The UK Approach to assessing Conservation Status for the 2019 Article 17 reporting under the EU Habitats Directive

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Contents

1. Introduction

1.1. Article 17 reporting

This document sets out how the UK has approached the 2019 reporting under Article 17 of the EU Habitats Directive. Article 17 requires Member States to report on the general implementation of the Directive and on the conservation status of habitats and species listed under Annexes I, II, IV and V of the Directive that occur in their territory every six years.

Article 1(e) of the Directive defines favourable conservation status of a habitat as when:

its natural range and areas it covers within that range are stable or increasing, and; the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and; the conservation status of its typical species is favourable as defined in Article 1(i).

Article 1(i) of the Directive defines favourable conservation status of a species as when:

population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and; the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and; there is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long term basis.

To assist Member States with the 2019 reporting, the European Commission created a set of general evaluation matrices to assess conservation status (see Appendix 1: General evaluation matrices to assess conservation status), developed a set of Explanatory Notes and Guidelines[1], and set out a comprehensive format for the reporting[2]. The Guidelines explained how conservation status and its component parameters should be assessed, and how each of the reporting fields should be completed.

The 2019 Article 17 report, which relates to the 2013-2018 six-year reporting period, is the fourth of its kind, but only the third report on conservation status, the first report in 2001 focusing solely on implementation of the Directive.

1.2. Background information and aggregation

The UK approach to the assessment of conservation status was very closely aligned to the requirements set out by the European Commission[1]. The reporting format was completed for each habitat and species (feature), providing information in all the mandatory reporting fields. There were several additional optional reporting fields, which were generally not completed. For most fields, a pre-determined reporting category/option had to be selected or specific information provided. Fields completed and not completed are listed at the beginning of each section of this document.

Most of the background information used to create the UK reports was provided by the statutory nature conservation bodies (SNCB) in England (Natural England), Northern Ireland (Northern Ireland Environment Agency), Scotland (Scottish Natural Heritage), Wales (Natural Resources Wales) and UK (JNCC) – referred to as the SNCBs hereafter. Depending on the habitat/species concerned, individual country conservation bodies provided information on terrestrial and marine inshore environments in their country, whilst JNCC covered marine

[1] DG Environment (2017) Reporting under Article 17 of the Habitats Directive: Explanatory Notes and Guidelines for the period 2013–2018. Brussels. Available to download at: http://cdr.eionet.europa.eu/help/habitats_art17/

[2] DG Environment (2016) Reporting under Article 17 of the Habitats Directive: Report format for the period 2013-2018. Brussels. Available to download at: http://cdr.eionet.europa.eu/help/habitats_art17/

offshore waters. In all cases the SNCBs worked closely together to produce the final UK assessments.

Information was also provided from a range of other sources, including non-governmental organisations (NGO), academia, industry etc. and all relevant sources of information used to produce the UK assessments were listed in the individual feature reports.

Information for most habitats and species was collated at country level initially using the EC reporting format and completing a set of 'free text' audit notes explaining decisions taken. These reports were then combined by JNCC through an 'aggregation' process. The methods used (see Appendix 2: Methods used to aggregate country/offshore information) depended on the type of information that was being aggregated. In some cases, all that was required was to concatenate the text (e.g. sources of information field), sum the values (e.g. habitat area, species population size fields), select the earliest and latest year (e.g. short-term trend period field), or to select a particular category (e.g. reason for change fields).

The method for some fields was more complex: it involved converting the country information to values, summing these values, and converting them back using numeric ranges (e.g. short-term trend direction fields); sometimes the converted values were weighted (multiplied) by the proportion of the total habitat area or species population in each country (e.g. method used fields). Some of the aggregation was determined manually: (i) where the country information was too dissimilar to aggregate using simple formulae; (ii) where the country information included 'unknown' or 'uncertain' entries; and (ii) when the outcome of the aggregation was judged to be incorrect. Aggregation was not required for habitats and species that occurred entirely within a single UK country (e.g. H91C0 Caledonian Forest (Scotland-only) and S5076 Pollan (Northern Ireland-only)).

The aggregated country information was used to assess conservation status at UK-level and to produce the UK reports submitted to the European Commission. The latter were finalised in consultation with the habitat and species specialists within the SNCBs.

Most habitats required country level information to be aggregated. However, the marine habitats had some aspects of the Range assessment completed at UK level and the report for one marine habitat (H1180) was produced directly at UK-level because the habitat is mainly found offshore with a small proportion occurring in Welsh inshore waters. Therefore, the information supplied by NRW was incorporated directly into the UK report.

Most species required country level information to be aggregated. However, a few species were assessed at UK level only, e.g. marine mammals, whilst others required a mixed approach, e.g. terrestrial mammals.

Details of the approach used for different habitat and species groups are provided in the relevant sections of this document.

2. Habitats assessments

2.1. Habitats included

Reports were submitted on all 77 habitats listed on the EU Habitats Directive Annex 1 that occurred within the UK. These included 69 terrestrial and 8 marine habitats, as listed in **Table** 1 and **Table** 2, respectively.

Table 1 List of UK terrestrial habitats that were reported on in the 2019 UK Article 17 reporting.

Code	Habitat name
H1210	Annual vegetation of drift lines
H1220	Perennial vegetation of stony banks
H1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
H1310	*Salicornia* and other annuals colonising mud and sand
H1320	*Spartina* swards (Spartinion maritimae)
H1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
H1340	Inland salt meadows
H1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)
H2110	Embryonic shifting dunes
H2120	Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)
H2130	Fixed dunes with herbaceous vegetation ('grey dunes')
H2140	Decalcified fixed dunes with *Empetrum nigrum*
H2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)
H2160	Dunes with *Hippophae rhamnoides*
H2170	Dunes with *Salix repens* ssp *argentea* (Salicion arenariae)
H2190	Humid dune slacks
H21A0	Machairs
H2250	Coastal dunes with *Juniperus* spp.
H2330	Inland dunes with open *Corynephorus* and *Agrostis* grasslands
H3110	Oligotrophic waters containing very few minerals of sandy plains
H3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
H3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
H3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation
H3160	Natural dystrophic lakes and ponds
H3170	Mediterranean temporary ponds
H3180	Turloughs
H3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
H4010	Northern Atlantic wet heaths with *Erica tetralix*
H4020	Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*
H4030	European dry heaths
H4040	Dry Atlantic coastal heaths with *Erica vagans*
H4060	Alpine and Boreal heaths
H4080	Sub-Arctic *Salix* spp. scrub
H5110	Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.)
H5130	*Juniperus communis* formations on heaths or calcareous grasslands
H6130	Calaminarian grasslands of the Violetea calaminariae
H6150	Siliceous alpine and boreal grasslands
H6170	Alpine and subalpine calcareous grasslands

Code	Habitat name
H6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)
H6230	Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)
H6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
H6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
H6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
H6520	Mountain hay meadows
H7110	Active raised bogs
H7120	Degraded raised bogs still capable of natural regeneration
H7130	Blanket bogs
H7140	Transition mires and quaking bogs
H7150	Depression on peat substrates of the Rhynchsporion
H7210	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae
H7220	Petrifying springs with tufa formation (Cratoneurion)
H7230	Alkaline fens
H7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae
H8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopietalia ladani)
H8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)
H8210	Calcareous rocky slopes with chasmophytic vegetation
H8220	Siliceous rocky slopes with chasmophytic vegetation
H8240	Limestone pavements
H8310	Caves not open to the public
H9120	Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)
H9130	Asperulo-Fagetum beech forests
H9160	Sub-Atlantic and medio-European oak and oak-hornbeam forests of the Carpinion betuli
H9180	Tilio-Acerion forests of slopes, screes and ravines
H9190	Old acidophilous oak woods with *Quercus robur* on sandy plains
H91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
H91C0	Caledonian Forest
H91D0	Bog woodland
H91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
H91J0	*Taxus baccata* woods of the British Isles

Table 2 List of UK marine habitats that were reported on in the 2019 UK Article 17 reporting.

Code	Habitat name
H1110	Sandbanks which are slightly covered by seawater all the time
H1130	Estuaries
H1140	Mudflats and sandflats not covered by seawater at low tide
H1150	Coastal lagoons
H1160	Large shallow inlets and bays
H1170	Reefs
H1180	Submarine structures made by leaking gases
H8330	Submerged or partially submerged sea caves

2.2. Habitat Range

Mandatory and optional fields completed: 2.1 Year or period; 2.2 Distribution map; 2.3 Distribution map method used; 4.1 Surface area; 4.2 Short-term trend Period; 4.3 Short-term trend Direction; 4.5 Short-term trend Method used; 4.10 Favourable Reference Range; 4.11 Change and reason for change in surface area of range; 4.12 Additional information (optional field completed to provide essential information on the assessment).

Optional fields not completed: 2.4 Additional maps; 4.4 Short-term trend Magnitude; 4.6 Long-term trend Period; 4.7 Long-term trend Direction; 4.8 Long-term trend Magnitude; 4.9 Long-term trend Method used.

The status of the Range of a habitat was assessed by:

- producing a distribution map;
- using a modelling tool to calculate the range surface area;
- assessing information on trends in range surface area;
- comparing the current range surface area with a Favourable Reference Range; and
- determining a conclusion on Range by applying thresholds/rules as set out in an evaluation matrix.

2.2.1. Distribution maps

UK distribution maps (**field 2.2**) were created to show the occurrence of habitats at a 10-km square scale. For terrestrial and inshore areas, these were based on the British National Grid (OSGB36) and Irish National Grid (TM65) projections, and for offshore areas the WGS84 projection was used. All of the 10-km square data, and the sources used to compile this, were summarised in spreadsheet format. The UK distribution maps were converted into the European ETRS89 grid using a standardised method (see Appendix 3: Conversion of distribution data to the ETRS grid).

The date range reported for the distribution map (**field 2.1**) was based on the earliest and latest years identified in the country/offshore information (see Appendix 2: Methods used to aggregate country/offshore information for method). The latter were based on when the habitat was actually recorded, when such information was compiled, the 2019 reporting period (2013-2018), or the short-term trend period (2007-2018). In many cases, records from before 2019 reporting period were used because it was considered likely that the habitat was still present even though it had not been recorded recently, i.e. both known and suspected locations were included.

There were four options to report the method used to create the distribution maps (**field 2.3**): (a) complete survey or a statistically robust estimate; (b) based mainly on extrapolation from a limited amount of data; (c) based mainly on expert opinion with very limited data; and (d) insufficient or no data available. This field was completed by considering how complete/ representative the 10-km square data were of the distribution of the habitat. The ‘complete survey or a statistically robust estimate’ option was interpreted broadly and selected if information on the habitat distribution was generally comprehensive. For marine habitats, the option that best matched the method used was selected.

No additional distribution maps were created (**field 2.4**). However, optional UK range maps were produced as these provided a visual display of the habitat range surface area. They did not constitute part of the UK report submission to the European Commission.

2.2.2. Range surface area calculation

Range surface area for terrestrial habitats **(field 4.1)** was calculated using: (i) the 10-km square distribution data (see above); (ii) the same range mapping tool used for the 2013

Article 17 reporting; and (iii) range surface area clipped to UK coastline for terrestrial habitats. The mapping tool generated a set of 'best-fitting' polygons around each grouping of 10-km squares. The range surface area was based on the total area enclosed by these polygons. An adjustable 'gap distance' parameter of 'alpha' was used to determine how tightly the polygons fitted. Alpha was set at 25 km for all terrestrial habitats, meaning that gaps of over 50 km in the distribution were required to create separate polygons. The smallest (non-clipped) range unit was normally an individual 10-km square. However, all polygons were clipped along the coastline to exclude areas of sea, and a specific clipping was applied to coastal habitats (H1210 to H2250, excluding H1340) to exclude any areas more than 10-km inland from the coastline (see Appendix 3: Conversion of terrestrial distribution data to the ETRS grid).

A different approach was used to produce the UK range surface area calculations for the eight marine habitats, because in many cases their range was determined primarily by physical and geological processes occurring over geological time-scales:

- for H1110, the UK range surface area was defined by the area of sloping sandy sediment habitat down to 60m and connected to sandbank habitat in less than 20m of water; the troughs of the banks were included for relevant offshore MPAs for which they are included in the feature definition;
- for H1130, H1140, H1150 and H1160, the UK range surface areas were the same as the UK distribution maps; and
- for H1170, H1180 and H8330, the UK range surface areas were developed from the UK distribution map. H1170 additionally included an area of iceberg ploughmarks off North-West Scotland in offshore waters, where cobble reefs had been recorded, and H1180 and H8330 included additional areas where there was potential for the habitat to occur based on an understanding of seabed geology.

Unlike the 2007 and 2013 Article 17 reporting, there was no requirement to submit UK habitat range maps to the European Commission.

2.2.3. Trend in Range

Short-term trends in the surface area of the Range of a habitat were reported on (**field 4.3**). There were no major issues aggregating the short-term trends for range in the country-level information (see Appendix 2: Methods used to aggregate country/offshore information for method), and all these trends were reported as stable. For marine habitats this was completed directly at UK-level using expert judgement and all trends were reported as stable except H1170, H1180, which were reported as uncertain.

The short-term trend period (**field 4.2**) was reported as 2007-2018, on the assumption that underpinning 10-km square distribution data were representative of the short-term trend period defined in the EU Reporting Guidelines. The options to report on the method used to determine the short-term trend in range (**field 4.5**) were the same as for the distribution maps, and this was completed using the same approach (see 2.2.1. Distribution maps).

Reporting of short-term trend magnitude (**field 4.4**) and long-term trend information (**fields 4.6-4.9**) was optional and not undertaken.

2.2.4. Favourable Reference Range

The conclusion on the Range of a habitat was partly based on the Favourable Reference Range (FRR) (**field 4.10**). FRRs were used to determine if the current range area was sufficiently large to allow the long-term survival of the habitat. Reporting options for FRRs

were: (a) provide a value for the FRR (in km^2); (b) use operators to describe the relationships between the FRR and current range area[3]; or (c) indicate if the FRR was unknown. FRR values or operators were identified for nearly all habitats. The FRR remained unknown only for H4080, H5130, H1170 and H1180. No changes were made to the relationships between the FRR and current range areas, and the use of FRR values and FRR operators remained the same, i.e. operators were only used for H1210 (> more than), H1320 (>> much more than), and H7120 (< less than). Nevertheless, 41 FRR values were updated to take account of improved information on the area of the habitat range.

Notes were included under **field 4.10d** to explain the relationship between the FRR and the current range area, where the FRR value has been updated, and where further information could be obtained on the approach taken to set the FRR. For marine habitats, supplementary information was included under **fields 4.10d** and **4.12**.

2.2.5. Reasons for change in Range area

Reasons for change in range surface area (compared to the range area reported in the 2013) were reported (**field 4.11**). Four options were available: (a) due to genuine change; (b) due to improved knowledge or more accurate data; (c) due to the use of a different method; and (d) no information on the nature of change. The range surface area of 41 habitats differed, but this was always due primarily to improved knowledge/ more accurate data, i.e. there was no genuine change in range surface area.

2.2.6. Range conclusions

Conclusions were reached on the status of the Range of all habitats (**field 10.1**). These were determined using the relevant section of the General Evaluation Matrix for assessing conservation status of a habitat type (see Appendix 1: General evaluation matrices to assess conservation status). **Table 3** summarises this information, showing how the short-term trend direction in range area and the relationship between the range surface area and the FRR combined to determine if the conclusion for Range should be Favourable, Unfavourable-inadequate, Unfavourable-bad or Unknown. In most cases (n = 64) the conclusion reached on Range was Favourable. The conclusion for one habitat was Unfavourable-inadequate, two were Unfavourable-bad, and four remained Unknown.

Table 3 Relationship between the short-term trend in range surface area (top rows), the current range surface area and Favourable Reference Range (FRR) (left-hand column), and the conclusion on conservation status of the Range of a habitat (the coloured cells indicate which conclusion should be applied).

	Short-term trend in range surface area			
	Unknown	**Increasing or stable**	**Decline 1% or less per year**	**Decline >1% per year**
Range area or FRR is unknown	Unknown	Unknown	Unfavourable-inadequate	Unfavourable-bad
Range area > or = FRR	Unknown	Favourable	Unfavourable-inadequate	Unfavourable-bad
Range area up to 10% below FRR	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-bad
Range area >10% below FRR	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad

[3] the operators were ≈ (FRR approximately equal to the current range area), > (FRR not more than 10% above than the current range area), and >> (FRR more than 10% above than the current range area); for H7120 Degraded raised bogs the options included ≈, < (FRR not more than 10% below the current range area), and << (FRR more than 10% below the current range area).

2.3. Habitat area

Mandatory and optional fields completed: 5.1 Year or period; 5.2 Surface area; 5.3 Type of estimate; 5.4 Surface area method used; 5.5 Short-term trend Period; 5.6 Short-term trend Direction; 5.8 Short-term trend Method used; 5.13 Favourable Reference Area; 5.14 Change and reason for change in surface area; 5.15 Additional information (optional but completed to provide essential information on the assessment process).

Optional fields not completed: 5.7 Short-term trend Magnitude; 5.9 Long-term trend Period; 5.10 Long-term trend Direction; 5.11 Long-term trend Magnitude; 5.12 Long-term trend Method used.

The status of the Area covered by a habitat was assessed by:

- estimating the area of a habitat;
- assessing information on the trend in the habitat area;
- comparing the current area with a Favourable Reference Area; and
- selecting a conclusion on Area.

2.3.1. Area

The area of habitats at a UK-level (**field 5.2**) was determined by summing the area values supplied in the country information (terrestrial habitats) or calculated directly at the UK-level for marine habitats, using data collated from the inshore regions of the four countries and from the offshore region. A best estimate was identified for most habitats (**field 5.3**), but there were four habitats (H3140-60, H7140) where a minimum area value had to be reported, because at least one of the country area values was a minimum. For H1180, H3260, H7150 H8310, and H8330, the country area information was incomplete, which meant the UK area was unknown and no area value was reported.

The date range for the surface area (**field 5.1**), and the method used to determine the surface area (**field 5.4**), were both reported in a similar manner to the corresponding distribution map fields (see 2.2.1).

The area values reported were often approximate; some were based on information that pre-dated the 2019 reporting period; some relied on extrapolation from information collected using other habitat classes, e.g. some woodland Annex I habitat areas were derived from habitat classes used for the National Forestry Inventory; some were simply estimated based on expert knowledge; some were based on remote sensing or aerial photo imagery; and some were based on information that pre-dated the 2019 reporting period.

For marine habitats, area values were derived from data sources that were classed as ‘high confidence’ or ‘potential habitat’ data. The data were derived from sources such as: ground-truthing survey data, remote sensing imagery and broad-scale geological maps. See JNCC website (https://jncc.gov.uk/our-work/marine-habitat-mapping/) for detailed methods.

2.3.2. Trend in Area

Short-term trends in the surface area of habitats were reported as either stable, decreasing, increasing or uncertain (**field 5.6**). Uncertain applied where data was not sufficient to determine the trend direction.

Trends for terrestrial habitats were determined by aggregating the short-term trends provided in the country-level information (see Appendix 2: Methods used to aggregate country/offshore information for method).

Several issues were encountered:

- about a quarter of the country trends were unknown or uncertain;
- a few habitats had contrasting trends, with a decreasing trend in one country and an increasing trend in another country;
- additional information on the amount/rate of change in area was sometimes limited or not available;
- most country trends were based on information that only partially aligned with the 2019 reporting period or pre-dated it, related to only part of the total habitat area, and/or were derived from information collected using other habitat classes;
- some country trends were based on limited information and expert opinion;
- in a few cases, trends at a country-level that were based on very small changes in area.

Where such issues arose, the available information was assessed, and a decision made on the most likely trend at a UK-level. Additional information was sometimes asked for from the SNCBs, and habitat specialists within the SNCBs were consulted on some of the decisions. When the trend of more than half of the total habitat area was uncertain or unknown, the UK trend was then set as uncertain. Very small (negligible) changes in area at a country-level were sometimes treated as stable at a UK-level.

For marine habitats, expert judgement was used to identify the short-term trend in area, directly at UK-level.

For most habitats, there was sufficient information to report the trend direction as either increasing, stable, or decreasing. Where the trend area was reported as decreasing, notes were included under **field 5.15** to make clear if the trend was considered to be, decreasing by 1% or less per year, or by more than 1% per year. This was done to assist with concluding on the status of habitat area (see 2.3.5. Area conclusions). However, for five terrestrial and six marine habitats, the trend was reported as uncertain due to data limitations.

The date range for the short-term trend period (**field 5.5**), and method used to determine the short-term trend in area (**field 5.8**), were both reported in a similar manner to the corresponding distribution map fields (see 2.2.1. Distribution maps).

Reporting of short-term trend magnitude (**field 5.7**) and long-term trend information (**fields 5.9-5.12**) was optional and not undertaken.

2.3.3. Favourable Reference Area

The conclusion on the Area of a habitat was partly based on the Favourable Reference Area (FRA) (**field 5.13**). FRAs were used to determine if the current habitat area was sufficiently large to allow the long-term survival of the habitat. Reporting options for FRAs paralleled those for FRRs (see 2.2.4. Favourable Reference Range).

FRA values or operators were identified for nearly all habitats – there were only five habitats (H1170, H1180, H4080, H6430, H7140, H7150, H7240, H8330) where the FRA remained unknown. The following changes were made to the use of FRA values and operators:

- the FRA value was updated in 18 habitat reports to take account of improved information on habitat area;
- 2 habitats (H8120, H8210) reported an FRA value instead of FRA operator based on the current habitat area; and 12 reported an FRA operator instead of FRA value because it was not clear what the exact area of the FRA was;
- three FRA relationships were changed from 'equal' to 'more than' because the habitat area had declined (H2150, H2160, H4010); one relationship was changed from 'more

than' to 'equal to' because the current area was considered to be sufficient (H2250); one relationship was changed from 'unknown' to 'equal to' (H3170); two were changed from 'unknown' to 'more than' (H3160, H7220); and another was changed from 'unknown' to 'much more than' (H7230).

Notes were included under **field 5.13d** to explain the relationship between the FRA and the current area, where this had been changed, the use of FRA operators, and where further information could be obtained on the approach taken to set the FRA.

2.3.4. Reasons for change in Area

Reasons for change in area were reported when the area of the habitat was different from that reported in 2013 (**field 5.14**). The options available were the same as for the reasons for change in range area (see 2.2.5. Reasons for change in range area). The area of 47 terrestrial habitats changed, but in only 21 cases did this include genuine change, and in only four cases was this mainly due to genuine change. The other changes were primarily due to improved knowledge, more accurate data, and/or the use of a different method. The area of 7 marine habitats changed and in all cases this was primarily due to improved knowledge or more accurate data.

2.3.5. Area conclusions

Conclusions were reached on the status of the Area of all habitats (**field 10.1**). These were determined using the relevant section of the General Evaluation Matrix for assessing conservation status of a habitat type (see Appendix 1: General evaluation matrices to assess conservation status). Table 4 presents summarises this information, showing how the short-term trend direction in area and the relationship between the area and the FRA combined to determine if the conclusion for Area should be Favourable, Unfavourable-inadequate, Unfavourable-bad or Unknown. The conclusions reached on Area were mostly either Favourable (n = 27) or Unfavourable-inadequate (n = 31). Seven conclusions were Unfavourable-bad and 12 were Unknown.

Table 4 Relationship between the short-term trend in area (top rows), the current area and Favourable Reference Area (FRA) (left-hand column), and the conclusion on conservation status of the Area of a habitat (the coloured cells indicate which conclusion should be applied).

	Short-term trend in area			
	Unknown or uncertain	**Increasing or stable**	**Decline 1% or less per year**	**Decline >1% per year**
Area or FRA unknown	Unknown	Unknown	Unfavourable-inadequate	Unfavourable-bad
Area > or = FRA	Unknown	Favourable	Unfavourable-inadequate	Unfavourable-bad
Area up to 10% below FRA	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-bad
Area >10% below FRA	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad

2.4. Structure and functions

Mandatory and optional fields completed: 6.1 Condition of habitat; 6.2 Condition of habitat Method used; 6.3 Short-term trend of habitat area in good condition Period; 6.4 Short-term trend of habitat area in good condition Direction; 6.5 Short-term trend of habitat area in good condition Method used; 6.6 Typical species; 6.8 Additional information (optional but completed to provide essential information on the assessment process).

Optional fields not completed: 6.7 Typical species Method used.

The status of the Structure and functions of a habitat was assessed by:

- evaluating the condition of the habitat;
- assessing the trend in habitat condition; and
- selecting a conclusion on Structure and functions.

2.4.1. Habitat condition

The area of habitat in good (favourable) condition, not good (unfavourable) condition, and unknown condition was reported on (**field 6.1**). The information reported was derived by aggregating the statistics provided in the country/offshore information (see Appendix 2: Methods used to aggregate country/offshore information for method). For many habitats, the assessment of favourable condition was based on the Common Standards Monitoring (CSM) methodology[4].

Statistics on the area of habitat in good and not good condition were reported for most habitats, but this usually accounted for only part of the total habitat area. For the majority of terrestrial habitats, the condition of at least half of the total habitat area was known; but there were five habitats where this applied to less than 20% of the total area (H7130, H9130, H9180, H91C0, H91E0). For six marine habitats, the condition of a least half of the total habitat area was known.

Condition statistics were not reported for rivers (H3260), and were only partially reported for H3130-60, H7150 and H8310. Nevertheless, for all of these habitats (except H8310), there was sufficient information to at least give an indication of what percentage of the habitat was in favourable/unfavourable condition, and this was included as additional information under **field 6.8**. No condition statistics were reported for H1180 and H8330, due to lack of information, but the number of sea caves (H8330) in good/not good condition was detailed under **field 6.8**.

The options to report on the method used to determine the surface area (**field 6.2**) were the same as for the distribution maps, and this was completed using the same approach (see 2.2.1. Distribution maps).

2.4.2. Trend in habitat in good condition

Short-term trends in the area of habitat in good (favourable) condition (**field 6.4**) were determined by aggregating the short-term trends provided in the country/offshore-level information for terrestrial and marine habitats (see Appendix 2: Methods used to aggregate country/offshore information for method). For most habitats, the trend direction was reported as either increasing, stable, or decreasing, but the trend for nine habitats was reported as unknown or uncertain due to a lack of information.

The date range for the short-term trend period (**field 6.3**), and method used to determine the short-term trend (**field 6.5**), were both reported in a similar manner to the corresponding distribution map fields (see 2.2.1. Distribution maps).

Reporting of typical species (**fields 6.6, 6.7**) was not undertaken. Nevertheless, the status of a range of plant and other species (depending on the habit type) was considered when the condition of habitats was assessed using CSM Guidance.

[4] for details see JNCC Guidance for Common Standards Monitoring https://jncc.gov.uk/our-work/common-standards-monitoring-guidance/

2.4.3. Structure and functions conclusions

Conclusions were reached on the status of the Structure and functions of all habitats (**field 10.3**). These were determined using the relevant section of the General Evaluation Matrix for assessing conservation status of a habitat type (see Appendix 1). Table 5 summarises this information, showing how the assessment depended on the percentage of habitat in favourable/unfavourable condition. For consistency with the 2013 UK reporting, the threshold used to conclude on Favourable status of structure and functions was 95% in favourable (good) condition, which was slightly higher than the indicative value of 90% in the EU Reporting Guidelines.

The statistics on reported under **field 6.1** (see 2.4.1. Habitat condition) were used to determine what percentage of a habitat was in good/not good (favourable/unfavourable) condition. The first step was to calculate if at least 25% of the habitat area was in unfavourable condition. In such cases, it was clear that the Unfavourable-bad conclusion applied. For the remaining terrestrial habitats, the area in favourable/unfavourable condition was determined using the statistics on that part of habitat where condition had been assessed (**fields 6.1a-b**), i.e. it was assumed that these statistics were representative of the condition of the habitat as a whole.

This second step was not applied to marine habitats, to ensure the approach taken was consistent with that used for the 2013 reporting. Nevertheless, where an Unfavourable-inadequate conclusion was reached which could potentially have been Unfavourable-bad, if some of the habitat area in unknown condition was in unfavourable (not good) condition, this was stated as additional information under **field 6.8**.

In most cases, this provided a clear indication of which conclusion should be selected. On only a few occasions where the results close to the thresholds shown in **Table 5** (Relationship between the percentage of habitat in good (favourable) or not good (unfavourable) condition and the conclusion on conservation status of the Structure and functions of a habitat (the coloured cells indicate which conclusion should be applied)). Where this happened, any additional information supplied in the country/offshore information was used to help decide on the conclusion, consideration was particularly given to the precision and representatively of the aggregated condition statistics, and habitat specialists within the Country Agencies were consulted on some of the decisions. For H3260, the amount of habitat in favourable/unfavourable condition was determined from the additional information supplied under **field 6.8** and the audit notes for **field 6.1**.

Most conclusions reached on Structure and functions were Unfavourable-bad (n = 60). Eight of the remaining conclusions were Unfavourable-inadequate, seven were Favourable, and only two were Unknown.

Table 5 Relationship between the percentage of habitat in good (favourable) or not good (unfavourable) condition and the conclusion on conservation status of the Structure and functions of a habitat (the coloured cells indicate which conclusion should be applied).

	% in favourable condition	% in unfavourable condition
Unknown	unknown	unknown
Favourable	at least 95%	no more than 5%
Unfavourable-inadequate	75-<95%	>5-25%
Unfavourable-bad	less than 75%	more than 25%

2.5. Future prospects

Mandatory and optional fields completed: 9.1 Future prospects of parameters; 9.2 Additional information (optional but completed to provide essential information on the process).
Optional fields not completed: none

The status of the Future prospects of a habitat was assessed by:

- identifying the Future prospects of Range, Area, and Structure and functions; and
- selecting a conclusion on Future prospects.

2.5.1. Future prospects of Range, Area, and Structure and functions

Future prospects were reported for Range, Area, and Structures and functions (**field 9.1**). The timeframe used was the next two reporting cycles i.e. 2019-2030. The process to determine the Future prospects of a habitat involved two steps.

Firstly, the *future trends* were identified for each parameter. The second step involved combining the future trends with the current conservation status of each parameter to decide on the *future prospects* of each parameter. **Table** 6 explains the approach further and shows the future trend and future prospects categories. Future trends were identified in the country-offshore information and aggregated into UK-level future trends (see Appendix 2: Methods used to aggregate country/offshore information for method). The latter were used to decide on the Future prospects of each parameter and were reported as additional information (**field 9.2**).

Table 6 Method to determine the future trends and future prospects of habitats. The likely balance between anticipated impacts from threats and potential improvements from measures and other remediating factors (column 1) were considered and used to determine the future trend (column 2). The future trend was then combined with the current conservation status (column 3) to determine the future prospects (column 4). Based on Table 32 in the EU Reporting Guidelines[1]

Balance between anticipated threats and improvements	Future trend	Current conservation status of parameter	Future prospects	
Threat impacts and improvements equal; threats mostly insignificant or medium-impact; status of parameter not expected to change	Overall stable	Favourable	Good	
		Unfavourable-inadequate	Poor	
		Unfavourable-bad	Bad	
		Unknown	Unknown	
Threat impacts exceed improvements irrespective of measures taken; threats mostly high- or medium-impact; status of parameter expected to decline	Negative/very negative	Favourable	Poor	Bad
		Unfavourable-inadequate	Poor	Bad
		Unfavourable-bad	Bad	
		Unknown	Poor	Bad
Improvements exceed threat impacts; threats mostly low or no impact; status of parameter expected to improve	Positive/very positive	Favourable	Good	
		Unfavourable-inadequate	Poor	Good
		Unfavourable-bad	Poor	Good
		Unknown	Poor	Good
Threats and measures poorly understood, not possible to predict balance between anticipated threats and improvements	Unknown	Favourable	Unknown	
		Unfavourable-inadequate		
		Unfavourable-bad		
		Unknown		

For Range and Area, the following thresholds were used to guide the selection of future trends:

- negative future trends equate to an expected decline of <1% per year;
- positive future trends equate to an expected increase <1% per year;
- very negative future trends equate to an expected decline of ≥1% per year;
- very positive future trends equate to an expected increase of ≥1% per year.

For Structure and functions, the future trend referred to the area of habitat in good condition, and the difference between negative/very negative and positive/very positive trends was based on whether declines/improvements were expected to be limited or moderate (negative/positive trend) or more substantive (very negative/very positive trend).

Future trends provided in country/offshore-level information were aggregated to UK level for terrestrial and marine habitats (see Appendix 2: Methods used to aggregate country/offshore information for method). Similar issues were encountered, including that: some of country-level future trends were unknown; a few habitats had contrasting trends (with a negative future trend in one country and a positive future trend in another country); and additional information on the rate of expected change was very limited.

An additional step was taken for 41 terrestrial habitats that were known to be sensitive to Nitrogen (N) deposition and had an assigned N Critical Load (N CL) (see Appendix 6: Nitrogen Critical Load exceedance in terrestrial habitats). For these habitats:

- where the estimated area of habitat N CL exceedance was >25%, the future prospects for structure and functions were always reported as Unfavourable-bad; and
- where N CL exceedance was between 5-25%, the future prospects for structure and functions were reported as at least Unfavourable-inadequate.

Notes was included under **field 9.2** to explain whether the future prospects for structure and functions took into account the level of N CL exceedance.

Although the approach to determine the future trends and future prospects provided some objectivity and consistency, judgements on future trends were inevitably subjective, depending on the knowledge-base and outlook of the individuals involved. Judging future trends was more difficult for Area than for Range, and most difficult for Structure and functions.

For most habitats, future prospects were reported for all parameters. The number of future prospects that were unknown was higher for area (n = 10), than for range (n = 5) and structure and functions (n = 4).

2.5.2. Future prospects conclusion

Conclusions were reached on the status of the Future prospects of all habitats (**field 10.4**). These were based on the relevant section of the General Evaluation Matrix for assessing conservation status of a habitat type (see Appendix 1: General evaluation matrices to assess conservation status), and the Future prospects for the Range, Area, and Structure and functions parameters (**Table 7** Relationship between the assessment of future prospects for Range, Area, and Structure and functions and the conclusion on conservation status of the Future prospects of a habitat (the coloured cells indicate which conclusion should be applied). Based on Table 33 in the EU Reporting Guidelines[1].).

Table 7 Relationship between the assessment of Future prospects for Range, Area, and Structure and functions and the conclusion on conservation status of the Future prospects of a habitat (the coloured cells indicate which conclusion should be applied). Based on Table 33 in the EU Reporting Guidelines[1].

Favourable	Unfavourable-Inadequate	Unfavourable-bad	Unknown
Future prospects for all parameters are good OR future prospects for one parameter is unknown and others are good	Any other combination	Future prospects for one or more parameters are bad	Future prospects for two or more parameters are unknown and none are bad

Most of the conclusions reached on Future prospects were Unfavourable-bad (n = 60). The remainder were mostly Unfavourable-inadequate (n = 9) or Favourable (n = 5). Three were Unknown.

2.6. Overall Conservation Status

The assessment of the Overall conservation status of a habitat was based on the parameter conclusions and short-term trends for the Range, Area, Structure and functions, and Future Prospects of a habitat (see 2.2.3, 2.2.6, 2.3.2, 2.3.5, 2.4.2, 2.4.3, 2.5.2).

2.6.1. Overall assessment and trend

Mandatory and optional fields completed: 10.1 Range; 10.2 Area; 10.3 Specific structure and functions; 10.4 Future prospects; 10.5 Overall assessment of conservation status; 10.6 Overall trend in conservation status; 10.7 Change and reasons for change in conservation status and conservation status trend; 10.8 Additional information (optional but completed to provide essential information on the process).
Optional fields not completed: none

The Overall conclusion of the status of a habitat (**field 10.5**) was based on the relevant section of the General Evaluation Matrix for assessing conservation status of a habitat type (see Appendix 1: General evaluation matrices to assess conservation status). **Table 8** Relationship between the Overall assessment of conservation status and the conclusions for Range, Area, Structure and functions, and Future prospects parameters (the coloured cells indicate which conclusion should be applied) summarises this information, showing how the Overall conclusion related to the conclusions for Range, Area, Structures and function, and Future prospects. Most of the Overall conclusions were Unfavourable-bad (n = 62), and most of the other conclusions were Unfavourable-inadequate (n = 8) or Favourable (n = 6). Only one of the marine habitat conclusions was Unknown. An explanation as to why the parameter and Overall conclusions were selected was reported under **field 10.8**.

Table 8 Relationship between the Overall assessment of conservation status and the conclusions for Range, Area, Structure and functions, and Future prospects parameters (the coloured cells indicate which conclusion should be applied)

Favourable	Four parameter conclusions favourable; or three parameter conclusions favourable and one unknown
Unfavourable-inadequate	All other combinations
Unfavourable-bad	One or more parameter conclusions unfavourable-bad
Unknown	Four parameter conclusions unknown; or two or three parameter conclusions unknown and one or two favourable

The Overall trend in conservation status (**field 10.6**) was determined from the short-term trends for range, area, and structure and functions. **Table** 9 was used to guide the process. For marine habitats, Table 8 of the EU Guidelines[1] was used to guide the process. In some cases, certain parameter trends were particularly important, and this resulted in a different category being selected from that indicated in **Table 9**. About half of the Overall trends were stable (n = 33), about the same number were either deteriorating or improving (n = 18 v 17), and the remainder either were unknown or not reported because the overall conclusions for the habitat was unknown. An explanation as to why the Overall trend was selected was included in **field 10.8**.

Table 9 Relationship between the Overall trend in conservation status (left-hand column) and the number of short-term trends that were increasing, stable, declining, or unknown/ uncertain. The trends considered were for range, area, and structure and functions.

	Increasing	**Stable**	**Declining**	**Unknown/ uncertain**
Improving	2 or 3	none or 1	none or 1	none or 1
	1	2	-	-
	1	1	-	1
Increasing or [unknown]	1	-	-	2
Stable	none or 1	2 or 3	none or 1	none or 1
Stable or [unknown]	-	1	-	2
Deteriorating	none or 1	none or 1	2 or 3	none or 1
	-	2	1	-
	-	1	1	1
Deteriorating or [unknown]	-	-	1	2
Unknown	-	-	-	3

The method to determine the Overall trend differed from the 2013 reporting, when the trend for future prospects was also considered. In some cases, the Overall trend was reported as improving or stable, despite the future trend for structure and function being negative or very negative. Where the reported trend appeared to be misleading, notes were included under **field 10.8** to explain what the overall trend would have been if the future trends had been taken into account. This applied to 22 terrestrial habitat reports.

The combined Overall conclusions reported for the 69 terrestrial and 8 marine habitats are summarised in **Table 10**.

Table 10 Overall conclusions and trends for terrestrial and marine habitats. The table shows the number of habitats in each category.

Overall conclusion	Overall trend	Terrestrial habitats	Marine habitats	All habitats
Favourable	Improving	2	0	2
	Stable	4	0	4
	Unknown	0	0	0
Unfavourable-inadequate	Improving	2	0	2
	Stable	2	2	4
	Deteriorating	0	0	0
	Unknown	0	2	2
Unfavourable-bad	Improving	13	0	13
	Stable	26	0	26
	Deteriorating	18	0	18
	Unknown	2	3	5
Unknown	Unknown	0	1	1

2.6.2. Reasons for change in Conservation Status

Where the Overall conclusions or Overall trends differed from those reported in 2013, the reasons for change were reported (**field 10.7**). The options available were: (a) no change, there is no difference; (b) changed, due to genuine change; (c) changed, due to improved knowledge/ more accurate data; (d) changed, due to the use of different methods; and (e) changed, no information on the nature of change. Where more than one of the options was selected, the main reason for change was also reported.

To decide which options should be selected, the 2019 conclusions/trends for Range, Area, Structure and functions, and Future prospects were compared with those from 2013. Those conclusions/trends that did differ per parameter were further scrutinised to establish if they were responsible for the change in the Overall conclusion/trend. Where responsibility for change in Overall conclusion/trend was determined to be due to a particular parameter (or number of parameters), it was then determined whether the change was either a genuine change or a change due to improved knowledge/more accurate data/different methods, i.e. non-genuine change.

Only nine of the Overall conclusions differed between 2013 and 2019 and all but one was due to genuine change. Far more Overall trends differed (n = 42) and the reasons for change were mixed. This was partly connected with the removal of the Future prospects trend from the method to assess the overall trend, which resulted in 18 habitats reports including ‘use of a different method’ as the main reason or one of the reasons for change in the Overall trend. For two habitats, the reasons for change included ‘improved knowledge/more accurate data’, because a trend had changed from unknown to stable or decreasing. For six habitats, the reasons included less information or less certainty in the information available, i.e. where a trend changed from declining, stable or increasing to unknown or uncertain. This type of change did not fit into any of the available reporting categories, so the ‘no information on the nature of the change’ was selected and notes added under **field 10.8** to make clear the reasons for change included less information/certainty in the information available.

For marine habitats, three Overall conclusions differed between 2013 and 2019 and all were the result of the use of a different method. Overall trends differed for four habitats because of the removal of the Future prospects trend from the 2019 method used to assess Overall trend.

3. Species assessments

3.1 Species included

Reports were submitted to the EC for 126 species listed on the Habitats Directive Annexes that occur within the UK.

Full conservation status assessments were prepared for 93 species, including 77 terrestrial[5] and 16 marine species. In addition, information on occurrence was prepared for 33 vagrants, including 7 terrestrial and 26 marine species. The vagrant species are occasional visitors to the UK and it is therefore inappropriate to undertake a full assessment of their conservation status. See Tables 11 - 14 for the full list of UK species covered in the 2019 report.

The reporting formats contained both mandatory and optional fields. Mandatory information was required to complete assessments and draw conservation status conclusions. Optional fields provided supplementary information that was not directly related to conservation status assessment, but which could provide additional support to the parameter and overall conclusions. The UK approach was to complete all mandatory fields, but not to complete optional fields, except in cases where mandatory information was incomplete and optional information helped in drawing conclusions.

It is recognised that it is extremely difficult to distinguish maerl species without genetic testing and previous identification of UK maerl species in surveys may not be reliable. Therefore, all records of maerl species in UK waters were used to map the distribution, calculate the range and population and complete the full reports for both species (S1376 and S1377). The UK was required to submit a report for each species, however, the reports for these two species are identical.

Table 11 List of UK terrestrial species with full conservation status assessments that were reported on in the 2019 UK Article 17 reporting

Species code	Species scientific name	Common name
S1013	*Vertigo geyeri*	Geyer's whorl snail
S1014	*Vertigo angustior*	Narrow-mouthed whorl snail
S1015	*Vertigo genesii*	Round-mouthed whorl snail
S1016	*Vertigo moulinsiana*	Desmoulin's whorl snail
S1026	*Helix pomatia*	Roman snail
S1029	*Margaritifera margaritifera*	Freshwater pearl mussel
S1034	*Hirudo medicinalis*	Medicinal leech
S1044	*Coenagrion mercuriale*	Southern damselfly
S1058	*Maculinea arion*	Large blue butterfly
S1065	*Euphydryas aurinia*	Marsh fritillary butterfly
S1079	*Limoniscus violaceus*	Violet click beetle
S1083	*Lucanus cervus*	Stag beetle
S1092	*Austropotamobius pallipes*	White-clawed crayfish

[5] The Eurasian Beaver (*Castor fiber*) was not assessed as, although it is an Annex IV species, it was not listed as a European Protected Species in the UK during the 20113-2018 reporting period (and therefore is not on the Article 17 checklist of UK species).

Species code	Species scientific name	Common name
S1095	*Petromyzon marinus*	Sea lamprey
S1096	*Lampetra planeri*	Brook lamprey
S1099	*Lampetra fluviatilis*	River lamprey
S1102	*Alosa alosa*	Allis shad
S1103	*Alosa fallax*	Twaite shad
S1106	*Salmo salar*	Atlantic salmon
S1109	*Thymallus thymallus*	Grayling
S1166	*Triturus cristatus*	Great crested newt
S1213	*Rana temporaria*	Common frog
S1261	*Lacerta agilis*	Sand lizard
S1283	*Coronella austriaca*	Smooth snake
S1303	*Rhinolophus hipposideros*	Lesser horseshoe bat
S1304	*Rhinolophus ferrumequinum*	Greater horseshoe bat
S1308	*Barbastella barbastellus*	Barbastelle
S1309	*Pipistrellus pipistrellus*	Common pipistrelle
S1312	*Nyctalus noctula*	Noctule
S1314	*Myotis daubentonii*	Daubenton’s bat
S1317	*Pipistrellus nathusii*	Nathusius' pipistrelle
S1320	*Myotis brandtii*	Brandt’s bat
S1322	*Myotis nattereri*	Natterer’s bat
S1323	*Myotis bechsteinii*	Bechstein's bat
S1326	*Plecotus auritus*	Brown long-eared bat
S1327	*Eptesicus serotinus*	Serotine
S1329	*Plecotus austriacus*	Grey long-eared bat
S1330	*Myotis mystacinus*	Whiskered bat
S1331	*Nyctalus leisleri*	Leisler’s bat
S1334	*Lepus timidus*	Mountain hare
S1341	*Muscardinus avellanarius*	Common dormouse
S1355	*Lutra lutra*	Otter
S1357	*Martes martes*	Pine marten
S1358	*Mustela putorius*	Polecat
S1363	*Felis silvestris*	Wildcat
S1378	*Cladonia subgenus Cladina*	*Cladonia* subgenus *Cladina* lichens
S1385	*Bruchia vogesiaca*	Bruchia moss
S1386	*Buxbaumia viridis*	Green shield-moss
S1390	*Marsupella profunda*	Western rustwort
S1395	*Petalophyllum ralfsii*	Petalwort
S1400	*Leucobryum glaucum*	Large white-moss
S1409	*Sphagnum sp.*	Bog-mosses
S1413	*Lycopodium sp.*	Clubmosses
S1441	*Rumex rupestris*	Shore dock
S1528	*Saxifraga hirculus*	Marsh saxifrage
S1614	*Apium repens*	Creeping marshwort
S1654	*Gentianella anglica*	Early gentian
S1831	*Luronium natans*	Floating water-plantain
S1833	*Najas flexilis*	Slender naiad
S1849	*Ruscus aculeatus*	Butcher’s broom

Species code	Species scientific name	Common name
S1902	*Cypripedium calceolus*	Lady's-slipper orchid
S1903	*Liparis loeselii*	Fen orchid
S2492	*Coregonus albula*	Vendace
S4035	*Gortyna borelii lunata*	Fisher's estuarine moth
S4056	*Anisus vorticulus*	Little ramshorn whirlpool snail
S5003	*Myotis alcathoe*	Alcathoe bat
S5009	*Pipistrellus pygmaeus*	Soprano pipistrelle
S5076	*Coregonus autumnalis pollan*	Pollan
S5085	*Barbus barbus*	Barbel
S6199	*Euplagia quadripunctaria*	Jersey tiger moth
S6216	*Hamatocaulis vernicosus*	Slender green feather- moss
S6284	*Epidalea calamita*	Natterjack toad
S6353	*Coregonus lavaretus*	Whitefish
S6963	*Cobitis taenia*	Spined loach
S6965	*Cottus gobio all others*	Bullhead
S6981	*Pelophylax lessonae*	Pool frog
S6985	*Vandenboschia speciosa*	Killarney fern

Table 12 List of UK Marine species with full conservation status assessments that were reported on in the 2019 UK Article 17 reporting

Species code	Species scientific name	Common name
S1223	*Dermochelys coriacea*	Leatherback turtle
S1349	*Tursiops truncates*	Bottlenose dolphin
S1350	*Delphinus delphis*	Common dolphin
S1351	*Phocoena phocoena*	Harbour porpoise
S1364	*Halichoerus grypus*	Grey seal
S1365	*Phoca vitulina*	Common seal
S1376	*Lithothamnion corallioides*	Maerl Lithothamnium
S1377	*Phymatolithon calcareum*	Maerl
S2027	*Orcinus orca*	Killer whale
S2029	*Globicephala melas*	Long-finned pilot whale
S2030	*Grampus griseus*	Risso's dolphin
S2031	*Lagenorhynchus acutus*	Atlantic white-sided dolphin
S2032	*Lagenorhynchus albirostris*	White-beaked dolphin
S2618	*Balaenoptera acutorostrata*	Minke whale
S2621	*Balaenoptera physalus*	Fin whale
S2624	*Physeter macrocephalus*	Sperm Whale

Table 13 List of UK vagrant terrestrial species in the 2019 UK Article 17 reporting

Species code	Species scientific name	Common name
S1313	*Eptesicus nilssonii*	Northern Bat
S1318	*Myotis dasycneme*	Pond Bat
S1321	*Myotis emarginatus*	Geofferies bat
S1324	*Myotis myotis*	Greater Mouse-Eared Bat
S1332	*Vespertilio murinus*	Particoloured Bat
S1387	*Orthotrichum rogeri*	
S2016	*Pipistrellus kuhlii*	Kuhl's pipistrelle

Table 14 List of vagrant marine species in the 2019 UK Article 17 reporting

Species code	Species scientific name	Common name
S1101	*Acipenser sturio*	Common sturgeon
S1224	*Caretta caretta*	Loggerhead turtle
S1225	*Eretmochelys imbricata*	Hawksbill turtle
S1226	*Lepidochelys kempii*	Kemp's ridley turtle
S1227	*Chelonia mydas*	Green turtle
S1345	*Megaptera novaeangliae*	Humpback whale
S1348	*Eubalaena glacialis*	Northern right whale
S2028	*Pseudorca crassidens*	False killer whale
S2034	*Stenella coeruleoalba*	Striped dolphin
S2035	*Ziphius cavirostris*	Cuvier's beaked whale
S2037	*Mesoplodon mirus*	True's beaked whale
S2038	*Mesoplodon bidens*	Sowerby's beaked whale
S2619	*Balaenoptera borealis*	Sei whale
S2622	*Kogia breviceps*	Pygmy sperm whale
S2625	*Mesoplodon densirostris*	Blainville's beaked whale
S2626	*Monodon monoceros*	Narwhal
S2637	*Cystophora cristata*	Hooded Seal
S2638	*Erignathus barbatus*	Bearded Seal
S2639	*Pagophilus groenlandicus*	Harp Seal
S5020	*Balaenoptera musculus*	Blue whale
S5023	*Lagenodelphis hosei*	Fraser's dolphin
S5029	*Delphinapterus leucas*	Beluga
S5033	*Hyperoodon ampullatus*	Northern bottlenose whale
S5034	*Mesoplodon europaeus*	Gervais' beaked whale
S6298	*Peponocephala electra*	Melon-headed whale
S6305	*Pusa hispida*	Ringed seal

3.2. Species Range

Mandatory fields completed: 2.1 Sensitive species 2.2 Year or period; 2.3 Distribution map; 2.4 Distribution map method used; 5.1 Surface area; 5.2 Short-term trend period; 5.3 Short-term trend direction; 5.5. Short-term trend method used; 5.10 Favourable reference range; 5.11 Change and reason for change in surface area of range; 5.12 Additional information (this field was optional but was completed in order to provide extra information on the assessment process).

Optional fields not completed: 2.5 Additional maps; 5.4 Short-term trend magnitude; 5.6 Long-term trend period; 5.7 Long-term trend direction; 5.8 Long-term trend magnitude; 5.9 Long-term trend method used.

The range of a species was defined as the area enclosed by the outer limits of its distribution in the UK and for marine species in UK waters. Range status was assessed by:

- producing a distribution map;
- using a modelling tool to calculate the range surface area or GIS to measure range surface area from modelled distribution;
- assessing information on trends in range surface area;
- comparing the current range surface area with a Favourable Reference Range; and
- determining a conclusion on Range by applying thresholds/rules as set out in an evaluation matrix

3.2.1. Data sources

In the 2013 Article 17 report distribution data were collated at UK level for each species using the data available through: the UK National Biodiversity Network (NBN) Gateway; non-government organisations for particular species or species groups; and in-house or contracted surveys by the SNCBs. These data sources provided the most comprehensive datasets on distribution available for most species.

The NBN Gateway was replaced by the NBN Atlas[6] in April 2017. Country level administration of the NBN Atlas meant it was more appropriate to collate distribution data at country rather than UK level and then aggregate data at UK level for the 2019 report. A few independent datasets were provided at UK level for some species.

Data on the NBN Atlas are openly accessible by default, not restricted in any way except in relation to sensitive species. A pre-requisite for all datasets on the NBN Atlas is that they are openly accessible i.e. no access *or use* restrictions can be applied by data providers. Only sensitive species data can be restricted. A consequence of this stipulation is that some data providers have not put their species data into the NBN Atlas.

Despite a targeted data call in early 2018, fewer datasets were available for this reporting round than in 2013, particularly in England. This resulted in fewer occurrence records being available and had an impact on completing the distribution, range surface area and range trend fields for a sub-set of terrestrial species. The impacts and mitigation actions are described in the relevant sections on Range trends (3.2.4. Range trends) and Favourable Reference Range (3.2.6. Reasons for changes in range surface area and FRRs in 2019).

For the two marine maerl species, the key source of data was the Marine Recorder database[7]. This records data collected from inshore marine surveys for maerl species and maerl beds. All records of maerl species in UK waters were used to create the distribution and range maps for both species.

For regularly occurring cetacean species, distribution was primarily based on data from the large-scale systematic SCANS-III survey[8], SeaWatch Foundation[9], MARINElife[10] and ORCA[11] datasets. The same data sources were checked for vagrant species, but additional

[6]NBN Atlas https://nbnatlas.org/
[7] UK Marine Recorder https://jncc.gov.uk/our-work/marine-recorder/
[8] SCANS-III survey https://synergy.st-andrews.ac.uk/scans3/files/2017/05/SCANS-III-design-based-estimates-2017-05-12-final-revised.pdf
[9] SeaWatch Foundation http://www.seawatchfoundation.org.uk/
[10] MARINElife http://www.marine-life.org.uk/
[11] ORCA https://www.orcaweb.org.uk/

information was also gleaned from the Cetacean Strandings Investigation Programme (CSIP[12]), Whale and Dolphin Conservation, Highland Biological Recording Group and the Outer Hebrides Biological Recording. Seal maps were based on long-term telemetry deployments and haul-out count data. Information pertaining to the occurrence and distribution of turtles was extracted from the UK 'TURTLE' database[13].

3.2.2. Distribution maps

Distribution maps **(field 2.3)** were produced for all non-sensitive terrestrial and two marine maerl species to show occurrence at a 10x10 km square scale, based on the British National Grid (OSGB36) and Irish National Grid (TM65) projections. The 10x10 km square data, and the sources used to compile these, were summarised in spreadsheet format. The UK distribution maps were converted into the European ETRS89 grid using a standardised method (see Appendix 3: Conversion of terrestrial distribution data to the ETRS grid). Mobile marine species distribution maps were based on 50km ETRS grid squares.

Distribution maps were produced using the most comprehensive data that were representative of the distribution between 2013-2018 **(field 2.2).** The date range reported for each distribution map was based on the earliest and latest years identified in the country/offshore information. In many cases, data collected prior to this period were included if they were still representative of the current distribution. Recent and accurate estimates, post-2013, were available for well-surveyed species with clearly defined distributions. For most species, the date range was much wider, dictated by data availability and an expert understanding of current species distribution. The maps were produced from actual records rather than predicted distributions, making them a conservative estimate of distribution.

Records identified as erroneous, or likely to be vagrants, were omitted, as were records for species that had been introduced to areas outside their natural range (areas they would have been unlikely to naturally colonise). However, records of species that had been reintroduced to their former range were included. In some cases, knowledge had improved as to whether a species was considered native to an area, which led to slight differences in the distribution/range reported. This was fully audited on a case-by-case basis.

There were four options to report the method used to create the distribution maps (**field 2.4**): (a) complete survey or a statistically robust estimate; (b) based mainly on extrapolation from a limited amount of data; (c) based mainly on expert opinion with very limited data; and (d) insufficient or no data available. This field was completed by considering how complete/ representative the data were of the distribution of the species. The 'complete survey or a statistically robust estimate' option was interpreted broadly and selected if information on the species distribution was generally comprehensive.

The method reported at UK level for all terrestrial species was derived from the method used reported at country level, weighted by the proportion of the species population found in each country (see Appendix 2: Methods used to aggregate country/offshore information for detail on aggregation methods). The method was reported directly at UK-level for the two marine maerl species.

No additional distribution maps were created (**field 2.5**). However, optional UK range maps were produced for most resident species. These provided a visual display of the species range surface area. They did not constitute part of the UK report submission to the European Commission.

[12] Cetacean Strandings Investigation Programme http://ukstrandings.org/
[13] TURTLE database https://registry.nbnatlas.org/public/show/dr1313

3.2.3. Range surface area calculation

Range surface area **(field 5.1)** for most terrestrial species groups was calculated using:

(i) the 10x10 km square distribution data;
(ii) the range mapping tool applied in the 2013 Article 17 reporting[14]; and
(iii) Range surface area clipped to UK coastline for terrestrial species

The mapping tool generated a set of 'best-fitting' polygons around each set of 10x10 km squares. The range surface area was based on the total area enclosed by these polygons. An adjustable 'gap distance' parameter of 'Alpha' was used to determine how tightly the polygons fitted. The range surface area calculations were highly dependent on the quality of the distribution data and the modelling method used. The simple mechanistic method used to calculate range meant that some erroneous 'gaps' or 'additions' to the range were included, but these did not affect the range conclusion.

For most species the Alpha values were the same as those used in the 2013 reporting round to ensure maximum comparability. Values range from 18 to 50 km and were selected: to reflect the dispersal behaviour of individual species; to allow a buffer around incomplete records; and to provide the most realistic range estimate in the absence of complete census. See Appendix 7: Range Mapping Alpha hull values for a list of species Alpha values. A set of coastal clipping rules were applied to ensure that only inland land areas were included.

Terrestrial mammals: the approach to calculating the range surface area for 19 of the 23 terrestrial mammals has changed for 2019. In 2007 and 2013 a 45km alpha hull value was used for all terrestrial mammal species (except mountain hare, which was 25km) with a starting range unit of individual 10km squares. A new SNCB commissioned review of the population and conservation status of British mammals (Mathews *et. al.,* 2018[15], GB only) has developed a method producing finer detail surface area calculations, underpinned by data gathered at a finer resolution. Range surface area is based on presence records collected between 1995-2016. An alpha hull value of 20km was drawn around the distribution records. This represented the best balance between the inclusion of unoccupied sites (i.e. where records were sparse but close enough for inclusion) and the exclusion of occupied areas due to gaps in the data (i.e. where records existed but were too isolated for inclusion). This may have resulted in areas that contained very isolated records not being included in the range surface area. An additional 10km buffer was added to the final hull polygon to provide smoothing to the hull and to ensure that the hull covered the areas recorded rather than intersecting them.

The range surface areas for nine of the 11 mammal species that occur in Northern Ireland was also recalculated using the Mathews *et. al.* method, to produce UK range surface area calculations for those species. Two species, whiskered bat and mountain hare also occur in Northern Ireland, but their ranges were calculated by JNCC using the 2013 approach (see following paragraph).

[14] See Joint Nature Conservation Committee (2007) Supporting documentation for making conservation status assessments: Technical Note I AlphaShapes range calculation tool. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available to download at http://jncc.defra.gov.uk/pdf/FCS2007_techI_alphashapes.pdf.

[15] Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C., McDonald, R.A., Shore, R.F (2018). A review of the population and conservation status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage.

Four mammal species, S1320 Brandt's bat, S1330 whiskered bat, S1334 mountain hare, and S1336 wildcat had range surface areas calculated by JNCC using the 2013 range mapping tool, because additional country level distribution data were provided quite late in the reporting process and the 2013 method was more easily applicable. For these species the alpha values used in 2013 were maintained.

For maerl species the 10 x 10 grids containing maerl records were used to calculate the range. Maps were created in the WGS84 projection and 10 x 10 grids were converted to ETRS89 using a standardised method.

For mobile marine species, the surface area (or envelope) enclosed the species range at a 50-km ETRS square resolution. The edge of the range was based on expert opinion taking into account the distribution and frequency of records throughout UK waters and information within the published literature. Range was a difficult parameter to define for this group of species, which are highly mobile with distribution that varies considerably in time and space. However, the range area was estimated to convey the maximum extent of the range, taking into account seasonal variability.

3.2.4. Range trends

The trend in the range surface area of a species was determined using the most appropriate data sources, all of which have been listed in source information for individual species

Short term trend
Short-term trends in the range surface area **(fields 5.2, 5.3. 5.5)** were required for the period 2007-2018. Although data on range were not always collected between the exact dates the trend reported was considered to be representative of this period, and the short-term trend period **(field 5.2)** was generally reported as such. Short-term trend direction **(field 5.3)** was derived by the following processes:

- comparing the range map and surface area of range reported this time with the map and area figure produced for the 2013 reporting round,
- considering the views of experts from the four country conservation agencies to help assess whether an apparent change in the map was genuine or due to differences in recording effort/data availability;
- considering if there was any published analysis or range trend already available.

The short-term direction of trend **(field 5.3)** was categorised as stable, increasing, decreasing, uncertain (where some data are available but insufficient to accurately determine direction) or unknown (where there are no data available). Increasing or decreasing trends were only reported when they were considered to be genuine. For example, if the range surface area for a species was much larger in 2019 than in 2013, but the SNCB specialists considered that this was due to better recording rather than genuine increase, then the short-term trend was reported as stable rather than increasing.

The options for the method used to determine the short-term trend in range (**field 5.5**) were the same as for the distribution maps **(field 2.4),** and this field was completed using the same approach (see 3.2.2. Distribution maps; 3.2.3. Range surface area calculation).

For mobile marine species, current range based on distribution data was visually compared to that from the previous reporting round which was based on predicted densities from the analysis of datasets collated under the Joint Cetacean Protocol[16]. The views of experts from

[16] Joint Cetacean Protocol – available at http://jncc.defra.gov.uk/page-5657.

the four country conservation agencies were considered to help assess whether an apparent change in the map was genuine or due to differences in recording effort/data availability. The long-term monitoring programme of UK seal populations, as reported on annually through the Special Committee on Seals, were used as the source of trend information for both grey and harbour seals.

3.2.5. Favourable Reference Range

Favourable Reference Range (FRR) values **(field 5.10)** were established for species, where this was possible. Generally, the range surface area established in 2007 and modified in 2013 to accommodate a slight change in the method for calculating range had been set as the FRR. The default for the 2019 report was to use the FRR values from the 2013 report. If new or amended FRRs were required, the same general approach was used as documented in the 2013 UK Approach, summarised in **Table 15** Main considerations used to determine the Favourable Reference Range (FRR) for a species. A brief summary of the method used was reported in **field 5.10d** of the reports.

Table 15 Main considerations used to determine the Favourable Reference Range (FRR) for a species.

Component	Interpretation	Exceptions
1) Post-1994 trend in range surface area	*Increasing trend:* Suggests range is large enough and has sufficient coverage to support species survival. FRR likely to be equal to 1994* estimate.	Trend attributed to introduction programme only, or increased survey effort only, rather than natural range increase; OR The 1994 range was at risk from stochastic events (informed by Component 2), and reported increase was not been sufficient to suitably eliminate this risk.
	Stable trend: Suggests range is large enough and has sufficient coverage to support species survival. FRR likely to be equal to 1994* estimate.	The 1994 range was at risk from stochastic events (informed by Component 2).
	Decreasing trend: Suggests range may <u>not</u> be large enough, or have sufficient coverage, to support species survival. FRR may need to be <u>greater than</u> the 1994* estimate.	Trend attributed to natural fluctuation.
2) Size/ coverage of range area	The longer a species has persisted within a naturally restricted range, the greater the confidence that it is resilient to stochastic events and natural change, thus the greater likelihood it will be equivalent to the FRR.	None.

* or nearest, most relevant alternative.

In determining a favourable reference value for an individual species range, the species 1994[17] range was used as a preliminary baseline. Where 1994 data were not available, the nearest, most recent/relevant alternative was taken as the baseline and consideration was given to whether the range at that time was sufficiently large to support a long-term viable population of the species. It was hard to make the assessment in the absence of detailed modelling, so to help inform this decision, current trend data were considered. A decreasing trend suggested that the range area was not large enough to support a viable population and a stable or increasing trend suggested that it was sufficiently large. Decisions also took into account conservation management and vulnerability to stochastic events. If the baseline range was considered large enough, this value was set as the FRR. If not, the figure was set as larger than the baseline. If it was not possible to set a value for the FRR then either an operator was considered or the FRR was noted to be unknown.

3.2.6. Reasons for changes in Range surface area and FRRs in 2019

Field 5.11 required information on whether the range surface area had changed since 2013. Four options were available: (a) due to genuine change; (b) due to improved knowledge or more accurate data; (c) due to the use of different methods; and (d) no information on the nature of change.

The decision on reason for change in range surface area was closely linked to the trend reported in **field 5.3**, the views of species specialists from the SNCBs, and, whether the FRR had been updated.

In some cases, a species might have an increasing trend in range supported by increasing trends in other parameters, such as population, resulting in a current range surface area that was larger than the FRR set previously. In such cases, this was considered genuine change and the FRR was not revised to the current surface area, but maintained at the 2013 level, because the FRR set at that time was sufficient to support the species and no less than when the Habitats Directive came into force in the UK.

In other cases, a species was under recorded in the past and the range surface area in 2019 was larger than in 2013, despite lack of evidence to suggest a genuine increase in range. In such circumstances the FRR was either updated to the range surface area reported in 2019 or set as an operator “approximately equal to” current, recognising that the surface area reported in 2013 was probably less than when the Habitats Directive came into force in the UK. The option ‘due to improved knowledge or more accurate data’ was selected as reason for change.

There were several species where the FRR was reported as ‘Unknown’ in 2013. Where possible, an FRR was set for these species in 2019, or an operator was used to indicate if the FRR was thought to be “approximately equal to”, “more than”, “much more than”, or “less than” the current range. However, for some species, the FRR was still recorded as ’Unknown’ due to limited data availability. Where the range surface area was reported as ‘Unknown’ in 2013, it was not possible to report the reason for change in this reporting round.

For many terrestrial mammal species, the change in approach to calculating range noted in 3.2.3. Range surface area calculation resulted in a range surface area that was smaller than the FRR value set in 2013. Where this was the case, the FRR value was revised to the current range surface area, recognising that this was not a genuine change, but the result of change in the method used and the new surface area calculations were a more realistic

[17] 1994 is used as the baseline year for assessing favourable reference values as it is the year in which the Habitats Directive came into force in the UK.

representation of the species' ranges now and when the Habitats Directive came into force in the UK.

The change in data availability noted in 3.2.1. Data sources introduced a level of uncertainty regarding the accuracy of the distribution information, range surface area calculations and range trends for a subset of terrestrial species. Range surface area calculations for this subset of species were smaller than in 2013, largely because of fewer records being available to assess distribution and range. Many of these species were assessed as Favourable in 2013, with no indications of decline over the current reporting period. However, comparing the 2013 and 2019 range surface areas provided a decreasing trend and an overall reduction in the range surface areas to below the FRRs, which could in turn have led to Unfavourable conclusions. In cases where species had unexpected declines, or declines that were larger than expected, expert opinion was used to verify the calculated trends (**Table 16** Species where the range surface areas in 2019 have reduced due to data availability and not as a result of genuine change).

The UK approach taken to mitigate this issue:

- The current range surface area calculations were used in the 2019 assessment, because they were based on distribution records collated for this reporting round.
- Trend in range was based on the comparison between 2013 and 2019 range calculations, in conjunction with expert opinion.
- If a species unexpectedly showed a decline in range and expert opinion considered the trend to be stable, then the weight of expert opinion was greater than the calculated trend.
- In such cases the FRR set in 2013 was converted to an operator rather than maintaining a value. Usually the operator was 'approximately equal to' current, which maintained the Favourable conclusion for range.
- Information on the genuine range surface area (usually considered to be the area specified in 2013) and the value of the FRR if different to the 2013 range area calculation (the case for a small number of species) was recorded in Additional information (**field 5.12)**.

Table 16 Species where the range surface areas in 2019 have reduced due to data availability and not as a result of genuine change

Species code	Species scientific name	Common name	2019 Calculated short-term trend direction	Trend direction expert opinion
S1014	*Vertigo angustior*	Narrow-mouthed whorl snail	decreasing[18]	decreasing
S1026	*Helix pomatia*	Roman snail	decreasing	stable
S1034	*Hirudo medicinalis*	Medicinal leech	decreasing	stable
S1044	*Coenagrion mercuriale*	Southern damselfly	decreasing	stable
S1058	*Maculinea arion*	Large blue butterfly	decreasing	increasing
S1065	*Euphydras aurinia*	Marsh fritillary	decreasing	stable
S1095	*Petromyzon marinus*	Sea lamprey	decreasing	stable
S1099	*Lampetra fluviatilis*	River lamprey	decreasing	stable

[18] For *Vertigo angustior,* the calculated percentage change in range since 2013 indicated a decline in range greater than 1% per year over the short-term, resulting in an Unfavourable-bad Range conclusion. In 2013 the Range conclusion was Favourable. Expert opinion considers that a genuine decline of less than 1% per year has occurred in the short-term leading to an Unfavourable-inadequate Range conclusion (see Table 17).

Species code	Species scientific name	Common name	2019 Calculated short-term trend direction	Trend direction expert opinion
S1102	*Alosa alosa*	Allis shad	decreasing	stable
S1106	*Salmo salar*	Atlantic salmon	decreasing	increasing
S1109	*Thymallus thymallus*	Grayling	decreasing	stable
S1283	*Coronella austriaca*	Smooth snake	decreasing	stable
S1400	*Leucobryum glaucum*	Large white-moss	decreasing	stable
S1654	*Gentianella anglica*	Early Gentian	decreasing	stable
S1849	*Ruscus aculeatus*	Butcher's broom	decreasing	stable
S5085	*Barbus barbus*	Barbel	decreasing	stable
S6284	*Epidalea calamita*	Natterjack toad	decreasing	stable
S6963	*Cobitis taenia*	Spined loach	decreasing	stable
S6985	*Trichomanes speciosum*	Killarney fern	decreasing	stable

3.2.7. Conclusion on Range

Conclusions were reached on the status of the Range of all species (**field 11.1**). These were determined using the relevant section of the General Evaluation Matrix for assessing conservation status of a species type (see Appendix 1: General evaluation matrices to assess conservation status). **Table 17** summarises this information, showing how the short-term trend direction in Range area and the relationship between the Range surface area and the FRR combined to determine if the conclusion for Range should be Favourable, Unfavourable-inadequate, Unfavourable-bad or Unknown.

Table 17 Relationship between the short-term trend in range surface area (top rows), the current range surface area and Favourable Reference Range (FRR) (left-hand column), and the conclusion on conservation status of the Range of a species (the coloured cells indicate which conclusion should be applied).

	Short-term trend in Range 2013-2018			
	Unknown	**Increasing or stable**	**Decline 1% or less per year**	**Decline >1% per year**
Range area or FRR Unknown	Unknown	Unknown or favourable	Unfavourable-inadequate	Unfavourable-bad
Range area > or = FRR	Unknown or favourable	Favourable	Unfavourable-inadequate	Unfavourable-bad
Range area up to 10% below FRR	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-bad
Range area >10% below FRR	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad

3.3 Population

Mandatory fields completed: 6.1 Year or period; 6.2 Population size; 6.3 Type of estimate; 6.4 Additional population size[19]; 6.5 Type of estimate; 6.6 Population size method used; 6.7 Short-term trend period; 6.8 Short-term trend direction; 6.10 Short term trend method used; 6.15 Favourable reference population; 6.16 Change and reason for

[19] Where relevant

change in population size; 6.17 Additional information (this field was optional but was completed in order to provide extra information on the assessment process).

Optional fields not completed: 6.9 Short term trend magnitude; 6.11 Long term trend period; 6.12 Long term trend direction; 6.13 Long-term trend magnitude; 6.14 Long term trend method used.

Population status was one of the fundamental attributes used to assess the conservation status of a species by:

- estimating the population size;
- assessing trends in population size;
- comparing the population size with a Favourable Reference Population; and
- determining a conclusion on population by applying thresholds/rules as set out in an evaluation matrix.

3.3.1 Population estimate

Population units

For the 2019 reporting round the European Commission introduced mandatory population units for population estimates for all species to allow comparison at biogeographic region and EU level. The mandatory units were individuals or 1x1 km grids. The EU guidance specified which mandatory unit had to be reported for each species. Endemic species were the only exception to this rule, in this case Member States could specify the reporting unit[20]. There was also the opportunity to carry out the population assessment using a different unit from the mandatory ones, recognising that there were country and species-specific methods and approaches to collecting and collating species data. If additional population units were used, then that information was reported in **field 6.4** and associated **field 6.5.**

In the UK, the population units used for most species assessments were the same as used in the 2013 report, to maintain maximum comparability and ensure that Favourable Reference Population (FRP) values were still relevant. For some species the EU mandatory unit and the UK preferred assessment unit were the same, for example occupied grid squares (equivalent to a count of 1x1 km grids). However, in some cases the mandatory unit was 1x1 km grids, but the preferred UK unit was number of individuals e.g. for the majority of bat species. This posed a problem in providing a realistic population estimate in the mandatory unit when the best data were available as number of individuals.

For a few species, where appropriate, the population unit and the FRP were changed from the 2013 assessment unit to the relevant 2019 mandatory unit.

Where additional population units were provided, they varied depending on the availability and applicability of information. For example, for some species, the number of discrete populations was the most useful unit for comparison, whilst for others it was breeding individuals or another specific life-stage. Mobile marine species populations were always reported as individuals. Where information was considered too incomplete, a judgement of unknown was reported.

Population size

Some species had an agreed UK population estimate based on a published source, for example terrestrial mammals[21], where new population estimates were provided at GB level

[20] The UK endemic S1654 *Gentianella anglica* was the only species for which the UK could specify the reporting unit.

[21] For example, the mammal population estimates were based on Mathews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C., McDonald, R.A., Shore, R.F (2018). A review of the population and conservation status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage.

(Mathews *et. al.,* 2018). These were combined with population estimates from Northern Ireland to provide UK estimates for relevant species.

The majority of terrestrial species had current population size estimated at country level by the SNCBs, and these were aggregated to obtain UK population estimates. A best single value could be obtained for some species, but in other cases country level minima and maxima were aggregated to provide UK level minimum and maximum population estimates. The type of estimate was reported under **field 6.3**.

The difficulties previously noted (See section 3.2. Species Range) in distinguishing maerl species also affected the population parameter. All records of maerl species and maerl-derived gravel in UK waters were used to map and calculate population size for both maerl reports (S1376 and S1377). This was done directly at the UK-level.

Population estimates within UK waters for many of the regular cetacean species were derived from the most robust population estimates available from the third Small Cetacean Abundance in European Atlantic waters and the North Sea (SCANS-III) project[22]. This survey covered European waters on and beyond the continental shelf edge. The estimates from this survey were pro-rated by area to derive a UK estimate with an associated coefficient of variation. Estimates from these sources were not available for all regular species, and other sources had to be relied on. For more local populations, estimates were taken from the results of relevant photo-identification studies. In all cases, the lower and upper 95% confidence intervals were used to represent the minimum and maximum population estimates. For seals, the population information was taken from the most recent information supplied to SCOS[23]. Population sizes for marine turtles could not be assessed.

Where the population size estimate differed from that recorded in the 2013 reporting round, it was indicated whether this was considered to be a genuine change, a result of improved knowledge/more accurate data, and/or due to the use of a different method to calculate the population size (**field 6.16**).

The approach for classifying the 'year or period' (**field 6.1**) when data for population size were recorded was to provide the most recent and most comprehensive assessment of population. Ideally data used were collected between 2013-2018. However, for most species the date class was much wider, dictated by data availability and a professional understanding of current species population. If a published estimate was used, that date was reported; for other estimates, the year or period recorded reflects the period when data were collected. Data from before 2013 were used if considered to be still representative of the current population.

The method used to estimate the population size of a species (**field 6.6**) was categorised as being derived from a) complete survey or statistically robust estimate; *or* b) based mainly on extrapolation from a limited amount of data; c) based mainly on expert opinion with very limited data; d) insufficient or no data available. The category reported was based on the methods used in the different countries of the UK, weighted by the proportion of the population found in each country (see Appendix 2: Methods used to aggregate country/offshore information for further details on aggregation). For mobile marine species, JNCC assigned the category to the method used to estimate population size and gathered agency views through

[22] SCAN III https://synergy.st-andrews.ac.uk/scans3/files/2017/05/SCANS-III-design-based-estimates-2017-05-12-final-revised.pdf
[23] SCOS http://www.smru.st-andrews.ac.uk/research-policy/scos/

the Inter-Agency Marine Mammal Working Group review process. For the two maerl species, JNCC assigned the category directly at UK-level.

3.3.2 Population short-term trends

The short-term trend in the population of a species was determined using the most appropriate data sources. There were varying levels of data available; some species trends were based on robust surveillance schemes, whilst trends for other species were based on expert opinion.

Only increasing or decreasing trends believed to be genuine were reported. For example, if the population reported was much larger than in 2007 (or in some cases the population size in 2013 may have been used for the comparison and trend determination) but the SNCB specialists considered that this was due to better recording and population had therefore likely remained stable, then the short-term trend was reported as stable rather than increasing.

For mobile marine species, there were few data on which to assess magnitude and direction of trends in populations at the UK scale. The exception was for the two regular seal species, common and grey seals, for which trend information could be gleaned from long-term national monitoring programmes funded by NERC and conducted by the Sea Mammal Research Unit. An approach was agreed whereby a minimum of three UK population estimates were required in order for trends to be assessed. Of the cetaceans, there is trend information available from long-term monitoring of some coastal resident bottlenose dolphin populations but not for this species throughout UK waters

Short term trend period
Short-term trends **(field 6.7)** in the population size of a species were required for the period 2007-2018. A time period as close as possible to this was used. For some species the period varied slightly due to data availability, and to make best use of existing data analysis from monitoring schemes.

Short term trend direction
For some species, trends were available from a UK (or GB, or other cross country) scheme. For other species the SNCBs produced separate estimates of population trends and these were aggregated to produce the UK population trend. The direction of trend was categorised as stable, increasing, decreasing, uncertain, or unknown. In addition, for species that were declining, specialists provided an estimate of the rate of decline within the country-level reports. Declines were reported to be either i). 1% or less per year (during the reporting period), or ii). more than 1 % per year (during the repowering period). This information helped to establish if a declining trend would contribute to an Unfavourable-inadequate or Unfavourable-bad parameter conclusion, respectively. See Appendix 2: Methods used to aggregate country/offshore information for information on the aggregation of country information to provide UK level trends.

For most mobile marine species, trends could not be assessed because there were fewer than three UK population estimates. For grey seals, time series of abundance estimates were available from the national monitoring programmes funded by NERC and conducted by the Sea Mammal Research Unit. For the two marine maerl species, trend was reported as unknown at UK-level due to limited data availability.

A confidence interval was reported if the UK estimate was based on a statistically reliable sampling scheme, or if all SNCBs reported the same confidence interval.

3.3.3. Favourable Reference Population

Favourable Reference Population (FRP) values were established for each species, where this was possible and generally the FRP values established for species in the 2013 report were retained for the 2019 report. However, in some cases, updated knowledge and/or approach justified a revision. There were several species where the FRP was reported as 'unknown' in 2013. Where possible, an FRP was set for these species in 2019, or an operator was used to indicate if the FRP was thought to be "approximately equal to", "more than", "much more than", or "less than" the current population. However, for some species, the FRP was still recorded as unknown due to limited data availability.

In deriving or amending FRP values, the same general approach was used as documented in the 2007 UK Approach, summarised in **Table 18**. A summary of the method used was reported in **field 6.15d** and additional information provided in **field 6.17.**

Table 18 Main considerations used to determine the Favourable Reference Population (FRP) for a species

FAVOURABLE REFERENCE POPULATION		
Component	**Interpretation**	**Exceptions**
1) Current (post-1994) trend	*Increasing trend:* Suggests populations are perpetuating themselves, indicating viability (in terms of both population size and structure). Therefore, FRP likely to be equal to the 1994* estimate.	Trend attributed to introduction programme only, or increased survey effort only, rather than natural population increase; OR The 1994 population was at risk from stochastic events (informed by Component 2) and reported increase has not been sufficient to suitably eliminate this risk; OR Increase in absolute population numbers recognised as masking inadequacies in population structure (informed by Component 3).
	Stable trend: Suggests populations are maintaining themselves, indicating viability (in terms of both population size and structure). FRP may need to be equal to the 1994* estimate.	The 1994 population was at high risk from stochastic events (informed by Component 2); OR Stability in absolute population numbers recognised as masking inadequacies in population structure (informed by Component 3).
	Decreasing trend: Suggests populations are not maintaining themselves, indicating they may not be viable (in terms of both population size and structure). Therefore, FRP is <u>more than</u> the 1994* estimate.	Trend attributed to natural fluctuations.

2) Size	The longer a species has persisted with naturally low populations, the greater the confidence that these populations are resilient to stochastic events.	None.
3) Structure (where known)	Not deviating from normal: This indicates viable populations.	Where evidence suggests there are other external factors likely to affect viability.
	Deviating from normal: Indicates populations are not viable.	None.

* or nearest, most relevant alternative.

In order to determine an FRP for an individual species population, 1994 was used as a preliminary baseline[24]. Where 1994 data were not available, the nearest, most recent/relevant alternative was considered. Consideration was given to whether the population was sufficiently large be a long-term viable population. Viability was defined as 'the condition that a habitat or species needs to be in to perpetuate itself indefinitely over time under the likely conditions of future land and water management'. If the population of a species was considered large enough, the FRP was set at this level. If not, a higher value was used. Current trend data were used as an initial indicator for determining viability. A decreasing trend suggested that the population was not large enough to be viable. A stable or increasing trend, together with other indicators, suggested the species population was viable. Decisions were then informed by population structure, conservation management and vulnerability to stochastic events, as described in the table below. If a value could not be set then an operator was used, or the FRP was considered to be unknown

The new population estimates provided by Mathews *et. al.,* (2018) for all terrestrial mammals generally represented a very large increase in the previous population estimates and had extremely wide confidence intervals. The FRPs set in 2013 were generally well below the lowest 95% confidence interval and so were probably less than the populations of these species when the Directive came into force. The SNCBs considered that the best single value population figures for most of the mammals were not sufficiently reliable to form the basis of revised FRPs. However, they considered that the current populations were large enough to be viable into the future. Therefore, current FRPs for some mammals, particularly bats, were changed from an FRP value to an operator 'approximately equal to' current.

The change in availability of species distribution data noted in Section 3.2. Species Range also had an impact on the population estimates for some species, particularly those where population estimates were based on 1x1 km grid distribution data. For these species the current population estimates were often less than in 2013 and less than the previously set FRP. Once again, to avoid erroneous Unfavourable conclusions on population caused by change in data availability, expert opinion carried more weight than calculated values or trends and where relevant an operator was used to replace the 2013 FRP value.

Consideration of trend information in the setting of FRPs meant that for most mobile marine species, an FRP could not be set. In previous reporting rounds, cetacean FRPs were set based on the best UK abundance estimates made as close in time as possible to when the Habitats Directive was adopted, as is suggested in Article 17 Guidance[25] . However, because of the general lack of supporting information for this species group, the UKs interpretation of

[24] See footnote 17
[25] See Footnote 1

the FRP concept has changed between reporting rounds and concludes that information on trends needs to be better understood to set FRPs for mobile marine species. Where less than three UK abundance estimates were available, identification of trends was not possible and revised FRPs were set to “unknown”; this was the result for all cetacean species.

3.3.4. Conclusion on Population

Conclusions were reached on the status of the Population of all species (**field 11.2**). These were determined using the relevant section of the General Evaluation Matrix for assessing conservation status of a species (see Appendix 1: General evaluation matrices to assess conservation status Table B). **Table 19** summarises this information, showing how the short-term trend direction in population and the relationship between the current population size and the FRP combined to determine if the conclusion for Population should be Favourable, Unfavourable-inadequate, Unfavourable-bad or Unknown.

An assessment of how strongly population reproduction, mortality and age structure deviated from normal could be used to help with the assessment. Information on this was scarce, so short-term trend in population size was usually taken as a proxy measure of the degree to which these aspects of population status were imbalanced, as follows:

- population stable or increasing = reproduction/ mortality/ age structure normal;
- population declining by < 1% per year = reproduction/ mortality/ age structure moderately imbalanced;
- population declining by more than 1% per year = reproduction/ mortality/ age structure strongly imbalanced.

Table 19 Relationship between the short-term trend in population (top rows), the current population size and the Favourable Reference Population (FRP) (left-hand column), and the conclusion on conservation status of the Population of a species (the coloured cells indicate which conclusion should be applied)

	Short-term trend in Population 2007-2018			
	Unknown	**Increasing or stable**	**Decline 1% or less per year**	**Decline >1% per year**
Population or FRP Unknown	Unknown	Unknown or favourable	Unfavourable-inadequate	Unfavourable-bad
Population > or = FRP	Unknown or favourable	Favourable	Unfavourable-inadequate	Unfavourable-bad
Population up to 25% below FRP	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-inadequate	Unfavourable-bad
Population >25% below FRP	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad	Unfavourable-bad

3.4. Habitat for the species

Mandatory and optional fields completed: 7.1 Sufficiency of area and quality of a) occupied habitat and b) unoccupied habitat, 7.2 Sufficiency of area and quality of occupied habitat- method used, 7.3 Short-term trend period, 7.4 Short-term trend direction, 7.5 Short-term trend- method used, 7.9 Additional information (this field was optional but was completed, where necessary, to provide extra information on the assessment process).

Optional fields not completed: 7.6 Long-term trend period, 7.7 Long-term trend direction, 7.8 Long-term trend method used.

3.4.1 Sufficiency of area and quality of Habitat for the species

Habitat for the species was interpreted to take account of the following:

- all physical and biological requirements (abiotic and biotic) of the species[26]
- all stages of its life cycle should be covered and seasonal variation in the species' requirements reflected in the assessment.

Overall this parameter was assessed by:

- assessing whether the area of Habitat for the species was sufficient to achieve Favourable Conservation Status (FCS);
- assessing whether the quality of Habitat for the species was sufficient to achieve FCS;
- combining these two judgements to look at overall sufficiency of Habitat for the species; and,
- determining the short-term trend in area and quality of Habitat for the species during the 2007-2018 short-term period.

Although the EU Explanatory Notes and Guidelines[27] stated that area and quality of Habitat for the species can be considered separately at national level, the requirement as formulated in the reporting format[28] was to report on:

i) **7.1a** [the sufficiency of] area ***and*** quality of occupied habitat (for long-term survival) *AND* dependent on the answer under 7.1a,
ii) **7.1b** [the sufficiency of] area ***and*** quality of unoccupied habitat (for long-term survival).

This therefore required the consideration of both area and quality in combination. Further, it required taking account of the interaction/ balance of the impact of quantity and quality of the habitat resource on the species.

The UK interpretation of these EU guidelines was that question in **Field 7.1b** was incorrectly phrased because there was no value in purely establishing if there was sufficient area and quality of only unoccupied habitat alone. If the answer to **Field 7.1a** was 'No', or 'Unknown', then it was deemed that what actually should be known was is whether there was then sufficient area and quality of both occupied AND unoccupied habitat. In this way the answer to the second question (**Field 7.1b**) adds additional information and to the first question (see **Table 20** The UK revised questions used to assess the Habitat for the species parameter (Fields 7.1a and 7.1b).). That is, if there isn't sufficient area and quality of occupied Habitat for the species for long term survival of the species, is there sufficient area and quality of occupied and unoccupied Habitat for the species for long-term survival of the species? This takes into consideration whether the species should be able to expand into the currently unoccupied habitat, if circumstances allow. The UK interpretation of 'for long term survival' was to equate this with 'to maintain the species at FCS' (in situations where all other parameter conclusions are Favourable i.e. the Range, Population and Future prospects).

[26] Including elements like the availability of prey but also fragmentation where appropriate.
[27] See footnote 1
[28] See footnote 2

Table 20 UK revised questions used to assess the Habitat for the species parameter (Fields 7.1a and 7.1b).

7.1 a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)? YES/NO/Unknown *7.1 b) If NO, is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)? YES/NO/Unknown* To note, if the answer to 7.1a is 'YES' or 'Unknown', then there is no need to respond to 7.1b.

3.4.2 UK assessment and process

The assessment of Habitat for the species was undertaken directly at UK level for marine species and at country-level for all other species i.e. terrestrial and maerl. For the latter, where the species occurred in more than one country/offshore, these assessments were then aggregated at UK level.

Experts used available evidence and expert judgement to establish whether either the area or quality of the Habitat for the species, or both, were limiting factors in the wider achievement of FCS. This is a difficult parameter to assess and there is not a common standard approach to assess it across the constituent parts of the UK. Therefore, a 'consideration matrix' (**Table 21** Consideration matrix for Habitat for the species to assist with country/offshore assessments to help answer 7.1a and, if necessary, 7.1b, with added pragmatism) was developed as guidance for specialists to determine the answers to **field 7.1a** and **field 7.1b** (i.e. whether there was or was not sufficiency of area and quality of Habitat for the species, or whether this was unknown). The decision tree on page 40 of the 2013 UK Guidance http://jncc.defra.gov.uk/pdf/A17_2013_UKApproach.pdf also provided some useful considerations that could also be referred to for assessing Habitat for the species for terrestrial species (as used in the 2013 reporting round).

Where there were multiple assessments for a particular species i.e. in more than one country, for this parameter the UK answers to **fields 7.1a, 7.1b, 7.2, 7.3, 7.4, 7.6** were we determined using the UK aggregation method (See Appendix 2: Methods used to aggregate country/offshore information). This used the relative population size per country as a proxy measure to determine the relative area of Habitat for the species by country.

Table 21 Consideration matrix for Habitat for the species to assist with country/offshore assessments to help answer 7.1a and, if necessary, 7.1b, with added pragmatism:

Is the habitat area sufficient? (7.1 a i) (7.1 b i)	**Is the habitat quality sufficient? (7.1 a ii) (7.1 b ii)**	***Draft conclusion* (7.1 a) (7.1 b)**	**Pragmatic judgement[29]**	***Final conclusion* (7.1 a) (7.1 b)**
Yes	Yes	Yes	Not further required	Yes
Yes	No	No	Expert opinion/ evidence	No / upgrade to Yes
No	Yes	No	Expert opinion/ evidence	No / upgrade to Yes
Yes	Unknown	Unknown	Expert opinion/ evidence	Unknown / upgrade to Yes / downgrade to No[30] (unlikely)
Unknown	Yes	Unknown	Expert opinion/ evidence	Unknown / upgrade to Yes / downgrade to No (unlikely)
No	Unknown	Unknown	Expert opinion/ evidence	Unknown / downgrade to No / upgrade to Yes (unlikely)
Unknown	No	Unknown	Expert opinion/ evidence	Unknown / downgrade to No / upgrade to Yes (unlikely)
Unknown	Unknown	Unknown	Expert opinion/ evidence	Unknown

Key to consideration matrix (as per Table 21)

Field 7.1 a
7.1 a i) Is the area of occupied habitat sufficient (to maintain the species at FCS)?
7.1 a ii) Is the quality of occupied habitat sufficient (to maintain the species at FCS)?
Field 7.1 b
7.1 b i) Is the area of occupied AND unoccupied habitat sufficient (to maintain the species at FCS)?
7.1 b ii) Is the quality of occupied AND unoccupied habitat sufficient (to maintain the species at FCS)?

3.4.3 Trend in Habitat for a species

The information reported under **field 7.3** Short-term trend Period, **field 7.4** Short-term trend Direction and **field 7.5** Short-term trend method used, were provided to assess the likely trend in the Habitat for the species in the 2007-2018 timeframe (or a period as close to it as possible). It describes changes in overall area and quality of the occupied Habitat for the species. This was undertaken directly at UK level for marine species, and at country-level for all other species i.e. terrestrial and maerl. For the latter, where the species occurred in more than one country/offshore, these assessments were then aggregated at UK level, using the UK aggregation method (See Appendix 2: Methods used to aggregate country/offshore information .

[29] i.e. an informed judgement applying evidence of the situation on the ground towards meeting FSC based on expert opinion.
[30] This conclusion is considered 'unlikely' as no part of the question (7.1a/ 7.1b) has been answered with this response.

The short-term trend direction **(field 7.4)** was categorised as stable, increasing, decreasing, uncertain (where some data are available but insufficient to accurately determine direction) or unknown (where there are no data available). This information provided a useful indication about whether Habitat for the species area and/or Habitat for the species quality are limiting factors in the species reaching FCS (e.g. the trend direction is 'decreasing'). Experts used available evidence and expert judgement to establish this.

For mobile marine species, the approach taken in 2013 was to equate habitat area with range, and this approach was maintained for the 2019 reporting. These species used a range of habitats and were not directly measured at the UK scale. The assessment of habitat quality for marine mobile species was informed by the conclusions for range and population as a proxy for habitat quality; both parameters needed to be in favourable condition for a favourable habitat area and quality to be concluded. Information on habitat quality was also judged from the published literature and using 'expert opinion'.

For marine mobile species, the assessment of trends in habitat was based largely on expert opinion but taking into account the current estimates compared to FRVs and trends in both range and population as indicators of the sufficiency of the area and quality of habitat.

The options for the method used to determine the short-term trend in Habitat for the species (**field 7.5**) were the same as for the distribution maps **(field 2.4),** and this field was completed using the same approach (see 3.2.3. Range surface area calculation).

3.4.5. Conclusion on Habitat for the species

As far as possible the conclusion as to whether the UK habitat of a species was Favourable, Unfavourable-inadequate, Unfavourable-bad or Unknown, was dictated by the general evaluation matrix taken from the EC Reporting Guidelines (see **Table 22** General evaluation matrix for assessing the conservation status conclusion for Habitat for the species).

Table 22 General evaluation matrix for assessing the conservation status conclusion for Habitat for the species.

Favourable	Unfavourable-inadequate	Unfavourable-bad	Unknown
Area of habitat is sufficiently large (and stable or increasing) AND habitat quality is suitable for the long-term survival of the species	Any other combination	Area of habitat is clearly not sufficiently large to ensure the long-term survival of the species OR Habitat quality is bad, clearly not allowing long term survival of the species	*No or insufficient reliable information available*

The matrix was interpreted as follows:
- Unfavourable-bad = not sufficiently large area or poor quality;
- Unfavourable-inadequate = sufficiently large area, good or moderate quality, but declining;
- Favourable = sufficiently large area, not poor quality and not declining.

This information was translated into the assessment matrix in Table 23, which considers whether the area of habitat was sufficient (based on response to the question discussed in

Section 3.4.1 Sufficiency of area and quality of Habitat for the species, the quality of habitat and the trend in habitat.

Table 23 Matrix to evaluate contribution of habitat quantity, quality and trend to the assessment of conservation status.

	Sufficiently large area to support a viable population			Not sufficiently large area to support a viable population		
	increasing	**stable**	**declining**	**increasing**	**stable**	**declining**
Habitat quality good or moderate	Favourable	Favourable	Unfavourable -inadequate	Unfavourable-bad		
Habitat quality poor	Unfavourable -bad	Unfavourable -bad	Unfavourable -bad			

Where habitat for a species was judged as unfavourable (bad or inadequate) there was a requirement to add a qualifier as to whether the status was improving, stable, declining or unknown. The decision on this was based on the short-term trend in habitat.

3.5. Future prospects

Mandatory and optional fields completed: 10.1 Future prospects of parameters; 10.2 Additional information (optional but completed to provide essential information on the process).
Optional fields not completed: none

The status of the Future prospects of a species was assessed by:

- identifying the future prospects of range, population, and habitat for the species; and
- selecting a conclusion on Future prospects using an evaluation matrix.

3.5.1. Future prospects of Range, Population, and Habitat for the species

Future prospects were reported for Range, Population, and Habitat for the species (**field 10.1**). The timeframe used was the next two reporting cycles i.e. 2019-2030.

The process to determine the Future prospects of a species involved two steps. Firstly, the *future trends* were identified for each parameter. The second step involved combining the future trends with the current conservation status of each parameter to decide on the *future prospects*. **Table 24** explains the approach further and shows the future trend and future prospects categories[31]. Future trends were identified in the country information and aggregated into UK-level future trends (see Appendix 2: Methods used to aggregate country/offshore information). These UK-level future trends were used to decide on the Future prospects of each parameter and were reported as additional information (**field 10.2**).

[31] This is based on Table 25 in the EU Reporting Guidelines see footnote 1.

Table 24 Method to determine the future trends and Future prospects of species. The likely balance between anticipated impacts from threats and potential improvements from conservation measures and other remediating factors (column 1) were considered and used to determine the future trend (column 2). The future trend was then combined with the current conservation status (column 3) to determine the Future prospects (column 4).

Balance between anticipated threats and improvements[32]	Future trend	Current conservation status of parameter	Future prospects
Threat impacts and improvements equal; threats mostly insignificant or medium-impact; status of parameter not expected to change	Overall stable	Favourable	Good
		Unfavourable-inadequate	Poor
		Unfavourable-bad	Bad
		Unknown	Unknown
Threat impacts exceed improvements irrespective of measures taken; threats mostly high- or medium-impact; status of parameter expected to decline	Negative/very negative	Favourable	Poor / Bad
		Unfavourable-inadequate	Poor / Bad
		Unfavourable-bad	Bad
		Unknown	Poor / Bad
Improvements exceed threat impacts; threats mostly low or no impact; status of parameter expected to improve	Positive/very positive	Favourable	Good
		Unfavourable-inadequate	Poor / Good
		Unfavourable-bad	Poor / Good
		Unknown	Poor / Good
Threats and/or measures poorly understood, not possible to predict balance between anticipated threats and improvements	Unknown	Favourable	Unknown
		Unfavourable-inadequate	
		Unfavourable-bad	
		Unknown	

For range and population, the following thresholds were used to guide the selection of future trends:

- negative future trends equate to an expected decline of <1% per year;
- positive future trends equate to an expected increase <1% per year;
- very negative future trends equate to an expected decline of ≥1% per year;
- very positive future trends equate to an expected increase of ≥1% per year.

The approach taken to aggregate the country-level future trends was similar to that used for short-term trends in population (see 3.3.2 Population short-term trends). Similar issues were encountered, including that: some of country-level future trends were unknown; a few species had contrasting trends (with a negative future trend in one country and a positive future trend in another country); and additional information on the rate of expected change was very limited.

[32] As reported within Report Sections 8 Main pressures and threats and 9 Conservation measures, details of the assessment of which can be found under 4. Supplementary information.

Although the approach to determine the future trends and Future prospects provided some objectivity and consistency, judgements on future trends were inevitably subjective, depending on the knowledge-base and outlook of the individuals involved. Judging future trends was more difficult for Population and most difficult for Habitat for the species.

3.5.2. Future prospects conclusion

Conclusions were reached on the status of the Future prospects of all species (**field 10.4**). These were based on the relevant section of the General Evaluation Matrix for assessing conservation status of species (see Appendix 1: General evaluation matrices to assess conservation status), and the future prospects for the Range, Population, and Habitat for the species parameters (**Table 25**).

Table 25 Relationship between the assessment of future prospects for range, area, and structure and functions and the conclusion on conservation status of the Future prospects of a habitat (the coloured cells indicate which conclusion should be applied[33]).

Favourable	Unfavourable-inadequate	Unfavourable-bad	Unknown
Future prospects for all parameters are 'good' OR future prospects for one parameter is 'unknown' and others are 'good'	Any other combination	Future prospects for one or more parameters are 'bad'	Future prospects for two or more parameters are 'unknown' and none are 'bad'

The conclusions reached on Future prospects were mixed with Favourable the largest grouping (n = 31), followed by Unfavourable-inadequate (n = 24) and Unfavourable-bad (n = 12). Twenty-six were Unknown, inclusive of 11 of the 16 marine species. This represents a lack of conclusive evidence and/ or knowledge on which to form a prediction of future prospects.

3.6. Determining overall Conservation Status for species

The assessment of the Overall conservation status of a species was based on the parameter conclusions and short-term trends for the Range, Population, Habitat for the species, and Future prospects (see sections 3.2.7, 3.3.4, 3.4.5, 3.5.2)

3.6.1. Overall assessment of Conservation Status and trend

Mandatory and optional fields completed: 11.1 Range; 11.2 Population; 11.3 Habitat for the species; 11.4 Future prospects; 11.5 Overall assessment of conservation status; 11.6 Overall trend in conservation status; 11.7 Change and reasons for change in conservation status and conservation status trend; 11.8 Additional information (optional but completed to provide essential information on the process).

Optional fields not completed: none

The Overall conclusion of the status of a species (**field 11.5**) was based on the relevant section of the General Evaluation Matrix for assessing conservation status of a species (see Appendix 1: General evaluation matrices to assess conservation status). **Table 26**

[33] This is based on Table 26 in the EU Reporting Guidelines see footnote 1.

summarises this information, showing how the Overall conclusion related to the conclusions for Range, Population, Habitat for the species, and Future prospects.

Table 26 Relationship between the Overall assessment of conservation status and the conclusions for Range, Population, Habitat for the species, and Future prospects parameters (the coloured cells indicate which conclusion should be applied).

Favourable	Four parameter conclusions Favourable; or three parameter conclusions Favourable and one Unknown
Unfavourable-inadequate	One of more parameter conclusions Unfavourable-adequate but none Unfavourable-bad
Unfavourable-bad	One or more parameter conclusions Unfavourable-bad
Unknown	Four parameter conclusions unknown; or two or three parameter conclusions Unknown and one or two Favourable

The combined Overall conclusions reported for the 77 terrestrial and 16 marine species are summarised in Table 28. The Overall conclusions were mixed with the largest number concluded Favourable (n=33), followed by Unfavourable-inadequate (n = 24) and Unfavourable-bad (n = 16). There were 20 species for which the overall conclusion was Unknown. An explanation as to why the parameter and Overall conclusions were selected was reported under **field 10.8**.

The Overall trend in conservation status (**field 11.6**) was determined from the short-term trends for range, population, and, habitat for the species. To conclude on overall trend, Table 8 of the EU Guidelines[34] was used to guide the process (replicated in **Table 27**). The majority of Overall trends for terrestrial species were stable (n = 29), about the same number were either deteriorating or improving (n = 16 v 14), and the remainder either were unknown or not reported because the overall conservation conclusions for the species was unknown (n=18). For marine species the majority of Overall trends were unknown or not reported (n=15), with one species having an improving trend. An explanation as to why the Overall trend was selected was included in **field 11.8**.

[34] See footnote 1

Table 27 Relationship between the Overall trend in conservation status (left-hand column) and the number of short-term trends that were increasing, stable, declining, or unknown/ uncertain. The trends considered were for range, population, and habitat for the species.

	Increasing	Stable	Declining	Unknown/ uncertain
Improving	3	0	0	0
	2	1	0	0
	1	2	0	0
Stable * The overall trend in conservation status is stable only in cases of moderate declines (<1% per year)	0	3	0	0
	2	0	1	0
	2	0	0	1
	1	1	1*	0
	1	1	0	1
Deteriorating ** The overall trend in conservation status is declining only in cases of important declines (>1% per year)	0	0	3	0
	1	0	2	0
	0	1	2	0
	0	0	2	1
	0	2	1	0
	1	1	1**	0
Unknown	0	0	0	3
	1	0	0	2
	0	1	0	2
	0	1	0	2
	1	0	1	1
	0	1	1	1

The method to determine the Overall trend differed from the 2013 reporting, when the trend for future prospects was also considered. In circumstances where this impacted the final trend conclusion this was noted under **field 11.8**.

Table 28 Overall conclusions and trends for terrestrial and marine species. The table shows the number of species in each category.

Overall conclusion	Overall trend	Terrestrial species	Marine species	All species
Favourable	Improving	10	1	11
	Stable	19	0	19
	Unknown	3	0	3
Unfavourable-inadequate	Improving	1	0	1
	Stable	7	0	7
	Deteriorating	9	0	9
	Unknown	4	3	7
Unfavourable-bad	Improving	3	0	3
	Stable	3	0	3
	Deteriorating	7	0	7
	Unknown	3	0	3
Unknown	Unknown	8	12	20

3.6.2. Reasons for change in Conservation Status

Where the Overall conclusions or Overall trends differed from those reported in 2013, the reasons for change were reported (**field 11.7**). The options available were: (a) no change, there is no difference; (b) changed, due to genuine change; (c) changed, due to improved knowledge/ more accurate data; (d) changed, due to the use of different methods; and (e) changed, no information on the nature of change. Where more than one of the options was selected, the main reason for change was also reported.

To decide which options should be selected, the 2019 conclusions/trends for Range, Population, Habitat for the species, and Future prospects were compared with those from 2013. Those conclusions/trends that did differ per parameter were further scrutinised to establish if they were responsible for the change in the Overall conclusion/trend. Where responsibility for change in Overall conclusion/trend was determined to be due to a particular parameter (or number of parameters), it was then determined whether the change was either a genuine change or a change due to improved knowledge/more accurate data/different methods, i.e. non-genuine change.

4. Supplementary information

Supplementary information was provided for both habitat and species assessments. The fields included were: information sources; additional information on Annex V species; pressures and threats; conservation measures; and Natura 2000 coverage. In some cases, this information did not contribute to the assessment of conservation status, but provided background and context to the assessments i.e. information sources, additional information on Annex V species and Natura 2000 coverage. In the case of pressures and threats and conservation measures, these had a direct impact on the assessment of the Future prospects parameter.

4.1. Information sources

Information sources used to create the UK reports (**field 3.2 for habitats, 4.2 for species**) for each habitat and species were compiled from the information provided by the SNCBs and listed by country in each report.

4.2. Information related to Annex V species

For 2019 an additional section was included on Annex V species (**Section 3 fields 3.1-3.5**). This section aimed to identify which Annex V species, that were not in Favourable conservation status, were taken in the wild or exploited, and for which, if any, relevant conservation measures were being implemented. This section, therefore, only applied to huntable Annex V species in Unfavourable status which are taken or exploited in the wild and was completed retrospectively (i.e. after conservation status conclusions were made). Of the 24 Annex V species on the UK checklist 4 species and two species groups are both in Unfavourable conservation status and are taken or exploited in the wild (**field 3.1**). The 4 species are Atlantic salmon (*Salmo* salar), grayling (*Thymallus thymallus*), mountain hare (*Lepus timidus*) and common seal *(Phoca vitulina*), and the two species groups are *Cladonia* subgenus *Cladina* (lichens) and *Sphagnum* spp. (bog-mosses).

This small subset of species/species groups required further detail to be completed regarding measures taken under Article 14 (**field 3.2**), details of the 'hunting bag' or 'quantity taken in the wild' during the reporting period (year-on-year) and the method used to assess this (mammals only, **field 3.3** and **field 3.4**) and any additional information **(field 3.5**).

4.3. Pressures and threats

For each habitat/species, a list of the main pressures and threats was drawn up (**field 7.1 for habitats, field 8.1 for species**), primarily by aggregating the country/offshore information (see Appendix 2: Methods used to aggregate country/offshore information for method). These lists were based on the standard list of pressure/ threat categories and codes provided by the European Commission[35] (see Appendix 4: Pressure and threat reporting categories and codes). Pressures related to the 2019 reporting period (2013-2018), and threats to the period 2019-2030, i.e. the next two reporting periods. Each pressure/threat was ranked as either high or medium importance/impact (see Table 29 Definition of high and medium importance/impact for pressures and threats from the EU Reporting Guidelines.). No more than ten pressures and ten threats could be reported, and no more than five of these could be high-ranked. Where more were identified during the aggregation process, the least important were left off the UK list (see Appendix 2: Methods used to aggregate country/offshore information for method). For most of the marine habitats, more than ten pressures or threats were identified; information on these was detailed under **field 7.3**.

[35] DG Environment (2018) List of pressures and threats. Available to download at http://cdr.eionet.europa.eu/help/habitats_art17/

In some terrestrial cases, it was apparent that some countries had selected different categories for the same type of pressure/threat. As a result, some of the UK lists had fewer pressure/threat categories reported and these tended to have fewer high-ranked categories.

Table 29 Definition of high and medium importance/impact for pressures and threats from the EU Reporting Guidelines.

High	Important direct or immediate influence and/or acting over large areas (a pressure is the major cause or one of the major causes, if acting in combination with other pressures, of significant decline of population size, range or habitat area or deterioration of habitat quality at the bio-geographical scale; or pressure acting over large areas preventing the species population or habitat from being restored at Favourable conservation status at the bio-geographical scale)
Medium	Medium direct or immediate influence, mainly indirect influence and/or acting over moderate part of the area/acting only regionally (other pressure not directly or immediately causing significant declines)

An additional step was taken for 41 terrestrial habitats that were known to be sensitive to Nitrogen (N) deposition and had an assigned Nitrogen Critical Load (N CL) (see Appendix 6: Nitrogen Critical Load exceedance in terrestrial habitats). Where it was estimated that >25% of a habitat area exceeded the N CL, the pressure/threat code J03 (mixed source air pollution, air-borne pollutants) was reported as high importance/impact, and where 5-25% area of habitat exceeded the N CL this code was reported as medium importance/impact. Notes were included under **field 7.3** to explain why this had been done.

Reporting of sources of information (**field 7.2**) was optional and not undertaken.

4.4. Conservation measures

Information on conservation measures was drawn up (**field 8.5 for habitats and field 9.5 for species**) by aggregating the country information (see Appendix 2: Methods used to aggregate country/offshore information for method). For each habitat/species, it was reported whether any measures were needed and, where measures were required, whether: (a) the measures had been identified but not yet undertaken; (b) measures had been identified and undertaken; or (c) measures were needed but could not be identified (**field 8.1 for habitats and field 9.1 for species**). The most relevant option was selected based on weighting of the country level/ offshore information (see Appendix 2: Methods used to aggregate country/offshore information).

The main purpose of the measures taken for habitats (**field 8.2)** was reported as: (a) to maintain the current range, surface area or structure and functions of the habitat type; (b) to expand the current range of the habitat type; (c) to increase the surface area of the habitat type; or (d) to restore the structure and functions, including the status of typical species. For the majority of habitats, the main purpose was to restore the structure and functions.

For species that main purposes of the measures taken **(field 9.2)** was reported as: a) Maintain the current range, population and/or habitat for the species or b) Expand the current range of the species (related to ‘Range’) or c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to ‘Population’) or d) Restore the habitat of the species (related to ‘Habitat for the species’).

The location of the measures taken (**field 8.3 for habitats and 9.3 for species**) was identified as: (a) only inside Natura 2000 sites; (b) both inside and outside Natura 2000 sites; or (c) only outside Natura 2000 sites. And the results timeframe for measures (**field 8.4 for**

habitats and 9.4 for species) was reported as: (a) short-term results (within the current reporting period, 2013-2018); (b) medium-term results (within the next two reporting periods, 2019-2030); or (c) long-term results (after 2030).

Finally, a list the main conservation measures was provided (**field 8.5 for habitats and 9.5 for species**). These lists included measures that were expected to have a positive impact over the next two reporting periods, i.e. 2019-2030. They were based on the standard list of conservation measures categories and codes provided by the European Commission[36] (see Appendix 5: Conservation measure reporting categories and codes). No more than ten measures could be reported. To facilitate UK aggregation (see Appendix 2: Methods used to aggregate country/offshore information for method), the measures identified in the country/offshore information were ranked in the same way as pressures/threats (see 4.3. Pressures and threats).

4.5. Natura 2000 coverage

4.5.1 Habitats

The area of habitats inside the Natura 2000 network (**field 11.1**) was reported using an aggregation of the values supplied at country level. The area was calculated directly at the UK-level for marine habitats, using data collated from the inshore regions of the four countries and from the offshore region. This included proposed Sites of Community Importance (pSCIs), Sites of Community Importance (SCIs), and Special Areas of Conservation (SACs). An area value was reported for all habitats apart from H3260, and for the five freshwater lake habitats (H3110, H3130-60) only a minimum value could be reported, because one of the country values was a minimum. An area value was reported for all marine habitats apart from H8330.

Short-term trends in the area of habitat in good (favourable) condition within the Natura 2000 network (**field 11.4**) were reported in a similar way to the trends in habitat area and similar issues were encountered (see 2.3.2. Trend in area). For most habitats, the trend direction was reported as either stable, decreasing or increasing, but the trend for two habitats (H2190, H6130) was reported as uncertain. For marine habitats, the trend direction was reported as either stable or decreasing, but the trend for one habitat was reported (H1180) as uncertain.

The methods used to determine the area of habitat within the Natura 2000 network (**field 11.3**), and the short-term trend in the area of habitat in good (favourable) condition (**field 11.5**), were both reported in a similar manner to the corresponding distribution map fields (see 2.2.1. Distribution maps).

For marine habitats, additional information explaining the reported results were provided in **Field 11.6**.

4.5.2 Species

The population size inside the Natura 2000 network (**field 12.1**) was reported using an aggregation of the values supplied at country level. This included proposed Sites of Community Importance (pSCIs), Sites of Community Importance (SCIs), and Special Areas of Conservation (SACs). The population size was calculated directly at the UK-level for marine mammals.

[36] DG Environment (2018) List of conservation measures. Available to downloaded at http://cdr.eionet.europa.eu/help/habitats_art17/

Short-term trends in the populations within the Natura 2000 network (**field 12.4**) were reported in a similar way to the wider trends in population (see 3.3.2 Population short-term trends).

The methods used to determine the population size within the Natura 2000 network (**field 12.3**), and the short-term trend in the population (**field 12.5**), were both reported in a similar manner to the corresponding distribution map fields (see 3.2.2. Distribution maps).

Population size
The SNCBs estimated the population size within SACs at country level. The figures were aggregated to produce a UK population estimate within SACs. The exception to this was for the SACs for harbour porpoise which are large and span country boundaries; JNCC derived estimates for this SAC network using density estimates from the SCANS-III surveys.

Estimates were generally based on data collected through the Common Standards Monitoring Scheme/ Site Condition Monitoring scheme. The SNCBs recorded the method used to come up with their population estimates. The category of method used reported for the UK was based on the categories chosen by the SNCBs, weighted by the proportion of the species population within SACs in each country.

Population trends
Each country within the UK estimated the population trend (stable, increasing, decreasing or unknown) within SACs in their country. Their estimates were generally based on data collected through the Common Standards Monitoring Scheme/ Site Condition Monitoring scheme. To get an overall UK trend within SACs for a particular feature, the trend categories chosen by the SNCBs were weighted by the population estimate within SACs for that country, and then combined. To establish the UK trend the following factors were considered: the proportion of the SAC resource associated with the trend, the magnitude of the trend, the confidence the SNCB had in reporting the trend, the ecology of the species, and any other comments from the SNCBs. If a country (or countries) with over 50% of the SAC resource reported the trend as ‘unknown’ then the overall UK trend was reported as ‘unknown’.

There are relatively few SACs for mobile marine species. However, those for seals and bottlenose dolphins have been well monitored over decades and trends within individual SACs are relatively well understood. The site information was considered in the context of wider population trends to determine whether numbers in the SAC network were likely stable or otherwise. The harbour porpoise SACs are newly designated and therefore, there are insufficient data currently to understand trends in abundance within the network.

APPENDICES

Appendix 1: General evaluation matrices to assess Conservation Status

Table A: Matrix to assess the conservation status of a habitat – based on Annex E in the EU Reporting Guidelines.

	Favourable	Unfavourable-inadequate	Unfavourable-bad	Unknown
Range	Stable (loss and expansion in balance) or increasing, AND not smaller than the Favourable Reference Range	Any other combination	Large decrease, equivalent to a loss of more than 1% per year, OR more than 10% below Favourable Reference Range	No or insufficient reliable information available
Area	Stable (loss and expansion in balance) or increasing, AND not smaller than the Favourable Reference Area, AND without significant changes in distribution pattern within range	Any other combination	Large decrease in surface area, equivalent to a loss of more than 1% per year, OR with major losses in distribution pattern within range, OR more than 10% below Favourable Reference Area	No or insufficient reliable information available
Structures and functions	Structures and functions (including typical species) in good condition and no significant deteriorations / pressures	Any other combination	More than 25% of the area is unfavourable as regards its specific structures and functions (including typical species)	No or insufficient reliable information available
Future prospects	Habitat prospects for its future are excellent/good, no significant impact from threats expected, long-term viability assured	Any other combination	Habitat prospects are bad, severe impact from threats expected, long-term viability not assured	No or insufficient reliable information available
Overall assessment	All favourable OR three favourable and one unknown	One or more unfavourable-inadequate, none unfavourable-bad	One or more unfavourable-bad	Two or more unknown combined with favourable or all unknown

Table B: Evaluation matrix to assess the Conservation Status of a species – based on Annex C in the EU Reporting Guidelines.

	Favourable	Unfavourable – inadequate	Unfavourable-bad	Unknown
Range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decline: Equivalent to a loss of more than 1% per year within period specified by MS OR more than 10% below favourable reference range	*No or insufficient reliable information available*
Population	Population(s) not lower than 'favourable reference population' AND reproduction, mortality and age structure not deviating from normal (if data available)	Any other combination	Large decline: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS AND below 'favourable reference population' OR More than 25% below favourable reference population OR Reproduction, mortality and age structure strongly deviating from normal (if data available)	*No or insufficient reliable information available*
Habitat for the species	Area of habitat is sufficiently large (and stable or increasing) AND habitat quality is suitable for the long-term survival of the species	Any other combination	Area of habitat is clearly not sufficiently large to ensure the long-term survival of the species OR Habitat quality is bad, clearly not allowing long-term survival of the species	*No or insufficient reliable information available*
Future prospects	Main pressures and threats to the species not significant; species will remain viable on the long-term	Any other combination	Severe influence of pressures and threats to the species; very bad prospects for its future, long-term viability at risk.	*No or insufficient reliable information available*
Overall assessment	All 'favourable' OR three 'favourable' and one 'unknown'	One or more 'Unfavourable-inadequate' but no 'Unfavourable-bad'	One or more 'Unfavourable-bad'	Two or more 'unknown' combined with Favourable or all "unknown"

Appendix 2: Methods used to aggregate country/offshore information

Table A: Methods used to aggregate habitat information

N.B. Sections 2, 4, 5 and 11.1-11.3 were completed directly at UK-level for marine habitats

	Parameter	Reporting field	Aggregation method
Year/ Period	**2 Maps**	*2.1 Maps; year or period*	• Select earliest and latest year from country/offshore entries
	5 Area covered by habitat	*5.1 Area; year or period* *5.5 Area; short term trend; period*	
	6 Structure and functions	*6.3 Area in good condition; short term trend; period*	
	3 Biogeographical and marine regions	*3.2 Sources of information*	• Concatenate country/offshore entries
Yes/ No Questions (and associated reason(s))	**4 Range**	*4.11 Change in range; Change and reason for change in area of range; Is there a change between reporting periods? YES/NO. If yes, provide the nature of that change a) genuine change; b) improved knowledge; c) different method; d) no information*	• Select 'Yes' if all country/offshore entries are 'Yes' • Select 'No' if any country/offshore entry is 'No' • Select 'No' if all country/offshore entries are 'No' • Select 'Yes' if any country/offshore entry is 'Yes' • If 'yes' then select the nature of that change*; Reasons A-C, as follows;* • Select the Reason (A-C) if any country/offshore entry is 'Yes'. • Select Reason D) no information, only in circumstances where Reasons A-C are not selected.
	5 Area covered by habitat	*5.14 Change in area; Change and reason for change in area of range; Is there a change between reporting periods? YES/NO. If yes, provide the nature of that change a) genuine change; b) improved knowledge; c) different method; d) no information*	

	Parameter	Reporting field	Aggregation method
	8 Conservation measures	*8.1 Conservation measures; a) needed?* *8.1 Conservation measures; b) status of measures*	• Select 'No' if all country/offshore entries are 'No' • Select 'Yes' if any country/offshore entry is 'Yes' • If 'Yes', convert country/offshore entries to values *(Measures identified, but none yet taken = 1; Measures needed but cannot be identified = 0.1; Measures identified and taken = -10)*, • Sum converted values, • Convert summed values back to categories using numeric ranges *(≤0 = Measures identified and taken; <1 = Measures needed but cannot be identified; ≥1 = Measures identified, but none yet taken)*
Type of estimate	**5 Area covered by habitat**	*5.3 Area; type of estimate*	• If all country/offshore entries are same select this category ***or*** Manually select if country/offshore entries differ
	11 Natura 2000 coverage	*11.2 Natura 2000 network; surface area; type of estimate*	
Total estimate	**5 Area covered by habitat**	*5.2 Area; a) minimum; b) maximum; c) best single value*	• Sum country/offshore entries if full set of values provided
	11 Natura 2000 coverage	*11.1 Natura 2000 network; surface area; a) minimum; b) maximum; c) best single value*	
	6 Structure and functions	*6.1 a Area in good condition; i) minimum; ii) maximum* *6.1 b Area in not-good condition; i) minimum; ii) maximum* *6.1 c Area in unknown condition; i) minimum; ii) maximum*	• Sum country/offshore entries
Method Used	**2 Maps**	*2.3 Distribution map; method used*	• Convert country/offshore entries to values *(Complete survey = 3; Extrapolation = 2; Expert opinion = 1; Insufficient or no data available = 0),* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum weighted values,
	5 Area covered by habitat	*5.4 Area; surface area; method used* *5.8 Area; short term trend; method used*	
	6 Structure and functions	*6.2 Condition of habitat; method used* *6.5 Area in good condition; short term trend; method used*	

	Parameter	Reporting field	Aggregation method
	11 Natura 2000 coverage	*11.3 Natura 2000 network; surface area; method used* *11.5 Natura 2000 network; short term trend of area in good condition; method used*	• Convert summed values back to categories using numeric ranges *(>2.5 = Complete survey; ≤2.5 & >1.5= Extrapolation; ≤1.5 & >0.5= Expert opinion; ≤0.5 & >0 = Insufficient or no data available).*
	4 Range	*4.3 Range; short term trend; direction*	• Convert country/offshore entries to values *(Increasing = 1; Stable = 0; Decreasing = -0.1; Uncertain = -10; Unknown = -10),* • Sum converted values, • Convert summed values back to categories using numeric ranges *(>0 & integer = Increasing; 0 = Stable; 0>-1 = Decreasing; >0 & non-integer = manual calculation required; ≤-1 = manual calculation required).*
Trend Direction	**5 Area covered by habitat**	*5.6 Area; short term trend; direction* *6.4 Area in good condition; short term trend;*	
	6 Structure and functions	*6.4 Area in good condition; short term trend; direction*	
	11 Natura 2000 coverage	*11.4 Natura 2000 network; short term trend of area in good condition; direction*	
Main Reason/ Response	**4 Range**	*4.11 Change in range; f) main reason*	• Convert country/offshore entries to proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum proportions for each category, • Select category with largest summed value; if two or more categories have same value then determine manually.
	5 Area covered by habitat	*5.14 Change in area; f) main reason*	
	8 Conservation measures	*8.2 Conservation measures; main purpose of measures taken*	• Convert country/offshore entries to values *(Expand the current range etc= 4; Increase the surface area etc = 3; Maintain the current range, etc = 2; Restore the structure and functions etc = 1),* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(>3.5 = Expand the current range etc; ≤3.5 to >2.5 = Increase the surface area etc; ≤2.5 to >1.5 = Maintain the current range etc; >0 to ≤1.5 = Restore the structure and functions etc).*

	Parameter	Reporting field	Aggregation method
		8.3 Conservation measures; location of measures taken	• Convert country/offshore entries to values *(Only inside Natura 2000 = 1; Only outside Natura 2000 = -0.1; Both inside and outside Natura 2000 = -10),* • Sum converted values, • Convert summed values back to categories using numeric ranges *(>0 & non-integer = Both inside and outside; >0 & integer = Only inside; <0 & >-1 = Only outside; ≤-1 = Both inside and outside).*
		8.4 Conservation measures; response to measures	• Convert country/offshore entries to values *(Short-term results etc = 2; Medium-term results etc = 1; Long-term results etc = 0)* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum weighted values, Convert summed values back to categories using numeric ranges *(>1.5 = Short-term results etc; ≤1.5 & >0 = Medium-term results etc; 0 = Long-term results etc)*
Lists	**7 Main pressures and threat**	*7.1 Characterisation of pressures/threats*	• Convert country/offshore entries to values *(High = 3; Medium = 2)* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(> 2 = High; >1 & ≤2 = Medium; ≤1 = Not reported),* • Manually select ten highest scoring pressures /threats/measures.

	Parameter	Reporting field	Aggregation method
			Marine habitats • Convert country/offshore entries to values *(High = 3; Medium = 2)* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • If any region ranked a pressure/threat/measure as medium then it was considered to be medium importance at UK-level; if >25% resource had ranked a pressure/threat/measure as high then it was considered to be high importance at the UK-level. • Manually select ten highest scoring pressures /threats/measures based on weightings
	8 Conservation measures	*8.5 List of main conservation measures*	
Future Prospects	**9 Future Prospects**	*9.1 Future prospects; a) future trend of range* *9.1 Future prospects; b) future trend of area* *9.1 Future prospects; c) future trend of structure and functions*	• Convert country/offshore entries to values *(Very positive = 3; Positive = 1; Overall stable = 0; Negative = -1; Very negative = -3; Unknown = -10),* • Weight (multiply) converted values (except Unknown) by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(≥2 = Very positive; <2 & >0.15 = Positive; ≤0.15 & ≥-0.15 = Stable; <-0.15 & >-2 = Negative; ≥-3 & ≤-2 = Very negative; ≤3 = Unknown)*

Table B Methods used to aggregate species information

	Parameter	Reporting field	Aggregation method
Yes/ No Questions (and associated reason(s))	**2 Maps**	*2.1 Sensitive species?*	• Select 'No' if all country/offshore entries are 'No' • Select 'Yes' if any country/offshore entry is 'Yes'
	3 Annex V Species	*3.1 Is the species taken in the wild/ exploited?* *3.2 Which of the measures in Art. 14 have been taken? YES/NO (measures listed a-h)*	
	9 Conservation measures	*9.1 Conservation measures; Are measures needed? YES/NO*	
	7 Habitat for the species	*7.1 Sufficiency of area and quality of occupied habitat a) area and quality of occupied habitat, and b) area and quality of unoccupied habitat*	• Select 'Yes' if all country/offshore entries are 'Yes' • Select 'No' if any country/offshore entry is 'No' • Select 'Unknown' if any country/ offshore entry is 'Unknown' and summed weighted values account 70%> of the total population.
	5 Range	*5.11 Change and reason for change in surface area of range; Is there a change between reporting periods? YES/NO. If yes, provide the nature of that change a) genuine change; b) improved knowledge; c) different method; d) no information*	• Select 'No' if all country/offshore entries are 'No' • Select 'Yes' if any country/offshore entry is 'Yes' • If 'yes' then select the nature of that change*; Reasons A-C, as follows;* • Select the Reason (A-C) if any country/offshore entry is 'Yes'. • Select Reason D) no information, only in circumstances where Reasons A-C are not selected.
	6 Population	*6.16 Change and reason for change in population size; Is there a change between reporting periods? YES/NO. If yes, provide the nature of that change a) genuine change; b) improved knowledge; c) different method; d) no information*	
	9 Conservation measures	*9.1 Conservation measures; Are conservation measures needed? YES/NO and status of measures, if yes*	• Select 'No' if all country/offshore entries are 'No' • Select 'Yes' if any country/offshore entry is 'Yes' • Convert country/offshore entries to values *(Measures identified, but none yet taken = 1; Measures needed but cannot be identified = 0.1; Measures identified and taken = -10)*, • Sum converted values, • Convert summed values back to categories using numeric ranges *(≤0 = Measures identified and taken; <1 = Measures needed but cannot be identified; ≥1 = Measures identified, but none yet taken)*

	Parameter	Reporting field	Aggregation method
Year or Period	**2 Maps**	*2.2 Year or period*	• Select earliest and latest year from country/offshore entries
	5 Range	*5.3 Short-term trend Period* *5.6 Long-term trend Period*	
	6 Population	*6.1 Year or period* *6.7 Short-term trend Period* *6.11 Long-term trend period*	
	7 Habitat for the species	*7.3 Short-term trend Period* *7.6 Long-term trend Period*	
Method Used	**2 Maps**	*2.3 Distribution map; Method used*	• Convert country/offshore entries to values *(Complete survey = 3; Extrapolation = 2; Expert opinion = 1; Insufficient or no data available = 0),* • Weight (multiply) converted values by proportion of species population in each country/offshore (based on entries in field 6.2), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(>2.5 = Complete survey; ≤2.5 & >1.5= Extrapolation; ≤1.5 & >0.5= Expert opinion; ≤0.5 & >0 = Insufficient or no data available).*
	3 Annex V species	*3.4 Hunting bag or quantity taken in the wild; Method used*	
	5 Range	*5.5 Short-term trend; Method used* *5.9 Long-term trend; Method used*	
	6 Population	*6.6 Population size; Method used* *6.10 Short-term trend; Method used* *6.14 Long-term trend; Method used*	
	7 Habitat for the species	*7.2 Sufficiency of area and quality of occupied habitat; Method used* *7.5 Short-term trend; Method used* *7.8 Long-term trend; Method used*	
	12 Natura 2000 coverage	*12.3 Population size inside the network; method used* *12.5 Short-term trend of population size within the network; method used*	

	Parameter	Reporting field	Aggregation method
Total Estimate	**3 Annex V species**	*3.3 Hunting bag or quantity taken in the wild; b) Statistic Min/ Max Season/ Year 1- Year 6*	• Sum country/offshore entries if a full set country/ offshore values (i.e. min and max *or* bsv) is provided. *If* values are missing leave blank. • *For Annex V species* (mammals in Unfavourable status only) if a full set of values (i.e. min and max) is not provided mark 'Unknown'
	6 Population	*6.2 Population size; b) minimum; c) maximum; d) best single value (bsv)* *6.4 Additional population size; b) minimum; c) maximum; d) best single value*	
	12 Natura 2000 coverage	*12.1 Natura 2000 network; population size inside the network; b) minimum; c) maximum; d) best single value*	
Lists	**4 Biogeographical and marine regions**	*4.2 Sources of information*	• Concatenate country/offshore entries
Type of Estimate	**6 Population**	*6.3 Population size; Type of estimate* *6.5 Additional population size; Type of estimate*	• If all country/offshore entries are the same select this category ***or*** Manually select if country/offshore entries differ using the weighting population weighting as a guide (based on entries in field 6.2)
	12 NATURA 2000 coverage	*12.2 Population size in the network; Type of estimate*	
Trend Direction	**5 Range**	*5.3 Short-term trend; direction* *5.7 Long-term trend; direction*	• Convert country/offshore entries to values *(Increasing = 1; Stable = 0; Decreasing = -0.1; Uncertain = -10; Unknown = -10),* • Sum converted values, • Convert summed values back to categories using numeric ranges *(>0 & integer = Increasing; 0 = Stable; 0>-1 = Decreasing; >0 & non-integer = manual calculation required; ≤-1 = manual calculation required).*
	6 Population	*6.8 Short-term trend; direction* *6.12 Long-term trend; direction*	
	7 Habitat for the species	*7.4 Short-term trend; direction* *7.7 Long-term trend; direction*	

	Parameter	Reporting field	Aggregation method
	12 NATURA 2000 coverage	*12.4 Short-term trend of population size within the network; direction*	
Main Reason/ Response	**5 Range**	*5.11 Change in range; e) main reason for change*	• Convert country/offshore entries to proportion of population in each country/offshore (based on entries in field 6.2), • Sum proportions for each category, • Select category with largest summed value; if two or more categories have same value then determine manually.
	6 Population	*6.16 Change in area; e) main reason for change*	
	9 Conservation measures	*9.2 Conservation measures; main purpose of measures taken (a-d)*	• Convert country/offshore entries to values *(Maintain the current range, population and/or habitat for the species= 4; Expand the current range of the species =3; Increase the population size and/or improve population dynamics =2; or Restore the habitat of the species= 1)* • Weight (multiply) converted values by proportion of population in each country/offshore (based on entries in field 5.2c), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(>3.5 = Maintain the current range, population and/ or habitat for the specie; ≤3.5 to >2.5 = expand the current range of the species; ≤2.5 to >1.5 = increase the population size; >0 to ≤1.5 = Restore the habitat of the species).*
		9.3 Conservation measures; location of measures taken	• Convert country/offshore entries to values *(Only inside Natura 2000 = 1; Only outside Natura 2000 = -0.1; Both inside and outside Natura 2000 = -10),* • Sum converted values, • Convert summed values back to categories using numeric ranges *(>0 & non-integer = Both inside and outside; >0 & integer = Only inside; <0 & >-1 = Only outside; ≤-1 = Both inside and outside).*

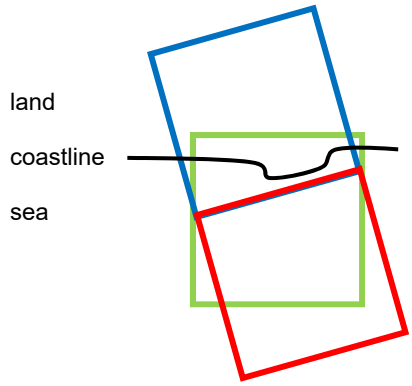
	Parameter	Reporting field	Aggregation method
		9.4 Conservation measures; response to measures	• Convert country/offshore entries to values *(Short-term results etc = 2; Medium-term results etc = 1; Long-term results etc = 0)* • Weight (multiply) converted values by proportion of population in each country/offshore (based on entries in field 5.2c), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(>1.5 = Short-term results etc; ≤1.5 & >0 = Medium-term results etc; 0 = Long-term results etc)* •
Aggregated Lists	**8 Main pressures and threats**	*8.1 Characterisation of pressures/threats*	• Convert country/offshore entries to values *(High = 3; Medium = 2)* • Weight (multiply) converted values by proportion of population in each country/offshore (based on entries in field 6.2), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(> 2 = High; >1 & ≤2 = Medium; ≤1 = Not reported),* • Manually select ten highest scoring pressures /threats/measures. <u>Maerl species</u> • Convert country entries to values *(High = 3; Medium = 2)* • Weight (multiply) converted values by proportion of habitat area in each country/offshore (based on entries in field 5.2c), • If any country ranked a pressure/threat/measure as medium, then it was considered to medium importance at UK-level; if >25% resource had ranked a pressure/threat/measure as high then it was considered to be high importance at the UK-level. • Manually select ten highest scoring pressures /threats/measures based on weightings
	9 Conservation measures	*9.5 List of main conservation measures*	

Part	Parameter	Reporting field	Aggregation method
Future Prospects	**10 Future Prospects**	*10.1 Future prospects; a) future trend of range; b) future trend of population; c) future trend of habitat of the species*	• Convert country/offshore entries to values for trends *(Very positive = 3; Positive = 1; Overall stable = 0; Negative = -1; Very negative = -3; Unknown = -10),* • Weight (multiply) converted values (except Unknown) by proportion of population in each country/offshore (based on entries in field 6.2), • Sum weighted values, • Convert summed values back to categories using numeric ranges *(≥2 = Very positive; <2 & >0.15 = Positive; ≤0.15 & ≥-0.15 = Stable; <-0.15 & >-2 = Negative; ≥-3 & ≤-2 = Very negative; ≤3 = Unknown)*

Appendix 3: Conversion of terrestrial distribution data to the ETRS grid

Habitat and species distribution data was submitted to the European Commission using the European standard ETRS grid (LAEA 5210 projection). This involved converting the UK terrestrial habitats and species 10km gridded square distribution into the ETRS grid, as these were originally compiled using the GB national grid for Great Britain and the Ireland national grid for Northern Ireland.

The conversion involved selecting which of the 10km ETRS squares had the maximum overlap with the corresponding GB/Ireland grid squares. This is illustrated in the figure below. The source GB grid square is shown in green, and the potential ETRS squares to which it could match are shown in blue and red. The green square overlaps with the red square to a greater extent than the blue square, so the green square was converted to the red ETRS square. For some coastal features that occurred above high water, this resulted in ETRS squares that were left isolated in the sea by a few km. This applied to a small percentage of coastal squares, mainly those where the coast only occupied a small proportion of the GB grid square as in the example below.



In some cases, two original adjacent GB/Ireland grid squares matched with the same ETRS square. This produced ETRS maps with a slightly lower number of squares compared with the GB/Ireland source maps (typically 1-2% less where the square count exceeded 100 source squares). This minor reduction in the square count was considered preferable to the alternative of reporting every 10-km ETRS square that overlapped with each source square, as this ‘intersection’ method would have resulted in one isolated 10-km GB/Ireland square generating four ETRS squares.

Appendix 4: Pressure and threat reporting categories and codes[37]

The list of pressures/threats provides A standard list to be used to report information on pressures and threats in fields '8.1 Characterisation of pressures/threats' of the Art 17 species format, '7.1 Characterisation of pressures/threats' of the Art 17 habitat format.

A	Agriculture
A01	Conversion into agricultural land (excluding drainage and burning)
A02	Conversion from one type of agricultural land use to another (excluding drainage and burning)
A03	Conversion from mixed farming and agroforestry systems to specialised (e.g. single crop) production
A04	Changes in terrain and surface of agricultural areas
A05	Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.)
A06	Abandonment of grassland management (e.g. cessation of grazing or mowing)
A07	Abandonment of management/use of other agricultural and agroforestry systems (all except grassland)
A08	Mowing or cutting of grasslands
A09	Intensive grazing or overgrazing by livestock
A10	Extensive grazing or undergrazing by livestock
A11	Burning for agriculture
A12	Suppression of fire for agriculture
A13	Reseeding of grasslands and other semi-natural habitats
A14	Livestock farming (without grazing)
A15	Tillage practices (e.g. ploughing) in agriculture
A16	Other soil management practices in agriculture
A17	Harvesting of crops and cutting of croplands
A18	Irrigation of agricultural land
A19	Application of natural fertilisers on agricultural land
A20	Application of synthetic (mineral) fertilisers on agricultural land
A21	Use of plant protection chemicals in agriculture
A22	Use of physical plant protection in agriculture
A23	Use of other pest control methods in agriculture (excluding tillage)
A24	Waste management practices in agriculture
A25	Agricultural activities generating point source pollution to surface or ground waters
A26	Agricultural activities generating diffuse pollution to surface or ground waters
A27	Agricultural activities generating air pollution
A28	Agricultural activities generating marine pollution
A29	Agricultural activities generating soil pollution
A30	Active abstractions from groundwater, surface water or mixed water for agriculture
A31	Drainage for use as agricultural land
A32	Development and operation of dams for agriculture
A33	Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams)
A34	Introduction and spread of new crops (including GMOs)
A35	Agricultural crops for renewable energy production
A36	Agriculture activities not referred to above

B	Forestry
B01	Conversion to forest from other land uses, or afforestation (excluding drainage)
B02	Conversion to other types of forests including monocultures
B03	Replanting with or introducing non-native or non-typical species (including new species and GMOs)
B04	Abandonment of traditional forest management
B05	Logging without replanting or natural regrowth

[37] further details available from http://cdr.eionet.europa.eu/help/habitats_art17/

B06	Logging (excluding clear cutting) of individual trees
B07	Removal of dead and dying trees, including debris
B08	Removal of old trees (excluding dead or dying trees)
B09	Clear-cutting, removal of all trees
B10	Illegal logging
B11	Cork extraction and forest exploitation excluding logging
B12	Thinning of tree layer
B13	Burning for forestry
B14	Suppression of fire for forestry
B15	Forest management reducing old growth forests
B16	Wood transport
B17	Tillage practices in forestry and other soil management practices in forestry
B18	Application of natural fertilisers
B19	Application of synthetic fertilisers in forestry, including liming of forest soils
B20	Use of plant protection chemicals in forestry
B21	Use of physical plant protection in forestry, excluding tree layer thinning
B22	Use of other pest control methods in forestry
B23	Forestry activities generating pollution to surface or ground waters
B24	Forestry activities generating air pollution
B25	Forestry activities generating marine pollution
B26	Forestry activities generating soil pollution
B27	Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams)
B28	Forests for renewable energy production
B29	Other forestry activities, excluding those relating to agro-forestry

C	Extraction of resources (minerals, peat, non-renewable energy resources)
C01	Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)
C02	Extraction of salt
C03	Extraction of oil and gas, including infrastructure
C04	Coal mining
C05	Peat extraction
C06	Dumping/depositing of inert materials from terrestrial extraction
C07	Dumping/depositing of dredged materials from marine extraction
C08	Abandonment or conversion of saltpans
C09	Geotechnical surveying
C10	Extraction activities generating point source pollution to surface or ground waters
C11	Extraction activities generating diffuse pollution to ground or surface waters
C12	Extraction activities generating marine pollution
C13	Extraction activities generating noise, light or other forms of pollution
C14	Abstraction of surface and ground water for resource extraction
C15	Mining and extraction activities not referred to above

D	Energy production processes and related infrastructure development
D01	Wind, wave and tidal power, including infrastructure
D02	Hydropower (dams, weirs, run-off-the-river), including infrastructure
D03	Solar power, including infrastructure
D04	Geothermal power generation (including infrastructure)
D05	Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants)
D06	Transmission of electricity and communications (cables)
D07	Oil and gas pipelines
D08	Energy production and transmission activities generating pollution to surface or ground waters
D09	Energy production and transmission activities generating air pollution
D10	Energy production and transmission activities generating marine pollution
D11	Energy production and transmission activities generating noise pollution

D12	Energy production and transmission activities generating light, heat or other forms pollution
D13	Abstraction of surface and ground water for energy production (excluding hydropower)
D14	Energy production and transmission activities not referred to above

E	Development and operation of transport systems
E01	Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels)
E02	Shipping lanes and ferry lanes transport operations
E03	Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging)
E04	Flight paths of planes, helicopter and other non-leisure aircrafts
E05	Land, water and air transport activities generating pollution to surface or ground waters
E06	Land, water and air transport activities generating air pollution
E07	Land, water and air transport activities generating marine pollution
E08	Land, water and air transport activities generating noise, light and other forms of pollution
E09	Land, water and air transport activities not referred to above

F	Development, construction and use of residential, commercial, industrial and recreational infrastructure and areas
F01	Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions)
F02	Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas
F03	Conversion from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions)
F04	Construction or modification of commercial / industrial infrastructure in existing commercial / industrial areas
F05	Creation or development of sports, tourism and leisure infrastructure (outside the urban or recreational areas)
F06	Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning
F07	Sports, tourism and leisure activities
F08	Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures)
F09	Deposition and treatment of waste/garbage from household/recreational facilities
F10	Deposition and treatment of waste/garbage from commercial and industrial facilities
F11	Pollution to surface or ground water due to urban run-offs
F12	Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water
F13	Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water
F14	Other residential and recreational activities and structures generating point pollution to surface or ground waters
F15	Other industrial and commercial activities and structures generating point pollution to surface or ground waters
F16	Other residential and recreational activities and structures generating diffuse pollution to surface or ground waters
F17	Other industrial and commercial activities and structures generating diffuse pollution to surface or ground waters
F18	Residential and recreational activities and structures generating air pollution
F19	Industrial and commercial activities and structures generating air pollution
F20	Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution)
F21	Industrial or commercial activities and structures generating marine pollution (excluding marine macro- and micro-particular pollution)
F22	Residential or recreational activities and structures generating marine macro- and micro-particulate pollution (e.g. plastic bags, Styrofoam)
F23	Industrial or commercial activities and structures generating marine macro- and micro-particulate pollution (e.g. plastic bags, Styrofoam)

F24	Residential or recreational activities and structures generating noise, light, heat or other forms of pollution
F25	Industrial or commercial activities and structures generating noise, light, heat or other forms of pollution
F26	Drainage, land reclamation and conversion of wetlands, marshes, bogs, etc. to settlement or recreational areas
F27	Drainage, land reclamation or conversion of wetlands, marshes, bogs, etc. to industrial/commercial areas
F28	Modification of flooding regimes, flood protection for residential or recreational development
F29	Construction or development of reservoirs and dams for residential or recreational development
F30	Construction or development of reservoirs and dams for industrial or commercial development
F31	Other modification of hydrological conditions for residential or recreational development
F32	Other modification of hydrological conditions for industrial or commercial development
F33	Abstraction of ground and surface waters (including marine) for public water supply and recreational use
F34	Abstraction of ground and surface waters (including marine) for commercial/industrial use (excluding energy)

G	Extraction and cultivation of biological living resources (other than agriculture and forestry)
G01	Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species
G02	Marine fish and shellfish processing
G03	Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats
G04	Marine plant harvesting
G05	Freshwater fish and shellfish harvesting (professional)
G06	Freshwater fish and shellfish harvesting (recreational)
G07	Hunting
G08	Management of fishing stocks and game
G09	Harvesting or collecting of other wild plants and animals (excluding hunting and leisure fishing)
G10	Illegal shooting/killing
G11	Illegal harvesting, collecting and taking
G12	Bycatch and incidental killing (due to fishing and hunting activities)
G13	Poisoning of animals (excluding lead poisoning)
G14	Use of lead ammunition or fishing weights
G15	Modification of coastal conditions for marine aquaculture
G16	Marine aquaculture generating marine pollution
G17	Introduction and spread of species (including GMOs) in marine aquaculture
G18	Abandonment of marine aquaculture
G19	Other impacts from marine aquaculture, including infrastructure
G20	Abstraction of water, flow diversion, dams and other modifications of hydrological conditions for freshwater aquaculture
G21	Freshwater aquaculture generating point source pollution to surface or ground waters
G22	Freshwater aquaculture generating diffuse source pollution to surface or ground waters
G23	Freshwater aquaculture generating marine pollution
G24	Introduction and spread of species (including alien species and GMOs) in freshwater aquaculture
G25	Abandonment of freshwater aquaculture
G26	Other impacts from freshwater aquaculture, including infrastructure
G27	Other activities related to extraction and cultivation of biological living resources not referred to above

H	Military action, public safety measures, and other human intrusions
H01	Military, paramilitary or police exercises and operations on land

H02	Military, paramilitary or police exercises and operations in the freshwater and marine environment
H03	Abandonment of terrestrial military or similar exercises (loss of open habitats)
H04	Vandalism or arson
H05	Tree surgery, felling/removal of roadside trees and vegetation for public safety
H06	Closure or restricted access to site/habitat
H07	Intrusive and destructive research and monitoring activities
H08	Other human intrusions and disturbance not mentioned above

I	Alien and problematic species
I01	Invasive alien species of Union concern
I02	Other invasive alien species (other than species of Union concern)
I03	[not to be used]
I04	Problematic native species
I05	Plant and animal diseases, pathogens and pests

J	Mixed source pollution
J01	Mixed source pollution to surface and ground waters (limnic and terrestrial)
J02	Mixed source marine water pollution (marine and coastal)
J03	Mixed source air pollution, air-borne pollutants
J04	Mixed source soil pollution and solid waste (excluding discharges)
J05	Mixed source excess energy

K	Human-induced changes in water regimes
K01	Abstraction from groundwater, surface water or mixed water
K02	Drainage
K03	Development and operation of dams
K04	Modification of hydrological flow
K05	Physical alteration of water bodies

L	Natural processes (excluding catastrophes and processes induced by human activity or climate change)
L01	Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)
L02	Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)
L03	Accumulation of organic material
L04	Natural processes of eutrophication or acidification
L05	Reduced fecundity / genetic depression (e.g. inbreeding or endogamy)
L06	Interspecific relations (competition, predation, parasitism, pathogens)
L07	Absence or reduction of interspecific faunal and floral relations (e.g. pollinators)

M	Geological events, natural catastrophes
M01	Volcanic activity
M02	Tidal waves, tsunamis
M03	Earthquake
M04	Avalanche (snow)
M05	Collapse of terrain, landslide
M06	Underground collapses (natural processes)
M07	Storm, cyclone
M08	Flooding (natural processes)
M09	Fire (natural)
M10	Other natural catastrophes

N	Climate change
N01	Temperature changes (e.g. rise of temperature & extremes) due to climate change
N02	Droughts and decreases in precipitation due to climate change
N03	Increases or changes in precipitation due to climate change

N04	Sea-level and wave exposure changes due to climate change
N05	Change of habitat location, size, and / or quality due to climate change
N06	Desynchronisation of biological / ecological processes due to climate change
N07	Decline or extinction of related species (e.g. food source / prey, predator / parasite, symbiote, etc.) due to climate change
N08	Change of species distribution (natural newcomers) due to climate change
N09	Other climate related changes in abiotic conditions

X	Unknown pressures, no pressures and pressures from outside the Member State
Xu	Unknown pressure
Xxp	No pressures
Xxt	No threats
Xp	No information on pressures
Xt	No information on threats
Xe	Threats and pressures from outside the EU territory
Xo	Threats and pressures from outside the Member State

Appendix 5: Conservation measure reporting categories and codes[38]

This list of conservation measures provides a standard list to be used to report information on measures in fields '9.5 List of main conservation measures' of the Art. 17 species format, '8.5 List of main conservation measures' of the Art. 17 habitat format.

CA	Measures related to agriculture and agriculture-related habitats
CA01	Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land
CA02	Restore small landscape features on agricultural land
CA03	Maintain existing extensive agricultural practices and agricultural landscape features
CA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures
CA05	Adapt mowing, grazing and other equivalent agricultural activities
CA06	Stop mowing, grazing and other equivalent agricultural activities
CA07	Recreate Annex I agricultural habitats
CA08	Adapt soil management practices in agriculture
CA09	Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production
CA10	Reduce/eliminate point pollution to surface or ground waters from agricultural activities
CA11	Reduce diffuse pollution to surface or ground waters from agricultural activities
CA12	Reduce/eliminate air pollution from agricultural activities
CA13	Reduce/eliminate marine pollution from agricultural activities
CA14	Reduce/eliminate soil pollution from agricultural activities
CA15	Manage drainage and irrigation operations and infrastructures in agriculture
CA16	Other measures related to agricultural practices

CB	Measures related to forestry and forest-related habitats
CB01	Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation
CB02	Maintain existing traditional forest management and exploitation practices
CB03	Reinstate forest management and exploitation practices
CB04	Adapt/manage reforestation and forest regeneration
CB05	Adapt/change forest management and exploitation practices
CB06	Stop forest management and exploitation practices
CB07	Combat illegal logging
CB08	Restoration of Annex I forest habitats
CB09	Manage the use of chemicals for fertilisation, liming and pest control in forestry
CB10	Reduce diffuse pollution to surface or ground waters from forestry activities
CB11	Reduce air pollution from forestry activities
CB12	Reduce marine pollution from forestry activities
CB13	Reduce soil pollution from forestry activities
CB14	Manage drainage and irrigation operations and infrastructures
CB15	Other measures related to forestry practices

CC	Measures related to resources extraction and energy production
CC01	Adapt/manage extraction of non-energy resources
CC02	Adapt/manage exploitation of energy resources
CC03	Adapt/manage renewable energy installation, facilities and operation
CC04	Reduce impact of hydropower operation and infrastructure
CC05	Adapt/manage fossil energy installation, facilities and operation
CC06	Reduce impact of service corridors and networks
CC07	Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure
CC08	Manage/reduce/eliminate point pollution to surface or ground waters from resource exploitation and energy production

[38] further details available from http://cdr.eionet.europa.eu/help/habitats_art17/

CC09	Manage/reduce/eliminate diffuse pollution to surface or ground waters from resource exploitation and energy production
CC10	Manage/reduce/eliminate air pollution from resource exploitation and energy production
CC11	Manage/reduce/eliminate marine pollution from resource exploitation and energy production
CC12	Reduce/eliminate noise, light, thermal and other forms of pollution related to resource exploitation and energy production
CC13	Manage water abstraction for resource extraction and energy production
CC14	Other measures related to extraction and energy exploitation activities

CE	Measures related to development and operation of transport systems
CE01	Reduce impact of transport operation and infrastructure
CE02	Manage/reduce/eliminate pollution to surface or ground water from transport
CE03	Manage/reduce/eliminate air pollution from transport
CE04	Manage/reduce/eliminate marine pollution from transport
CE05	Manage/reduce/eliminate noise, light and other forms of pollution from transport
CE06	Habitat restoration of areas impacted by transport
CE07	Other measures related to transport

CF	Measures related to residential, commercial, industrial and recreational infrastructures, operations and activities
CF01	Manage conversion of land for construction and development of infrastructure
CF02	Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities
CF03	Reduce impact of outdoor sports, leisure and recreational activities
CF04	Reduce/eliminate point source pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities
CF05	Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities
CF06	Reduce/eliminate air pollution from industrial, commercial, residential and recreational areas and activities
CF07	Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities
CF08	Reduce/eliminate marine contamination with litter
CF09	Reduce/eliminate noise, light, heat or other forms pollution from industrial, commercial, residential and recreational areas and activities
CF10	Manage changes in hydrological and coastal systems and regimes for construction and development
CF11	Manage water abstraction for public supply and for industrial and commercial use
CF12	Other measures related to residential, commercial, industrial and recreational infrastructures, operations and activities

CG	Measures related to the effects of extraction and cultivation of biological living resources
CG01	Management of professional/commercial fishing (including shellfish and seaweed harvesting)
CG02	Management of hunting, recreational fishing and recreational or commercial harvesting or collection of plants
CG03	Reducing the impact of (re-) stocking for fishing and hunting, of artificial feeding and predator control
CG04	Control/eradication of illegal killing, fishing and harvesting
CG05	Reduce bycatch and incidental killing of non-target species
CG06	Reduce impact of lead poisoning
CG07	Manage changes in coastal conditions for marine aquaculture
CG08	Reduce/eliminate marine pollution from marine aquaculture
CG09	Other measures to reduce impacts from marine aquaculture infrastructures and operation
CG10	Manage water abstraction and modifications of hydrological conditions for freshwater aquaculture
CG11	Reduce/eliminate point source pollution to surface waters from freshwater aquaculture
CG12	Reduce/eliminate diffuse pollution to surface waters from freshwater aquaculture
CG13	Reduce/eliminate marine pollution from freshwater aquaculture

CG14	Other measures to reduce impacts of freshwater aquaculture infrastructures and operation
CG15	Other measures related to exploitation of species

CH	Measures related to military installations and activities and other specific human activities
CH01	Reduce impact of military installations and activities
CH02	Adapt/maintain military activities
CH03	Reduce impact of other specific human actions

CI	Measures related to alien and problematic native species
CI01	Early detection and rapid eradication of invasive alien species of Union concern
CI02	Management, control or eradication of established invasive alien species of Union concern
CI03	Management, control or eradication of other invasive alien species
CI05	Management of problematic native species
CI06	Other measures related to problematic species
CI07	Controlling and eradicating plant and animal diseases, pathogens and pests

CJ	Measures related to mixed source pollution and human-induced changes in hydraulic conditions for several uses
CJ01	Reduce impact of mixed source pollution
CJ02	Reduce impact of multi-purpose hydrological changes
CJ03	Restore habitats impacted by multi-purpose hydrological changes
CJ04	Other measures related to mixed source pollution and multi-purpose human-induced changes in hydraulic conditions

CL	Measures related to natural processes, geological events and natural catastrophes
CL01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes
CL02	Minimise/prevent impacts of geological and natural catastrophes
CL03	Restore habitats following geological and natural catastrophes
CL04	Other measures related to natural processes

CN	Measures related to climate change
CN01	Adopt climate change mitigation measures
CN02	Implement climate change adaptation measures

CX	Measures outside the Member State
CX01	Support conservation measures in another EU Member State
CX02	Support conservation measures in countries outside the EU

CS	Measures related to management of species from the nature directives and other native species
CS01	Reinforce populations of species from the directives
CS02	Reintroduce species from the directives
CS03	Improvement of habitat of species from the directives
CS04	Manage other native species

Appendix 6: Nitrogen Critical Load exceedance in terrestrial habitats

Introduction

Exceedance of Nutrient Nitrogen Critical Loads (N CL) can have damaging impacts on the condition of a wide-range of terrestrial habitat types[39]. To take account of this, N CL exceedance was systematically taken into account in a number of the UK Article 17 terrestrial habitat reports.

Methodology

The 41 habitats included were those known to be sensitive to N deposition, and which had a good equivalence to a EUNIS habitat type that already had an assigned N CL. These habitats, and details of the N CL values used in the assessment of exceedance, are shown in Table A.

The approach taken to assess the scale of N CL exceedance relied on N deposition mapping data for 2013-2015 from APIS, which was based on the CBED model[40]. Other aspects of the approach differed between England, Northern Ireland, Scotland and Wales:

- for nearly all habitats in *England* and *Northern Ireland*, the percentage of the habitat area within SACs that exceeded the N CL was estimated directly from the APIS Site Relevant Critical Loads (SRCL) database[41]; the exception was H4040, a scarce heathland type found only in The Lizard SAC in SW England, which was assessed using localised information on the distribution of the habitat within SSSIs compartments;
- three approaches were taken to assess N CL exceedance in *Scotland*:
  - for H1310, H1330, H2110-50, H2190, H9180, H91A0 and H91C0, exceedance was calculated using digital maps of the distribution of the habitat across Scotland;
  - for habitats H4010, H4030, H4060, H4080, H6150, H6170, H6210, H6230, H7130-50 and H7230-40, exceedance was calculated for the location and extent of the habitat in Scottish SACs (maps for the distribution of these habitats outside of SACs was not available);
  - for the remaining habitats, H1130, H1150 and H7110-20, exceedance estimates were derived directly from the APIS SRCL database;
- for all habitats in Wales, exceedance was determined using digital maps of the distribution of each habitat across Wales.

There were three potential issues with the approach taken:

(i) for some of the habitats, only a small part of the total habitat area occurred within the SAC network – however, given the geographic pattern of the habitat distribution and N deposition, it was considered unlikely that this would mean that the approach would produce unrealistic N CL exceedance figures;

(ii) those calculations which utilised the APIS Site Relevant Critical Load database were based on the boundaries of SACs, and certain Annex I habitat types occupied only a limited part of certain SACs – again, given the geographic pattern of habitat distribution and N CL exceedance, it seemed unlikely this would produce unrealistic results; and

[39] see Emmett, B.A., Rowe, E.C., Stevens, C.J., Gowing, D.J., Henrys, P.A., Maskell, L.C. & Smart, S.M. (2011) Interpretation of evidence of nitrogen impacts on vegetation in relation to UK biodiversity objectives. JNCC Report No. 449, Peterborough; Field, C.D., Dise, N.B., Payne, R.J., Britton, A.J., Emmett, B.A., Helliwell, R.C., Hughes, S., Jones, L., Lees, S., Leake, J.R., Leith, I.D., Phoenix, G.K., Power, S.A., Sheppard, L.J., Southon, G.E., Stevens, C.J. & Caporn, S.J.M. (2014) The role of nitrogen deposition in widespread plant community change across semi-natural habitats. Ecosystems 17, 864-877; Stevens, C.J., Smart, S.M., Henrys, P., Maskell, L.C., Walker, K.J., Preston, C.D., Crowe, A., Rowe, E., Gowing, D.J. & Emmett, B.A. (2011) Collation of evidence of nitrogen impacts on vegetation in relation to UK biodiversity objectives, JNCC Report 447, Peterborough.

[40] for further information go to www.apis.ac.uk/srcl

[41] for further information go to http://www.apis.ac.uk/popup/cbed

(iii) ideally the analysis would have also included an analysis based on predicted levels of N CL exceedance in c.2030 – whilst a suitable dataset did become available late in the reporting process, a quick comparison with N deposition levels in 2013-15 showed that, whilst predicted N deposition was reduced nationwide, only two habitats would change threat category, and, as the majority of proposed measures to reduce N deposition would only be implemented in the mid-late 2020s, it was considered that habitat condition would largely be responding to the cumulative deposition before 2030 and the benefits of emission reductions would only manifest later.

Results

The exceedance figures were aggregated taking account of the habitat area within each country (as reported in **field 5.2c** in the country-level information). This produced a UK-level figure for each habitat, showing the estimated percentage area of the habitat area where the N CL was exceeded (see Table B).

The results revealed that for 33 habitats, N deposition exceedance occurred across more than 25% of the habitat area. This included 20 habitats where more than 75% of the area was receiving excess atmospheric nitrogen deposition (N CL exceeded). These habitats covered a wide variety of types, from coastal dunes to bog, fen, grassland, heathland, montane, upland and woodland habitats.

N deposition exceedance was between 5-25% of the habitat area in only one case. This was H4010, a very extensive habitat in the north and west of the UK, where N deposition is generally low.

N deposition for H4040 was found to be just below or just above the minimum N CL range across most of the area it occupied within the Lizard SAC: <1% of the habitat area exceeding the upper N CL range.

None of the area of the six remaining habitats suffered from N CL exceedance. This included a mix of estuarine, coastal lagoon, mudflat and saltmarsh habitat types, all of which had high N CL figures (see Table A).

Implications

The estimates of habitat N CL exceedance were used to decide:

(i) if N CL exceedance should be reported as a pressure and threat; and
(ii) how the future trend for Structure and functions parameter should be reported.

Reporting of pressures and threats

N CL exceedance was reported in the list of pressures and threats using code *J03: Mixed source air pollution, air-borne pollutants*. More specific categorisation was not used because the number of pressures and threats categories that could be reported was limited (see 4.3); habitats with excess nitrogen deposition were affected by a variety of sources and source attribution varied between countries; and more detailed source attribution information was already being used to target site-level measures (e.g. Natural England Shared Nitrogen Action Plans).

Where >25% of the habitat area exceeded the N CL, this code was reported as a High-rank pressure and threat, and where 5-25% area of habitat exceeded the N CL, this code was reported as a Medium-rank pressure and threat. Notes were included under **field 7.3** to explain why this was done.

Reporting of Future prospects for Structure and functions

The reporting of the Future prospects for Structure and functions also depended on the level of N CL exceedance at a UK-level. Where the area of habitat exceedance was >25%, it was expected that the Future prospects would be reported as Unfavourable-bad, and where exceedance was between 5-25%, the Future prospects would be reported as at least Unfavourable-inadequate. This anticipated that:

(i) the same area of habitat would likely be in unfavourable condition in 2030 due to N CL exceedance; and
(ii) the future trend for Structure and functions would likely be very negative or negative, unless: (a) the condition of the habitat was already mostly unfavourable and unlikely to deteriorate further; and/or (b) targeted measures to reduce N deposition impacts were implemented.

Notes were included under **field 9.2** to explain where the Future prospects for structure and functions took into account the level of N CL exceedance.

Table A. Details of the Nitrogen Critical Load (N CL) values used to determine the scale of N CL exceedance for 41 Annex I habitat types.

Code	Habitat name	N CL range (kgN/ha/yr)	N CL used for assessment (kgN/ha/yr)
H1130	Estuaries[1]	20-30[1]	30[2]
H1150	Coastal lagoons	20-30[1]	30[2]
H1310	*Salicornia* and other annuals colonising mud and sand	20-30	30
H1320	*Spartina* swards (Spartinion maritimae)	20-30	30
H1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	20-30	30
H1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	20-30	30
H2110	Embryonic shifting dunes	10-20	10
H2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	10-20	10
H2130	Fixed dunes with herbaceous vegetation (grey dunes)	8-15	8[3]
H2140	Decalcified fixed dunes with *Empetrum nigrum*	10-20	10
H2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	10-20	10
H2190	Humid dune slacks	10-20	10[4]
H2330	Inland dunes with open *Corynephorus* and *Agrostis* grasslands	8-15	8
H4010	Northern Atlantic wet heaths with *Erica tetralix*	10-20	10
H4020	Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*	10-20	10
H4030	European dry heaths	10-20	10
H4040	Dry Atlantic coastal heaths with *Erica vagans*	10-20	10
H4060	Alpine and Boreal heaths	5-15	5
H4080	Sub-Arctic Salix spp. scrub	5-15	5
H6150	Siliceous alpine and boreal grasslands	5-10	5
H6170	Alpine and subalpine calcareous grasslands	5-10	5
H6210	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia)	15-25	15
H6230	Species-rich *Nardus* grassland, on siliceous substrates in mountain areas	10-15	10
H6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	15-25	15
H6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	20-30	20
H6520	Mountain hay meadows	10-20	10
H7110	Active raised bogs	5-10	5[5]
H7120	Degraded raised bogs still capable of natural regeneration	5-10	5[5]
H7130	Blanket bogs	5-10	5[5]

Code	Habitat name	N CL range (kgN/ha/yr)	N CL used for assessment (kgN/ha/yr)
H7140	Transition mires and quaking bogs	10-15	10
H7150	Depressions on peat substrates of the Rhynchosporion	10-15	10
H7230	Alkaline fens	15-30	15
H7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	15-25	15
H9120	Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer	10-20	15
H9130	Asperulo-Fagetum beech forests	10-20	15
H9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	15-20	15
H9180	Tilio-Acerion forests of slopes, screes and ravines	15-20	15
H9190	Old acidophilous oak woods with *Quercus robur* on sandy plains	10-15	10
H91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	10-15	10
H91C0	Caledonian forest	5-15	12
H91J0	*Taxus baccata* woods of the British Isles	5-15	5[6]

Notes

[1] Critical Load applies to the saltmarsh element of this habitat only

[2] 30 kgN/ha/yr is used – it is recommended that this is the relevant Critical Load for most of saltmarsh but the lower level of 20 kgN/ha/yr should be applied to the more densely vegetated upper marsh and to areas of marsh subjected to direct run-off from adjacent catchments

[3] Use 8 kgN/ha/yr for acid types and 10 kgN/ha/yr for calcareous types – if unknown use 8 kgN/ha/yr as precaution

[4] Use 10 kgN/ha/yr for acid types and 15 kgN/ha/yr for calcareous types – if unknown use 10 kgN/ha/yr as precaution

[5] Mapping value is based on rainfall – water table modifying factor also used for local impact assessments – use 5 kgN/ha/yr as precaution

[6] No UK evidence to set mapping value – default to minimum, but appears more sensitive than other woodland types which might not be the case – unlikely to affect CL exceedance

The table excludes the following Annex I habitats because: (a) they are not sensitive to N deposition – H1110, H1160 (although this may have saltmarsh elements which are potentially sensitive), H1170, H1180, H1210, H8310, H8330, H91E0); or (b) they are sensitive but there is no Critical Load with sufficient equivalence – H1140, H1220, H1230, H1340, H2160, H1270, H21A0, H2250, H5110, H5130, H6130, H6430, H7210, H7220, H8110, H8120, H8210, H8220, H8240, H91D0

Table B. Estimates of N Critical Load exceedance in 2013-15 for Annex I habitats identified in Table A – see the main text for details of how the figures in the table were generated – the colour coding identifies habitats with <5% exceedance (green), 5-25% exceedance (orange), and >25% exceedance (red) at a UK-level.

Habitat code	UK	England	Northern Ireland	Scotland	Wales
H1130	0	0	0	0	0
H1150	0	0	0	0	0
H1310	0	0	0	0	0
H1320	0	0	0	0	0
H1330	0	0	0	0	0
H1420	0	0	0	0	0
H4040*	<1	<1	0	0	0
H4010	22	13	6	3	0
H2190	31	12	11	8	<1
H6410	33	28	0	5	0
H91C0	35	0	35	0	0
H2150	45	14	22	1	8
H2110	51	26	12	12	<1
H6510	51	51	0	0	0
H4030	52	21	19	10	2
H2120	53	34	12	7	<1
H7150	59	14	12	33	0
H7240	59	7	48	4	0
H2140	61	0	61	0	0
H2130	66	27	21	12	5
H6230	68	7	58	3	<1
H7140	76	36	7	19	13
H9180	78	31	33	12	<1
H7230	79	68	7	3	<1
H7130	81	11	61	2	6
H7120	87	39	45	3	0
H6210	92	91	0	<1	0
H6520	94	94	0	0	0
H91A0	94	3	25	65	1
H4080	98	0	98	0	0
H6170	98	0	98	<1	0
H4060	99	3	95	<1	<1
H6150	99	2	97	<1	<1
H4020	100	100	0	0	0
H7110	100	26	37	10	28
H2330	100	100	0	0	0
H9120	100	74	0	26	0
H9130	100	89	0	11	0
H9160	100	100	0	0	0
H9190	100	100	0	0	0
H91J0	100	96	0	4	0

Notes

* H4040 was assessed separately using localised information, which revealed that N deposition only exceeded the upper N CL range across <1% of the habitat area.

Appendix 7: Range Mapping Alpha hull values

Table A: Terrestrial species Alpha values

Species code	Species scientific name	Species common name	Taxon group	Alpha value (km)
S1013	*Vertigo geyeri*	Geyer's whorl snail	Mollusc	20
S1014	*Vertigo angustior*	Narrow-mouthed whorl snail	Mollusc	20
S1015	*Vertigo genesii*	Round-mouthed whorl snail	Mollusc	20
S1016	*Vertigo moulinsiana*	Desmoulin's whorl snail	Mollusc	20
S1026	*Helix pomatia*	Roman snail	Mollusc	20
S1029	*Margaritifera margaritifera*	Freshwater pearl mussel	Mollusc	25
S1034	*Hirudo medicinalis*	Medicinal leech	Annelid	20
S1044	*Coenagrion mercuriale*	Southern damselfly	Arthropod	20
S1065	*Euphydryas aurinia*	Marsh fritillary butterfly	Arthropod	20
S1079	*Limoniscus violaceus*	Violet click beetle	Arthropod	20
S1083	*Lucanus cervus*	Stag beetle	Arthropod	20
S1092	*Austropotamobius pallipes*	White-clawed crayfish	Arthropod	25
S1095	*Petromyzon marinus*	Sea lamprey	Fish	25
S1096	*Lampetra planeri*	Brook lamprey	Fish	25
S1099	*Lampetra fluviatilis*	River lamprey	Fish	25
S1102	*Alosa alosa*	Allis shad	Fish	25
S1103	*Alosa fallax*	Twaite shad	Fish	25
S1106	*Salmo salar*	Atlantic salmon	Fish	25
S1109	*Thymallus thymallus*	Grayling	Fish	25
S1166	*Triturus cristatus*	Great crested newt	Amphibian	34
S1213	*Rana temporaria*	Common frog	Amphibian	35
S1261	*Lacerta agilis*	Sand lizard	Reptile	25
S1283	*Coronella austriaca*	Smooth snake	Reptile	25
S1303	*Rhinolophus hipposideros*	Lesser horseshoe bat	Terrestrial mammal	20
S1304	*Rhinolophus ferrumequinum*	Greater horseshoe bat	Terrestrial mammal	20
S1308	*Barbastella barbastellus*	Barbastelle	Terrestrial mammal	20
S1309	*Pipistrellus pipistrellus*	Common pipistrelle	Terrestrial mammal	20
S1312	*Nyctalus noctula*	Noctule	Terrestrial mammal	20
S1314	*Myotis daubentonii*	Daubenton’s bat	Terrestrial mammal	20
S1317	*Pipistrellus nathusii*	Nathusius' pipistrelle	Terrestrial mammal	20
S1320	*Myotis brandtii*	Brandt’s bat	Terrestrial mammal	45
S1322	*Myotis nattereri*	Natterer’s bat	Terrestrial mammal	20
S1323	*Myotis bechsteinii*	Bechstein's bat	Terrestrial mammal	20

Species code	Species scientific name	Species common name	Taxon group	Alpha value (km)
S1326	*Plecotus auritus*	Brown long-eared bat	Terrestrial mammal	20
S1327	*Eptesicus serotinus*	Serotine	Terrestrial mammal	20
S1329	*Plecotus austriacus*	Grey long-eared bat	Terrestrial mammal	20
S1330	*Myotis mystacinus*	Whiskered bat	Terrestrial mammal	45
S1331	*Nyctalus leisleri*	Leisler's bat	Terrestrial mammal	20
S1334	*Lepus timidus*	Mountain hare	Terrestrial mammal	25
S1341	*Muscardinus avellanarius*	Common dormouse	Terrestrial mammal	20
S1355	*Lutra lutra*	Otter	Terrestrial mammal	20
S1357	*Martes martes*	Pine marten	Terrestrial mammal	20
S1358	*Mustela putorius*	Polecat	Terrestrial mammal	20
S1363	*Felis silvestris*	Wildcat	Terrestrial mammal	45
S1378	*Cladonia* subgenus *Cladina*	Cladonia subgenus Cladina (a subgenus of lichens)	Lower plant	20
S1385	*Bruchia vogesiaca*	Bruchia moss	Lower plant	no map; species not found
S1386	*Buxbaumia viridis*	Green shield-moss	Lower plant	20
S1390	*Marsupella profunda*	Western rustwort	Lower plant	50
S1395	*Petalophyllum ralfsii*	Petalwort	Lower plant	20
S1400	*Leucobryum glaucum*	Large white-moss	Lower plant	20
S1409	*Sphagnum* spp.	Bog-mosses	Lower plant	18
S1413	*Lycopodium* spp.	Clubmosses	Vascular plant	20
S1441	*Rumex rupestris*	Shore dock	Vascular plant	20
S1528	*Saxifraga hirculus*	Marsh saxifrage	Vascular plant	20
S1614	*Apium repens*	Creeping marshwort	Vascular plant	20
S1654	*Gentianella anglica*	Early gentian	Vascular plant	20
S1831	*Luronium natans*	Floating water-plantain	Vascular plant	20
S1833	*Najas flexilis*	Slender naiad	Vascular plant	20
S1849	*Ruscus aculeatus*	Butcher's broom	Vascular plant	20
S1902	*Cypripedium calceolus*	Lady's-slipper orchid	Vascular plant	20
S1903	*Liparis loeselii*	Fen orchid	Vascular plant	20
S2492	*Coregonus albula*	Vendace	Fish	25

Species code	Species scientific name	Species common name	Taxon group	Alpha value (km)
S4035	*Gortyna borelii lunata*	Fisher's estuarine moth	Arthropod	20
S4056	*Anisus vorticulus*	Little ramshorn whirlpool snail	Mollusc	20
S5003	*Myotis alcathoe*	Alcathoe bat	Terrestrial mammal	20
S5009	*Pipistrellus pygmaeus*	Soprano pipistrelle	Terrestrial mammal	20
S5076	*Coregonus autumnalis pollan*	Pollan	Fish	25
S5085	*Barbus barbus*	Barbel	Fish	25
S6199	*Euplagia quadripunctaria*	Jersey tiger moth	Arthropod	20
S6216	*Hamatocaulis vernicosus*	Slender green feather- moss	Lower plant	20
S6265	*Phengaris arion*	Large blue butterfly	Arthropod	20
S6284	*Epidalea calamita*	Natterjack toad	Amphibian	20
S6353	*Coregonus lavaretus*	Whitefish	Fish	25
S6963	*Cobitis taenia*	Spined loach	Fish	25
S6965	*Cottus gobio all others*	Bullhead	Fish	25
S6981	*Pelophylax lessonae*	Pool frog	Amphibian	35
S6985	*Vandenboschia speciosa*	Killarney fern	Vascular plant	20

Table B: Marine species mapping approach

Species code	Species scientific name	Species common name	Taxon group	Gridded maps (km)
S1223	*Dermochelys coriacea*	Leatherback turtle	Reptile	50x50 km gridded distribution and range map
S1349	*Tursiops truncatus*	Bottlenose dolphin	Marine mammal	50x50 km gridded distribution and range map, additional point map
S1350	*Delphinus delphis*	Common dolphin	Marine mammal	50x50 km gridded distribution and range map
S1351	*Phocoena phocoena*	Harbour porpoise	Marine mammal	50x50 km gridded distribution and range map
S1364	*Halichoerus grypus*	Grey seal	Marine mammal	50x50 km gridded distribution and range map
S1365	*Phoca vitulina*	Common seal	Marine mammal	50x50 km gridded distribution and range map
S1376	*Lithothamnion corallioides*	Maerl Lithothamnium	Lower plant	10x10km gridded distribution and range map
S1377	*Phymatolithon calcareum*	Maerl	Lower plant	10x10km gridded distribution and range map
S2027	*Orcinus orca*	Killer whale	Marine mammal	50x50 km gridded distribution and range map
S2029	*Globicephala melas*	Long-finned pilot whale	Marine mammal	50x50 km gridded distribution and range map, additional point map
S2030	*Grampus griseus*	Risso's dolphin	Marine mammal	50x50 km gridded distribution and range map
S2031	*Lagenorhynchus acutus*	Atlantic white-sided dolphin	Marine mammal	50x50 km gridded distribution and range map

S2032	*Lagenorhynchus albirostris*	White-beaked dolphin	Marine mammal	50x50 km gridded distribution and range map, additional point map
S2618	*Balaenoptera acutorostrata*	Minke whale	Marine mammal	50x50 km gridded distribution and range map
S2621	*Balaenoptera physalus*	Fin whale	Marine mammal	50x50 km gridded distribution and range map
S2624	*Physeter macrocephalus*	Sperm Whale	Marine mammal	50x50 km gridded distribution and range map