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on the Conservation of Natural Habitats
and of Wild Fauna and Flora
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Second Report by the United Kingdom under Article 17

on the implementation of the Directive from January 2001 to December 2006

Supporting documentation for making Conservation status assessments: Technical Note III Assessment of air pollution impacts for Conservation status reporting

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Assessment of air pollution impacts for conservation status reporting

1. Introduction

1.1 Air pollution is included in the list of 'Main Pressures' and 'Threats' in European Commission Guidance for Article 17 reporting (October 2006).

1.2 This paper documents the approach taken by JNCC to assess whether air pollution should be listed in these categories for each feature.

1.3 An overview of the approach is given in Section 2 and a summary of results in Section 3. A full explanation and justification for the method is given in Appendix 1 and the records for individual habitat assessments are presented in Appendix 2.

1.4 The current reporting acts to highlight the potential threat and pressure from air pollution on sensitive Annex I habitats. Looking forward to the next reporting round, it is critical that the air pollution assessment approach is refined and that this is done in a consistent manner across Member States.

2. Summary of approach

2.1 The assessment is based on the use of critical load exceedance data for acidity and nutrient nitrogen. Critical loads are an established assessment tool for atmospheric deposition and form the principle ecosystem assessment for air pollution policy development.

2.2 For the reporting of conservation status, a combined approach has been used which draws on UK national critical loads exceedance mapping for Biodiversity Action Plan (BAP) Broad Habitats (http://critloads.ceh.ac.uk/) and the Site Relevant Critical Loads (SRCL) produced for Natura 2000 sites (SNIFFER, 2007).

2.3 Where ‘relevant’ critical loads are exceeded for a particular habitat, air pollution will be listed as a current 'pressure' and future 'threat' (future/foreseeable impacts). ‘Relevant’ critical loads are assigned to Annex I habitats where there is adequate equivalence with a European Nature Information System (EUNIS) class/or BAP Broad Habitat for which critical loads are assigned, for nutrient nitrogen and acidity respectively. Any evidence of current impacts on habitat structure and function highlighted in the habitat assessments will also be used to inform whether air pollution is listed as a current threat.

2.4 This assessment has been carried out for Annex I habitats only. It is considered that the critical loads approach is not appropriate for Annex II species in this context. (see Appendix 1 for justification).

2.5 Freshwater, marine and habitats which are not sensitive are omitted from the assessments. For freshwater, the individual habitat assessments of sensitive habitats have considered acidification impacts. Although the critical loads concept is well founded for freshwaters it is not appropriate in this context.

2.6 In addition, a few Annex I habitats which are potentially sensitive have had to be excluded because there is not a habitat for which a critical load is set which has sufficient equivalence with the Annex I habitat.

2.7 Results are presented in a summary table (Table 1) which identifies whether air pollution should be listed as a 'Threat' and 'Pressure'. Habitats excluded are presented in Table 2.

2.8 The following questions are addressed for each habitat:

- Is the Annex I habitat sensitive to atmospheric inputs of nutrient nitrogen or acidity?
- Is there an appropriate critical load i.e.;
  - is there a reasonable equivalence between the EUNIS/BAP habitats, for which critical loads are set, and the Annex I habitat? If so,
  - is the research upon which critical loads are based representative of potential impacts on the Annex I habitat?
- What is the exceedance of nutrient nitrogen and acidity critical loads of the habitat within the SAC series?
- What is the extent of the habitat which occurs in the SAC series (%)?
- Undertake a comparison of the distribution of the Annex I habitat with the distribution of the relevant BAP broad habitat mapped for critical load exceedance if applicable.

2.9 The judgement is then based on critical load exceedance for SACs and for relevant BAP habitats, but qualified by the level of certainty in the above steps.

2.10 The assessment is based on national modelling and provides a national overview. Some Annex I habitats which are not identified as ‘at risk’ at a national level may still be under threat on a local/site specific basis.

2.11 .It is not possible at this stage to undertake risk assessments of ozone impacts on individual habitats. (see Appendix 1 for more details).

References

SNIFFER. 2007. Source attribution and critical loads assessment for Special Areas of Conservation and Special Protection Areas in the UK. Project AQ02.
www.sniffer.org.uk/exe/download.asp?sniffer_outputs/AQ02.pdf

3. Summary of results

Table 1. Habitats included and summary of outcome based on critical loads assessment

HD Code	European Name	Lay Name	Air Pollution threat or pressure?
H1310	Salicornia and other annuals colonising mud and sand	Glasswort and other annuals colonising mud and sand.	No
H1320	Spartina swards (Spartinion maritimae)	Cord-grass swards.	No
H1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Atlantic salt meadows.	No
H2110	Embryonic shifting dunes	Shifting dunes.	No
H2120	Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	Shifting dunes with marram.	No
H2130	Fixed dunes with herbaceous vegetation (grey dunes)	Dune grassland.	No
H2140	Decalcified fixed dunes with Empetrum nigrum	Coastal dune heathland with crowberry.	No
H2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	Coastal dune heathland.	No
H2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	Dunes with creeping willow	No
H2190	Humid dune slacks	Humid dune slacks.	No
H2250	Coastal dunes with Juniperus spp.	Coastal dune heathland with juniper	No
H2330	Inland dunes with open Corynephorus and Agrostis grasslands	Open grassland with grey-hair grass and common bent grass of inland dunes.	Yes
H4010	Northern Atlantic wet heaths with Erica tetralix	Wet heathland with cross-leaved heath.	Yes
H4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	Wet heathland with Dorset heath and cross-leaved heath.	Yes
H4030	European dry heaths	Dry heaths.	Yes
H4040	Dry Atlantic coastal heaths with Erica vagans	Dry coastal heaths with Cornish heath.	No
H4060	Alpine and Boreal heaths	Alpine and subalpine heaths.	Yes
H4080	Sub-Arctic Salix spp. Scrub	Mountain willow scrub.	Yes
H5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	Natural Box Scrub	No
H5130	Juniperus communis formations on heaths or calcareous grasslands	Juniper on heaths or calcareous grasslands	Yes
H6130	Calaminarian grasslands of the Violetalia calaminariae	Grasslands on soils rich in heavy metals.	Yes
H6150	Siliceous alpine and boreal grasslands	Montane acid grasslands.	Yes
H6170	Alpine and subalpine calcareous grasslands	Alpine and subalpine calcareous grasslands.	Yes
H6210 H6211	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) and	Dry grasslands and scrublands on chalk or limestone.	Yes

	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites)		
H6230	Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)	Species-rich grassland with mat-grass in upland areas.	Yes
H6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Purple moor-grass meadows.	Yes
H6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Tall herb communities.	Yes
H6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Lowland hay meadows.	No
H6520	Mountain hay meadows	Mountain hay meadows.	Yes
H7110	Active raised bogs	Active raised bogs.	Yes
H7120	Degraded raised bogs still capable of natural regeneration	Degraded raised bog.	Yes
H7130	Blanket bogs	Blanket bog.	Yes
H7140	Transition mires and quaking bogs	Very wet mires often identified by an unstable quaking surface.	Yes
H7150	Depressions on peat substrates of the Rhynchosporion	Depressions on peat substrates.	Yes
H7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	Calcium-rich fen dominated by great fen sedge (saw sedge)	No
H7220	Petrifying springs with tufa formation (Cratoneurion)	Hard Water Springs	No
H7230	Alkaline fens	Calcium-rich springwater-fed fens.	No
H7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	High-altitude plant communities associated with areas of water seepage.	No
H8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	Acidic scree.	Yes
H8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	Base-rich scree.	Yes
H8210	Calcareous rocky slopes with chasmophytic vegetation	Plants in crevices in base-rich rocks.	Yes
H8220	Siliceous rocky slopes with chasmophytic vegetation	Plants in crevices on acid rocks.	Yes
H9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	Beech forests on acid soils.	Yes
H9130	Asperulo-Fagetum beech forests	Beech forests on neutral to rich soils.	Yes
H9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	Oak-hornbeam forests.	Yes
H9180	Tilio-Acerion forests of slopes, screes and ravines	Mixed woodland on base-rich soils associated with rocky slopes.	Yes

H9190	Yes Old acidophilous oak woods with Quercus robur on sandy plains	Dry oak-dominated woodland.	Yes
H91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	Western acidic oak woodland.	Yes
H91C0	Caledonian forest	Native pine woodland	Yes
H91D0	Bog woodland	Bog woodland.	Yes
H91J0	Taxus baccata woods of the British Isles	Yew-dominated woodland.	Yes

Table 2. Habitats excluded and rationale

HD code	European Name	Lay Name	Rationale why excluded
H1110	Sandbanks which are slightly covered by sea water all the time	Subtidal sandbanks.	Aquatic
H1130	Estuaries	Estuaries.	Aquatic
H1140	Mudflats and sandflats not covered by seawater at low tide	Intertidal mudflats and sandflats.	poor equivalence – cannot assign 'relevant' critical load (unlikely to be at risk from air pollution)
H1150	Coastal lagoons	Lagoons.	Aquatic
H1160	Large shallow inlets and bays	Shallow inlets and bays.	Aquatic
H1170	Reefs	Reefs.	Aquatic
H1220	Perennial vegetation of stony banks	Coastal shingle vegetation outside the reach of waves.	poor equivalence – cannot assign 'relevant' critical load (unlikely to be at risk from air pollution)
H1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Vegetated sea cliffs.	No equivalence – cannot assign 'relevant' critical load
H1340	Inland salt meadows	Inland saltmarshes	no equivalence – cannot assign 'relevant' critical load (note if same sensitivity as coastal saltmarshes it is unlikely to be vulnerable, unless there is a large point source close to site).
H1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	Mediterranean saltmarsh scrub.	poor equivalence – cannot assign 'relevant' critical load (unlikely to be at risk from air pollution)
H2110	Annual vegetation of drift lines	Annual vegetation of drift lines.	not sensitive
H2160	Dunes with Hippophae rhamnoides	Dunes with sea-buckthorn.	no equivalence – cannot assign 'relevant' critical load
H21A0	Machairs	Machair	poor equivalence – cannot assign

			'relevant' critical load (unlikely to be at risk from air pollution)
H3110	Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae	Nutrient-poor shallow waters with aquatic vegetation on sandy plains.	Aquatic
H3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea	Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels.	Aquatic
H3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	Calcium-rich nutrient-poor lakes, lochs and pools.	Aquatic
H3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	Naturally nutrient-rich lakes or lochs which are often dominated by pondweed.	Aquatic
H3160	Natural dystrophic lakes and ponds	Acid peat-stained lakes and ponds.	Aquatic
H3170	Mediterranean temporary ponds	Mediterranean temporary ponds.	Aquatic
H3180	Turloughs	Turloughs.	Aquatic
H3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Rivers with floating vegetation often dominated by water-crowfoot.	Aquatic
H8240	Limestone pavements	Limestone pavements.	poor equivalence – cannot assign 'relevant' critical load (unlikely to be at risk from air pollution)
H8310	Caves not open to the public.	Caves not open to the public.	not sensitive
H8330	Submerged or partially submerged sea caves	Sea caves.	Aquatic
H91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	Alder woodland on floodplains.	not sensitive

NB. acidification impacts on sensitive aquatic habitats considered as part of coarse assessments

AIR POLLUTION ASSESSMENT FOR CONSERVATION STATUS REPORTING

Appendix 1. Assessment methodology

1. Introduction

1.1 The air pollution assessment is based on nutrient nitrogen (N) and acidity critical load exceedance. The justification for this, the background to critical loads, and the method are described below. This critical loads assessment will be combined with any evidence of air pollution impacts recorded in the habitat assessments, to provide an overall judgement as to whether air pollution should be listed as a threat or pressure.

2. Which air pollutants are included?

2.1 A related research contract (Hall *et al*., 2006) on methods to assess the risk of air pollutant impacts to SSSIs, recently recommended that sufficient information exists for an assessment of acid deposition (nitrogen and sulphur compounds), nutrient nitrogen deposition, NOx concentrations, SO_2 concentrations, NH_3 concentrations and potentially ozone. There are critical loads or levels for each of these pollutants.

2.2 However, given the very low exceedance of the SO_2, NOx and NH_3 critical levels, based on national mapping and since impacts of the three gases are partly considered within critical loads exceedance (as the dry deposition element), it is considered unnecessary, for the purposes of this round of FCS reporting, to include an assessment of critical level exceedance for SO_2, NOx and NH_3. An exception is for sensitive habitats/species with very limited distribution which could be severely affected by a local point source. However, national maps will not adequately demonstrate this and only a local assessment can provide this information.

2.3 Ozone is the most important gaseous air pollutant in terms of regional scale impacts on vegetation. It is considered to represent a significant threat to sensitive habitats and plant species in the UK. However, the implications of current and future ozone exposure on Annex I habitats has not been assessed, and at present it is not possible to undertake an assessment of the threat to individual Annex I habitats. JNCC and the country agencies have recently funded a research project to review the impacts of ozone focussing on BAP Priority Habitats (Morrissey *et al*., in press). The information on effects on different habitats is too limited, at present, to inform the current assessment.

2.4 Therefore, to summarise, the assessment is based on a 'national' critical loads exceedance assessment of acid deposition and nutrient nitrogen deposition.

3. Background to assessment approach

3.1 *Critical loads and national critical loads exceedance mapping*

3.1.1 Critical loads have been developed under the auspices of the UNECE Convention on Long Range Transboundary Air Pollution (CLRTAP). They are an effects-based tool used to map the sensitivity of habitats across Europe. This is combined with maps of deposition to show

where pollutant deposition exceeds the critical load. Using integrated assessment models, emission reductions can then be spatially targeted at the sources contributing most to the problem. There are established methodologies and standardised protocols for the setting of critical loads within CLTRAP.

3.1.2 CEH Monks Wood is the UK's Critical Load Focal Centre (NFC). They provide critical load maps for submission to the CLRTAP Co-ordination Centre for Effects and also to Defra for national policy development. CEH Edinburgh provides deposition estimates for the UK using a combination of measured and modelled data (www.critloads.ceh.ac.uk).

3.1.3 Critical load maps are available for the UK based on a 1km^2 grid. They are mapped for BAP Broad Habitats that are sensitive to acidification or eutrophication and for which sufficient information exists (Table 1). The habitats are mapped using a combination of data from the CEH Land Cover Map and ancillary datasets on species distributions, soils and altitude (Hall *et al*., 2003). There are a number of limitations and uncertainties with the habitat mapping. The approach is adequate to give an overview of critical load exceedance for national mapping purposes. However, the Land Cover Map polygons greatly under-represent Annex I habitats. So national maps are not representative of the presence of the Annex I habitats, and may not represent faithfully the location of the Broad Habitat in some cases. For this reason, the national maps should not be used at the site level.

Table 1. List of BAP Broad Habitats mapped in the UK for critical load exceedance

BAP Broad Habitat	Critical loads Broad Habitat Maps	Critical loads mapped for:	
		Acidity	Nutrient N
Broadleaved, mixed and yew woodland	Managed broadleaved woodland Unmanaged broadleaved & coniferous woodland	√ √	√ √
Coniferous Woodland	Managed coniferous woodland	√	√
Calcareous Grassland	Calcareous grassland	√	√
Acid Grassland	Acid grassland	√	√
Dwarf Shrub Heath	Dwarf Shrub Heath	√	√
Bog	Bog	√	√
Montane	Montane (Racomitrium Heath)	√	√
Supralittoral Sediment	Dune Grassland	X	√

3.2 *Acidity Critical Loads (terrestrial habitats)*

3.2.1 Acidity critical loads are based on the underlying soil series and its mineralogy and weathering rate, or for peat soils the critical load is based on the amount of acid deposition that would prevent the soil solution pH falling below pH 4.4 (this method is not suitable for lowland fen peats, some of which develop in calcareous conditions and so are less sensitive to acidification). Exceedance of the acidity critical load demonstrates the potential for harmful effects to a system

at steady-state. No timescales are attached to this and no account is made of historic inputs (dynamic models are in development).

3.2.2 There are two methods used in the UK for calculating acidity critical loads for terrestrial ecosystems - a Simple Mass Balance (SMB) equation applied to woodland habitats (balances acidic inputs and outputs to ensure a critical chemical limit is not exceeded), and an empirical approach (based solely on the soil series and the amount of acid inputs which can be buffered by base cations from weathering) for all other habitats.

3.2.3 Critical loads for acidity for terrestrial habitats are therefore based on the dominant soil series within the dominant soil association found in each 1 km^2. National exceedance maps provide information on the area of sensitive habitats in the 1 km squares where the critical loads values are exceeded. These values are summed to provide statistics by habitat and country.

3.3 *Nutrient nitrogen critical loads*

3.3.1 Critical loads for nutrient nitrogen have been set by a UNECE working group under the CLTRAP and are assigned to EUNIS habitat classes, in order that there is common nomenclature across the UNECE. They are set for those habitats for which sufficient information exists, which in practice is a small subset. Reliability estimates are given to reflect the uncertainties of impacts on each habitat.

3.3.2 In the UK, the EUNIS habitats are translated into BAP Broad Habitats for the purposes of mapping (see table below). However, there is a limitation on the degree of translation between EUNIS classes and BAP Broad Habitats so this introduces a further uncertainty. In addition, not all the habitats for which a UNECE critical load is set are mapped in the UK (see Table 2 and Table 3).

3.3.3 The UNECE critical loads are a range (i.e. 10-20 kgN/ha/yr) to reflect the intrinsic variability in response between ecosystems. Since a single value is required for mapping purposes, UK experts derive mapping values (usually the mid point in the range) based on UK conditions.

Table 2. List of UNECE nutrient nitrogen critical loads and UK mapping values

Ecosystem (with corresponding EUNIS class, where used)	Critical load range from UNECE 2001 (kgN/ha/yr)[1]	UK mapping value (kgN/ha/yr)
Grasslands		
Dry acid and neutral closed grassland (E1.7)	10-20 #	15
Calcareous grassland (E1.26)	15-25 ##	20
Montane grassland hay meadows (E2.2)	20-30 (#)	-
Montane hay meadows (E2.3)	10-20 (#)	-
Arctic/sub-alpine grass	10-15 (#)	-
Moist/wet oligotrophic grass (E3.5)	10-20 #	15
Molinia meadows (E3.51)	15-25 (#)	-
Nardus stricta swards (E3.52)	10-20 #	15
Moss/lichen mountain summits (E4.2)	5-10 #	7
Inland dune pioneer grass (E1.94)	10-20 (#)	-
Inland dune silicaceous grass (E1.95)	10-20 (#)	-
Heathland/moorland		
Lowland dry heaths (F4.2)	10-20 ##	12
Lowland *Erica* wet heaths (F4.11)	10-25 #	15
Upland *Calluna* wet heaths (F4.11)	10-20 (#)	15
Arctic/alpine heaths (F2)	5-15 (#)	-
Tundra (F1)	5-10 #	-
Coastal habitats		
Coastal stable dune grasslands (B1.4)	10-20 #	15
Shifting coastal dunes (B1.3)	10-20 #	15
Coastal dune heaths (B1.5)	10-20 (#)	-
Moist-wet dune slacks (B1.8)	10-25 (#)	-
Dune slack pools (C1.16)	10-20 (#)	-
Salt marshes (A2.64 & A2.65)	30-40 (#)	-
Softwater oligotophic lakes		
Permanent oligotrophic lakes (C1.1)	5-10 ##	-
Bogs, mires and fens		
Ombrotrophic and raised bogs (D1)	5-10 ##	10
Poor fens (D2.2)	10-20 #	15
Rich fens (D4.1)	15-35 (#)	-
Montane rich fens (D4.2)	15-25 (#)	-
Forests [G]: Response type:-		
Unmanaged woodlands with high diversity of ground flora: protection of ground flora	10-15 # (all forests)	12 (all forests)
Woodlands with high diversity of epiphytic lichens: protect of epiphytic lichens and algae	10-15 (#)	10

[1]The reliability of the recommended range of critical load values is indicated as:

(#) expert judgement
quite reliable
reliable

Table 3 Nutrient nitrogen critical loads and corresponding BAP habitat used for UK critical loads mapping

Broad Habitat[1]	EUNIS class	Critical load range (kg N ha^{-1} $year^{-1}$)	UK mapping value (kg N ha^{-1} $year^{-1}$)
Acid grassland	Dry acid & neutral closed grassland (E1.7) Moist or wet oligotrophic grassland (E3.5)	10-20 10-20	15 15
Calcareous grassland	Semi-dry calcareous grassland (E1.26)	15-25	20
Dwarf shrub heathland	(Lowland) dry heaths (F4.2) (Lowland) *Erica* wet heaths (F4.11) (Upland) *Calluna* wet heaths (F4.11)	10-20 10-25 10-20	12 15 15
Bogs	Raised and blanket bogs (D1)	5-10	10
Montane	Moss & lichen dominated mountain summits (E4.2)	5-10	7
Unmanaged woodland	Broadleaved woodland (effects on ground flora)	10-15	12
Broadleaved woodland (Atlantic oak woods)	Broadleaved woodland (effects on epiphytic lichens & algae)	10-15	10
Supralittoral sediment	Shifting coastal dunes (B1.3) Stable dune grassland (B1.4)	10-20 10-20	15 15

Notes:

[1] The "broadleaved, mixed and yew woodland" broad habitat is separated into the following classes for the purposes of mapping nutrient nitrogen critical loads: "broadleaved woodland (managed)", "broadleaved woodland (Atlantic oak woods)" and "unmanaged (ancient & semi-natural) coniferous and broadleaved woodland" (excluding Atlantic oak woods) abbreviated to "unmanaged woodland" above.

3.4 *Site Relevant Critical Loads*

3.4.1 As part of assessments to fulfil obligations under Regulations 48-51 of the Conservation (Natural Habitats & c.) Regulations 1994 (the "Habitats Regulations"), the Environment Agency and SNIFFER (on behalf of SEPA and EHS), in collaboration with the conservation agencies, have undertaken a major screening exercise of critical load exceedance at Natura 2000 sites. This has been combined with deposition modelling in order to apportion deposition at each site to 100 of the largest emitters of sulphur and nitrogen compounds in the UK and to other sectors such as agriculture, transport and area sources such as urban/domestic. Full details are described in SNIFFER (2007).

3.4.2 The national critical load mapping, as described above, was not appropriate for this exercise, largely because the national habitat mapping did not adequately represent the designated features at sites (see paragraph 3.1.3). "Site relevant critical loads" have therefore been developed and represent the allocation of the most 'relevant' critical load for every potentially sensitive designated feature at a particular European site.

3.4.3 The derivation of SRCLs and limitations are explained in the box below (adopted from Hall *et al*., 2006).

3.4.4 It is important to note that some Annex I habitats are well matched to EUNIS habitats for which critical loads are assigned and there can be a lot of confidence in the critical load assigned. For others, this is much more tenuous. Although the Annex I habitats may nest within particular EUNIS classes (at level 2) they are often only a small part, and not necessarily a representative subset, of the wider EUNIS classification.

3.4.5 Assigning a habitats based critical load to species is particularly challenging. The approach taken in SRCLs (see box) is justified as a screening assessment and enshrines a precautionary approach. The more detailed appropriate assessment, on a site by site basis, required under the Habitats Regulations, allows this to be considered in more detail based on site specific conditions, but such an assessment is not possible as a national overview on all sites. For the FCS air pollution assessment, only those habitats with reasonable equivalence will be included since local site based assessments are not possible, see section 3.5, and other habitats and species are excluded.

1. ***Assigning Relevant Critical Loads to designated features***

1.1 **Assigning critical loads for acidity**

There are eight terrestrial habitat classifications for acidity (acid grassland, calcareous grassland, dwarf shrub heath, bog, montane, unmanaged coniferous and broadleaved woodland, managed deciduous woodland, and managed coniferous woodland), all based on BAP Broad Habitats. Only six of these were used in this assessment, which excluded managed coniferous and managed deciduous woodlands, since these are not protected within the network European designated sites.

The next step was to assess whether the designated features are sensitive to acidification. All the features which are potentially sensitive were then matched to their corresponding critical load Broad Habitat. Justification for these linkages was noted as well as a description of the impacts of exceedance.

1.2 **Assigning critical loads for nutrient nitrogen**

A similar process was adopted to assign critical loads for nutrient nitrogen. Annex I habitat and Annex II plant species were linked with the most suitable EUNIS class used in classifying empirical critical loads for nutrient nitrogen (UNECE, 2003). Justifications for this match were noted for transparency and consistency (based on the NBN habitats dictionary www.nbn.org.uk/habitats/). The relevant critical load values, reliability of these values and the likely impacts of exceedance were all noted.

1.3 **Assigning critical loads SAC Annex II "non-plant" species**

There are few, if any, instances of direct effects on non-plant species from nitrogen and acid deposition. Therefore, assigning critical loads directly to these features is an unsuitable method for assessing likely impacts. However, by examining the relationship between a species' integrity and that of its habitat provides for a better causal link between potential species decline and atmospheric pollutant deposition. Where the habitat in which a species occurs was assessed to be insensitive to acidity or eutrophication, no critical load was assigned.

For each species the following series of questions were applied:

i. What is the relevant BAP Broad Habitat for this species?

ii. Is this habitat sensitive to eutrophication (from atmospheric deposition) or acidification?

iii. If yes, what are the impacts of eutrophication or acidification on this habitat and will it affect the viability of that species?

iv. If there are potential negative effects on the species, the most relevant critical load for nutrient nitrogen or critical load for acidity is assigned based on the broad habitat in which the species occurs (often more than one). Similar justifications were made as for SAC features and the relevant critical load values and impacts were noted.

2. **Assigning critical loads to sites**

Each SAC and SPA site is made up of a number of GIS polygons or for smaller sites often just one polygon. Using ArcView GIS, the 1 km acidity critical loads for each of the six habitat classes, were overlaid on the site polygons to produce a grid of critical load values and appropriate critical load extracted for each feature. By comparing the critical load values across each of the six 1 km grid squares, the maximum and minimum values for each polygon, and for each of the six broad habitat types, were determined. These maximum and minimum values, make up the CLmaxS, CLminN and CLmaxN components that comprise the critical load function. For N critical loads the relevant critical load for the features are assigned to each polygon assuming the habitat occurs across the whole site.

3. **The database**

By combining site information, including feature lists and polygon IDs, and the critical loads, a database of site based critical loads by feature and polygon was built for each SAC and SPA in the UK network. The finished database was presented as an interactive Excel spreadsheet database. Some notes have been added to the Excel spreadsheet that provides guidance and instruction in the use of critical loads and the critical load function. The database is incorporated into the Air Pollution Information System (APIS) and is accessible online at www.apis.ac.uk. Users can search by SAC/SPA and retrieve information on designated features (e.g. their sensitivities to acidification and eutrophication) including a breakdown of the sources that are contributing to nitrogen and acid deposition at any chosen site.

4. Limitations in using critical loads for site-based assessments

The application of critical loads to site based assessments should, in general, be based on the soil type and location on which the feature lies. Using national data sets in this exercise has led to a number of inconsistencies and limitations in the use of critical loads to assess site based habitat and species features.

i. Adopting the use of national critical loads for acidity gives rise to a number of problems including:

National maps for critical loads of acidity are based on the dominant soil type for each 1 km grid square. This leads to problems for all features that make up small areas or mosaics of habitats, but are not represented by the dominant soil type for that 1 km grid square.

Some features can be found on a number of different soil types (e.g. ranging from calcareous to acidic), and are therefore represented by a number of different acidity classes. For example *Juniper communis* occurs on calcareous, acidic and montane soils. The critical load values will in most cases reflect the correct underlying soil type, but prior knowledge of the soil type on which the feature occurs on a particular site should also be taken into account.

Some features, which are sensitive to acidity, may have missing critical load values. This occurs particularly with coastal sites where the 1 km gridded national critical loads maps from which the site relevant values have been derived do not exactly match the real coastline.

ii. For all sites there is the assumption that all features are in every polygon and this is a major limitation. Future improvements in the mapping of designated features within sites would greatly improve the efficiency of the database and avoid duplication of feature accounts.

iii. The use of critical loads in assessing the importance of exceedance, and how this relates to other drivers of ecological change impacting on the features like land management or climate change, is not addressed. Such drivers would certainly apply to decisions made when a more detailed site based assessment is conducted out.

3.5 *Features to be included in the critical load assessment*

3.5.1 For many of the Annex I habitats, and especially for Annex II species, the effect of air pollution has not been studied. To assign 'relevant' critical loads to the Annex I habitats, the development of SRCL is based on equivalence between the Annex I habitat and the EUNIS habitats for which critical loads are set. This was based on published relationships between the different habitat classifications (i.e. the NBN Habitats dictionary) as well as expert judgement.

3.5.2 For FCS reporting only those habitats with a reasonable equivalence with a EUNIS class or BAP Broad habitat (for which critical loads have been set) have been included in the assessment. This deviates from the approach taken for the purposes of the national screening for Regulation 48-50 assessments (the original intention of the SRCL database), where habitats with very weak equivalence are also included. The justification for this is that appropriateness of the critical load association will be taken into account in the more detailed appropriate assessments. For the purposes of FCS, such a site specific approach is not possible so those with weak equivalence have been excluded.

3.5.3 Species have not been included in the assessment because critical loads have generally been applied at the habitat level. The SRCLs database makes associations between critical loads and species based on the potential response of the habitat supporting the species. For site specific assessment these judgements can be scrutinised at a site specific level. For FCS this is not possible and hence, because of the uncertainties, this has been omitted. Where air pollution is known to be having current impacts on species these will have been highlighted in the individual assessments. However, it is acknowledged that relating cause and effect is extremely challenging and air pollution impacts may be under-reported.

3.5.4 Freshwater habitats are also excluded from the critical loads assessment because freshwaters critical loads are based on approximately 1,700 sites across the UK and therefore do not represent all waters in the UK. However, the impacts of acidification of freshwaters are well documented. Acidification is considered within CSM for standing waters in as far as ANC (Acid Neutralising Capacity) is included as an attribute. Therefore, for sensitive freshwater features, the impacts of acidification should be recorded in the coarse assessments.

4. Assessment procedure

4.1 The individual habitat assessments are based on a combination of exceedance of SRCLs and national critical loads exceedance mapping. Where the extent of the habitat is primarily within the SAC series, it is reliable to base the assessment solely on the SAC exceedance data. Where not, more emphasis has to be put on the national critical loads mapping. There are a number of limitations and uncertainties with both these approaches. There are also a

number of important differences in the data used to calculate critical loads and exceedance:

i. Deposition data are from different sources. For the SRCL the deposition is based on emissions from 2003 modelled by FRAME (SNIFFER, 2007) and calibrated. For the national critical loads exceedance mapping deposition is from CBED (NEGTAP, 2001), which combines measurements with some modelling and is for an average of 2002-2004.

ii. The national mapping of critical loads incorporates updates from 2004 which have not been included in the SRCL database yet.

iii. To generate SRCLs, critical loads are provided or each of the six classes for the whole country. The database extracts the relevant critical load for the designated habitat(s) at each SAC. For the national mapping, critical loads are only generated for the habitats which are mapped as present in each square.

4.2 In practice, these differences are unlikely to affect the outcome of individual assessments.

4.3 The following table lists the criteria for the assessment of individual habitats which are recorded in the tables presented in Appendix 2. For each criterion, the table provides details of the data sources and explains specific considerations which arise.

Criteria	Data source and comments
Is the habitat potentially sensitive to atmospheric inputs of acidity or nutrient nitrogen?	This is taken directly from the SRCL database (SNIFFER, 2007). It is an assessment of potential sensitivity and not vulnerability (which combines sensitivity and exposure i.e. critical load exceedance). Hence calcareous grasslands are potentially sensitive to acidity, but they are unlikely to be vulnerable because they are very well buffered and acid inputs do not exceed this buffering capacity. This assessment only considers sensitivity to atmospheric inputs of N and/or acidity. Some habitats, such as marine waters, are sensitive to nutrients, but atmospheric sources are generally a small component of inputs so are not considered in this assessment.
Is there an appropriate critical load for the habitat? (EUNIS for N; BAP broad for acidity) based on equivalence	**Nutrient Nitrogen:** For nutrient nitrogen this is based on whether there is equivalence between the Annex I habitat and a EUNIS class for which a critical load is set (see Table 2 above). This was undertaken during the development of SRCLs and has been adopted for the current assessment (and verified). Note that this is not simply a question of matching the most appropriate EUNIS class to Annex I, but is limited to those EUNIS classes for which critical loads are assigned. The UK National Focal Centre (NFC) uses relationships between EUNIS and BAP Broad Habitat to map nutrient nitrogen critical loads for Broad Habitats. This only covers a limited number of the EUNIS class for which critical loads are set (see Table 3). The critical loads (kgN/ha/yr) are recorded and where the associated Broad Habitat is mapped by the NFC the mapping value is given. **Acidity**: For acidity, the equivalence of the Annex I habitat with a BAP Broad Habitat for which acidity critical loads are calculated and mapped is presented. This is also taken from SRCLs work which is based on published relationships between habitat types (NBN Habitat dictionary).

Is the research upon which the critical load is set, indicative of an impact on the Annex I habitat?	This step considers whether the research upon which critical loads are based is representative of potential impacts on the Annex I habitat. Inevitably this also reflects the strength of the equivalence between the Annex I habitat and the EUNIS class for which a critical load is set and the reliability of the critical load. For nutrient nitrogen the background document from UNECE 2003 is the sole data source. For acidity see (Hall *et al*., 2003 & 2004).
Critical load exceedance for SACs containing habitat	This is derived from the SRCLs database (Bealey *et al*., 2005). The deposition data is from 2003 and is based on calibrated FRAME modelling; the critical loads are from the 2003 UK update (Hall *et al*. 2003). This takes the exceedance of the relevant critical load for each Annex I habitat on each SAC. It assumes that the Annex I habitat feature is distributed across the whole of each SAC for which it is designated. Critical loads for nutrient nitrogen are a range. Therefore, exceedance data are provided for the mapping value (where there is one, alternatively the mid point of the range is used) and the min and max of the range. The decision is then based on the mapping value/mean so as to be consistent with the approach of the NFC. Note the deviation from the approach used for screening assessments by the environment agencies (see paragraph 3.4.4). For acidity, for each SAC a min, mean and max exceedance has been generated by the SRCLs. At the site level, the minimum reflects the minimum acidity critical load across the site for a particular habitat, i.e. it will reflect the most sensitive critical load within the 1km grid square over which the site falls. The maximum critical load reflects the max critical load in any 1 km grid in which the site occurs and the mean simply reflects the area averaged critical load. Deposition is area averaged across the site. Where a site falls entirely within a single 1 km grid the min, max and mean will the same for any one habitat. These site results are then scaled up for a national assessment. The mean values are used as the basis for decision. For acidity critical load, the fact the habitats may not be present on the dominant soil type is a significant uncertainty. This is exacerbated by the assumption that each habitat is present across the whole site.
Extent of Annex I habitat in SACs	This is derived from www.jncc.gov.uk/page-2447. The weighting given to the SAC exceedance data in the decision is dependent on the extent to which the Annex I habitat occurs within the SAC series.
Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for critical load exceedance	Where there is a representative UK critical load exceedance map; a comparison is made of the distribution of the Annex I habitat and the BAP broad habitat. The NFC BAP broad habitat mapping is taken from Hall *et al*., 2003. These are based on a 1km grid. The Annex I habitat distribution maps are taken from JNCC Annex I habitat accounts (www.jncc.gov.uk/ProtectedSites/SACselection/SAC_habitats.asp). These are based on a 10 km grid. In practice the closeness of the match depends on how much wider the BAP classification is from the Annex I as well as mapping uncertainties and differences in resolution. This comparison is done by eye since other uncertainties in the assessment do not justify a quantitative GIS comparison. The national critical load exceedance maps are also examined at this stage (see below) to consider whether differences in distribution between the Annex I and the BAP Broad Habitat are likely to affect the estimate of critical load exceedance, i.e. whether the Annex I habitat concentrated in an area of the wider BAP habitat distribution which is not exceeded when the remainder of the habitat is.

Exceedance of Broad Habitat from UK mapping	These data are supplied by the NFC and reflect the annual submission to Defra. They are based on 2004 critical loads and deposition from 2002-2004. A description of the critical loads and the deposition estimates are given in Hall *et al*., 2004, and NEGTAP 2001. Note the different sources for critical load and deposition for the SRCL and the national mapping described in paragraph 4.1.
Outcome - list air pollution as a threat or pressure?	This records the decision as to whether air pollution should be listed as a "current threat" or "pressure on the future viability" of the habitat. The decision is based on critical load exceedance. It is based on the mean exceedance values for acidity and N critical loads. Account is given to the strength of the relationship between the critical load for which habitats have been set and the Annex I habitat and also of how indicative the research upon which the critical load is set (or critical load function parameters for acidity). A criterion of > 50% of the habitat area exceeding the critical load for either acidity and/or N, was used define whether air pollution is listed as a threat or pressure. It could be argued that this is not conservative and should be lower. However, in practice, for most habitat exceedance is very low, <10%, or very high, > 75%, so the decision is clear. There are a large number of uncertainties built into this assessment. However, the approach is considered appropriate for a national overview. In practice, the decision for each habitat is usually clear cut and reflects perceived vulnerability of habitats. The critical load assessment will be combined with any evidence of air pollution impacts recorded in the individual assessments to provide an overall judgement. In reality, it is expected that air pollution impacts will rarely be recorded in the individual assessment because of the difficulty in attributing cause and effect.

5. References

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AIR POLLUTION ASSESSMENT FOR CONSERVATION STATUS REPORTING

Appendix 2. Record of Individual Habitat Assessments for Annex I habitats with 'relevant' critical loads

HD Code	European Name	Lay Name
H1310	Salicornia and other annuals colonising mud and sand	Glasswort and other annuals colonising mud and sand

H1310	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No strong equivalence with EUNIS class for which CL is set. However, site relevant critical loads database assigns it to "Pioneer and low-mid saltmarshes [A2.64,A2.65]". CL= 30-40 kgN/ha/yr. Not mapped nationally by NFC.	Weak. Poor equivalence and few experiments on habitats to base CL on which is classed as 'expert judgement'. However, unlikely to effect outcome in this instance as unlikely to be particularly sensitive.	Mean – 0% Min – 0% Max – 0%	100%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H1320	Spartina swards (Spartinion maritimae)	Cord-grass swards

H1320	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No strong equivalence with EUNIS class for which CL is set. However, site relevant critical loads database assigns it to "Pioneer and low-mid saltmarshes [A2.64,A2.65]". CL= 30-40 kgN/ha/yr. Not mapped nationally by NFC.	Weak. Weak equivalence and few experiments on habitats to base CL on which is classed as 'expert judgement'. However, unlikely to effect outcome in this instance as unlikely to be particularly sensitive.	Mean – 0% Min – 0% Max – 0%	113%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

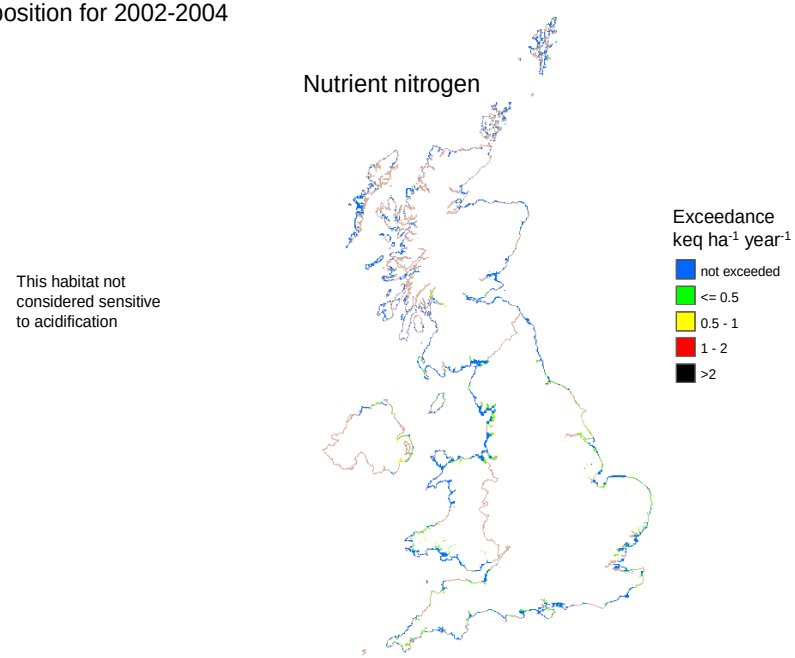
HD Code	European Name	Lay Name
H1330	Atlantic salt meadows (Glauco-Puccinellietalia maritmae)	Atlantic saltmeadows

H1330	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No strong equivalence with EUNIS class for which CL is set. However, site relevant critical loads database assigns it to "Pioneer and low-mid saltmarshes [A2.64,A2.65]". CL= 30-40 kgN/ha/yr. Not mapped nationally by NFC.	Weak. Weak equivalence and few experiments on habitats to base CL on which is classed as 'expert judgement'. However, unlikely to effect outcome in this instance as unlikely to be particularly sensitive.	Mean – 0% Min – 0% Max – 0%	81%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H2110	Embryonic shifting dunes	Shifting dunes

H2110	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained within" EUNIS class "Shifting coastal dunes [B1.3]". Critical load is 10-20kgN/ha/yr. Mapped as part of the Supralittoral sediment BAP Broad Habitat. Mapping value 15kgN/ha/yr. (see map below)	Good. CL based on field evidence from UK, including recent survey (funded by CCW and English Nature).	Mean – 0% Min – 0% Max – 0%	139%	NFC mapping of Broad Habitat shows extent is much wider than the Annex I habitat reflecting its wider classification. However, this is unlikely to have an affect on the overall judgement. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	17%	No
Acidity	No	N/A	N/A	N/A			N/A	

Exceedance of critical loads for supralittoral sediments (dune grassland) by deposition for 2002-2004

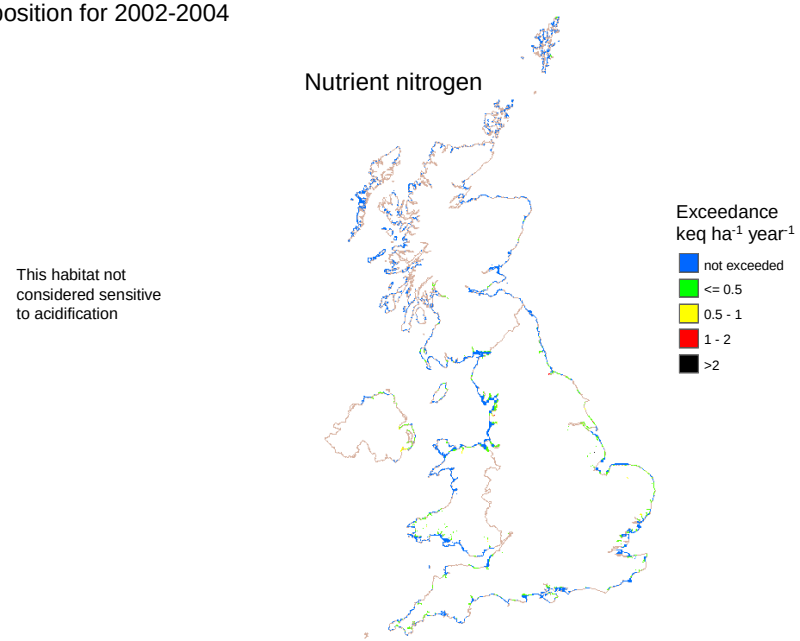


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H2120	Shifting dunes along the shoreline with Ammophila arenaria (white dunes)	Shifting dunes with marram

H2120	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained within" EUNIS class "Shifting coastal dunes [B1.3]". Critical load is 10-20kgN/ha/yr. Mapped as part of the Supralittoral sediment BAP Broad Habitat. Mapping value 15kgN/ha/yr. (see map below)	Good. CL based on field evidence from UK, including recent survey (funded by CCW and English Nature).	Mean – 0% Min – 0% Max – 0%	77%	NFC mapping of Broad Habitat shows extent is much wider than the Annex I habitat reflecting its wider classification and that this Annex 1 habitat is a small component. However, this is unlikely to have an affect on the overall judgement. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	17%	No
Acidity	No	N/A	N/A	N/A			N/A	

Exceedance of critical loads for supralittoral sediments (dune grassland) by deposition for 2002-2004

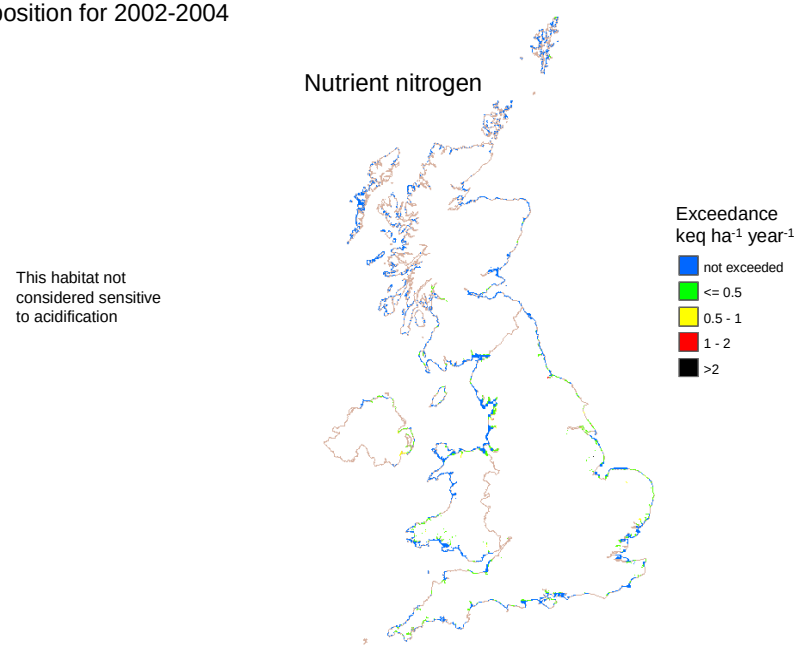


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H2130	Fixed dunes with herbaceous vegetation (grey dunes)	Dune grassland

H2130	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "equal to" the EUNIS class "Coastal stable dune grasslands [B1.4]". CL=10-20kgN/ha/yr. Mapped as supra "littoral sediment" BAP Broad Habitat. (see map below)	Good. CL based on field evidence from UK, including recent survey (funded by CCW and English Nature).	Mean – 8% Min – 87% Max – 0%	44%	NFC mapping of Broad Habitat shows extent is much wider than the Annex I habitat reflecting its wider classification. However, this is unlikely to have an affect on the overall judgement. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	17%	No
Acidity	Yes	No equivalence with BAP habitat for which CL is assigned. Cannot undertake acidity assessment using CL approach.	N/A	N/A			N/A	

Exceedance of critical loads for supralittoral sediments (dune grassland) by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H2140	Decalcified fixed dunes with Empetrum nigrum	Coastal dune heathland with crowberry

H2140	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. The habitat is contained within EUNIS class "Coastal dune heaths [B1.5]" CL= 10-20 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Reasonable/Weak. Good equivalence but few studies on habitat for which CL based. CL is "expert judgement".	Mean – 0% Min – 8% Max – 0%	113%	Very weak. Decision will be based on the SAC exceedance data only since 100% covered. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	N/A	No
Acidity	Yes	Yes. The habitat is contained within Supralittoral sediment" BAP Broad Habitat. However, the site relevant critical loads database assigns it to Dwarf Shrub Heath for CL assessment.	Reasonable/weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.. Calculation of CL function same for all semi-natural habitats exc. calcareous broad habitat.	Mean – 0% Min – 0% Max – 0%			N/A	

HD Code	European Name	Lay Name
H2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	Coastal dune heathland

H2150	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes, is contained within EUNIS class "Coastal dune heaths [B1.5]". CL= 10-20kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Reasonable/Weak. Good equivalence, but few studies on habitat for which CL is based. CL classed as "expert judgement" to reflect this.	Mean – 9% Min – 93% Max – 0%	158%	Not mapped for N. No equivalence for acidity.	N/A	No
Acidity	Yes	No, the equivalence with Broad Habitats for which acidity CLs are defined is too weak	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H2170	Dunes with Salix repens ssp. argentea (Salicion arenariae)	Dunes with creeping willow

H2170	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No strong equivalence with EUNIS class with CL. However, site relevant critical loads assigns to Moist to wet dune slacks [B1.8]. CL = 10-25 kgN/ha/yr.	Weak. Little experimental or survey evidence on which to set CL (hence regarded as "expert judgement"). CL set on basis of resemblance to other habitats.	Mean – 0% Min – 0% Max – 0%	73%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H2190	Humid dune slacks	Humid dune slacks

H2190	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat "overlaps with" EUNIS Class Moist to wet dune slacks [B1.8]. CL 10-25 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Weak. Little experimental or survey evidence on which to set CL (hence regarded as "expert judgement"). CL set on basis of resemblance to other habitats.	Mean – 3% Min – 79% Max – 0%	70%	Not mapped for N. No equivalence for acidity.	N/A	No
Acidity	Yes	No equivalence with BAP habitat for which CL is assigned. Cannot undertake acidity assessment using CL approach.	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H2250	Coastal dunes with *Juniperus* spp.	Coastal dune heathland with juniper

H2250	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. The EUNIS class "Coastal dune heaths [B1.5]" represents the closest match for which a CL is set but equivalence is poor. CL= 10-20 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC	Very weak. No specific studies on this habitat type.	Mean – 0% Min – 0% Max – 0%	100%	Not mapped for nutrient nitrogen. For acidity the Broad Habitat distribution is not representative at all of Annex I. Decision will be based on the SAC exceedance data only since 100% covered. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	N/A	No
Acidity	Yes	Yes. The habitat is contained within Supralittoral sediment" BAP Broad Habitat. However, the site relevant critical loads database assigns it to Dwarf Shrub Heath for CL assessment.	Reasonable/weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.Calculation of CL function same for all semi-natural habitats exc. calcareous broad habitat.	Mean – 0% Min – 0% Max – 0%			N/A	

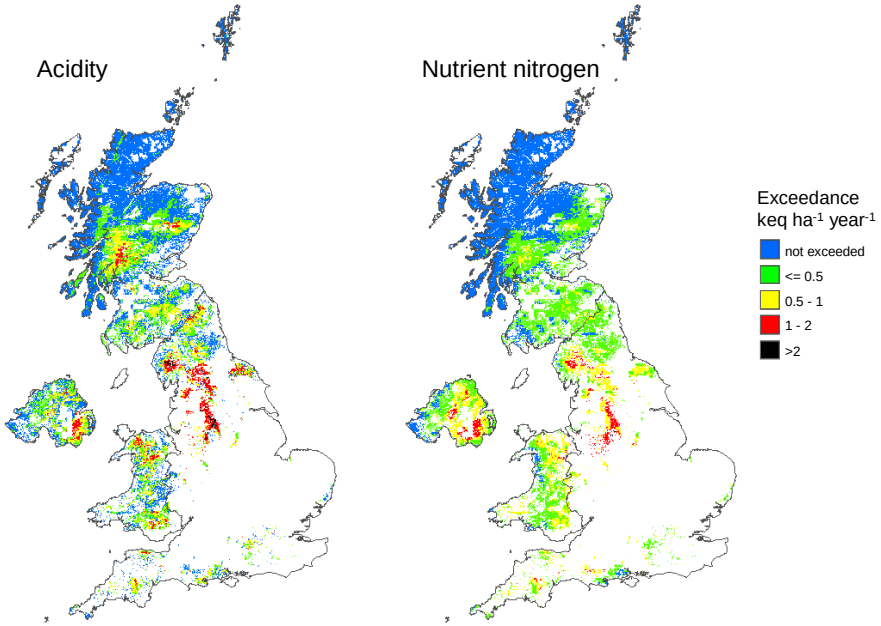
HD Code	European Name	Lay Name
H2330	Inland dunes with open Corynephorus and Agrostis grasslands	Open grassland with grey-hair grass and common bent grass of inland dunes

H2330	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. "Overlaps with" "Inland dune pioneer grassland [E1.94]". CL = 10-20 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC	Weak. Equivalence not strong and CL based on expert judgement based on similar response to coastal grey dune grasslands expected.	Mean – 100% Min – 100% Max – 0%	101%	N/A for nutrient N. Comparison with distribution of acid grassland Broad Habitat as mapped by NFC is not justifiable since the Annex I habitat is such a small component of the Broad Habitat. However, all Annex I habitat occurs within SAC series and only 1 site. Therefore, judgement based on SAC exceedance data only.	N/A	Yes
Acidity	Yes	Yes, habitat is "contained within" acid grassland BAP Broad habitat.	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. which may be significant in this case since there is only one site.	Mean – 100% Min – 100% Max – 0%			N/A	

HD Code	European Name	Lay Name
H4010	Northern Atlantic wet heaths with Erica tetralix	Wet heathland with cross-leaved heath

H4010	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "equal to" EUNIS class "Northern wet heath: Erica tetralix dominated wet heath [F4.11]" . CL = 10-25 kgN/ha/yr. Mapped as Dwarf Shrub Heath. Mapping value 15 kgN/ha/yr. (see map below)	Reasonable, but largely based on Dutch studies and modelling.	Mapping value – 45% Min – 73% Max – 13%	22%	Reasonable. UK exceedance data for Dwarf Shrub Heath European Dry Heath and upland Calluna moorland which has a lower mapping value than this habitat. However, this is very unlikely to affect the conclusion.	33%	Yes
Acidity	Yes	Yes. Habitats is "contained within" Dwarf Shrub Heath BAP Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. Calculation of CL function same for all semi-natural habitats exc. calcareous broad habitat.	Mean – 53% Min – 95% Max – 2%			41%	

Exceedance of dwarf shrub heath critical loads by deposition for 2002-2004

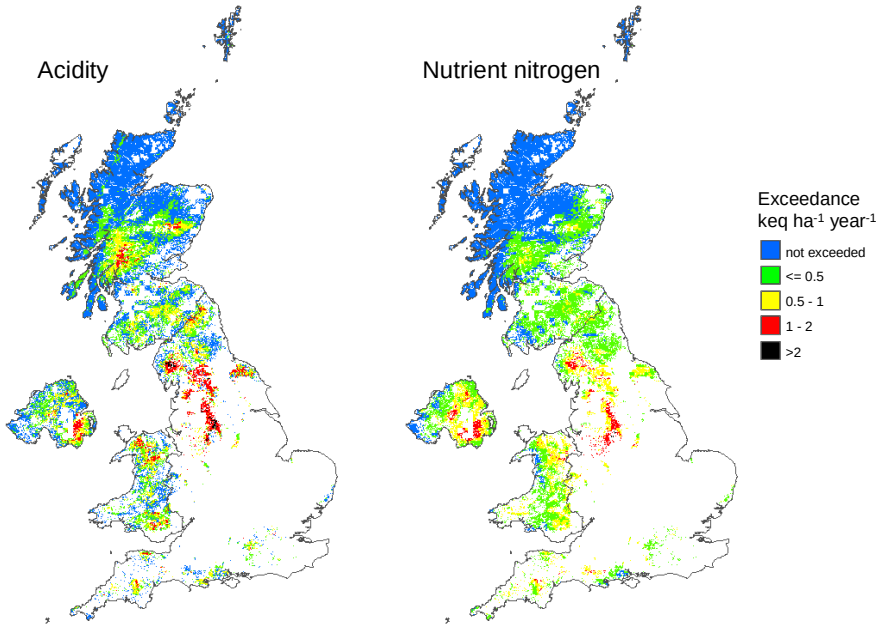


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	Wet heathland with Dorset heath and cross-leaved heath

H4020	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "equal to" EUNIS class "Southern Wet heath [F4.12]. No CL established for this habitat, however site relevant critical loads database assigns CL of EUNIS class Northern wet heath: Erica tetralix dominated wet heath [F4.11]. CL= 10-25kgN/ha/yr. Mapped as Dwarf Shrub Heath Broad Habitat. Mapping value 15kgN/ha/yr (see map below)	Weak. Based on comparison with Northern Atlantic Wet Heaths (4010) and expected similar response.	Mapping value – 2% Min – 100% Max – 0%	110%	The Annex I habitat is such a small component of the Broad Habitat that comparison of the range and use of national CL statistics is not valid. Hence assessment made on basis of SAC data alone.	N/A	Yes (based on expert judgement - Discussion with Isabel Alonso (Natural England's Heathland Specialist): "*H4020 is often near urban areas and intersected by roads, which will not always be well represented by the low resolution national mapping. Since the minimum end of the range is 100% exceeded and because of the likely influence of local sources this is included as a threat or pressure"*)
Acidity	Yes	Yes. Habitat is "contained within" "Dwarf Shrub Heath" BAP Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each of 1km square. So the greatest uncertainty is where the habitat is not found on the dominant soils type.	Mean – 0% Min – 88% Max – 0%			N/A	

Exceedance of dwarf shrub heath critical loads by deposition for 2002-2004

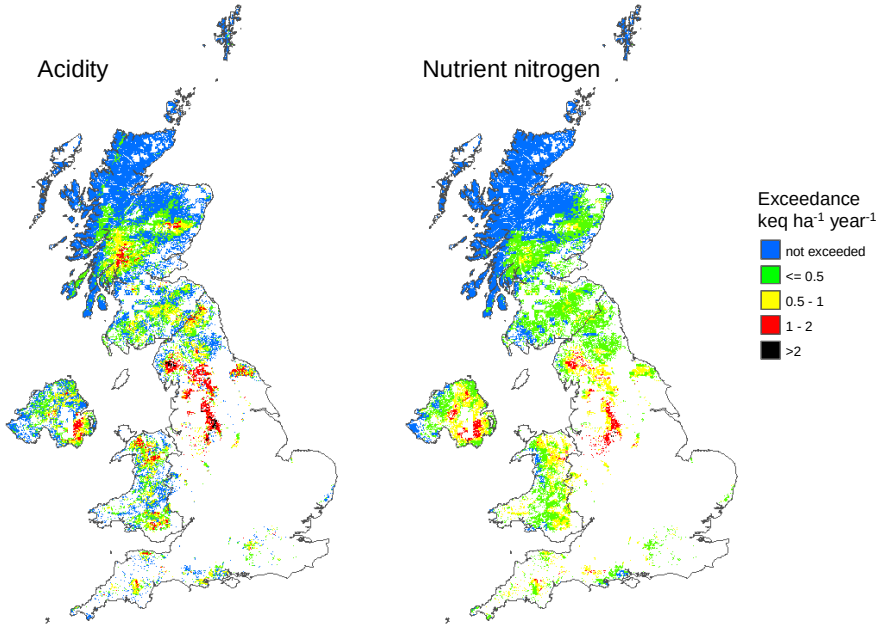


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H4030	European dry heaths	Dry heaths

H4030	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes, all 'contained within' "Dry Heaths EUNIS class F4.2". Mapped as Dwarf Shrub Heath for UK mapping purposes. This BAP broad habitat is much wider classification but all of European Dry Heaths is contained within it. (see map below)	Good. Includes N manipulation on SAC in SE England. CL for lichen rich heaths is at the lower end of the range (reflected in UK mapping value).	Mapping Value –68% Min – 92% Max – 34%	18%	Reasonable. Some under-representation in East Anglia where deposition inputs likely to be high, also for Scotland where exceedance is lower. UK exceedance data for Dwarf Shrub Heath includes Northern Wet heath (EUNIS F4.11) which has higher mapping value than dry heath. However, this is very unlikely to affect the outcome for the Annex I habitat.	33%	Yes
Acidity	Yes	Yes Dwarf Shrub Heath	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. Calculation of CL function same for all semi-natural habitats exc. calcareous broad habitat.	Mean – 67% Min – 94% Max – 3%			41%	

Exceedance of dwarf shrub heath critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

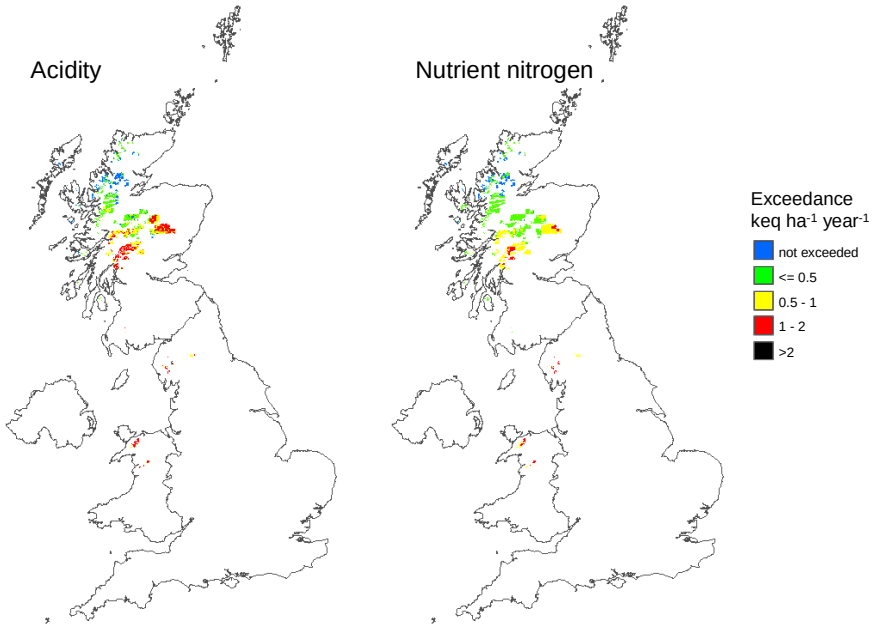
HD Code	European Name	Lay Name
H4040	Dry Atlantic coastal heaths with Erica vagans	Dry coastal heaths with Cornish heath

H4040	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Is "contained within" EUNIS class F4.2. Dry Heaths. CL= 10-20 kgN/ha/yr. Mapped as Dwarf Shrub Heath. Mapping value 12 kgN/ha/yr.	Reasonable. Most studies on F4.22 but UNECE 2003 recommends it is reasonable to apply CL across F4.2 (which contains this Annex 1 habitat).	Mean – 0% Min – 8% Max – 0%	100%	Very weak. Decision will be based on the SAC exceedance data only since 100% covered. Also note coastal cells not always covered by CL map – some missing data. This affects the SAC exceedance data as well as national mapping.	N/A	No
Acidity	Yes	Yes. Is "contained within" Dwarf Shrub Heath" BAP Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. Calculation of CL function same for all semi-natural habitats exc. calcareous broad habitat.	Mean – 0% Min – 0% Max – 0%			N/A	

HD Code	European Name	Lay Name
H4060	Alpine and Boreal heaths	Alpine and subalpine heaths

H4060	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes, is 'contained within' EUNIS class F2 "Arctic, alpine and subalpine scrub habitats". CL = 5-15 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Reasonable/Weak. Good equivalence, but little information on relationship with habitat types used in N manipulation experiments.	Mean – 89% Min – 100% Max – 33%	17%	Reasonable and combined with SAC exceedance data there is clearly CL exceedance of large area of the habitat.	N/A	Yes
Acidity	Yes	Yes All contained within "Montane" Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 97% Min – 100% Max – 23%			89%	

Exceedance of montane critical loads by deposition for 2002-2004

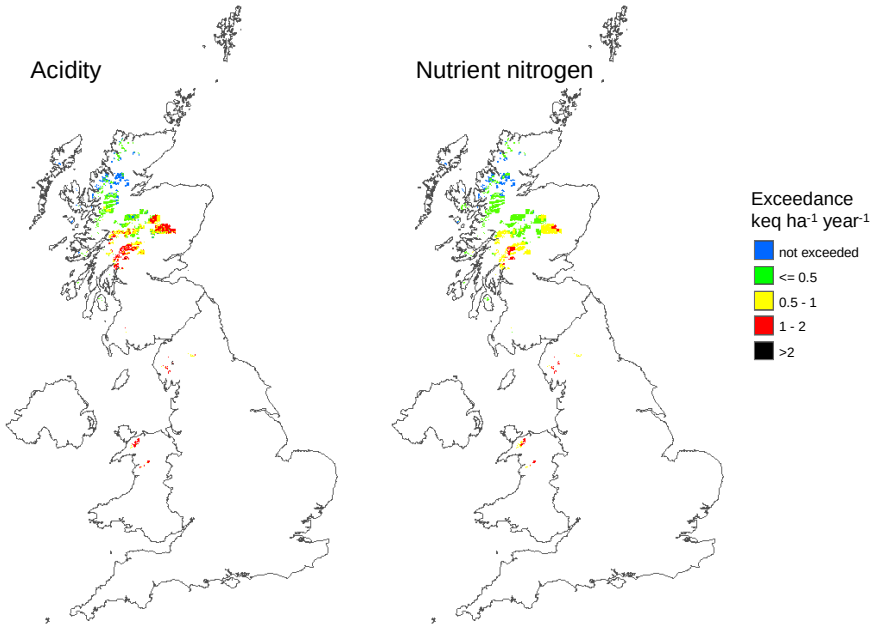


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H4080	Sub-Arctic Salix spp. Scrub	Mountain willow scrub

H4080	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No good equivalence with EUNIS class for which CL is set. SRCL database recommends closest match is "Arctic, alpine and subalpine scrub habitats [F2]". CL = 5-15 kgN/ha/yr. Not mapped nationally by NFC. Montane presented below but not relevant	Weak. Little information on relationship with habitat types used in N manipulation experiments.	Mean – 99% Min – 100% Max – 20%	230%	Not applicable for N. For acidity, distribution of Annex I habitat much smaller than Broad habitat as a result of its wider classification. Soils are likely to be more buffered than dominant soil type so SAC acidity exceedance data may be an over-estimate. However, N still poses a threat (Dave Horsfield, SNH, pers comm.)	N/A	Yes
Acidity	Yes	Is "contained within" montane BAP Broad Habitat. Mapped for acidity. (see map below)	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. For this Annex I habitat the soils are likely to be more buffered than the dominant soil type.	Mean – 98% Min – 100% Max – 39%			N/A	

Exceedance of montane critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H5110	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	Natural Box Scrub

H5110	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No EUNIS class for which CL is set with strong equivalence. However, site relevant critical loads database assigns "Temperate and boreal forests: ground flora [G]. CL=10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. Entire habitat is within one SAC. EUNIS class G is thought to be inappropriate for this site and calcareous grassland ["Sub-Atlantic semi-dry calcareous grassland [E1.26]" a closer equivalence for this one site CL = 15-25 kgN/ha/yr.	Very weak - no experiments reported for this habitat in UNECE 2003	For [G] Mapping value – 100% Min – 100% Max – 100% For E1.26 = Mean = 0% Min = 0% Max = 0% Note that N deposition at site is 15kg for "low" vegetation	100%	Distribution of Annex I habitat far too narrow to compare with Broad habitat. Since 100% is found within SACs the assessment is based entirely on exceedance within the SAC series.	N/A	No

Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland. However, as above calcareous grassland BAP broad habitat is thought to be more appropriate for this site. Data are available for exceedance on SAC.	Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. CLF includes removal rates more based on lowland grassland ecosystems.	Mean – 0% Min – 100% Max – 0% Or for calcareous grassland Mean – 0% Min – 0% Max – 0%			N/A	

HD Code	European Name	Lay Name
H5130	Juniperus communis formations on heaths or calcareous grasslands	Juniper on heaths or calcareous grasslands

H5130	~~Potentially~~ sensitive?	~~Appropriate CL~~ (EUNIS for N; BAP broad for acidity) based on equivalence?	~~Is the research on~~ which the CL is set, indicative of impact on the Annex I habitat?	~~Critical load~~ exceedance for SACs containing habitat	~~Extent of~~ Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No strong equivalence with EUNIS class with CL. However, site relevant critical loads assigns to Dry heaths [F4.2]]. CL = 10-20 kgN/ha/yr. Mapping value 15 kgN/ha/yr. Calcareous grassland may also be relevant (15-25kg/ha/yr). National mapping not relevant.	Very weak. No studies on this community and relationship with changes in heath (or calc. grassland) from N deposition (impacts not well established).	Mean – 78% Min – 52% Max – 100%	114%	Not applicable. Assessment based on SAC exceedance data since all is found within SAC series and also not a good match to any particular BAP habitat. However, note this may be an overestimate for acidity and a slight over estimate for N.	N/A	Yes
Acidity	Yes (found on both calcareous and acidic subtrates, the former would be expected to be not vulnerable to acidity)	Yes. Can found on both found on both calcareous grassland and dry heath. The site relevant critical loads database uses the CLF for dry heath since it is more sensitive and therefore precautionary (for screening). Result may be large over estimate of risk however, since habitat on calcareous substrate will not be vulnerable.	Reasonable for Broad Habitat type which this feature occurs but very weak association with feature itself.	Mean – 0% Min – 0% Max – 0%			N/A	

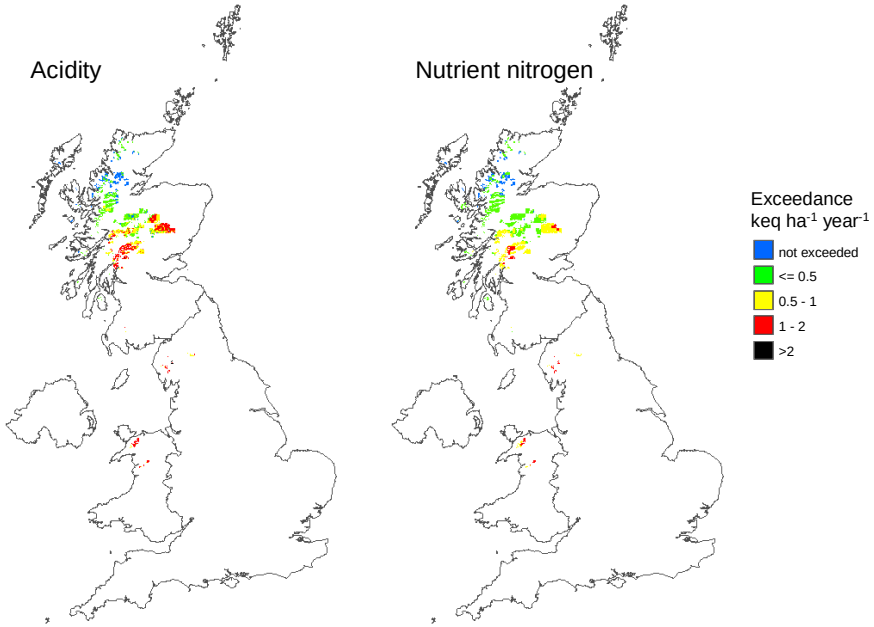
HD Code	European Name	Lay Name
H6130	Calaminarian grasslands of the Violetalia calaminariae	Grasslands on soils rich in heavy metals

H6130	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. The EUNIS class "Sub-Atlantic semi-dry calcareous grassland [E1.26]" represents the closest match for which a CL is set. CL=15-25kgN/ha/yr, but equivalence is weak. Mapped as Calcareous Grassland Broad Habitat. Mapping value = 20kgN/hr/yr.	Very weak and no applicable research documented in UNECE 2003. However, nutrient input in the form of fertilizer to open Calaminarian grassland has been shown to lead to a loss of characteristic flora (Dave Horsfield, pers comm..)	Mapping value – 62% Min – 91% Max – 1%	unknown	Very weak. Broad habitat is much wider classification and distribution and extent not representative of habitat in question. Data on exceedance provided for information, but suggest that they are not used and SAC exceedance data used as basis for judgement.	N/A	Yes
Acidity	Yes	No. The habitat is "contained within" "Inland Rock" BAP Broad Habitat. However, the site relevant critical loads database assigns the Calcareous Grassland Broad Habitat for assessing acidity impacts.	Very weak. Sometimes on base rich soils and in which case are well buffered, but also found on acidic soils.	Mean – 0% Min – 0% Max – 0% (this assumes present on calcareous soils – some may be acidic)			N/A	

HD Code	European Name	Lay Name
H6150	Siliceous alpine and boreal grasslands	Montane acid grasslands

H6150	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained within" Alpine and subalpine grasslands [E4.3]. CL = 10-15 kgN/ha/yr. Annex I also contains *Racomitrium* moss-heath which is contained within the EUNIS class Moss/lichen mountain summits [E4.2] which has a lower critical load (5-10kgN/ha/yr). SRCL database uses the 10-15 kgN/ha/yr CL so SAC exceedance data may be an underestimate. *Racomitrium* moss-heath (U10) is mapped for national CL mapping purposes (see map below)	Few experiments reported in UNECE 2003 for this EUNIS class [E4.3]. Good experimental base, including GB studies, for Moss/lichen mountain summits [E4.2].	Mean – 50% Min – 74% Max – 2%	22%	Reasonable comparison with Montane Broad Habitat. Note for N, different CL value used for national mapping (range 5-10kgN/ha/yr; mapping value used 7 kgN/ha/yr) than for SRCL (10-15kgN/ha/yr, with mean at 12.5kgN/ha/yr). This does not affect the overall conclusion.	93%	Yes
Acidity	Yes	Yes. Habitat is "contained within" "Montane" BAP Broad Habitat type.	Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 98% Min – 100% Max – 18%			89%	

Exceedance of montane critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

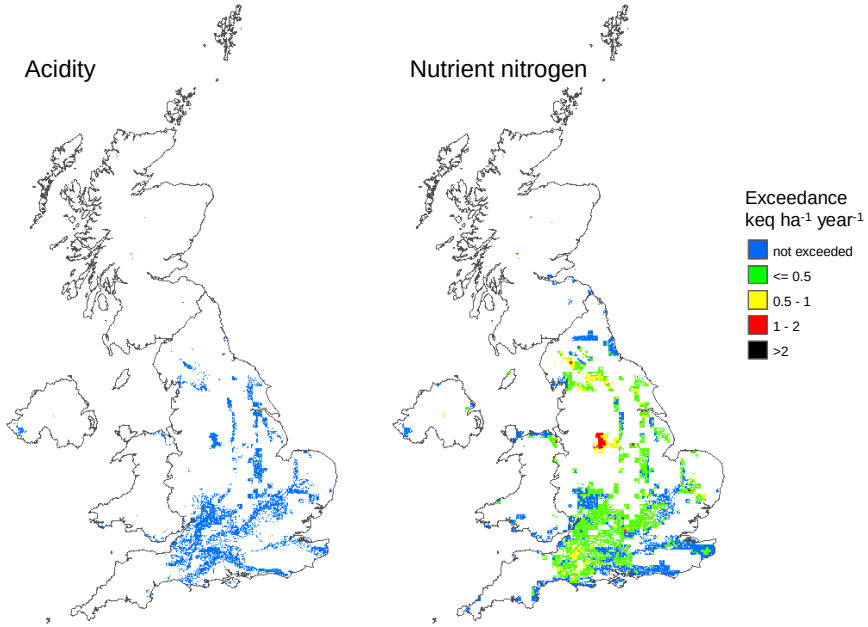
HD Code	European Name	Lay Name
H6170	Alpine and subalpine calcareous grasslands	Alpine and subalpine calcareous grasslands

H6170	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Y	Yes. Overlaps with Alpine and subalpine grasslands [E4.3, E4.4]. Not exact match. CL= 10-15 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Weak. Very few experiments on this EUNIS class reported in UNECE 2003.	Mean – 69% Min – 92% Max – 60%	90%	Very poor. BAP habitat is much wider classification so extent is much greater and % of CL exceedance from national mapping unlikely to be representative of the Annex I habitat. Decision will therefore be based on the SAC exceedance data only (which is 90% of extent).	N/A	Yes
Acidity	Y. Potentially sensitive but well buffered so unlikely to be vulnerable.	Yes. Is contained within "Calcareous Grassland" Broad Habitat. However, this classification is much wider.	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. CLF includes removal rates more based on lowland grassland ecosystems. Does not affect outcome. In this case the habitat is localised and rarely extensive and is likely to be rarely found on the dominant soil type.	Mean – 0% Min – 0% Max – 0%			N/A	

HD Code	European Name	Lay Name
H6210	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia)	Dry grasslands and scrublands on chalk or limestone
H6211	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites)	Dry grasslands and scrublands on chalk or limestone

H6210 & H6211	**Potentially sensitive?**	**Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?**	**Is the research on which the CL is set, indicative of impact on the Annex I habitat?**	**Critical load exceedance for SACs containing habitat**	**Extent of Annex I habitat in SACs**	**Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance**	**Exceedance of Broad Habitat from UK mapping**	**Outcome – list air pollution as a threat or pressure?**
Nutrient N	Yes	Yes. Habitat is "contained within" EUNIS class "Sub-Atlantic semi-dry calcareous grassland [E1.26]" (but also within a number of related EUNIS classes). CL = 15-25 kgN/ha/yr. Mapped as calcareous grassland. Mapping value is 20 kgN/ha/yr (see map below)	Good. Includes number of experiments from UK and CL is considered "reliable".	For H6210 Mapping value – 50% Min – 74% Max – 2% (for H6211 Mapping value – 1% Min – 95% Max – 1%)	59% for H6210 unknown for H6211	Reasonable representation for H6210 although NFC maps for Broad habitat cover wider distribution as habitat classification is wider.	62%	Yes
Acidity	Yes Potentially sensitive but well buffered	Yes. Is contained within "Calcareous Grassland" Broad Habitat. However, this classification is much wider.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 0% Min – 0% Max – 0%			0%	

Exceedance of calcareous grassland critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H6230	Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)	Species-rich grassland with mat-grass in upland areas

H6230	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained within" EUNIS class "Non-mediterranean dry acid and neutral closed grassland [E1.7]" and also "Acid alpine and subalpine grassland [E4.3]. Site relevant critical loads database assigns CL for E1.7 of 10-20kgN/ha/yr. Mapped nationally (partially) as "Acid Grassland" BAP Broad Habitat with mapping value of 15kgN/ha/yr.	Good. Includes range of experiments on habitats with good equivalence, including UK sites. Sites are often base rich but nutrient poor.	Mapping value– 37% Min – 98% Max – 27%	unknown	NFC habitat maps for Broad Habitat are much wider range, since this is just a small component of the Broad Habitat and therefore the national exceedance data are not representative. Assessment will be based on SACs.	N/A	Yes
Acidity	Yes	Can be acidic or calcareous mapped under acid grassland broad habitat for purposes of CL exceedance.	Weak/ Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type	Mean – 97% Min – 100% Max – 11%			N/A	

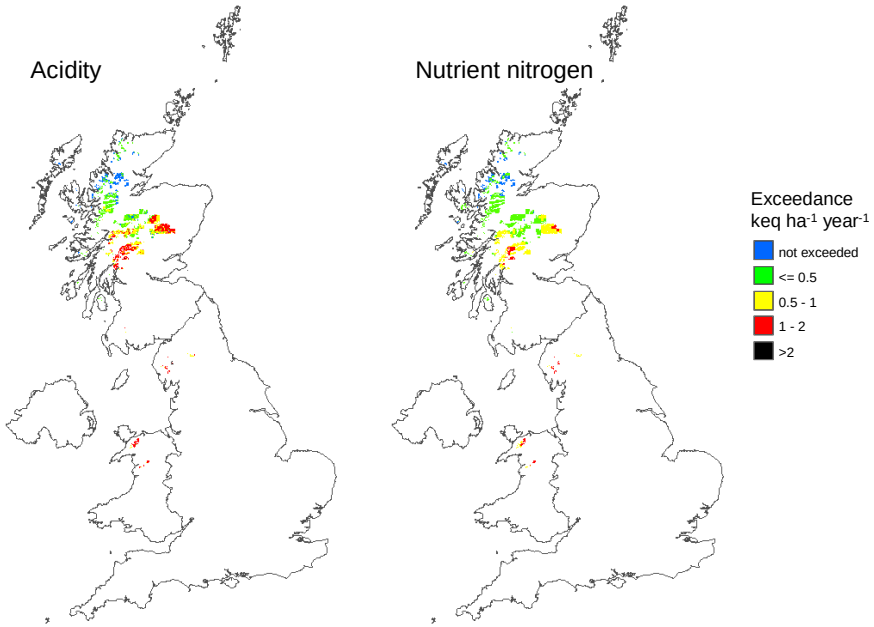
HD Code	European Name	Lay Name
H6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Purple moor-grass meadows

H6410	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat "contained within" EUNIS class "Moist and wet oligotrophic grasslands: Molinia caerulea meadows [E3.51]". CL = 15-25 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Reasonable/weak. Based on UK experiment, but one site only and derived CL is based on 'expert judgement'	Mean – 19% Min – 59% Max – 3%	67%	Distribution of Annex I habitat far too narrow to compare with Broad habitat and not appropriate due to poor equivalence between habitats. The assessment is based entirely on exceedance within the SAC series.	N/A	Yes
Acidity	Yes	Yes. Habitat is "contained within" "Fen, Marsh and Swamp" BAP Broad Habitat but no strong equivalence with BAP habitats for which CLs are assigned. The Site Relevant CL database assigned to acid grassland and this is used for the assessment	N/A	Mean – 77% Min – 99% Max – 0.2%			N/A	

HD Code	European Name	Lay Name
H6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Tall herb communities

H6430	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes but weak equivalence. Site relevant critical loads database assigns EUNIS class "Alpine and subalpine grasslands [E4.3, E4.4]" . CL = 10-15kgN/ha/yr as closest match. But equivalence weak. Not mapped for Nutrient N exceedance by UK NFC	Very weak. Few experiments to derive CL for EUNIS class and weak equivalence.	Mean – 52% Min – 96% Max – 41%	235%	Comparison not particularly valid since Annex I habitat is component of Inland Rock BAP Broad Habitat. Some overlap of areas. Outcome is clear from SAC exceedance data.	N/A	Yes
Acidity	Yes	Yes. Habitat is "contained within" "Inland Rock" BAP Broad Habitat type. However, site relevant critical loads database assigns Montane Broad Habitat as most appropriate CL. (See map below)	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type. However, this habitat is localised and often will not be present on the dominant soil type.	Mean – 96% Min – 100% Max – 20%			89%	

Exceedance of montane critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	Lowland hay meadows

H6510	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Is "contained within" EUNIS class "Low and medium altitude hay meadows [E2.2]". CL = 20-30 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Reasonable/weak. UK field studies from this habitat used to support CL derivation but based on 'expert judgement'.	Mean – 0% Min – 0% Max – 0%	45%	N/A	N/A	No
Acidity	Yes	No. Habitat is "contained within" "Neutral Grassland" BAP Broad Habitat but no equivalence with BAP habitats for which CLs are assigned.	N/A	N/A			N/A	

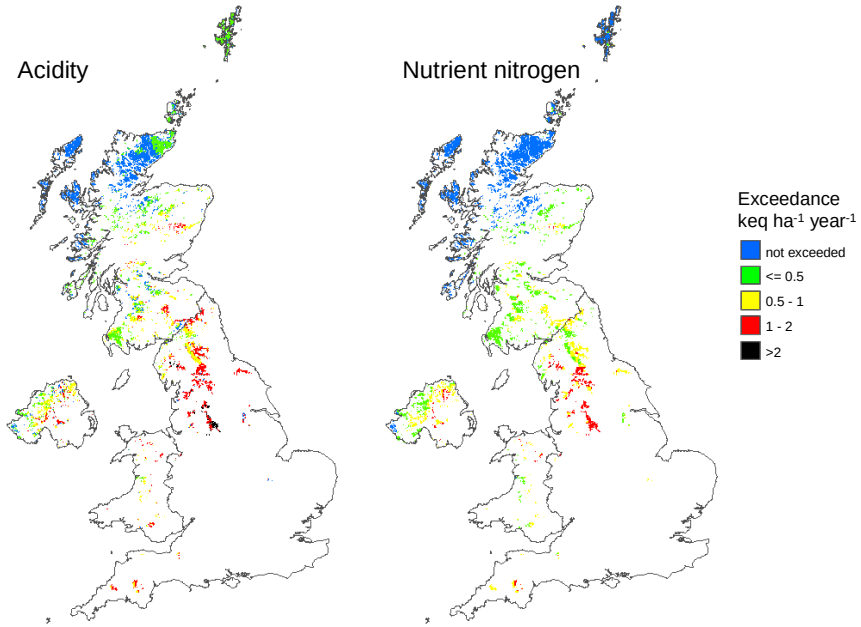
HD Code	European Name	Lay Name
H6520	Mountain hay meadows	Mountain hay meadows.

H6520	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained with" EUNIS class "Mountain hay meadows [E2.3]". CL = 10-20 kgN/ha/yr. Not mapped for Nutrient N exceedance by UK NFC.	Weak. Little experimental or survey evidence on which to set CL (hence regarded as "expert judgement"). CL set on basis of resemblance to other habitats.	Mean – 100% Min – 100% Max – 1% (NB only two SACs containing habitat)	72%	N/A	N/A	Yes
Acidity	Yes	No. Habitat is "contained within" "Neutral Grassland" BAP Broad Habitat but not sufficient equivalence with BAP habitats for which CLs are assigned.	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H7110	Active raised bogs	Active raised bogs

H7110	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Largely 'contained within' EUNIS class D1 "Raised and Blanket Bogs". CL = 5-10 kgN/ha/yr. Mapped as "Bogs Broad Habitat" for UK mapping purposes. Mapping value = 10kgN/ha/yr. (see map below)	Reasonable. Some studies at UK sites used to inform the setting of the CL. UK experts recommend the upper end of the range relevant for UK conditions because of high precipitation.	Mapping Value – 98% Min – 100% Max – 98%	62%	The UK NFC map for Bogs Broad Habitat shows the range is much wider, reflecting that Active Raised Bogs are only a component of the wider classification of the Broad Habitat. In particular the NFC maps shows greater coverage in Northern Scotland where exceedance is typically low. Therefore it would be expected that the figure for UK exceedance is to be an underestimate for the Annex I habitat.	42%	Yes
Acidity	Yes	Yes All contained within "Bogs" Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 100% Min – 100% Max – 100%			61%	

Exceedance of bog critical loads by deposition for 2002-2004

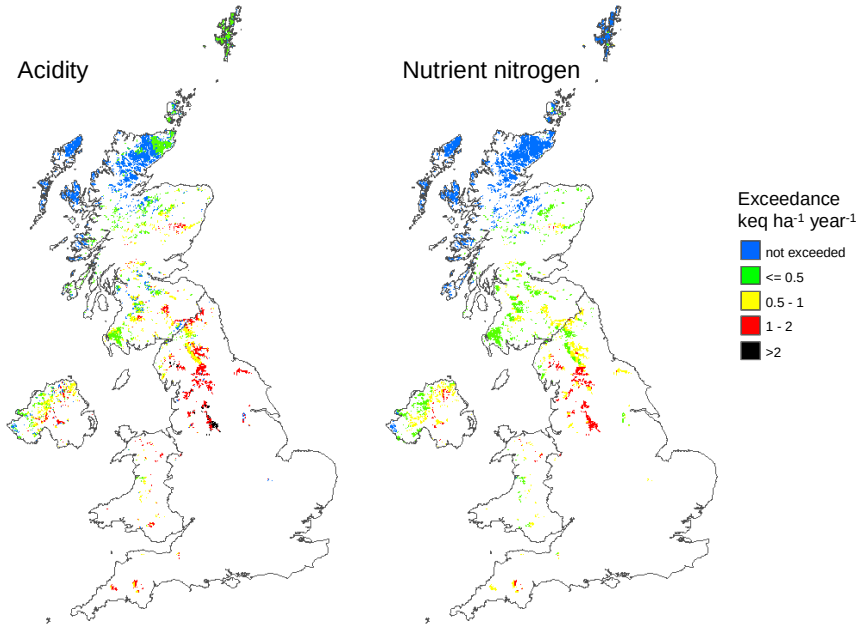


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H7120	Degraded raised bogs still capable of natural regeneration	Degraded raised bog

H7120	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Largely 'contained within' EUNIS class D1 "Raised and Blanket Bogs". CL = 5-10 kgN/ha/yr. Mapped as "Bogs Broad Habitat" for UK mapping purposes. Mapping value = 10kgN/ha/yr. (see map below)	Reasonable. Some studies at UK sites used in setting of CL. UK experts recommend the upper end of the range relevant for UK conditions because of high precipitation.	Mapping Value – 96% Min – 100% Max – 96%	30%	The UK NFC map for Bogs Broad Habitat shows the range is much wider, reflecting that the Annex I habitat are only a component of the wider classification of the Broad Habitat. In particular the NFC maps shows greater coverage in Northern Scotland where exceedance is typically low. Therefore it would be expected that the figure for UK exceedance is to be an underestimate for the Annex I habitat.	42%	Yes
Acidity	Yes	Yes All contained within "Bogs" Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 100% Min – 100% Max – 100%			61%	

Exceedance of bog critical loads by deposition for 2002-2004

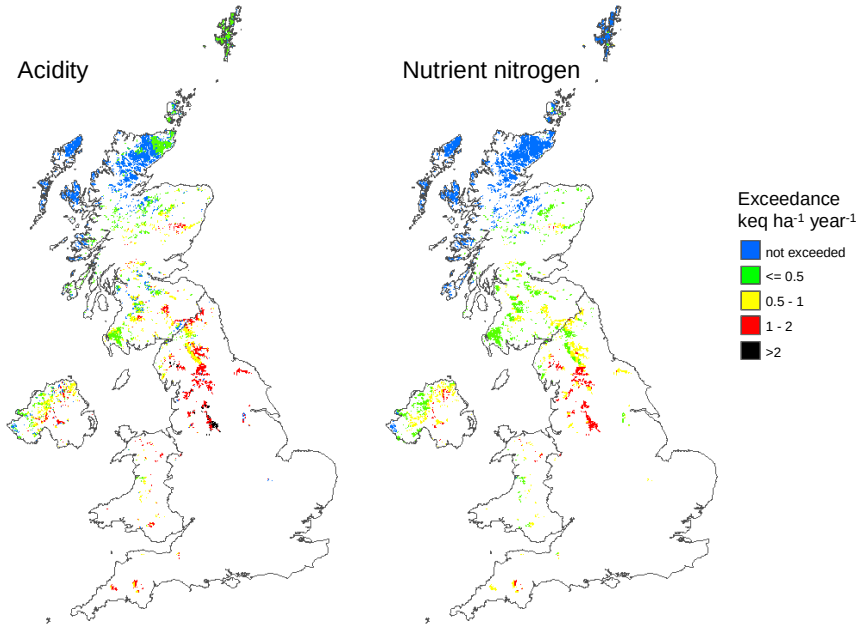


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H7130	Blanket bogs	Blanket bog

H7130	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Is contained with EUNIS class "Raised and blanket bogs [D1]". CL = 5-10kgN/ha/yr. Mapping value = 10kgN/ha/yr. (see map below)	Reasonable. Some studies at UK sites. UK experts recommend the upper end of the range relevant for UK conditions because of high precipitation.	Mapping value – 75% Min – 100% Max – 75%	16%	Reasonable, but Bogs Broad Habitat includes much wider classification, including lowland raised bogs. However, this is unlikely to affect the outcome.	42%	Yes
Acidity	Yes	Yes. Is contained with in "Bogs" BAP Broad Habitat.	Reasonable. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 92% Min – 67% Max – 99%			61%	

Exceedance of bog critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H7140	Transition mires and quaking bogs	Very wet mires often identified by an unstable quaking surface

H7140	~~Potentially~~ sensitive?	~~Appropriate CL~~ (EUNIS for N; BAP broad for acidity) based on equivalence?	~~Is the research on~~ which the CL is set, indicative of impact on the Annex I habitat?	~~Critical load~~ exceedance for SACs containing habitat	~~Extent of~~ Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No strong equivalence with EUNIS class for which CL is set. However, site relevant critical loads database assigns it to "Raised and blanket bogs [D1]". CL = 5-10 kgN/ha/yr. (could be argued that D2.2 is closer equivalence – see next column) Mapped as part of Bogs Broad habitat. Mapping Value of 10kgN/ha/yr.	Weak. Arguably SRCL has assigned incorrect EUNIS class and transition mires and quaking bogs (D2.3) is better equivalence (SRCL database will be updated to reflect this). Most information is for poor fens D2.2 rather than D2.3. However, UNECE 2003 states that D2.3 which contains this Annex I habitat are generally more sensitive than poor fens and so the lower end of the range is applicable (eq. to 10 kgN/ha/yr). So exceedance of max CL from SRCL database is probably reasonable estimate of risk	Mapping value – 59% Min – 100% Max – 59%	unknown	Bogs Broad Habitat is very much wider than the Annex I habitat and therefore not representative. Map not included.	61%	Yes (but area occurring with in SAC is important and information is not available)

Acidity	Yes	Yes. Habitat is "contained within" "Fen march and swamp" BAP Broad Habitat. However, SRCL assigns Bogs Broad Habitat for CL assessment.	Reasonable. Acidity critical loads are based on the dominant soil type in each of 1km square. So the greatest uncertainty is where the habitat is not found on the dominant soils type.	Mean – 96% Min – 100% Max – 58%			42%	

HD Code	European Name	Lay Name
H7150	Depressions on peat substrates of the Rhynchosporion	Depressions on peat substrates

H7150	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. The EUNIS class D1 "Raised and Blanket Bogs" is the closest match though there is not good equivalence. CL = 5-10 kgN/ha/yr. Mapped as "Bogs Broad Habitat" for UK mapping purposes. Mapping value = 10kgN/ha/yr.	Weak. Equivalence not strong. NBN habitats dictionary gives stronger equivalence with EUNIS class transition mires and quaking bogs (D2.3) (CL = 10-20kgN/ha/yr) , whereas site relevant critical load database assigns it to D1 and the Annex 1 habitat rests within Blanket Bog. Most N impacts information is for poor fens D2.2 rather than D2.3. However, UNECE 2003 states that D2.3 (which contains this Annex 1 habitat) are generally more sensitive than poor fens and so the lower end of the	Mapping Value – 44% Min – 100% Max – 44%	unknown	NFC map for Bogs Broad Habitat is not at all representative of the Annex 1 habitat and national exceedance statistics cannot be used for this assessment. Assessment will be based on SAC exceedance alone.	N/A	Yes

			range is applicable (eq. to 10 kgN/ha/yr). So exceedance of max CL from SRCL database is probably reasonable estimate of risk.					
Acidity	Yes	Yes Overlaps with "Fens, Marsh and Swamp" and "Bogs" Broad Habitats. Site relevant critical loads database assigns it to "Bogs" for CL assessment.	Weak because of equivalence. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 90% Min – 98% Max – 36%			N/A	

HD Code	European Name	Lay Name
H7210	Calcareous fens with Cladium mariscus and species of the Caricion davallianae	Calcium-rich fen dominated by great fen sedge (saw sedge)

H7210	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. No good equivalence with EUNIS class with CL. However, site relevant critical loads assigns to Rich Fens [D4.1]. CL = 10-25 kgN/ha/yr.	Weak. Poor equivalence and no experiments documented in UNECE 2003 on this habitat type.	Mean – 0% Min – 0% Max – 0%	96%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H7220	Petrifying springs with tufa formation (Cratoneurion)	Hard Water Springs

H7220	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No exact equivalence but site relevant critical loads database assigns EUNIS class [D.2] Rich Fens. CL = 15-25 kgN/ha/yr. Not mapped nationally by NFC.	Weak. Poor equivalence with D4.2 and CL set for that habitat is based on expert judgement	Mean – 0% Min – 0% Max – 0%	112%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H7230	Alkaline fens	Calcium-rich springwater-fed fens

H7230	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "equal to" EUNIS class "Rich fens [D4.1]". CL = 15-35 kgN/ha/yr. Not mapped nationally by NFC.	Weak/Reasonable. Range of experiments on D4.1. Critical load set is based on "expert judgement".	Mean – 0% Min – 0% Max – 0%	Unknown	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H7240	Alpine pioneer formations of the Caricion bicoloris-atrofuscae	High-altitude plant communities associated with areas of water seepage

H7240	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Habitat is "contained within" EUNIS class "Mountain rich fens [D4.2]". CL is 15-25 kgN/ha/yr. Not mapped nationally by NFC.	Weak/Reasonable. One experimental study reported using D4.2. However, N application very high. Critical load set is based on "expert judgement".	Mean – 0% Min – 0% Max – 0%	136%	N/A	N/A	No
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)	Acidic scree

H8110	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No equivalence with EUNIS class for which CL is set. SRCL database recommends closest match is EUNIS class "Arctic, alpine and subalpine scrub habitats [F2]". CL = 5-15 kgN/ha/yr.	Weak. Poor equivalence. However, Lower plants, notably lichens and bryophytes, are important within these habitats. These lower plants are especially susceptible to atmospheric nutrient inputs	Mean – 95% Min – 100% Max – 51%	20%	N/A. Annex I distribution much narrower and equivalence between habitats poor.	N/A	Yes Very uncertain due to poor equivalence
Acidity	Yes	Habitat is "contained within" Inland Rock" BAP Broad Habitat. Site relevant critical loads database assigns to the "Montane" Broad Habitat for purpose of mapping	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type	Mean – 98% Min – 100% Max – 17%			N/A	

HD Code	European Name	Lay Name
H8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	Base-rich scree

H8120	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No equivalence with EUNIS class for which CL is set SRCL database recommends closest match is EUNIS class "Arctic, alpine and subalpine scrub habitats [F2]". CL = 5-15 kgN/ha/yr.	Weak. Poor equivalence. However, Lower plants, notably lichens and bryophytes, are important within these habitats. These lower plants are especially susceptible to atmospheric nutrient inputs	Mean – 0% Min – 0% Max – 0%	74%	N/A	N/A	No Very uncertain due to poor equivalence
Acidity	No	N/A	N/A	N/A			N/A	

HD Code	European Name	Lay Name
H8210	Calcareous rocky slopes with chasmophytic vegetation	Plants in crevices in base-rich rocks

H8210	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No equivalence with EUNIS class for which CL is set. SRCL database recommends closest match is EUNIS class Alpine and subalpine grasslands [E4.3, E4.4]. CL = 10-15 kgN/ha/yr.	Weak. Poor equivalence. However, Lower plants, notably lichens and bryophytes, are important within these habitats. These lower plants are especially susceptible to atmospheric nutrient inputs	Mean – 65% Min – 97% Max – 60%	339%	N/A. Equivalence between habitats too poor to justify comparison	N/A	Yes Very uncertain due to poor equivalence
Acidity	Yes	Habitat is "contained within" Inland Rock" BAP Broad Habitat. Site relevant critical loads database assigns to the "Montane" Broad Habitat for purpose of mapping	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type	Mean – 98% Min – 100% Max – 14%			N/A	

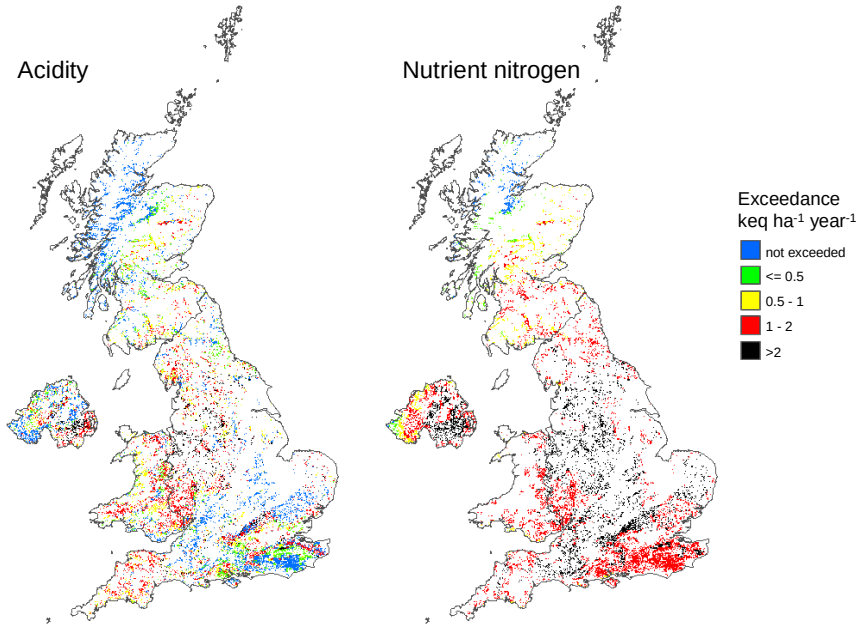
HD Code	European Name	Lay Name
H8220	Siliceous rocky slopes with chasmophytic vegetation	Plants in crevices on acid rocks

H8220	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	No equivalence with EUNIS class for which CL is set. SRCL database recommends closest match is EUNIS class "Arctic, alpine and subalpine scrub habitats [F2]". CL = 5-15 kgN/ha/yr.	Weak. Poor equivalence. However, Lower plants, notably lichens and bryophytes, are important within these habitats. These lower plants are especially susceptible to atmospheric nutrient inputs	Mean – 95% Min – 100% Max – 53%	21%	N/A. Equivalence between habitats to poor to justify comparison	N/A	Yes Very uncertain due to poor equivalence
Acidity	Yes	Habitat is "contained within" Inland Rock" BAP Broad Habitat. Site relevant critical loads database assigns to the "Montane" Broad Habitat for purpose of mapping	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type	Mean – 98% Min – 100% Max – 19%			N/A	

HD Code	European Name	Lay Name
H9120	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	Beech forests on acid soils

H9120	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Reasonable but uncertain. Large number of studies on deciduous woodland but not clear as to what EUNIS categories these relate	Mapping value – 100% Min – 100% Max – 100%	52%	NFC maps for Broadleaved/Coniferous unmanaged woodland show much greater range reflecting that the Annex I habitat is only a small component of the wider classification for the CL. National statistics not likely to be very representative, but since this shows 96% exceedance for N, combining this with the SAC results, the outcome is unequivocal.	96%	Yes
Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 6% Min – 100% Max – 0%			61%	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004

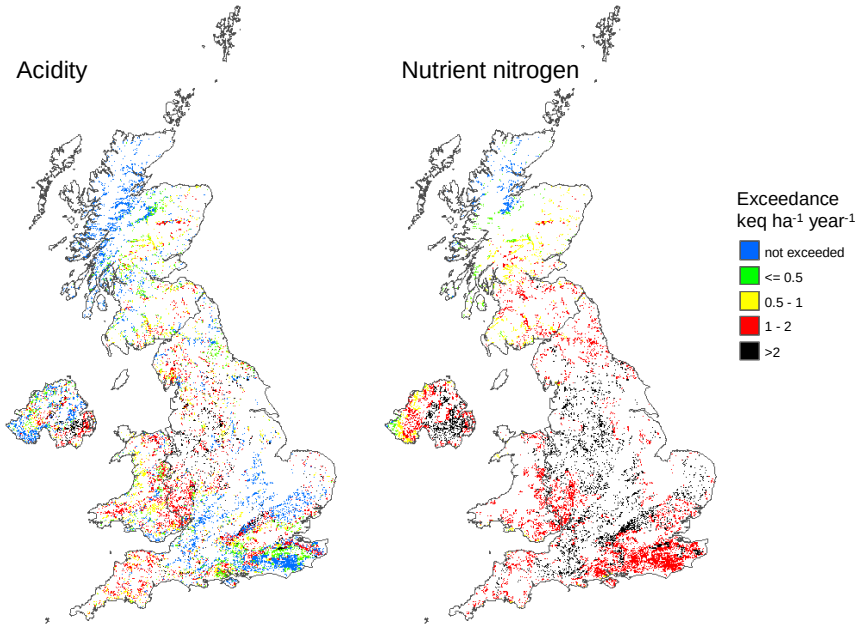


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H9130	Asperulo-Fagetum beech forests	Beech forests on neutral to rich soils

H9130	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Reasonable but uncertain. Large number of studies on deciduous woodland but not clear as to what EUNIS categories these relate.	Mapping value – 100% Min – 100% Max – 100%	20%	National statistics unlikely to be particularly representative for acidity as soil type is not particularly vulnerable. NFC maps for Broadleaved/Coniferous unmanaged woodland show much greater range reflecting that the Annex I habitat is only a small component of the wider classification for the CL. National statistics not likely to be very representative, but since this shows 96% exceedance for N, combining this with the SAC results, the outcome is unequivocal.	96%	Yes
Acidity	Yes (not calcareous soils so unlikely to be vulnerable)	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 0% Min – 98% Max – 0%			61%	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004

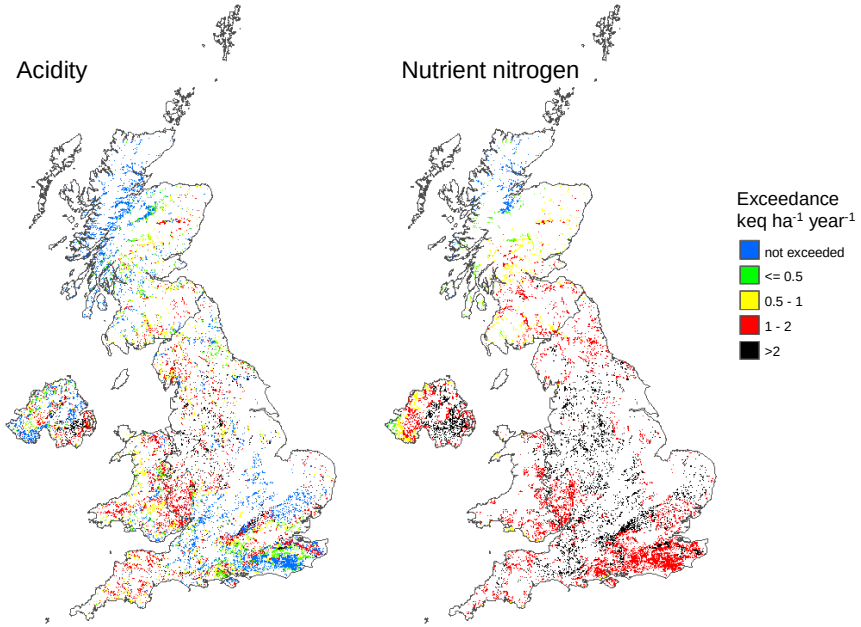


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli	Oak-hornbeam forests

H9160	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Reasonable but uncertain. Large number of studies on deciduous woodland but not clear as to what EUNIS categories these relate.	Mapping value – 100% Min – 100% Max – 100%	37% (only 2 sites)	NFC maps for Broadleaved/Coniferous unmanaged woodland show much greater range reflecting that the Annex I habitat is only a small component of the wider classification for the CL. National statistics not likely to be very representative, but since this shows 96% exceedance for N, combining this with the SAC results, the outcome is unequivocal.	96% (100% England)	Yes
Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 0% Min – 39% Max – 0%			61% (64% England)	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004

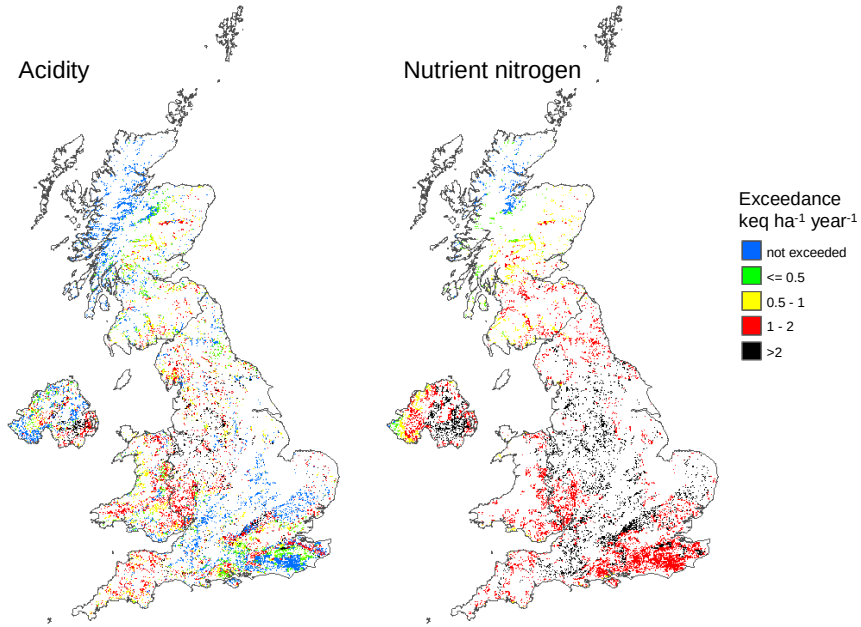


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H9180	Tilio-Acerion forests of slopes, screes and ravines	Mixed woodland on base-rich soils associated with rocky slopes

H9180	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes (note many sites will be N rich and not sensitive, but some are N limited)	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below).	Reasonable but uncertain. Large number of studies on deciduous and coniferous woodland but not clear as to what EUNIS categories these relate.	Mapping value – 85% Min – 100% Max – 57%	49%	NFC maps for Broadleaved/Coniferous unmanaged woodland show much greater range reflecting that the Annex I habitat is only a very small component of the wider classification for the CL. National statistics not likely to be very representative, but since this shows 96% exceedance, combining this with the SAC results, the outcome is unequivocal.	96%	Yes
Acidity	Yes (note usually well buffered)	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types. Soils are basic and acidity CL exceedance may be overestimate of risk.	Mean – 18% Min – 82% Max – 0%			61%	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004

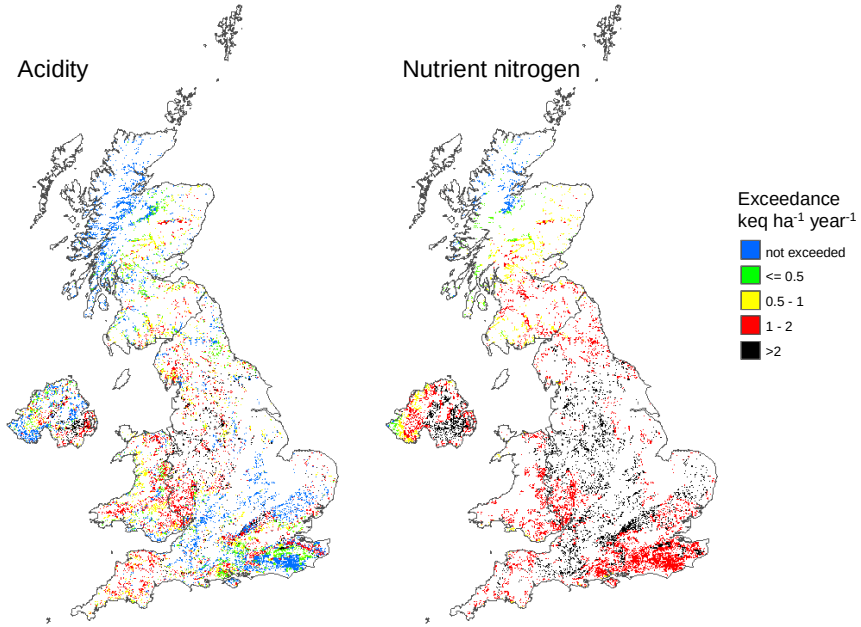


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H9190	Old acidophilous oak woods with Quercus robur on sandy plains	Dry oak-dominated woodland

H9190	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Reasonable but uncertain. Large number of studies on deciduous woodland but not clear as to what EUNIS categories these relate.	Mapping value – 100% Min – 100% Max – 100%	29%	NFC maps of unmanaged Broadleaved/Coniferous woodland covers much greater distribution since habitat classification is much wider. Hence not applicable to compare. However, since England exceedance value for whole of the BAP habitat is 100% and 64% for N and acidity respectively and the outcome is unequivocal.	96% (100% for England)	Yes
Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 15% Min – 100% Max – 1%			61% (64 % for England)	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004

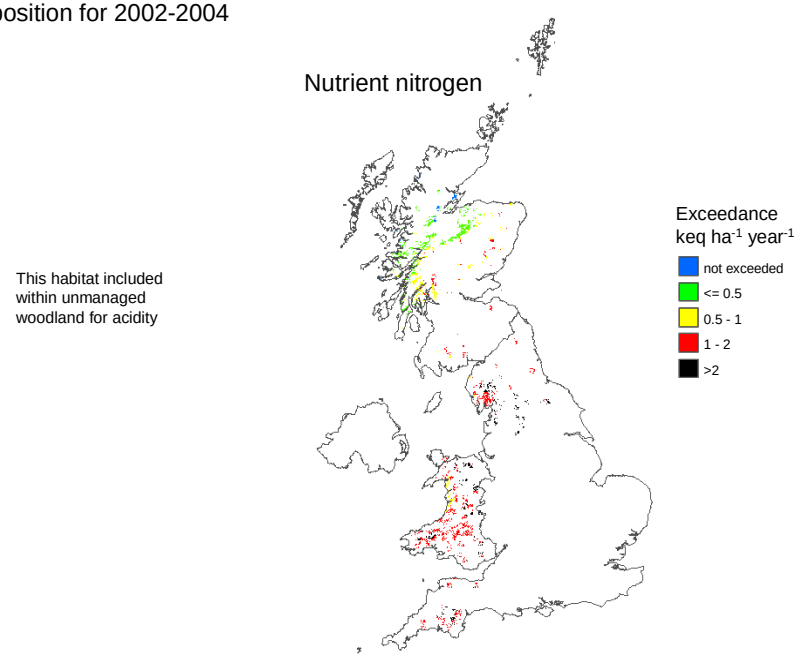


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	Western acidic oak woodland

H91A0	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect Epiphytic lichens and algae. CL= 10-15 kgN/ha/yr. Mapping value is 10 kgN/ha/yr. (see map below)	Reasonable. Based largely on UK data but from relatively few sites.	Mapping value – 94% Min – 100% Max – 91%	17%	Reasonable comparison for N exceedance maps from NFC which are based on W17 NVC class. Only a small component of the wider Broad Habitat map for acidity. Hence not applicable to compare. However, both SAC data and national CL mapping show large exceedance, so the outcome is unequivocal.	97%	Yes
Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 79% Min – 90% Max – 2%			61%	

Exceedance of critical loads for Atlantic oak (effects on epiphytic lichens) by deposition for 2002-2004

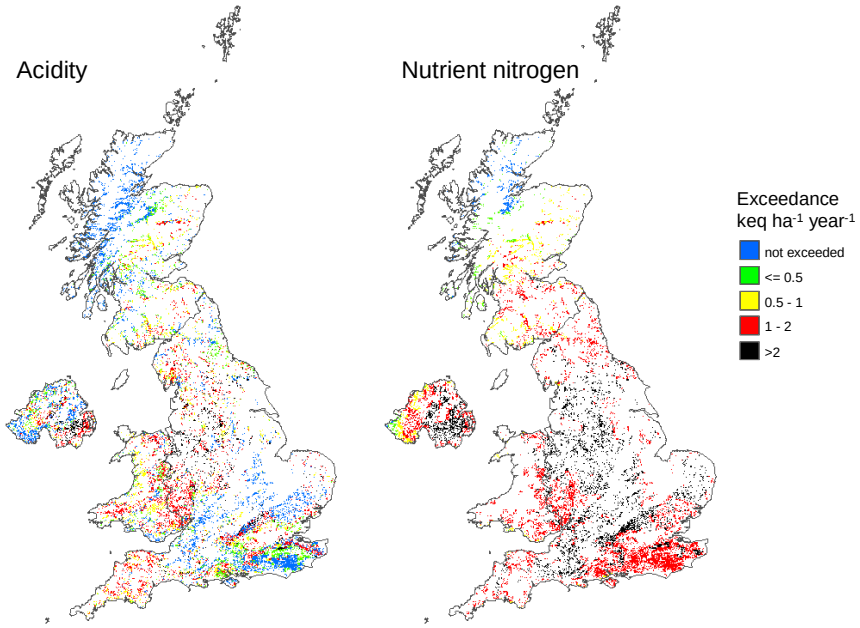


This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

HD Code	European Name	Lay Name
H91C0	Caledonian forest	Native pine woodland

H91C0	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Weak/reasonable. No studies reported in UNECE 2003 specifically for this habitat type. But other coniferous, inc. native pine woodlands well researched.	Mapping value – 98% Min – 100% Max – 97%	59%	Comparison not valid as Annex I habitat is such a small component of the NFC mapped habitat. National statistics (or Scotland statistics) are unlikely to be very representative, but since this shows 96% (or 77% for Scotland) exceedance for N, combining this with the SAC results, the outcome is unequivocal.	96% (UK) 77% (Scotland)	Yes
Acidity	Yes	Yes. Contained within "Coniferous Forest" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 49% Min – 86% Max – 1%			61% 45% (Scotland)	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

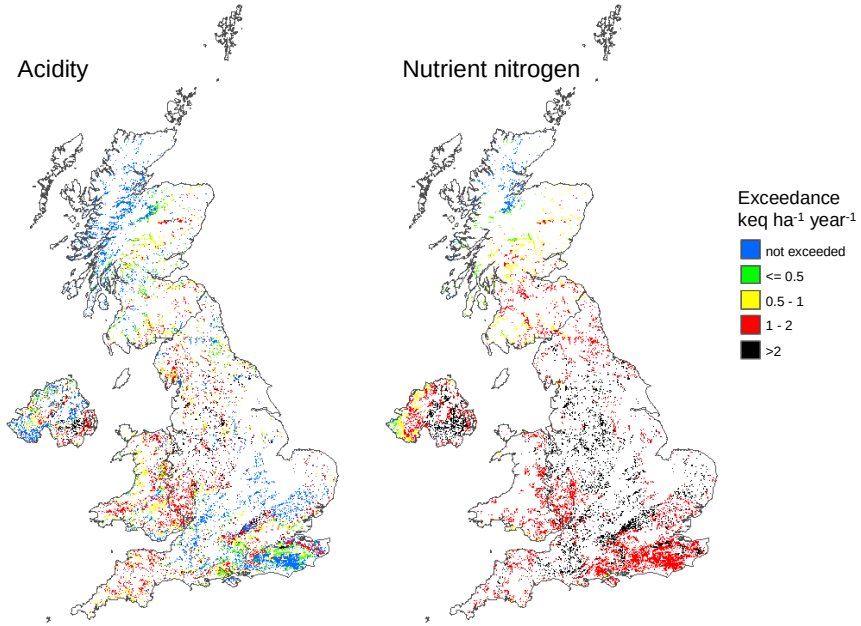
HD Code	European Name	Lay Name
H91D0	Bog woodland	Bog woodland

H91D0	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Site relevant critical loads database assigns EUNIS class "Raised and blanket bogs [D1]" CL = 5-10kgN/ha/yr. Mapping value (10kgN/ha/yr). But equivalence not strong as also overlaps with other habitats under EUNIS class "G". Considered that D1 more appropriate in order to protect *sphagnum* communities etc.	Weak. Poor equivalence to habitat and no studies directly relevant to this habitat reported in UNECE 2003. However, research on other communities in D1 can be used to judge impacts on bog communities.	Mapping value – 100% Min – 100% Max – 100%	76%	Broad Habitat distribution is not representative of the Annex I habitat at all. Therefore decision is based entirely on SAC exceedance data.	N/A	Yes
Acidity	Yes	Yes. Site relevant critical loads database assigns "Bogs" broad habitat critical load based on soil type but habitat closest to "Broad-leaved, mixed and yew woodland"	Weak. Acidity critical loads are based on the dominant soil type in each 1km square. So the greatest uncertainty is whether the habitat is found on the dominant soil type.	Mean – 100% Min – 100% Max – 89%			N/A	

HD Code	European Name	Lay Name
H91J0	Taxus baccata woods of the British Isles	Yew-dominated woodland

H91J0	Potentially sensitive?	Appropriate CL (EUNIS for N; BAP broad for acidity) based on equivalence?	Is the research on which the CL is set, indicative of impact on the Annex I habitat?	Critical load exceedance for SACs containing habitat	Extent of Annex I habitat in SACs	Comparison of Annex I habitat distribution in UK with equivalent habitat mapped for CL exceedance	Exceedance of Broad Habitat from UK mapping	Outcome – list air pollution as a threat or pressure?
Nutrient N	Yes	Yes. Contained within EUNIS class "Temperate and boreal forests: ground flora [G]". CL set to protect ground flora 10-15 kgN/ha/yr. Mapping value is 12 kgN/ha/yr. (see map below)	Reasonable/weak but uncertain. Large number of studies on coniferous woodland, but not clear as to whether this includes this Annex 1 type (unlikely and not documented in UNECE 2003) .	Mapping value – 100% Min – 100% Max – 100%	54%	NFC maps for Broadleaved/Coniferous unmanaged woodland show much greater range reflecting that the Annex I habitat is only a very small component of the wider classification for the CL. National statistics not likely to be very representative, but since this shows 96% exceedance for N, combining this with the SAC results, the outcome is unequivocal.	96%	Yes
Acidity	Yes	Yes. Contained within "Broadleaved, mixed and yew woodland" BAP Broad Habitat. Mapped as Broadleaved/Coniferous unmanaged woodland.	Reasonable/weak. Acidity CL is based on SMB method and is not specific to different woodland habitat types.	Mean – 5% Min – 96% Max – 3%			61%	

Exceedance of unmanaged woodland critical loads by deposition for 2002-2004



This map should be compared with Map 2.1.2. habitat distribution in the audit trail for this habitat

References:

UNECE. 2003. Empirical Critical Loads for Nitrogen - Expert Workshop, Berne 2002, Eds. Acherman and Bobbink. Environmental Documentation No. 164, SAEFL.