Appendices describing the data used in the creation of Interim Chalara Control Plan

Anyone wishing for more information on identifying the disease, guidance on managing ash trees or the latest outbreak maps should go to the Forestry Commission website.

Interim Chalara Control Plan – Defra website

Details of the general approach taken with identifying the areas of important ash available from http://jncc.defra.gov.uk/pdf/important_ash.pdf

Copies of the geographic data available from http://jncc.defra.gov.uk/page-6357

Appendix 1: Description of the data sources used to identify important ash locations.

This appendix documents the origin/derivation of each data source used in producing the important ash locations map. It describes the quality/limits of interpretation of each data source and the way in which it has been used to identify important ash locations.

Natura Database (JNCC)

Origin: The Natura Database contains for each Special Area of Conservation designated under the Habitats Directive i) a detailed digital boundary, ii) designation information, iii) habitats and species of European Interest for which it is designated. The Database is populated by information provided by the country conservation agencies as part of the process that notifies the SACs with the European Commission.

Quality: The data set contains a boundary and list information. It does not contain detailed maps showing the location or extent of each of the notified features. SACs usually contain more than one feature and so the boundary may not represent the boundary of any one of its component features.

Use for important ash locations: The following habitats of community interest, H9130, H9180, and H91E0 contain ash as a significant component of the habitat. All SACs containing one or more of these habitats as an A or B grade feature (sites designated primarily for these habitats) were selected and the overall SAC boundaries used in plotting Important Ash Locations. This use of the data will over represent important ash, as the boundaries for the selected SACs will in some cases contain other habitat (and may be dominated by other habitats). It will also under-represent it as in some SACs there will be important ash but not as part of the three Habitats of Community interest selected for mapping.

Sites of Special Scientific Interest (SSSI) country data sets

Origin: The Countryside Council for Wales, Natural England and Scottish Natural Heritage maintain databases of the SSSI designated in their respective countries including information on notified features (the habitats, species or geological interest present that quality under SSSI guidelines), their boundaries mapped at a small scale digitally, and a range of other information. From these datasets Natural England provided two shape files, one showing English SSSI with ash containing NVC feature types W8/W9 (see appendix 2 for definitions), and the other for features containing one or more of W7,8,9,12. SNH provided a list of SSSI where “Upland mixed ash” was a feature of the site or, for the lowlands, where the site citation or management statement referred to ash as being a component of the woodland canopy. The list was used to select the boundaries of the relevant SSSI from GIS information downloaded from the SNH website on 23/11/2012. CCW provided digital boundaries for SSSIs in Wales with NVC information. The Phase 2 Woodland Survey was used to identify sites containing W8 and W9 (the qualifying feature of 'semi-natural broadleaved woodland' was too broad to identify sites where Ash was a feature).

Quality: SSSI are often designated for more than one feature and so the boundary of an SSSI may be larger than the extent of ash woodland within it. In addition the slightly different approaches to recording the cited features on SSSIs and varying states of habitat inventories across the UK means that the maps for the three countries cannot be regarded as directly comparable. In particular the methodology used in Wales and, to a lesser extent England, will tend to be more inclusive (i.e. include a greater number of sites).

Use for important ash locations: the separate country data sets were combined into a single layer for plotting important Ash.

National Vegetation Classification Samples[1]

Origin: The National Vegetation Classification was created from statistical analysis of a large number of standard field samples (quadrats) of vegetation across the UK. The majority of the sampling was undertaken in the late 1970s, after which preliminary accounts of the major vegetation types were drafted. The final accounts of the plant communities and their integration within an overall framework were completed in 1989. JNCC holds a spreadsheet that contains information on the 14,000 locations classified to woodland vegetation types with information on Grid Reference, site name, NVC types, observation date,

Quality: The 10km square location information is a fairly coarse geographical reference for comparison with other digital often more precise boundary information. The data set is not a comprehensive sample or census of all semi natural woodland, and so underestimates the number and locations of woods of any given national vegetation woodland class.

Use: All locations containing the two predominantly Ash NVC classes W8 or W9 were selected from this data set (for explanations of W8 and W9 see appendix 2). The 10km squares from these locations were compared with the boundaries of the Ancient Woodland Inventory data set. The ancient woodland inventory locations that intersected with (i.e. overlapped in some way) the 10km squares were selected for plotting of Important Ash. This methodology will tend to overestimate those ancient woodlands with a significant proportion of Ash.

Ancient Woodland Inventories

Origin: Ancient Woodland Inventories for England Scotland and Wales were created in the 1980s/1990s from analysis of historical maps, and field survey to detect topographic and species indications of long established woodland. Boundaries for each Ancient Woodland have been digitised and are continuously being improved and updated. The published versions of the Ancient Woodlands Inventories were obtained from the Forest Commission Website (http://www.forestry.gov.uk/datadownload), from Natural England (http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm) and from data.gov for Scotland (http://data.gov.uk/dataset/ancient-woodland-inventory-scotland1)

Quality: The inventories have identified the majority of long established ancient semi-natural woodland but as they are used (verified on the ground) a few missed woodlands are discovered. Overall the inventories are good reflections particularly of the larger stands but the quality and detail (especially for smaller stands) varies depending on the source.

Use for important ash locations: The digital published versions of the inventories do not contain information of the type of woodland within each ancient woodland location. The Ancient Woodlands were compared with another data set (National Vegetation Classification Samples) see above, to provide a subset of woodlands containing ash. It should be noted that the methodology was very coarse; where the woodland boundary overlapped with a 10km square where W8 or W9 had been recorded the whole woodland was highlighted. In addition the fact that the NVC inventory was incomplete means that there were obvious gaps (i.e. ancient woodland that contained ash but

[1] This database is not based primarily on the woodland samples (quadrats) used to create the NVC. The source for this was the UK Woodland NVC Types spreadsheet held by JNCC. This contains the locations of approximately 14,000 sites where woodland NVC types have been mapped, using the NVC.

was not shown). The product is considered suitable for providing an overview but not for more detailed presentation / analysis.

Veteran Trees database

Origin: Since the 1990s the Woodland Trust has been encouraging its members and the public to record Veteran[2] and notable trees. Interested members of the public are encouraged to record a range of attributes about veteran trees with significant entries being verified by a pool of volunteers. The Woodland Trust provided JNCC with a copy of this database on 23/11/12 containing detailed co-ordinates for each tree, its species and other information.

Quality: The dataset should not be considered complete and overall is likely to give a considerable underestimate of the number and location of veteran ash trees.

Use: The veteran ash trees from this dataset were selected for plotting important ash. Only verified records were included in the analysis.

Species associated with ash

Origin: There is no definitive source of species which are strongly associated with, or dependent on, ash. However, there is obviously a lot that is known about species associations and there have been a number of attempts to collate these observations into more general databases. The current study accessed a range of sources:

Database of Insect Foodplants – this is a database hosted by the Biological Records Centre. It is a literature extraction of insects associated with plants and essentially records any recorded references between a phytophagous insect and a plant host. All species that were specific to ash or to ash and privet (Oleaceae) were included.

British Lichen Society – the British Lichen Society has carried out an initial assessment of species associated with ash using the substrate records within their database. This provides an assessment for each species the proportion of records associated with a bark or lignum substrate, and within those the proportion associated with ash. This assessment was provided in part in response to a request from Plant Link UK. The species list used was where, of those records held, at least half occurred on ash trees.

"The invertebrates of living & decaying timber in Britain and Ireland - a provisional annotated checklist" by Keith Alexander (English Nature Research Reports no 467) – this contract looked at invertebrates associated with dead wood. Each species listed has a comment indicating habitat requirements. The comments were searched for references to "*Fraxinus*" and where this was one of two or three species that the invertebrate was associated with it was included. More general species were excluded.

Plant Link UK – this forum for plant conservation organisations has facilitated a rapid assessment of plant and fungal species associated with ash trees, as well as information regarding the strength of the association. In addition to the lichen species described, Plant Link UK have also provided information on bryophytes and fungi from a range of experts and databases. Bryophytes included in the analysis were those rated as either 4 or 5 in their strength of association with ash (using a scale of 0-5 where 5 represents a specialist), whilst fungi were those with at least 50% of records associated with ash.

[2] A 'Veteran' tree is defined as one which is usually in the second or mature stage of its life and has important wildlife and habitat features including: hollowing or associated decay fungi; holes; wounds and large dead branches. It will generally include old trees but also younger, middle aged trees where premature aging characteristics are present.

Quality: None of the sources could be regarded as definitive but represent the best available. Although species may appear monophagous from the database it may simply be due to a lack of data. However it is probably a reasonable reflection of those species that are at least strongly associated with ash.

Use: The species list obtained from each of these sources is listed in Appendix 3. For this study the list of species was solely used to extract a list of where these species had been recorded across Great Britain.

Species records

Origin: Across GB there is a huge amount of amateur recording of a wide range of species. Records are generally mobilised through a range of local and national organisations and published through the NBN Gateway.

Quality: The data collection is very ad hoc and does not follow any fixed sampling frame. Therefore the location and density of records is very variable. Despite this there is still very good coverage within the UK across a wide range of species but in presenting a more national picture it is important that sampling effort is taken into consideration. When combined with other environmental data, spatial modelling techniques can provide predicted distributions that overcome many of the biases in the sample data.

Use: For the purpose of this study all records of those species strongly associated with Ash which were available through the NBN Gateway were downloaded. Full list of the data sources used is included in Appendix 4. Species distributions were modelled, using a technique known as Maxent, at the 1km square level. Models were only generated for species with records from twenty or more 1km squares since 1980 (see appendix 3). Only those models with an AUC[3] of 0.85 or better were used. These distributions were then summarised as the number of species predicted to occur within each 10km squares to provide a more general national overview. Lichens and all other species were summarised separately, due to their complementary important ash distributions. Important squares were judged as those where more than 12 species of lichen or 19 of all other species were predicted to occur. The overall quality of the output is hard to assess.

[3] "Area Under Curve". This gives a measure of the strength of the model where 1 indicates a perfect fit. 0.85 is a fairly rigorous cut-off value.

Appendix 2: Ash in the National Vegetation Classification.

The SSSI and Ancient Woodland Data sets used to plot important ash locations were subset (filtered) by the presence of one or more of several classes of woodland as defined by the National Vegetation Classification. The classes are referred to in the main text by their codes, W7 to W12. All contain Ash as a significant component although some of the classes can occur with very small proportions of Ash within them.

This appendix provides the definitions of the classes used and is drawn from National vegetation classification field guide to woodland (revised 2004), by Hall, J.E., Kirby, K.J., Whitbread, A.M. , published by JNCC.

The NVC is a detailed phytosociological classification, which assesses the full suite of vascular plant, bryophyte and macro-lichen species within a certain vegetation type. It is based on about 35,000 samples of vegetation. These cover nearly all natural, semi-natural and a number of major artificial vegetation communities in terrestrial, freshwater and maritime situations across Great Britain (but not Northern Ireland).

W7 Alder-Ash woodland (Alnus glutinosa - Fraxinus excelsior – Lysimachia nemorum woodland)

> This is one of seven woodland communities in the NVC classed as wet woodlands. Alder is often not as abundant as in the other wet woodland types. **Ash** and/or silver birch are frequent with mixtures of common sallow, hazel and hawthorn in the shrub layer. Ground flora includes meadow sweet, yellow pimpernel, lady fern, rough stalked meadow grass, creeping soft grass, creeping buttercup and/or golden saxifrage. These are found on base rich flushes with gleyed mineral soils. It is the commonest alder type in upland woods; it does occur in the lowlands but often in a rather fragmentary fashion along streams.

W8 Ash – Field Maple woodland (Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland)

> This is one of the six communities falling in the "mixed deciduous and oak/birch woodlands" group in the NVC. This community is widespread throughout lowland Britain, becoming scarcer in the north and west, where it is replaced by community W9. **Ash**, field maple and hazel are characteristic of W8, but may play quite a minor role, as other species that are occasional in the community as a whole can be locally abundant. Such species include blackthorn (particularly as ride-side and post-coppice vegetation in the *Deschampsia* sub-community), dogwood, elder (in more eutrophic situations), guilder rose, hawthorn, privet (on more base-rich soils), spindle, wayfaring tree, and willows, *Salix caprea* and *S. cinerea*. Lime and elm may also be local dominants, as may sycamore in disturbed or secondary stands.
>
> On the lighter, base-rich soils of southern England, beech and yew are common, forming transitions between W8 and W12 (*Fagus sylvatica – Mercurialis perennis* woodland) and W13 (*Taxus baccata* woodland). Yew woodland is also often present as part of the mosaic with W8 in the southern Lake District. Transitions between W8 and the alder types (W5–W7) are common around flushes and on wet plateaus.

W9 Ash – Rowan woodland (Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis woodland)

> A community of permanently moist calcareous soils in the sub-montane climate of north-west Britain. It is commonly found by streams and flush lines in the uplands, where the climate is cool, wet and windy, and hence unsuitable for the more continental species found in south-eastern mixed deciduous woods. **Ash** and hazel are the most abundant woody species, and downy birch and rowan may be co-dominant. The more continental trees and shrubs

characteristic of W8 (small-leaved lime, hornbeam, Midland hawthorn) are usually absent. The community varies from well-developed ash, wych elm, sycamore and sessile oak high forest with a distinct shrub layer, to scrubby mixtures of hazel, downy birch and rowan with scattered ash trees in the far north-west, and in exposed areas with irregular topography.

In many upland woods small areas of W9 occur at the base of slopes or along flush lines. The absence of shrubs with a southern distribution (e.g. dogwood and spindle) and the greater frequency of rowan helps to separate the community from its southern counterpart, W8.

W12, W13 W14 Beech and Yew woods (W12 Fagus sylvatica – Mercurialis perennis woodland, W13 Taxus baccata woodland, W14 Fagus sylvatica – Rubus fruticosus woodland)

W12: A community of free-draining base-rich calcareous soils (pH between 7 and 8) in the south-east lowlands of Britain, generally limited to the steeper drift-free faces of chalk escarpments. Beech is dominant throughout the community. **Ash** and sycamore are often present, often readily colonizing gaps. Pedunculate oak may occur but does not persist under deep shade. Whitebeam and yew are characteristic of the community, either as relicts of an early successional stand or persisting in areas where beech is not too tall. Yew is shadetolerant and may persist as a shrub layer. Apart from this, the shrub layer is usually sparse, although a wide range of species may occur, including patches of hazel, hawthorn, field maple or holly. Small gaps in the beech canopy may be dominated by ash, oak or sycamore but are often best treated as part of the beech community.

W13: A community of moderate to very steep, usually south-facing, limestone slopes carrying shallow dry rendzinas. It is almost common on the chalk of south-east England, on sites too dry for ash or beech woods and on limestone in northern England. Yew is the main canopy species, and rarely exceeds 10 m in height. Few other species occur, although **ash**, beech, pedunculate oak, sycamore and whitebeam may be present, usually as scattered trees. There is seldom a true shrub layer, but only scattered elder, holly or hawthorn, with box a rare associate.

W14: A community confined to brown earth soils of low base status with moderate to slightly impeded drainage in south Britain, usually on superficial deposits (e.g. clay with flints) over the southern chalk. The pH is generally low (4-5) but leaching is limited. Stands tend to be dominated by beech which forms a closed, even-topped cover of very well-grown trees. There may be some structural complexity, relating to patterns of natural invasion or management, and in younger stands. Other species are scarce: there may be some birch, **ash** or sycamore in gaps, but less frequently than in W12. The shrub layer may be limited, but holly can be dense in oceanic areas. Yew, rowan, hawthorn, elder, hazel, privet and willow, *Salix caprea* occur sporadically.

Appendix 3 Ash in Annex 1 habitats

There are the three main habitats defined under Annex 1 of the Habitats and Species Directive for which ash is a significant component, although each of them are quite ecologically variable. The three habitats are H9130 *Asperulo-Fagetum* beech forests, H9180 *Tilio-Acerion* forests of slopes, screes and ravines and H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*,*Salicion albae*). Ash is also of varying importance in a few others but not consistently so, so only these three have been included within these data.

H9130 *Asperulo-Fagetum* beech forests
UK stands of *Asperulo-Fagetum* beech forest belong to the central and northern European associations of the habitat that are additionally characterised by the presence in the canopy (typically at low cover) of English oak *Quercus robur*, sessile oak *Q. petraea*, hornbeam *Carpinus betulus*, Sycamore *Acer pseudoplatanus* and ash *Fraxinus excelsior*.

The current distribution of this habitat is across southern England and south east Wales.

H9180 *Tilio-Acerion* forests of slopes, screes and ravines
These are woods of ash *Fraxinus excelsior*, wych elm *Ulmus glabra* and lime (mainly small-leaved lime *Tilia cordata* but more rarely large-leaved lime *T. platyphyllos*). They are found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact. It often occurs as a series of scattered patches grading into other types of woodland on level valley floors and on slopes above, or as narrow strips along stream-sides. More extensive stands occur on limestone and other base-rich rocks. This habitat type is ecologically variable, particularly with respect to the dominant tree species. To the north and west, ash and wych elm assume increasing importance in the canopy, and lime may be completely absent.

The current distribution of this habitat is across most of Great Britain with the exception of eastern England.

H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*,*Salicion albae*)
This habitat comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* species on flood plains in a range of situations from islands in river channels to low-lying wetlands alongside the channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation. On the drier margins of these areas other tree species, notably ash *Fraxinus excelsior* and elm *Ulmus* spp., may become abundant.

The current distribution of this habitat is broadly spread cross Great Britain, though more commonly in the west.

Appendix 4 Species associated with Ash

Five sources were used to identify species that were specialists associated with Ash (see appendix 1 for further details):

- Alexander (2002) - "The invertebrates of living & decaying timber in Britain and Ireland - a provisional annotated checklist" by Keith Alexander (English Nature Research Reports no 467).
- BLS – British Lichen Society.
- Chandler – personal communication with Peter Chandler
- DB Insect Foodplants - Database of Insect Foodplants (www.brc.ac.uk/DBIF/).
- Plant Link UK – List generated through forum of experts

These sources were used to derive a list of species which was used to extract data available through the NBN Gateway (see Appendix 5 for sources used) for the period 1980-2012. The data were supplemented with more recent data from the British Lichen Society. Where the data for a species covered less than 20 1km squares that species was excluded from further analysis. Such species are listed below in grey.

Group	Species	Source	Number of 1km squares
acarine (Acari)	Aceria fraxinivora	DB Insect Foodplants	194
fungus	Botryosphaeria stevensii	Plant Link UK	3
fungus	Crocicreas dolosellum	Plant Link UK	118
fungus	Cryptosphaeria eunomia	Plant Link UK	11
fungus	Cucurbitaria obducens	Plant Link UK	2
fungus	Daldinia concentrica	Plant Link UK	882
fungus	Diaporthe samaricola	Plant Link UK	16
fungus	Geastrum berkeleyi	Plant Link UK	1
fungus	Hymenoscyphus albidus	Plant Link UK	28
fungus	Hypoxylon cercidicola	Plant Link UK	1
fungus	Hypoxylon intermedium	Plant Link UK	3
fungus	Hypoxylon petriniae	Plant Link UK	7
fungus	Hypoxylon rubiginosum	Plant Link UK	116
fungus	Inonotus hispidus	Plant Link UK	193
fungus	Nitschkia confertula	Plant Link UK	2
fungus	Peniophora limitata	Plant Link UK	52
fungus	Phyllactinia fraxini	Plant Link UK	30
fungus	Stagonospora samarorum	Plant Link UK	11
insect - beetle (Coleoptera)	Alaobia subglabra	Alexander (2002)	4
insect - beetle (Coleoptera)	Ampedus rufipennis	Alexander (2002)	28
insect - beetle (Coleoptera)	Biphyllus lunatus	Alexander (2002)	150
insect - beetle (Coleoptera)	Cerylon fagi	Alexander (2002)	47
insect - beetle (Coleoptera)	Cryptarcha strigata	Alexander (2002)	32
insect - beetle (Coleoptera)	Cryptophagus ruficornis	Alexander (2002)	29
insect - beetle (Coleoptera)	Dinoptera collaris	Alexander (2002)	1
insect - beetle (Coleoptera)	Dorcatoma chrysomelina	Alexander (2002)	77
insect - beetle (Coleoptera)	Elater ferrugineus	Alexander (2002)	6
insect - beetle (Coleoptera)	Enicmus brevicornis	Alexander (2002)	70
insect - beetle (Coleoptera)	Enicmus rugosus	Alexander (2002)	42

insect - beetle (Coleoptera)	Epuraea rufomarginata	Alexander (2002)	11
insect - beetle (Coleoptera)	Eucnemis capucina	Alexander (2002)	2
insect - beetle (Coleoptera)	Glischrochilus quadriguttatus	Alexander (2002)	64
insect - beetle (Coleoptera)	Gyrophaena lucidula	Alexander (2002)	7
insect - beetle (Coleoptera)	Gyrophaena manca	Alexander (2002)	47
insect - beetle (Coleoptera)	Hallomenus binotatus	Alexander (2002)	53
insect - beetle (Coleoptera)	Hylesinus crenatus	Alexander (2002)	57
insect - beetle (Coleoptera)	Hylesinus orni	Alexander (2002)	10
insect - beetle (Coleoptera)	Hylesinus toranio	Alexander (2002)	53
insect - beetle (Coleoptera)	Hylesinus varius	Alexander (2002)	99
insect - beetle (Coleoptera)	Ischnodes sanguinicollis	Alexander (2002)	9
insect - beetle (Coleoptera)	Latridius consimilis	Alexander (2002)	25
insect - beetle (Coleoptera)	Limoniscus violaceus	Alexander (2002)	9
insect - beetle (Coleoptera)	Lissodema cursor	DB Insect Foodplants	11
insect - beetle (Coleoptera)	Lyctus linearis	Alexander (2002)	2
insect - beetle (Coleoptera)	Lytta vesicatoria	DB Insect Foodplants	4
insect - beetle (Coleoptera)	Melandrya caraboides	Alexander (2002)	78
insect - beetle (Coleoptera)	Mordellochroa abdominalis	Alexander (2002)	127
insect - beetle (Coleoptera)	Mycetophagus atomarius	Alexander (2002)	166
insect - beetle (Coleoptera)	Mycetophagus multipunctatus	Alexander (2002)	92
insect - beetle (Coleoptera)	Nossidium pilosellum	Alexander (2002)	40
insect - beetle (Coleoptera)	Phloeophagus lignarius	Alexander (2002)	86
insect - beetle (Coleoptera)	Platycis minutus	Alexander (2002)	182
insect - beetle (Coleoptera)	Platyrhinus resinosus	Alexander (2002)	149
insect - beetle (Coleoptera)	Procraerus tibialis	Alexander (2002)	36
insect - beetle (Coleoptera)	Pteleobius vittatus	Alexander (2002)	16
insect - beetle (Coleoptera)	Soronia grisea	Alexander (2002)	71
insect - beetle (Coleoptera)	Strigocis bicornis	Alexander (2002)	15
insect - beetle (Coleoptera)	Symbiotes latus	Alexander (2002)	22
insect - beetle (Coleoptera)	Tetrops starkii	DB Insect Foodplants	4
insect - beetle (Coleoptera)	Thanasimus formicarius	Alexander (2002)	197
insect - beetle (Coleoptera)	Triplax russica	Alexander (2002)	81
insect - hymenopteran	Macrophya punctumalbum	DB Insect Foodplants	20
insect - hymenopteran	Tomostethus nigritus	DB Insect Foodplants	14
insect - moth	Atethmia centrago	DB Insect Foodplants	3863
insect - moth	Caloptilia syringella	DB Insect Foodplants	572
insect - moth	Cossus cossus	Alexander (2002)	302
insect - moth	Euzophera pinguis	DB Insect Foodplants	510
insect - moth	Oecophora bractella	Alexander (2002)	18
insect - moth	Pammene suspectana	DB Insect Foodplants	1
insect - moth	Prays fraxinella	DB Insect Foodplants	596
insect - moth	Pseudargyrotoza conwagana	DB Insect Foodplants	539
insect - moth	Zelleria hepariella	DB Insect Foodplants	72
insect - true bug (Hemiptera)	Psallus flavellus	DB Insect Foodplants	29
insect - true bug (Hemiptera)	Psallus lepidus	DB Insect Foodplants	54
insect - true bug (Hemiptera)	Pseudoloxops coccineus	DB Insect Foodplants	21

insect - true bug (Hemiptera)	Psyllopsis discrepans	DB Insect Foodplants	5
insect - true bug (Hemiptera)	Psyllopsis distinguenda	DB Insect Foodplants	13
insect - true bug (Hemiptera)	Psyllopsis fraxini	DB Insect Foodplants	198
insect - true bug (Hemiptera)	Psyllopsis fraxinicola	DB Insect Foodplants	30
insect - true bug (Hemiptera)	Prociphilus bumeliae	DB Insect Foodplants	0
insect - true bug (Hemiptera)	Prociphilus fraxini	DB Insect Foodplants	0
insect - true fly (Diptera)	Aulagromyza heringii	DB Insect Foodplants	0
insect - true fly (Diptera)	Brittenia fraxinicola	Alexander (2002)	0
insect - true fly (Diptera)	Contarinia marchali	DB Insect Foodplants	1
insect - true fly (Diptera)	Dasineura acrophila	DB Insect Foodplants	34
insect - true fly (Diptera)	Dasineura fraxinea	DB Insect Foodplants	25
insect - true fly (Diptera)	Dasineura fraxini	DB Insect Foodplants	165
insect - true fly (Diptera)	Lonchaea fraxina	Alexander (2002)	5
insect - true fly (Diptera)	Lonchaea nitens	Chandler	3
insect - true fly (Diptera)	Pandivirilia melaleuca	Alexander (2002)	1
insect - true fly (Diptera)	Tanyptera nigricornis	Alexander (2002)	31
insect - thrips (Thysanoptera)	Oxythrips halidayi	DB Insect Foodplants	0
lichen	Acrocordia gemmata	BLS	552
lichen	Anaptychia ciliaris	BLS	214
lichen	Arthonia anglica	BLS	4
lichen	Bacidia auerswaldii	BLS	2
lichen	Bacidia incompta	BLS	161
lichen	Bacidia laurocerasi	BLS	245
lichen	Bacidia subincompta	BLS	18
lichen	Biatora britannica	BLS	39
lichen	Biatora epixanthoides	BLS	122
lichen	Biatora sphaeroides	BLS	138
lichen	Biatoridium monasteriense	BLS	6
lichen	Caloplaca flavorubescens	BLS	37
lichen	Caloplaca luteoalba	BLS	82
lichen	Caloplaca virescens	BLS	10
lichen	Catapyrenium psoromoides	BLS	7
lichen	Chaenotheca laevigata	BLS	2
lichen	Collema fragrans	BLS	44
lichen	Collema nigrescens	BLS	44
lichen	Cryptolechia carneolutea	BLS	66
lichen	Fuscopannaria ignobilis	BLS	30
lichen	Gyalecta derivata	BLS	74
lichen	Gyalecta flotowii	BLS	38
lichen	Gyalecta truncigena	BLS	353
lichen	Leptogium cochleatum	BLS	26
lichen	Leptogium hildenbrandii	BLS	1
lichen	Leptogium saturninum	BLS	23
lichen	Lithothelium phaeosporum	BLS	10
lichen	Megalospora tuberculosa	BLS	43
lichen	Melaspilea bagliettoana	BLS	4

lichen	Mycobilimbia epixanthoides	BLS	109
lichen	Mycobilimbia pilularis	BLS	172
lichen	Opegrapha rufescens	BLS	121
lichen	Physcia tribacioides	BLS	58
lichen	Piccolia ochrophora	BLS	17
lichen	Pyrenula chlorospila	BLS	466
lichen	Ramonia nigra	BLS	16
lichen	Schismatomma graphidioides	BLS	58
lichen	Strangospora ochrophora	BLS	103
lichen	Strigula taylorii	BLS	121
lichen	Teloschistes flavicans	BLS	91
lichen	Thelenella modesta	BLS	1
lichen	Vezdaea stipitata	BLS	2
lichen	Wadeana dendrographa	BLS	112
lichen	Wadeana minuta	BLS	23
liverwort	Apometzgeria pubescens	Plant Link UK	142
liverwort	Lejeunea mandonii	Plant Link UK	9
liverwort	Pedinophyllum interruptum	Plant Link UK	21
liverwort	Plagiochila norvegica	Plant Link UK	2
millipede	Nemasoma varicorne	Alexander (2002)	492
moss	Amblystegium confervoides	Plant Link UK	43
moss	Anomodon longifolius	Plant Link UK	10
moss	Campylophyllum calcareum	Plant Link UK	76
moss	Eurhynchium striatulum	Plant Link UK	94
moss	Habrodon perpusillus	Plant Link UK	18
moss	Homomallium incurvatum	Plant Link UK	9
moss	Leucodon sciuroides	Plant Link UK	1401
moss	Orthotrichum lyellii	Plant Link UK	1791
moss	Orthotrichum obtusifolium	Plant Link UK	19
moss	Orthotrichum pallens	Plant Link UK	15
moss	Orthotrichum pumilum	Plant Link UK	4
moss	Orthotrichum speciosum	Plant Link UK	36
moss	Pterogonium gracile	Plant Link UK	367
moss	Pylaisia polyantha	Plant Link UK	95
moss	Rhynchostegiella curviseta	Plant Link UK	64
moss	Rhynchostegium rotundifolium	Plant Link UK	3
moss	Scorpiurium circinatum	Plant Link UK	236
moss	Seligeria acutifolia	Plant Link UK	65
moss	Seligeria calcarea	Plant Link UK	124
moss	Seligeria calycina	Plant Link UK	303
moss	Seligeria campylopoda	Plant Link UK	10
moss	Seligeria pusilla	Plant Link UK	105
moss	Syntrichia laevipila	Plant Link UK	3435
moss	Taxiphyllum wissgrillii	Plant Link UK	279
moss	Tortella inflexa	Plant Link UK	89
moss	Zygodon rupestris	Plant Link UK	545

Appendix 5 Sources on the NBN Gateway which were accessed to provide species distribution information

Data on the Gateway has access levels set by the data providers. The data access position used for this data extraction was an amalgam of the best access available to the three Country Agencies and JNCC.

Providing organisation	Dataset
Balfour-Browne Club	Water Beetle Surveys from Britain and Ireland
Bedfordshire and Luton Biodiversity Recording and Monitoring Centre	Bedfordshire Coleoptera (BNHS) - 1986-2011
Bedfordshire and Luton Biodiversity Recording and Monitoring Centre	Bedfordshire Diplopoda (BNHS) - 1975-1985
Bedfordshire and Luton Biodiversity Recording and Monitoring Centre	Bedfordshire Hymenoptera (BNHS) - 1930-2009
Bedfordshire and Luton Biodiversity Recording and Monitoring Centre	Bedfordshire Micro Moths (BNHS) - 1820-2012
Biodiversity Information Service for Powys and Brecon Beacons National Park	CCW Regional Data : Mid-Wales
Biological Records Centre	Cerambycidae Dataset
Biological Records Centre	Cranefly (Diptera; Tipuloidea) records for Britain to 2007
Biological Records Centre	Derek Lott Coleoptera Dataset
Biological Records Centre	Millipede (Diplopoda) records for Britain and Ireland to 2005
Biological Records Centre	Moths - John Heath Lepidoptera recording scheme macro-moth data from BRC
Biological Records Centre	Soldier Beetle and Jewel Beetle (Coleoptera; Cantharoidea and Buprestoidea) records for Britain and Ireland to 2000
Bristol Regional Environmental Records Centre	BRERC February 2012
British Bryological Society	Bryophyte data for Great Britain from the British Bryological Society held by BRC
British Lichen Society	BLS Lichen Database: England
British Lichen Society	BLS Lichen Database: English churchyards
British Lichen Society	BLS Lichen Database: Scotland
British Lichen Society	BLS Lichen Database: Wales
British Lichen Society	BLS Lichen Database: Welsh churchyards
British Lichen Society	BLS Mapping Scheme dataset, 1750-2009
British Lichen Society	BLS Rare and Threatened Lichen Records: England
British Lichen Society	BLS Rare and Threatened Lichen Records: Wales
Buckinghamshire and Milton Keynes Environmental Records Centre	Bryophytes in Buckinghamshire
Butterfly Conservation	Macro-moth provisional distribution for the British Isles (excluding the Republic of Ireland) from the National Moth Recording Scheme

Cambridgeshire & Peterborough Environmental Records Centre	Cambridge Lichen group data held by CPERC.
Cambridgeshire & Peterborough Environmental Records Centre	Cambridgeshire data for Environment Agency held by CPERC
Cambridgeshire & Peterborough Environmental Records Centre	Chippenham fen Moth surveillance project
Cambridgeshire & Peterborough Environmental Records Centre	CPERC Recorders day at Waterbeach barracks and airfield
Centre for Environmental Data and Recording	NI Lichen Data set
Centre for Environmental Data and Recording	Northern Ireland Priority Species Data Set
Cofnod (North Wales Environmental Information Service)	CCW Regional Data: North Wales
Countryside Council for Wales	Lichens of Conservation Concern - Site Data, Wales
Countryside Council for Wales	UK Biodiversity Action Plan Invertebrate Data for Wales
Countryside Council for Wales	Welsh Invertebrate Database (WID)
Countryside Council for Wales	Welsh Peatland Invertebrate Survey (WPIS)
Cumbria Biodiversity Data Centre	Cumbria Biodiversity Data Centre. Fungi and Lichen Observation Records. Pre-2010 for Cumbria.
Cumbria Biodiversity Data Centre	Cumbria Biodiversity Data Centre. Invertebrate Observation Records other than Lepidoptera. Pre-2010 for Cumbria
Cumbria Biodiversity Data Centre	Cumbria Biodiversity Data Centre. Lepidoptera Observation Records. Pre-2010 for Cumbria
Cumbria Biodiversity Data Centre	Cumbria Biodiversity Data Centre. Moss and Liverwort Observation Records. Pre-2010 for Cumbria
Derbyshire Biological Records Centre	Hemiptera Records 1969 - 2011
Devon Biodiversity Records Centre	Devon incidental species records 1950-2002
Dipterists Forum	Dipterists Forum - Field Weeks 2000 & 2001 (Cornwall & Devon)
Dorset Environmental Records Centre	Dorset Important Species 2011 for Natural England use only
Dorset Environmental Records Centre	Dorset Important Species 2012 for Natural England use only
Dorset Environmental Records Centre	Dorset Sites of Nature Conservation Interest (SNCI) species records 2000-2008
Dorset Environmental Records Centre	Dorset Sites of Nature Conservation Interest (SNCI) species records pre 2000
Dorset Environmental Records Centre	Dorset SSSI Species Records 1952 - 2004 (Natural England)
Dorset Environmental Records Centre	Dorset Wildlife Trust Reserve Records
Dr Francis Rose Field Notebook Project	Field Notebook Records of Dr Francis Rose 1950's to 1990's
Dumfries and Galloway Environmental Resources Centre	Micro-moths distribution for Dumfries and Galloway
Environmental Records Centre for Cornwall and the Isles of Scilly	Bannister Beetle distribution dataset from 1922 to 1976 for Cornwall and the Isles of Scilly.
Environmental Records Centre for Cornwall and the Isles of Scilly	Fungi species distribution dataset from 1847 to 2009 for Cornwall and the Isles of Scilly.
Environmental Records Centre for Cornwall and the Isles of Scilly	Lepidoptera species distribution dataset from 1981 to 2008 for Cornwall and the Isles of Scilly

Environmental Records Information Centre North East	ERIC North East non-sensitive species records
Fife Nature Records Centre	Records for Fife Nature Records Centre
Hampshire Biodiversity Information Centre	HBIC and partners species records
Hampshire Biodiversity Information Centre	HBIC Protected and notable species
Herefordshire Biological Records Centre	Herefordshire Biological Records Centre Species Records
Highland Biological Recording Group	HBRG Fungus, Lichen and Lower Plants Dataset
Highland Biological Recording Group	HBRG Insects Dataset
Highland Biological Recording Group	HBRG Other Invertebrates Dataset
John Muir Trust	List of Lichen Species recorded on high ground in the Ben Nevis range
John Muir Trust	Plants, Bryophytes and Lichens recorded on the Nevis Estate during summer 2003.
Kent & Medway Biological Records Centre	Coleoptera: Records for Kent for the period 1978 to 2007
Kent & Medway Biological Records Centre	Lepidoptera: Moths: Records for Kent
Lancashire Environment Record Network	LERN Fungi Records.
Leicestershire and Rutland Environmental Records Centre	Leicestershire & Rutland Coleoptera
Leicestershire and Rutland Environmental Records Centre	Leicestershire Bryophyte Data
Leicestershire and Rutland Environmental Records Centre	Leicestershire Diplopoda Records
Lincolnshire Biodiversity Partnership	Lincolnshire Beetles
Lincolnshire Biodiversity Partnership	Lincolnshire Moths
Lincolnshire Biodiversity Partnership	Lincolnshire Sawflies
Lincolnshire Biodiversity Partnership	Lincolnshire True Bugs (terrestrial)
Merseyside BioBank	Merseyside BioBank Active Naturalists (unverified)
Merseyside BioBank	North Merseyside Insects (unverified)
Merseyside BioBank	North Merseyside Other Taxa (unverified)
Merseyside BioBank	North Merseyside Other Taxa (verified)
National Trust	Anglesey Abbey wildlife species data held by The National Trust.
National Trust	Hatfield Forest species data held by The National Trust.
National Trust	Ickworth species data held by The National Trust.
National Trust	Wicken Fen nature reserve species data held by The National Trust
National Trust for Scotland	NE Scotland NTS properties species records
Natural England	Invertebrate Site Register - England (1738-2005).
North & East Yorkshire Ecological Data Centre	North and East Yorkshire Ecological Data Centre - Non-sensitive Records from all taxonomic groups.
North Ayrshire Countryside Ranger	Species within North Ayrshire from 1984 - Present

Service	
North East Scotland Biological Records Centre	NE Scotland beetle records 1800-2010
North East Scotland Biological Records Centre	NE Scotland butterfly and moth records 1800-2010
North East Scotland Biological Records Centre	NE Scotland fungus and lichen records 1800-2010
North East Scotland Biological Records Centre	NE Scotland moss and liverwort records 1800-2010
North East Scotland Biological Records Centre	NE Scotland other invertebrate records 1800-2010
Northamptonshire Biodiversity Records Centre	Data on a range of protected and notable species specified by Natural England for Northamptonshire for dates up to November 2011
Northern Ireland Environment Agency	EHS Species Datasets
Northern Ireland Fungus Group	Fungi records from Northern Ireland
Nottinghamshire Biological and Geological Records Centre	UK abstract from Nottingham City Museums & Galleries (NCMG) Insect Collection Baseline database
Outer Hebrides Biological Recording Project	OHBRP Insects Dataset - Outer Hebrides
Record, the Biodiversity Information System for Cheshire, Halton, Warrington and the Wirral	RECORD Bryopsida Data up to 29/05/2009
Rotherham Biological Records Centre	Rotherham Biological Records Centre - Non-sensitive Records from all taxonomic groups
Royal Horticultural Society	Records from the RHS insect reference collection
Royal Horticultural Society	RHS monitoring of native and naturalised plants and animals at its gardens and surrounding areas
Scottish Natural Heritage	Invertebrate Site Register - Scotland
Scottish Natural Heritage	SNH Species Repository
Scottish Wildlife Trust	Commissioned surveys and staff surveys and reports for SWT reserves.
Seil Natural History Group	SNHG Biological Records Dataset
Sheffield Biological Records Centre	Sheffield Biological Records Centre- Non-sensitive Records from all taxonomic groups.
Shropshire Ecological Data Network	Shropshire Ecological Data Network Database
South East Wales Biodiversity Records Centre	CCW Regional Data : South East Wales Non-sensitive Species Records
South East Wales Biodiversity Records Centre	Microlepidoptera of Glamorgan
Staffordshire Ecological Record	SER Site-based Surveys
Staffordshire Ecological Record	SER Species-based Surveys
Staffordshire Ecological Record	Staffordshire Wildlife Trust Nature Reserves Inventory
Staffordshire Ecological Record	Stoke-on-Trent Environmental Survey results (1982-1984)
Suffolk Biological Records Centre	Suffolk Biological Records Centre (SBRC) dataset
Surrey Biodiversity Information Centre	Surrey Wildlife Trust Nature Reserves - Tranche 1 Species Records
Sussex Biodiversity Record Centre	Patrick Roper's Notebooks
Sussex Biodiversity Record Centre	Sussex Bryophyte Atlas Data edited by Howard Matcham
Sussex Biodiversity Record Centre	SxBRC Full dataset for Environment Agency and

	Natural England use only.
Thames Valley Environmental Records Centre	2000-2003 RBWM WHS Surveys
Thames Valley Environmental Records Centre	English Nature and NCC Oxfordshire Surveys
Thames Valley Environmental Records Centre	English Nature Berkshire SSSI Records
Thames Valley Environmental Records Centre	English Nature Oxfordshire Invertebrate Surveys
Thames Valley Environmental Records Centre	Local Wildlife Site Surveys Berkshire
Thames Valley Environmental Records Centre	Local Wildlife Site Surveys Oxfordshire
The Wildlife Information Centre	Lothian Wildlife Information Centre Secret Garden Survey
Tullie House Museum	Tullie House Museum Natural History Collections
West Wales Biodiversity Information Centre	CCW Regional Data: all taxa (excluding sensitive species), West Wales
Wiltshire and Swindon Biological Records Centre	Wiltshire & Swindon Incidental Species Records
Wiltshire and Swindon Biological Records Centre	Wiltshire & Swindon Site-based Survey Records
Worcestershire Biological Records Centre	Natural England species data for SSSI within Worcestershire from date of notification to present
Worcestershire Biological Records Centre	Species data for Special Wildlife Sites within Worcestershire from date of notification to present.
Worcestershire Biological Records Centre	WBRC Species data for Worcestershire collated by date.
Worcestershire Biological Records Centre	Worcestershire Wildlife Trust species data for owned and managed Reserves within Worcestershire from date of first acquisition to present.
Yorkshire Wildlife Trust	Yorkshire Wildlife Trust - Non-sensitive records from all taxonomic groups