011	Not classified	2,412	2005/6-2009/10	WeBS	Incomplete count coverage of SPA
Upper Solway Flats and Marshes	1.3	Not yet classified	8,632	6,909	2005/6-2009/10	WeBS	
Ythan Estuary Sands of Forvie and Meikle Loch	1.3	Not yet classified	2,542	2,303	2005/6-2009/10	WeBS	
		Total for SPAs in GB	196,995	**212,726**	in January		
		GB population	1,500,000	**620,000**			
		thus GB SPAs hold	9.8% GB	**34.3% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Belfast Lough	1.3	Not yet classified	2,507	1,200	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	3,084	2,943	2005/6-2009/10	WeBS	
Lough Neagh and Lough Beg	1.3	Not yet classified	6,899	5,728	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	8,359	4,445	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	15,839	**11,394**	in January		
		All-Ireland population	250,000	**207,700**			
		thus NI SPAs hold	6.3% All-Ireland	**5.5% All-Ireland**			
		Total for SPAs in UK	212,834	**224,120**	in January		
		Biogeographic population	7,000,000	**7,500,000**			
		thus SPAs hold	3.0% international	**3.0% international**			

Knot *Calidris canutus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	320,000	Musgrove *et al.* 2011	3,200	282,859	88.4%
All-Ireland	18,970	Crowe *et al.* 2008	190	1,799	9.5%
Biogeographic – *islandica*, NE Canada & Greenland/W Europe	450,000	Stroud *et al*. 2004; Wetlands International 2012	4,500	284,658	63.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+11.1%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+23.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Knot, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-64.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Knot since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species, although there is very considerable international literature on the population structure and management needs of Knot (*e.g.* Piersma & Davidson 1992; Piersma 1994; Piersma & Koolhaas 1997; Leyrer 2011) which is a flagship species for European estuarine conservation.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Knot was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Knot, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during November each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for Knot SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Benfleet and Southend Marshes	1.2	14 February 1994	8,850	9,738	2004/5-2009/10	WeBS	
Burry Inlet	1.2	14 July 1992	2,153	3,779	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	Not yet classified	2,875	1,764	2004/5-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	3,078	2,289	2004/5-2009/10	WeBS	
Dengie (Mid-Essex Coast Phase 1)	1.2	24 March 1994	8,393	18,537	2004/5-2009/10	WeBS	
Duddon Estuary	1.2	16 March 1998	4,495	1,234	2004/5-2009/10	WeBS	
Firth of Forth	1.2	Not yet classified	8,013	3,752	2004/5-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.2	4 October 1996	40,429	30,478	2004/5-2009/10	WeBS	
Gibraltar Point	1.2	Not yet classified	10,155	63,260	2004/5-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	33,848	38,388	2004/5-2009/10	WeBS	
Lindisfarne	1.2	Not yet classified	3,827	3,477	2004/5-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	3,300	11,927	2004/5-2009/10	WeBS	
Montrose Basin	1.2	3 February 1995	4,500	1,618	2004/5-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	29,426	44,879	2004/5-2009/10	WeBS	
North Norfolk Coast	1.2	20 January 1989	10,801	45,507	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.2	16 February 1995	57,865	45,746	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	3,293	5,464	2004/5-2009/10	WeBS	
Teesmouth and Cleveland Coast	1.2	15 August 1995	4,190	1,535	2004/5-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	21,553	14,822	2004/5-2009/10	WeBS	
The Swale	1.2	Not yet classified	5,582	3,750	2004/5-2009/10	WeBS	
The Wash	1.2	30 March 1988	186,892	125,785	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Upper Solway Flats and Marshes	1.2	30 November 1992	12,271	11,252	2004/5-2009/10	WeBS	
		Total for SPAs in GB	242,039	**282,859**	in November		
		GB population	291,000	**320,000**			
		thus GB SPAs hold	83.5% GB	**88.4% GB**			
Belfast Lough	1.3	Not yet classified	444	73	2004/5-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	441	327	2004/5-2009/10	WeBS	
Strangford Lough	1.2	9 March 1998	8,723	5,335	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	3,863	**1,799**	in November		
		All-Ireland population	37,500	**18,970**			
		thus NI SPAs hold	10.3% All-Ireland	**9.5% All-Ireland**			
		Total for SPAs in UK	245,902	**284,658**	in November		
		Biogeographic population	345,000	**450,000**			
		thus SPAs hold	70.3% international	**63.3% international**			

Sanderling *Calidris alba*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	16,000	Musgrove *et al.* 2011	160	9,896	61.9%
All-Ireland	6,680	Crowe *et al.* 2008	65		No SPAs selected in Northern Ireland
Biogeographic – *alba*, East Atlantic Europe, W & S Africa (win)	120,000	Delany *et al*.2009; Wetlands International 2012	1,200	9,896	8.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+63.9%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+29.9%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Sanderling, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-65.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Sanderling since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Sanderling was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Sanderling, modelled impacts are as follows: by 2050, under a medium emissions scenario, wintering numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%, and for autumn passage numbers to decline by up to 25% with low confidence.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during May each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, Ribble and Alt Estuaries, Upper Solway Flats and Marshes, and South Uist Machair SPAs in future WeBS counts.

Seek to enhance regular population monitoring in Orkney and the Western Isles, not just through the Non-Estuarine Waterbird Survey but on a more regular basis. In particular, good knowledge is lacking not only of regular peak numbers in northern and western Scotland (particularly Orkney and the Western Isles), but also of turnover rates during passage periods. This applies not only to SPAs, but also to adjacent stretches of suitable habitat.

Undertake and report on numbers on South Uist Machair and Lochs in the absence of May data from the 2000s.

9. Distribution map for Sanderling SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

Delany, S., Scott, D.A., Dodman, T., & Stroud, D.A. (eds.) 2009. *An atlas of wader populations in Africa and western Eurasia.* Wetlands International, Wageningen, The Netherlands. 524 pp.

Holt, C.A., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. 2012. *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* BTO/RSPB/JNCC, Thetford. 183 pp.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Chichester and Langstone Harbours	1.3	28 October 1987	236	226	2005/6-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	1,055	374	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	223	336	2005/6-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	1,767	970	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	Not classified	485	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	Not yet classified	2,466	604	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	420	1,074	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries	1.2	16 February 1995	6,172	6,016	2005/6-2009/10	WeBS	
South Uist Machair and Lochs	1.4	1 December 1997	700	64	2005/6-2009/10	WeBS	
Teesmouth & Cleveland Coast	1.3	15 August 1995	357	287	2005/6-2009/10	WeBS	
The Dee Estuary	1.3	Not yet classified	798	642	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	1,854	2,432	2005/6-2009/10	WeBS	
		Total for SPAs in GB	3,535	**9,896**	in May		
		GB population	23,200	**16,000**			
		thus GB SPAs hold	15.5% GB	**61.9% GB**			
		Total for SPAs in UK	3,535	**9,896**	in May		
		Biogeographic population	123,000	**120,000**			
		thus SPAs hold	3.5% international	**8.2% international**			

Purple Sandpiper *Calidris maritima*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	13,000	Musgrove *et al.* 2011	130	745	5.7%
All-Ireland	3,330	Crowe *et al.* 2008	35		No SPAs selected in Northern Ireland
Biogeographic – *maritima*, NE Canada & N Greenland	25,000	Delany *et al*. 2009; Wetlands International 2012	250	745	3.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-18.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-29.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Purple Sandpiper, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-66.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic

change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Purple Sandpiper was not included in the *Climatic Atlas of European breeding birds.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Purple Sandpiper, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient – especially in southern and western UK
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Enhance coverage of North Uist Machair and Islands, and Northumberland Coast SPAs in future WeBS counts in the light of the paucity of data from 2000s.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for Purple Sandpiper SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
East Sanday Coast	1.2	11 August 1997	840	125	2005/6-2009/10	WeBS	
North Uist Machair and Islands	1.4	Not yet classified	370	439	Peak count from 2004/5 used in absence of WeBS counts		
Northumbria Coast	1.2	2 February 2000	763	230	2005/6-2009/10	WeBS	
		Total for SPAs in GB	1,973	**745**	in January		
		GB population	21,300	**13,000**			
		thus GB SPAs hold	9.3% GB	**5.7% GB**			
		Total for SPAs in UK	1,973	**745**	in January		
		Biogeographic population	50,500	**25,000**			
		thus SPAs hold	3.9% international	**3.0% international**			

Dunlin *Calidris alpina schinzii* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I[100]
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	8,600	Forrester & Andrews 2007; Brown & Grice 2005; Johnstone *et al.* 2008	85	6,108	71.0%
All-Ireland	175	Hutchinson 1989	2	0	No SPAs selected in Northern Ireland
Biogeographic – *schinzii,* Britain & Ireland (breeding)	8,800	Forrester & Andrews 2007; Brown & Grice 2005; Johnstone *et al.* 2008; Hutchinson 1989 (see also Stroud *et al.* 2004)	90	6,108	69.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980-85 to 2005-07	-3.0%	Stroud *et al.* 1987; Musgrove *et al.* 2013
Short-term UK trend	1998 to 2010	+55.5%[101]	BBS; Risely *et al.* 2012

[100] *C. alpina schinzii* was added to Annex I of the Birds Directive in 2003 by the Act concerning the conditions of accession and the adjustments to the Treaties — Accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia and the Slovak Republic (OJ L 236, 23.9.2003, p. 33).

[101] See also Sim *et al.* (2005) for recent assessments of population trends in the British uplands

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Dunlin, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-67A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Dunlin, the *Climatic Atlas* predicts a northerly contraction of distribution with virtual absence in England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Dunlin was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Wet and damp machair and blackland grassland. No spatial information.	Insufficient information	Insufficient information for identifying important feeding areas away from nesting areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, high fidelity to breeding sites
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, high between-year fidelity to cropped habitats
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes
Is the use of cropped habitats determined by crop type?	Yes
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient to fulfil Directive requirements, and there are no other factors suggesting a need to revise the previously identified suite of SPAs. Site boundaries of particular SPAs however, should be reviewed especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Establish monitoring regimes at Caithness and Sutherland Peatlands, Lewis Peatlands and South Pennine Moors SPAs (for which no contemporary assessments exist) to ensure that population numbers on all sites within the terrestrial SPA suite and surrounding areas can be assessed by the time of the next national review. (This can be linked to surveys of breeding Golden Plover and Greenshank on the same sites).

Undertake necessary surveys to enhance the currently poor quality of the national breeding population estimate for the Annex I *schinzii* Dunlin.
(See Dunlin non-breeding species account regarding the occurrence of this race on UK SPAs in the non-breeding season).

9. Distribution map for breeding Dunlin SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Reed, T.M., Pienkowski, M.W. & Lindsay, R.A. 1987. *Birds, bogs and forestry: the peatlands of Caithness and Sutherland.* Nature Conservancy Council, Peterborough. 121 pp.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

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11. SPA suite

	SPA Guidelines selection stage[102]	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.1 *[1.2]*	2 February 1999	1,860	1,366	2009	Bellamy & Eaton 2010	
Fetlar	1.1 *[1.4]*	29 March 1994	90	95	2003	SNH (per Malcolm Smith)	
Lewis Peatlands	1.1 *[1.2]*	7 December 2000	3,650	3,673	See comment		In absence of new whole site census, a site total derived from BBS trend for Scotland of 0.6% over the period 1995–2010 based on 15 BBS squares
North Pennine Moors	1.1 *[1.2]*	Not yet classified	330	186	2005-07	Shepherd 2008	
North Uist Machair and Islands	1.1 *[1.2]*	29 March 1999	260	244	2007	Conway *et al.* 2008	
South Pennine Moors	1.1 *[1.2]*	Not yet classified	140	140			There are no new site population estimates
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.1 *[1.2]*	30 October2001	125	72	2007	Conway *et al.* 2008	
South Uist Machair and Lochs	1.1 *[1.2]*	1 December1997	357	332	2007	Conway *et al.* 2008	
		Total for SPAs in GB	6,812	**6,108**			
		GB population	9,150	**8,600**			
		thus GB SPAs hold	74.0% GB	**71.0% GB**			
		Total for SPAs in UK	6,812	**6,108**			
		Biogeographic population	11,000	**8,800**			
		thus SPAs hold	61.9% international	**69.4% international**			

[102] Selection guideline stages in square brackets are those given in the 2001 SPA Review at which time *schinzii* Dunlin was not listed on Annex I. Following its addition to Annex I in 2003, the selection stage under which each site qualifies has been amended as shown.

Dunlin *Calidris alpina alpina* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	350,000	Musgrove *et al.* 2011	3,500	297,892	85.1%
All-Ireland	88,480	Crowe *et al.* 2008	880	5,073	5.7%
Biogeographic – total *alpina*	1,333,000	Stroud *et al.* 2004; Wetlands International 2012	13,300	302,965	22.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-27.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-13.8%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Dunlin, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-67B.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Dunlin since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Dunlin was not included in the *Climatic Atlas of European breeding birds.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Dunlin, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Note that the other races of Dunlin – notably *C. a. schinzii* which has Annex I status and breeds in the UK – also occur on UK SPAs in the non-breeding season. *C. a. schinzii* probably occur most in the immediate post-breeding period when birds are en route to wintering areas further south (Delaney *et*

al. 2009). The occurrence of this smaller, Annex I population should not be neglected, although at present it is not feasible to disaggregate counts of Dunlin by race.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary and Upper Solway Flats and Marshes SPAs in future WeBS counts.

Better understanding of the extent and distribution on SPAs, of other races of Dunlin (in particular the Annex I *C. a. schinzii*) in the non-breeding season would be valuable.

9. Distribution map for non-breeding Dunlin SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Alde-Ore Estuary	1.3	Not yet classified	4,371	4,478	2005/6-2009/10	WeBS	
Benfleet and Southend Marshes	1.3	14 February 1994	11,372	16,002	2005/6-2009/10	WeBS	
Blackwater Estuary	1.2	12 May 1995	33,267	15,470	2005/6-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	2,870	3,534	2005/6-2009/10	WeBS	
Burry Inlet	1.3	14 July 1992	6,242	5,601	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	28 October 1987	44,294	28,508	2005/6-2009/10	WeBS	
Colne Estuary	1.3	Not yet classified	11,065	5,323	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Cromarty Firth	1.3	Not yet classified	3,384	1,165	2005/6-2009/10	WeBS	
Dengie	1.3	Not yet classified	7,838	10,339	2005/6-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.3	Not yet classified	4,462	4,088	2005/6-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	11,216	8,566	2005/6-2009/10	WeBS	
Exe Estuary	1.2	11 March 1992	5,740	3,522	2005/6-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	10,033	5,853	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	5,479	3,942	2005/6-2009/10	WeBS	
Foulness	1.3	Not yet classified	9,529	6,971	2005/6-2009/10	WeBS	
Hamford Water	1.3	Not yet classified	6,618	3,576	2005/6-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	23,605	19,493	2005/6-2009/10	WeBS	
Lindisfarne	1.2	11 March 1992	7,703	4,734	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.3	Not yet classified	25,936	9,044	2005/6-2009/10	WeBS	
Mersey Estuary	1.2	20 December 1995	44,300	33,997	2005/6-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	4,069	8,032	2005/6-2009/10	WeBS	
Montrose Basin	1.3	Not yet classified	2,244	1,500	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Moray and Nairn Coast	1.3	Not yet classified	2,689	2,265	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	52,671	28,228	2005/6-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	4,121	3,477	2005/6-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	6,083	3,271	2005/6-2009/10	WeBS	Incomplete count coverage for SPA
Ribble and Alt Estuaries	1.2	16/ February 1995	39,952	44,838	2005/6-2009/10	WeBS	
Severn Estuary	1.2	13 July 1995	44,624	20,933	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	13,210	6,347	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	23,940	8,147	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.2	31 March 2000	11,184	11,462	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	22,479	13,989	2005/6-2009/10	WeBS	
The Swale	1.2	31 August 1982	12,394	8,257	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	35,620	27,270	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	30 November 1992	14,566	8,460	2005/6-2009/10	WeBS	
		Total for SPAs in GB	412,566	**297,892**	in January		
		GB population	532,000	**350,000**			
		thus GB SPAs hold	77.8% GB	**85.1% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Belfast Lough	1.3	Not yet classified	1,619	964	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	5,606	2,378	2005/6-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	5,317	2,864	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	8,192	**5,073**	in January		
		All-Ireland population	125,000	**88,480**			
		thus NI SPAs hold	6.6% GB	**5.7% All-Ireland**			
		Total for SPAs in UK	420,758	**302,965**	in January		
		Biogeographic population	1,373,000	**1,333,000**			
		thus SPAs hold	30.1% international	**22.7% international**			

Ruff *Philomachus pugnax* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	6	Holling *et al.* 2012	1	2	33%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic - Europe	105,000	Thorup 2006	1,000	2	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	-86%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	-67%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Ruff, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-68A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Breeding Ruff was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Ruff, the study predicts extinction in the UK.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, there is need to assess site condition, current management and potential for enhancement of key sites given the extinction of breeding Ruff from three of the four SPAs used in the 1990s.

8. Recommendations regarding survey and monitoring

Continue annual monitoring of any breeding attempts and reporting of these via Rare Breeding Birds Panel including all negative data.

9. Distribution map for breeding Ruff SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Lower Derwent Valley	1.1	Not yet classified	7	0	2005-09	RBBP	
Nene Washes	1.1	Not yet classified	1	0	2005-09	RBBP	
Ouse Washes	1.1	Not yet classified	1	0	2005-09	RBBP	
Ribble and Alt Estuaries	1.1	16 February 1995	1	2	2005-09	RBBP	
		Total for SPAs in GB	10	**2**			
		GB population	11	**6**			
		thus GB SPAs hold	91.0% GB	**33% GB**			
		Total for SPAs in UK	10	**2**			
		Biogeographic population	105,700	**105,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Ruff *Philomachus pugnax* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	800	Musgrove *et al.* 2011	8 [50]	242	30.2%
All-Ireland	<20	Crowe 2005		0	Species does not regularly occur in Northern Ireland
Biogeographic – N Europe & W Siberia/W Africa	1,250,000	Delany *et al.* 2009; Wetlands International 2012	12,200	242	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+12.4%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-46.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Ruff, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-68B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Ruff was not included in the *Climatic Atlas of European breeding birds.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Ruff were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient – especially in western Britain
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary SPA in future WeBS counts.

9. Distribution map for non-breeding Ruff SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Blackwater Estuary	1.1	Not yet classified	51	15	2005/6-2009/10	WeBS	
Broadland	1.1	21 September 1994	96	42	2005/6-2009/10	WeBS	
Hamford Water	1.1	Not yet classified	53	12	2005/6-2009/10	WeBS	
Humber Estuary	1.1	31 August 2007	Not classified	64	2005/6-2009/10	WeBS	
Lower Derwent Valley	1.1	8 June 1993	133	100	2005/6-2009/10	WeBS	
Nene Washes	1.1	Not yet classified	91	37	2005/6-2009/10	WeBS	
North Norfolk Coast	1.1	Not yet classified	54	142	2005/6-2009/10	WeBS	
Ouse Washes	1.1	5 March 1993	137	122	2005/6-2009/10	WeBS	
Pagham Harbour	1.1	30 March 1988	160	1	2005/6-2009/10	WeBS	
		Total for SPAs in GB	316	**242**	in January		
		GB population	700	**800**			
		thus GB SPAs hold	45.1% GB	**30.2% GB**			
		Total for SPAs in UK	316	**242**	in January		
		Biogeographic population	1,000,000	**1,250,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Snipe *Gallinago gallinago* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,000,000	Musgrove *et al.* 2011	10,000	1,094	0.1%
All-Ireland	Unknown	Crowe *et al.* 2008			No SPAs selected in Northern Ireland
Biogeographic – Europe/SW Europe & NW Africa	2,500,000	Delany *et al.* 2009; Wetlands International 2012	20,000**	1,094	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-18.0%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-57.1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Snipe, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-69.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species, although Devort *et al.* 1997 give much valuable data and information on international contexts.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Snipe was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Snipe, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Wet meadows and pastures. No spatial information available.	Maintain suitable hydrological management of grasslands.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes - high fidelity as long as the habitat remains wet.
Does the species show between-year fidelity to cropped habitats as part of its ecological	Little known - but possibly medium to low site-fidelity.

Cropped habitats assessment from SPA Review Decision Framework	
requirements?	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes - high fidelity as long as the habitat remains wet.
Is the use of cropped habitats determined by crop type?	Yes, significantly so.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats. Further suitable sites currently not known.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Detection rates and thus counts of Snipe at wetland sites are very low using conventional WeBS count methodologies. This has consequences for understanding of trends (and population sizes) at both site and national scales. A practical, targeted methodology should be developed by WeBS and other interested parties which could be used to give more realistic assessments of numbers of Snipe present at wetland sites. This would materially enhance knowledge of the status of this species and likely enhance the currently poor quality of the national population estimate and trend.

Existing coverage for monitoring at key and other sites should continue to be maintained through WeBS using existing methodologies until a new survey methodology is developed.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

9. Distribution map for non-breeding Snipe SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Somerset Levels and Moors	1.3	Not yet classified	2,097	1,094	2004/5-2009/10	WeBS	
		Total for SPAs in GB	2,097	**1,094**	in January		
		GB population	100,000	**1,000,000**			
		thus GB SPAs hold	2.1% GB	**0.1% GB**			
		Total for SPAs in UK	2,097	1,094	in January		
		Biogeographic population	20,000,000	**2,500,000**			
		thus SPAs hold	<0.1% international	**<0.1 % international**			

Black-tailed Godwit *Limosa limosa* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	54	Holling *et al.* 2012	1	47	87.0%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic - *limosa*, W Europe/NW & W Africa	84,000	Stroud *et al.* 2004 updated with data from Jensen *et al.* 2008	840	47	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980-82 to 2006-10	+1%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+59%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Black-tailed Godwit, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-70A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen & Perennou 2007). Relevant objectives are as follows:

- "Identify and designate as SPAs all breeding sites in natural and semi-natural habitats of international importance for Black-tailed Godwit in the EU."

- "Prepare Management Plans and initiate implementation for designated sites (SPAs) of importance for breeding Black-tailed Godwit to ensure no further loss of Black-tailed Godwit numbers and distribution and to increase reproductive success and colonising ability."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives are as follows:

- "Ensure the provision of flood-free grassland adjacent to the Ouse Washes to re-establish the breeding population that has declined due to changed flooding patterns; and vigilance at the Nene Washes to identify flooding changes and remedy appropriately."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Breeding Black-tailed Godwit was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Black-tailed Godwit, the study predicts extinction in the UK.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue annual monitoring of numbers on the two SPAs (as well as other key sites) and report these via Rare Breeding Birds Panel including all negative data.

9. Distribution map for breeding Black-tailed Godwit SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Nene Washes	1.4	5 March 1993	16	43	Mean 2005-2009	RBBP	
Ouse Washes	1.4	5 March 1993	26	4	Mean 2005-2009	RBBP	
		Total for SPAs in GB	42	**47**			
		GB population	34	**54**			
		thus GB SPAs hold	c. 100% GB	**87.0% GB**			
		Total for SPAs in UK	42	**47**			
		Biogeographic population	120,000	**84,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Black-tailed Godwit *Limosa limosa islandica* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	43,000	Musgrove *et al.* 2011	430	28,999	67.4%
All-Ireland	13,880	Crowe *et al.* 2008	140	724	5.2%
Biogeographic – *islandica*, Iceland/W Europe	61,000	Gill *et al.* 2007; Wetlands International 2012	610	29,723	48.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+614.3%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+66.7%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Black-tailed Godwit, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-70B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen & Perennou 2007). Relevant objectives are as follows:

- "Identify and designate as SPAs all staging and wintering areas of international importance for Black-tailed Godwit within the EU."

- “Prepare Management Plans and initiate implementation for designated SPAs of importance for staging and/or wintering Black-tailed Godwit.”

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Black-tailed Godwit was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Black-tailed Godwit, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

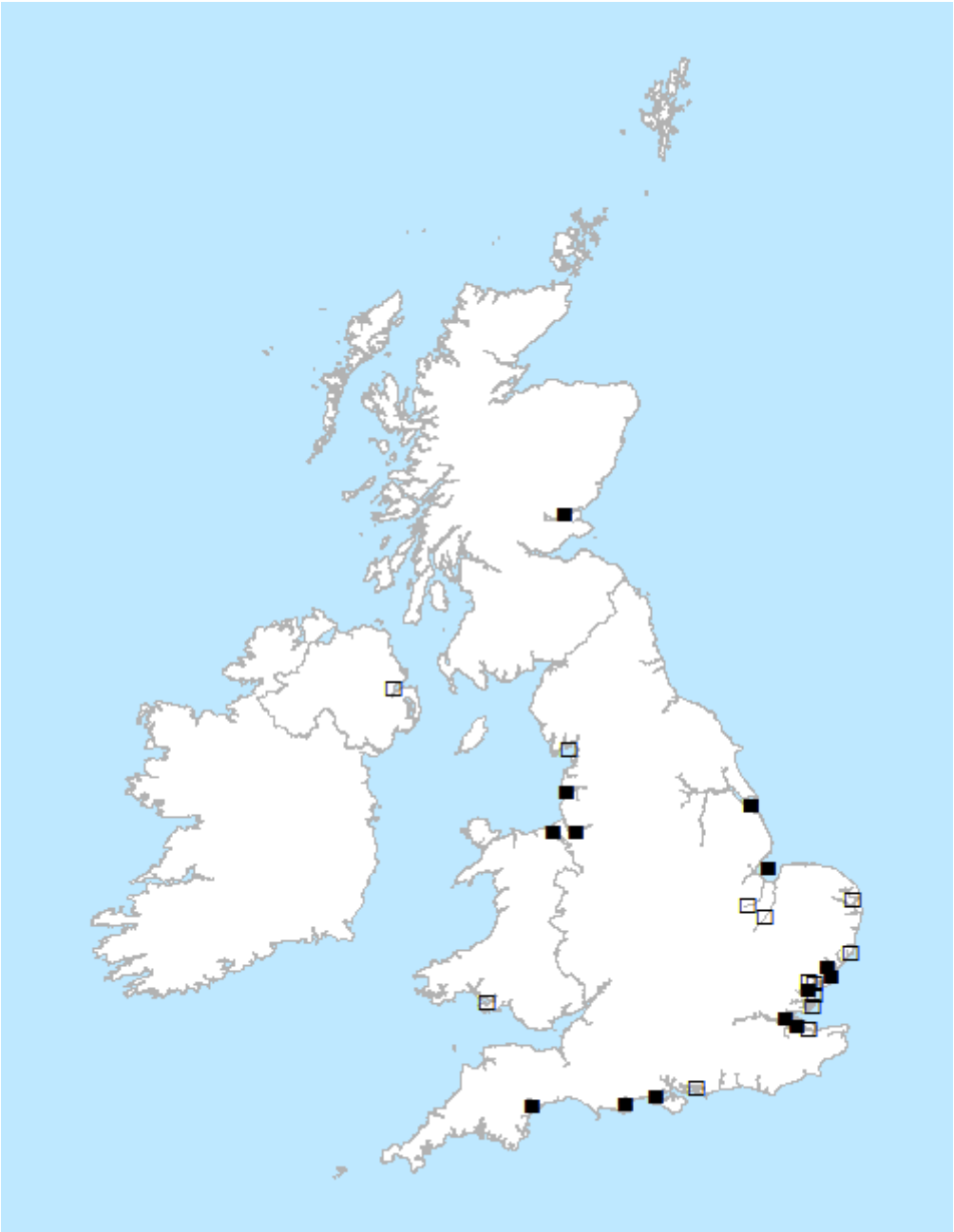
Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key sites through WeBS, and promote the counting of all sites within SPA suite during September each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Alde-Ore Estuary, Colne Estuary (Mid-Essex Coast Phase 2), Nene Washes, The Swale, and Humber Estuary SPAs in future WeBS counts.

9. Distribution map for non-breeding Black-tailed Godwit SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Abberton Reservoir	1.3	Not yet classified	294	115	2005/6-2009/10	WeBS	
Alde-Ore Estuary	1.3	Not yet classified	268	1,091	2005/6-2009/10	WeBS	
Blackwater Estuary	1.2	12 May 1995	1,280	1,823	2005/6-2009/10	WeBS	
Breydon Water	1.3	Not yet classified	240	1,592	2005/6-2009/10	WeBS	
Burry Inlet	1.3	Not yet classified	83	345	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	Not yet classified	1,003	1,137	2005/6-2009/10	WeBS	
Colne Estuary	1.3	Not yet classified	235	477	2005/6-2009/10	WeBS	
Dengie	1.3	Not yet classified	80	7	2005/6-2009/10	WeBS	
Exe Estuary	1.3	11 March 1992	533	985	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.3	2 February 2000	150	239	2005/6-2009/10	WeBS	
Foulness	1.3	Not yet classified	79	428	2005/6-2009/10	WeBS	
Hamford Water	1.2	8 June 1993	1,121	480	2005/6-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	71	4,180	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	957	1,120	2005/6-2009/10	WeBS	
Mersey Estuary	1.3	20 December 1995	343	1,465	2005/6-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	79	1,239	2005/6-2009/10	WeBS	
Nene Washes	1.3	Not yet classified	312	2,422	2005/6-2009/10	WeBS	
Ouse Washes	1.2	Not yet classified	1,198	1,323	2005/6-2009/10	WeBS	
Poole Harbour	1.2	31 March 1999	1,576	2,068	2005/6-2009/10	WeBS	
Ribble and Alt Estuaries	1.2	16 February 1995	819	4,193	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.2	1 October 1998	1,125	1,172	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	2,475	1,981	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Thames Estuary and Marshes	1.3	31 March 2000	322	2,572	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	1,739	4,812	2005/6-2009/10	WeBS	
The Swale	1.2	Not yet classified	1,755	1,611	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	859	9,261	2005/6-2009/10	WeBS	
		Total for SPAs in GB	8,686	**28,999**	in September		
		GB population	7,410	**43,000**			
		thus GB SPAs hold	*c.* 100% GB	**67.4% GB**			
Belfast Lough	1.3	Not yet classified	316	867	2005/6-2009/10	WeBS	
		Total for SPAs in Northern Ireland	287	**724**	in September		
		All-Ireland population	9,000	**13,880**			
		thus NI SPAs hold	3.2% All-Ireland	**5.2% All-Ireland**			
		Total for SPAs in UK	8,973	**29,723**	in September		
		Biogeographic population	65,000	**61,000**			
		thus SPAs hold	12.8% international	**48.7% international**			

Bar-tailed Godwit *Limosa lapponica*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	38,000	Musgrove *et al.* 2011	380	33,076	87.0%
All-Ireland	16,280	Crowe *et al.* 2008	160	2,656	16.3%
Biogeographic – *L l. lapponica*	120,000	Stroud *et al.* 2004; Wetlands International 2012	1,200	35,733	29.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+28.2%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+17.6%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Bar-tailed Godwit, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-71.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Bar-tailed Godwit since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Bar-tailed Godwit was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Bar-tailed Godwit, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during February each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, Morecambe Bay, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

9. Distribution map for Bar-tailed Godwit SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Chichester and Langstone Harbours	1.1	28 October 1987	1,692	1,036	2004/5-2009/10	WeBS	
Cromarty Firth	1.1	22 March 1999	1,420	930	2004/5-2009/10	WeBS	
Dengie	1.1	Not yet classified	1,156	2,423	2004/5-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.1	24 March 1997	1,300	884	2004/5-2009/10	WeBS	
East Sanday Coast	1.1	Not yet classified	600	18	2004/5-2009/10	WeBS	
Firth of Forth	1.1	24 March 1997	2,600	1,314	2004/5-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.1	24 March 1997	2,400	1,118	2004/5-2009/10	WeBS	
Foulness	1.1	24 March 1997	7,639	5,885	2004/5-2009/10	WeBS	
Gibraltar Point	1.1	24 March 1997	719	1,941	2004/5-2009/10	WeBS	
Humber Estuary	1.1	31 August 2007	1,593	5,926	2004/5-2009/10	WeBS	
Inner Moray Firth	1.1	22 March 1999	1,155	204	2004/5-2009/10	WeBS	
Lindisfarne	1.1	11 March 1992	2,946	2,434	2004/5-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.1	5 July 2013	Not classified	80	2004/5-2009/10	WeBS	
Moray and Nairn Coast	1.1	Not yet classified	1,156	302	2004/5-2009/10	WeBS	
Morecambe Bay	1.1	4 October 1996	2,611	2,164	2004/5-2009/10	WeBS	
North Norfolk Coast	1.1	Not yet classified	1,236	2,888	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries	1.1	16 February 1995	18,958	7,955	2004/5-2009/10	WeBS	
The Dee Estuary	1.1	17 July 1985	1,013	186	2004/5-2009/10	WeBS	
The Swale	1.1	Not yet classified	542	893	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Wash	1.1	30 March 1988	11,250	11,930	2004/5-2009/10	WeBS	
Upper Solway Flats and Marshes	1.1	30 November 1992	2,367	825	2004/5-2009/10	WeBS	
		Total for SPAs in GB	37,168	**33,076**	in February		
		GB population	52,500	**38,000**			
		thus GB SPAs hold	70.1% GB	**87.0% GB**			
Belfast Lough	1.1	Not yet classified	232	173	2004/5-2009/10	WeBS	
Lough Foyle	1.1	27 January 1999	1,896	2,316	2004/5-2009/10	WeBS	
Strangford Lough	1.1	Not yet classified	882	1,005	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	2,218	**2,656**	in February		
		All-Ireland population	16,000	**16,280**			
		thus NI SPAs hold	12.7% All-Ireland	**16.3% All-Ireland**			
		Total for SPAs in UK	39,386	**35,733**	in February		
		Biogeographic population	115,000	**120,000**			
		thus SPAs hold	39.4% international	**29.8% international**			

Whimbrel *Numenius phaeopus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	310	Jackson 2009	3	20	6.5%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic – *N. p. islandicus*	225,000	Delany *et al.* 2009; Wetlands International 2012	2,200	20	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1982-86 to 2009	-30.0%	Richardson 1990; Jackson 2009
Short-term UK trend	1994 to 2009	-35.0%	Dore *et al.* 1996; Jackson 2009

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Whimbrel, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-72A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Whimbrel, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Whimbrel was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Ploughed or harrowed areas and reseeded grasslands. No spatial information available.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes. Whimbrel breed primarily in moorland, avoiding rough and improved pastures (Richardson 1990; Ellis 2007). However, prior to nesting the adults use established pastures for feeding and during nesting most used ploughed or harrow reseeded areas (Grant *et al*. 1992a, 1992b). After hatching, some broods and older broods are taken into ploughed or harrowed reseeded grasslands, although older pastures are avoided (Grant *et al*. 1992c).

Cropped habitats assessment from SPA Review Decision Framework	
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown.
Is the use of cropped habitats determined by crop type?	Unknown.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to provide adequate coverage of population numbers and distribution.

In view of declining trends at the single SPA, a review of management and boundaries is needed to ensure that important areas used for feeding or other functional needs are included.

8. Recommendations regarding survey and monitoring

Continue annual monitoring of numbers on the single SPA (as well as other key and other sites) and report these via Rare Breeding Birds Panel, including all negative data.

Establish better assessment of the national population size and trend and consider the potential for annual monitoring of the whole population, or at least a significant proportion of it, to allow the calculation of an annual trend.

9. Distribution map for breeding Whimbrel SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Fetlar	1.4	29 March 1994	65	20	Mean 2010-12	SNH (per Allan Perkins)	
		Total for SPAs in GB	65	**20**			
		GB population	530	**310**			
		thus GB SPAs hold	12.3% GB	**6.5% GB**			
		Total for SPAs in UK	65	**20**			
		Biogeographic population	220,000	**225,000**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Whimbrel *Numenius phaeopus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red[103] BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (inds)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	670,000	Wetlands International 2012	6,700	622	0.1%
All-Ireland	<10	Crowe 2005			No SPAs selected in Northern Ireland
Biogeographic – *phaeopus,* N Europe/W Africa	600,000 - 750,000	Delany *et al.* 2009; Wetlands International 2012	6,700	622	0.1%

Peak numbers of migrating Whimbrel on UK SPAs typically occur in August, when birds on southwards migration from northern breeding sites (Iceland, Shetland and possibly Scandinavia) stage on UK estuaries and other wetlands. The SPA suite total in August is 622.

In the general context of lack of knowledge of Whimbrel migration (Trolliet 2006), the SWG considered the issue of the most appropriate population estimate against which to assess Whimbrel in the non-breeding period. Options were to derive an estimate based either on:

a. The mid-winter population estimate of Musgrove *et al.* 2011 (30), being the total of the small number that overwinter in the UK. This is clearly inappropriate.

b. Assuming that numbers on migration in August might just be Scottish breeding birds, then (following the standard conversion factor of three – Appendix 4) gives 1,200 non-breeding individuals derived from the GB breeding estimate of 400 pairs. However, this seems unlikely given the large breeding population in Iceland, and that females may well leave chicks with males and depart from breeding grounds early. Further, unsuccessful breeders will leave breeding areas as early as June or July.

[103] in respect of the breeding population only

c. An average of totals counted in August (and May for spring passage assessment). However, these totals will certainly be under-estimates. There are probably other counts in county bird reports not reported to WeBS.

d. An estimate reflecting the total number of post-breeding birds passing southwards, *i.e.* the size of the non-breeding Icelandic population (600,000 - 750,000). This assumes no birds directly overfly UK without being recorded, or migrate through UK from Scandinavia. Further, it assumes that *all* Iceland birds fly across/through UK which is inherently unlikely as it makes no allowance for birds passing south from Iceland to either the west or east of the UK.

Noting that none of the four options are likely to reflect reality well, SWG considered that the least unsatisfactory option for this review was to use an estimate which reflected the possible total volume of birds in the Icelandic birds passing through the UK, noting that general knowledge of the migration of this species is very poorly understood (Trolliet 2006).

As for other passage migrants, the issue of rapid population turnover at monitored sites adds further complexity to the assessment of the number of passage Whimbrel at key sites.

The SWG recommends further research to clarify this issue (below).

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-42.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	+1%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Whimbrel, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-72B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the

limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Whimbrel was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Whimbrel, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with poor confidence, to increase by over 50%, and for autumn passage numbers to increase by between 25-50% (with poor confidence).

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during August each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, Morecambe Bay and Severn Estuary SPAs in future WeBS counts.

Undertake work to better understand the total numbers of Whimbrel occurring on spring and autumn passage through the UK as well as at site-level through better assessment of turnover.

9. Distribution map for non-breeding Whimbrel SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Burry Inlet	1.3	Not yet classified	108	116	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	Not yet classified	135	167	2004/5-2009/10	WeBS	
Exe Estuary	1.3	Not yet classified	75	64	2004/5-2009/10	WeBS	
Humber Estuary	1.3	31 August 2007	75	107	2004/5-2009/10	WeBS	Incomplete count coverage
Medway Estuary and Marshes	1.3	Not yet classified	58	9	2004/5-2009/10	WeBS	
Morecambe Bay	1.3	Not yet classified	73	80	2004/5-2009/10	WeBS	
North Norfolk Coast	1.3	Not yet classified	58	136	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries	1.3	16 February 1995	Not classified	142	2004/5-2009/10	WeBS	
Severn Estuary	1.3	Not yet classified	120	168	2004/5-2009/10	WeBS	
Somerset Levels & Moors	1.3	Not yet classified	52	2	2004/5-2009/10	WeBS	
Thames Estuary and Marshes	1.3	Not yet classified	101	38	2004/5-2009/10	WeBS	
The Wash	1.3	Not yet classified	410	496	2004/5-2009/10	WeBS	
		Total for SPAs in GB	612	**622**	in August		
		GB population	5,000	**670,000**			See text
		thus GB SPAs hold	12.2% GB	**0.1% GB**			
		Total UK	612	**622**	in August		
		1% biogeographic	650,000	**670,000**			
		thus SPAs hold	<0.1% International	**0.1% international**			

Curlew *Numenius arquata* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	66,000	O'Brien 2004	660	5,454	8.3%
All-Ireland	625	Colhoun *et al.* 2014 & Irish Article 12 report	6	0	No SPAs selected in Northern Ireland
Biogeographic European *arquata*	205,000	Stroud *et al*. 2004	2,000	5,454	2.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	-59.4%	Baillie *et al.* 2013
Short-term UK trend	1998 to 2010	-37.9%[104]	Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Curlew, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-73A.pdf.

[104] See also Sim *et al.* (2005) for recent assessments of population trends in the British uplands

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen 2007). Relevant objectives are as follows:

- "Prepare Management Plans and Schemes and initiate the implementation in key sites for breeding Curlew to ensure no further loss of numbers and distribution and to increase reproductive success and colonising ability."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010).

An international single species action plan has been developed for Curlew by the African-Eurasian Waterbirds Agreement (Brown 2015). Relevant objectives are as follows:

1.1. "Important breeding sites for Eurasian Curlew are appropriately protected and managed.

1.1.1. Ensure all breeding sites of international importance for Eurasian Curlew are protected under the Ramsar Convention and/or the EU Birds Directive, as appropriate[105].

Applicable to: **All Range States with breeding populations.**

1.1.2. Ensure all other important breeding sites for Eurasian Curlew are protected under national or federal legislation, as appropriate, giving consideration to sites that host large populations as well as sites of importance for the purposes of maintenance of the breeding range.

Applicable to: **All Range States with breeding populations.**

1.1.3. At protected sites of importance for Eurasian Curlew:

- Inform central and local government of the importance and location of designated sites and/or sites proposed for future designation.
- Raise awareness of protected sites and Eurasian Curlew breeding requirements amongst relevant user-groups (e.g. farmers, hunters, foresters, tourism bodies).
- Regularly review management plans to ensure they include appropriate measures to conserve Eurasian Curlew populations and the habitats they require.

Applicable to: **All Range States with protected sites.**

1.1.4. At all important breeding sites (*i.e.* protected and non-protected sites):

- Ensure appropriate land management practices are being carried out (see objective 2 for further details).
- Respond to potential negative impacts from proposed developments using Ramsar's Avoid-Minimise-Compensate planning framework[106]. Potential threats are likely to involve those relating to large-scale agricultural change, forestry, wind turbines, residential/commercial developments, oil/gas developments, tourism, and increased disturbance that may be associated with each.

[105] For each subspecies, population thresholds for internationally important sites are those containing > 1% of the biogeographic population (Table 1).

[106] For details, see Gardner *et al*. 2013 (available online at http://ramsar.rgis.ch/bn/bn3.pdf)

Applicable to: **All Range States with breeding populations."**

2.1. The impact of farming operations on breeding success is minimized and beneficial farming practices are supported and encouraged.

2.1.1. Within important breeding sites:

- Raise awareness amongst farming communities of the importance of the area for Eurasian Curlew, and highlight the critical role of farming in conserving the species.
- Work proactively with farming communities to encourage the uptake of beneficial management practices such as delayed mowing of grasslands, appropriate grazing regimes, stock reduction to minimise nest trampling, conservation and management of wetlands, and minimising other detrimental field operations (e.g. rolling, spraying, etc.) and disturbance during the breeding season.
- Support the restoration of degraded habitats (e.g. lowland wet grassland, lowland raised bogs, etc).

Applicable to: **All Range States with breeding populations.**

2.1.2. Ensure appropriate agri-environment options and other conservation support schemes are (1) available and adequately-funded to support farmers and other land managers in carrying out conservation management and (2) targeted to where they will deliver the greatest benefit.

Applicable to: **All Range States with breeding populations**

2.1.3. Ensure wider agricultural support mechanisms are available to maintain agricultural activity at important breeding sites at risk from land abandonment.

Applicable to: **All Range States with breeding populations**

2.2. Land management techniques that reduce levels of nest and chick predation to those associated with stable or increasing populations are promoted and investigated.

2.2.1. At important breeding sites where high levels of nest and chick predation are either known or suspected to be responsible for breeding population declines:

- Promote the uptake of, and monitor the effectiveness of, different land management techniques designed to reduce predation pressure through non-lethal means (e.g. manipulation of patch dynamics, removal of landscape features associated with habitat fragmentation and increased predation rates - such as small woodlands, scrub, perch posts, pylons, etc).
- Investigate the effectiveness of predator control as a potential conservation tool (in tandem with habitat management) in scenarios when achieving optimal habitat conditions may not be feasible in the short-term.

Applicable to: **All Range States with breeding populations that are declining due to high rates of predation.**

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Curlew, the *Climatic Atlas* predicts a northerly distribution with absence in large areas of England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Curlew, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pastures (rough and improved), 1 km from moorland edge.	Maintain open moorland/pasture interface.	Maintain all pastures within 1 km of moorland edge, either by generic approach or on basis of local evidence of regular field usage.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a significant extent. Curlews nesting on moorland make significant use of adjacent grasslands, selecting larger fields close to nests in which to feed. Most field use is within 1 km of the nest, but birds range as far as 3 km (Robson & Percival 2002).
Does the species show between-year fidelity to cropped habitats as part of its ecological	Yes.

Cropped habitats assessment from SPA Review Decision Framework	
requirements?	
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, although poorly known.
Is the use of cropped habitats determined by crop type?	Poorly known. Grassland type did not appear to influence field choice, with both rough grazed and improved pastures being used (Robson & Percival 2002).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

A review of boundaries of the existing SPA is needed to ensure that important areas used for feeding or other functional needs are included.

8. Recommendations regarding survey and monitoring

Review site and national monitoring protocols and ensure monitoring provides reliable estimates of numbers within the North Pennine Moors SPA so that trends there can be better assessed by the time of the next national review. Aim to undertake national assessment of population size through appropriate sampling survey of other breeding areas coincident with survey of numbers on the North Pennine Moors SPA.

Better ecological information on foraging habitat requirements of breeding Curlew on agricultural grasslands near breeding sites is needed.

There is also a need to develop better survey methods.

9. Distribution map for breeding Curlew SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
North Pennine Moors	1.2	Not yet classified	3,930	5,454	2005-07	Shepherd 2008	
		Total for SPAs in GB	3,930	**5,454**			
		GB population	33,000	**66,000**			
		thus GB SPAs hold	11.9% GB	**8.3% GB**			
		Total for SPAs in UK	3,930	**5,454**			
		Biogeographic population	120,000	**205,000**			
		thus SPAs hold	3.3% international	**2.7% international**			

Curlew *Numenius arquata* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	140,000	Musgrove *et al.* 2011	1,400	45,952	32.8%
All-Ireland	54,650	Crowe *et al.* 2008	550	3,302	6.0%
Biogeographic -Europe/Europe, N & W Africa	850,000	Delany *et al.* 2009;Wetlands International 2012	8,400	49,254	5.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+49.3%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-16.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Curlew, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-73B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen 2007). Relevant objectives are as follows:

- "Identify and designate as SPAs all staging and wintering areas of international importance for Curlew within the EU."

- "Prepare Management Plans and initiate implementation for designated sites (SPAs) of importance for staging and wintering."

- "Establish hunting and disturbance-free areas in a minimum of two SPAs of international importance for staging and/or wintering Curlew in all relevant Member States."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010).

An international single species action plan has been developed for Curlew by the African-Eurasian Waterbirds Agreement (Brown 2015). Relevant objectives are as follows:

1.2. "Important staging, stopover and wintering sites for Eurasian Curlew are appropriately protected and managed.

1.2.1. Designate all non-breeding sites of international importance for Eurasian Curlew under the Ramsar Convention and/or the EU Birds Directive, as appropriate[107].

Applicable to: **All Range States with internationally important non-breeding populations.** Existing sites have already been prioritised for Range States in the Arabian Peninsula.

1.2.2. Designate other important non-breeding sites for Eurasian Curlew under national or local legislation, giving consideration to sites that host large populations as well as sites of importance for the purpose of maintaining range.

Applicable to: **All Range States with non-breeding populations.**

1.2.3. At protected sites of importance for Eurasian Curlew:

- Inform central and local government of the importance and location of designated sites and/or sites proposed for future designation.
- Raise awareness of protected sites and Eurasian Curlew non-breeding requirements amongst relevant user-groups (e.g. fisheries interests, hunters, etc).
- Regularly review management plans for protected sites to ensure they are appropriate for the purposes of the conservation of Eurasian Curlew populations and the habitats they require, paying particular attention to the threats identified in this ISSAP.

Applicable to: **All Range States with non-breeding populations.**

1.2.4. Respond to potential negative impacts from proposed developments using Ramsar's Avoid-Minimise-Compensate planning framework[108]. Potential threats are likely to involve those arising from proposals relating to drainage, large-scale agricultural change, forestry, wind turbines, residential/commercial developments, oil/gas developments, tourism, and increased disturbance or pollution that may be associated with each.

[107] "For each subspecies, population thresholds for internationally important sites are those containing > 1% of the biogeographic population: see Table 1 [of the AEWA Action Plan]."

[108] For details, see Gardner *et al*. 2013 (available online at http://ramsar.rgis.ch/bn/bn3.pdf)

Applicable to: **All Range States with non-breeding populations."**

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Curlew was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Curlew, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with moderate confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved and rough grasslands. No spatial information available.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	High site fidelity.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, high fidelity to sites with cropped habitats.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, high fidelity (although some field-level variation dependent on crop rotations).

Cropped habitats assessment from SPA Review Decision Framework	
Is the use of cropped habitats determined by crop type?	Yes, permanent pasture preferred.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and additional SPA provision, as feasible, should be sought.

Most sites within the current SPA suite does not provide adequate provision for foraging (data are based on WeBS, so represent roosting birds only). A review of boundaries of sites within the current suite is needed to identify and protect, *inter alia* areas used for feeding or other functional needs.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during February each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for non-breeding Curlew SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Blackwater Estuary (Mid-Essex Coast Phase 4)	1.3	Not yet classified	2,682	1,485	2004/5-2009/10	WeBS	
Burry Inlet	1.3	14 July1992	1,234	1,710	2004/5-2009/10	WeBS	
Chichester and Langstone Harbours	1.3	28 October 1987	1,861	2,915	2004/5-2009/10	WeBS	
Cromarty Firth	1.3	Not yet classified	1,475	1,332	2004/5-2009/10	WeBS	
Dornoch Firth and Loch Fleet	1.3	Not yet classified	1,366	1,394	2004/5-2009/10	WeBS	
Duddon Estuary	1.3	Not yet classified	2,192	2,021	2004/5-2009/10	WeBS	
Firth of Forth	1.3	30 October 2001	2,188	3,740	2004/5-2009/10	WeBS	
Foulness (Mid-Essex Coast Phase 5)	1.3	Not yet classified	2,127	2,339	2004/5-2009/10	WeBS	
Humber Estuary	1.3	31 August 2007	2,423	4,664	2004/5-2009/10	WeBS	
Inner Moray Firth	1.3	Not yet classified	1,337	826	2004/5-2009/10	WeBS	
Medway Estuary and Marshes	1.3	15 December 1993	1,900	1,012	2004/5-2009/10	WeBS	
Mersey Estuary	1.3	20 December 1995	1,156	1,315	2004/5-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	13,620	11,875	2004/5-2009/10	WeBS	
Poole Harbour	1.3	Not yet classified	1,726	1,135	2004/5-2009/10	WeBS	
Ribble and Alt Estuaries (Phase 2)	1.3	16 February 1995	1,798	2,424	2004/5-2009/10	WeBS	
Severn Estuary	1.2	Not yet classified	3,903	3,218	2004/5-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	1,877	1,316	2004/5-2009/10	WeBS	
Stour and Orwell Estuaries	1.3	13 July 1994	2,153	1,749	2004/5-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	4,028	4,555	2004/5-2009/10	WeBS	
The Swale	1.3	31 August 1982	1,622	1,447	2004/5-2009/10	WeBS	
The Wash	1.2	30 March 1988	3,835	8,463	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Upper Solway Flats and Marshes	1.2	30 November 1992	5,881	3,337	2004/5-2009/10	WeBS	
		Total for SPAs in GB	46,008	**45,952**	in February		
		GB population	115,000	**140,000**			
		thus GB SPAs hold	38.8% GB	**32.8% GB**			
Belfast Lough	1.3	Not yet classified	1,031	648	2004/5-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	2,038	2,331	2004/5-2009/10	WeBS	
Strangford Lough	1.3	Not yet classified	1,911	1,638	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	4,198	**3,302**	in February		
		All-Ireland population	87,500	**54,650**			
		thus NI SPAs hold	4.8% All-Ireland	**6.0% All-Ireland**			
		Total for SPAs in UK	50,206	**49,254**	in February		
		Biogeographic population	348,000	**850,000**			
		thus SPAs hold	14.3% international	**5.8% international**			

Redshank *Tringa totanus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	24,000	O'Brien 2004	240	1,838	7.7%
All-Ireland	4,400	Gibbons *et al.* 1993	45	0	No SPAs selected in Northern Ireland
Biogeographic -total *britannica*	28,400	O'Brien 2004; Gibbons *et al.* 1993	2,800	1,838	6.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	-73%	WBS/WBBS; BTO 2012
Short-term UK trend	1998 to 2010	-35%	BBS; Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Redshank, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-74A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen *et al.* 2009). Relevant objectives are as follows:

- “Prepare Management Plans and initiate the implementation in key sites for breeding Redshank to ensure no further loss of numbers and distribution and to increase reproductive success and colonising ability. Include measures to control generalist predators.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Redshank, the *Climatic Atlas* predicts a northerly distribution and absence from much of England, Wales and Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Redshank, modelled impacts are as follows: by 2050, under a medium emissions scenario, breeding numbers within the SPA suite are anticipated, with moderate confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Rough (unimproved), wet and damp meadows and pastures. No spatial information.	Maintain suitable hydrological management of grasslands, and mix of grassland types.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	High site fidelity.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, high fidelity to sites with cropped habitats.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes, high fidelity.
Is the use of cropped habitats determined by crop type?	Yes.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Use of cropped habitats other than for breeding is low
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Ensure all sites within SPA suite are periodically counted on a co-ordinated basis, and with an assessment undertaken prior to the next SPA network Review.

9. Distribution map for breeding Redshank SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
North Norfolk Coast	1.2	Not yet classified	700	885	2005	per Natural England (M. Rooney)	
North Uist Machair and Islands	1.4	29 March 1999	470	509	2007	Conway *et al.* 2008	
South Uist Machair and Lochs	1.4	30 October 2001	350	379	2007	Conway *et al.* 2008	
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.4	1 December 1997	140	65	2007	Conway *et al.* 2008	
		Total for SPAs in GB	1,660	**1,838**			
		GB population	30,600	**24,000**			
		thus GB SPAs hold	5.4% GB	**7.7% GB**			
		Total for SPAs in UK	1,660	**1,838**			
		Biogeographic population	59,000	**28,400**			
		thus SPAs hold	2.8% international	**6.5% international**			

Redshank *Tringa totanus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	120,000	Musgrove *et al.* 2011	1,200	46,584	38.8%
All-Ireland	31,090	Crowe *et al.* 2008	310	3,389	10.9%
Biogeographic – *robusta*, Iceland & Faeroes/W Europe	275,000	Delany *et al.* 2009; Wetlands International 2012	2,400	49,973	18.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+7.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-14.5%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Redshank, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-74B.pdf.

The Mersey Narrows & North Wirral Foreshore has been identified as an addition to the SPA suite for Redshank since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Jensen *et al.* 2009). Relevant objectives are as follows:

- "Prepare Management Plans and initiate the implementation in key sites for breeding Redshank to ensure no further loss of numbers and distribution and to increase reproductive success and colonising ability. Include measures to control generalist predators."

- "Identify and designate as SPAs all staging and wintering areas of international importance for Redshank. A minimum of two of the SPAs must include hunting and disturbance-free areas."

- "Prepare Management Plans and initiate implementation for designated SPAs of importance for staging and/or wintering Redshank. Include if necessary prescriptions to lower the off take on key wintering sites."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Redshank was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Redshank, modelled impacts are as follows: by 2050, under a medium emissions scenario, spring passage numbers within the SPA suite are anticipated, with moderate confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Colne Estuary (Mid-Essex Coast Phase 2), Humber Estuary, Medway Estuary and Marshes, and Upper Solway Flats and Marshes SPAs in future WeBS counts.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for non-breeding Redshank SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Alde-Ore Estuary	1.2	4 October 1996	1,919	1,579	2005/6-2009/10	WeBS	
Blackwater Estuary	1.2	Not yet classified	4,015	3,081	2005/6-2009/10	WeBS	
Chichester and Langstone Harbours	1.2	28 October 1987	1,788	2,877	2005/6-2009/10	WeBS	
Colne Estuary	1.2	28 July 1994	2,077	1,107	2005/6-2009/10	WeBS	Incomplete count coverage
Cromarty Firth	1.3	Not yet classified	1,324	1,721	2005/6-2009/10	WeBS	
Duddon Estuary	1.2	16 March 1998	2,289	2,940	2005/6-2009/10	WeBS	
Firth of Forth	1.2	30 October 2001	3,700	4,898	2005/6-2009/10	WeBS	
Firth of Tay and Eden Estuary	1.2	2 February 2000	1,800	1,484	2005/6-2009/10	WeBS	
Foulness	1.3	4 October 1996	2,144	2,138	2005/6-2009/10	WeBS	
Hamford Water	1.3	8 June 1993	1,461	1,467	2005/6-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	5,212	4,428	2005/6-2009/10	WeBS	
Inner Clyde Estuary	1.2	27 March 2000	1,918	1,873	2005/6-2009/10	WeBS	
Inner Moray Firth	1.2	22 March 1999	1,811	867	2005/6-2009/10	WeBS	
Lindisfarne	1.3	11 March 1992	1,192	1,371	2005/6-2009/10	WeBS	
Medway Estuary and Marshes	1.2	15 December 1993	3,690	1,405	2005/6-2009/10	WeBS	Incomplete count coverage
Mersey Estuary	1.2	20 December 1995	4,689	3,039	2005/6-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.3	5 July 2013	1,981	892	2005/6-2009/10	WeBS	
Montrose Basin	1.2	3 February 1995	2,259	2,250	2005/6-2009/10	WeBS	
Moray and Nairn Coast	1.2	2 February 1997	1,690	1,055	2005/6-2009/10	WeBS	
Morecambe Bay	1.2	4 October 1996	6,336	8,800	2005/6-2009/10	WeBS	
North Norfolk Coast	1.2	Not yet classified	2,998	1,699	2005/6-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Poole Harbour	1.3	Not yet classified	1,369	800	2005/6-2009/10	WeBS	Incomplete count coverage
Ribble and Alt Estuaries	1.2	16 February 1995	2,708	3,828	2005/6-2009/10	WeBS	
Severn Estuary	1.2	13 July 1995	2,330	2,454	2005/6-2009/10	WeBS	
Solent and Southampton Water	1.3	Not yet classified	1,211	846	2005/6-2009/10	WeBS	
Stour and Orwell Estuaries	1.2	13 July 1994	3,545	2,824	2005/6-2009/10	WeBS	
Teesmouth and Cleveland Coast	1.2	9 July 1998	1,287	1,557	2005/6-2009/10	WeBS	
Thames Estuary and Marshes	1.3	31 March 2000	1,161	1,058	2005/6-2009/10	WeBS	
The Dee Estuary	1.2	17 July 1985	8,451	11,037	2005/6-2009/10	WeBS	
The Swale	1.2	31 August 1982	1,640	1,242	2005/6-2009/10	WeBS	
The Wash	1.2	30 March 1988	2,953	6,320	2005/6-2009/10	WeBS	
Upper Solway Flats and Marshes	1.2	30 November 1992	3,088	3,918	2005/6-2009/10	WeBS	Incomplete count coverage
Ythan Estuary Sands of Forvie and Meikle Loch	1.3	Not yet classified	1,149	2,751	2005/6-2009/10	WeBS	
Total for SPAs in GB			53,284	**46,584**	in January		
GB population			114,000	**120,000**			
thus GB SPAs hold			45.8% GB	**38.8% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Belfast Lough	1.2	5 August 1998	2,466	**1,579**	2005/6-2009/10	WeBS	
Lough Foyle	1.3	Not yet classified	812	**1,188**	2005/6-2009/10	WeBS	
Strangford Lough			3,176	**4,244**	2005/6-2009/10	WeBS	
Total for SPAs in Northern Ireland			3,455	**3,389**	in January		
All-Ireland population			24,500	**31,090**			
thus NI SPAs hold			13.0% All-Ireland	**10.9% All-Ireland**			
Total for SPAs in UK			58,167	**49,973**	in January		
Biogeographic population			177,000	**275,000**			
thus SPAs hold			32.9% international	**18.2% international**			

Greenshank *Tringa nebularia* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,100	Hancock *et al.* 1997	10	824	74.9%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic - NW Europe	76,600	Delaney *et al.* 2009	770	824	1.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985 to 1995	+13%	Stroud *et al.* 1987; Hancock *et al.* 1997
Short-term UK trend	1995 to 2010	+12.3% (based on 8 BBS squares)[109]	Breeding Bird Survey; Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Greenshank, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-75.pdf.

[109] See also Sim *et al.* (2005) for recent assessments of population trends in the British uplands

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Greenshank, the *Climatic Atlas* predicts virtual extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Greenshank were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Establish monitoring regimes at Caithness and Sutherland Peatlands and Lewis Peatlands SPAs (for which no contemporary assessment exist) to ensure that population numbers on all sites within the terrestrial SPA suite and surrounding areas can be assessed by the time of the next national review. (This can be linked to surveys of breeding Dunlin and Golden Plover on the same sites).

Continue annual monitoring all regularly and previously used sites and encourage full reporting via Rare Breeding Birds Panel including negative data.

Improve procedures for estimating national population total currently based on the single survey of 1995 adjusted by a low-quality Breeding Bird Survey trend since then.

9. Distribution map for breeding Greenshank SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Bellamy, P.E. & Eaton, M.A. 2010. *2009 CSM bird monitoring of Caithness and Sutherland Peatlands SPA.* RSPB report for SNH. 69 pp.

Delany, S., Scott, D.A., Dodman, T., & Stroud, D.A. (eds.) 2009. *An atlas of wader populations in Africa and western Eurasia.* Wetlands International, Wageningen, The Netherlands. 524 pp.

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Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.4	2 February 1999	256	653	2009	Bellamy & Eaton 2010	
Lewis Peatlands	1.4	7 December 2000	152	171	See comment	SPA citation	In absence of new whole site census, a site total was derived from the 1995-2010 BBS trend for Scotland of 12.3% based on 8 BBS squares. Note small sample size / low confidence of trend.
		Total for SPAs in GB	408	**824**			**Note uncertainty about total**
		GB population	1,440	**1,100**			
		thus GB SPAs hold	28.3% GB	**74.9% GB**			
		Total for SPAs in UK	408	**824**			**Note uncertainty about total**
		Biogeographic population	57,600	**76,600**			
		thus SPAs hold	0.7% international	**1.1% international**			

Greenshank *Tringa nebularia* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	610	Musgrove *et al.* 2011	6 [50]	37	6.1%
All-Ireland	1,265	Crowe *et al.* 2008	10 [50]	0	No SPAs selected in Northern Ireland
Biogeographic - N Europe/SW Europe, NW & W Africa	230,000	Delany *et al*. 2009; Wetlands International 2012	2,300	37	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	+257.1%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-32.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs were selected for non-breeding Greenshank by the 2001 SPA Review (Stroud *et al.* 2001) for reasons given there. However, Humber Estuary was classified as the first SPA for non-breeding Greenshank in 2007. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Greenshank was not included in the *Climatic Atlas.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Greenshank, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it provides adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of the single SPA during August each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Humber Estuary SPA in future WeBS counts.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for non-breeding Greenshank SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Humber Estuary	1.3	31 August 2007	Not classified	**54**	2004/5-2009/10	WeBS	Incomplete count coverage
		Total for SPAs in GB	0	**37**	in August		
		GB population	380	**610**			
		thus GB SPAs hold	0%	**6.1% GB**			
		Total UK	0	**37**	in August		
		1% biogeographic	560	**230,000**			
		thus SPAs hold	0%	**<0.1% international**			

Wood Sandpiper *Tringa glareola* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	11	Holling *et al.* 2010	1	9	82%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic -Europe	350,000	Delany *et al*. 2009; Wetlands International 2012	3,500	9	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+209%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+108%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Wood Sandpiper, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-76.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Wood Sandpiper, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Wood Sandpipers were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge (Kalejta-Summers & Chisholm 2009), contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue annual monitoring all regularly and previously used sites and report via Rare Breeding Birds Panel including negative data.

9. Distribution map for breeding Wood Sandpiper SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Delany, S., Scott, D.A., Dodman, T., & Stroud, D.A. (eds.) 2009. *An atlas of wader populations in Africa and western Eurasia.* Wetlands International, Wageningen, The Netherlands. 524 pp.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Achanalt Marshes	1.1	1 December 1997	3	8	2005-2009	RBBP; Kalejta-Summers & Chisholm 2009	
Caithness and Sutherland Peatlands	1.1	2 December 1999	5	1	2005-2009	RBBP; Kalejta-Summers & Chisholm 2009	
River Spey – Insh Marshes	1.1	2 February 1997	2	0	2005-2009	RBBP; Kalejta-Summers & Chisholm 2009	
		Total for SPAs in GB	10	**9**			
		GB population	10	**11**			
		thus GB SPAs hold	100% GB	**82% GB**			
		Total for SPAs in UK	10	**9**			
		Biogeographic population	298,800	**350,000**			
		thus SPAs hold	0.1% international	**<0.1% international**			

Turnstone *Arenaria interpres*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	48,000	Musgrove *et al.* 2011	480	4,917	10.2%
All-Ireland	11,810	Crowe *et al*. 2008	120	1,624	13.8%
Biogeographic - *interpres*, NE Canada & Greenland/W Europe & NW Africa	150,000	Delany *et al*. 2009; Wetlands International 2012	1,400	6,541	4.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980/81 to 2010/11	-6.5%	WeBS; Holt *et al.* 2012
Short-term UK trend	1999/2000 to 2010/11	-13.0%	WeBS; Holt *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Turnstone, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-77.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Turnstone was not included in the *Climatic atlas of European breeding birds.*

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Turnstone was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Continue to ensure national population monitoring and coverage of key and other sites through WeBS.

Promote the counting of all sites within SPA suite during January each year so as to enhance quality of assessment of numbers within the SPA suite using numbers from that month.

Ensure complete coverage of Firth of Forth, Humber Estuary, Upper Solway Flats and Marshes, North Uist Machair and Lochs, Tiree Wetlands and Coast, and Strangford Lough SPAs in future WeBS counts.

Undertake and report on numbers on Tiree Wetlands and Coast in the absence of January data from the 2000s.

Seek to enhance regular population monitoring on non-estuarine coasts, not just through the Non-Estuarine Waterbird Survey but on a more regular basis.

9. Distribution map for Turnstone SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A.J. 2008. Estimates and trends of waterbird numbers wintering in Ireland 1995/95 – 2004/04. *Bird Study* 55: 66-77.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
East Sanday Coast	1.2	11 August 1997	1,400	142	2004/5-2009/10	WeBS	
Firth of Forth	1.2	30 October 2001	1,286	854	2004/5-2009/10	WeBS	
Humber Estuary	1.2	31 August 2007	n/a	553	2004/5-2009/10	WeBS	
Mersey Narrows and North Wirral Foreshore	1.2	5 July 2013	1,138	151	2004/5-2009/10	WeBS	
Morecambe Bay	1.2	31 August 2007	1,583	1,200	2004/5-2009/10	WeBS	
North Uist Machair and Lochs	1.2	31 August 2007	670	145	2004/5-2009/10	WeBS	
Northumbria Coast	1.2	31 August 2007	1,456	944	2004/5-2009/10	WeBS	
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	1.2	30 October 2001	700	700	1995, 1998 & 1999	RSPB	No more recent data available
Stour and Orwell Estuaries	1.3	13 July 1994	836	720	2004/5-2009/10	WeBS	
Thanet Coast and Sandwich Bay	1.2	28 July 1994	940	1,086	2004/5-2009/10	WeBS	
The Wash	1.2	30 March 1988	717	704	2004/5-2009/10	WeBS	
		Total for SPAs in GB	8,606	**4,917**	in January		
		GB population	64,400	**48,000**			
		thus GB SPAs hold	13.4% GB	**10.2% GB**			
Belfast Lough	1.2	Not yet classified	734	**463**	2004/5-2009/10	WeBS	
Outer Ards	1.2	11 December 2002	1,241	**1,063**	2004/5-2009/10	WeBS	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Strangford Lough	1.3	Not yet classified	401	**429**	2004/5-2009/10	WeBS	
		Total for SPAs in Northern Ireland	1,594	**1,624**	in January		
		All-Ireland population	22,500	**11,810**			
		thus NI SPAs hold	7.1% All-Ireland	**13.8% All-Ireland**			
		Total for SPAs in UK	10,200	**6,541**	in January		
		Biogeographic population	67,000	**150,000**			
		thus SPAs hold	14.6% international	**4.4% international**			

Red-necked Phalarope *Phalaropus lobatus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (males)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	20	Holling *et al.* 2012	1	11	55%
All-Ireland	0	Hillis 2007, 2008, 2009, 2010, 2011		0	Species does not occur in Northern Ireland
Biogeographic -Europe	112,500	BirdLife International 2004	1,100	11	<0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	-18.0%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	-23.0%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Red-necked Phalarope, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-78.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives include:

- "Ensure the maintenance of areas of open water with emergent vegetation via hydrological control, appropriate grazing and management of vegetation succession for key sites."

5. Projected impact of climate change on the SPA suite

In the period of this review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Red-necked Phalarope, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Red-necked Phalarope were not assessed by CHAINSPAN

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:
Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing trends, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of breeding Red-necked Phalarope, and additional SPA provision should be considered. Much of the population is held on one site and a first step should be an evaluation as to whether there are any viable sites not currently subject to conservation management.

In view of the small size of the national population and declining trend within and outwith SPAs, the conservation management of all regularly used breeding sites should be subject to urgent review.

8. Recommendations regarding survey and monitoring

Ensure consistent annual monitoring all regularly and previously used sites and report via Rare Breeding Birds Panel including negative data.

9. Distribution map for Red-necked Phalarope SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (males)	Assessment of UK SPA suite in 2000s (males)	Data period	Data source	Comment
Fetlar	1.1	29 March 1994	30	11	2005-2009	RBBP	
		Total for SPAs in GB	30	**11**			
		GB population	36	**20**			
		thus GB SPAs hold	83% GB	**55% GB**			
		Total for SPAs in UK	30	**11**			
		Biogeographic population	65,500	**112,500**			
		thus SPAs hold	<0.1% international	**<0.1% international**			

Arctic Skua *Stercorarius parasiticus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Green BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	2,100	Furness & Ratcliffe 2004a	20	343	16.3%
All-Ireland	0	Furness & Ratcliffe 2004a		0	No SPAs selected in Northern Ireland
Biogeographic – NE Atlantic	25,000	Furness & Ratcliffe 2004a	250	343	1.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-37.0%	Lloyd *et al.* 1991; Furness & Ratcliffe 2004a
Short-term UK trend	1999 to 2011	-61.7%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Arctic Skua, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-79.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives include:

- "Establish network of seabird feeding Special Protection Areas (joint action)."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Arctic Skua, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Arctic Skua was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite, including in the

marine environment, should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue annual monitoring all regularly and previously used sites and encourage full reporting via Rare Breeding Birds Panel including negative data.

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

In future monitoring, align boundaries of count units with SPA boundaries at Hoy and Rousay SPAs, and improve quality of census methods at Fetlar SPA.

9. Distribution map for breeding Arctic Skua SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper to from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Furness, R.W. & Ratcliffe, N. 2004a. Arctic Skua *Stercorarius parasiticus*. Pp. 160-172. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland.* T. & A.D. Poyser.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Fair Isle	1.3	16 December 1994	74	29	2011	UK Seabird Monitoring Programme	
Fetlar	1.3	29 March 1994	130	83	2002	UK Seabird Monitoring Programme	Only a rough estimate due to nature of survey (counted in 1 km sq. blocks).
Foula	1.3	27 November 1995	125	50	2010	UK Seabird Monitoring Programme	
Hoy	1.3	7 December 2000	59	16	2010	UK Seabird Monitoring Programme	16 AOT in 2010 for Hoy and South Walls, possibly including small number of AOT outside SPA boundary.
Papa Westray (North Hill and Holm)	1.4	27 March 1996	135	25	2011	UK Seabird Monitoring Programme	
Rousay	1.3	2 February 2000	180[110]	85	2010	UK Seabird Monitoring Programme	Data in 2010 is for whole of Rousay; no breakdown available. [The 1990s Rousay total of 180 seems very high and possibly erroneous as only 13-85 AOS were recorded from Rousay during four all-Orkney censuses between 1982-2010.]
West Westray	1.3	16 August 1996	77	55	2000	UK Seabird Monitoring Programme	
		Total for SPAs in GB	780	**343**			
		GB population	3,200	**2,100**			
		thus GB SPAs hold	24.4% GB	**16.3% GB**			
		Total for SPAs in UK	780	**343**			
		Biogeographic population	30,000	**25,000**			
		thus SPAs hold	2.6% international	**1.4% international**			

[110] Total is probably erroneously high

Great Skua *Catharacta skua* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	9,600	Furness & Ratcliffe 2004b	95	7,063	73.6%
All-Ireland	Present			0	No SPAs selected in Northern Ireland
Biogeographic - World	16,000	Furness & Ratcliffe 2004b	160	7,063	44.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+26.0%	Lloyd *et al.* 1991; Furness & Ratcliffe 2004b
Short-term UK trend	1999 to 2011	Unknown	JNCC 2013

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Great Skua, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-80.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Great Skua, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Great Skua was not assessed by CHAINSPAN

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. Marine distribution in the breeding season will be addressed by on-going review of SPA provision at sea.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

In future monitoring, align boundaries of count units with SPA boundaries at Hoy and Ronas Hill - North Roe and Tingon SPAs, and improve quality of census methods at Fetlar SPA.

9. Distribution map for breeding Great Skua SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Furness, R.W. & Ratcliffe, N. 2004b. Great Skua *Stercorarius skua*. Pp. 173-186. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) Seabird populations of Britain and Ireland. T. & A.D. Poyser.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Fair Isle	1.2	29 March 1994	130	227	2011	UK Seabird Monitoring Programme	
Fetlar	1.2	27 November 1995	512	585	2002	UK Seabird Monitoring Programme	Rough estimate due to survey method (counted in 1 km sq. blocks)
Foula	1.2	29 March 1994	2,170	2,293	2000	UK Seabird Monitoring Programme	
Handa	1.2	7 December 2000	110	241	2010	UK Seabird Monitoring Programme	
Hermaness, Saxa Vord and Valla Field	1.2	16 August 1996	630	950	2001-2002	UK Seabird Monitoring Programme	Later updates for Hermaness only
Hoy	1.2	11 August 1997	1,900	1,973	2010	UK Seabird Monitoring Programme	1,346 AOT in 2010 for whole of Hoy and South Walls *i.e.* not just SPA. Thus, will include small number of AOT outside SPA boundary, but figure is directly comparable with data quoted from earlier years.
Noss	1.2	31 August 1992	410	365	2007	UK Seabird Monitoring Programme	
Ronas Hill – North Roe and Tingon	1.2	29 March 1994	130	189	2002	UK Seabird Monitoring Programme	Rough estimate due to survey method (counted in 1 km sq. blocks).

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
St Kilda	1.2	27 November 1995	270	240	2000	Furness & Ratcliffe 2004b	
		Total for SPAs in GB	6,262	**7,063**			
		GB population	8,500	**9,600**			
		thus GB SPAs hold	73.7% GB	**73.6% GB**			
		Total for SPAs in UK	6,262	**7,063**			
		Biogeographic population	13,600	**16,000**			
		thus SPAs hold	46.0% international	**44.1% international**			

Mediterranean Gull *Larus melanocephalus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	600	Holling *et al.* 2012	6	145	24.2%
All-Ireland	5	Parsons 2004	1	0	No SPAs selected in Northern Ireland
Biogeographic – Europe (excluding Russia and Turkey)	81,000	Parsons 2004	810	145	0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+17,811%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+1,359%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Mediterranean Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-81.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Mediterranean Gull, the *Climatic Atlas* predicts extinction in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Mediterranean Gull was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient, especially in northern parts of the range.
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of increasing numbers and distribution, contemporary SPA coverage is no longer sufficient for the requirements of breeding Mediterranean Gull, and additional SPA provision should be sought.

8. Recommendations regarding survey and monitoring

Continue annual monitoring all regularly and previously used sites and encourage full reporting via Rare Breeding Birds Panel including negative data.

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Mediterranean Gull SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Holling, M. & the Rare Breeding Birds Panel. 2012. Rare breeding birds in the United Kingdom in 2010. *British Birds* 105: 352–416.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Parsons, M. 2004. Mediterranean Gull *Larus melanocephalus.* Pp. 187-195. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland.* T. & A.D. Poyser.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Dungeness to Pett Level	1.1	2 August 1999	2	41	mean 2003-2007	RBBP	
North Norfolk Coast	1.1	Not yet classified	2	3	mean 2003-2007	RBBP	
Poole Harbour	1.1	31 March 1999	5	87	2008	RBBP via NE	
Solent and Southampton Water	1.1	1 October 1998	2	9	mean 2003-2007	RBBP	
The Swale	1.1	Not yet classified	12	5	mean 2003-2007	RBBP	
		Total for SPAs in GB	23	**145**			
		GB population	31	**600**			
		thus GB SPAs hold	74%GB	**24.2% GB**			
		Total for SPAs in UK	23	**145**			
		Biogeographic population	184,000	**81,000**			
		thus SPAs hold	<0.1% international	**0.2% international**			

Mediterranean Gull *Larus melanocephalus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,800	Musgrove *et al.* 2011	20	0	No SPAs selected in GB
All-Ireland				0	No SPAs selected in Northern Ireland
Biogeographic – Europe (excluding Russia and Turkey)	50,000-120,000	Wetlands International 2012	770	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1980 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. This species was not assessed in the non-breeding season.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Mediterranean Gulls in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Mediterranean Gulls were not assessed by the *Climatic atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Mediterranean Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key sites and incorporate findings into a further national non-breeding gull census to be undertaken before the next SPA Network review.

9. Distribution map for breeding Mediterranean Gull SPA suite

No SPAs have previously been selected for non-breeding Mediterranean Gulls.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Joint Nature Conservation Committee 2013a. *10th Report by the United Kingdom under Article 12 on the implementation of the Directive on the conservation of wild birds (2009/147/EC) from January 2008 to December 2012.* JNCC, Peterborough. Available at: http://jncc.defra.gov.uk/default.aspx?page=6526

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. *British Birds* 104: 364–397.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: www.wpe.wetlands.org

11. SPA suite

No SPAs have previously been selected for non-breeding Mediterranean Gulls.

Little Gull *Hydrocoloeus minutus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	Unknown	Musgrove *et al.* 2011	Not set	213	Unknown
All-Ireland	100	Crowe 2005	1	0	No SPAs selected in Northern Ireland
Biogeographic C & E Europe/SW Europe & W Mediterranean	123,000	BirdLife International 2004; Wetlands International 2012	1,100	213	0.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to produce an index for this species in the absence of distributional data.

3. Changes to the SPA suite since the 2001 Review

Passage Little Gulls were not included in the 2001 SPA Review (Stroud *et al*. 2001).

Mersey Narrows and North Wirral Foreshore has been classified for passage Little Gulls since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

The *Climatic Atlas* did not model the non-breeding distribution of Little Gull.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Little Gull in the non-breeding season was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and SPA provision, as feasible, should be sought.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Noting the significant limitations of existing, shore-based WeBS monitoring for this marine species, establish programme that adequately monitors marine distribution and trends, including initial collation of existing information, analysis of gaps where additional and continuing surveys needed, and initiation of new aerial and other surveys as appropriate.

Undertake necessary survey work to allow the estimation of the size of the wintering population, and to better understand at sea distribution and phenology in UK waters.

9. Distribution map for non- breeding Little Gull SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

BirdLife International 2004. *Birds in Europe: population estimates, trends and conservation status.* Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).

Crowe, O. 2005. *Ireland's wetlands and their waterbirds: status and distribution.* BirdWatch Ireland, Rockingham, Co. Wicklow.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Joint Nature Conservation Committee 2013a. *10th Report by the United Kingdom under Article 12 on the implementation of the Directive on the conservation of wild birds (2009/147/EC) from January 2008 to December 2012.* JNCC, Peterborough. Available at: http://jncc.defra.gov.uk/default.aspx?page=6526

Musgrove, A.J., Austin, G.E., Hearn, R.D., Holt, C.A., Stroud, D.A. & Wotton, S.R. 2011. Overwinter population estimates of British waterbirds. British Birds 104: 364–397.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Wetlands International 2012. *Waterbird Population Estimates. Fifth edition.* Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 2001 (individuals)	Assessment of UK SPA suite in 2012 (individuals)	Data period	Data source	Comment
Mersey Narrows and North Wirral Foreshore	1.1	5 July 2013	Not classified	213	2004/05-2008/09	WeBS	
		Total for SPAs in GB	0	**213**			
		GB population	unknown	**unknown**			
		thus GB SPAs hold	unknown %	**unknown% GB**			
		Total for SPAs in UK	0	**213**			
		Biogeographic population	unknown	**123,000**			
		thus SPAs hold	unknown % international	**0.2% international**			

Black-headed Gull *Larus ridibundus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	130,000	Dunn 2004	1,300	9,492	7.3%
All-Ireland	14,000	Dunn. 2004	140	3,269	23.4%
Biogeographic - World	2,450,000	Dunn 2004	20,000**	12,761	0.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+0.3%[111]	Lloyd *et al.* 1991; Dunn 2004
Short-term UK trend	1999 to 2011	+52.8%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. Results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Black-headed Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-82.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic

[111] This long-term trend relates to coastal population only as inland breeders were not adequately covered during the 1985-1988 national seabird census (Lloyd *et al.* 1991). Other statistics in Sections 2a and 2b relate to birds in both coastal and inland environments.

change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Black-headed Gull, the *Climatic Atlas* predicts virtual absence from Wales, central England, and most of Ireland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Black-headed Gull, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Damp, improved pastures. No spatial information.	Insufficient information.	Insufficient information.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	High fidelity to those cropped habitats used as breeding sites.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	High fidelity to those cropped habitats used as breeding sites.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Medium fidelity to specific locations used as breeding sites.
Is the use of cropped habitats determined by crop type?	No.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	No.

Cropped habitats assessment from SPA Review Decision Framework	
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	No, this species makes use of a wide range of feeding sources which varies within and between years, it is not possible to capture these in a meaningful way in SPA site selection during the breeding season. There would need to be broad scale and substantial changes in availability of arable and pasture to have a significant impact.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, assessing SPA suite against Seabird 2000 distribution map show gaps in range, and this may need consideration in a future network Review.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Black-headed Gull SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur (although the site may be classified for other species).

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Dunn, T.E. 2004. Black-headed Gull *Larus ridibundus*. Pp. 196-213. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland.* T. & A.D. Poyser, London.

Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991.* London. T. & A.D. Poyser

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

JNCC 2012. *Seabird Population Trends and Causes of Change: 2012 Report* (http://www.jncc.defra.gov.uk/page-1550). Joint Nature Conservation Committee. Updated July 2012.

Lloyd, C., Tasker, M.L. & Partridge, K. 1991. *The status of seabirds in Britain and Ireland*. London, T. & A.D. Poyser. 355 pp.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Alde-Ore Estuary	1.3	Not yet classified	1,582	725	1999	UK Seabird Monitoring Programme	Later updates for Havergate Island only
Coquet Island	1.3	Not yet classified	2,100	3,525	2011	UK Seabird Monitoring Programme	
Ribble and Alt Estuaries	1.2	16/02/1995	11,900	5,242	2008	UK Seabird Monitoring Programme	
		Total for SPAs in GB	15,582	**9,492**			
		GB population	167,000	**130,000**			
		thus GB SPAs hold	9.3% GB	**7.3% GB**			
Lough Neagh and Lough Beg	1.2	Not yet classified	33,000	3,269	2000	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	33,000	**3,269**			
		All-Ireland population	53,800	**14,000**			
		thus NI SPAs hold	61.3% All-Ireland	**23.4% All-Ireland**			
		Total for SPAs in UK	48,582	**12,761**			
		Biogeographic population	1,650,000	**2,450,000**			
		thus SPAs hold	2.9% international	**0.5% international**			

Black-headed Gull *Larus ridibundus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	2,200,000	Banks *et al.* 2007	20,000**	0	No SPAs selected in GB
All-Ireland	100,000	Crowe 2005	1,000	0	No SPAs selected in Northern Ireland
Biogeographic - W Europe/W Europe, W Mediterranean & W Africa	4,250,000	BirdLife International 2004; Wetlands International 2012	20,000**	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Black-headed Gulls in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Black-headed Gulls were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Black-headed Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Feed primarily in improved pasture. No spatial information.	Insufficient information.	Insufficient information.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

As a consequence of the lack of data for non-breeding gulls identified in 2001 SPA Review, a major survey of numbers and key sites was undertaken between 2003/04 – 2005/06 (Banks *et al.* 2007; Burton *et al.* 2013). These data have materially enhanced knowledge of UK gulls in the non-breeding season. There is a need to repeat this national survey at appropriate future intervals, ideally not more than 10 years since the previous survey.

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key and other sites and incorporate findings into any further national non-breeding gull censuses to be undertaken before the next SPA Network Review.

9. Distribution map for non-breeding Black-headed Gull SPA suite

No SPAs have previously been selected for non-breeding Black-headed Gulls.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. 2007. *Winter gulls in the UK: population estimates from the 2003/04-2005/06 Winter Gull Roost Survey.* BTO Research Report No. 456. BTO, Thetford.

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Burton, N.H.K., Banks, A.N., Calladine, J.R. & Austin, G.E. 2013. The importance of the United Kingdom for wintering gulls: population estimates and conservation requirements. *Bird Study* 60: 87-101.

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11. SPA suite

No SPAs have previously been selected for non-breeding Black-headed Gulls.

Common Gull *Larus canus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	48,000[112]	Tasker 2004b	480	6,240	13.0%
All-Ireland	1,600[1]	Tasker 2004b	15	30	1.9%
Biogeographic – *canus*, NW & Central Europe/ Atlantic/ Mediterranean	525,000	Tasker 2004b	5,200	6,270	1.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+36%[1]	Lloyd *et al.* 1991; Tasker 2004b
Short-term UK trend	1999 to 2011	-43.8%	Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Common Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-83.pdf.

[112] Relates largely to coastal colonies as inland colonies were not well covered in earlier national censuses.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Paz & Poulin 2009). Relevant objectives are as follows:

- "Identify and protect all important breeding sites of Common Gulls in north-western European Member States. Important breeding sites for Common Gulls, especially in the Netherlands, Sweden and UK are identified and protected, included as SPAs where appropriate."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Common Gull, the *Climatic Atlas* predicts a breeding distribution centred mainly in the northern Highlands of Scotland and the Shetland Isles.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Common Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Damp, improved pastures. No spatial information.	Insufficient information.	Insufficient information.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite, including in the marine environment, should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Common Gull SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. *The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991.* London. T. & A.D. Poyser

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Tasker, M.L. 2004b. Common Gull *Larus canus*. Pp. 214-225. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland*. T. & A.D. Poyser.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Tips of Corsemaul and Tom Mor (formerly Correen/Mortlach Hills)	1.2	15 December 2000	18,000	6,240	2007/2008	SNH surveys via UK Seabird Monitoring Programme	Tom Mor = 4,156; Tips of Corsemaul = 2,084
		Total for SPAs in GB	18,000	**6,240**			
		GB population	68.000	**48,000**			
		thus GB SPAs hold	26.5% GB	**13.0% GB**			
Lough Neagh and Lough Beg	1.3	Not yet classified	200	0	1998-2002	Tasker 2004b	No birds recorded during Seabird 2000
Rathlin Island	1.3	Not yet classified	64	30	2011	NIEA survey	Occupied nests
		Total for SPAs in Northern Ireland	264	**30**			
		All-Ireland population	3,600	**1,600**			
		thus NI SPAs hold	7.3% All-Ireland	**1.9% All-Ireland**			
		Total for SPAs in UK	18,264	**6,270**			
		Biogeographic population	124,000	**525,000**			
		thus SPAs hold	14.7% international	**1.2% international**			

Common Gull *Larus canus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	700,000	Banks *et al.* 2007	7,000	0	No SPAs selected in GB
All-Ireland	67,500	Lack 1986; Crowe 2005	670	0	No SPAs selected in Northern Ireland
Biogeographic *canus*, NW & C Europe/ Atlantic/ Mediterranean	1,725,000	BirdLife International 2004;Wetlands International 2012	16,400	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Common Gulls in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international management plan has been developed by the European Union for this species (Paz & Poulin 2009). There are no relevant site-related actions in the non-breeding season.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Common Gulls were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Common Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Improved meadows/ silage grasslands, ploughed fields, improved pastures, autumn-sown cereals. Feed up to 30 km from roost, field choice very variable.	None.	Maintenance of specific feeding areas not necessary.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

As a consequence of the lack of data for non-breeding gulls identified in 2001 SPA Review, a major survey of numbers and key sites was undertaken between 2003/04 – 2005/06 (Banks *et al.* 2007; Burton *et al.* 2013). These data have materially enhanced knowledge of UK gulls in the non-breeding season. There is a need to repeat this national survey at appropriate future intervals, ideally not more than 10 years since the previous survey.

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key sites and incorporate findings into any further national non-breeding gull censuses to be undertaken before the next SPA network Review.

9. Distribution map for non-breeding Common Gull SPA suite

No SPAs have previously been selected for non-breeding Common Gulls.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. 2007. *Winter gulls in the UK: population estimates from the 2003/04-2005/06 Winter Gull Roost Survey.* BTO Research Report No. 456. BTO, Thetford.

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Wetlands International 2012. *Waterbird Population Estimates*. Fifth edition. Wetlands International, Wageningen, The Netherlands. Available at: http://wpe.wetlands.org

11. SPA suite

No SPAs have previously been selected for non-breeding Common Gulls.

Lesser Black-backed Gull *Larus fuscus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	110,000	Calladine 2004	1,100	42,295	38.5%
All-Ireland	4,800	Calladine 2004	50	600	12.5%
Biogeographic – total *graellsii*	179,000	Calladine 2004	1,800	42,895	24.0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+40.3%[113]	Lloyd *et al.* 1991; Calladine 2004
Short-term UK trend	1999 to 2011	Unknown[114]	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Lesser Black-backed Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-84.pdf.

[113] This long-term trend relates to coastal population only as inland breeders were not adequately covered during the 1985-1988 national seabird census (Lloyd *et al.* 1991). Other statistics in Sections 2a and 2b relate to birds in both coastal and inland environments.

[114] Seabird Colony Register sample of sites is unrepresentative of the whole population

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Lesser Black-backed Gull, the *Climatic Atlas* predicts a wide UK breeding distribution but absence from south-east England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Lesser Black-backed Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. Appropriate SPA provision in the offshore marine environment in the breeding season is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Lesser Black-backed Gull SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ailsa Craig	1.2	25 April 1990	1,800	183	2010	UK Seabird Monitoring Programme	
Alde-Ore Estuary	1.2	4 October 1996	21,700	6,000	2003	UK Seabird Monitoring Programme	
Bowland Fells	1.2	16 December 1993	13,900	4,575	2008-2012	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.2	25 April 1990	2,920	1,608	2005-2009	per SNH	
Isles of Scilly	1.2	10 August 2001	3,608	3,333	2006	UK Seabird Monitoring Programme	
Morecambe Bay	1.2	Not yet classified	22,000	9,829	2010	UK Seabird Monitoring Programme	
Ribble and Alt Estuaries	1.2	16 February 1995	1,800	4,117	2008	UK Seabird Monitoring Programme	
Skomer and Skokholm	1.2	Not yet classified	20,300	12,650	2011	UK Seabird Monitoring Programme	
		Total for SPAs in GB	88,028	**42,295**			
		GB population	83,000	**110,000**			
		thus GB SPAs hold	100% GB	**38.5% GB**			
Lough Neagh and Lough Beg	1.3	Not yet classified	450	493	2000	UK Seabird Monitoring Programme	
Rathlin Island	1.3	Not yet classified	155	107	2011	NIEA survey:	Occupied nests
	Total for SPAs in Northern Ireland		605	**600**			
		All-Ireland population	5,200	**4,800**			
		thus NI SPAs hold	11.6% All-Ireland	**12.5% All-Ireland**			
		Total for SPAs in UK	88,633	**42,895**			
		Biogeographic population	124,000	**179,000**			
		thus SPAs hold	71.4% international	**24.0% international**			

Lesser Black-backed Gull *Larus fuscus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	120,000	Banks *et al.* 2007	1,200	0	No SPAs selected in GB
All-Ireland	10,000	Crowe 2005	100	0	No SPAs selected in Northern Ireland
Biogeographic – total *graellsii*	550,000	BirdLife International 2004; Wetlands International 2012	5,500	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Lesser Black-backed Gulls.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Lesser Black-backed Gulls were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Lesser Black-backed Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

As a consequence of the lack of data for non-breeding gulls identified in 2001 SPA Review, a major survey of numbers and key sites was undertaken between 2003/04 – 2005/06 (Banks *et al.* 2007; Burton *et al.* 2013). These data have materially enhanced knowledge of UK gulls in the non-breeding season. There is a need to repeat this national survey at appropriate future intervals, ideally not more than 10 years since the previous survey.

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key sites and incorporate findings into any further national non-breeding gull censuses to be undertaken before the next SPA network review.

9. Distribution map for non-breeding Lesser Black-backed Gull SPA suite

No SPAs have previously been selected for non-breeding Lesser Black-backed Gulls.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. 2007. *Winter gulls in the UK: population estimates from the 2003/04-2005/06 Winter Gull Roost Survey.* BTO Research Report No. 456. BTO, Thetford.

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11. SPA suite

No SPAs have previously been selected for non-breeding Lesser Black-backed Gulls.

Herring Gull *Larus argentatus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	130,000	Madden & Newton 2004	1,300	16,307	12.5%
All-Ireland	6,500	Madden & Newton 2004	65	23	0.4%
Biogeographic *L. a. argenteus*	752,000	Madden & Newton 2004	7,500	16,300	2.2%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-12.7%[115]	Lloyd *et al.* 1991; Madden & Newton 2004
Short-term UK trend	1999 to 2011	-30.9%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Herring Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-85.pdf.

[115] This long-term trend relates to coastal population only as inland breeders were not adequately covered during the 1985-1988 national seabird census (Lloyd *et al.* 1991). Other statistics in Sections 2a and 2b relate to birds in both coastal and inland environments.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Herring Gull, the *Climatic Atlas* predicts a wide breeding distribution in the UK but virtual absence from south and east England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Herring Gull, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Appropriate SPA provision in the offshore marine environment in the breeding season is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Herring Gull SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ailsa Craig	1.3	25 April 1990	2,250	131	2010	UK Seabird Monitoring Programme	
Alde-Ore Estuary	1.3	Not yet classified	6,050	2,000	2003	UK Seabird Monitoring Programme	
Buchan Ness to Collieston Coast	1.3	30 March 1998	4,292	2,604	2007	UK Seabird Monitoring Programme	
Canna and Sanday	1.3	20 February 1998	1,391	63	2011	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	27 March 1996	9,370	3,393	1999	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.2	25 April 1990	6,600	2,827	2005-2009	per SNH	
Flamborough Head and Brampton Cliffs	1.3	Not yet classified	1,110	495	2010	UK Seabird Monitoring Programme	
Fowlsheugh	1.3	31 August 1992	3,190	214	2009	UK Seabird Monitoring Programme	
Morecambe Bay	1.2	Not yet classified	11,000	2,246	2010	UK Seabird Monitoring Programme	
St Abb's Head to Fast Castle	1.3	11 August 1997	1,160	647	2000	UK Seabird Monitoring Programme	Later updates for St Abb's Head NNR only
Troup, Pennan and Lion's Heads	1.3	14 March 1997	4,200	1,687	2007	UK Seabird Monitoring Programme	
		Total for SPAs in GB	50,613	**16,307**			
		GB population	160,000	**130,000**			
		thus GB SPAs hold	31.7% GB	**12.5% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Rathlin Island	1.3	Not yet classified	4,037	23	2011	NIEA survey	Occupied nests
		Total for SPAs in Northern Ireland	4,037	**23**			
		All-Ireland population	44,700	**6,500**			
		thus NI SPAs hold	9.0% All-Ireland	**0.4% All-Ireland**			
		Total for SPAs in UK	54,650	**16,330**			
		Biogeographic population	940,000	**752,000**			
		thus SPAs hold	**5.8% international**	**2.2% international**			

Herring Gull *Larus argentatus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	730,000	Banks *et al.* 2007	7,300	0	No SPAs selected in GB
All-Ireland	30,000	Crowe 2005	300	0	No SPAs selected in Northern Ireland
Biogeographic – *argentatus & argenteus* NW Europe & Iceland/W Europe	3,030,000	Wetlands International 2012	20,000**	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Herring Gulls in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives include:

- “Designate important sites for wintering birds where appropriate.”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Herring Gulls were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For non-breeding Herring Gulls, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

As a consequence of the lack of data for non-breeding gulls identified in 2001 SPA Review, a major survey of numbers and key sites was undertaken between 2003/04 – 2005/06 (Banks *et al.* 2007; Burton *et al.* 2013). These data have materially enhanced knowledge of UK gulls in the non-breeding

season. There is a need to repeat this national survey at appropriate future intervals, ideally not more than 10 years since the previous survey.

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key sites and incorporate findings into any further national non-breeding gull censuses to be undertaken before the nest SPA Network review.

9. Distribution map for non-breeding Herring Gull SPA suite

No SPAs have previously been selected for non-breeding Herring Gulls.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Banks, A.N., Burton, N.H.K., Calladine, J.R. & Austin, G.E. 2007. *Winter gulls in the UK: population estimates from the 2003/04-2005/06 Winter Gull Roost Survey.* BTO Research Report No. 456. BTO, Thetford.

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11. SPA suite

No SPAs have previously been selected for non-breeding Herring Gulls.

Great Black-backed Gull *Larus marinus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	17,000	Reid 2004	170	2,863	16.8%
All-Ireland	2,300	Reid 2004	25	0	No SPAs selected in Northern Ireland
Biogeographic – Europe (excluding Russia)	105,000	Reid 2004	1,000	2,863	2.7%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-3.9%	Lloyd *et al.* 1991; Reid 2004
Short-term UK trend	1999 to 2011	-42.8%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Great Black-backed Gull, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-86.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Great Black-backed Gull, the *Climatic Atlas* predicts a northern and western breeding distribution in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Great Black-backed Gull, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the light of decreasing numbers and distribution, existing site-based conservation provision provided by the current SPA suite is no longer adequate for the requirements of Great Black-backed Gulls, and additional SPA provision should be considered.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Great Black-backed Gull SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Calf of Eday	1.3	29 June 1998	938	675	2000	UK Seabird Monitoring Programme	
Copinsay	1.3	29 March 1994	600	324	2008	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	27 March 1996	850	175	1999	UK Seabird Monitoring Programme	
Hoy	1.3	7 December 2000	570	438	2000	UK Seabird Monitoring Programme	
Isles of Scilly	1.3	10 August 2001	766	901	2006	UK Seabird Monitoring Programme	
North Rona and Sula Sgeir	1.3	30 October 2001	733	350	2009	UK Seabird Monitoring Programme	
		Total for SPAs in GB	4,457	**2,863**			
		GB population	19,000	**17,000**			
		thus GB SPAs hold	23.5% GB	**16.8% GB**			
		Total for SPAs in UK	4,457	**2,863**			
		Biogeographic population	95,546	**105,000**			
		thus SPAs hold	4.7% international	**2.7% international**			

Great Black-backed Gull *Larus marinus* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	76,000	Banks *et al.* 2007	760	0	No SPAs selected in GB
All-Ireland	9,000	Crowe 2005	90	0	No SPAs selected in Northern Ireland
Biogeographic -N & W Europe	435,000	BirdLife International 2004; Wetlands International 2012	4,200	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1980 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Great Black-backed Gulls in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Non-breeding Great Black-backed Gulls were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Great Black-backed Gulls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Appropriate SPA provision is needed in the inshore/terrestrial environment. Appropriate SPA provision in the offshore marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

As a consequence of the lack of data for non-breeding gulls identified in 2001 SPA Review, a major survey of numbers and key sites was undertaken between 2003/04 – 2005/06 (Banks *et al.* 2007; Burton *et al.* 2013). These data have materially enhanced knowledge of UK gulls in the non-breeding season. There is a need to repeat this national survey at appropriate future intervals, ideally not more than 10 years since the previous survey.

Continue to encourage reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to establish the most appropriate means of establishing and monitoring numbers at key sites and incorporate findings into any further national non-breeding gull censuses to be undertaken before the next network Review.

9. Distribution map for non-breeding Great Black-backed Gull SPA suite

No SPAs have previously been selected for non-breeding Great Black-backed Gulls.

10. References

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11. SPA suite

No SPAs have previously been selected for non-breeding Great Black-backed Gulls.

Kittiwake *Rissa tridactyla* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	370,000	Heubeck. 2004	3,700	209,083	56.5%
All-Ireland	49,000	Heubeck 2004	490	7,922	16.2%
Biogeographic – N Atlantic = total *tridactyla*	2,750,000	Heubeck 2004	20,000**	217,005	7.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-24.8%	Lloyd *et al.* 1991; Heubeck 2004
Short-term UK trend	1999 to 2011	-46.6%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Kittiwake, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-87.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Kittiwake, the *Climatic Atlas* predicts a westerly and northerly breeding distribution with virtual absence from south and east England coasts.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Kittiwake, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

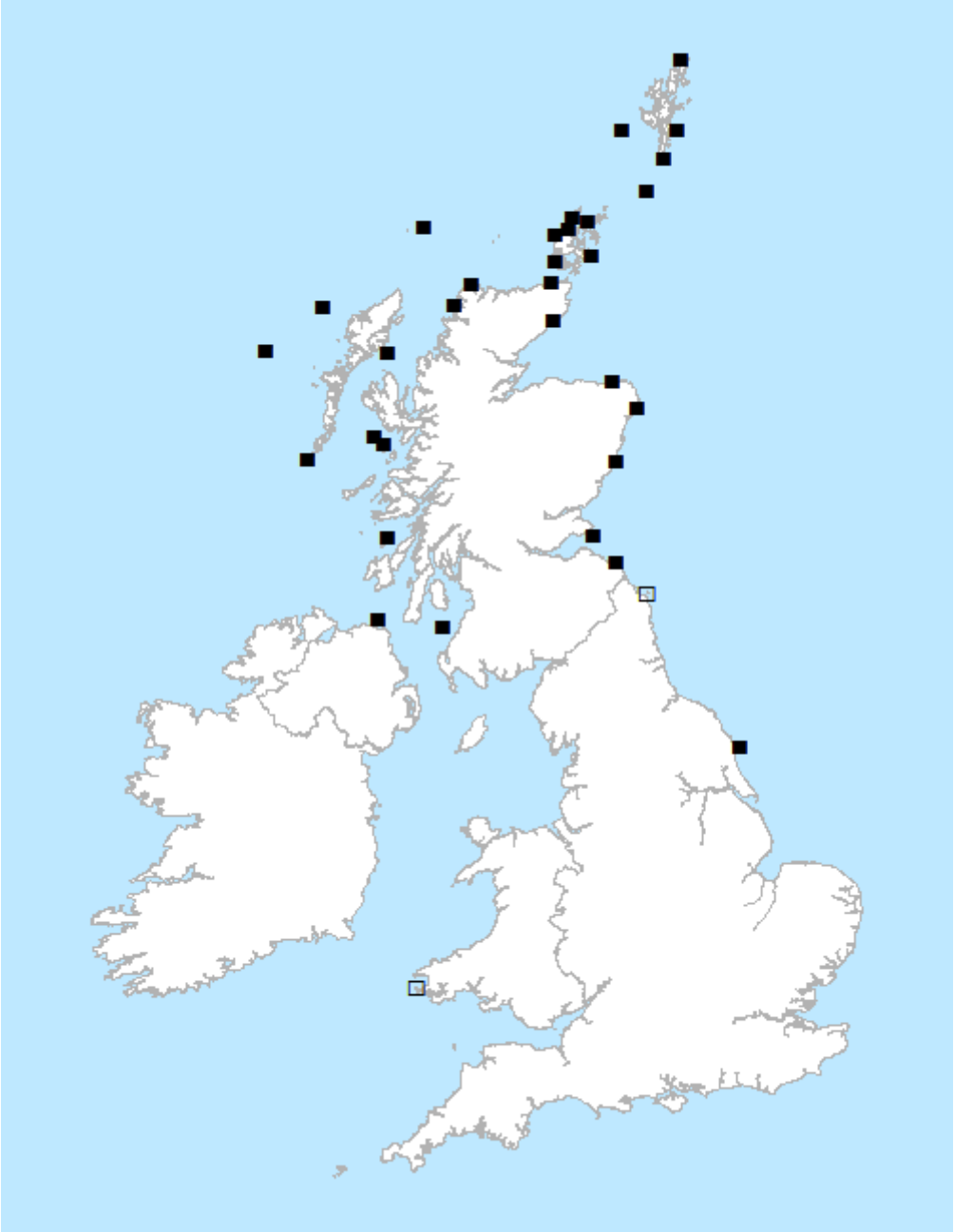
Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. Appropriate SPA provision in the offshore marine environment in the breeding season is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

In future monitoring, align boundaries of count units with SPA boundaries at Cape Wrath and North Caithness Cliffs SPAs.

9. Distribution map for breeding Kittiwake SPA suite



Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ailsa Craig	1.3	25 April 1990	3,100	75	2011	UK Seabird Monitoring Programme	
Buchan Ness to Collieston Coast	1.3	30 March 1998	30,452	14,133	2007	UK Seabird Monitoring Programme	
Calf of Eday	1.3	29 June 1998	1,717	765	2002	UK Seabird Monitoring Programme	
Canna and Sanday	1.3	15 March 1996	1,193	1,002	2011	UK Seabird Monitoring Programme	
Cape Wrath	1.3	29 March 1994	9,660	10,344	2000	UK Seabird Monitoring Programme	Coastline length larger than SPA by about 1 km
Copinsay	1.2	27 March 1996	3,610	433	2005	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	16 December 1994	31,930	40,410	1999	UK Seabird Monitoring Programme	
Fair Isle	1.3	25 April 1990	9,660	1,438	2011	UK Seabird Monitoring Programme	
Farne Islands	1.3	Not yet classified	6,236	3,976	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.3	25 April 1990	9,380	4,523	2005-2009	per SNH	
Flamborough Head and Bempton Cliffs	1.3	27 November 1995	83,370	37,617	2008	UK Seabird Monitoring Programme	
Flannan Isles	1.2	31 August 1992	2,800	1,392	1998	UK Seabird Monitoring Programme	
Foula	1.3	25 April 1990	3,840	480	2011	UK Seabird Monitoring Programme	
Fowlsheugh	1.3	7 December 2000	34,870	9,454	2009	UK Seabird Monitoring Programme	
Handa	1.3	16 December 1994	7,420	4,466	2009	UK Seabird Monitoring Programme	
Hermaness, Saxa Vord and Valla Field	1.3	16 December 1994	1,710	755	1999	UK Seabird Monitoring Programme	Later updates for Hermaness only
Hoy	1.3	16 August 1996	3,000	397	2007	UK Seabird Monitoring Programme	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Marwick Head	1.3	24 March 1997	7,110	2,018	2009	UK Seabird Monitoring Programme	
Mingulay and Berneray	1.3	30 October 2001	8,610	2,228	2009	UK Seabird Monitoring Programme	
North Caithness Cliffs	1.3	16 August 1996	15,650	10,147	1999~2000	UK Seabird Monitoring Programme	Data includes all of Stroma
North Colonsay and Western Cliffs	1.3	25 February 1999	4,512	5,563	2000	UK Seabird Monitoring Programme	
North Rona and Sula Sgeir	1.3	2 February 2000	5,040	4,119	1998	UK Seabird Monitoring Programme	Later updates for North Rona only *e.g.* Murray & Wilson 2013
Noss	1.2	31 August 1982	4,270	507	2010	UK Seabird Monitoring Programme	
Rousay	1.3	2 February 2000	4,900	2,713	1999	UK Seabird Monitoring Programme	
Rum	1.3	31 August 1982	1,500	788	2000	UK Seabird Monitoring Programme	
Skomer and Skokholm	1.3	Not yet classified	1,959	1,837	2011	UK Seabird Monitoring Programme	
St Abb's Head to Fast Castle	1.3	11 August 1997	19,600	16,222	2000	UK Seabird Monitoring Programme	Later updates for St Abb's Head NNR only
St Kilda	1.3	31 August 1992	7,800	957	2008	UK Seabird Monitoring Programme	
Sumburgh Head	1.3	27 March 1996	1,366	549	2010	UK Seabird Monitoring Programme	
The Shiant Isles	1.3	31 August 1992	1,850	549	2008	UK Seabird Monitoring Programme	
Troup, Pennan and Lion's Heads	1.2	14 March 1997	31,660	17,171	2007	UK Seabird Monitoring Programme	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
West Westray	1.3	16 August 1996	24,000	12,055	2007	UK Seabird Monitoring Programme	
		Total for SPAs in GB	383,755	**209,083**			
		GB population	490,000	**370,000**			
		thus GB SPAs hold	78.3% GB	**56.5% GB**			
Rathlin Island	1.2	25 February 1999	6,822	7,922	2011	NIEA survey	Occupied nests
		Total for SPAs in Northern Ireland	6,822	**7,922**			
		All-Ireland population	50,200	**49,000**			
		thus NI SPAs hold	13.6% All-Ireland	**16.2% All-Ireland**			
		Total for SPAs in UK	390,597	**217,005**			
		Biogeographic population	3,170,000	**2,750,000**			
		thus SPAs hold	12.3% international	**7.9% international**			

Sandwich Tern *Sterna sandvicensis* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	11,000	Ratcliffe 2004a	110	7,932	72.1%
All-Ireland	3,700	Ratcliffe 2004a	35	1,302	35.2%
Biogeographic – *sandvicensis* Europe	74,000	Ratcliffe 2004a	740	9,234	12.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-15.4%	Lloyd *et al.* 1991; Ratcliffe 2004a
Short-term UK trend	1999 to 2011	+6.6%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Sandwich Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-88A.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Sandwich Tern, the *Climatic Atlas* predicts a westerly and northerly breeding distribution in the UK with virtual absence from the south and eastern coasts of England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Sandwich Terns were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. Site condition and management should be considered at those sites where numbers have shown major decreases.
Appropriate SPA provision in the offshore marine environment in the breeding season is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for breeding Sandwich Tern SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Alde-Ore Estuary	1.1	4 October 1996	169	2	2009	UK Seabird Monitoring Programme	
Chichester and Langstone Harbours	1.1	28 October 1987	158	183	2009	UK Seabird Monitoring Programme	
Coquet Island	1.1	17 July 1985	1,590	1,717	2011	UK Seabird Monitoring Programme	
Duddon Estuary	1.1	16 March 1998	210	0	2011	UK Seabird Monitoring Programme	
Farne Islands	1.1	17 July 1985	2,070	544	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.1	25 April 1990	22	0	2010	UK Seabird Monitoring Programme	
Foulness	1.1	4 October 1996	320	0	2006	UK Seabird Monitoring Programme	
Loch of Strathbeg	1.1	27 Noveber1995	530	0	2010	UK Seabird Monitoring Programme	
Morecambe Bay	1.1	4 October 1996	290	1	2011	UK Seabird Monitoring Programme	
North Norfolk Coast	1.1	20 January 1989	3,457	2,980	2010	UK Seabird Monitoring Programme	
Solent and Southampton Water	1.1	1 October 1998	231	215	2007	UK Seabird Monitoring Programme	
Ynys Feurig, Cemlyn Bay and The Skerries	1.1	10 June 1992	460	1,700	2011	UK Seabird Monitoring Programme	
Ythan Estuary, Sands of Forvie and Meikle Loch	1.1	30 March 1998	600	590	2011	UK Seabird Monitoring Programme	
		Total for SPAs in GB	10,107	**7,932**			
		GB population	14,000	**11,000**			
		thus GB SPAs hold	72.2% GB	**72.1% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Carlingford Lough	1.1	9 March 1998	575	0	2009	UK Seabird Monitoring Programme	
Larne Lough	1.1	4 March 1997	165	324	2011	UK Seabird Monitoring Programme	
Strangford Lough	1.1	9 March 1998	593	978	2011	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	1,333	**1,302**			
		All-Ireland population	4,400	**3,700**			
		thus NI SPAs hold	30.3% All-Ireland	**35.2% All-Ireland**			
		Total for SPAs in UK	11,440	**9,234**			
		Biogeographic population	**132,000**	**74,000**			
		thus SPAs hold	**8.7% international**	**12.5% international**			

Sandwich Tern *Sterna sandvicensis* (passage)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	32,000	Derived from Ratcliffe 2004a	320	1,746	5.5%
All-Ireland	11,100	Derived from Ratcliffe 2004a	110	0	No SPAs selected in Northern Ireland
Biogeographic *sandvicensis,* Europe	220,000	Derived from Ratcliffe 2004a	2,200	1,746	0.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1999 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to calculate an index for Sandwich Tern in the passage period.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Sandwich Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-88B.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Passage Sandwich Tern were not assessed by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For passage Sandwich Tern, modelled impacts are as follows: by 2050, under a medium emissions scenario, autumn passage numbers within the SPA suite are anticipated, with poor confidence, to increase by up to 25%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite, including in the marine environment, should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to encourage better reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to understand the source of late summer numbers at SPAs and relationships with local and other breeding colonies.

9. Distribution map for passage Sandwich Tern SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp; 438 pp; 392 pp). Available at: http://jncc.defra.gov.uk/page-1412.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Firth of Forth	1.1	30 October 2001	1,611	1,243	2004/5-2009/10	WeBS	
Teesmouth and Cleveland Coast	1.1	15 August 1995	2,190	318	2004/5-2009/10	WeBS	
The Dee Estuary	1.1	17 July 1985	818	1,088	2004/5-2009/10	WeBS	
		Total for SPAs in GB	4,619	**1,746**			
		GB population	42,000	**32,000**			
		thus GB SPAs hold	11.0% GB	**5.5% GB**			
		Total for SPAs in UK	6,619	**1,746**			
		Biogeographic population	396,000	**220,000**			
		thus SPAs hold	1.2% international	**0.4% international**			

Roseate Tern *Sterna dougallii*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	86	Holling *et al*. 2012	1	81	94%
All-Ireland	738	Newton 2004	7	0	0.0%
Biogeographic Europe	2,150	Newton 2004	20	81	3.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1969-70 to 2006-10	-91%	Cramp *et al.* 1974; Holling *et al*. 2012
Short-term UK trend	1991 to 2011	+61.4%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated high population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Roseate Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-89.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union for this species (Newbury 1999).

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives include:

- “Establish network of seabird feeding Special Protection Areas (joint action).”

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK’s birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Roseate Tern, the *Climatic Atlas* predicts a westerly and northerly distribution in the UK with virtual absence from the coasts of England and Wales.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Roseate Terns were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2006).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

A review of monitoring of those sites where Roseate Terns have gone extinct since the second Review is needed to assess whether breeding tern surveys might have failed to detect breeding Roseate Terns at those sites.

Continue annual monitoring of all regularly and previously used sites and report via Rare Breeding Birds Panel including negative data. Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for Roseate Tern SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Cramp, S., Bourne, W.R.P. & Saunders, D. 1974. *The seabirds of Britain and Ireland.* London, Collins.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Coquet Island	1.1	17 July 1985	31	78	2011	UK Seabird Monitoring Programme	
Farne Islands	1.1	Not yet classified	3	0	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.1	25 April 1990	9	3	2005-09	UK Seabird Monitoring Programme	
North Norfolk Coast	1.1	Not yet classified	2	0	2010	UK Seabird Monitoring Programme	
Solent and Southampton Water	1.1	1 October 1998	2	0	2009	UK Seabird Monitoring Programme	
Ynys Feurig, Cemlyn Bay and The Skerries	1.1	10 June 1992	3	0	2011	UK Seabird Monitoring Programme	
		Total for SPAs in GB	50	**81**			
		GB population	64	**86**			
		thus GB SPAs hold	88% GB	**94% GB**			
Larne Lough	1.1	4 March1997	6	0	2011	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	6	**0**			
		All-Ireland population	400	**738**			
		thus NI SPAs hold	1.4% All-Ireland	**0.0% All-Ireland**			
		Total for SPAs in UK	56	**81**			
		Biogeographic population	1,770	**2,150**			
		thus SPAs hold	3.2% international	**3.8% international**			

Common Tern *Sterna hirundo* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	10,000	Ratcliffe 2004b	100	4,555	45.6%
All-Ireland	4,200	Ratcliffe 2004b	40	1,205	28.7%
Biogeographic Europe	280,000	Ratcliffe 2004b	2,800	5,760	2.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-9.3%	Lloyd *et al.* 1991; Ratcliffe 2004b
Short-term UK trend	1990 to 2011	-14.3%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Common Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-90.pdf.

Imperial Dock Lock, Leith, and Mersey Narrows and North Wirral Foreshore have been identified as additions to the SPA suite for Common Tern since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Common Tern, the *Climatic Atlas* predicts a patchy westerly and northerly distribution in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Common Terns were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for Common Tern SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Breydon Water	1.1	29 March 1996	155	158	2011	UK Seabird Monitoring Programme	
Coquet Island	1.1	17 July 1985	740	1,193	2011	UK Seabird Monitoring Programme	
Cromarty Firth	1.1	22 March 1999	294	0	2010	UK Seabird Monitoring Programme	
Dungeness to Pett Level	1.1	2 August 1999	266	235	2011	UK Seabird Monitoring Programme	
Farne Islands	1.1	17 July 1985	230	101	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.1	25 April 1990	800	26	2011	UK Seabird Monitoring Programme	
Foulness	1.1	4 October 1996	220	25	2008	UK Seabird Monitoring Programme	
Glas Eileanan	1.1	20 February 1998	530	97	2011	UK Seabird Monitoring Programme	
Imperial Dock Lock, Leith	1.1	23 September 2004	Not classified	818	2010	UK Seabird Monitoring Programme	
Inner Moray Firth	1.1	22 March 1999	310	0	2010	UK Seabird Monitoring Programme	
~~Monach Isles~~	~~1.1~~	~~19 September 1994~~	~~194~~	~~1~~	~~2001~~	~~UK Seabird Monitoring Programme~~	Monarch Isles was included as data error in 2001 Review
Mersey Narrows and North Wirral Foreshore	1.1	5 July 2013	Not classified	177	2005-2009	UK Seabird Monitoring Programme	
North Norfolk Coast	1.1	20 January 1989	460	347	2010	UK Seabird Monitoring Programme	
Poole Harbour	1.1	31 March 1999	155	222	2011	UK Seabird Monitoring Programme	
Ribble and Alt Estuaries	1.1	16 February 1995	182	111	2008	UK Seabird Monitoring Programme	
Solent and Southampton Water	1.1	1 October 1998	267	280	2007	UK Seabird Monitoring Programme	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Dee Estuary	1.1	17 July 1985	277	0	2010	UK Seabird Monitoring Programme	
The Wash	1.1	30 March 1988	152	169	2011	UK Seabird Monitoring Programme	
Ynys Feurig, Cemlyn Bay and The Skerries	1.1	10 July 1992	189	592	2011	UK Seabird Monitoring Programme	
Ythan Estuary, Sands of Forvie and Meikle Loch	1.1	30 March 1998	265	4	2010	UK Seabird Monitoring Programme	
		Total for SPAs in GB	5,607	**4,555**			
		GB population	12,300	**10,000**			
		thus GB SPAs hold	45.6%	**45.6% GB**			
Carlingford Lough	1.1	9 March 1998	339	69	2011	UK Seabird Monitoring Programme	
Larne Lough	1.1	4 March 1997	180	317	2011	UK Seabird Monitoring Programme	
Lough Neagh and Lough Beg	1.1	1 March 1996	185	93	2000	UK Seabird Monitoring Programme	
Strangford Lough	1.1	9 March 1998	603	726	2011	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	1,307	**1,205**			
		All-Ireland population	3,100	**4,200**			
		thus NI SPAs hold	42.2% All-Ireland	**28.7% All-Ireland**			
		Total for SPAs in UK	6,914	**5,760**			
		Biogeographic population	195,105	**280,000**			
		thus SPAs hold	3.5% international	**2.1% international**			

Common Tern *Sterna hirundo* (passage)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Green BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	30,000	Ratcliffe 2004b	300	1,475	4.9%
All-Ireland	12,600	Ratcliffe 2004b	130	0	No SPAs selected in Northern Ireland
Biogeographic Europe	840,000	Ratcliffe 2004b	8,400	1,475	0.2%

2b. Population trend[116]

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	-
Short-term UK trend	1998 to 2010	Unknown	-

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. No assessment was made for Common Tern in the passage period.

3. Changes to the SPA suite since the 2001 Review

Passage Common Terns were not included in the 2001 SPA Review (Stroud *et al*. 2001).

Mersey Narrows and North Wirral Foreshore has been classified for passage Common Terns since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current

[116] Presumably trends in the migration season will be related to trends in the national breeding population

distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Common Tern, the *Climatic Atlas* predicts a patchy westerly and northerly distribution in the UK. Distribution in the migration season was not assessed.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding or passage Common Terns were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and SPA provision, as feasible, should be sought.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue to encourage better reporting of numbers at sites monitored by WeBS.

Undertake methodological studies to understand the source of late summer numbers at SPAs and relationships with local and other breeding colonies.

9. Distribution map for passage Common Tern SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Joint Nature Conservation Committee 2012. *Seabird Population Trends and Causes of Change: 2012 Report* (http://www.jncc.defra.gov.uk/page-1550). Joint Nature Conservation Committee. Updated July 2012.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Mersey Narrows and North Wirral Foreshore	1.1	5 July 2013	Not classified	1,475	2004-2008	WeBS	
		Total for SPAs in GB	0	**1,475**			
		GB population	37,000	**30,000**			
		thus GB SPAs hold	0%	**4.9% GB**			
		Total for SPAs in UK	0	**1,475**			
		Biogeographic population	585,000	**840,000**			
		thus SPAs hold	0% international	**0.2% international**			

Arctic Tern *Sterna paradisaea*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	53,000	Ratcliffe 2004c	530	10,938	20.6%
All-Ireland	3,500	Ratcliffe 2004c	35	2,029	58.0%
Biogeographic Europe	629,000	Ratcliffe 2004c	6,300	12,967	2.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	-30.6%	Lloyd *et al.* 1991; Ratcliffe 2004c
Short-term UK trend	1991 to 2011	-13.6%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Arctic Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-91.pdf.

Copeland Islands have been identified as an addition to the SPA suite for Arctic Tern since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Arctic Tern, the *Climatic Atlas* predicts virtual extinction in the UK, with a remnant distribution in northern Scotland and the Shetland Isles.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Arctic Terns, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to decrease by over 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient – notably in western Scotland
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage.
Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for Arctic Tern SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Lloyd, C., Tasker, M.L. & Partridge, K. 1991. *The status of seabirds in Britain and Ireland*. London, T. & A.D. Poyser. 355 pp.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Ratcliffe, N. 2004c. Arctic Tern *Sterna paradisaea*. Pp. 328-338. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland.* T. & A.D. Poyser.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Auskerry	1.1	29 June 1998	780	0	2011	UK Seabird Monitoring Programme	
Coquet Island	1.1	17 July 1985	700	1,140	2011	UK Seabird Monitoring Programme	
Fair Isle	1.1	16 December 1994	1,120	9	2011	UK Seabird Monitoring Programme	
Farne Islands	1.1	17 July 1985	2,840	1,830	2011	UK Seabird Monitoring Programme	
Fetlar	1.1	29 March 1994	520	2	2010	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.1	25 March 1990	540	250	2011	UK Seabird Monitoring Programme	
Foula	1.1	27 November 1995	1,100	95	2007	UK Seabird Monitoring Programme	
Mousa	1.1	27 November 1995	767	0	2011	UK Seabird Monitoring Programme	
Papa Stour	1.1	27 March 2000	1,000	1,172	2000	UK Seabird Monitoring Programme	
Papa Westray (North Hill and Holm)	1.1	27 March 1996	1,950	176	2011	UK Seabird Monitoring Programme	
Pentland Firth Islands	1.1	1 December 1997	1,200	667	2009	UK Seabird Monitoring Programme	
Rousay	1.1	2 February 2000	1,000	707	2000	UK Seabird Monitoring Programme	
Sumburgh Head	1.1	27 March 1996	700	203	2000	UK Seabird Monitoring Programme	
West Westray	1.1	16 August 1996	1,200	1,067	2000	UK Seabird Monitoring Programme	
Ynys Feurig, Cemlyn Bay and The Skerries	1.1	10 June 1992	1,290	3,620	2011	UK Seabird Monitoring Programme	
		Total for SPAs in GB	16,707	**10,938**			
		GB population	44,000	**53,000**			
		thus GB SPAs hold	37.9% GB	**20.6% GB**			

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Copeland Islands	1.1	29 September 2009	Not classified	1,025	2011	UK Seabird Monitoring Programme	NIEA data from 2011 for site
Outer Ards	1.1	11 December 2002	207	775	2011	UK Seabird Monitoring Programme	NIEA data from 2011 for site
Strangford Lough	1.1	9 March 1998	210	229	2011	UK Seabird Monitoring Programme	NIEA data from 2011 for site
		Total for SPAs in Northern Ireland	417	**2,029**			
		All-Ireland population	2,500	**3,500**			
		thus NI SPAs hold	16.7%	**58.0% All-Ireland**			
		Total for SPAs in UK	17,124	**12,967**			
		Biogeographic population	900,000	**629,000**			
		thus SPAs hold	1.9% international	**2.1% international**			

Little Tern *Sterna albifrons*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1,900	Pickerill 2004	20	1,156	60.8%
All-Ireland	210	Pickerill 2004	2	0	Species does not occur in Northern Ireland
Biogeographic *albifrons,* Europe	19,500	Pickerill. 2004	190	1,156	5.9%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+23.4%	Lloyd *et al.* 1991; Pickerill 2004
Short-term UK trend	1999 to 2011	-4.8%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Little Tern, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-92.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Little Tern, the *Climatic Atlas* predicts a scattered distribution, mainly in England and northern Scotland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Little Terns, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

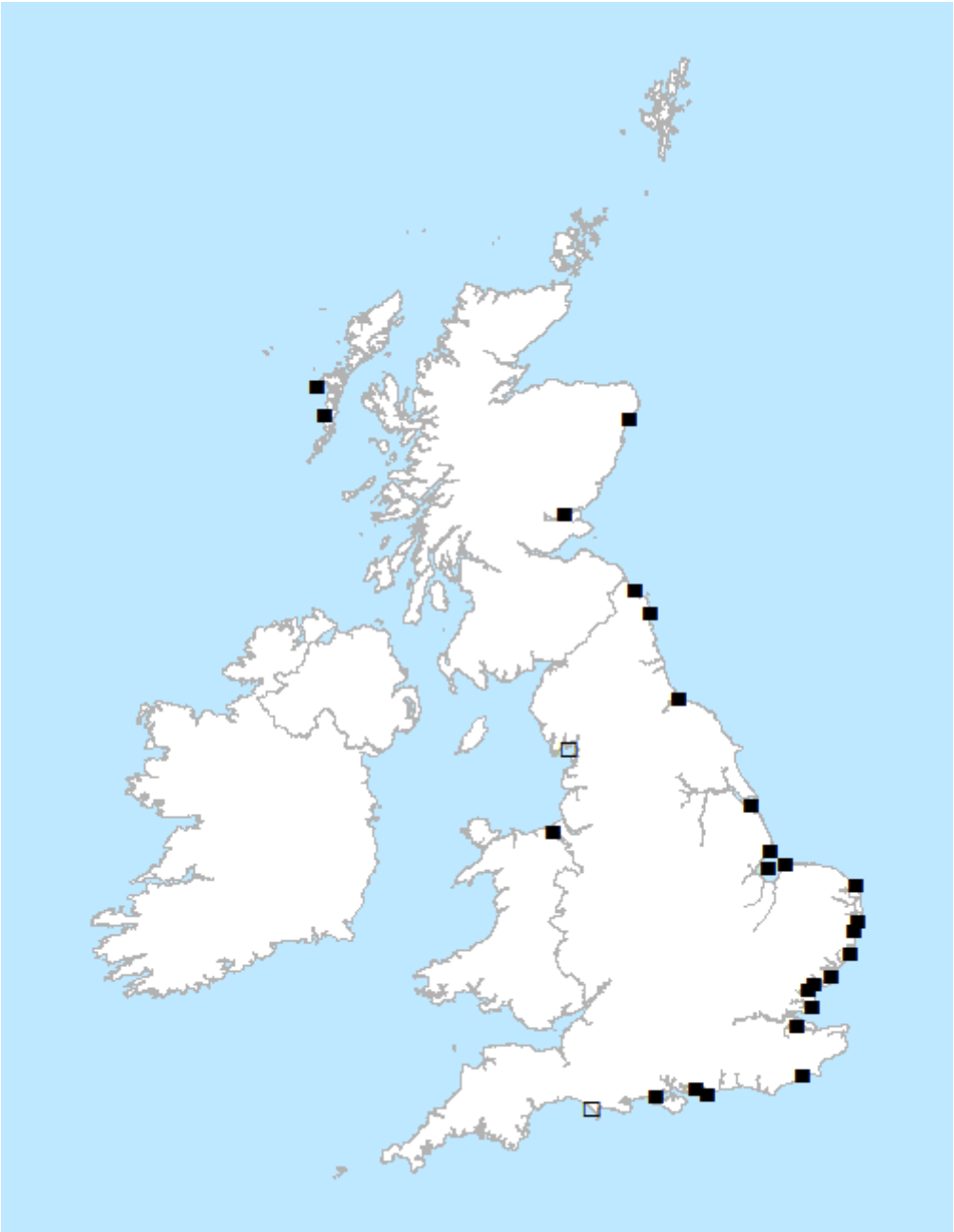
Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

Appropriate SPA provision in the marine environment is separately under review for this species.

8. Recommendations regarding survey and monitoring

Continue annual monitoring all regularly and previously used sites and encourage full reporting via Rare Breeding Birds Panel including negative data. Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

9. Distribution map for Little Tern SPA suite



Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Pickerill, G. 2004. Little Tern *Sterna albifrons*. Pp. 337-349. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland*. T. & A.D. Poyser.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Alde-Ore Estuary	1.1	28 July 1994	48	0	2009	UK Seabird Monitoring Programme	
Benacre to Easton Bavents	1.1	2 August 1999	53	45	2011	UK Seabird Monitoring Programme	
Blackwater Estuary	1.1	2 February 2000	36	99	2000	UK Seabird Monitoring Programme	
Chesil Beach and The Fleet	1.1	Not yet classified	55	19	2011	UK Seabird Monitoring Programme	
Chichester and Langstone Harbours	1.1	5 March 1993	100	60	2011	UK Seabird Monitoring Programme	
Colne Estuary	1.1	5 March 1993	38	0	2011	UK Seabird Monitoring Programme	
Dungeness to Pett Level	1.1	8 June 1993	35	10	2011	UK Seabird Monitoring Programme	
Firth of Tay and Eden Estuary	1.1	31 August 2007	44	1	2007	UK Seabird Monitoring Programme	
Foulness	1.1	11 March 1992	24	0	2005	UK Seabird Monitoring Programme	
Gibraltar Point	1.1	15 December 1993	23	12	2011	UK Seabird Monitoring Programme	
Great Yarmouth North Denes	1.1	19 May 1992	220	5	2011	UK Seabird Monitoring Programme	
Hamford Water	1.1	19 September 1994	55	45	2011	UK Seabird Monitoring Programme	
Humber Flats, Marshes and Coast	1.1	4 October 1996	63	29	2011	UK Seabird Monitoring Programme	
Lindisfarne	1.1	20 January 1989	38	8	2011	UK Seabird Monitoring Programme	
Medway Estuary and Marshes	1.1	2 February 2000	28	18	2009	UK Seabird Monitoring Programme	
Minsmere – Walberswick	1.1	30 March 1988	28	30	2010	UK Seabird Monitoring Programme	
Monach Isles	1.1	1 October 1998	26	2	2001	UK Seabird Monitoring Programme	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Morecambe Bay	1.1	Not yet classified	26	62	2011	UK Seabird Monitoring Programme	
North Norfolk Coast	1.1	15 August 1995	377	409	2011	UK Seabird Monitoring Programme	
Northumberland Coast	1.1	17 July 1985	40	38	2011	UK Seabird Monitoring Programme	
Pagham Harbour	1.4	30 March 1988	12	6	2011	UK Seabird Monitoring Programme	
Solent and Southampton Water	1.1	30 March 1998	49	0	2007	UK Seabird Monitoring Programme	
South Uist Machair and Lochs	1.1	28 July 1994	31	17	2002	UK Seabird Monitoring Programme	
Teesmouth and Cleveland Coast	1.1	2 August 1999	37	84	2011	UK Seabird Monitoring Programme	
The Dee Estuary	1.1	2 February 2000	56	126	2011	UK Seabird Monitoring Programme	
The Wash	1.1	4 October 1996	33	0	2009-2010	UK Seabird Monitoring Programme	
Ythan Estuary, Sands of Forvie and Meikle Loch	1.1	5 March 1993	41	31	2011	UK Seabird Monitoring Programme	
		Total for SPAs in GB	1,616	**1,156**			
		GB population	2,400	**1,900**			
		thus GB SPAs hold	67.3%	**60.8% GB**			
		Total for SPAs in UK	1,616	**1,156**			
		Biogeographic population	20,643	**19,500**			
		thus SPAs hold	7.8% international	**5.9% international**			

Guillemot *Uria aalge albionis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern (*Uria aalge*)
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes[117] (pairs/ individuals)[118]	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	94,000 prs 141,000 inds	Harris & Wanless 2004a, 2007	940 prs 1,400 inds	63,834 prs 95,274 inds	67.6%
All-Ireland	158,500 prs 236,600 inds	Harris & Wanless 2004a, 2007	1,600 prs 2,400 inds	87,398 prs 130,445 inds	55.1%
Biogeographic	256,000 prs 382,000 inds	Harris & Wanless 2004a, 2007	2,600 prs 3,800 inds	151,232 prs 225,719 inds	59.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1969-70 to 1998-2002	+164%	Cramp *et al.* 1974; Harris & Wanless 2004a
Short-term UK trend	1985-88 to 1998-2002	+60%	Lloyd *et al.* 1991; Harris & Wanless 2004a

[117] The geographic ranges of the two Guillemot races in Britain and Ireland follows Harris & Wanless (2007) as follows:

- Guillemots in England (other than Northumberland), Ireland and SW Scotland north to, and including Ailsa Crag, are *U. a. albionis.*
- Guillemots elsewhere in Scotland and in Northumberland are *U. a aalge.*
- Races are separable but there is a degree of clinal change, so split is not absolute.

[118] Conversion from individuals to pairs is x 0.67 after Lloyd *et al.* (1991). However, we note the recently published study by Harris *et al.* (2015a) which indicates a higher conversion factor for 2000s based on detailed studies at the Isle of May and Sumburgh Head.

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species (*i.e.* both *albionis* and *aalge* sub-species) indicates anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Guillemot (both races), and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-93.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Guillemot (both races), the *Climatic Atlas* predicts a westerly and northerly distribution with virtual absence from the south and east coasts of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Guillemot (both races), modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Recommendations regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

Appropriate SPA provision in the marine environment is separately under review for this species.

We note the need for detailed studies to clarify current conversion factors between individuals and pairs of Guillemots as highlighted by Harris *et al.* (2015a).

9. Distribution map for *albionis* Guillemot SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Harris, M.P. & Wanless, S. 2004a. Common Guillemot *Uria aalge*. Pp. 350-363. In: Mitchell, P.I., Newton, S., Ratcliffe, N. & Dunn, T.E. (eds.) *Seabird populations of Britain and Ireland.* T. & A.D. Poyser.

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Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s[119]	Assessment of UK SPA suite in 2000s[3]	Data period	Data source	Comment
Ailsa Craig	1.3	25 April 1990	5,000 inds	11,668 inds	2009	UK Seabird Monitoring Programme	
			3,350 prs	7,818 prs			
Flamborough Head and Bempton Cliffs	1.3	Not yet classified	24,104 inds	59,166 inds	2008	UK Seabird Monitoring Programme	
			16,150 prs	39,641 prs			
Skomer and Skokholm	1.3	Not yet classified	10,548 inds	23,900 ind	2011	UK Seabird Monitoring Programme	
			7,067 prs	16,375 prs			
		Total for SPAs in GB	39,652 inds	**95,274 inds**			
			26,567 prs	**63,834 prs**			
		GB population		**141,000 inds**			
				94,470 prs			
		thus GB SPAs hold		**67.2% GB**			
Rathlin Island	1.2	25 February 1999	41,886 inds	130,445 inds	2011	UK Seabird Monitoring Programme	
			28,064 prs	87,398 prs			
		Total for SPAs in All-Ireland	41,886 inds	**130,445 inds**			
			28,064 prs	**87,398 prs**			
		All-Ireland population		**236,654 inds**			
				158,558 prs			
		thus All-Ireland SPAs hold		**55.1% All-Ireland**			
		Total for SPAs in UK	81,539 inds	**225,719 inds**			
			54,631 prs	**151,232 prs**			
		Biogeographic population		**382,000 inds**			
				255,940 prs			
		thus SPAs hold		**59.1% international**			

[119] Conversion from individuals to pairs is x 0.67 after Lloyd *et al.* (1991). However, we note the recently published study by Harris *et al.* (2015a) which indicates a higher conversion factor for 2000s based on detailed studies at the Isle of May and Sumburgh Head.

Guillemot *Uria aalge aalge* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern (*Uria aalge*)
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes[120] (pairs & individuals)[121]	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	792,000 prs 1,182,000 inds	Harris & Wanless 2004a, 2007	7,920 prs 11,800 inds	578,643 prs 863,646 inds	73.1%
All-Ireland	0	Harris & Wanless 2004a, 2007	0	0	Race does not occur in Northern Ireland
Biogeographic – N Atlantic	2,110,000 prs 3,150,000 inds	Harris & Wanless 2004a, 2007	21,100 prs 31,500 inds	578,643 prs 863,646 inds	27.4%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1969-70 to 1998-2002	+126%	Cramp *et al.* 1974; Harris & Wanless 2004a
Short-term UK trend	1985-88 to 1998-2002	-36.1%	Lloyd *et al.* 1991; Harris & Wanless 2004a

[120] The geographic ranges of the two Guillemot races in Britain and Ireland follows Harris & Wanless (2007) as follows:

- Guillemots in England (other than Northumberland), Ireland and SW Scotland north to, and including Ailsa Crag, are *U. a. albionis.*
- Guillemots elsewhere in Scotland and in Northumberland are *U. a aalge.*
- Races are separable but there is a degree of clinal change, so the split is not absolute.

[121] Conversion from individuals to pairs is x 0.67 after Lloyd *et al.* (1991). However, we note the recently published study by Harris *et al.* (2015a) which indicates a higher conversion factor for 2000s based on detailed studies at the Isle of May and Sumburgh Head.

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species (*i.e.* both *albionis* and *aalge* sub-species) indicate anticipated low population provision within the UK SPA network.

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network. Note this assessment was undertaken at species level.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Guillemot (both races), and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-93.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Guillemot (both races), the *Climatic Atlas* predicts a westerly and northerly distribution with virtual absence from the south and east coasts of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.
For breeding Guillemot (both races), modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Recommendations regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

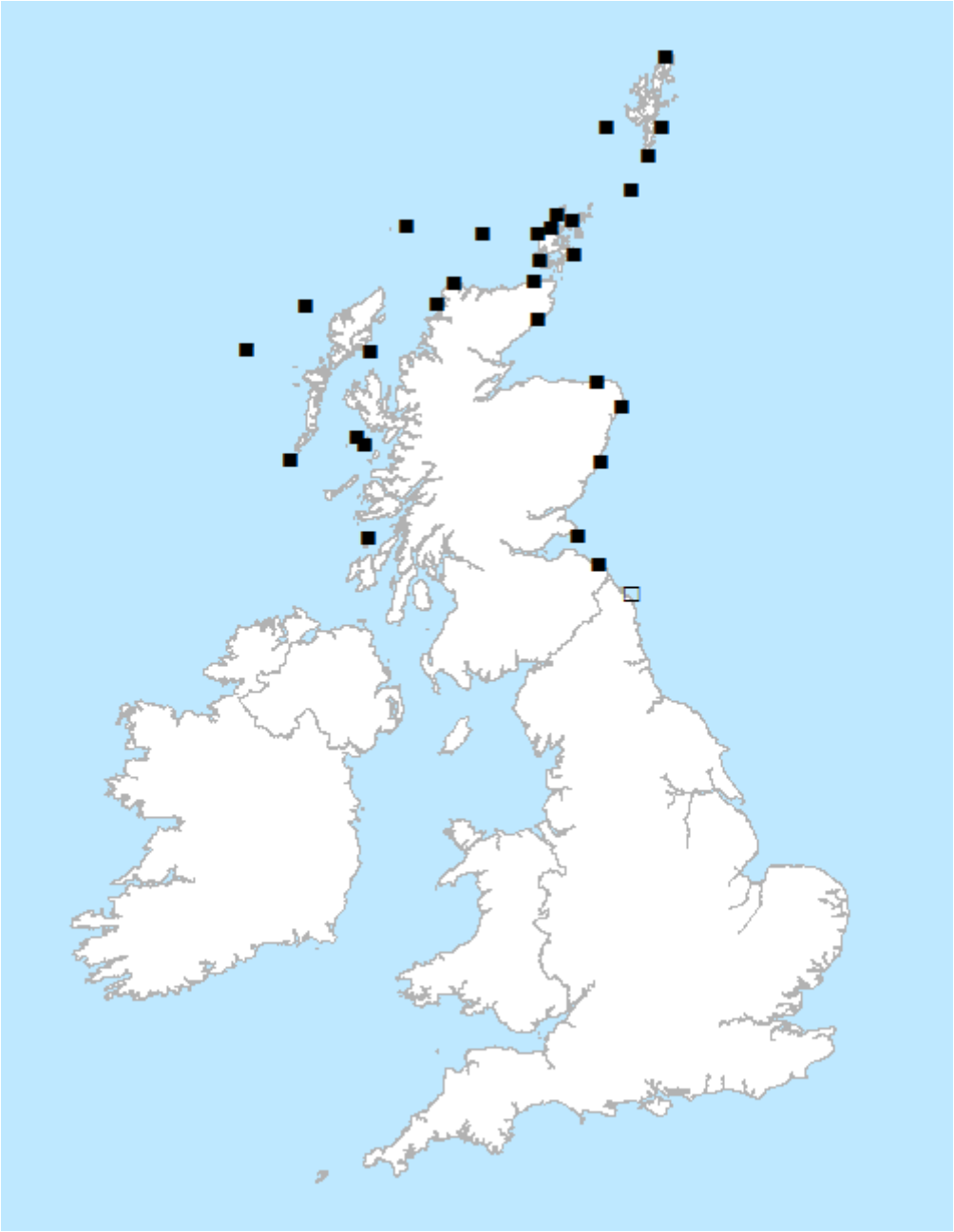
Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

In future monitoring, align boundaries of count units with SPA boundaries at Cape Wrath and North Caithness Cliffs SPAs.

Appropriate SPA provision in the marine environment is separately under review for this species.

We note the need for detailed studies to clarify current conversion factors between individuals and pairs of Guillemots as highlighted by Harris *et al.* 2015a.

9. Distribution map for breeding *aalge* Guillemot SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Cramp, S., Bourne, W.R.P. & Saunders, D. 1974. *The seabirds of Britain and Ireland.* London, Collins.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s[122]	Assessment of UK SPA suite in 2000s	Data period	Data source	Comment
Buchan Ness to Collieston Coast	1.3	30 March 1998	12,896 inds 8,640 prs	19,296 inds 12,928 prs	2007	UK Seabird Monitoring Programme	
Calf of Eday	1.3	29 June 1998	12,300 inds 8,241 prs	2,560 inds 1,715 prs	2002	UK Seabird Monitoring Programme	
Canna and Sanday	1.3	20 February 1998	5,758 inds 3,858 prs	5,841 inds 3,913 prs	1999	UK Seabird Monitoring Programme	
Cape Wrath	1.3	15 March 1996	13,670 inds 9,159 prs	40,835 inds 27,359 prs	2000	UK Seabird Monitoring Programme	Includes c. 1 km of coastline outside SPA boundary
Copinsay	1.3	29 March 1994	19,900 inds 13,333 prs	13,680 inds 9,166 prs	2008	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.2	27 March 1996	106,730 inds 71,509 prs	158,985 inds 106,520 prs	1999	UK Seabird Monitoring Programme	
Fair Isle	1.2	16 December 1994	37,560 inds 25,165 prs	19,501 inds 13,066 prs	2010	UK Seabird Monitoring Programme	
Farne Islands	1.2	Not yet classified	35,073 inds 23,499 prs	47,977 inds 32,145 prs	2011	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.3	25 March 1990	33,510 inds 22,452 prs	25,080 inds 16,804 prs	2005-2009	per SNH	
Flannan Isles	1.3	27 November 1995	21,930 inds 14,693 prs	14,638 inds 9,807 prs	1998	UK Seabird Monitoring Programme	
Foula	1.3	31 August 1992	37,500 inds 25,125 prs	24,799 inds 16,615 prs	2007	UK Seabird Monitoring Programme	
Fowlsheugh	1.2	25 April 1990	59,910 inds 40,140 prs	50,556 inds 33,873 prs	2009	UK Seabird Monitoring Programme	
Handa	1.2	29 March 1994	113,590 inds	56,706 inds	2011	UK Seabird Monitoring	

[122] Conversion from individuals to pairs is x 0.67 after Lloyd *et al.* (1991). However, we note the recently published study by Harris *et al.* (2015a) which indicates a higher conversion factor for 2000s based on detailed studies at the Isle of May and Sumburgh Head.

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s122	Assessment of UK SPA suite in 2000s	Data period	Data source	Comment
			76,105 prs	37,993 prs		Programme	
Hermaness, Saxa Vord and Valla Field	1.2	7 December 2000	16,960 inds 11,363 prs	15,589 inds 10,445 prs	1999-2000	UK Seabird Monitoring Programme	Later updates for Hermaness only
Hoy	1.3	16 December 1994	20,000 inds 13,400 prs	9,020 inds 6,043 prs	2007	UK Seabird Monitoring Programme	
Marwick Head	1.3	16 December 1994	36,400 inds 24,388 prs	16,817 inds 11,267 prs	2006	UK Seabird Monitoring Programme	
Mingulay and Berneray	1.2	16 August 1996	30,900 inds 20,703 prs	20,189 inds 13,527 prs	2009	UK Seabird Monitoring Programme	
North Caithness Cliffs	1.3	24 March 1997	40,290 inds 26,994 prs	70,154 inds 47,003 prs	1999-2000	UK Seabird Monitoring Programme	Includes all of Stroma (*i.e.* some coastline outside SPA boundary)
North Colonsay and Western Cliffs	1.2	30 October 2001	9,934 inds 6,656 prs	19,657 inds 13,170 prs	2000	UK Seabird Monitoring Programme	
North Rona and Sula Sgeir	1.3	16 August 1996	43,200 inds 28,944 prs	31,374 inds 21,021 prs	1998	UK Seabird Monitoring Programme	
Noss	1.2	25 February 1999	45,700 inds 30,619 prs	22,065 inds 14,784 prs	2009	UK Seabird Monitoring Programme	
Rousay	1.2	2 February 2000	10,600 inds 7,102 prs	6,149 inds 4,120 prs	1999	UK Seabird Monitoring Programme	
Rum	1.2	31 August 1982	4,000 inds 2,680 prs	2,454 inds 1,644 prs	2000	UK Seabird Monitoring Programme	
Shiant Isles	1.3	31 August 1992	27,433 inds 18,380 prs	7,684 inds 5,148 prs	2008	UK Seabird Monitoring Programme	
St Abb’s Head tp Fast Castle	1.3	11 August 1997	31,300 inds 20,971 prs	43,744 inds 29,308 prs	1998 & 2000	UK Seabird Monitoring Programme	Later updates for St Abb's Head NNR only
St Kilda	1.3	31 August 1992	22,700 inds 15,209 prs	23,393 inds 15,673 prs	1999	UK Seabird Monitoring Programme	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s122	Assessment of UK SPA suite in 2000s	Data period	Data source	Comment
Sule Skerry and Sule Stack	1.3	29 March 1994	9,400 inds 6,298 prs	11,393 inds 7,633 prs	1998	UK Seabird Monitoring Programme	
Sumburgh Head	1.3	27 March 1996	16,048 inds 10,752 prs	16,572 inds 11,103 prs	1999	UK Seabird Monitoring Programme	Later updates for Sumburgh Head only
Troup, Pennan and Lion's Heads	1.2	14 March 1997	44,630 inds 29,902 prs	16,325 inds 10,938 prs	2007	UK Seabird Monitoring Programme	
West Westray	1.2	16 August 1996	42,300 inds 28,274 prs	50,613 inds 33,911 prs	2007	UK Seabird Monitoring Programme	
		Total for SPAs in GB	962,021 inds 644,554 prs	**863,646 inds** **578,643 prs**			
		GB population		**1,182,000 inds** **792,000 prs**			
		thus GB SPAs hold		**73.1% GB**			
		Total for SPAs in UK	962,021 inds 644,554 prs	**863,646 inds** **578,643 prs**			
		Biogeographic population		**3,150,000 inds** **2,110,000 prs**			
		thus SPAs hold		**27.4% international**			

Razorbill *Alca torda* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)[123]	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	110,000	Merne & Mitchell 2004	1,100	68,456	62.2%
All-Ireland	35,000	Merne & Mitchell 2004	350	15,393	44.0%
Biogeographic *islandica*, NW Europe	530,000	Merne & Mitchell 2004	5,300	83,849	15.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+21.3%	Lloyd *et al.* 1991; Merne & Mitchell 2004
Short-term UK trend	1999 to 2011	+7.5%	JNCC 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Razorbill, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/ukspa/ukspa-a6-94.pdf.

[123] Conversion from individuals to pairs is x 0.67 after Lloyd *et al.* 1991. However, we note the recently published study by Harris *et al.* 2015b which indicates a higher conversion factor for 2000s based on detailed studies at the Isle of May.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Razorbill, the *Climatic Atlas* predicts a westerly and northerly distribution with virtual absence from the south and east coasts of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Razorbill, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species.

8. Recommendations regarding survey and monitoring

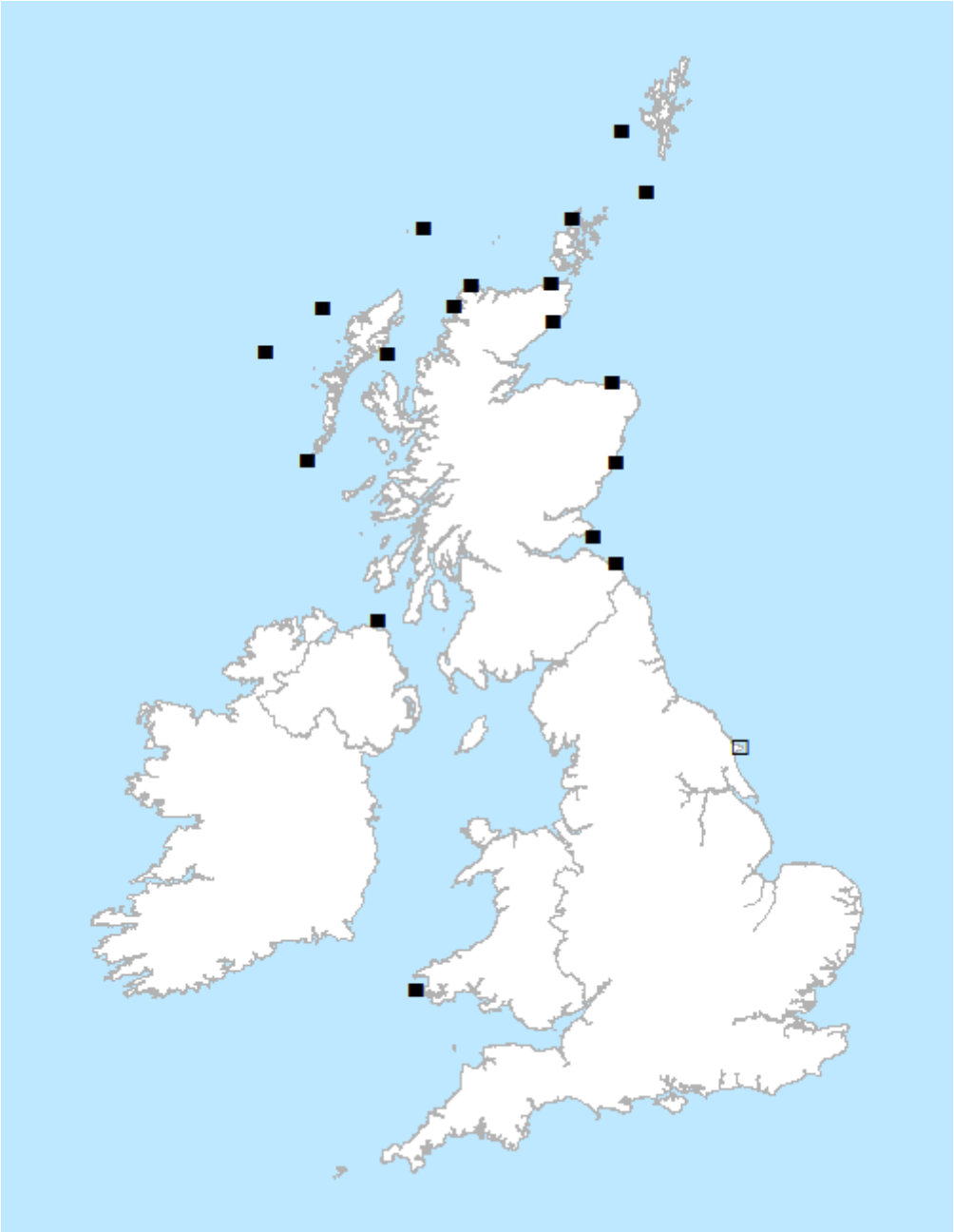
Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

In future monitoring, align boundaries of count units with SPA boundaries at Cape Wrath and North Caithness Cliffs SPAs.

Appropriate SPA provision in the marine environment is separately under review for this species.

We note the need for detailed studies to clarify current conversion factors between individuals and pairs of Razorbills as highlighted by Harris *et al.* 2015b.

9. Distribution map for breeding Razorbill SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content*. JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Cape Wrath	1.3	15 March 1996	1,206	2,005	2000	UK Seabird Monitoring Programme	Includes c. 1 km of coastline outside SPA boundary
East Caithness Cliffs	1.2	27 March 1996	9,259	11,972	1999	UK Seabird Monitoring Programme	
Fair Isle	1.3	16 December 1994	2,044	915	2010	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.3	25 April 1990	2,693	2,402	2005-2009	UK Seabird Monitoring Programme	
Flamborough Head and Bempton Cliffs	1.3	Not yet classified	5,133	10,001	2008	UK Seabird Monitoring Programme	
Flannan Isles	1.3	31 August 1992	2,117	1,051	1998	UK Seabird Monitoring Programme	
Foula	1.3	27 November 1995	4,154	2,814	2000	UK Seabird Monitoring Programme	
Fowlsheugh	1.3	31 August 1992	4,576	3,103	2009	UK Seabird Monitoring Programme	
Handa	1.2	25 April 1990	10,432	5,165	2010	UK Seabird Monitoring Programme	
Mingulay and Berneray	1.2	16 December 1994	11,323	10,111	2009	UK Seabird Monitoring Programme	
North Caithness Cliffs	1.3	16 August 1996	2,212	1,652	1999-2000	UK Seabird Monitoring Programme	Includes all of Stroma (*i.e.* some coastline outside SPA boundary)
North Rona and Sula Sgeir	1.3	30 October 2001	1,541	1,089	1998	UK Seabird Monitoring Programme	
Shiant Isles	1.2	31 August 1982	7,337[124]	5,391	1999	UK Seabird Monitoring Programme	
Skomer and Skokholm	1.3	11 August 1997	2,854	4,425	2011	UK Seabird Monitoring Programme	

[124] The total of 10,950 for the Shiants presented in 2001 Review was of individuals, now corrected to pairs, with national totals adjusted accordingly

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
St Abb's Head to Fast Castle	1.3	31 August 1992	1,407	2,115	1998 & 2000	UK Seabird Monitoring Programme	Later updates for St Abb's Head NNR only
St Kilda	1.2	31 August 1992	2,546	1,689	1999	UK Seabird Monitoring Programme	
Troup, Pennan and Lion's Heads	1.3	14 March 1997	3,216	2,011	2007	UK Seabird Monitoring Programme	
West Westray	1.3	16 August 1996	1,307	545	2007	UK Seabird Monitoring Programme	
		Total for SPAs in GB	75,357	**68,456**			
		GB population	99,160	**110,000**			
		thus GB SPAs hold	76.0% GB	**62.2% GB**			
Rathlin Island	1.2	25 February 1999	5,978	15,393	2011	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	5,978	**15,393**			
		All-Ireland population	22,780	**35,000**			
		thus NI SPAs hold	26.2% All-Ireland	**44.0% All-Ireland**			
		Total for SPAs in UK	81,335	**83,849**			
		Biogeographic population	575,000	**530,000**			
		thus SPAs hold	14.1% international	**15.8% international**			

Puffin *Fratercula arctica* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	**Vulnerable**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	580,000	Harris & Wanless 2004b	5,800	483,158	83.3%
All-Ireland	21,000	Harris & Wanless 2004b	210	731	3.5%
Biogeographic *arctica,* NE Atlantic[125]	5,676,000	Harris & Wanless 2004b	56,700	483,889	8.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1985-88 to 1998-2002	+18.8%	Lloyd *et al.* 1991; Harris & Wanless 2004b
Short-term UK trend	1990 to 2011	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Puffin, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-95.pdf.

[125] *i.e.* France, Ireland, UK, Faeroes, Iceland, Norway and Russia

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Puffin, the *Climatic Atlas* predicts a scattered distribution on the western and northern coasts of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Puffin, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with low confidence, to decrease by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, the notable drop in population proportion in SPA series may be indicative of a developing

trend. There is a need to review the situation following the next national survey in the light of contemporary data.

8. Recommendations regarding survey and monitoring

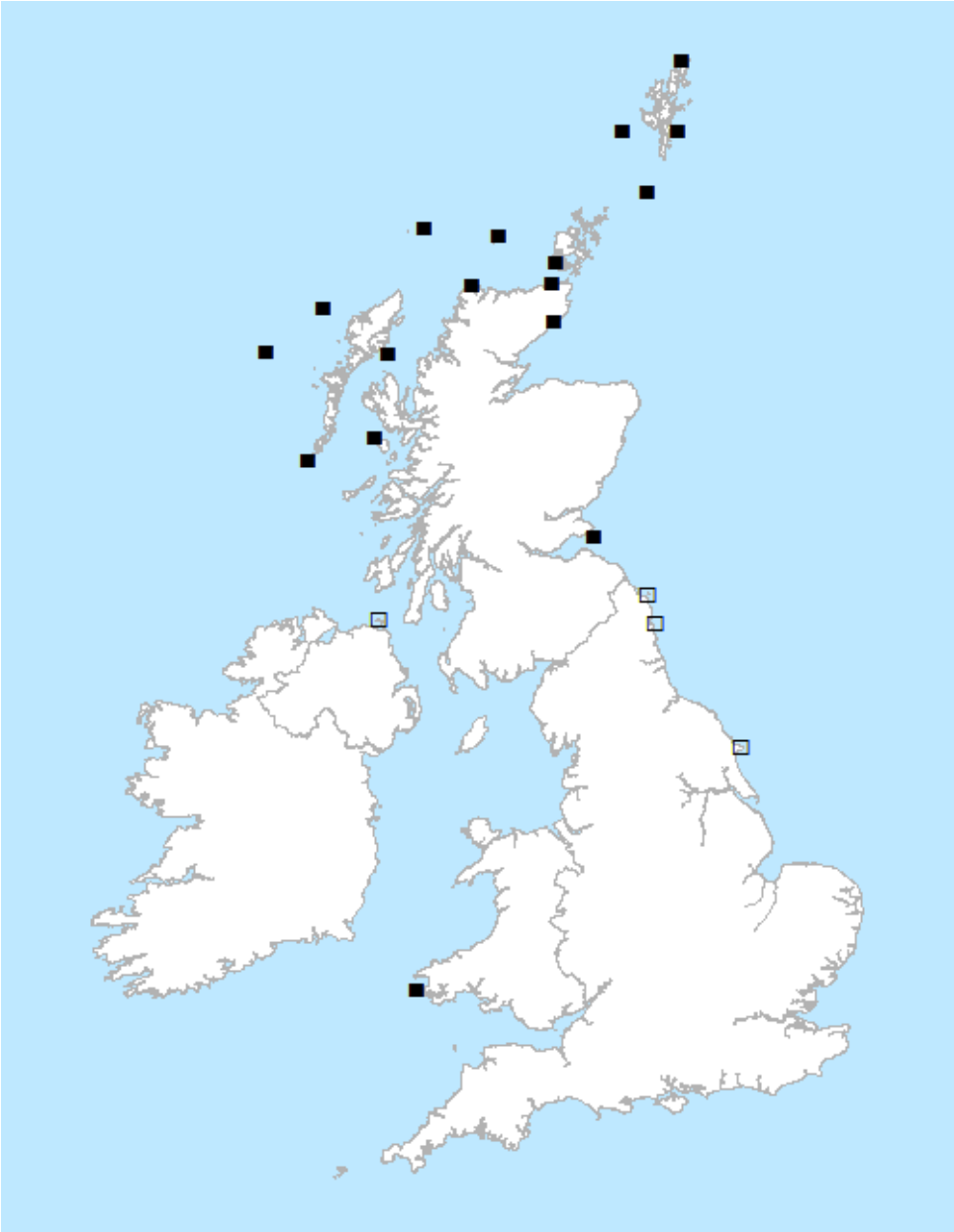
Ensure coverage of all terrestrial SPAs within forthcoming periodic national census of breeding seabirds.

Ensure coverage of Hoy where the population has not been assessed since the 1990s and Fair Isle where quality of assessments are low.

In future monitoring, align boundaries of count units with SPA boundaries at Cape Wrath and North Caithness Cliffs SPAs.

Appropriate SPA provision in the marine environment is separately under review for this species.

9. Distribution map for breeding Puffin SPA suite



Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Canna and Sanday	1.3	20 February1998	1,225	945	1999	UK Seabird Monitoring Programme	
Cape Wrath	1.3	15 March 1996	5,900	1,602	2000	UK Seabird Monitoring Programme	Includes c. 1 km of coastline outside SPA boundary
Coquet Island	1.2	Not yet classified	11,400	15,812	2009	UK Seabird Monitoring Programme	
East Caithness Cliffs	1.3	27 March 1996	1,750	274	1999	UK Seabird Monitoring Programme	
Fair Isle	1.3	16 December 1994	8,700	7,278	2009	UK Seabird Monitoring Programme	True population largely unknown. 40,000-45,000 pairs suspected 1995-2001 but no update attempt update since. 2009 count is early season inds *c.f.* 17,000 inds in 1995
Farne Islands	1.2	Not yet classified	34,710	36,835	2008	UK Seabird Monitoring Programme	
Firth of Forth Islands	1.2	5 March1993	21,000	50,355	2008-2010	UK Seabird Monitoring Programme	
Flamborough Head and Bempton Cliffs	1.3	Not yet classified	3,473	958	2008	UK Seabird Monitoring Programme	
Flannan Isles	1.3	25 April 1990	5,500	15,761	1998 & 2001	UK Seabird Monitoring Programme	
Foula	1.2	27 November 1995	48,000	22,500	2000	UK Seabird Monitoring Programme	
Hermaness, Saxa Vord and Valla Field	1.2	29 March 1994	25,400	27,297	1999 & 2002	UK Seabird Monitoring Programme	Later updates for Hermaness only
Hoy	1.3	7 December 2000	3,500	3,500	1985-1988; Lloyd *et al.* 1991	UK Seabird Monitoring Programme	No more recent counts. Hoy Puffins apparently not

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
							counted during Seabird 2000
Mingulay and Berneray	1.3	16 December 1994	4,000	3,126	2009	UK Seabird Monitoring Programme	
North Caithness Cliffs	1.3	16 August 1996	1,750	7,045	1999~2000	UK Seabird Monitoring Programme	Includes all of Stroma (*i.e.* some coastline outside SPA boundary)
North Rona and Sula Sgeir	1.3	30 October 2001	5,250	5,442	1998 & 2001	UK Seabird Monitoring Programme	
Noss	1.3	29 March 1999	2,348	802	2007	UK Seabird Monitoring Programme	
Shiant Isles	1.2	31 August 1992	77,000	65,170	2000	UK Seabird Monitoring Programme	
Skomer and Skokholm	1.2	31 August 1982	9,500	16,721	2007	UK Seabird Monitoring Programme	
St Kilda	1.2	31 August 1992	155,000	142,264	1999-2000	UK Seabird Monitoring Programme	
Sule Skerry and Sule Stack	1.2	29 March 1994	43,380	59,471	1998	UK Seabird Monitoring Programme	
		Total for SPAs in GB	468,886	**483,158**			
		GB population	449,000	**580,000**			
		thus GB SPAs hold	100% GB	**83.3% GB**			
Rathlin Island	1.3	Not yet classified	2,398	731	2007	UK Seabird Monitoring Programme	
		Total for SPAs in Northern Ireland	2,398	**731**			
		All-Ireland population	20,500	**21,000**			
		thus NI SPAs hold	11.7% All-Ireland	**3.5% All-Ireland**			
		Total for SPAs in UK	470,284	**483,889**			
		Biogeographic population	901,000	**5,676,000**			
		thus SPAs hold	52.2% international	**8.5% international**			

Short-eared Owl *Asio flammeus* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	610	Gibbons *et al.* 1993; Musgrove *et al.* 2013	6	111[126]	18.2%
All-Ireland	Unknown			0	No SPAs selected in Northern Ireland
Biogeographic -Europe	19,000	BirdLife International 2004	190	111	0.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2011	Fluctuating[127]	Risely *et al.* 2012
Short-term UK trend	1990 to 2011	Fluctuating	Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Short-eared Owl, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-96.pdf.

[126] Note there is significant uncertainty as to the SPA network total owing to lack of contemporary data for four of the six SPAs

[127] Large population changes linked to changes in populations of voles in particular

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Short-eared Owl, the *Climatic Atlas* predicts a scattered distribution, mainly in the northern half of the UK and absence from Ireland and Wales.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Short-eared Owls were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Young conifer plantation for nesting and foraging. Rough grasslands for foraging. No spatial information.	Maintain open moorland/pasture interface and pasture type.	Insufficient information. Will benefit from maintenance of cropped habitats for Hen Harrier and Merlin.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, although location of nesting sites are varied. Short-eared Owls nest mainly in upland moorland habitats, including young forestry, and numbers fluctuate widely according to the abundance of small

Cropped habitats assessment from SPA Review Decision Framework	
	mammals, which are the main prey. The almost complete reliance on small mammals as prey means that Short-eared Owls forage mainly over rough grassland habitats where prey species are most abundant: grassy moorland, rough pastures and other grassy features such as field boundaries (Picozzi & Hewson 1970; Glue 1977; Lawton Roberts & Bowman 1986).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	No. Nest-site fidelity is very low and the species appears to be opportunistic in settling to nest each season, responding to local prey abundance (Village 1987).
Is the use of cropped habitats determined by crop type?	Unknown. A study in Orkney showed that Orkney Voles, which were the most important prey, were absent from improved pasture, barley and turnip crops.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Contemporary (this Review) SPA coverage of numbers and distribution is sufficient, and there are no other factors suggesting the need to revise the previously identified suite of SPAs for the species. However, there is significant uncertainty as to the SPA network total owing to lack of contemporary data for four of the six SPAs.

8. Recommendations regarding survey and monitoring

There is high uncertainty as to the current suite assessment: no new data were available for four of the six SPAs, leading to the assumption of no change for 91% of the suite total.

In the light of lack of contemporary data for four of the six SPAs, ensure monitoring regimes are developed and in place and reporting at the Peatlands of Caithness and Sutherland, Muirkirk and North Lowther Uplands, Orkney Mainland Moors and South Pennine Moors by the time of the next SPA Network review. Additionally standardise methods between these and the other two SPAs (Forest of Clunie, and Skomer and Skokholm) where monitoring does occur.

Continue work to develop appropriate survey methodologies applicable at wide-scales although noting that work undertaken so far (Calladine *et al.* 2008) has shown the development of such methods to be especially challenging.

9. Distribution map for breeding Short-eared Owl SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Village, A. 1987. Numbers, territory size and turnover of Short-eared Owls *Asio flammeus* in relation to vole abundance. *Ornis Scandinavica* 18: 198-204.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Caithness and Sutherland Peatlands	1.1	2 February 1999	30	30	Mid 1990s	No contemporary data	Assuming no change since mid-1990s
Forest of Clunie	1.1	13 August 2001	20	6	2006-2011	per SNH	
Muirkirk and North Lowther Uplands	1.1	7 March 2003	30	26	1997-1998	No contemporary data	Assuming no change since 1997-1998
Orkney Mainland Moors	1.1	13 October 2000	20	20	Two year mean 1993-1995	No contemporary data	Assuming no change since 1993-1995
Skomer and Skokholm	1.1	Not yet classified	6	4	2007-2011 mean	per CCW	
South Pennine Moors	1.1	Not yet classified	25	25	1990	No contemporary data	Assuming no change since 1990
		Total for SPAs in GB	131	**111**[128]			
		GB population	1,000	**610**			
		thus GB SPAs hold	13.1% GB	**18.2% GB**			
		Total for SPAs in UK	131	**111**			
		Biogeographic population	13,400	**19,000**			
		thus SPAs hold	1.0% international	**0.6% international**			

[128] Note there is significant uncertainty as to the SPA network total owing to lack of contemporary data

Nightjar *Caprimulgus europaeus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	4,600	Conway *et al.* 2007	45	2,124	46.2%
All-Ireland				0	Species does not occur in Northern Ireland
Biogeographic European *C. e. europaeus*	202,000	Derived from Cramp 1985 & BirdLife International 2004	2,000	2,124	1.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1981 to 2004	+97%	Gribble 1983; Conway *et al.* 2007
Short-term UK trend	1992 to 2004	+34%	Morris *et al.* 1994; Conway *et al*. 2007

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Nightjar, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-97.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives include:

- "Review effectiveness of existing Special Protection Areas and completeness of the network for Nightjar, in light of 2004 results."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Nightjar, the *Climatic Atlas* predicts a wide distribution in England, Wales and Ireland but a more sparse distribution in Scotland.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Nightjar, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by between 25-50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Young and coppiced woodlands. Forage within 1-3 km of nest.	Maintain a mosaic of stand ages in forestry, and coppice management.	Maintain conifer forest and coppiced woodlands used regularly for nesting.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a great extent within wider rotational clear felled areas. Nightjars nest in lowland heaths, conifer plantations, mixed woodland, coppiced woodland, bogs and, less frequently, other open habitats such as dunes and grasslands. Plantation forestry is generally suitable only until canopy closure at 15-20 years of age, although small clearings within mature forestry may be used. Large forests are favoured, with birds missing from apparently suitable small and fragmented forests.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes. Most of the British population is now associated with conifer plantations, where the availability of open forest structure, either as clear-felled areas or young restock is crucial.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	High fidelity to specific favoured locations. Adults are generally faithful to a nesting area between years if it remains suitable (Berry 1979) and females may occasionally use the same nest scrapes from one year to the next.
Is the use of cropped habitats determined by crop type?	Yes.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	None known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient, especially in northern parts of the range
Ecological sufficiency: Sufficient

Further special conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

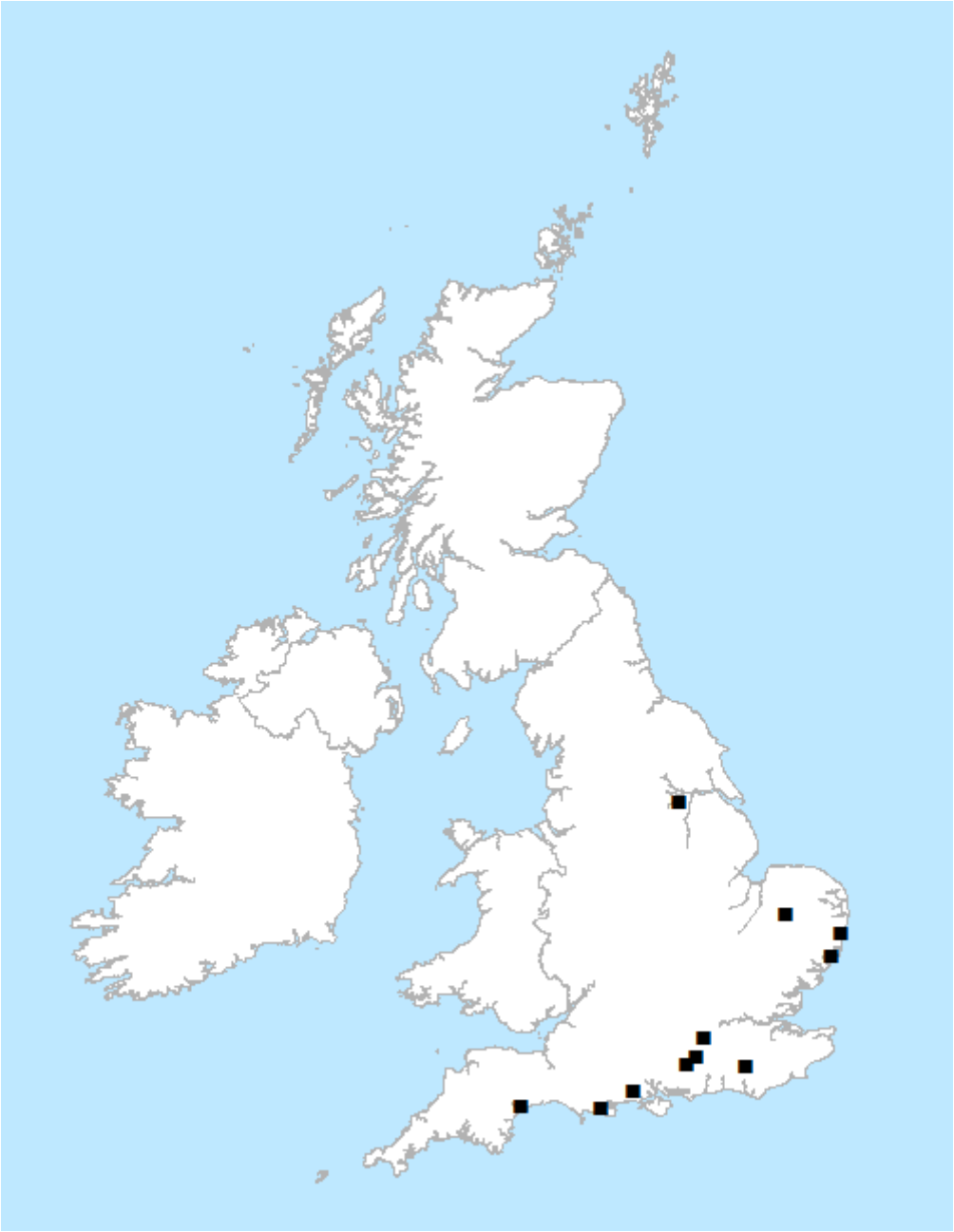
To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage.

Site boundaries of particular SPAs should also be reviewed, especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Review site and national monitoring protocols and ensure monitoring provides reliable estimates of numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

9. Distribution map for Nightjar SPA suite



Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E, Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ashdown Forest	1.1	11 March 1996	35	85	2004	SCARABBS: Conway *et al.* 2007	
Breckland	1.1	21 September 2006	415	349	2004	SCARABBS: Conway *et al.* 2007	
Dorset Heathlands	1.1	1 October 1998	386	438	2004	SCARABBS: Conway *et al.* 2007	
East Devon Heaths	1.1	29 June 1998	83	58	2004	SCARABBS: Conway *et al.* 2007	
Minsmere – Walberswick	1.1	19 May 1992	24	39	2004	SCARABBS: Conway *et al.* 2007	
New Forest	1.1	22 September 1993	300	667	2004	SCARABBS: Conway *et al.* 2007	
Sandlings	1.1	10 August 2001	109	81	2004	SCARABBS: Conway *et al.* 2007	
Thames Basin Heaths	1.1	9 March 2005	264	301	2004	SCARABBS: Conway *et al.* 2007	
Thorne and Hatfield Moors	1.1	16 August 2000	66	39	2004	SCARABBS: Conway *et al.* 2007	
Wealden Heaths	1.1	1 March 1998	103	67	2004	SCARABBS: Conway *et al.* 2007	
		Total for SPAs in GB	1,785	**2,124**			
		GB population	3,400	**4,600**			
		thus GB SPAs hold	52.5% GB	**46.2% GB**			
		Total for SPAs in UK	1,785	**2,124**			
		Biogeographic population	224,000	**202,000**			
		thus SPAs hold	0.8% international	**1.1% international**			

Kingfisher *Alcedo atthis* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	3,600	Gibbons *et al.* 1993; Musgrove *et al.* 2013	35	0	No SPAs selected in GB
All-Ireland	1,300	Gibbons *et al.* 1993	15	0	No SPAs selected in Northern Ireland
Biogeographic *A. a. ispida*[129]	51,000	Derived from Cramp 1985 & BirdLife International 2004	510	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	+23.0%	BTO; WBS/WBBS 2012
Short-term UK trend	1998 to 2010	-23.9%	Risely *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for breeding Kingfisher in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

[129] Europe other than Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Georgia, Greece, 50% of Italian popn. (2,500-5,000 prs.), Macedonia, Moldova, Portugal, Romania, Russia, Serbia & Montenegro, Slovenia, 50% of Spanish popn. (1,800-3,500) and Turkey & Ukraine - all of which are the race *A. a. atthis.*

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Kingfisher, the *Climatic Atlas* predicts a wide distribution in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Kingfishers were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Take necessary measures to collect and assess better site-related data to act as a basis for appropriate SPA selection.

Continue to monitor population trends through the Waterways Breeding Bird Survey.

9. Distribution map for breeding Kingfisher SPA suite

No SPAs have previously been selected for breeding Kingfisher.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

No SPAs have previously been selected for breeding Kingfisher.

Kingfisher *Alcedo atthis* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	10,800	Derived from Gibbons *et al.* 1993; Musgrove *et al.* 2013	110	0	No SPAs selected in GB
All-Ireland	3,900	Derived from Gibbons *et al.* 1993	40	0	No SPAs selected in Northern Ireland
Biogeographic *A. a ispida*[130]	153,000	Derived from Cramp 1985 & BirdLife International 2004	1,500	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for non-breeding Kingfisher in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

[130] Europe other than Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Georgia, Greece, 50% of Italian popn. (2,500-5,000 prs.), Macedonia, Moldova, Portugal, Romania, Russia, Serbia & Montenegro, Slovenia, 50% of Spanish popn. (1,800-3,500), Turkey & Ukraine (= *A. a. atthis*).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Kingfisher in the breeding season, the *Climatic atlas* predicts a wide distribution in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Non-breeding Kingfishers were not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

Classification of an SPA suite should be sought as a result of a change in understanding of legal requirements.

8. Recommendations regarding survey and monitoring

Take necessary measures to collect and assess better site-related data to act as a basis for appropriate SPA selection.

Actively encourage better reporting of numbers at sites monitored by WeBS.

Encourage local studies to better understand total numbers at coastal sites in the non-breeding season (including as reported to WeBS) and the most appropriate survey methods to monitoring populations using these areas.

9. Distribution map for non- breeding Kingfisher SPA suite

No SPAs have previously been selected for non-breeding Kingfisher.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Musgrove, A.J., Aebischer, N.J., Eaton, M.A., Hearn, R.D., Newson, S.E., Noble, D.G., Parsons, M., Risely, K. & Stroud, D.A. 2013. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106: 64-100.

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11. SPA suite

No SPAs have previously been selected for non-breeding Kingfisher.

Woodlark *Lullula arborea*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	3,100	Conway *et al.* 2009	30	960	31.0%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic *L. a. arborea*	1,556,000	Derived from Cramp 1988 & BirdLife International 2004	15,600	960	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1968-70 to 2006	+854%	Sharrock 1976; Conway *et al.* 2009
Short-term UK trend	1994-98 to 2006-10	+40%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Woodlark, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-98.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010). Relevant objectives include:

- "Review effectiveness of existing Special Protection Areas and completeness of the network for Woodlark, in light of 2006 results."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Woodlark, the *Climatic atlas* predicts a wide distribution across southern areas of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Woodlark, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Conifer plantation and rough grasslands. Forage within 400 m of nest.	Maintain a mosaic of stand ages in forestry and suitable grasslands within and adjacent to forests.	Maintain forest used regularly for nesting and rough grasslands within 0.5 km of nesting areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, to a great extent in rotationally clear-felled areas. Woodlarks occur primarily in lowland heath and young conifer plantations, but small numbers nest in rough grasslands (especially downlands), woodland clearings and other open habitats such as set-aside, arable, horticultural habitats and dunes (Sitters *et al*. 1996; Wotton & Gillings 2000).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes, to a great extent in rotationally clear-felled areas.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Poorly known.
Is the use of cropped habitats determined by crop type?	Yes.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Not known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in those parts of the distribution without current SPA coverage.

Site boundaries of particular SPAs should also be reviewed, especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Review site and national monitoring protocols and ensure monitoring provides reliable estimates of numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Continue annual monitoring of key sites and report via Rare Breeding Birds Panel including negative data.

9. Distribution map for Woodlark SPA suite

Closed symbols indicate where the species occurs as a classified ‘feature’ of a site, whilst open symbols show those sites within the species’ SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Joint Nature Conservation Committee 2010. *Lullula arborea*. UK priority species pages – Version 2. 19 pp. Available at: http://jncc.defra.gov.uk/_speciespages/426.pdf

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Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. (eds.) 2001. *The UK SPA network: its scope and content.* JNCC, Peterborough. Three volumes. (90 pp.; 438 pp.; 392 pp.)

Wotton, S.R. & Gillings, S. 2000. The status of breeding Woodlarks *Lullula arborea* in Britain in 1997. *Bird Study* 47: 212-224.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Breckland	1.1	21 September 2006	430	365	2006	SCARABBS national survey; Conway *et al.* 2009	
Dorset Heathlands	1.1	1 October 1998	60	78	2006	SCARABBS national survey; Conway *et al.* 2009	
Minsmere-Walberswick	1.1	Not yet classified	20	30	2006	SCARABBS national survey; Conway *et al.* 2009	
New Forest	1.1	22 September 1993	184	163	2006	SCARABBS national survey; Conway *et al.* 2009	
Sandlings	1.1	10 August 2001	154	73	2006	SCARABBS national survey; Conway *et al.* 2009	
Thames Basin Heaths	1.1	9 March 2005	149	200	2006	SCARABBS national survey; Conway *et al.* 2009	
Wealden Heaths	1.1	1 March 1998	105	51	2006	SCARABBS national survey; Conway *et al.* 2009	
		Total for SPAs in GB	1,102	**960**			
		GB population	1,500	**3,100**			
		thus GB SPAs hold	73.4% GB	**31.0% GB**			
		Total for SPAs in UK	1,102	**960**			
		Biogeographic population	1,050,000	**1,556,000**			
		thus SPAs hold	0.1% international	**0.1% international**			

Fair Isle Wren *Troglodytes troglodytes fridariensis*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	**Critically Endangered**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – not evaluated BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	29	Aspinall & Aspinall 2011	1	29	100%
All-Ireland	0			0	Race does not occur in Northern Ireland
Biogeographic World	29	Aspinall & Aspinall 2011	1	29	100%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+71%	Aspinall & Aspinall 2011
Short-term UK trend	1994-98 to 2006-10	-13%	Aspinall & Aspinall 2011

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Fair Isle Wren, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-99.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010).

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current

distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Fair Isle Wren was not specifically included within the *Climatic Atlas*, although generally Wrens are predicted to have a wide distribution across Europe.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

This sub-species was not modelled by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

There is no potential to extend the SPA suite. The single SPA holds the totality of the range of this endemic Wren sub-species.

8. Recommendations regarding survey and monitoring

Ensure and give priority to supporting current annual monitoring of whole population.

Encourage studies to better understand:

- factors influencing the local and island dynamics of this population;

- factors influencing individual territory occupancy at a local scale and thus potentially affecting overall population viability at island scale;
- the apparent negative relationship between Wrens and Fulmars; and
- the potential for positive local management to restore numbers to former levels.

9. Distribution map for Fair Isle Wren SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Fair Isle	1.1	16 December 1994	37	**29**	2007-2011	Aspinall & Aspinall 2011	Five year mean
		Total for SPAs in GB	37	**29**			
		GB population	37	**29**			
		thus GB SPAs hold	100%	**100% GB**			
		Total for SPAs in UK	37	**29**			
		Biogeographic population	37	**29**			
		thus SPAs hold	100% international	**100% international**			

Ring Ouzel *Turdus torquatus*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	6,200[131]	Wotton *et al.* 2002	60	0	No SPAs selected in GB
All-Ireland	<20	IRBBP annual reports 2003-2007; Hillis 2007, 2008	1	0	Species does not occur in Northern Ireland
Biogeographic *T. t. torquatus*	19,500	Derived from BirdLife International 2004	190	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1968-72 to 1999	-43%	Sharrock 1976; Wootton *et al.* 2002
Short-term UK trend	1988-91 to 1999	-17%	Gibbons *et al.* 1993; Wootton *et al.* 2002[132]

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

No SPAs have previously been selected for Ring Ouzel in the UK.

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has been developed for this species (JNCC 2010).

[131] As this Review was published, Wotton *et al.* (2016) published a new UK estimate of 5,332 pairs (range 4,096 - 6,875) from a national survey in 2012.

[132] See Wotton *et al.* (2016) for latest trend information from 2012 national survey

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Ring Ouzel, the *Climatic Atlas* predicts a northerly distribution in the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Breeding Ring Ouzels were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pasture. Forage within 450 m of nest.	Maintain good moorland management and open moorland/ pasture interface.	Maintain suitable grassland habitats within 0.5 km of regularly used nesting areas.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Poorly known. Ring Ouzels nest on rocky outcrops in upland moorlands, foraging in moorland and semi-improved pastures. Open, grassy habitats are preferred foraging areas, and grazed areas with short-swards are the most favoured. However, bracken patches Are also used for foraging, although woodland is avoided.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Unknown.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown.

Cropped habitats assessment from SPA Review Decision Framework	
Is the use of cropped habitats determined by crop type?	Unknown.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Not known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Site selection probably an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

Continue to monitor national population through a further SCARABBS national survey, aiming to undertake a further national survey prior to the next SPA network Review.

9. Distribution map for Ring Ouzel SPA suite

No SPAs have previously been selected for Ring Ouzel.

10. References

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11. SPA suite

No SPAs have previously been selected for Ring Ouzel.

Aquatic Warbler *Acrocephalus paludicola* (passage)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	**Vulnerable**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	10	Musgrove *et al.* 2013	1	25	21.4%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic - World	37,500	Derived from Flade & Lachmann 2008	370	25	0.1%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	-60%	Davies 2012
Short-term UK trend	1994-98 to 2006-10	-81%	Davies 2012

The population statistics above are based on the total number of recorded individuals seen in the UK on autumn migration in the period 2000-2011 (as summarised by Davies 2012). Note this makes no allowance for potential issues related to turnover (which may reduce the apparent total) or of counting birds twice at different sites (so inflating the apparent total).

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to calculate an index for Aquatic Warbler in the passage period.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Aquatic Warbler, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-100.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union for this species (Flade & Lachmann 2008). Relevant objectives include:

- "Seek formal designation as protected areas of all sites regularly holding Aquatic Warblers."
- "Create, approve, use and regularly update Management Plans for each Aquatic Warbler site with special consideration of the conservation needs of the species."
- "Prevent the implementation of activities, projects or programmes that could be detrimental to the sites used by the Aquatic Warbler."
- "Create favourable hydrological conditions at the sites used by the Aquatic Warbler, either through restoration of natural hydrological conditions or through suitable management of new or existing hydrological infrastructure."
- "Limit the eutrophication of sites caused by water feeding the site, mineralisation of drained peat soil and through aerial deposition."
- "Prevent the natural succession of the vegetation by ongoing active management at those Aquatic Warbler sites where the extent and quality of suitable habitat would otherwise deteriorate."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives include:

- "Ensure all key passage sites are protected effectively."
- "Ensure known sites are managed appropriately."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2004) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

Potential changes to the migration route of Aquatic Warbler were not modelled by the *Climatic Atlas*.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress

the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

The distribution of Aquatic Warbler on migration was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2006).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Sufficient
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it provides adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Encourage fuller reporting of numbers occurring on sites (via BirdTrack *etc*.) within the SPA suite and consider added value of dedicated monitoring to enable better assessment by the time of the next national review.

9. Distribution map for passage Aquatic Warbler SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)*	Assessment of UK SPA suite in 2000s (individuals)*	Data period	Data source	Comment
Dungeness to Pett Level	1.1	Not yet classified	30	21	2000-2011	Davies 2012	Total number of records
Marazion Marsh	1.1	10 August 2001	6	2	2000-2011	Davies 2012	Total number of records
Poole Harbour	1.1	Not yet classified	11	2	2000-2011	Davies 2012	Total number of records
		Total for SPAs in GB	47	**25**			
		GB population	67	**117**			Total number of autumn records 2000-2011
		thus GB SPAs hold	70% GB	**21.4% GB**			
		Total for SPAs in UK	47	**25**			
		Biogeographic population	11,220	**37,500**			
		thus SPAs hold	0.4% international	**0.1% international**			

*See earlier note regarding population statistics.

Dartford Warbler *Sylvia undata*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	**Near Threatened**
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	3,200	Wotton *et al.* 2009	30	1,654	51.7%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic	654,000	*S. u. dartfordiensis* Derived from BirdLife International 2004[133]	6,500	1,654	0.3%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1978-82 to 2006-10	+728%	RBBP; Holling *et al.* 2012
Short-term UK trend	1994-98 to 2006-10	+48%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

[133] Range of *S. u. dartfordiensis* based on Snow & Perrins (1998) and del Hoyo *et al.* (2006), and population calculated as whole of UK population + 80% of French population + 15% of Spanish population on the basis of information given in those sources.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Dartford Warbler, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-101.pdf.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Dartford Warbler, the *Climatic Atlas* predicts a wide distribution across the southern half of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For Dartford Warbler, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with moderate confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient in the north of the expanding range
Ecological sufficiency: Sufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

To represent species range adequately, additional SPA provision should be considered in parts of the distribution beyond current SPA coverage.

8. Recommendations regarding survey and monitoring

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Continue annual monitoring all regularly and previously used sites and report via Rare Breeding Birds Panel including negative data.

9. Distribution map for Dartford Warbler SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Ashdown Forest	1.1	11 March 1996	29	38	2006	SCARABBS; Wotton *et al.* 2009	
Dorset Heathlands	1.1	1 October 1998	418	613	2006	SCARABBS; Wotton *et al.* 2009	
East Devon Heaths	1.1	29 June 1998	128	69	2006	SCARABBS; Wotton *et al.* 2009	
New Forest	1.1	22 September 1993	538	419	2006	SCARABBS; Wotton *et al.* 2009	
Thames Basin Heaths	1.1	9 March 2005	445	376	2006	SCARABBS; Wotton *et al.* 2009	
Wealden Heaths	1.1	1 March 1998	123	139	2006	SCARABBS; Wotton *et al.* 2009	
		Total for SPAs in GB	1,681	**1,654**			
		GB population	1,600	**3,200**			
		thus GB SPAs hold	100% GB	**51.7% GB**			
		Total for SPAs in UK	1,681	**1,654**			
		Biogeographic population	2,026,000	**654,000**			
		thus SPAs hold	<0.1% international	**0.3% international**			

Red-backed Shrike *Lanius collurio*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I; migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	1-3	RBBP; Holling *et al.* 2012	1	0	0%
All-Ireland	0			0	Species does not occur in Northern Ireland
Biogeographic – Europe	5,550,000	BirdLife International 2004	55,500	0	0%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2008	-90%	RBBP; Holling *et al.* 2012
Short-term UK trend	1996 to 2008	-37%	RBBP; Holling *et al.* 2012

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to calculate an index for Red-backed Shrike.

3. Changes to the SPA suite since the 2001 Review

Red-backed Shrike was not assessed in the 2001 SPA Review.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic

change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For breeding Red-backed Shrike, the *Climatic Atlas* predicts a widespread distribution in southern and eastern England.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Red-backed Shrikes were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment
Not relevant therefore not assessed by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007).

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

SPA provision should be sought for Red-backed Shrike as feasible.

8. Recommendations regarding survey and monitoring

Continue to encourage annual population monitoring, and reporting via Rare Breeding Birds Panel including all negative data.

9. Distribution map for non-breeding Red-backed Shrike SPA suite

No SPAs have previously been selected for Red-backed Shrike.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. 2007. *A climatic atlas of European breeding birds.* Durham University, RSPB and Lynx Edicions, Barcelona. 521 pp.

Pearce-Higgins, J.W., Johnston, A., Ausden, M., Dodd, A., Newson, S.E., Ockendon, N., Thaxter, C.B., Bradbury, R.B., Chamberlain, D.E., Jiguet, F., Rehfisch, M.M. & Thomas, C.D. 2011. *Final Report to the Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) Steering Group.* BTO Report to DEFRA. 90 pp. Available at: http://randd.defra.gov.uk/Document.aspx?Document=9962_CHAINSPANFINALREPORT.pdf

11. SPA suite

No SPAs have previously been selected for Red-backed Shrike.

Chough *Pyrrhocorax pyrrhocorax* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	300	Johnstone *et al.* 2007	3	149	49.7%
All-Ireland	838	Gray *et al.* 2003	8	0	No SPAs selected in Northern Ireland
Biogeographic *P. p. pyrrhocorax*[134]	1,290	Finney & Jardine 2003; Thorpe & Johnstone 2003; Gray *et al.* 2003; Moore 2004	15	149	11.6%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1982 to 2002	+39.4%	Bullock *et al.* 1983; Johnstone *et al.* 2007
Short-term UK trend	1992 to 2002	+28.1%	Johnstone *et al.* 2007

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

[134] UK, Isle of Man and Ireland

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Chough, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-102A.pdf.

Oronsay and South Colonsay; The Oa, Islay; and Gruinart Flats, Islay were classified as additions to the SPA suite for Chough since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic atlas* and should be read alongside any summary interpretation presented below.

For Chough, the *Climatic atlas* predicts a distribution mainly on the western coasts of the UK.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

For breeding Chough, modelled impacts are as follows: by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pastures all year round, and over-wintered stubbles and root crops in winter. Site faithful. Forage 1-3 km from nest.	Maintain specific pasture types at field level.	Maintain suitable grassland habitats within 1 km of the nest, on the basis of local evidence of regular field usage (recommendation already accepted by the Natura 2000 Steering Committee).

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, as shown by long-term colour-marking studies.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes (Curtis *et al*. 1989)
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes; to a significant degree (Bignal *et al.* 1989; Reid *et al.* 2009a, 2009b).
Is the use of cropped habitats determined by crop type?	Yes. Uses pastures all year round, and over-wintered stubbles and root crops in winter. Site faithful. Forage 1-3 km from nest. (See Warnes & Stroud 1989; Reid *et al.* 2009a, 2009b; and review by Baker & Stroud 2007 [Appendix 10]).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Yes: close association with grazing animals and also autumn stubbles. Changes in management of rough grassland leading to longer swards and loss of rough grassland to other crop types are both responsible for localised reductions in Chough numbers and remain the most significant threat (Bullock *et al*. 1983; Johnstone *et al*. 2007).
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Maintain suitable grassland habitats within 1 km of the nest, and outside of the breeding period on the basis of local evidence of regular field usage (recommendation already accepted by the Natura 2000 Steering Committee)

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advices regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision – especially in the context of the species' changed distribution within the UK – is insufficient for the requirements of breeding Chough, and additional SPA provision, as feasible, should be sought.

8. Recommendations regarding survey and monitoring

Continue annual monitoring all sites in regular use and with past occupancy, and report via Rare Breeding Birds Panel including negative data.

Ensure monitoring of total numbers within SPAs during SCARABBS national surveys, and undertake a further national survey prior to the next network review.

Collect and collate data on use by pairs breeding within SPAs, of foraging areas outwith current SPA boundaries to inform extensions of SPA boundaries to include cropped habitats.

9. Distribution map for breeding Chough SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Thorpe, R.T. & Johnstone, I.G. 2003. The status of the Chough *Pyrrhocorax pyrrhocorax* in Wales in 2002. *Welsh Birds* 3: 354–362.

Warnes, J.M. & Stroud, D.A. 1989. Habitat use and food of Choughs on the island of Islay, Scotland. Pp. 46-51. *In*: *Choughs and Land-use in Europe. Proceedings of an International Workshop on the Conservation of the Chough, Pyrrhocorax pyrrhocorax, in the EC. 11-14 November 1988.* Ed. by Bignal, E.M. & Curtis, D.J. Scottish Chough Study Group, Kintyre.

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Castlemartin Coast	1.1	12 January 1996	12	17	2002	SCARABBS: Johnstone *et al.* 2007	
Craig yr Aderyn	1.1	29 June 2001	6	6	2002	SCARABBS: Johnstone *et al.* 2007	
Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island	1.1	10 June 1992	12	22	2001	RSPB data	
Glannau Ynys Gybi/Holy Island Coast	1.1	1 June 1992	18	17	2002	SCARABBS: Johnstone *et al.* 2007	
Gruinart Flats, Islay	1.1	1 September 2006	Not classified	6	2009-2012	Mean per Scottish Chough Study Group	
North Colonsay and Western Cliffs	1.1	10 June 2003	9	9	2009-2012	Mean per Scottish Chough Study Group	
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands	1.1	24 March 1997	9	17	2002	SCARABBS: Johnstone *et al.* 2007	
Oronsay and South Colonsay	1.1	1 December 2007	Not classified	4	2009-2012	Mean per Scottish Chough Study Group	
Ramsey and St David's Peninsula Coast	1.1	24 July 1996	11	13	2002	SCARABBS: Johnstone *et al.* 2007	
Rinns of Islay	1.1	27 November 1995	31	28	2009-2012	Mean per Scottish Chough Study Group	
Skomer and Skokholm	1.1	Not yet classified	4	6	2002	SCARABBS: Johnstone *et al.* 2007	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
The Oa, Islay	1.1	2 April 2007	Not classified	4	2009-2012	Mean per Scottish Chough Study Group	
		Total for SPAs in GB	112	**149**			
		GB population	340	**300**			
		thus GB SPAs hold	32.9% GB	**49.7% GB**			
		Total for SPAs in UK	112	**149**			
		Biogeographic population	12,265	**1,290**			
		thus SPAs hold	0.9% international	**11.6% international**			

Chough *Pyrrhocorax pyrrhocorax* (non-breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Amber BOCC 3 (2009) – Amber BOCC 4 (2015) – Green

2a. Population size

Area	Population sizes (individuals)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	930	Johnstone *et al.* 2007	9	371	39.9%
All-Ireland	2,432	Gray *et al.* 2003	25	0	No SPAs selected in Northern Ireland
Biogeographic *P. p. pyrrhocorax*[135]	3,800	Finney & Jardine 2003; Thorpe & Johnstone 2003; Gray *et al.* 2003; Moore 2004	40	371	9.8%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1982 to 2002	+56.8%	Bullock *et al.* 1983; Johnstone *et al.* 2007
Short-term UK trend	1992 to 2002	+38.2%	Johnstone *et al.* 2007

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated medium population provision within the UK SPA network.

[135] UK, Isle of Man & Ireland

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Chough, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-102B.pdf.

Oronsay and South Colonsay, The Oa, Islay, and Gruinart Flats, Islay were classified as additions to the SPA suite for Chough since the 2001 Review. See Section 11 for details.

4. Relevant site-related recommendations within international and national (BAP) action plans

No international or national action or management plan has been developed for this species.

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Chough, the *Climatic Atlas* predicts breeding distribution mainly on the western coasts of the UK. Since Chough is a non-migratory species, this also predicts the non-breeding distribution.

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

The distribution and abundance of Chough in the non-breeding season were not modelled by CHAINSPAN although – as a resident species – changes in the non-breeding season will be likely similar to those predicted for the breeding season. These were that by 2050, under a medium emissions scenario, numbers within the SPA suite are anticipated, with poor confidence, to increase by at least 50%.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Pastures all year round, and over-wintered stubbles and root crops in winter. Site faithful. Forage in winter within 5-8 km of roost.	Maintain specific pasture types at field level.	Maintain suitable grassland habitats outside of the breeding period on the basis of local evidence of regular field usage (recommendation already accepted by the Natura 2000 Steering Committee).

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes, as shown by long-term colour-marking studies.
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes (Curtis *et al*. 1989)
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Yes; to a significant degree (Bignal *et al.* 1989; Reid *et al.* 2009a, 2009b).
Is the use of cropped habitats determined by crop type?	Yes. Uses pastures all year round, and over-wintered stubbles and root crops in winter. Site faithful. Forage in winter within 5-8 km of roost. Short-sward rough pastures remain a primary foraging habitat in winter. Choughs at the coast feed predominantly in grazed maritime and dune grasslands, also feeding amongst the tide line on invertebrates associated with washed up seaweeds. (See Warnes & Stroud 1989; Reid *et al.* 2009a, 2009b; and review by Baker & Stroud 2007 [Appendix 11]).
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Yes: close association with grazing animals and also autumn stubbles. Changes in management of rough grassland leading to longer swards and loss of rough grassland to other crop types are both responsible for localised reductions in Chough numbers and remain the most significant threat (Bullock *et al*. 1983; Johnstone *et al*. 2007).
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Site selection is an appropriate strategy for concentrations of this species in relevant cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Sufficient

Range coverage: Insufficient

Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (2013) SPA provision – especially in the context of the species' changed distribution within the UK – is insufficient for the requirements of breeding Chough, and additional SPA provision, as feasible, should be sought.

Site boundaries of particular SPAs should also be reviewed, especially in the context of feeding areas or other functional needs.

8. Recommendations regarding survey and monitoring

Put in place monitoring programmes that will monitor non-breeding population sizes at all sites within the Chough SPA suite and report data to a repository agreed with relevant country agency.

Noting the rapidity of the decline of the population on Islay especially, which has been linked to mortality of first-year birds, give priority to assessment of non-breeding numbers at The Oa, Islay; Castlemartin Coast; Ramsey and St David's Peninsula Coast; and Oronsay and South Colonsay where no contemporary data on non-breeding numbers apparently exist.

Undertake studies to establish patterns of use by non-breeding Chough within each SPA (and including surrounding areas used by birds) so as to be able to best ensure the long-term viability of populations at these sites.

9. Distribution map for non-breeding Chough SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
Castlemartin Coast	1.1	Not yet classified	24	34	2002	Johnstone *et al.* 2007	Assumed as 2x breeding population (17 prs) + zero non-breeders
Craig yr Aderyn	1.1	29 June 2001	55	35	2007/08	RSPB unpublished data	
Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island	1.1	Not yet classified	24	45	2007	RSPB unpublished data	
Glannau Ynys Gybi /Holy Island Coast	1.1	1 June 1992	18	19	2000	RSPB unpublished data	
Gruinart Flats, Islay	1.1	14 July 1988	Not classified	50	mean 2009-2012	Scottish Chough Study Group	
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands	1.1	10 June 2003	18	29	2003	RSPB unpublished data	
North Colonsay and Western Cliffs	1.1	24 March 1997	18	18	mean 2009-2010	Scottish Chough Study Group	
Oronsay and South Colonsay	1.1	1 December 2007	Not classified	12	2002	Johnstone *et al.* 2007	Assumed as 2x breeding population (4 prs) + 47.5% non-breeders
Ramsey and St David's Peninsula Coast	1.1	Not yet classified	22	26	2002	Johnstone *et al.* 2007	Assumed as 2x breeding population (13 prs) + zero non-breeders
Rinns of Islay	1.1	27 November 1995	62	92	mean 2009-2012	Scottish Chough Study Group	

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (individuals)	Assessment of UK SPA suite in 2000s (individuals)	Data period	Data source	Comment
The Oa, Islay	1.1	1 April 2007	Not classified	11	2002	Johnstone *et al.* 2007	Assumed as 2x breeding population (4 prs) + 33.5% non-breeders
		Total for SPAs in GB	241	**371**			
		GB population	689	**930**			
		thus GB SPAs hold	35.0% GB	**39.9% GB**			
		Total for SPAs in UK	241	**371**			
		Biogeographic population	36,800	**3,800**			
		thus SPAs hold	0.7% international	**9.8% international**			

Twite *Carduelis flavirostris* (breeding)

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Migratory
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Red BOCC 4 (2015) – Red

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB English uplands popn. of *C. f. pipilans*	<600	Baker *et al.* 2002; Langston *et al.* 2006	6	0	No SPAs selected in GB
All-Ireland *C. f. pipilans*	54-110	McLoughlin & Cotton 2008	1	0	No SPAs selected in Northern Ireland
Biogeographic English uplands popn. of *C. f. pipilans*	<600	Baker *et al.* 2002; Langston *et al.* 2006	6	0	No SPAs selected in UK

2b. Population trend

	Period of trend	UK trend[136]	Source
Long-term UK trend	1980 to 2011	Unquantified decline	Sharrock 1976; Langston *et al.* 2006; McLoughlin & Cotton 2008
Short-term UK trend	1988-91 to 1999	-85%	Gibbons *et al.* 1993; Langston *et al.* 2006; McLoughlin & Cotton 2008

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. It was not possible to calculate an index for the English uplands population of Twite.

[136] Trend of all Twite in UK, *i.e.* both UK populations of *C. f. pipilans* (including *C. f. bensonorum*). See Baker *et al.* 2002 for information about changes of the English uplands population.

3. Changes to the SPA suite since the 2001 Review

No SPAs were selected for Twite in the UK in the 2001 Review. Since then the UK SPA & Ramsar Scientific Working Group assessed the status of Twite on the basis of information presented by Baker *et al.* 2002. The SWG decided as follows:

> "The group agreed that site-based protection for Twite was appropriate given the species behaviour. On the basis of the best data available the Group agreed that there was good evidence for concluding that Twite occur in two distinct biogeographical populations in the UK; the English uplands breeding population (concentrated in the southern Pennines) and the Scottish/Irish/Welsh breeding population.
>
> "Of these the former is clearly migratory, while the latter is only partially migratory and would not be considered migratory under the Bonn Convention definition[137].
>
> "With this in mind it was agreed that the geographical range of the English uplands breeding population should be all-England, and that EN should assess whether any areas may be suitable for consideration as SPAs for the species (for both breeding and wintering birds).[138]"

4. Relevant site-related recommendations within international and national (BAP) action plans

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant actions include:

- Instigate a co-ordinated species recovery programme for Twite (including the development of an effective monitoring scheme).
- Maintain close juxtaposition of suitable nesting and feeding habitats in core breeding areas and ensure provision of adequate winter food supply.
- Recreate suitable habitat, including tall heather or bracken for nesting and late cut flower rich meadows for feeding within (recent) former range.
- Ensure rate of, and approach to, managed realignment keeps pace with the loss of preferred passage and winter saltmarsh habitat.
- Promote the retention of low intensity agricultural practices (including cattle) in crofting areas.
- Develop and implement and effective monitoring scheme. Species-specific monitoring/survey

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Twite, the *Climatic Atlas* predicts a scattered population in Scotland and northern England.

[137] Article 1

[138] Minutes of SPAR SWG meeting, 13 March 2002: http://jncc.defra.gov.uk/pdf/minutes130303.pdf

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Twite were not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Unimproved meadows, rough pastures and machair during the breeding season. Over-wintered stubbles and root crops in winter. Forage within 2.5-3.5 km of nest. No spatial information for winter.	Maintain open moorland / grassland interface and suitable grassland types.	Maintain suitable grassland habitat within 2.5 km of nesting areas, either by generic approach or on basis of local evidence of regular field usage. Insufficient information for identifying regularly used important feeding areas outside of breeding season.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	Yes. Although a moorland nesting species, Twite feed in adjacent flower-rich meadows, rough pastures and other weedy habitat features. In the Western Isles of Scotland, machair habitats are important where they occur, with birds feeding on fallow areas and in patches of vegetables up to 2 km from the nest during breeding. In these areas, bird forage in grasslands and meadows once the young have fledged (RSPB, unpublished).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Yes.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown. Fields used for foraging may be up to 3.5 km from the nest, and after fledging birds move into suitable feeding areas, which are typically relative close to nesting areas (average 2.4 km, up to 8.2 km from nests). There is no further information on factors influencing field selection.
Is the use of cropped habitats determined by crop type?	Poorly known.

Cropped habitats assessment from SPA Review Decision Framework	
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Not known.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

There should be an assessment as to whether whether any areas are suitable for consideration as SPAs for the species in either the breeding or non-breeding season in England.

8. Recommendations regarding survey and monitoring

Continue to monitor national population through a further SCARABBS national survey, aiming to undertake a further national survey prior to the next network review.

Promote annual monitoring of the Pennine Twite population given the rapidity of its decline and that it is the only population for which a systematic recovery project is in place.

Further investigate migratory and other movements of English Twite, especially in the context of site-based protection measures.

9. Distribution map for breeding Twite SPA suite

No SPAs have previously been selected for Twite.

10. References

Baker, H., Fraser, B., Langston, R. & Wilson, J. 2002. Twite *Carduelis flavirostris* in the UK: consideration of treatment under Article 4 of the Birds Directive. 4 pp. Unpublished discussion paper to the UK SPA & Ramsar Scientific Working group. Available at: http://jncc.defra.gov.uk/pdf/twite.pdf

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11. SPA suite

No SPAs have previously been selected for Twite.

Scottish Crossbill *Loxia scotica*

1. Legal status and legislative or conservation status changes since 2001

Birds Directive Article 4 status	Annex I
IUCN Red List status and change:	Least Concern
Birds of Conservation Concern status and change:	BOCC 2 (2002) – Red BOCC 3 (2009) – Amber BOCC 4 (2015) – Amber

2a. Population size

Area	Population sizes (pairs)	Source	Selection thresholds	Totals in species' SPA suite	Proportion in SPA suite
GB	6,800	Summers & Buckland 2010	70	235	3.5%
All-Ireland					Species does not occur in Northern Ireland
Biogeographic	6,800	Summers & Buckland 2010	70	235	3.5%

2b. Population trend

	Period of trend	UK trend	Source
Long-term UK trend	1980 to 2010	Unknown[139]	JNCC 2013a
Short-term UK trend	1998 to 2010	Unknown	JNCC 2013a

2c. Site Provision Index

The background and methodology for the Site Provision Index is presented elsewhere in this report. The results for this species indicate anticipated low population provision within the UK SPA network.

3. Changes to the SPA suite since the 2001 Review

Background information on the ecology and distribution of Scottish Crossbill, and information about the derivation of the SPA suite for the species is given in the 2001 SPA Review (Stroud *et al*. 2001) at http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-103.pdf.

[139] Recent methodological studies summarised by Summers & Buckland (2010) give a basis for future survey and monitoring.

4. Relevant site-related recommendations within international and national (BAP) action plans

An international single species action plan has been developed by the European Union for this species (Wright 1999). Relevant objectives include:

- "To designate according to relevant legislation all sites which are known or thought to support populations of Scottish Crossbills."

A UK Biodiversity Action Plan has also been developed for this species (JNCC 2010). Relevant objectives include:

- "Consider the designation of additional Special Protection Areas."

5. Projected impact of climate change on the SPA suite

In the period of this Review there have been two analyses to model the effects of climate change on UK's birds. The *Climatic atlas of European breeding birds* (Huntley *et al.* 2007) modelled current distributions against current climate and then projected these to reflect models of future climatic change. This predicted the distribution of European breeding birds at and beyond the end of the 21st century. However, the technique makes no allowance for how bird habitats will change and move. For example, some species may be unable to extend their geographical range into areas made potentially suitable by climate change because of lack of suitable habitat. Caveats as to the limitations of the method are presented in the *Climatic Atlas* and should be read alongside any summary interpretation presented below.

For Scottish Crossbill, the *Climatic Atlas* predicts extinction in the UK. However, Summers & Buckland (2010) noted: "Under current climate change models, there is concern that the Scottish Crossbill will disappear from Britain because the climatic conditions within which it currently occurs (its climate envelope) will no longer occur by the late 21st century (Huntley *et al.* 2007). However, this assumes that the conifers on which Scottish Crossbills rely will also disappear. Commercial forestry will play a key role within this scenario, and it is notable that increased conifer timber productivity is predicted for southwest and northeast Scotland, whilst potential range expansion is expected for Scots Pines within eastern Scotland (Broadmeadow and Ray 2005). Therefore, the situation the Scottish Crossbill may not be as bleak as suggested by the climate envelope model (Huntley *et al.* 2007).

The Climate Change Impacts on Avian Interests of Protected Area Networks (CHAINSPAN) project (Pearce-Higgins *et al*. 2011) used more sophisticated modelling techniques, specifically in relation to some of the qualifying species using the UK SPA network. In particular, they modelled future abundance as well as presence/absence. Their report gives a number of interpretive caveats.

Climate modelling can provide important information as to anticipated future changes in distribution and abundance, but this information should be interpreted with caution. Pearce-Higgins *et al.* stress the important role of habitat management within SPAs as an important adaptation measure. This will help improve site-quality as well as reduce the severity of other pressures on populations.

Scottish Crossbill was not assessed by CHAINSPAN.

6. Assessment of SPA suite by this Review

Cropped habitat assessment

Summary recommendations for this species made by the SPAR SWG Cropped Habitats Information Project (Baker & Stroud 2007) are as follows:

Cropped habitats required	Key conservation requirements	Recommended approach
Mature conifer plantation, especially of pine species[140]. No spatial information.	Maintain mature conifer plantations used regularly for nesting.	Maintain mature conifer plantations used regularly for nesting by the species.

Cropped habitats assessment from SPA Review Decision Framework	
Does the species use the same sites each year when exploiting cropped habitats?	To a moderate extent with some dependence on location of cone crop, although the evaluation of habitat use by Scottish Crossbills is problematic due to the difficulties in identifying them in the field from both Common Crossbills (*Loxia curvirostra*) and Parrot Crossbills (*Loxia pytyopsittacus*).
Does the species show between-year fidelity to cropped habitats as part of its ecological requirements?	Medium - some dependence on location of cone crop.
Does the species show fidelity to specific locations (*e.g.* specific fields)?	Unknown: nothing is known about movements of individual birds, although Mature plantation forestry, especially containing Scots Pine, is clearly important to the Scottish Crossbill population.
Is the use of cropped habitats determined by crop type?	Yes. Scottish Crossbills may be more generalist in their use of conifer forests than is traditionally thought, utilising mixed conifer plantations as well as natural and semi-natural Scots Pine (*Pinus sylvestris*) woodland. However, they show preference for Scots Pine woodland, even though they feed in a variety of conifer species.
Are there any other reasons why classification of cropped habitats is necessary for the ecological requirements of the species?	Yes. Dependence of global population on cropped forest habitats.
Assessment outcome: If sites are appropriate: select SPAs and determine, or amend boundaries of existing SPA (either SPAs with non-rotational management regimes (with or without special conservation measures for cropped habitats; or SPAs with a rotational management regime (with or without special conservation measures for cropped habitats)	Yes. Site selection an appropriate strategy for concentrations of this species in appropriate cropped habitats.

Overall assessment of sufficiency of SPA suite:

Population numbers: Insufficient
Range coverage: Insufficient
Ecological sufficiency: Insufficient

[140] See also Summers & Broome 2012

Additional conservation measures recommended?
Consideration of the need for and provision of, additional conservation measures (outwith this SPA Review) is required.

7. Scientific advice regarding SPA suite

In the context of current knowledge, contemporary (this Review) SPA provision is insufficient for the requirements of the species, and appropriate changes or additions to the SPA suite should be considered to ensure that it continues to provide adequate coverage of population numbers and distribution.

8. Recommendations regarding survey and monitoring

Establish a monitoring regime that will allow assessment of change in population size at each of the five SPAs (Abernethy Forest, Ballochbuie, Cairngorms, Glen Tanar and Kinveachy) by the time of the next SPA network Review.

Encourage studies to better understand the longer-term status and distribution of Scottish Crossbill, especially in relation to the existing SPA suite.

9. Distribution map for Scottish Crossbill SPA suite

Closed symbols indicate where the species occurs as a classified 'feature' of a site, whilst open symbols show those sites within the species' SPA suite where formal classification has yet to occur. The shape of symbol indicates the nature of the grounds for selection in the context of the UK SPA Selection Guidelines.

10. References

Baker, H. & Stroud, D.A. 2007. An assessment of the use of cropped habitats by birds represented in the UK Special Protection Area network. 71 pp. Unpublished paper from SPA Scientific Working Group to Natura 2000 and Ramsar Steering Committee.

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Summers, R.W. & Broome, A. 2012. Associations between crossbills and North American conifers in Scotland. *Forest Ecology and Management* 271: 37-45.

Summers, R.W. & Buckland, S.T. 2010. A first survey of the global population size and distribution of the Scottish Crossbill *Loxia scotica. Bird Conservation International* 21: 186–198. Available at: https://research-repository.st-andrews.ac.uk/bitstream/10023/1957/1/SummersBucklandBirdConsInt2011ScottishCrossbill.pdf

Wright, A. 1999. *Species Action Plan for Scottish Crossbill* Loxia scotica *in Europe.* European Commission. 18 pp. Available at: http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/loxia_scotica.pdf

11. SPA suite

	SPA Guidelines selection stage	Date of classification	UK SPA suite in 1990s (pairs)[141]	Assessment of UK SPA suite in 2000s (pairs)	Data period	Data source	Comment
Abernethy Forest	1.1	25 April 1990	175	**26**	2012; individuals	Ron Summers unpubl.	
Ballochbuie	1.1	12 June 1998	10	**14**	2012; individuals	Ron Summers unpubl.	
Cairngorms	1.1	25 September 1997	50	**71**	2012; individuals	Ron Summers unpubl.	
Glen Tanar	1.1	19 September 1994	50	**62**	2012; individuals	Ron Summers unpubl.	
Kinveachy	1.1	2 February 2000	10	**62**	2012; individuals	Ron Summers unpubl.	
		Total for SPAs in GB	295	**235**			
		GB population	300	**6,800**			
		thus GB SPAs hold	98% GB	**3.5% GB**			
		Total for SPAs in UK	295	**235**			
		Biogeographic population	300	**6,800**			
		thus SPAs hold	98% international	**3.5% international**			

[141] Note that these site totals, from the 1990s when the species was poorly known, are of low quality.

Appendix 10. Summary table of key information drawn from species accounts

Notes:

- 1% thresholds are derived from the population estimates given in Appendix 3, and derived using the rounding protocol of Stroud *et al.* (2004).
- [50] indicates that 50 is the nominal threshold for the species – see Stroud *et al.* 2001.
- For background on CHIP species, see section 5.4.
- For background on types of sufficiency, see section 5.3.1.

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Red-throated Diver *Gavia stellata* (breeding)	13		270	No	Sufficient	Sufficient	Insufficient
Red-throated Diver *Gavia stellata* (non-breeding)	170	20 [50]	2,600	No	Insufficient	Insufficient	Insufficient
Black-throated Diver *Gavia arctica* (breeding)	2		190	No	Insufficient	Insufficient	Insufficient
Little Grebe *Tachybaptus ruficollis* (non-breeding)	160	25 [50]	3,900	No	Insufficient	Insufficient	Insufficient
Great Crested Grebe *Podiceps cristatus* (breeding)	45	21	2,500	No	Sufficient	Sufficient	Sufficient
Great Crested Grebe *Podiceps cristatus* (non-breeding)	190	55	3,500	No	Insufficient	Insufficient	Sufficient
Slavonian Grebe *Podiceps auritus* (breeding)	1		65	No	Insufficient	Insufficient	Sufficient
Slavonian Grebe *Podiceps auritus* (non-breeding)	10	1	55	No	Insufficient	Insufficient	Sufficient
Fulmar *Fulmarus glacialis* (breeding)	5,000	390	20,000**	No	Sufficient	Sufficient	Sufficient
Manx Shearwater *Puffinus puffinus*	3,000	370	3,700	No	Sufficient	Sufficient	Sufficient
Storm Petrel *Hydrobates pelagicus* (breeding)	260	990	4,900	No	Sufficient	Sufficient	Sufficient
Leach's Petrel *Oceanodroma leucorhoa* (breeding)	480	3	2,300	No	Sufficient	Sufficient	Sufficient
Gannet *Morus bassanus* (breeding)	2,200	330	3,900	No	Sufficient	Sufficient	Sufficient
Cormorant *Phalacrocorax carbo carbo* (breeding)	85	50	520	No	Insufficient	Insufficient	Sufficient
Cormorant *Phalacrocorax carbo carbo* (non-breeding)	350	140	1,200	No	Insufficient	Insufficient	Sufficient
Shag *Phalacrocorax aristotelis* (breeding)	270	35	690	No	Sufficient	Sufficient	Sufficient
Bittern *Botaurus stellaris* (breeding)	1		440	No	Insufficient	Insufficient	Sufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Bittern *Botaurus stellaris* (non-breeding)	6	1	65	No	Insufficient	Insufficient	Insufficient
Little Egret *Egretta garzetta* (breeding)	7	2	450	No	Insufficient	Insufficient	Insufficient
Little Egret *Egretta garzetta* (non-breeding)	45 [50]		1,300	No	Insufficient	Insufficient	Insufficient
Spoonbill *Platalea leucorodia* (breeding)	1		85	No	Insufficient	Insufficient	Insufficient
Spoonbill *Platalea leucorodia* (non-breeding)	1		115	No	Insufficient	Insufficient	Insufficient
Bewick's Swan *Cygnus columbianus bewickii*	70	4 [50]	220	CHIP	Sufficient	Sufficient	Sufficient
Whooper Swan *Cygnus cygnus*	120	150	290	CHIP	Insufficient	Sufficient	Insufficient
Bean Goose *Anser fabalis*	4 [50]		420	CHIP	Sufficient	Sufficient	Sufficient
Pink-footed Goose *Anser brachyrhynchus* (roost)	3,600		3,600	CHIP	Sufficient	Sufficient	Sufficient
European White-fronted Goose *Anser albifrons albifrons*	25 [50]		12,000	CHIP	Sufficient	Sufficient	Sufficient
Greenland White-fronted Goose *Anser albifrons flavirostris*	130	110	240	CHIP	Insufficient	Insufficient	Insufficient
Icelandic Greylag Goose *Anser anser* (roost)	850	50	980	CHIP	Insufficient	Insufficient	Insufficient
Greenland Barnacle Goose *Branta leucopsis*	580	90	700	CHIP	Sufficient	Sufficient	Sufficient
Svalbard Barnacle Goose *Branta leucopsis*	330		330	CHIP	Sufficient	Sufficient	Insufficient
Dark-bellied Brent Goose *Branta bernicla bernicla*	910		2,400	CHIP	Sufficient	Sufficient	Insufficient
Canadian Light-bellied Brent Goose *Branta bernicla hrota*	7 [50]	400	400	CHIP	Sufficient	Sufficient	Sufficient
Svalbard Light-bellied Brent Goose *Branta bernicla hrota*	35 [50]		75	CHIP	Sufficient	Sufficient	Sufficient
Shelduck *Tadorna tadorna* (non-breeding)	610	150	3,000	No	Sufficient	Sufficient	Sufficient
Wigeon *Anas penelope* (breeding)	3		5,000	No	Sufficient	Sufficient	Sufficient
Wigeon *Anas penelope* (non-breeding)	4,400	820	15,000	CHIP	Sufficient	Sufficient	Sufficient
Gadwall *Anas strepera* (breeding)	7	1	200	No	Sufficient	Sufficient	Sufficient
Gadwall *Anas strepera* (non-breeding)	250	20	600	No	Sufficient	Sufficient	Sufficient
Teal *Anas crecca* (non-breeding)	2,100	450	5,000	CHIP	Sufficient	Sufficient	Sufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Mallard *Anas platyrhynchos* (non-breeding)	6,800	380	20,000**	CHIP	Sufficient	Sufficient	Sufficient
Pintail *Anas acuta* (non-breeding)	290	10	600	CHIP	Sufficient	Sufficient	Sufficient
Shoveler *Anas clypeata* (breeding)	3	1	15	No	Sufficient	Sufficient	Sufficient
Shoveler *Anas clypeata* (non-breeding)	180	25	400	No	Sufficient	Sufficient	Sufficient
Pochard *Aythya ferina* (non-breeding)	380	380	3,000	No	Insufficient	Insufficient	Sufficient
Tufted Duck *Aythya fuligula* (non-breeding)	1,100	370	12,000	No	Sufficient	Sufficient	Sufficient
Scaup *Aythya marila*	50	44 [50]	3,100	No	Sufficient	Sufficient	Sufficient
Eider *Somateria m. mollissima* (non-breeding)	550	29 [50]	10,300	No	Insufficient	Insufficient	Insufficient
Eider *Somateria mollissima faeroeensis* (non-breeding)	55		55	No	Insufficient	Insufficient	Insufficient
Long-tailed Duck *Clangula hyemalis*	110		16,000	No	Insufficient	Insufficient	Insufficient
Common Scoter *Melanitta nigra* (breeding)	1	1	1,800	No	Sufficient	Sufficient	Sufficient
Common Scoter *Melanitta nigra* (non-breeding)	1,000	230	5,500	No	Unable to assess	Insufficient	Sufficient
Velvet Scoter *Melanitta fusca*	25 [50]		4,500	No	Insufficient	Sufficient	Sufficient
Goldeneye *Bucephala clangula* (non-breeding)	200	95	11,500	No	Insufficient	Insufficient	Sufficient
Smew *Mergus albellus*	2	1	400	No	Insufficient	Insufficient	Insufficient
Red-breasted Merganser *Mergus serrator* (non-breeding)	85	35	1,700	No	Insufficient	Insufficient	Insufficient
Goosander *Mergus merganser* (non-breeding)	120		2,700	No	Insufficient	Insufficient	Sufficient
Honey-buzzard *Pernis apivorus*	1		640	CHIP	Sufficient	Sufficient	Sufficient
Red Kite *Milvus milvus* (breeding)	15		220	CHIP	Insufficient	Insufficient	Sufficient
Red Kite *Milvus milvus* (non-breeding)	50		660	CHIP	Insufficient	Insufficient	Insufficient
White-tailed Eagle *Haliaeetus albicilla*	1		45	No	Insufficient	Insufficient	Insufficient
Marsh Harrier *Circus aeruginosus*	3		650	CHIP	Sufficient	Sufficient	Sufficient
Hen Harrier *Circus cyaneus* (breeding)	6	2	150	CHIP	Insufficient	Insufficient	Insufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Hen Harrier *Circus cyaneus* (non-breeding)	15	5	460	CHIP	Insufficient	Insufficient	Sufficient
Montagu's Harrier *Circus pygargus*	1		210	CHIP	Insufficient	Insufficient	Insufficient
Golden Eagle *Aquila chrysaetos*	4		50	No	Sufficient	Sufficient	Sufficient
Osprey *Pandion haliaetus*	2		65	CHIP	Insufficient	Insufficient	Insufficient
Merlin *Falco columbarius* (breeding)	10	1	130	CHIP	Insufficient	Insufficient	Insufficient
Merlin *Falco columbarius* (non-breeding)	15	4	400	CHIP	Insufficient	Insufficient	Insufficient
Peregrine *Falco peregrinus* (breeding)	14	5	150	No	Insufficient	Insufficient	Sufficient
Capercaillie *Tetrao urogallus*	13		4,460	CHIP	Sufficient	Sufficient	Sufficient
Spotted Crake *Porzana porzana*	1		900	No	Insufficient	Insufficient	Sufficient
Corncrake *Crex crex*	12	2	4,000	CHIP	Sufficient	Sufficient	Sufficient
Coot *Fulica atra* (non-breeding)	1,800	330	17,500	No	Sufficient	Sufficient	Sufficient
Common Crane *Grus grus* (breeding)	1		590	No	Insufficient	Insufficient	Insufficient
Common Crane *Grus grus* (non-breeding)	1		2,400	No	Insufficient	Insufficient	Insufficient
Oystercatcher *Haematopus ostralegus* (breeding)	1,100	30	2,700	CHIP	Sufficient	Sufficient	Sufficient
Oystercatcher *Haematopus ostralegus* (non-breeding)	3,200	680	8,200	No	Sufficient	Sufficient	Sufficient
Avocet *Recurvirostra avosetta* (breeding)	15		300	No	Insufficient	Insufficient	Sufficient
Avocet *Recurvirostra avosetta* (non-breeding)	75		730	No	Sufficient	Sufficient	Sufficient
Stone-curlew *Burhinus oedicnemus*	3		45	CHIP	Sufficient	Sufficient	Sufficient
Ringed Plover *Charadrius hiaticula* (breeding)	55	10	240	CHIP	Sufficient	Sufficient	Sufficient
Ringed Plover *Charadrius hiaticula* (non-breeding)	340	150	730	No	Insufficient	Insufficient	Sufficient
Dotterel *Charadrius morinellus*	6		250	No	Insufficient	Insufficient	Sufficient
Golden Plover *Pluvialis apricaria* (breeding)	490	4	600	CHIP	Sufficient	Insufficient	Insufficient
Golden Plover *Pluvialis apricaria* (non-breeding)	4,000	1,700	9,300	CHIP	Sufficient	Sufficient	Insufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Grey Plover *Pluvialis squatarola*	430	65	2,500	No	Sufficient	Sufficient	Sufficient
Lapwing *Vanellus vanellus* (non-breeding)	6,200	2,100	20,000**	CHIP	Sufficient	Sufficient	Insufficient
Knot *Calidris canutus*	3,200	190	4,500	No	Sufficient	Sufficient	Sufficient
Sanderling *Calidris alba*	160	65	1,200	No	Sufficient	Insufficient	Sufficient
Purple Sandpiper *Calidris maritima*	130	35	250	No	Insufficient	Insufficient	Sufficient
Dunlin *Calidris alpina schinzii* (breeding)	85	2	90	CHIP	Sufficient	Sufficient	Insufficient
Dunlin *Calidris alpina alpina* (non-breeding)	3,500	880	13,300	No	Sufficient	Sufficient	Sufficient
Ruff *Philomachus pugnax* (breeding)	1		1,000	No	Sufficient	Sufficient	Sufficient
Ruff *Philomachus pugnax* (non-breeding)	8 [50]		12,200	No	Insufficient	Insufficient	Sufficient
Snipe *Gallinago gallinago* (non-breeding)	10,000		20,000**	CHIP	Insufficient	Insufficient	Sufficient
Black-tailed Godwit *Limosa limosa* (breeding)	1		840	No	Sufficient	Sufficient	Sufficient
Black-tailed Godwit *Limosa limosa islandica* (non-breeding)	430	140	610	No	Sufficient	Sufficient	Sufficient
Bar-tailed Godwit *Limosa lapponica*	380	160	1,200	No	Sufficient	Sufficient	Sufficient
Whimbrel *Numenius phaeopus* (breeding)	3		2,200	CHIP	Insufficient	Insufficient	Insufficient
Whimbrel *Numenius phaeopus* (non-breeding)	6,700		6,700	No	Sufficient	Sufficient	Sufficient
Curlew *Numenius arquata* (breeding)	660	6	2,000	CHIP	Insufficient	Insufficient	Insufficient
Curlew *Numenius arquata* (non-breeding)	1,400	550	8,400	CHIP	Insufficient	Sufficient	Insufficient
Redshank *Tringa totanus* (breeding)	240	45	2,800	CHIP	Insufficient	Insufficient	Sufficient
Redshank *Tringa totanus* (non-breeding)	1,200	310	2,400	No	Sufficient	Sufficient	Sufficient
Greenshank *Tringa nebularia* (breeding)	10		770	No	Sufficient	Sufficient	Sufficient
Greenshank *Tringa nebularia* (non-breeding)	6 [50]	10 [50]	2,300	No	Insufficient	Insufficient	Sufficient
Wood Sandpiper *Tringa glareola* (breeding)	1		3,500	No	Sufficient	Sufficient	Sufficient
Turnstone *Arenaria interpres*	480	120	1,400	No	Insufficient	Insufficient	Sufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Red-necked Phalarope *Phalaropus lobatus*	1		1,100	No	Insufficient	Insufficient	Sufficient
Arctic Skua *Stercorarius parasiticus* (breeding)	20		250	No	Insufficient	Sufficient	Sufficient
Great Skua *Catharacta skua* (breeding)	95		160	No	Sufficient	Sufficient	Sufficient
Mediterranean Gull *Larus melanocephalus* (breeding)	6	1	810	No	Insufficient	Insufficient	Sufficient
Mediterranean Gull *Larus melanocephalus* (non-breeding)	20		770	No	Insufficient	Insufficient	Insufficient
Little Gull *Larus minutus* (non-breeding)	Unknown		1,100	No	Insufficient	Insufficient	Sufficient
Black-headed Gull *Larus ridibundus* (breeding)	1,300	140	20,000**	CHIP	Sufficient	Sufficient	Sufficient
Black-headed Gull *Larus ridibundus* (non-breeding)	20,000**	1,000	20,000**	CHIP	Insufficient	Insufficient	Insufficient
Common Gull *Larus canus* (breeding)	480	15	5,200	CHIP	Insufficient	Sufficient	Sufficient
Common Gull *Larus canus* (non-breeding)	7,000	670	16,400	CHIP	Insufficient	Insufficient	Insufficient
Lesser Black-backed Gull *Larus fuscus* (breeding)	1,100	50	1,800	No	Sufficient	Sufficient	Sufficient
Lesser Black-backed Gull *Larus fuscus* (non-breeding)	1,200	100	5,500	No	Insufficient	Insufficient	Insufficient
Herring Gull *Larus argentatus* (breeding)	1,300	65	7,500	No	Sufficient	Sufficient	Sufficient
Herring Gull *Larus argentatus* (non-breeding)	7,300	300	20,000**	No	Insufficient	Insufficient	Insufficient
Great Black-backed Gull *Larus marinus* (breeding)	170	25	1,000	No	Insufficient	Sufficient	Sufficient
Great Black-backed Gull *Larus marinus* (non-breeding)	760	90	4,200	No	Insufficient	Insufficient	Insufficient
Kittiwake *Rissa tridactyla* (breeding)	3,700	490	20,000**	No	Sufficient	Sufficient	Sufficient
Sandwich Tern *Sterna sandvicensis* (breeding)	110	35	740	No	Sufficient	Sufficient	Sufficient
Sandwich Tern *Sterna sandvicensis* (passage)	320	110	2,200	No	Insufficient	Insufficient	Insufficient
Roseate Tern *Sterna dougallii*	1	7	20	No	Sufficient	Sufficient	Sufficient
Common Tern *Sterna hirundo* (breeding)	100	40	2,800	No	Sufficient	Sufficient	Sufficient
Common Tern *Sterna hirundo* (passage)	300	130	8,400	No	Insufficient	Insufficient	Sufficient
Arctic Tern *Sterna paradisaea*	530	35	6,300	No	Sufficient	Insufficient	Sufficient

Species/population	1% GB	1% All-Ireland	1% international	CHIP species?	Numerical sufficiency	Range sufficiency	Ecological sufficiency
Little Tern *Sterna albifrons*	20	2	190	No	Sufficient	Sufficient	Sufficient
Guillemot *Uria aalge aalge* (breeding)	11,800 inds	0	31,500 inds	No	Sufficient	Sufficient	Sufficient
Guillemot *Uria aalge albionis* (breeding)	1,400 inds	2,400 inds	3,800 inds	No	Sufficient	Sufficient	Sufficient
Razorbill *Alca torda* (breeding)	1,100	350	5,300	No	Sufficient	Sufficient	Sufficient
Puffin *Fratercula arctica* (breeding)	5,800	210	56,700	No	Sufficient	Sufficient	Sufficient
Short-eared Owl *Asio flammeus* (breeding)	6		190	CHIP	Sufficient	Sufficient	Sufficient
Nightjar *Caprimulgus europaeus*	45		2,000	CHIP	Sufficient	Insufficient	Sufficient
Woodlark *Lullula arborea*	30		15,600	CHIP	Sufficient	Insufficient	Insufficient
Kingfisher *Alcedo atthis* (breeding)	35	15	510	No	Insufficient	Insufficient	Insufficient
Kingfisher *Alcedo atthis* (non-breeding)	110	40	1,500	No	Insufficient	Insufficient	Insufficient
Fair Isle Wren *Troglodytes troglodytes fridariensis*	1		1	No	Sufficient	Sufficient	Sufficient
Ring Ouzel *Turdus torquatus*	60	1	190	CHIP	Insufficient	Insufficient	Insufficient
Aquatic Warbler *Acrocephalus paludicola*	1		370	No	Insufficient	Sufficient	Sufficient
Dartford Warbler *Sylvia undata*	30		6,500	No	Sufficient	Insufficient	Sufficient
Red-backed Shrike *Lanius collurio*	1		55,500	No	Insufficient	Insufficient	Insufficient
Chough *Pyrrhocorax pyrrhocorax* (breeding)	3	8	15	CHIP	Sufficient	Insufficient	Insufficient
Chough *Pyrrhocorax pyrrhocorax* (non-breeding)	9	25	40	CHIP	Sufficient	Insufficient	Insufficient
Twite *Carduelis flavirostris*	<6	1	<6	CHIP	Insufficient	Insufficient	Insufficient
Scottish Crossbill *Loxia scotica*	70		70	CHIP	Insufficient	Insufficient	Insufficient

Appendix 11 An assessment of the use of cropped habitats by bird species represented in the UK Special Protection Area Network

JNCC paper to Natura 2000 & Ramsar Steering Committee, 24 May 2007

Helen Baker & David A. Stroud

Contents

Introduction 1043

Methods of evaluation 1044

Results of the review 1045

Table 1: Summary of cropped habitat requirements of birds in the UK SPA network, key conservation requirements and recommendations for identifying important areas of cropped habitats to maintain 1045

Discussion 1050

Functional importance of cropped habitats to birds represented in the UK SPA network 1050

Recent changes in cropped habitats in the UK and vulnerability to future change 1052

Mechanisms available to maintain cropped habitats 1054

The legal requirement of the EU Birds Directive and the UK SPA Selection Guidelines 1056

Conclusions: developing policy for maintaining cropped habitats for birds 1057

Table 2: Species/management system matrix to aid the development of policy for cropped habitat maintenance 1059

Appendix [11.]1 Review pro-forma using Greenland White-fronted Goose as an example 1061

Appendix [11.]2 Summary of the CHIP species reviews 1068

- Breeding waterbirds
- Non-breeding waterbirds
- Raptors and owls
- Birds of plantation forestry
- Other species reviewed

Appendix [11.]3 References 1082

Introduction

Many species of bird are ecologically dependent on cropped habitats *inter alia* arable, grass and planted tree crops. However, conservation of many of these species typically fails to address the issue of cropped habitat protection; whether there is a need to preserve and manage these habitats and if so the best mechanisms to do so. In particular, within the UK, as in many other countries, the inclusion of cropped habitats within protected sites is unusual.

In 2001, the Joint Nature Conservation Committee published a review of the UK Special Protection Area (SPA) network (Stroud *et al.* 2001; UK SPA Review). SPAs are sites designated for the conservation of rare and vulnerable, and migratory birds within the European Union, in accordance with the EU Council Directive on the conservation of wild birds (79/409/EEC; Birds Directive).

In the UK, SPAs have been selected according to principles laid out in the *Selection Guidelines for Special Protected Areas* (JNCC 1999), which were developed by the UK Government in response to the lack of detailed European guidance for selecting SPAs in the Birds Directive. These guidelines provide a two-stage procedure for assessing the suitability of areas for classification as SPAs, and provide guidance on both site selection and boundary determination.

Whilst, application of the guidelines should result in boundary selection that delimits areas providing for the conservation requirements of a species, one of the guiding principles relates to naturalness of habitats, with more natural habitats favoured for selection. This has resulted in a UK SPA network that comprises largely natural and semi-natural habitats with very little coverage of cropped habitats. However, the Birds Directive does not specify that habitat protection in support of its objectives should relate solely to more natural habitat types.

The Birds Directive was transposed into national law through the Wildlife & Countryside Act 1981 (as amended), Wildlife (Northern Ireland) Order 1985 and Environment (Northern Ireland) Order 2002, which provide for the designation of Sites of Special Scientific Interest (SSSI) in Britain and Areas of Special Scientific Interest (ASSI) in Northern Ireland. Such designation provides a mechanism for management and protection of any overlapping SPA, and further SPA protection is provided by both the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and Conservation (Natural Habitats, &c.) Regulations (Northern Ireland) 1995 (as amended).

The Wildlife & Countryside Act 1981 does not provide guidance for selecting SSSIs; this was developed for Great Britain and published as the *Guidelines for Selection of Biological SSSIs* (NCC 1989). This guidance predates that for SPAs and has been highly influential in developing the latter. Many of the selection principles within the SSSI guidelines themselves originate from the development of the national 'areas of special interest' network which began in the 1940s (under the National Parks and Access to the Countryside Act 1949) and which evolved into the SSSI network. The development of international site selection guidelines was also influential on the SSSI guidelines, especially those relating to the Convention on Wetlands (Ramsar, 1971).

The main emphasis of SSSI notification is to protect remnant natural and semi-natural habitats, which typically support a greater diversity of species; this emphasis arose out of a period when British conservation priority was very much focussed on the critical need to halt the further loss and degradation of these typically fragmented habitats.

The *Guidelines for Selection of Biological SSSIs* (NCC 1989) does not preclude the designation of non-natural (highly modified) habitats, but they emphasise that such designation should be exceptional and only where a high diversity of native species is present. In relation to birds, the guidelines specify that feeding and roosting areas on croplands should not usually be selected since birds are rarely restricted to special parts of such areas, the significance of which may alter with a change of crop.

Recent recognition of the role of cropped habitats for conservation of some species has led to a small number of SPA classifications that have included such habitats, notably short-sward, unimproved grassland and arable crops for Stone-curlew and mature plantation forestry for Capercaillie. However, coupled with the lack of recognition of the role of cropped habitats in maintaining biodiversity has been the generally held belief that site-based protection is not the best mechanism to secure this resource. Other land management mechanisms associated with national policies (agricultural and forestry) are considered by some as the most

appropriate way to ensure cropped habitats meet biodiversity needs. While such policies make some provision for biodiversity maintenance and enhancement, they may not yet adequately consider the conservation requirements of the full range of species that have an ecological dependence on these habitats.

The UK is not alone in its lack of inclusion of cropped habitats in SPAs; it is also reflected in the EU15 networks of SPAs. Whilst, habitat data are lacking for four Member States (which have not submitted habitat data for SPAs on Natura 2000 Standard Data Forms), the only significant inclusion of cropped habitats in SPAs for non-breeding swans and geese occurs in Denmark and Austria (based on data to 2001; European Topic Centre for Nature).

Country	Number of SPAs for non-breeding geese/ swans	Number of SPAs with cropped habitats included	Total area of cereal (ha)	Total area of improved grassland (ha)	Total area of other arable crops (ha)
Austria	16	14	9,150	5,400	47,350
Denmark	60	57	19,120	0	53,430

In contrast, just three of 185 SPAs in Finland, one of 28 SPAs in Ireland, two of 15 in The Netherlands and 22 of 108 SPAs in Sweden classified for non-breeding swans and geese contained cropped habitats. In Denmark, inclusion has been guided by SPA selection principles based on habitat use and aggregation of relevant species (A.D. Fox, *pers. comm*.); these selection principles have much in common with the approach to SPA selection in the UK. There appear to be no published evaluations of the requirement or value of inclusion of cropped habitats in the EU SPA network. Exclusion of this habitat does not appear to have been rationalised across Europe through any scientific approach.

In response to the publication of the UK SPA Review, the non-governmental conservation organisations criticised the Government for not including within SPAs what they perceived to be suitable areas of cropped habitats. For example, SPAs for non-breeding geese were focussed on roost sites and did not typically include feeding areas that were in cropped habitats. However, Important Bird Areas (IBA; BirdLife International) in the UK also generally lack inclusion of cropped habitats for relevant species and so an existing inventory of such sites and a scientific rationale for defining boundaries is absent.

In 2001, the UK Government established a scientific consultative group to aid it in further developing the UK SPA network, including consideration of issues raised by the use of cropped habitats by Annex I and migratory species: the SPA & Ramsar (avian) Scientific Working Group (SPAR SWG). The SPAR SWG identified the need for a review of knowledge of the ecological requirements of a range of species that make significant use of cropped habitats. In response, the Joint Nature Conservation Committee (JNCC) established the *Cropped Habitats Information Project* (CHIP) and commissioned species reviews to assist it.

This paper presents the results of CHIP, which can inform any policy review of the need to include cropped habitats in SPAs for the species concerned. The SPAR SWG has been consulted several times on the content of the paper, and has endorsed the species reviews and summaries of ecological needs, but it should be noted that any views expressed on policy influencing the protection of cropped habitats are those of the authors only.

Methods of evaluation

The working definition of cropped habitat established by the SPAR SWG was that:

> A cropped habitat is one used for harvesting seeds, roots, leaves, or other plant parts that are of commercial value to humans, *inter alia* formed by the planting of plants in cultivated (prepared) ground, by the regular application of fertilisers, manures or through other management. Such habitats include semi-improved and reseeded grasslands, cereals, brassicas, potatoes, other root crops, fruit and forestry (deciduous and conifer), as well as set-aside.

A list of UK bird species thought to have some ecological dependence on cropped habitats and already represented within the UK SPA Network, or in review by the SPAR SWG, was developed. This extensive list was then prioritised according to conservation status and the perceived importance of cropped habitats to

each species. On this basis, reviews of cropped habitat use were carried out for a large number of species, but not all originally listed.

The aim of the species reviews was to provide a general overview of the ways in which species make use of cropped habitats and to identify the main conservation issues arising from this. In order to develop the format of the species reviews, a pro-forma was developed using the Greenland White-fronted Goose *Anser albifrons flavirostris* as an example (Appendix [11.]1). Central to this was describing the species functional unit system in the relevant season(s): those habitats that provide the overall ecological or behavioural requirements of a population, or part of it.

The evaluation of how each seasonal functional unit system contributes to overall population maintenance is clearly a related, but separate area of conservation science. Building from the description of the functional unit system, we identified the need for review of information available on cropped habitat usage (types, temporal and spatial), and assessment both of the possible vulnerability of these habitats and implications for the species of change in them.

Just Ecology was contracted by JNCC to complete a pro-forma for each of 47 species/populations – this was phased over two years - and the SPAR SWG was consulted on each of the completed reviews. The reviews were developed further by JNCC based on consultation responses and further review of the literature, especially any published since the initiation of the project.

Results of the review

The individual species/population reviews are not reproduced in full here; we provide summaries in loose species groupings, related to season and ecology, in Appendix [11.]2.

Of the 47 species reviewed by the project, some were found to have little ecological reliance on cropped habitats and these species were not considered further, although comments on some species are included for context. They were Shelduck, Gadwall, Shoveler, Pochard, Coot, Bar-tailed Godwit, and Dartford Warbler.

For many species it is difficult to describe fully the functional unit system in any season due to lack of knowledge. In particular, temporal and/or spatial ecology has been studied infrequently in relation to feeding behaviour, especially outside of the breeding season, for many species. This significantly limits the conclusions that can be drawn about the ecological importance of different crop types and the vulnerability of populations that arises from habitat change or loss. However, for most species there is sufficient information to be able to draw general conclusions about important cropped habitats and their spatial character (Table 1). This has allowed us to generalise key conservation requirements in relation to cropped habitats for each of these species and recommend suitable approaches to identifying which habitats should be maintained in order to ensure population maintenance.

Table 1. Summary of cropped habitat requirements of birds in the UK SPA network, key conservation requirements and recommendations for identifying important areas of cropped habitats to maintain.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Bewick's Swan	NB	Improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil seed rape. Feed within 10 km of roost, but no other spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 10 km of roost based on local evidence of regular field usage.

[142] S = season in which cropped habitat used: B = breeding; NB = non-breeding (outside of breeding season). It should be noted that not all species were reviewed in both seasons under CHIP, but this does not necessarily mean that the species does not have ecological dependence on cropped habitats in both seasons.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Whooper Swan	NB	Improved pasture, autumn-sown cereals, over-wintered stubbles, sugar beet and oil-seed rape. Feed within 3-5 km of roost, but no other spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 5 km of roost based on local evidence of regular field usage.
Bean Goose	NB	Wet and damp pastures (both improved and unimproved). Field choice highly variable.	Maintain open, pastoral landscape.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Pink-footed Goose	NB	Large, open, rough pasture for resting. Improved pasture, over-wintered stubbles, autumn-sown cereals, waste root crops for feeding. In one study, feeding areas within 5-6 km of roost, but known to range frequently up to 40 km. Complex pattern of field usage.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding and resting habitat based on local evidence of regular field usage.
White-fronted Goose (Baltic/North Sea population of nominate race)	NB	Wet and damp pastures. Feeds within 10 km of roost, but no other spatial information except at Slimbridge, where flock feeds within 1 km of roost.	Maintain open pasture landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
White-fronted Goose (Greenland race)	NB	Pasture, over-wintered stubble, waste root crops. Highly faithful to feeding areas.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Greylag Goose (Iceland population)	NB	Improved pasture, over-wintered stubbles, autumn-sown cereals, waste root crops. Feeding areas generally within 12 km of roost.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Barnacle Goose	NB	Improved pasture, over-wintered stubbles and autumn-sown cereals. Highly faithful to feeding areas; travel 2-5 km from roost depending on location.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Dark-bellied Brent Goose	NB	Improved pasture, autumn-sown cereals and oil-seed rape. Feed within 5 km of roost.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 5 km of roost based on local evidence of regular field usage.
Light-bellied Brent Goose (East Atlantic population)	NB	Improved and unimproved pasture, autumn-sown cereals. Field choice has been studied at single UK site.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Light-bellied Brent Goose (East Canadian High Arctic population)	NB	Improved and unimproved pasture and autumn-sown cereals. No spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Wigeon	NB	Wet and damp pasture, autumn-sown cereals. Feed typically within 2 km of roost, but no other spatial information.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat within 2 km of roost based on local evidence of regular field usage.
Teal	NB	Over-wintered stubbles, autumn-sown cereal, waste root crops, especially flooded fields. No spatial information.	Maintain open arable landscape close to roost areas.	Insufficient information.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Mallard	NB	Over-wintered stubbles, autumn-sown cereal, waste root crops. Feed typically within 2 km of roost, but no other spatial information.	Maintain open arable landscape close to roost areas.	Maintain suitable feeding habitat within 2 km of roost based on local evidence of regular field usage.
Pintail	NB	Only a single study – probably similar behaviour to Mallard.	Maintain open arable landscape close to roost areas.	Insufficient information.
Honey-buzzard	B	Mature conifer and mixed forest. Territories used in successive years. Males feed up to 2 km and females 1 km from nest.	Maintain mature conifer and mixed forests used regularly.	Maintain mature woodlands used regularly, including all woodland within 2 km of each nest site.
Red Kite	B/ NB	Conifer forest – mature for nesting and young plantings for foraging. Forages over wide variety of cropped and other habitats. Home ranges used in successive years. Most foraging within 3 km of nest.	Maintain mature conifer forest used regularly for nesting.	Maintain mature conifer plantation used regularly for nesting. Insufficient information for identifying regularly used important feeding areas outside of breeding season.
Marsh Harrier	B	Open cropped habitats within 2 km of nest used for foraging.	Maintain open, mixed pastoral/arable landscape adjacent to nesting areas.	Maintain open cropped habitats within 2 km of nesting areas.
Hen Harrier	B/ NB	Young conifer plantation for nesting and foraging. Rough grasslands for foraging. In NI, also mature conifer plantation for nesting and foraging. Home ranges used in successive years. Most foraging is within 2-3 km of nest and roost.	Maintain open moorland/pasture interface and pasture type. In NI, also maintain mature conifer forests used regularly.	Maintain grassland feeding habitats within 2-3 km of nests in regularly used home ranges and regularly used communal roosts. In NI, also maintain mature conifer forest within 2-3 km of nests in regularly used home ranges.
Montagu's Harrier	B	Nests in arable habitats, and grasslands. Not site-faithful. Females forage within 2 km of nest, males up to 12 km.	Maintain open arable landscape featuring some low-intensity open habitats.	Not possible to identifying regularly used important feeding areas.
Osprey	B	Mature conifer forest for nesting. Nests re-used over long period and adopted by successive pairs. No information on required nesting woodland characteristics and disturbance limits.	Maintain nest sites and surrounding forest character to avoid nest abandonment.	Insufficient information.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Merlin	B/ NB	Both young and mature conifer forest for nesting and foraging. Rough grasslands for foraging. Home ranges used in successive years. No spatial information.	Maintain open moorland/pasture interface and pasture type. Also maintain mature forest used regularly for nesting.	Maintain grassland feeding habitats within 2 km of nests in regularly used home ranges (based on minimum Hen Harrier require-ments). Also maintain mature conifer forest within 2 km of nests in regularly used home ranges. Insufficient information for identifying important feeding areas outside of breeding season.
Capercaillie	B/ NB	Mature conifer forest. Leks and home ranges used in successive years. Complex spatial ecology.	Maintain mature regularly used forestry.	Maintain mature conifer plantation based on evidence of regular presence.
Corn Crake	B	Meadows and rough, low-intensity pastures. Home ranges very variable: males 4 to 50 ha, females up to 30 ha.	Maintain mixture of low-intensity grassland types.	Maintain suitable feeding habitat within regularly occupied ranges, either based on a generic 30 ha range size or on basis of local evidence of regular field usage.
Oystercatcher	B	Pastures (rough and improved). No spatial information.	Insufficient information.	Insufficient information.
Stone-curlew	B	Close-grazed, unimproved pasture and spring-sown arable crops. Feed within 3 km of nest, but no other spatial information.	Maintain close-grazed, low-input pastures and suitable crop sowing regimes.	Maintain suitable feeding habitat within 3 km of nesting areas, either by generic approach or on basis of local evidence of regular field usage.
Ringed Plover	B	Dry, cultivated machair. No spatial information.	Insufficient information.	Insufficient information for identifying important feeding areas away from nesting areas.
Golden Plover	B	Improved, close-grazed pastures, 2 km from moorland edge.	Maintain open moorland/pasture interface.	Maintain improved pastures within 2 km of moorland edge, either by generic approach or on basis of local evidence of regular field usage.
Golden Plover	NB	Roost on ploughed fields. Feed primarily in improved pasture. No spatial information.	Insufficient information.	Insufficient information.
Lapwing	NB	Roost on ploughed fields. Feed primarily in improved pasture – old pasture preferred. No spatial information.	Insufficient information.	Insufficient information.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Dunlin	B	Wet and damp machair and blackland grassland. No spatial information.	Insufficient information.	Insufficient information for identifying important feeding areas away from nesting areas.
Snipe	B	Wet meadows and pastures. No spatial information.	Maintain suitable hydrological management of grasslands.	Insufficient information.
Whimbrel	B	Ploughed or harrowed areas and reseeded grasslands. No spatial information.	Insufficient information.	Insufficient information.
Curlew	B	Pastures (rough and improved), 1 km from moorland edge.	Maintain open moorland/pasture interface.	Maintain all pastures within 1 km of moorland edge, either by generic approach or on basis of local evidence of regular field usage.
Curlew	NB	Improved and rough grasslands, arable fields. Feed up to 15 km inland, field choice variable.	Maintain open, mixed pastoral/arable landscape close to roost areas.	Maintain suitable feeding habitat based on local evidence of regular field usage.
Redshank	B	Rough (unimproved), wet and damp meadows and pastures. No spatial information.	Maintain suitable hydrological management of grasslands, and mix of grassland types.	Insufficient information.
Black-headed Gull	B	Damp, improved pastures. No spatial information.	Insufficient information.	Insufficient information.
Black-headed Gull	NB	Feed primarily in improved pasture. No spatial information.	Insufficient information.	Insufficient information.
Common Gull	B	Damp, improved pastures. No spatial information.	Insufficient information.	Insufficient information.
Common Gull	NB	Improved meadows/silage grasslands, ploughed fields, improved pastures, autumn-sown cereals. Feed up to 30 km from roost, field choice very variable.	None.	Maintenance of specific areas not necessary.
Short-eared Owl	B/ NB	Young conifer plantation for nesting and foraging. Rough grasslands for foraging. No spatial information.	Maintain open moorland/pasture interface and pasture type.	Insufficient information. Will benefit from maintenance of cropped habitats for Hen Harrier and Merlin.
Nightjar	B	Young conifer forest, coppiced woodland. Forage within 1-3 km of nest.	Maintain a mosaic of stand ages in forestry, and coppice management.	Maintain conifer forest and coppiced woodlands used regularly for nesting.
Wood Lark	B/ NB	Conifer plantation and rough grasslands. Forage within 400 m of nest.	Maintain a mosaic of stand ages in forestry and suitable grasslands within and adjacent to forests.	Maintain conifer forest used regularly for nesting and rough grasslands within 0.5 km of nesting areas.
Ring Ouzel	B	Pasture. Forage within 450 m of nest.	Maintain good moorland management and open moorland/ pasture interface.	Maintain suitable grassland habitats within 0.5 km of regularly used nesting areas.

Species	S[142]	Cropped habitats required	Key conservation requirements	Recommended approach
Chough	B/ NB	Pastures all year round, and over-wintered stubbles and root crops in winter. Site faithful. Forage 1-3 km from nest, and in winter within 5-8 km of roost.	Maintain specific pasture types at field level.	Maintain suitable grassland habitats within 1 km of the nest, and outside of the breeding period on the basis of local evidence of regular field usage (recommendation already accepted by the Natura 2000 Steering Committee)
Twite	B/ NB	Unimproved meadows, rough pastures and machair during the breeding season. Over-wintered stubbles and root crops in winter. Forage within 2.5-3.5 km of nest. No spatial information for winter.	Maintain open moorland/grassland interface and suitable grassland types.	Maintain suitable grassland habitat within 2.5 km of nesting areas, either by generic approach or on basis of local evidence of regular field usage. Insufficient information for identifying regularly used important feeding areas outside of breeding season.
Scottish Crossbill	B/ NB	Mature conifer plantation, especially of Scots Pine. No spatial information.	Maintain mature conifer plantations used regularly for nesting.	Maintain mature conifer plantations used regularly for nesting by the species.

Discussion

This discussion is structured to explore both technical and policy information related to the use of cropped habitats by birds represented in the UK SPA network and how these habitats might be maintained in the landscape.

We initially review understanding of the ecological importance of cropped habitats to those bird species covered by the project, drawing on the species reviews, and present summarised recommendations on identifying cropped habitats that should be maintained for each. We then provide a brief overview of recent changes in cropped habitat extent and draw conclusions on the vulnerability of those habitats. Currently available mechanisms for maintaining or protecting cropped habitats are reviewed briefly, followed by an overview of the legal requirements of the Birds Directive.

In concluding, we draw out a number of principles that we recommend are adopted to ensure continued appropriate management of cropped habitats that have a significant role in maintaining the populations of species already represented in the UK SPA network.

Functional importance of cropped habitats to birds represented in the UK SPA network

CHIP did not cover all species initially identified and may have also missed others of relevance, but the results of the project can inform generic recommendations that may be applicable to a wider range of species. Several species reviewed were deemed to have little reliance on cropped habitats and are not considered further.

The project clearly demonstrates that many species have a high functional reliance on cropped habitats, typically in association with semi-natural habitats used for other ecological or behavioural functions or at other times of the year. The functional unit system can be considered in terms of the functions of habitats and their

temporal and spatial use. For most of the species reviewed there is sufficient information on the types of habitats used and the functions provided, such as feeding, to identify those habitats that are important for maintaining populations. However, the availability of information required to define the functional unit system of individual species is very varied (summarised in Table 1).

A wide variety of different cropped habitats are used by the species reviewed. Many utilise a number of different cropped habitats, typically in seasonal succession in response to food availability, but some species use primarily just one type of cropped habitat. The latter, which could be considered habitat specialists, may be more vulnerable to landscape-scale changes in availability of cropped habitats, irrespective of habitat type, and documented declines in many of them provides good evidence to support this conclusion. In particular, the progressive loss of low-input grasslands and changes in management of those remaining has driven declines – for example in Stone-curlew (Green & Taylor 1995) and Corn Crake (see Brown & Grice 2005). In contrast, agricultural intensification has benefited many of the more adaptable species and contributed to population increases, for example in some swans and geese (see for example Madsen *et al*. 1999).

Whilst species dependent on one particular habitat could be described as specialists, this term needs to be qualified by habitat character to provide an understanding of the mechanisms that might influence population status. Habitat character is dependent on the management system in place. Some specialist species, like Chough and Wood Lark, depend on very specific management of a particular habitat for that habitat to remain functionally suitable, *i.e.* have precise ecological requirements.

In general, low-input and/or low-intensity management systems have become rare and those specialist species that depend on them have typically also become rare: specialised species highly dependent on low-input and/or low-intensity management systems are highly vulnerable. In contrast, some habitat specialists have benefited from agricultural intensification. Some species, like breeding Golden Plover, Common Gull and Black-headed Gull, are dependent on short-sward pastures and may have benefited from the conversion of these to higher-input, re-seeded grasslands due to subsequent increases in prey availability.

In contrast to our relatively good understanding of the use of cropped habitats for certain functions by species, both the temporal and spatial aspects of functional unit systems are typically little studied, except at larger scales, and hence poorly known. This presents a significant gap in our understanding of the ecological requirements of birds and currently hinders our ability to make scientifically informed decisions in relation to conservation approaches for some species, especially site-based conservation measures.

For those species for which there is spatial and temporal information on habitat use, this information typically comes from just a few studies. Locally, habitat availability as well as other factors, such as weather, will influence spatial and temporal use of cropped habitats. Defining a generic functional unit system for an individual species using a limited number of studies may not always be appropriate, depending on the quality of those studies, but may be a useful and precautionary option for conservation purposes.

We present highly summarised descriptions of generic functional unit systems for each species in this review (Table 1), noting limits of understanding. In our recommendations for identifying which cropped habitats require maintenance we make a distinction between species for which a generic (modelled) approach may be suitable and those for which, due to either uncertainty in understanding of habitat needs or the scale involved, a site-specific approach may be more appropriate.

It is important to emphasize that lack of information should not preclude action to further the conservation of species that have an ecological dependence on cropped habitats. For some of the species in this review there is sufficient information to allow for targeted habitat conservation that will contribute to the maintenance of populations. However, for others the lack of information should be addressed through research, prioritised according to species population status, ecology and threats to relevant cropped habitats.

We have commented that the UK SPA network frequently excludes habitats that are essential components of qualifying species' functional unit systems, and described why this may have arisen in the introduction. Effective species conservation requires the maintenance of all elements of a species' functional unit system – take away any part in sufficient extent and it will have a negative impact on the population. For this reason, the maintenance of cropped habitats is essential for a number of species, but the exact nature of the appropriate management required will vary according to habitat type, its vulnerability and those species' ecological requirements. Whilst an obvious solution would be to extend SPAs to include all required cropped habitats for qualifying species, site-based conservation is not the only mechanism that can ensure the

maintenance of habitats in the landscape. In this respect, we do not use the term maintenance to automatically mean statutory site designation; rather we use this term to indicate that there is a clear requirement for some form of preservation of cropped habitats in relation to existing SPAs.

Having identified the cropped habitats that are of ecological importance for many of the species represented in the UK SPA network, and made recommendations on which habitats should be maintained, we believe that there is a need for review of policy on the maintenance of cropped habitats in support of the birds protected by the SPA network. There are a number of technical and legal considerations that could be taken into account in assessing whether existing policy continues to be appropriate, and to facilitate any policy review we discuss these briefly in the following sections.

Recent changes in cropped habitats in the UK and vulnerability to future change

Different species have responded to changes in the agricultural landscape in different ways, due to differing ecological requirements and adaptability, and past experience shows that differing types of habitat protection and management regimes are necessary. Some species, such as Chough, require highly specific management of cropped habitats at the local level coupled with generic landscape character maintenance. Others require general preservation of a large-scale management system without specific local management of crop type, but again coupled with generic landscape character maintenance, such as some geese in the non-breeding season. Other species require intermediate approaches.

In order to develop the optimal approaches to habitat maintenance it is necessary not only to understand species ecological requirements, but to also understand the pressures within functionally important habitats. To do this it is worth considering both the historical patterns of change in agricultural landscapes and current drivers of future change.

Landscape Change

The Countryside Surveys of 1990 and 1998, and previous ecological surveys of rural Britain in 1984 and 1977/78, provide an overview of the changes in the countryside over the last 25 years (www.cs2000.org.uk). These give some idea of gross change in broad habitats – both types and areas, but also provide valuable insights on changes in the six broad environmental zones defined for Great Britain. Between 1984 and 1998, there was little change in most habitats, but a fairly consistent feature across all but the Scottish upland environmental zones has been loss of improved grassland and gains in built land and gardens. In the Scottish lowlands, there have been significant declines in the area of acid grassland and bogs and gains in neutral grassland (unimproved and semi-improved), broadleaf, mixed and yew woodland, and bracken. In the Scottish uplands, there have been significant gains of improved grassland, possibly due to conversion from neutral grasslands.

In Scotland, the change in land cover between the 1940s and 1980s has been described in detail by Mackey *et al*. (1998). Significant increases in the areas of conifer plantations (620%), arable (11%), semi-improved grassland (15%), and the built environment (46%) have taken place. Alongside these increases have been significant declines in the areas of improved grassland (-11%), and rough grassland (-10%). The patterns of change are broadly: conversion of heather moorland and mire to forestry and rough grassland; rough grassland to forestry and semi-improved (intermediate) grassland; and improved (smooth) grassland to arable.

Over the last ten years (1993 to 2004), changes in agriculture in the UK have been more subtle (Defra 2004). The total area of arable land has declined by 2.8%, whereas the total area of grassland, excluding rough grazing, has increased by 5%. Sole-right rough grazing has declined by 10.4%, but common rough grazing has remained relatively stable. The total area of arable and horticultural crops has remained relatively stable, but there have been significant changes to the drop types being grown. Changes to livestock numbers have taken place with the total cattle herd gradually declining through the period and down by 11% and the sheep herd down by 18%.

The Countryside Survey 2000 provides further detailed breakdown of these changes by environmental zone and an insight into changes in forestry over the period 1990 to 1998. In most of the UK's environmental zones there has been little change in forestry, but there has been some increase in conifer area in the marginal uplands of Scotland (Zone 5) corresponding to losses in heath, mire and neutral grasslands.

Description of gross changes in the agricultural landscape suggests that relatively subtle changes have taken place in the last two decades and that the overall availability of different cropped habitats may be generally stable. Of most concern is the continuing loss of rough grasslands in the uplands. However, the gross patterns of change mask important localised changes, which in some areas have been demonstrated to affect bird populations; for example, the loss of rough grassland has been partly responsible for localised decline of Hen Harriers in Orkney.

Statistics on change in extent of habitat types also offer nothing in terms of understanding the impacts of changes in management on the characteristics of any given type of cropped habitat. Livestock stocking levels have been in decline though the 1990s, which is likely to continue under changes to the Common Agricultural Policy. The total area of grassland also declined over the same period, so it is difficult to know what impact the decline in livestock has had, if any, on pasture characteristics. In future, livestock numbers may continue to decline due to the switch to a whole-farm payment method of subsidy. This may result in changes in pasture character and there is a possibility that the area of rough pasture might increase, although total grass area may also continue to decline due to conversion to other uses. Whilst a gain in rough pasture is likely to be beneficial to a number of species, such as breeding waders in the uplands, it may disadvantage those species that require short-sward grasslands, such as Chough.

The descriptions of gross habitat change also provide little understanding of the effect of agri-environment schemes on cropped habitats. Whilst such schemes occur over relatively limited areas, this is changing: in England, the Entry Level Stewardship scheme is anticipated to bring a significant proportion of agricultural land into management that will benefit a range of farmland birds and other biodiversity. This is likely to bring benefits to species that prey on small passerines and small mammals (most of the reviewed birds of prey), as the areas of less-intensively managed habitats will increase and are likely to enhance populations of these types of prey species.

Future Change

It is difficult to predict how the agricultural landscape might change over the next few decades and further into the future; this uncertainty needs to be considered in developing approaches to cropped habitat maintenance for birds. All habitats are vulnerable to change and changes will affect different species in different ways. Habitat loss to birds can come about through both subtle changes in management, such as change in livestock stocking levels or seasonality of stocking that may result in unfavourable sward height at the key time, to more obvious changes such as conversion of grassland to forest or arable crops, or from loss to built development. Loss may also occur through changes in use of areas adjacent to important crops for birds.

It is likely that current EU policies in relation to agriculture will bring about significant changes to both the area of different cropped habitats grown and the associated landscape character over the next few decades, especially with the wider implementation of agri-environment schemes. However, other drivers, such as energy policy, may also have a significant and widespread affect.

Biofuels are one source of biomass energy, originating from both some existing agricultural wastes and from new crop types. Current EU targets for renewable energy and the underpinning implementation policies (*e.g.* Biomass Action Plan (European Commission 2005), Strategy for Biofuels (2006)) are driving change in financial incentives (including via CAP) that are likely to result in significant changes to types of crops grown in the UK, with potential large-scale increases in certain oil-bearing and cellulosic (including woody) crops.

Whilst marginal lands, including set-aside, are most likely to be selected for novel biofuel crop production this will depend on the constraints of crop types, soils and climate, and associated economics. Not only might biofuel production cause loss of cropped habitats for birds through direct changes in crop type, but also through indirect affects of changing landscape structure. For example, the replacement of pasture with woody biofuel crops like willows in non-breeding goose foraging areas will not only directly reduce the available grazing area because of crop replacement but may also lead to abandonment of retained pastures due to change in landscape character.

Mechanisms available to maintain cropped habitats

Given the differing requirements of species, it is possible that for some the existing legal and policy framework already adequately ensures that important areas of cropped habitats will be maintained. While this may mean that conditions are favourable for some species without the need for additional measures, there is a risk that policy might change in such a way as to remove favourable management: there are also legal considerations (see *Legal requirement of the EU Birds Directive* below). However, a brief review of the mechanisms that are available to maintain cropped habitats is worthwhile, these are: planned landscape use, land management policies, and statutory designations.

Landscape planning

UK planning laws require the development of local development or structural plans, which identify broad zones of permissible land use. There is general control of built development, but most individual projects undergo an application process and permission is granted after public consultation. While zoning has a strong influence on planning decisions, some developments are granted permission in areas zoned for other uses.

We have already described the loss of a significant area of agricultural land to built development over the last 60 years; there continues to be intensive pressure to build new residential and commercial properties, and roads in the UK. However, under planning law some development is permitted without planning permission, for example agricultural buildings of certain types and size are exempt from planning permission, as are some types of temporary land-use for recreation.

Some developments associated with forestry operations are also allowed under permitted development rights. The law is complex, and even under permitted development rights, many projects require a determination to be made by the local authority before projects can go ahead, but these are not open to public consultation.

Within this mechanism for land use control, the protection of areas of high nature conservation value is influenced by national planning statements (policies) and other laws, which place stricter levels of protection from built development on Natura 2000 sites (including SPAs), and other statutorily designated sites. The law also requires a broader assessment of the possible impacts of a planned development on an SPA even if the development is outside of the site.

A number of species reviewed are sensitive to disturbance and select feeding areas in the agricultural landscape partly on the basis of distance from buildings; suitable feeding areas close to buildings are avoided. **Whilst current control of built development is likely to reduce loss of feeding areas within cropped habitats, there remains a possibility that important areas could be lost by relatively minor increases in the number of buildings and associated access routes.**

For many of the species reviewed we have highlighted that ‘openness’ of the landscape, *i.e.* areas with a high proportion of arable and/or pasture fields with low boundaries, is a key conservation requirement and current planning law may fall short of ensuring that important feeding areas are not lost to development. However, most of these species have benefited considerably from changes in agriculture during a period of significant growth in built development, and appear to have adapted well to changes in land use. For these species at least there seems to be little evidence to suggest that the current system of cropped habitat maintenance is not adequate.

Agricultural policy and agri-environment schemes

The type of management systems adopted in the agricultural landscape are not controlled under planning law, but are influenced by land type and a highly complex policy and economic framework. The financing, and therefore type, of agriculture is influenced by European Union policy (Common Agricultural Policy: CAP), and the specific implementation of this at the national level, as well as market forces. Coupled with technological advances (machinery, chemicals, and plant and animal breeding) agricultural policy, financing and markets have lead to significant long-term changes in agriculture. Forestry policy effectively sits within agricultural policy. In recognition of the need for a sustainable approach to land management, European policy has changed over the last two decades, reflected in changes to CAP, and agri-environment schemes have become one tool for delivery of sustainability goals.

Environmentally Sensitive Areas (ESAs) were established in the mid 1980s, covering large areas of differing habitat types throughout Great Britain that were identified as having particular sensitivity to changes in agricultural management. Within an ESA, farmers were invited to voluntarily implement specific management approaches, for which they are financially compensated.

ESA designations have made a significant contribution in some areas to maintaining low-input and/or low-intensity farm management systems, and hence securing certain types of cropped habitats in the landscape. However, a number of studies have demonstrated that despite good take-up and implementation of management prescriptions that the effect on bird populations has been limiting (Mathers & Woods 1989), although a recent review by Defra (2004) has shown that some species have benefited from ESA. Overall, the total area and take-up of ESAs in Britain remains relatively limited; for example, there are 615,000 ha in ESA in England, representing just 64% of the total area eligible (Defra 2004). ESA schemes have been superseded by broader agri-environmental schemes.

Other agri-environment schemes (A-ES) have provided some benefits to birds. Many of the prescriptions within agri-environment schemes are influenced by the needs of a variety of birds, but especially commoner species that have undergone significant declines since the 1980s. A-ES are voluntary and to-date are relatively limited in coverage: 400,000 ha in England in 2003 (Defra 2004). In an attempt to bring more land into agri-environment management, Defra launched Entry Level Stewardship in England in 2005. This scheme includes simple prescriptions to enhance biodiversity in primarily arable landscapes, but includes prescriptions for retaining moorland, rough grazing and rush pastures in Less Favoured Areas (LFAs). In Wales, Tir Gofal, has prescriptions designed to benefit non-breeding waterbirds and breeding waders, and provides prescriptions for adjusting grazing levels to benefit Chough in certain areas.

As part of some A-ES, special projects aimed at recovering certain species have been developed, for example for Cirl Bunting in England and Corn Crakes in Scotland. The Cirl Bunting project (linked to delivering BAP targets) has been very successful and some of the prescriptions developed under the project are now included more broadly within the English Environmental Stewardship Scheme. Stone-curlew plots, bare areas within cereal fields that provide suitable nesting opportunities for the species, have been in use for more than a decade, initially developed by the RSPB and recently included in the Higher Level English Environmental Stewardship Scheme.

In Scotland, Goose Management Schemes are another agri-environment approach, although their principal aim is to alleviate the possible financial burden of crop damage by non-breeding geese. Although providing conservation management for some species in some areas, these schemes are not focused on preserving or recreating habitats, and are therefore quite different from other A-ES. They are also expensive and very limited in geographical extent.

Agri-environment schemes are limited in their coverage and are entirely voluntary. The benefits of A-ES to maintaining species within SPAs that use adjacent cropped habitats have not been evaluated, but are likely to be relatively minimal given the poor match between ESAs and SPAs, the limited coverage of current schemes and the current scope of targets in all of these schemes. There are legal issues associated with delivery of conservation requirements via voluntary means, although A-ES are typically highly successful in engaging land managers and getting near-complete coverage over their target areas, but such schemes would need to be considerably more extensive than at present and have new or modified prescriptions if they were to provide an effective means of maintaining cropped habitats for the species considered in this review. In addition, A-ES do not place any additional controls on planned development, and although they make retention of cropped habitats in certain form financially attractive they allow highly flexible land use management. However, A-ES, whether associated with SPAs or not, can be effective at maintaining low/input and/or low-intensity management systems and could be developed further for certain species (Table 2) as a policy for delivering conservation requirements.

Statutorily protected areas

Site-based statutory designation is one mechanism to ensure maintenance of habitats essential for the maintenance of bird populations.

SSSI/ASSI designation provides for regulation of agricultural management with the aim of maintaining the features of interest, and operates via a system of consents based on the conservation objectives or management plan for the site. Management schemes can also be established to aid in achieving specific

habitat characteristics, especially in situations where recovery of habitats has been identified within conservation objectives.

Most SPAs are underpinned with SSSIs/ASSIs and benefit accordingly. However, a number of SPAs are not protected in this way, but are underpinned with special voluntary management schemes. Another significant generic benefit in statutory designation is regulation of planned development, either via specific legislation (e.g. for SPAs) or special status in planning policy.

Cropped habitats in statutorily designated sites are at considerably lower risk from loss to built development, afforestation, and conversion or loss through changed agricultural management.

The legal requirements of the EU Birds Directive and the UK SPA Selection Guidelines

The overall objective of the Birds Directive is to achieve maintenance of populations of naturally occurring wild birds in the European territory of the EU at 'favourable levels' (Article 2). Member States are required to preserve, maintain or re-establish a sufficient diversity and area of habitats to contribute to this objective, creating protected areas and managing habitats both inside and outside of these protected zones (Article 3).

Special Protection Areas are a specific form of protected area, required amongst other measures to ensure the survival and reproduction of rare and vulnerable species (listed in Annex I) and migratory species across their area of distribution (Article 4). There is an obligation to manage SPAs in such a way as to avoid pollution or deterioration of habitats or disturbances to birds that would significantly affect the species for which the SPA provides protection. There is also an obligation to avoid pollution or deterioration of habitats outside of SPAs. The Birds Directive does not specify that different habitat types should be treated any differently in meeting its objectives.

The Birds Directive stipulates that the most suitable territories in number and size should be classified as SPAs for the conservation of Annex I and migratory species. In particular, for migratory species areas where species breed, moult, stage and winter should be selected, paying particular attention to wetlands of international importance (Article 4). There are no more detailed criteria for selecting SPAs than those provided by Article 4 of the Directive and refinement of the methods of selection have been left to the discretion of the Member States (MSs) following early attempts to develop guidance (outlined by Stroud *et al*. 1990).

Legal interpretation of parts of the Birds Directive has been established through European case law and there are a number of judgements relevant to SPAs and cropped habitats. Fundamental is the ruling that Member States cannot take into account economic requirements when classifying SPAs (Case C-44/95 Lappel Bank, and others) and that, although MSs have some discretion with regard to the choice of SPAs, classification of areas is subject to the ornithological criteria specified in the Directive (Case C-355/90 Santona Marshes, and others). In addition, the obligation to classify SPAs cannot be avoided by implementing other conservation measures (Case C-3/96 *Commission vs. Netherlands*).

A number of cases have found that the area of a specific SPA has been insufficient in meeting the requirements of Article 4 of the Birds Directive; a larger area than that classified has met the ornithological criteria specified in the Directive (*e.g.* cases C-96/98 Marais Poitevin and C-209/04 Lauteracher Ried). Finally, voluntary measures, such as agri-environment schemes, cannot meet the protective requirements of classified SPAs (C-96/98 Marais Poitevin).

At minimum, the obligation to classify SPAs to meet the objectives of the Birds Directive could be interpreted as being an area of habitat large enough to sustain a viable population of a species. In this respect, all habitats of functional relevance to a species should be considered for inclusion in the area of SPA classified if viability is to be ensured. With this interpretation in mind it follows that cropped habitats should be considered for inclusion in SPAs if those habitats are necessary for the survival and reproduction of the birds for which SPAs have been classified. However, the interpretation of whether these habitats are the 'most suitable' for classification as SPAs, *i.e.* meet the ornithological criteria set out in the Birds Directive, remains an important consideration.

In the UK, SPAs are selected using guidelines (JNCC 1999) that highlight the importance of areas that support more than 1% of a population, or an internationally important assemblage, or are of importance for

other reasons; application of the guidelines results in identification of the most suitable areas for classification. We noted earlier that the UK guidelines place greater emphasis on the classification of natural and semi-natural habitats, an approach not necessarily supported by the Birds Directive. However, the guidelines do not preclude the inclusion of cropped habitats, but they do include a relevant definition on the suitability of an area for classification:

- "Areas to be classified should be distinct in habitat and/or ornithological importance from the surroundings and have definable and recognisable character."

With respect to some cropped habitats, it would be relatively easy to demonstrate habitat distinctiveness and the characteristics that make the habitat important for the species concerned. However, scale is important and where cropped habitats are extensive this becomes more difficult.

In extensive habitats of any type, the presence of birds can be, and often is, used as an indirect measure of habitat distinctiveness, given that birds respond to features of habitats that may not be readily apparent, and so, ornithological importance becomes an important measure in such habitats. Areas within extensive habitats that are used regularly by a qualifying number of birds, or a significant proportion of the birds for which a functionally linked SPA has been classified, may meet the definition of suitability for classification.

There is no guidance on what might represent a significant proportion of the birds within an existing SPA; an arbitrary threshold could be adopted. In extensive areas of cropped habitats, regularity of use might also need further definition as habitat choice is likely to vary considerably both within and between years, in part influenced by the mobility of certain cropped habitats (via rotation); guidance may be needed on the minimum amount of data that would be needed to confidently identify habitats that are of real functional importance (the loss of which would have a negative affect on the numbers within the SPA).

Conclusions: developing policy for maintaining cropped habitats for birds

Many of the species represented in the UK SPA network have a reliance on cropped habitats, much of which is not included in the SPA network (Stroud *et al.* 2001). The maintenance of suitable cropped habitats for these species is essential to ensure that populations are maintained at favourable levels, as is required under the EU Birds Directive.

Gross changes in the agricultural landscape over the last few decades have been subtle, but certain low-input/low-intensity cropped habitats, such as rough pasture in the uplands, continue to be lost.

There is evidence that local losses in some cropped habitats have caused population declines in a number of birds, for example the decline of the Hen Harrier population in Orkney. It is extremely difficult to predict future patterns of change in cropped habitat extent and character, but sustainable development may bring about significant change. Of particular note are the affects that biodiversity conservation needs are having on agricultural practice, which is driving an increase in agri-environment provision, and the likely impact of growing renewable energy needs, which is driving the development of a biofuels sector.

Policies for maintaining cropped habitats for birds that are represented in the SPA network need to take account of the likely affects of recent and future changes in agricultural policy.

There are a number of mechanisms already available for maintaining cropped habitats: planning law, agricultural policy and agri-environment schemes, and site-based statutory protection.

- Planning law minimises the risk of loss of cropped habitats to built development, but does not influence the types and patterns of crops grown. Many of the species that utilise open mixed pastoral and arable habitats have faired well over the last several decades, at a time when there was considerable growth in built development, suggesting that planning law may have been beneficial at least for these species at the landscape scale.

- Agricultural policy, including agri-environment schemes, has a strong influence on land use and the types and patterns of cropped habitats in the landscape. Agri-environment schemes are limited in coverage and voluntary, but they have made a significant contribution to the conservation of a number of species that are reliant on low-input and/or low-intensity management systems. Such schemes

have an important role to play in delivering the conservation requirements of many species, but due to their voluntary nature are not risk-free.

- Site-based statutory protection is effective at limiting planned development and allows for regulation of cropped habitat management. It is the best mechanism available for ensuring that both specific cropped habitat characteristics and landscape character are maintained for the species for which a site is designated, especially when management schemes are implemented to assist in achieving conservation objectives.

These mechanisms, at present levels of implementation, do not ensure maintenance of important cropped habitats for all of the species reviewed and hence do not currently deliver their conservation requirements. None of the mechanisms, either alone or in combination, are risk-free, but for some of the more adaptable species the combination of these mechanisms has proven beneficial. However, it is clear that some species, typically those with reliance on low-input and/or low-intensity management systems and that have undergone considerable historical declines, are being recovered only through highly targeted conservation management.

We believe that there is a need to review policy on maintaining the cropped habitats that provide for the ecological needs of species in the SPA network. We have recommended species-specific approaches to identifying which cropped habitats are important (Table 1) and we recommend that these are used to develop policy. For some of the species reviewed there is no information on general ecological requirements and we recommend that research addresses this, prioritised by species status and vulnerability of the cropped habitats concerned.

We have discussed briefly the legal requirements of the Birds Directive and their interpretation through case law. Such case law suggests that there is little flexibility in adopting alternative measures to SPA classification for habitats of any kind that meet the ornithological criteria set out in the Directive.

The UK SPA Selection Guidelines (JNCC 1999) were developed to aid in interpreting the ornithological criteria in the Directive and, hence, identify the 'most suitable' areas for classification as SPAs. If additional SPA provision is identified as a requirement to ensure that cropped habitats are maintained, then we recommend that additional guidance to assist in application of the guidelines is developed by the SPAR SWG, specifically in relation to determining the ornithological importance of extensive areas of relatively uniform cropped habitats. This guidance should indicate what constitutes a significant proportion of the numbers of any species in an SPA and regularity of use when there is variation in the use of different cropped habitats both within and between years. With the additional guidance, we suggest that application of the UK SPA Selection Guidelines to areas of cropped habitats will identify those, if any, that may be the most suitable for classification as SPAs.

It is likely that, in applying UK SPA Selection Guidelines and additional guidance on cropped habitats, new areas of cropped habitats will be identified as suitable for classification as SPAs. If this is the case, then the species-specific recommendations that we have made in Table 1 are relevant to aid boundary definition.

For some species there is sufficient evidence to draw general conclusions about ecological requirements and a generic (modelled) approach to boundary determination may be appropriate. For example, the SPAR SWG recently recommended to the Government's Natura 2000 & Ramsar Steering Committee (the decision-making body on UK SPA policy) that SPA boundary determination for breeding Chough should be based on a generic model (inclusion of suitable habitat within 1 km radius of each nest location within an SPA), but that boundaries for the same species outside of the breeding season should be based on local evidence of habitat use.

Table 2. Species/management system matrix to aid the development of policy for cropped habitat maintenance.

Cropped habitat management system	Species ecology[143]	
	Specialist	**Generalist**
Low-input habitats, where relevant with low-intensity stock management systems or low-intensity harvesting regimes	[Category 1[144]] Chough Curlew (B) Hen harrier (B) Merlin (B) Nightjar Short-eared owl (B) Stone-curlew Twite (B)	[Category 2] Corn crake
High-input habitats, and/or intensive management systems	[Category 3] Capercaillie Chough Golden plover (B) Hen harrier (B) Honey buzzard Merlin (B: NI only) Nightjar Red kite (B) Ring ouzel Scottish crossbill Wood lark	[Category 3] Curlew (NB) Non-breeding geese, swans and ducks Marsh harrier (B)

Generic approaches to defining boundaries are unsuitable for widely ranging species because large areas of unsuitable habitat will be included in a site. For these species, for example non-breeding swans, a location-specific approach will be more appropriate, but would be possible only if knowledge of field use was available. Such data are not typically available and new surveys would be needed to be able to determine both the suitability of cropped habitats for SPA classification around existing SPAs and the boundaries of any that are then judged suitable.

Given the ecological requirements of the species in this review, and conservation priorities, we recommend that:

1. High priority should be given to ensuring that existing SPAs for all species dependent on cropped habitats arising from low-input and/or low-intensity management systems are adequate to meet the ecological needs of the birds for which the site was classified (Category 1 & 2 species in Table 2). If this leads to addition of habitats to SPAs then boundary determination should be based on either a generic (modelled) approach or on evidence of regular use. For such species, specific crop types and character need to be maintained and so the condition of any areas added to the SPA network should be secured through an appropriate mechanism, including targeted management.

2. Where existing SPAs support species dependent on cropped habitats arising from high-input and/or high-intensity management systems (Category 3 in Table 2) the maintenance of landscape character, and where relevant crop types, is secured through an appropriate mechanism. In the majority of cases such areas should be identified only from regular use by a significant proportion of the birds for which the site was classified.

Many other species use cropped habitats, including a large number of farmland passerines and a few others with SPA provision. For the former, landscape-scale approaches have been adopted to aid in conservation (various agri-environment schemes). For the latter, which includes species like Golden Eagle, the policies developed from this review will be relevant.

[143] B = breeding, NB = non-breeding (outside of the breeding season)

[144] See earlier for explanation

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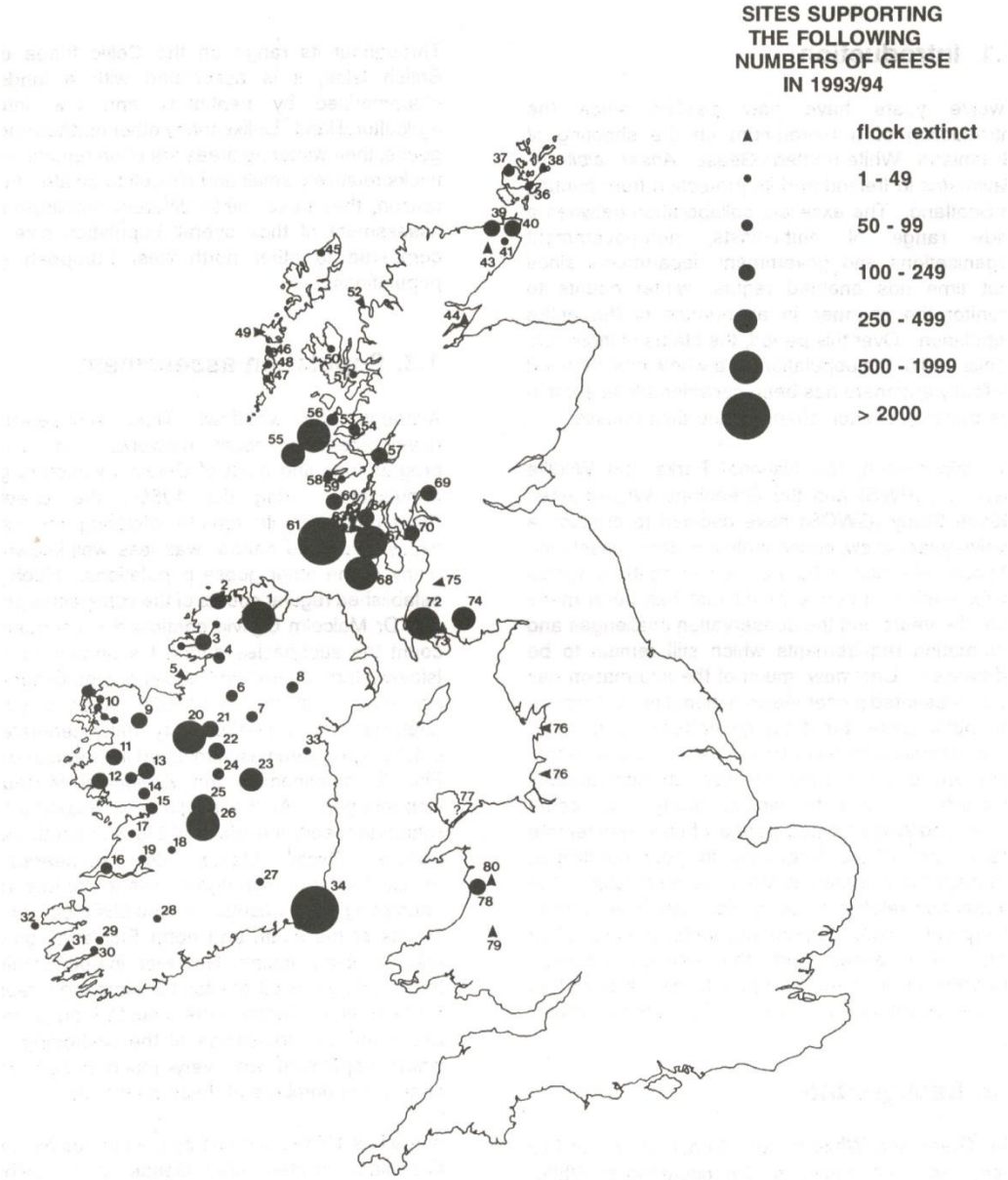
Appendix [11.]1. Species review pro-forma: an example using the Greenland White-fronted Goose (*Anser albifrons flavirostris*)

Cropped Habitats Information Project:
draft pro-forma for Greenland White-fronted Goose

Context: range and distribution

The global distribution of Greenland White-fronted Geese in the non-breeding season is restricted to a few localities in the north and west of Britain and in Ireland (mainly the south and west) (Figure 1[1]). Sites used are traditional between years, and the gross extent of the range has been substantially stable over at least 100 years[2, 3]. There have, however, been a small number of new flocks established in the last 30 years and a significant number of flock extinctions, especially consequent on a major population decline between the 1950s and the late 1970s[3]. Notable flock extinctions have occurred at the edge of the range, in south-west Ireland, mid-Wales and north-west England[4].

Figure 1. Distribution of flocks of Greenland White-fronted Geese in Britain and Ireland 1993/94. Sites with a high probability of exchange of birds within a winter, unrelated to spring or autumn migration, are linked by lines.



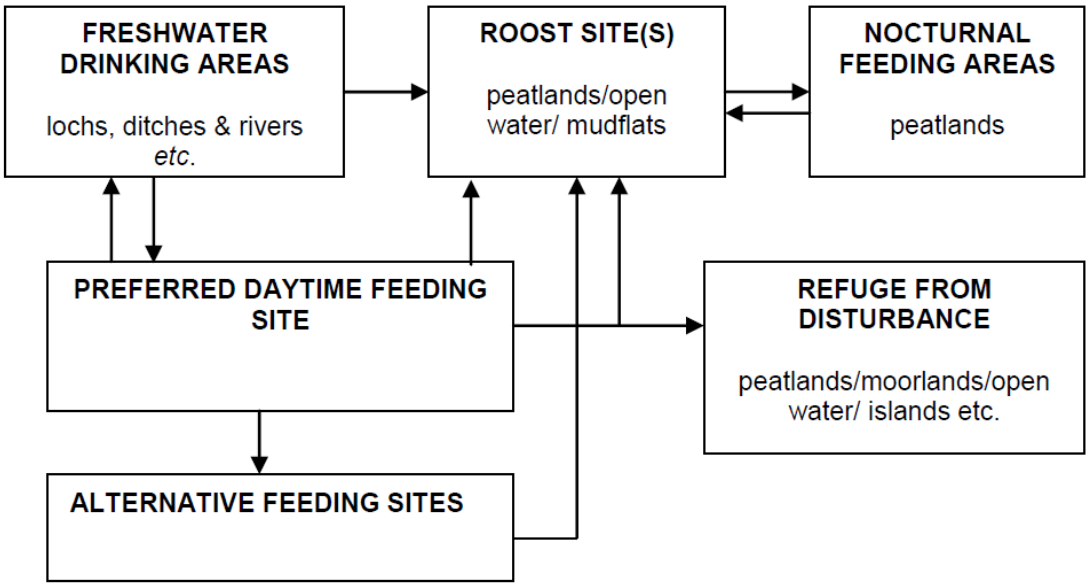
Cropped and other habitats used in the UK

Flock dynamics in relation to habitats - Functional Unit Systems

Typically, sites used by a flock of Greenland White-fronted Geese comprise one or more nocturnal roost sites, one or more separate feeding areas, and areas used for refuge in the event of disturbance during the day. Wilson *et al.*[5] described the use of traditional locations in terms of a 'Functional Unit System' (Figure 2) – a means of conceptualising the different functional components of the overall flock range.

The total area used by any one flock in winter is highly limited – often just a few tens of hectares (below).

Figure 2. Components important in the definition of Greenland White-fronted Goose functional unit systems. Arrows indicate movements between different components of flock 'home-range'.



Habitat descriptions

Greenland White-fronted Geese roost on peatlands, open waters (including moorland and other lochs) and at a few sites, on inter-tidal sands or saltmarshes[6]. Historically, feeding occurred probably exclusively on peatlands (the overall extent of the range closely mirrors the geographic extent of oceanic patterned blanket, and coastal raised, mires in Britain and Ireland). Today, significant nocturnal feeding on bog plants still occurs on these areas but the main diurnal feeding has changed, first to low-intensity grasslands of permanent (and sometimes semi-natural) character, and more recently (although only at some locations) to rotational grasslands under greater intensity management.

In some localities[5], flocks now feed on high intensity grassland, although without having changed locations: feeding fields formerly subject to low intensity management (and with high nature conservation value) have been reseeded and are now managed as rotational leys. The continued visitation of geese to these same fields now causes alleged damage, although on the part of the geese there has been no change in feeding location, just a change in intensity of agricultural management of areas continuously used.

The main cropped habitats used are thus grasslands. Throughout their range there is little winter cereal growing. Where autumn stubbles do occur however, (especially in Caithness, Coll, Tiree, Kintyre and Islay) they are used intensively on the arrival of geese in October, and consumption of split grain at this time is important in allowing the rapid recouping of body condition after migration from Iceland (and prior to mid-winter).

At Wexford in Ireland some use of carrots and sugar beet fields is regular[7], whilst topped forage beet is sometimes taken on Islay. Generally, root crops are available at some locations only, although where they do occur they are energetically very important, being highly digestible and with high energy content (as also stubble grains)[7].

Current SPA provision (sites and habitats)

The current SPA suite is as follows:

Site name	Site total	% of GB population	FUNCTIONS PROVIDED BY SPA		
			Nocturnal roost	Diurnal roost or loafing area	Feeding (cropped habitats)
Caithness Lochs	183	1.3%	Freshwater lochs	NO	NO
Coll	789	5.7%	Moorland lochs	NO	NO {although significant feeding areas lie within the Coll (Corncrake) SPA}
Dyfi Estuary	144	1.1%	Saltings and mudflats {raised bog excluded}	Saltings	NO
Kintyre Goose Roosts	2,323	17.0	Moorland lochs and lowland wet grassland	NO	NO {some limited feeding included at grassland roost area at Rhunahaorhine Point}
Loch of Inch and Torrs Warren	534	3.9	Inter-tidal sandflats	NO	NO
Loch Ken and River Dee Marshes	350	2.6	Three freshwater lochs and marshes	NO	Grassland managed at varying intensity
Loch Lomond	237	1.7	Freshwater loch	NO	Some limited feeding areas on wet grassland and marsh included
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	783	5.7	Freshwater and moorland lochs	NO	Semi-natural wetland in one area otherwise NO
ISLAY					
Eilean na Muice Duibhe/Duich Moss, Islay	1,300	9.5	Blanket/raised mire	NO	NO {but some birds use Laggan SPA}
Laggan, Islay	300	2.2	NO {but some birds use Eilean na Muice Duibhe SPA}	NO	Grassland managed at high intensity
Rinns of Islay	1,600	11.7	Blanket mires	Freshwater loch	NO {but some birds use Gruinart SPA}
Gruinart Flats, Islay	1,000	7.3	NO {but some birds use Rhinns SPA}	Saltings	Grassland managed at varying intensities

There are a number of key points regarding the SPA suite in the context of the CHIP review:

- For nearly all flocks, sites with the current SPA suite do not contain whole functional unit systems (all areas used by flocks). Generally sites just contain roosts, with feeding areas not subject to formal protection[8]. Some sites just contain feeding areas with no roosts.
- For two pairs of sites on Islay, there is at least partial coverage of both feeding and roosting areas. Most birds feeding on Laggan SPA probably roost on Eilean na Muice Duibhe/Duich Moss SPA (although the converse is not true). Some birds feeding at Gruinart SPA probably roost within the Rhinns SPA, although again the converse is not true, with the majority of Rhinns roosting birds feeding outwith the Rhinns and Gruinart SPAs.
- There are some sites on mainland Argyll qualifying at Stage 1[9] (holding numbers of European importance), which were not selected at Stage 2 of the SPA selection process. This was on the grounds that Loch Lomond contributed more to the coverage of range in the UK.
- There are other roost sites on Islay of at least national importance which were not considered by the SPA review because of lack of regular count data[10].

An example is given in Figure 3, which shows the use of habitats in an area of Tiree. Whilst all main roost areas of this part of Tiree are included within the SPA, the immediately adjacent feeding areas for these birds are excluded. These feeding areas are grasslands of various types, including cultivated leys, meadows and dune grasslands.

Spatial change in availability of cropped habitats between years

There are few changes in either gross or local availability of grassland used by Greenland White-fronted Geese between years. Patterns of land-use in western and northern Scotland tends to be generally stable. Changes to local agricultural practice typically occurs either in response to new land-owners adopting more progressive farming systems, or in response to external factors (such as the recent abandonment of dairying on Islay which will probably have long-term implications for the intensity of grassland management on the island). Thus, local availability of grasslands to particular flocks is entirely predictable year-to-year and largely unchanging over long periods[12].

Within Scotland, the National Countryside Monitoring Scheme has quantified the general trend of intensification of grassland management from the 1940s to 1980s, although the extent of this change has been variable between regions[13].

Between-year site fidelity to specific cropped habitats

Greenland White-fronted Geese are highly site-faithful within and between years both on wintering areas and at areas in Iceland used on migration[5, 6, 14, 15]. Site-fidelity between winters has been estimated at 80% on Islay[22] and 85% at Wexford).

Flocks comprise groups of extended families, with long-lasting relationships between parents and offspring[16, 17]. Individual colour-marking[18] has shown that the same social groups repeatedly visit the same areas year after year. One bird is known to have used the same small number of fields on Islay every year for at least 19 years[19].

Extent of within-year/seasonal variability in use of habitats

Detailed ecological studies in Iceland[20, 21], have shown that small-scale patterns of between and within-field use are related to the need to maximise nutritional intake. Such fine-scale studies have not been undertaken on the wintering areas, but intensive survey work on Islay in the 1980s showed that local use of fields was predictable on a day-to-day basis.

Radio-tracking of marked geese on Islay by WWT in the 1980s demonstrated that individuals have discrete home –ranges of limited extent[22]. Specific grass fields used for feeding within these home ranges are linked to regularly used roost sites in a predictable manner. Cluster analysis of resightings of individually marked birds on Islay in 1991/2 and 1992/3 indicated an average home range extent of 195.7 ha and 488.3 ha respectively. However, some 80% of resightings occurred in areas of only 13.3 ha and 20.1 ha in the two winters. The 80% utilisation level is thought to represent core areas of the home ranges, with occasional resightings elsewhere representing some limited excursive activity[22].

Ridgill *et al.* (1994)[22] concluded:

i) *"that individual birds have a limited distribution, utilising a very small area in winter;*
ii) *that they make only patchy use of their home range, thus proving highly selective in their choice of sites on a field-by field basis; and*
iii) *that they show an exceptionally high level of winter site fidelity."*

Other importance of habitat to survival of species

Diurnal feeding areas (typically grasslands and stubbles) and nocturnal roosts/feeding areas (typically peatlands or freshwater systems) are the primary biotopes used by Greenland White-fronted Geese. Behavioural observations have shown that other areas are also of importance, in particular refuge areas used when geese are subject to high levels of disturbance. Refuge areas are of particular significance, with their loss at many sites being thought to be related to declining favourability of many sites, especially in Ireland[2, 23].

Figure 3a. Relevant area of Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)

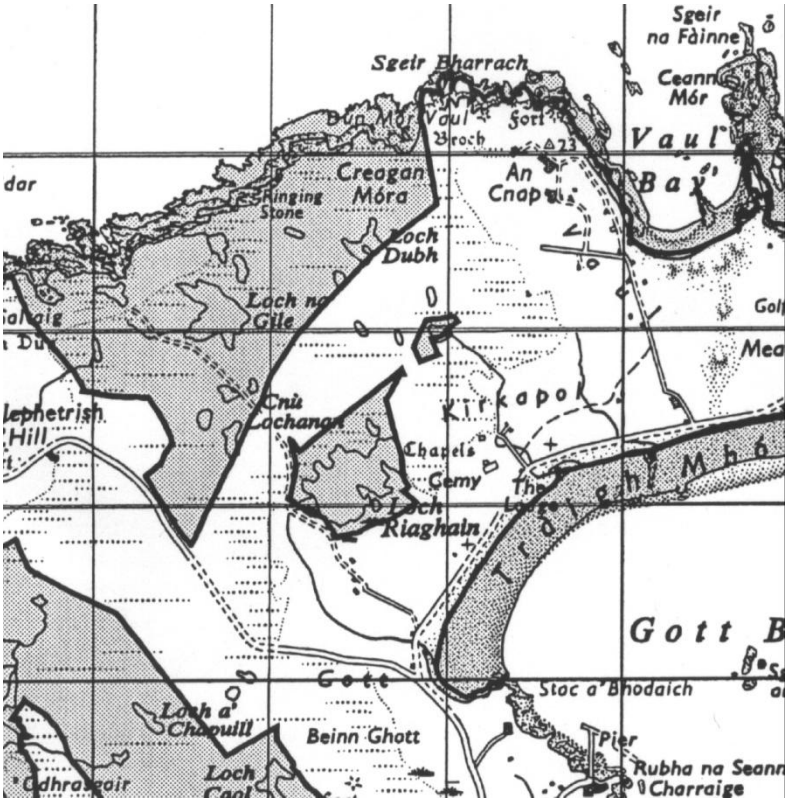
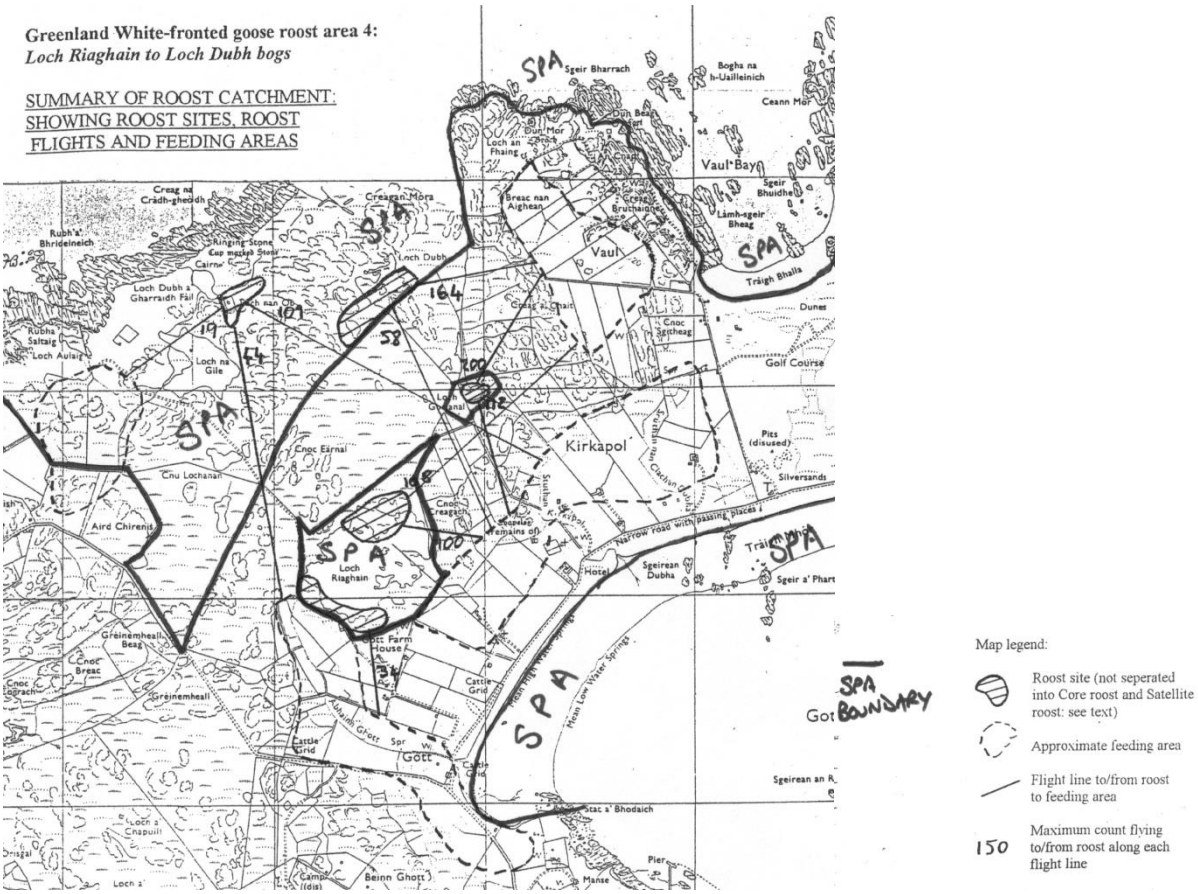


Figure 3b. Goose usage around a roost complex within part of Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast). Data from SNH contract surveys in January - April 1996[11].



Freshwater lochs are also used for loafing and drinking typically in the middle of the day[24]. This habitat is of particular importance, probably in physiological contexts not fully understood. Birds will regularly travel significant distance during the day to drink, and access to water can result in considerable aggression - indicating its value as a resource to individuals. Consideration of freshwater resources (pools, ditches, lochs and rivers) seem thus to be an important element in the consideration of particular functional units and the conservation provision made for the particular components.

Significance of cropped habitats and implications of change

Analysis of patterns of changes in flock size in the last decade have shown that size, number and quality of feeding areas, level of disturbance, flock size and latitude are factors that all influence flock status[25]. Those flocks occurring in areas with fewest, poor quality, limited feeding ranges have shown the most serious declines and also now tend to be the smallest flocks. These national-scale findings are supported by more fine-grained analyses from Ireland[26].

The implication of this is that loss of one or more feeding sites at a traditional wintering locality will reduce, in the long-term, the favourability of that locality for geese. Thus conservation measures that address just roost areas will not secure the conservation status of Greenland White-fronted Geese – additional measures addressing conservation needs on feeding sites (and other components of the function unit system at each wintering site) are also needed.

Conclusions

The overall conclusions are that:

- analysis of trends of different local flocks over the last two decades shows that flocks with poorest status are those with fewest feeding areas associated with roost sites. By inference, loss of feeding areas at other sites will result in the quality of those areas declining (probably through mechanisms such as a lower ability of geese to maintain and acquire necessary condition crucial for successful breeding[16]). Thus conservation measures directed at roost sites alone will be insufficient to ensure the long-term favourable conservation status of wintering flocks; and
- given the stability of local patterns of agricultural land-use in areas used by the geese; the within and between year fidelity to sites used; and the limited extent of feeding areas exploited (*i.e.* a high degree of selectivity for just a few highly preferred areas), site-based protection measures are an appropriate means of delivering these conservation measures.

[1] From: Fox, A.D., Norriss, D.W., Stroud, D.A. & Wilson, H.J. 1994. *Greenland White-fronted Geese in Ireland and Britain 1982/83-1993/94 - the first twelve years of international conservation monitoring.* Greenland White-fronted Goose Study Research Report No. 8. GWGS, Aberystwyth & National Parks and Wildlife Service, Dublin. 55 pp.

[2] Gray, R. 1871. *Birds of the West of Scotland, including the Outer Hebrides.* Murray, Scotland.

[3] Ruttledge, R.F. & Ogilvie, M.A. 1979. The past and current status of the Greenland White-fronted Goose in Ireland and Britain. *Irish Birds* 1: 293-363.

[4] Ruttledge & Ogilvie (1979) documented 34 deserted sites in Ireland and three in Scotland up until 1979, and Fox *et al.* (1998) reported a further seven (five in Ireland) by 1994/95. Despite increase in numbers recently, a further five flocks remain close to extinction.

[5] Wilson, H.J., Norriss, D.W., Walsh, A., Fox, A.D. & Stroud, D.A. 1991. Winter site fidelity in Greenland White-fronted Geese: implications for conservation and management. *Ardea* 79(2): 287-294.

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[7] Mayes, E. 1991. The winter ecology of Greenland White-fronted Geese *Anser albifrons flavirostris* on semi-natural grassland and intensive farmland. *Ardea* 79: 295-304.

[8] Although some feeding areas may be subject to management under ESA prescriptions, and on Islay some feeding areas have been and are within the Islay Goose Management Scheme.

[9] Danna/Keills & Lismore/Benderloch

[10] *e.g.* the roost at Loch Finlaggan - Stroud, D.A. 1985. A preliminary list of Greenland White-fronted Goose roost sites in Argyll. *The Second Argyll Bird Report:* 20-29.

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[19] Greenland White-fronted Goose Study unpublished.

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Appendix [11.]2. Summary of the CHIP species reviews

Breeding waterbirds

Many breeding waterbirds use cropped habitats adjacent to wetlands in which they nest, whilst others are associated with wet pastoral habitats, and some use cropped habitats away from water bodies. Information on cropped habitat use by waterbirds during the breeding period is lacking for many species, especially for ducks (Anatidae), and few conclusions can be drawn.

Within the gulls (Laridae), the Common (*Larus canus*) and Black-headed Gulls (*Larus ridibundus*) make greatest use of cropped habitats during the breeding season; both species have significant inland breeding populations in the UK. Inland breeding Common Gulls show a preference for foraging on improved pastures (Arbouw & Swennen 1985), taking primarily earthworms, but also a variety of insects, especially beetles (Coleoptera) (Arbouw & Swennen 1985; Vernon 1970 & 1972).

Soil moisture, influenced by field location and rainfall, significantly affects earthworm availability and field usage by Common Gulls (Arbouw & Swennen 1985). Black-headed Gulls use a variety of cropped habitats, but again pastures are important and coastal nesting birds will forage inland to make use of them (Gribble 1976; Vernon 1970 & 1972). For both of these species there are no studies on habitat use at the landscape scale, but since nesting colonies are used over many years there is likely to be some consistency in foraging activity around them and some predictable use of pastures. However, the widespread improvement of pastures, especially in the uplands where inland Common Gull colonies are located, is likely to have benefited both species. In terms of food availability, it is likely that the most important factor in maintaining breeding colonies is the continued presence of pasture, although the required spatial characteristics (area and distance from colony) are not known.

Breeding waders (Charadridae), in the uplands, lowlands and along our coasts, make significant use of cropped habitats. In the uplands, especially adjacent to moorland, pasture is a primary habitat for nesting and/or foraging for a number of species.

Golden Plovers (*Pluvialis apricaria*) nest on short-sward moorland, but adults forage primarily in pastures close to nesting areas during incubation. Once travelling with a brood, adults tend to restrict daytime foraging to moorland, and Tipulids are important food for both adults and chicks, but adults will still make nocturnal visits to favoured pastures. Improved, closely grazed pastures are favoured, and arable fields may also be used for foraging. Field choice is related to number of molehills (an indicator of earthworm abundance), distance from roads and uneveness of ground, and larger fields may be selected. Diet includes a variety of soil and ground living invertebrates, and earthworms and Tipulidae larvae are important.

Individual birds show a high degree of fidelity to feeding areas, even if these change slightly in quality over time, although birds from the same pair may use a different selection of fields. Most fields used are within 4 km of the nest and 2 km from the moorland edge. In one study, travel distance to feeding areas was on average 2.7 km, but some birds foraged up to10 km from the nest (O'Connell *et al*. 1996; Whittingham *et al*. 2000; Pearce-Higgins & Yalden 2003).

Curlews (*Numenius arquata*) nesting on moorland make significant use of adjacent grasslands, selecting larger fields close to nests in which to feed. Most fields were within 1-km of the nest, but birds ranged as far as 3 km. Grassland type did not appear to influence field choice, with both rough grazed and improved pastures being used (Robson & Percival 2002).

Whimbrels (*Numenius phaeopus*) nest primarily in moorland, avoiding rough and improved pastures (Fisher & Richardson 1984); they are not regarded as a relevant species for this review. However, prior to nesting the adults used established pastures for feeding and during nesting most used ploughed or harrow reseeded areas (Grant *et al*. 1992a; 1992b). Tipulidae larvae and earthworms were primary foods in these habitats, and bird selected fields in accordance with Tipulidae biomass (Grant *et al*. 1992b). Most broods are raised for at least the first 10 days after hatching within the heath habitat where nesting takes place, remaining within 800 m of the nest. However, some broods and older broods are taken into ploughed or harrowed reseeded grasslands, although older pastures are avoided (Grant *et al*. 1992c).

Several other waders nest in a wider variety of habitats, including upland moorland and pastures, lowland pastures, arable habitats, stony ground, shingles and coasts.

The Oystercatcher (*Haematopus ostralegus*) is one such species that nests in diverse habitats, including a number of cropped habitats, reaching its highest breeding density in the machair of the Western Isles (Galbraith *et al*. 1984). Both unimproved and improved grasslands are utilised, and birds nesting in adjacent habitats will feed in pastures, feeding primarily on earthworms (Heppleston 1979). Pasture improvements may have been beneficial to Oystercatcher in some areas due to resulting increase in earthworm biomass (Baines 1988). Each year adults return to broadly the same area, within 20 km of previous season's nest, and natal dispersal is typically less than 20 km (Sitters. 2002).

The machair habitat of the Western Isles is also an important cropped habitat for other waders. Machair is a distinctive type of coastal grassland that occurs on calcareous sand, especially where this is blown inland following periodic breakdowns of foredunes. It is managed through low-input rotation, with summer-rested pasture giving way to cereals (oats and rye) and potatoes.

Ringed Plovers (*Charadrius hiaticula*) reach high densities in machair, showing a preference for dry and cultivated areas, and around a quarter of the British population nests in this habitat (Galbraith *et al*. 1984; Fuller *et al*. 1986; Prater 1989). They are highly site-faithful, with most adults returning to within 100 m of the previous season's nest and natal dispersal of typically less than 2.5 km (Jackson 1994).

A significant proportion of the UK's breeding Dunlin (*Calidris alpina schinzii*) population nests in machair and, as with several other waders, density is higher than in other habitats (Etheridge 1982). Dunlins prefer wetter machair grasslands and grasslands in the transitional zone between the machair and inland peatlands (known as blackland) (Fuller *et al*. 1986). Their diet comprises predominantly invertebrates at or near the soil surface (Snow & Perrins 1998). Dunlins are highly site-faithful; most adults return to within 100 m of previous nests and natal dispersal is on average less than 2 km (Jackson 1994).

Common Snipe (*Gallinago gallinago*) also have a high reliance on wet grasslands in the lowlands, although they also breed in abundance in the uplands, again utilising wet pastures, and in the machair of the Western Isles (Galbraith *et al*. 1984; Fuller *et al*. 1986; Baines 1988). They have a close association with damp and wet habitats, and when nesting in dry grasslands they do so in close proximity to wet features. Unimproved habitats are favoured, and improvement to grasslands by draining, fertilising and reseeding has been shown to reduce Snipe numbers (Baines 1988). Meadows are also preferred to pastures, especially wet meadows with a high water table, but without extensive flooding (Herbert *et al*. 1990; Green *et al*. 1990). Nests are typically located in grass and rushes, but in moorland habitats heather is also used (Mason & MacDonald 1976). Diet comprises a wide variety of invertebrates, but especially insect larvae, earthworms and snails, which are taken both from the soil surface and by probing into the soil (Green 1988). Moist soils are essential for good breeding success and adults will travel some distance from the nest area in drier summers to find suitable feeding habitat (Green 1988; Green *et al*. 1990). There is no information on fidelity to breeding areas.

The Redshank (*Tringa totanus*) shares many similarities with Common Snipe in breeding habitat requirements, but in addition to utilising wet grasslands and machair also breeds in dry grasslands, arable areas and shingles (Galbraith *et al*. 1984; Fuller *et al*. 1986). However, like Snipe, when nesting in dry habitats Redshanks will preferentially feed in wetter habitats and wetland edges are important (Chandler & Walker 1985; Ausden *et al*. 2003). Unimproved grasslands are favoured and drainage, fertilising and reseeding of these reduces Redshank numbers dramatically (Baines 1988). Redshanks show a high degree of site-fidelity in all seasons; mean natal dispersal was typically less than 2 km and the majority of adults returned to within 100 m of the previous season's nest in the Western Isles (Jackson 1994; Thompson & Hale 1998; Clark 2002).

The Stone-curlew (*Burhinus oedicnemus*) nests in close-grazed unimproved grasslands (sward height of nesting areas is typically <2 cm), spring-sown arable crops and occasionally in other sparsely vegetated habitats, such as recently burnt heath and clear-felled forestry plantation. Habitat requirements are well known, and the loss of unimproved grasslands with appropriate grazing regimes (sheep and rabbit grazing) and the change to autumn sowing of arable crops has resulted in suitable habitat becoming rare and highly localised. Crops that exceed 10 cm height and 10% cover by late May are avoided by nesting Stone-curlews, and birds will abandon nests if the vegetation height becomes too tall (Green & Griffiths 1994). Intensive management of spring-sown crops reduces suitability for the species and management and harvesting operations also place nests and young birds at risk.

As part of existing agri-environment schemes there are provisions that benefit Stone-curlews, such as retention of bare ground as nesting plots in arable areas and changes to management of set-aside to make this suitable for nesting. Pairs may use different habitats for successive broods in the same season or between years, but little is known about nesting area fidelity of adults. Diet comprises mainly ground-living invertebrates and earthworms, and adults will travel up to 3 km from the nest location to forage in suitable habitats, although patterns of use, including fidelity to specific areas has not been described (Green *et al*. 2000). Stone-curlews are migrants and are absent from Britain during the winter (Green 2002).

Male Corn Crakes (*Crex crex*) call from cover in meadows and pastures; early in the season *Iris pseudoacorus* beds in wetter pastures, along field margins, and in other marshy areas are used, but as the season progresses meadows and field margins become important as the vegetation height increases. Birds have also been recorded occasionally calling in cereals and potatoes. Birds occupy home ranges, which are varied in size, and utilise areas of taller vegetation within these ranges for foraging. Areas of short-vegetation, such as close-grazed improved grassland, are avoided.

Density of calling males is correlated with cover of tall herbage in spring, especially Iris, *Phragmites* or *Phalaris* (Green 1996). Nests are scrapes, typically lined with dead vegetation, on the ground in tall grasses, nettles, rushes, irises and other herbaceous plants, but rarely in cereals. Most first clutches are laid in nests in tall herbage, primarily nettles, and tend not to be in meadows, but second clutches, which are frequent, are mostly in nests in meadows (Green *et al*. 1997). Diet comprises largely small invertebrates, with a wide variety taken, and some plant matter, including seeds.

Corn Crakes forage in taller grasses and herbaceous vegetation within meadows, low-input pastures, silage, gardens, field edges, and in cereal crops and potato fields. Foraging habitat changes during the season depending on vegetation height. Territorial males occupy ranges of varying size from 4 ha to over 50 ha, wandering through neighbouring territories while foraging, and some may be faithful to ranges between years. Females are non-territorial and will use feeding areas some distance from nest (up to 6.5 km once young can fly), but occupy ranges typically of less than 30 ha. Key threats to Corn Crake are loss of meadows and unsympathetic hay-cutting regimes. Summarised from Cramp *et al*. 1980, Stowe & Hudson 1988 and Stowe & Hudson 1991.

Non-breeding waterbirds

A large number of species, or biogeographical populations, of waterbird make use of cropped habitats outside of the breeding period, including swans, geese, ducks, waders and gulls. There have been many studies on feeding behaviour of swans and geese, especially in relation to semi-natural habitats like salt-marsh and also in relation to the conflict between farming and the heavy use of arable crops by these species. These studies provide a good overview of the dietary choices that these species make and how these are influenced by availability and depletion of different foods. However, there are relatively few studies of ranging behaviour and the mechanisms that operate to limit how these species use the landscape.

In the UK, classification of Special Protection Areas has been made for two populations of swans: NW Europe Bewick's Swan (*Cygnus columbianus bewickii*) and Iceland Whooper Swan (*Cygnus cygnus*). The status and ecology of these populations has been detailed in Robinson *et al*. 2004a and 2004b respectively - the details are not repeated here, but the following summary information is derived, except where indicated, from these publications.

Grasses are the main diet of Bewick's Swans and a wide variety is sourced from wet, species-rich to improved, reseeded grasslands. In addition to grassland, other crops are utilised, including sugar beet, winter cereals, waste potatoes, oil seed rape, and spilled grain in stubbles, although the importance of these habitats may be higher in the E England stronghold of the species. Seasonal changes in diet occur, probably in relation to food preference and availability; aquatic plants are important on first arrival in wintering areas, along with grain from stubbles and root crops, but on depletion of these there is increased grazing of winter cereals and grasslands, with the latter being predominant in spring (Dirksen *et al*. 1991; Laubek 1995). At the main site in the UK, the Ouse Washes, birds have been recorded foraging in cropped habitats as far as 10 km from roosting areas. However, there are no studies of spatial patterns of crop use and the mechanisms that might determine them.

The majority of the Iceland breeding Whooper Swan population winters in Britain and Ireland, utilising a large number of sites. Like the Bewick's Swan and many of the wintering geese, they have increasingly made use of cropped habitats over the last 40 years, and around 15% had some reliance on arable crops in January 2000. Aquatic food plants are important in the diet when birds arrive at wintering grounds, but are soon depleted and birds then switch to grazing in a wide variety of grasslands, including flooded pastures. Many species of grass are eaten, as are the stolons of clover (*Trifolium* spp.). Where arable crops are available, use is made of stubbles, waste root crops, winter cereals, and oil seed rape, with similar seasonality to that shown by Bewick's Swans. At the Ouse Washes, birds have been recorded travelling up to 5 km from the roosts to forage in cropped habitats. In Scotland, birds switched roosts throughout the season depending on the proximity of favoured feed areas.

A study of birds on the Firth of Forth showed that most fields used for feeding were within 3 km of a roost (Brazil 1981 & 2003). Local studies of Whooper Swans exist and provide insight into localised patterns of habitat use – the intensive study of the Black Cart flock near Glasgow is a good example (unpublished SNH Reports).

Migratory geese on wintering grounds have been studied extensively and the history of both population and behavioural changes are well documented; all now make use of cropped habitats to some degree.

The Bean Goose (*Anser fabalis fabalis*) is rare in the UK and occurs in significant numbers in only two areas; Slamannan Plateau in C Scotland and Yare Valley in E England. In both of these areas, the birds are entirely dependent on pastures in which to feed, but the characteristics of the two areas differ. Birds in the Yare Valley feed on species-rich, wet pastures, selecting areas that are not intensively grazed. Grazing regime appears to be an important factor in field choice with short swards resulting from sheep grazed being less favoured (Allport 1991).

In contrast, birds at Slamannan feed in semi-improved and improved grasslands with short swards, selecting wetter fields with the least disturbance (Smith *et al*. 1994). Patterns of field use have been studied in both flocks and whilst the birds return to the same general area each year the choice of fields varies considerably within and between years, depending on sward characteristics and disturbance levels.

The Pink-footed (*Anser brachyrhynchus*) and Iceland Greylag Geese (*Anser anser*) are the most abundant of our wintering geese and frequently occur together at roost sites. Both species make considerable use of cropped habitats throughout the winter. Pink-footed Geese have complex functional unit systems (ranges), typically comprising multiple roosts, resting, feeding and bathing areas, and will travel considerable distances in utilising these elements. In Britain, birds will travel regularly up to 40 km from roosts (Hearn *pers. comm*.), but in one study, marked birds spent 90% of their time within 5-6 km of the roost. Total range size in this study was 100 km^2, but individuals occupied specific areas and used only around half of the total range area.

Birds move within a range in relation to roost choice, daily routine requirements, food availability and disturbance (Giroux & Patterson 1995). Field choice is influenced not only by crop type, but distance to roost, size, proximity to roads and buildings and slope; larger fields with good visibility, close to the roost, but away from sources of human disturbance (especially buildings) were favoured (Urquhart 2002).

Sequential use of fields within a foraging area takes place, with individual fields or groups of fields used until the food is depleted (Meire & Kuijken 1991), although such patterns of use were not shown for individual birds in one Scottish study (Giroux & Patterson 1995). Day-time resting areas tend to be more marginal habitats, such as rough pastures or moor, but are large, undisturbed, open areas. Such resting areas may be used in a more predictable way than foraging areas (Newton *et al*. 1973). Individual birds utilise several different roosts and associated feeding areas within each range, using a complex of ranges over the winter period and making considerable movements between them. A relatively high degree of fidelity to ranges has been demonstrated (Giroux 1991; Fox *et al*. 1994; Keller *et al*. 1997).

Pink-footed Geese graze on grasslands all through the winter, but their proportionate use increases in spring. Those roosting at the coast will also graze on saltmarsh. Spilled grain in stubbles is taken early in the winter, along with waste root crops, and winter cereals are used in the latter part of the winter (oil seed rape was not used); as with other waterfowl using cropped habitats, temporal patterns of use are related to availability (Newton *et al*. 1973; Bell 1988; Giroux 1991; Giroux & Patterson 1995; Gill *et al*. 1996). Birds that utilise improved grasslands achieve better body condition in spring and this may improve breeding success (Boyd & Fox 1995).

Greylag Geese are very similar to Pink-footed Geese in their behaviour and choice of cropped habitats, but they are more site-faithful and more tolerant of disturbance (Newton & Campbell 1973; Newton *et al*. 1973; Bell 1988; Bell *et al.* 1997; Urquhart 2002). Birds use more roosts within a range than Pink-footed Geese, moving between them more frequently. Ranging behaviour from roosts also differs, with Greylag Geese using fields mainly within 2-3 km of a roost (Urquhart 2002), although ranging frequently to 12 km and as far as 35 km (Bell 1988; Hearn *pers. comm*.). Summaries of the winter ecology of these species are found in Mitchell & Hearn 2004 and Hearn & Mitchell 2004. Some detailed local studies of habitat use have also been made, but are unpublished and not reviewed here.

Two different subspecies of White-fronted Goose (*Anser albifrons*) occur in the UK: the Baltic/North Sea population of the race *A. a. albifrons*, which breeds in N Russia, and the Greenland race *A. a. flavirostris*, which breeds in West Greenland.

A. a. albifrons feed mainly on permanent grasslands, typically grazing marshes, but do make some use of saltmarsh, stubbles and winter cereals; foraging areas are typically less than 10 km from roosts. At Slimbridge, one of the two principal wintering sites in the UK, management of permanent grasslands has led to a relatively sedentary flock that makes only minimal movements away from the site not exceeding 1 km (Hearn 2004). Detailed local information about field use may be available and Hearn (2004) provides a synopsis of which feeding areas may be regularly used by flocks at each nationally important site.

Greenland White-fronted Geese have been well studied and the species was used as a model for developing this project – the full account for this species is included as Appendix [11.]1.

Barnacle Geese (*Branta leucopsis*) from two populations occur in the UK in winter: Greenland breeding Barnacle Geese winter primarily along the west coast of Scotland, and those breeding in Svalbard winter primarily in the Solway Estuary. The traditional habitats in these two wintering locations differed to a degree with extensive use of saltmarsh in the Solway Estuary – habitat that is largely absent from haunts of the species along the west coast of Scotland. However, both populations show a high reliance on intensively cropped habitats, especially grasslands and cereals.

Most Greenland Barnacle Geese stage or winter on the island of Islay, where the species has been well studied for many years (Percival 1988, 1993; Percival & Houston 1992). Birds roost on inter-tidal flats and in bays, travelling up to 5 km to feeding in inland cropped habitats. Improved pastures, especially those reseeded and dominated by *Lolium perenne* and those heavily fertilised, are the primary feeding areas, with some use of cereal stubbles in autumn. Birds also occur on smaller, uninhabited islands where grazed maritime grasslands are the primary foraging habitat.

Barnacle Geese show a high degree of fidelity to foraging areas, visiting the same groups of fields repeatedly (Percival 1991). The Greenland Barnacle Goose population has increased substantially since the first census was done in 1959 (from 8,800 birds then to 54,100 in 1999) (Cranswick *et al*. 2000). This has increased pressure on habitats and a conflict arose between farmers and the conservation of the birds. As a result, much effort has been made in researching the impacts of geese on crop yields and seeking solutions to conservation (Percival 1993; Percival *et al*. 1997; Scottish Executive 2000). The outcome has been the establishment of a number of goose management schemes aimed at providing suitable, safe foraging areas for birds with compensation for losses in yield of crops (Douse 1998).

These schemes are not solely for Barnacle Geese and other species are included in other areas (the details of schemes are available at www.snh.gov.uk). Svalbard Barnacle Geese in the Solway Estuary roost on inter-tidal sandflats, rarely travelling more than 2 km to feeding areas (Roberts 1966; Owen *et al*. 1987). Grazed saltmarsh remains an important habitat, but in recent decades birds have made increasing use of cropped habitats, especially improved grasslands. In autumn, the geese also occasionally seek out spilled grain in cereal stubbles (Owen & Kerbes 1971). They are highly faithful to feeding areas and, as with Barnacle Geese on Islay, a management scheme with the same aims is currently operated (Black 1998).

Three populations of two races of Brent Geese (*Branta bernicla*) occur in the UK: the Dark-bellied Brent Goose (*B. b. bernicla*), which breeds in northern Russia and winters along the coasts of southern and eastern England; the East Canadian High Arctic Light-bellied Brent Goose (*B. b. hrota*), which winters in Ireland and Northern Ireland; and, the East Atlantic population of Light-bellied Brent Goose (*B. b. hrota*), which winters primarily in NE England and in small numbers elsewhere along the east coast of Britain.

Dark-bellied Brent Geese have a closer association with coastal habitats than any other goose species, roosting on mudflats or coastal waters and foraging on algal beds and saltmarsh. However, they also have a heavy reliance on cropped habitats, grazing on pastures, cereals and oil-seed rape typically within 5 km of the coast (St. Joseph 1979; Summers & Critchley 1990). A sequential pattern of habitat use occurs, with a switch from intertidal and saltmarsh habitats to inland cropped habitats in early winter, as natural food is depleted (Summers & Critchley 1990; Vickery *et al.* 1994).

Typically birds feed on winter cereals in early winter, again switching to pasture in late winter and spring, and then back to saltmarsh prior to departure to breeding areas in spring (McKay *et al.* 1994). They are highly site-faithful, using the same part of an estuary from one winter to the next, but whether this is reflected in choice of fields is not known. Birds selected cropped fields for foraging that were characterised by low hedges, close proximity to the sea, were unimproved in the case of pastures, and were without roads or paths nearby (McKay *et al*. 1996). The proximity of fresh water may also be critical in feeding field choice (Ward 2004). Pastures with moderate length swards are selected (6 cm) and longer swards are only chosen if fertiliser is added to boost nitrogen level (Hassall *et al*. 2001). Birds showed no preference for grass species, but had a strong preference for clover-rich swards (McKay *et al*. 2001).

The concept of Alternative Feeding Areas (AFAs) – the creation of specially managed areas to offset possible damage to crops – has been developed and McKay *et al*. (2001) suggest that clover-rich grasslands would be the best crop type to attract Dark-bellied Brent Geese. It has been suggested that specially managed set-aside and re-introduction of rotational clover leys could provide an opportunity to create AFAs for geese, but the siting of these would need to take into account field selection factors (McKay *et al*. 2001). Hassall & Lane (2001) also suggest that AFAs are fertilised just prior to use by birds to increase attractiveness.

East Canadian Light-bellied Brent Geese wintering throughout Ireland are also highly dependent on intertidal and saltmarsh habitats. Depletion of natural foods causes a switch to grassland feeding – predominantly improved grasslands, including recreational areas, but in some areas unimproved grasslands are important. In a few areas, birds also utilise cereal stubbles, spring-sown cereals and potatoes as they are available, but switch to intertidal and saltmarsh habitats in spring (see summary in Robinson *et al.* 2004c).

East Atlantic Light-bellied Brent Geese occur in significant numbers at only one site in the UK: Lindisfarne, NE England. Denny *et al.* (2004) provide a summary of habitat use by the species around the Lindisfarne coastal roosting areas. Intertidal habitats are used exclusively during autumn and as these are depleted birds switch to feeding in saltmarsh, submerged eelgrass beds and to a lesser extent pasture (Percival & Evans 1997; Clausen & Percival 1998; Anderson 1999). In harsher winters, increased use is made of pastures and winter cereals. In the last decade, more regular use of pasture and winter cereals has developed at Lindisfarne.

A number of duck species utilise cropped habitats during the non-breeding period. Shelducks (*Tadorna tadorna*) occur primarily along the coast, with increasing numbers at inland sites. They make use of wet and flooded grasslands and autumn sown cereals close to roosts, but to only a minor extent (Patterson 1982). Of all the ducks, Wigeon (*Anas penelope*) is perhaps most associated with cropped habitats. They are sensitive to disturbance and feed close to water or in partially flooded fields, both during the day and at night (Mayhew & Houston 1989; Mudge 1989). The preferred feeding habitat is short-sward, improved grassland, although unimproved grasslands are also important. In addition, the use of autumn sown cereals, especially wheat, has become common during December to February.

In autumn, Wigeon may also accompany other ducks utilising cereal stubbles to feed on spilled grain, but this behaviour may be erratic within a season and variable between years (Owen 1973; Thomas 1976 & 1981; Owen & Thomas 1979; Madsen 1988a; Mayhew & Houston 1998). In one study, birds used cropped habitats within 2 km of the roost, and generally may moved less than 10 km from any roost area (Thomas 1981), and in another it was concluded that most feeding was within 5 km of a roost site (Owen & Williams 1976). Birds show a high degree of roost site fidelity and may return repeatedly to specific feeding fields (Mayhew & Houston 1989; Mitchell *et al*. 1995).

Gadwall (*Anas strepera*) may graze in short-sward grasslands along the edges of water, but such use may be highly localised and relatively unimportant to the species (Thomas 1981).

Most of Britain's Teal (*Anas crecca*) occur at the coast, but the species is widespread inland using a wide range of wetland habitats and have been recorded foraging in arable fields close to wetlands. They feed

primarily at dusk, during the night and at dawn, making it difficult to quantify feeding habits, but have been recorded during the day in cereal stubbles, potatoes and winter wheat, especially if flooded (Thomas 1981).

Mallards (*Anas platyrhynchos*) make extensive use of cropped habitats for foraging during the non-breeding period, regularly travelling up to 2 km from roosts and frequently up to 5 km. They are often associated with other ducks while feeding in fields, especially Wigeon and Pintail. Most field feeding is done at dawn and dusk, with more extensive use in certain areas or during severe weather when wetland habitats become frozen. Habitat choice is seasonal, depending on availability of foods. In autumn, cereal stubbles are used and birds show a preference for wheat stubble over barley. As waste potatoes become available, birds switch to using this resource and then in spring will graze autumn-sown wheat (Olney 1964; Olney 1967; Street 1975; Thomas 1978, 1981 & 1982). There are no studies of field choice or site-fidelity in the species.

Studies on Pintail (*Anas acuta*) are few and most knowledge of field feeding by the species comes from the studies at the Ouse Washes that have provided good information on Mallard. In this area they show extremely similar behaviour to Mallard, often associating the latter. They have also been recorded feeding in cereal stubbles around the Solway in autumn (Owen *et al*. 1986).

Golden Plovers and Lapwing roost on ploughed farmland and spend some time both pre- and post- roost in recently sown cereals. They forage in pastures, Lapwings showing a preference for old pastures (>25 years old), but Golden Plovers making use of both young and old pastures. Diet comprises almost entirely earthworms, which reach higher density and biomass in older pastures. However, field choice by Golden Plovers is also affected by field size and, whilst more birds occur in large, old pastures, a strong preference for large fields means that young pasture is also used. Field choice is also affected by presence of either species and a complex relationship between the two species, and Black-headed Gulls, has been described in detail, in particular Golden Plovers nearly always choose to forage in mixed flocks with Lapwings, selecting fields partly on the basis of Lapwing density (Barnard & Thompson 1985). There is no information on fidelity to roosts or to associated feeding area, or on the spatial characteristics of the functional unit system in these species.

A study of Curlew in the Tees Estuary demonstrated the importance of fields surrounding the estuary for foraging (Townsend 1981a). Curlews fed on earthworms taken from pastures, but seasonal use varied in response to freezing, when birds could not feed, and water-logging, when earthworm availability increased. The relative importance of fields for foraging was shown by their use at some time by around half of marked birds, but individual strategies varied. Some individuals fed solely in fields all winter, some at certain times of the winter, while others rarely used fields preferring to feed on exposed inter-tidal substrates.

The majority of birds that relied on fields as foraging habitat were males, especially those making exclusive use of fields at certain times, while females tended to use fields only at high tide; both sexes made use of inter-tidal habitats. This difference between the sexes may be explained by the males' inability to capture sufficient *Nereis* worms at low substrate temperatures on mudflats due to their shorter bill length – this forces them to seek alternative prey in the form of earthworms. In separate studies, from direct flight line observations, colour-ring sightings and radio tracking, birds roosting and feeding by night on Teesmouth SPA, departed at dawn to forage at least 15 km inland (south, west & north) on pasture and arable fields, returning mid/late afternoon to the estuary (Ward *et al.* 2003). A study at Traeth Lafan, in Wales, also demonstrated that around half of the local Curlew population used fields for feeding at high tide. However, birds did not consistently use the same individual fields, but chose feeding locations within a broader network of fields in response to both disturbance and habitat suitability.

Common Gulls have been shown to forage as much as 30 km inland from coastal winter roosts, utilising a range of cropped habitats, but spatial patterns of field usage have not been described (Vernon & Walsh 1966).

In a study of birds roosting on the Severn Estuary, 38% of all fields around the roost had been used by Common Gulls over the winter, but use was seasonal and in any season a small proportion of all fields available was used. In late summer, birds used cut hay-fields in which to forage, moving to freshly ploughed fields as they became available and then onto reseeded pastures. By October, birds were feeding in autumn sown cereals, but only until sward height exceeded 15 cm, thereafter switching to short-sward pastures and occasionally using root crops such as kale. Primary prey was earthworms and invertebrates; the larvae of Tipulidae were especially important. Common Gulls may show a preference for pastures with high earthworm loads (Vernon & Walsh 1966). Black-headed Gulls forage in pastures during the winter, often in association

with Lapwings and Golden Plovers, on which they are kleptoparasites – stealing earthworms from these plovers (Barnard & Thompson 1985). However, there is little information on winter feeding habits of either species of gull.

Raptors and owls

Seven species of raptor and one owl were considered in this review.

Ospreys *Pandion haliaetus* make use of planted forestry, in which many of the UK's nests are located. Nest-site fidelity is high and young birds show a preference for using existing nests (Dennis 1987). Nest tree choice is influenced by the characteristics of the forestry around the site, but several tree species have been used (Dennis 1987). However, nesting densities are low in the UK and the species is not colonial, although some forests have several nests in relatively close proximity due to high quality local fisheries (see Stroud *et al*. 2001). Commercial management of planted forests may place nest sites, which are not protected when unoccupied or outside of the breeding period, at risk. Whilst, localised loss of nesting habitat may not affect population status, and single pairs may adapt relatively quickly to loss of a nest (nest site availability is not limiting; Dennis 1987), extensive losses could drive a population decline or significantly reduce the rate of population recovery.

Both the Honey-buzzard (*Pernis apivorous*) and Red Kite (*Milvus milvus*) make use of planted forestry, but the majority nest in mixed and deciduous woodlands. Studies in Continental Europe suggest that Honey-buzzards have a distinct preference for nesting in mature conifers within mature mixed woodland, and in close proximity to water (Amcoff *et al*. 1994; Gamauf 1999).

In the UK, nests were located in conifer woodlands at a similar frequency to other types, but in the uplands the majority of nests were in conifer forests, probably in response to availability (Roberts *et al*. 1999). Choice of woodland may be correlated with the abundance of small passerines, which are important prey early in the breeding season (Amcoff *et al*. 1994). Information on nest-site fidelity is lacking, although a large proportion of territories was occupied each year and some nests were re-used between years. Home ranges were small and correlated with abundance of wasps (Hymenoptera); males are territorial and foraged mainly within 2 km of the nest, while females are not territorial and foraged much closer to the nest (typically within 1 km). Most foraging took place within woodland, arable areas were avoided, and the main prey was small passerines and wasps, especially *Vespula* spp. (Gamauf 1999).

The loss of mature woodland may be detrimental to Honey-buzzards, but the greatest vulnerability probably relates to mature conifer forests in the uplands, some of which may be under commercial management. However, considerable secrecy surrounds the majority of nesting locations of Honey-buzzard in the UK (Ogilvie *et al*. 2002) due to the possibility of persecution and this makes assessment of both population vulnerability to habitat loss and conservation approaches difficult.

Red Kites were once common and widespread throughout Britain, but due to persecution the population was reduced to less than 20 pairs by 1900, located in central Wales. Since then, changes in the law and active protection have led to a recovery in the Welsh population, and re-introduction projects have successfully returned the species to England and Scotland. In Wales, Red Kites nest mainly within remnant native oak (*Quercus* spp.) woodland, but use a variety of other woodlands, including occasionally conifer plantations, showing a preference for building nests in oak trees. Areas with a high proportion of plantation forestry were avoided by Red Kites for nesting (Newton *et al*. 1996).

Nests may used in successive years, depending on breeding success, but alternative sites, up to 3 km from the previous year's nest, are also selected within a home range. Home ranges may be occupied year after year, either by the same pair or by successive pairs (Walters Davies & Davis 1973; Davis & Newton 1981). Birds forage typically up to 3 km from the nest, but occasionally to 7 km (Davis & Davis 1981), over a variety of largely open habitats, including pastures and young forestry. Prey includes a wide variety of insects, birds and mammals, and carrion is especially important, including sheep carrion in winter and spring (Walters Davies & Davis 1973; Davis & Davis 1981; Davis & Newton 1981). Availability of suitable habitat is not thought to be limiting the population in Wales (Davis & Newton 1981). Outside of the breeding season, Red Kites roost communally in traditional sites.

The same open habitats are used for foraging during the non-breeding period, with many birds remaining associated with their home ranges, but ranging further a field, and diet is again varied (Walters Davies & Davis 1973). Studies of the Welsh Red Kite population suggest that landscape-scale changes in land use have had no detrimental affect on the population (Davis & Newton 1981; Newton *et al*. 1996).

Three upland species are considered together due to broad similarity in habitats used.

The Hen Harrier (*Circus cyaneus*) breeds in upland moorlands and associated forestry throughout the UK and forages over moorland and associated habitats, such as rough pastures, moorland rides in forests, clear-felled areas and young forestry. Some moorland supports relatively high densities of birds, but across much of the suitable habitat area nesting is more dispersed. While territories may be used year after year, nest sites are infrequently used more than once. The diet of breeding Hen Harriers throughout much of the species range is dominated by just a few key prey species: Meadow Pipits (*Anthus pratensis*), small mammals (especially Short-tailed Vole *Microtus agrestis*), young Lagomorphs and Red Grouse (*Lagopus lagopus*) (Picozzi 1978; Redpath *et al*. 2001). Whilst, much of the prey is taken from moorland habitats, small mammals and other prey are also taken from pasture and young forestry.

In Northern Ireland, Sky Larks (*Alauda arvensis*) and Starlings (*Sturnus vulgaris*) are key prey species in addition to Meadow Pipits (Mellon *et al.* 2005), and while open moorland habitats are important foraging areas, birds forage frequently in young forests, including second-rotation forestry, and have also been recorded hunting over the canopy of mature forestry. In Orkney, the population is particularly dependent on the Orkney Vole (*Microtus arvalis orcadensis*), which reaches highest abundance in moorland, rough pasture and unmanaged grassy features such as field edges and set-aside. Other important prey for this population includes Lagomorphs, Snipe (*Gallinago gallinago*) and Starlings (*Sturnus vulgaris*), which were abundant in both rough and improved pastures.

In Orkney, the juxtaposition of moorland and rough pasture is critical for Hen Harriers. The loss of 11% of rough pasture and doubling of grazing pressure over the period 1960-1998 may have been a key factor in reducing productivity and driving recent population decline (Gorman & Reynolds 1993; Amar & Redpath 2005). Foraging range from the nest site is dependent on a number of factors, but both sexes have been shown to forage up to 5 km from the nest although most activity may be within 2-3 km of the nest (Schipper 1977; Picozzi 1978; Mellon *et al.* 2005). Forestry habitats used by Hen Harriers during the breeding season become unsuitable with canopy closure (at 10-15 years old for first rotation and 6-9 years for second rotation), although larger open rides within mature forestry may still be used for both nesting and foraging (Scottish Raptor Study Group data; Mellon *et al.* 2005).

Outside the breeding season Hen Harriers occur in coastal and lowland habitats as well as moorlands, and make significant use of cropped habitats for foraging and in some cases for roosting. Roosts are communal and tend to be traditional, although the numbers of birds at each fluctuates widely within and between years, and may be located in a variety of different habitats including marshes, rough grassland, heaths, conifer plantations and, rarely, arable crops (Watson & Dickson 1972; Clarke & Watson 1990).

Diet outside the breeding season is very varied, and includes small passerines, including many farmland species like Sky Lark, small mammals, Lagomorphs, beetles and other birds (Watson & Dickson 1972; Marquiss 1980; Clarke & Palmer 1987; Clarke *et al*. 1988; Clarke *et al*. 1997). A study of two roosts in SW Scotland showed that foraging range was highly variable; at one roost most sightings of foraging birds were within 3 km, but at the other frequent sightings came from as far as 6 km. A wide variety of habitats was used for foraging and this is reflected in the wide variety of dietary items (Watson & Dickson 1972). There is some evidence that individual birds occupy their own home ranges during the winter (see Lack 1987).

Merlins (*Falco columbarius*) in Britain nest in rough pasture, moorland and both young and mature plantation forestry, principally in the uplands, and occasionally in dunes. As in other moorland birds of prey that use young forestry, this habitat becomes less suitable for Merlin once it has reached the thicket stage (12-15 years old), although in some areas Merlins continue to nest and forage in maturing forest. Clear-felled forestry is not used (Newton *et al*. 1978 and 1986). The nest is typically placed on the ground in heather, but may occasionally be placed on a low rocky outcrop, and many are in old, unused crow (*Corvus* spp.) nests both on the ground and in trees.

Tree nesting birds select isolated or small groups of trees, or nest close to the forest edge (Newton *et al*. 1978; Williams 1981; Ellis & Okill 1990; Parr 1991; Parr 1994; Little & Davison 1992). In Northern Ireland,

almost all Merlins nest in upland mature forestry, in trees close to the forest edge, and infrequently in isolated trees or hedges and on the ground (Northern Ireland Raptor Study Group, pers. comm.). A large proportion of nesting areas are unoccupied each year, but some are occupied in successive years over long periods and individuals are relatively area-faithful. Nest-site fidelity is only moderate; many females use alternative nest-sites in the same nesting area between years (Newton *et al*. 1978 and 1986; Bibby 1986; Ellis & Okill 1990; Parr 1991; Parr 1994; Rebecca & Cosnette 2003).

Merlins are short-lived raptors, and nesting area occupancy may rarely exceed four years for any individual and typically much shorter periods for females (Marsden *et al*. 2003). In addition to survival, land-use change and disturbance may be key factors in determining whether nesting areas remain occupied (Newton *et al*. 1978). Merlins prey almost exclusively on small passerines, predominantly those that nest in moorland areas or adjacent pastures, i.e. birds of open habitats, rarely taking small mammals and insects.

In Shetland, Wheatear (*Oenanthe oenanthe*) and Sky Lark each represented a third of total weight of prey taken, with Meadow Pipit and young Dunlin also being significant prey (Ellis & Okill 1990). In other studies, Meadow Pipits, Sky Larks, House Sparrows and Starlings are principal prey species, and a number of woodland birds also feature in the diet, but are relatively unimportant (Newton *et al*. 1978 and 1984; Watson 1979; Bibby 1987; Meek 1988).

Afforestation in the uplands is likely to have reduced suitable Merlin habitat over the longer term, given the species' reliance on prey of open countryside (Newton *et al*. 1978 and 1986; Rebecca & Cosnette 2003). Bibby (1986) suggests that good areas may remain unoccupied in a population with poor productivity, due to lack of recruitment, leading to localized extinctions even in the presence of good habitat. Low productivity has been demonstrated in various parts of the species British range and is linked to both increased predation pressure and decline in habitat quality of nesting areas through certain land-use changes, such as afforestation of moorland and adjacent farmland, and pasture improvement (Newton *et al*. 1986; Bibby 1986).

In winter, Merlins move to lowland and coastal areas and may occupy communal roosts (Dickson 1973 and 1988; Lack 1986). Birds forage over open habitats and probably avoid woodland, but very little information on the behaviour of the species in winter is available. A study in SW Scotland showed that favoured habitats were lowland farmland, including pasture and cropped habitats, and associated marginal habitats, such as rough pastures. Relatively little use of coastal habitats or upland habitats (rough pasture and moorland) was observed for birds roosting near the coast. Main prey species were Sky Larks, Starlings and Meadow Pipits, with other small passerines and small waders making up the remaining diet (Dickson 1988).

Short-eared Owls (*Asio flammeus*) nest mainly in upland moorland habitats, including young forestry, and numbers fluctuate widely according to the abundance of small mammals, which are the main prey. Nest-site fidelity is very low and the species appears to be opportunistic in settling to nest each season, responding to local prey abundance (Village 1987). The almost complete reliance on small mammals as prey means that Short-eared Owls forage mainly over rough grassland habitats where prey species are most abundant: grassy moorland, rough pastures and other grassy features such as field boundaries (Picozzi & Hewson 1970; Glue 1977; Roberts & Bowman 1986).

Conifer plantations over moorland support high densities of voles and remain suitable as nesting and foraging areas until the trees are around 12 years old (Shaw 1995). A study in Orkney showed that Orkney Voles, which were the most important prey, were absent from improved pasture, barley and turnip crops (Gorman & Reynolds 1993).

There is no information about home range use by Short-eared Owls. Like Hen Harriers, the majority of Short-eared Owls winter away from the uplands, principally along the coast, and roost communally. Again diet is highly varied, but little is known about the birds' behaviour during this time.

Marsh Harriers (*Circus aeruginosus*) breed primarily in marsh habitats – nesting typically in *Phragmites communis* reedbeds, and rarely in salt-marsh and cereals (Underhill-Day 1984). There is no information on nest-site choice, nest use or home range use. Marsh Harriers are polygynous, with more than a third of females mated to a polygynous male (Underhill-Day 1984). Prey includes a wide variety of birds and mammals; Underhill-Day (1984) states that practically all species of bird or mammal of suitable size occurring in a territory appear in the diet, the only exception being woodland birds as Marsh Harriers do not hunt in woodlands. In the UK, small passerines, especially Starlings, young pheasants and ducks, and small mammals and rabbits were the most numerous prey types recorded (Underhill-Day 1984).

In Germany, a similar wide variety of prey was taken, with small passerines and small mammals of particular importance, but also insects and fish appeared in the diet (Lange & Hoffman 2002). Birds foraged typically up to 2 km from the nest, focussing activity over marshy areas within wetlands, and occasionally dune systems and cropped habitats adjacent to reedbeds (Schipper 1977).

The small population of Montagu's Harrier (*Circus pygargus*) in the UK nests primarily in arable habitats (winter wheat, barley and oils seed rape), but has used a wide range of other habitats including rough and improved grasslands, reedbeds, marsh, dune, heathland and young conifer forest (Brown & Grice 2005).

The species builds its nest on the ground, selecting a new site each year, and is semi-colonial. Relocation of 'colonies' often takes place from one year to the next, often over considerable distances. Factors influencing settlement of pairs in nesting locations include prey abundance, vegetation height and previous success (Arroyo *et al*. 2002). Diet is diverse and the species is a generalist; in the UK a wide range of small passerines and small mammals is taken, along with the young of a variety of birds and some insects (Clarke 1996).

In East Anglia, where birds are found in arable habitats, the main prey is Sky Lark and Meadow Pipits (Underhill-Day 1993). Foraging ranges are extensive, in some areas males hunt up to 12 km from the nest, but females range over shorter distances, focussing their hunting around the nest site (typically within 2 km of the nest). Birds hunt over many different open habitats, utilising linear features and transitional zones between different vegetation types, but males tended to avoid reedbeds (Schipper 1977). One of the key threats to breeding birds in Europe is crop harvesting regimes – nests are frequently destroyed and young birds killed during harvesting (Arroyo *et al*. 2002; Mischler 2002). Diet is similar throughout Europe, but insects and reptiles feature in southern parts of the breeding range. In The Netherlands, specific set-aside prescriptions have been used to increase small mammal abundance for this and a number of other birds of prey (Mischler 2002). Montagu's Harriers are migratory, wintering in sub-Saharan Africa.

Clarke (2002) suggests that conditions in wintering grounds, especially those affecting the abundance of its primary prey – large Orthoptera - such as rainfall, habitat degradation and pesticide use, are critical in influencing the breeding population in the UK.

Birds of plantation forestry

In addition to a number of raptors, there are four species that make use of planted forestry: Capercaillie, Nightjar, Wood Lark and Scottish Crossbill.

The Capercaillie (*Tetrao urogallus*) was re-introduced into a wide range of forest habitats in Scotland from the early 1800s, including some of the remaining fragments of mature semi-natural Scots Pine (*Pinus sylvestris*) woodland that were once the species natural habitat.

Suitable forest is mature with at least 40% canopy cover and 500-800 trees per hectare, although areas of very dense canopy cover (over 70%) are avoided by males (Gjerde 1991a). Managed forests that are thinned to less than 500 trees per hectare were abandoned, as were those from which pine trees were removed (Gjerde 1991b). The denser cover afforded by spruce (*Picea* spp.) is favoured by males seeking roost sites and removal of mature spruce from mixed woodland made it less attractive to males (Gjerde 1991a & 1991b).

The distribution of the Capercaillie throughout its European range is closely linked to the presence of bilberry (*Vaccinium myrtilus*) (Storch 2001). Display areas (leks) are traditional and located in more open areas of mature forest, typically on raised areas or slopes with short vegetation. Mean distance between leks was 1.9 km and they occur at a density of one per 5 km^2 of forest (Summers *et al*. 1995; Storch 2001). Males maintain a home range while associated with a lek, excluding other males, and these ranges tend to be radially arranged around the lek. Males show high fidelity to both a lek and spring home range.

Home range size varies with age, more mature males occupy smaller ranges typically less than 30 ha, while younger birds may occupy from 70-130 ha ranges (Storch 2001). Females visit one or more leks; those visiting a single lek occupy a range of around 50 ha, but range size may be several times this size when females visit more than one lek. Nests are sited in deep heather close to the forest edge, typically within 25 m, and often at the base of tree; location is not related to lek location (Storch 2001; Proctor & Summers 2002).

Females use the same nesting area in successive years and in some circumstances may be territorial (Storch 2001).

Diet varies through the year with fresh shoots, leaves and flowers of ground layer plants, especially those of bilberry, being predominant during late spring and summer, supplemented in late summer and autumn with berries of a variety of shrubs. Invertebrates are also taken.

From late autumn through to late spring diet comprises almost exclusively pine needles and shoots (Zwickel 1966; Storch 2001). Birds show a strong preference for pine needles when available, but will feed on the needles of a variety of conifers, although tend to avoid those of Norway Spruce (*Picea abies*). They will seek out stressed trees, which may have less resin and higher energy content in their needles (Storch 2001). Chicks rely on invertebrates for the first 3-4 weeks of life, especially Geometridae larvae in Scotland, adding vegetation to their diet as they mature (Moss 1985; Picozzi *et al*. 1999; Storch 2001).

The Nightjar (*Caprimulgus europeaus*) and Wood Lark (*Lullula arborea*) overlap considerably in their UK breeding distributions due to some overlap in habitat requirements.

The Nightjar is a migratory species that is present in the UK only as a breeding bird, nesting in lowland heaths, conifer plantations, mixed woodland, coppiced woodland, bogs and, less frequently, other open habitats such as dunes and grasslands. Plantation forestry is generally suitable only until canopy closure at 15-20 years of age, although small clearings within mature forestry may be used. Large forests are favoured, with birds missing from apparently suitable small and fragmented forests. The nest is on the ground, typically associated with scattered trees or at the edge of woodland. Adults are generally faithful to a nesting area between years if it remains suitable (Berry 1979) and females may occasionally use the same nest scrapes from one year to the next. When double-brooded, successive nests may be 50-250 m apart (Alexander & Cresswell 1990).

Nightjars are nocturnal, feeding on a variety of night-flying insects and gleaning other invertebrates from vegetation. During the day, birds roost singly in open habitats or woodland, either on the ground or perched in vegetation up to 10 m above the ground, and return to the same roost daily unless disturbed; males typically roost 50–100 m from the nest (Lack 1932; Berry 1979; Cresswell & Alexander 1992). Birds will forage over a variety of habitats, including forestry and woodlands, gardens, wetlands and open heath, showing a preference for deciduous and mixed woodland. Arable and improved grassland is avoided, but farmland was an important part of foraging habitat.

Foraging habitat quality may influence nest site selection as birds typically range only short distances from the nest site to feed: in Breckland within 1 km of the nest and in Dorset an average distance of 3 km from the nest (Berry 1979; Alexander & Cresswell 1990). Home-range size is typically 5–6 ha (Berry 1979). However, in a radio-telemetry study in Dorset, birds foraged as much as 7 km from nest areas in deciduous woodland, gardens and wetland areas – few fed in the heaths and conifer forests in which they nested (Alexander & Cresswell 1990). The majority of the British population is now associated with conifer plantations, where the availability of open forest structure, either as clear-felled areas or young restock is crucial.

The Woodlark occurs primarily in lowland heath and young conifer plantations, but small numbers nest in rough grasslands (especially downlands), woodland clearings and other open habitats such as set-aside, arable, horticultural habitats and dunes (Sitters *et al*. 1996; Wotton & Gillings 2000). Most territories lack shrub or tree canopy, but when present this was typically very sparse (Sitters *et al*. 1996). Eighty five percent of territories in 1997 were in habitats growing on sandy, especially acidic, soils, but in Devon up to 20% were on clays (Wotton & Gillings 2000).

Diet comprises largely invertebrates during the breeding period, but at other times also includes seeds taken from a wide range of open habitats. Woodlarks use clear-felled areas and young conifer plantations, but the latter begin to become unsuitable as early as 5-8 years after planting, probably as a result of increased ground cover rather than tree maturation (Bowden 1990; Bowden & Hoblyn 1990). Grazing regimes in heath and grasslands appear to be critical for Woodlarks, as short-swards (<5 cm) and bare ground are favoured foraging areas, and re-instatement of grazing in some areas, *e.g.* Breckland, has been beneficial (Bowden 1990; Sitters *et al*. 1996).

Territories in conifer plantations are relatively large at around 3 ha, but birds forage close to the nest when feeding young, with most movements of less than 400 m (Bowden 1990). Woodlarks are partial migrants,

some leaving breeding areas during winter, but probably not moving far (Sitters 1986; Wernham *et al*. 2002). Those birds wintering in Britain tend to occur in small flocks, and may include continental migrants, but movements have not been studied. Little is known of habitat use in winter, but flocks have been recorded in set-aside and stubbles (Wotton & Gillings 2000).

The evaluation of habitat use by Scottish Crossbills (*Loxia scotica*) is problematic due to the difficulties in identifying them in the field from both Common Crossbills (*Loxia curvirostra*) and Parrot Crossbills (*Loxia pytyopsittacus*).

All three species breed in Scottish conifer forests, but recent evidence suggests that the occurrence of Parrot Crossbills is influenced strongly by irruptions from Continental Europe and the species remains a rare breeding bird in the UK. Examination of museum specimens supports historical evidence that the majority of 'large-billed' crossbills occurring in Scotland were Scottish Crossbills. However, recent surveys based on call analysis suggest a wider distribution for Scottish Crossbills than previously described in the *New Atlas* (Gibbons *et al*. 1993). Although the core distribution remains forested areas of Deeside, lower Strathspey, Great Glen, and Easter Ross, records were widespread throughout Nairn, and Moray and Banff (NW Grampian), and there were scattered records in recently forested areas of Sutherland and Caithness.

Scottish Crossbills may be more generalist in their use of conifer forests than is traditionally thought, utilising mixed conifer plantations as well as natural and semi-natural Scots Pine (*Pinus sylvestris*) woodland. However, they show preference for Scots Pine woodland, even though they feed in a variety of conifer species (Summers *et al*. 2002).

The movements of all species of crossbills are thought to be similarly complex and determined by food availability (cone crops). The Scottish Crossbill appears to be no exception, moving to take advantage of differing patterns of cone maturation (Nethersole-Thompson 1975; Gibbons *et al*. 1993), but nothing is known about movements of individual birds and, hence, the characteristics of a functional unit system for the species. Mature plantation forestry, especially containing Scots Pine, is clearly important to the Scottish Crossbill population.

Other species reviewed

SPAs have been designated or may be considered in future for a number of passerines that have a functional reliance on cropped habitats; Chough, Dartford Warbler, Twite, and Ring Ouzel.

The Chough (*Pyrrhocorax pyrrhocorax*) was once far more abundant and widespread in Britain than it is now, occurring from southern England to northern Scotland. The population began to decline in the late 18th century, and widespread changes in farming practice may have been the primary cause, although shooting may have made a significant localised contribution (Owen 1988).

Choughs are territorial and highly site-faithful during the breeding period and are central-place foragers, typically remaining within 1 km of the nest at coastal sites and within 3 km at inland sites (Bullock *et al*. 1983; Roberts 1985; Johnstone *et al*. 2002). Short-sward (<4 cm) rough pastures and maritime turf are favoured foraging habitats, and both rocky and bare ground are also used by birds (Warnes 1982; Bullock *et al*. 1983; Roberts 1983; Johnstone *et al*. 2002). Birds that breed inland showed a preference for sheep-grazed rough pasture, but also made use of improved grassland.

In Scotland, cattle-grazed pastures are an important habitat, with the diet composed largely of dung beetles (*Aphodius* spp.). Soil, ground and dung living invertebrates form the mainstay of the birds' diet, especially Tipulid larvae, adults and larvae of beetles (Coleoptera; including dung beetles *Aphodius* spp.), spiders (Arachnidae), ants (Formicidae), and earwigs (*Forficula auricularia*) (Warnes 1982; Roberts 1989; Warnes & Stroud 1988). Changes in management of rough grassland leading to longer swards and loss of rough grassland to other crop types are both responsible for localised reductions in Chough numbers and remain the most significant threat (Bullock *et al*. 1983; Johnstone *et al*. 2002).

Non-breeding birds during the breeding period utilised a wide range of habitats over an extensive area, preferring grasslands, and in winter making greater use of heath, although spatial information is not specified (Bignal *et al*. 1988). In winter, birds typically form large communal roosts and loose foraging flocks, changing roost locations to take advantage of food availability (Monaghan 1988). Paired birds may also continue to use

the nest area to roost and feed in, and may be accompanied by their young of the year (Bignal *et al*. 1988). Short-sward rough pastures remain a primary foraging habitat in winter. Choughs at the coast feed predominantly in grazed maritime and dune grasslands, also feeding amongst the tide line on invertebrates associated with washed up seaweeds.

Improved grasslands are used rarely, but birds feed on spilled grain within cereal stubbles and forage in root crop fields (Bullock *et al*. 1983; Warnes & Stroud 1988). In some areas, reliance on dung invertebrates may increase outside of the breeding period (Roberts 1983; Johnstone *et al*. 2002). Limited information suggests that flocks do not travel far from the roost site to foraging areas; in two separate studies maximum distances were 5 km and 8 km (Warnes 1982). An overview of the Chough's functional unit system is given by Bignal *et al*. (1988), highlighting that low-intensity pastoralism is the key habitat management factor for the species.

The Dartford Warbler (*Sylvia undata*) is resident and relatively sedentary, occurring in lowland heaths that have stands of gorse (*Ulex europea*) and mature heather in which to nest. Pairs tend to be site-faithful and hold territories all year round, but in years of high population density some adults may undertake partial migration and have been recorded in Ireland, the Channel Islands and NW France. Diet is almost entirely invertebrates, including spiders, beetles, bugs and Lepidoptera larvae. Open, extensive heaths with frequent patches of gorse shrub are favoured, while fragmented heath and that close to woodland avoided (Bibby 1978). The species does not make extensive use of cropped habitats in the UK, although winter habitat use and diet is unknown away from breeding areas.

Ring Ouzels (*Turdus torquatus*) nest on rocky outcrops in upland moorlands, foraging in moorland and semi-improved pastures. Open, grassy habitats were preferred foraging areas, and grazed areas with short-swards were the most favoured. However, bracken patches were also used for foraging, although woodland was avoided. Birds would forage as far as 860 m from the nest, but the majority remained within 450 m, and mean range size was around 5 ha. Diet was predominantly earthworms, but Tipulids and ground living invertebrates were also important (Burfield 2002).

Although a moorland nesting species, the Twite (*Carduelis flavirostris*) feeds in adjacent flower-rich meadows, rough pastures and other weedy habitat features. Fields used for foraging may be up to 3.5 km from the nest, and after fledging birds move into suitable feeding areas, which are typically relative close to nesting areas (average 2.4 km, up to 8.2 km from nests). There is no further information on factors influencing field selection. A wide variety of seeds is taken and birds exploit differing seed sources as they become available. After meadows are cut in summer, weedy features, such as road-side banks, become more important foraging areas.

In the Western Isles of Scotland, machair habitats are important where they occur, with birds feeding on fallow areas and in patches of vegetables up to 2 km from the nest during breeding. In these areas, bird forage in grasslands and meadows once the young have fledged (RSPB, unpublished).

Twite move away from their moorland nesting haunts in winter to the lowlands and coasts. The majority of English birds are found wintering along coasts, foraging almost exclusively in saltmarsh. Birds that breed elsewhere in Britain also make use of cropped habitats, especially foraging amongst stubbles of a variety of crops and in weedy turnip fields (Clark & Sellers 1997, 1998 & 1999; Hancock & Wilson 2003; Brown & Grice 2005).

Appendix [11.]3 References

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