

**ADDENDUM TO:
STATUS OF UK CRITICAL LOADS – METHODS, DATA & MAPS
FEBRUARY 2003**

PRELIMINARY ASSESSMENT OF CRITICAL LOAD EXCEEDANCE

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EXECUTIVE SUMMARY [still to be added]

1.1 Introduction

This report is an addendum to the Main Report (Status of UK Critical Loads, Methods, Data and Maps – February 2003), prepared by the UK National Focal Centre for Critical Loads (NFC). It presents a preliminary assessment of the exceedance of critical loads for acidity and nutrient nitrogen, based on the critical loads maps described in the Main Report. These maps have been prepared in light of new scientific information on the location and extent of UK habitats, and the calculation of critical load values.

The exceedance is the amount of deposition (here, of acidity or nitrogen) above the critical load. By overlaying maps of acid or nitrogen deposition over critical load maps, the NFC generates ‘exceedance maps’. These maps highlight the areas receiving excess deposition, and the amount of deposition above the critical load, and are used by Defra and other bodies to guide policy development on the control of air pollutants.

It should be noted that the changes in exceedance described in this Addendum have resulted from a change to the methods to calculate and map critical loads, and are not due to a change in pollution climate.

1.2 Calculating exceedance of critical loads

Critical loads are compared with acidifying or eutrophying deposition to determine the excess deposition above the critical load, ie, the exceedance.

Exceedance = Deposition – Critical Load

In addition, accumulated exceedance is calculated, where exceedance is summed over the whole ecosystem/habitat area (see Section 1.4.2).

For eutrophication, the exceedance is calculated using total nitrogen deposition (derived from nitrogen oxides and ammonia). For acidification, the contribution of both sulphur and nitrogen compounds must be taken into account, and this is done using the Critical Loads Function (CLF, see Appendix 1, Main Report). The CLF was developed in Europe (Posch *et al.*, 1999; Posch & Hettelingh, 1997; Posch *et al.*, 1995; Hettelingh *et al.*, 1995). It defines separate acidity critical loads in terms of sulphur and nitrogen, referred to as the “minimum” and “maximum” critical loads of sulphur and nitrogen (see Appendix 1, Main Report). It is these “minimum” and “maximum” critical loads that are used in the calculation of critical loads exceedance for acidity.

The UK NFC has calculated exceedance maps for each of the Broad Habitats mapped. So far, the maps have been produced using the acid and nitrogen deposition averaged over three years of measurements 1995 – 97. **However, it should be noted that deposition has declined since 1997, and will decline further under current emission reduction policies (eg, National Emission Ceilings Directive, NECD). Therefore, exceedances that have been calculated here illustrate the changes that have arisen from updating the critical load maps, and do not represent the current position.** Maps based on more recent measurements, and under additional

emission scenarios, including the expected scenario in 2010 under the National Emission Ceilings Directive, are in preparation.

1.3 Exceedance and Damage

It should be noted that the critical loads data on which exceedance calculations are currently based, are derived from empirical or steady-state mass balance methods, which are used to define *long-term* critical loads for systems at *steady-state*. Therefore, exceedance is an indication of the potential for harmful effects to systems at steady-state, and a habitat that is currently exceeding its critical load is not necessarily already showing the signs of damage. In addition, reducing deposition to below the critical load does not mean the ecosystems immediately recover. There are time lags before chemical recovery takes place, and further delays before biological recovery. The timescales for both chemical and biological recovery could be very long, particularly for the most sensitive ecosystems.

1.4 Preliminary assessment of critical loads exceedances

This report provides a preliminary assessment of the exceedance of critical loads, using the updated critical loads information described in the Status of UK Critical Loads, February 2003 (<http://critloads.ceh.ac.uk>).

Three sets of results are presented:

- (i) UK exceedance maps based on 5th-percentile critical loads
- (ii) UK exceedance maps and statistics by habitat
- (iii) Exceedance statistics by country and habitat

1.4.1 UK exceedance maps based on 5th-percentile critical loads

There are many ways to present exceedance maps and data. To give a broad comparison with previous results (Feb 2001), exceedance maps have been calculated using “5th-percentile critical loads”. Given that a grid square can contain many of the broad habitat types, the 5th-percentile critical load maps are one way to combine the critical loads values for all habitats into a single map. In the 5th percentile maps, the critical load assigned to each 1km grid square is that which would protect 95% of the total habitat area in the grid square. It should be noted that the 1km acidity 5th-percentile maps used in this comparison do not include values for freshwaters.

Generation of the 5th percentile maps, requires an evaluation of the ecosystem/habitat area in each grid square. In the previous critical loads maps (Feb 2001), only those 1km squares where an ecosystem occupied 5% or more of the square were assigned critical loads. This 5% cut-off was used because of uncertainties in the mapping of the ecosystems using LCM1990 (Fuller *et al.*, 1994). In the updated critical loads maps (Feb 2003), all the 1km squares where the habitat occurs are included, thanks to the more refined mapping methods to produce LCM2000 (Fuller *et al.*, 2002a & 2002b).

However, in order to show the changes arising from the updated critical loads mapping methods, 5th percentile exceedance maps have been produced for this Addendum, using the 5% cut-off. Figures 1.1 and 1.2 (for acidity and nutrient nitrogen) show the exceedance maps based on previous and updated critical loads,

excluding grid squares where the ecosystem or habitat occupies less than 5% of the grid square.

A further simplification has been made in this comparison: exceedances have been calculated by overlaying the same fixed deposition field, based on average measured deposition data for 1995-97, (Figures 1.3a and 1.4a) onto the previous and updated critical load maps. So far, no changes have been made to the deposition fields to take account of the ecosystem-specific dry deposition velocities.

The total area mapped in the UK is less than previously (see below), but the two acidity exceedance maps (Figure 1.1) show the same broad patterns of exceedance, which also reflect the pattern of the total acid deposition used (Figure 1.3a). The updated maps shows lower exceedance in the south-east, most likely due to the higher critical loads for calcareous grassland (Main Report, Section 8.6). In the far south-west of England, northern England, Wales and southern Scotland many areas that previously had exceedances between 0.2 and 1.0 keq ha⁻¹ year⁻¹ (ie, yellow and red) are, in the update, either not mapped or not exceeded. In Northern Ireland additional habitat areas are now mapped in the south-east and these are exceeded.

On the exceedance maps for nutrient nitrogen (Figure 1.2), the update has resulted in less non-exceeded areas in England, Wales and southern Scotland, though many of these areas are no longer mapped. The areas of highest exceedance are the same on both the previous and updated maps, and also reflect the areas of highest nitrogen deposition (Figure 1.4a). The update has resulted in an increase in the magnitude of exceedance in many areas as a result of the lower nutrient nitrogen critical loads now being used (Main Report, Chapter 7 and Section 8.7).

1.4.2 UK exceedance maps and statistics by habitat

For each habitat, the NFC has calculated the following statistics:

- The habitat area
- The exceeded habitat area
- The percentage of habitat exceeded
- The Accumulated Exceedance – ie, a measure of exceedance that takes into account ***both the magnitude of exceedance and the area exceeded***:

$$AE \text{ (keq year}^{-1}\text{)} = \text{exceedance (keq ha}^{-1}\text{ year}^{-1}\text{)} * \text{habitat area exceeded (ha)}$$

Tables 1.1 and 1.3 show the statistics based on the previous (Feb 2001) critical load maps, where grid squares where the ecosystem or habitat occupies less than 5% of the grid square are excluded. Tables 1.2 and 1.4 show the statistics based on the updated (Feb 2003) critical load maps, where all grid squares containing habitat are mapped. For these the exceedances are reported by BAP Broad Habitat, except for the following:

- (i) The “freshwaters” category includes the results of sites sampled across the UK that are either “standing open water” or “rivers and streams”. However, it should be noted that these represent a number of selected sites only and not the whole of the BAP Broad Habitats (see Table 1.2).
- (ii) The “broadleaved, mixed and yew woodland” Broad Habitat is sub-divided into two categories for acidity ie, “managed (productive) broadleaved woodland” and “unmanaged (ancient & semi-natural) coniferous and

broadleaved woodland". For nutrient nitrogen, the unmanaged woodland is further divided into "Atlantic oak woods" (for the effects of nitrogen on epiphytic lichens) and other "unmanaged woodland" (for the effects of nitrogen on ground flora). These habitat names are abbreviated to "broadleaved woodland (managed)", "unmanaged woods" and "Atlantic oak" in the tables presented in this report.

- (iii) The "coniferous woodland" Broad Habitat only includes managed coniferous woodland. In this update, the unmanaged coniferous areas are included in the "unmanaged (ancient & semi-natural) coniferous and broadleaved woodland" category because no distinction could be made between unmanaged broadleaved woodland and unmanaged coniferous woodland (see Section 3.7.1, Main Report).

The "unmanaged woodland" category consists of ancient and semi-natural woodland, yew and Scots pine and is "managed" for biodiversity or amenity, but not timber production. All other coniferous and broadleaved woodland is assumed to be primarily managed as productive forest where harvesting and removal of trees takes place. Both managed and unmanaged woodlands are included, since the long-term protection of the whole ecosystem function is important.

An overview of the exceedance statistics is presented in the next sections.

The same deposition field (1995-97 measured) has been used in both cases, with habitat-specific dry deposition velocities. Values for low-growing vegetation (Figures 1.3b & 1.4b) are applied to the non-woodland terrestrial habitats and values for woodland (Figures 1.3c & 1.4c) are applied to the woodland habitats (including those for effects on ground flora and epiphytic lichens). For freshwaters the mean values for all vegetation types are used.

The total habitat areas given in this Section may differ slightly from the areas quoted in the Main Report (Section 8.3), since for acidity, calculations are only performed where there are data for CLmaxS, CLminN and CLmaxN for each 1km square. The soils database used to provide two of the inputs to CLminN (ie, Ni and Nde) does not include values for every 1km habitat square mapped, therefore a small number of squares are lost in the calculation of CLminN and exceedances. Changing from mapping the six general ecosystem types to selected BAP Broad Habitats has reduced the habitat areas mapped by 24.7% for acidity and 19.7% for nutrient nitrogen. It should be noted that both the previous ecosystem areas and the areas for the Broad Habitats in the update refer to actual area values derived from LCM data (Main Report, Chapter 3) and are not derived from summing the number of 1km squares containing habitat. **It is also important to note in the comparisons that follow of the previous and updated statistics, there are differences in the methods used to map the ecosystems in Feb 2001 and the habitats in Feb 2003, so they are not true like-for-like comparisons.** In drawing any comparisons, it is important to consider actual area as well as percentage areas exceeded, as in some cases, the updates have led to a significant change in the habitat area (e.g. acid grassland).

1.4.3 Acidity results

The results for acidity for the UK are given in Tables 1.1 (Feb 2001 data) and 1.2 (Feb 2003 data). The area of sensitive habitats exceeded has decreased by 4.4% (from 70.9% to 66.5%) and the accumulated exceedance has decreased by 25.4%.

Table 1.1 Acidity exceedance statistics for the UK – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	54573	43810	80.3	4289264
Calcareous grassland	10163	3256	32.0	211123
Heathland	9914	6883	69.4	613326
Coniferous woodland	7379	5106	69.2	530272
Deciduous woodland	10330	8425	81.6	1343843
Freshwaters*	3675	648	17.6	72865
All ecosystems	96034	68129	70.9	7060693

* The habitat areas for freshwaters are based only on the catchment areas of 1610 sites sampled throughout the UK.

Table 1.2. Acidity exceedance statistics for the UK – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	15291	13203	86.4	1662130
Calcareous grassland	1812	0	0	0
Dwarf shrub heath	24703	13829	56.0	949427
Bog	5463	3954	72.4	349753
Montane	3054	2647	86.7	185044
Coniferous woodland (managed)	7971	5849	73.4	825158
Broadleaved woodland (managed)	7554	5607	74.2	915274
Unmanaged woods	4011	2436	60.7	311489
Freshwaters**	2417	554	22.9	68050
All habitats	72275	48078	66.5	5266324

** The habitat areas for freshwaters are based only on the catchment areas of the 1163 sites sampled throughout the UK (Main Report, Section 3.7.4 and Chapter 6). The rigorous screening exercise has reduced both the number and total area of sites included in the mapping data set. A small proportion of those sites removed were exceeded in the February 2001 data set. Hence the following changes have occurred to the summary statistics presented in Tables 1.1 and 1.2 for freshwaters:

- The total area of freshwater habitats mapped for acidity has decreased significantly since 2001.
- The number of sites has decreased from 1610 to 1163 (27.8% reduction), but the number of sites where the acidity critical loads are exceeded has only decreased from 440 to 392 (10.9% reduction).
- The area of freshwater sites exceeded has decreased from 651 to 577 km².
- The proportion of exceeded sites, in terms of the percentage area exceeded, has increased relative to Feb 2001.

There is a net decrease in the area exceeded of approximately 19970 km² (areas rounded), due to:

- Critical loads being assigned to 6600 km² of new habitats (bog, montane).
- A decrease of 30610 km² in the area of acid grassland exceeded, largely as a result of the change in the area of habitat mapped.
- A decrease of 3260 km² in the area of calcareous grassland exceeded, resulting from the higher threshold used for setting empirical soil acidity critical loads for

these grassland areas (Main Report, Sections 3.7.2, 4.3, 8.6). This now results in no areas of calcareous grassland being exceeded for acidity.

- A 10 km² decrease in the area of freshwaters exceeded, resulting from the smaller habitat area mapped following the site screening exercise.

This is balanced by an increase in the exceeded areas of dwarf shrub heath (up 6950 km²) and woodland (up 360 km²), resulting from the increased areas of these habitats mapped.

Other reasons for the changes in the acidity statistics can be summarised as:

- An increase in the mean SMB acidity critical loads for coniferous, broadleaved and mixed woodland habitats (Main Report, Section 8.6).
- An increase in mean CLmaxN (as seen for calcareous grassland, dwarf shrub heath and broadleaved woodland: Main Report, Table 8.3) results in a decrease in percentage area exceeded.
- A decrease in mean CLmaxN (as seen for acid grassland and coniferous woodland: Main Report, Table 8.3) results in an increase in the percentage area exceeded.

1.4.4 Nutrient nitrogen results

For nutrient nitrogen (Tables 1.3 and 1.4) the total area of habitats exceeded has increased from 39.8% (Feb 2001 data) to 62.7% (Feb 2003 data) and the accumulated exceedance has increased by 23.7%. This is largely the result of the new nitrogen critical load values (Main Report, Chapter 7 and Section 8.7).

There is a net increase in the habitat areas exceeded of approximately 9770 km² (areas rounded), due to:

- Critical loads being assigned to 6220 km² of new habitats (bogs, montane, supralittoral sediments).
- A 3130 km² increase in the area of dwarf shrub heath exceeded; largely the result of the increased habitat area mapped.
- A 2350 km² increase in the area of woodlands exceeded, as a result of lower critical loads and an increased habitat area mapped (Main Report, Sections 3.7.1, 7.4, 7.5, 8.3 and 8.7).
- A 2760 km² increase in the area of calcareous grassland exceeded, as a result of a lower critical load being applied (from 50 kg N ha⁻¹ year⁻¹ to 20 kg N ha⁻¹ year⁻¹). The previous high value was based on the concept, now rejected, that phosphorous limited systems would not respond to nitrogen (Main Report, Section 7.3.1).

This is balanced by a decrease in the area of acid grasslands exceeded of 4690 km².

Other reasons for the changes in the nutrient nitrogen statistics can be summarised as:

- For acid grassland the percentage area exceeded has increased because the mean critical was previously (Feb 2001) 22.7 kg N ha⁻¹ year⁻¹ and the value now used (Feb 2003) is 15 N ha⁻¹ year⁻¹.
- Previously (Feb 2001) all woodland was treated as managed, and the critical loads were based on the minimum of the mass balance value (to protect the whole ecosystem), or the empirical value to protect the ground flora.
- Exceedance statistics for the effects of nitrogen on unmanaged woodland are now considered separately to the effects of nitrogen on managed woodland, where the

latter refers to managed productive woodland and the former to woodlands “managed” for their biodiversity or conservation value.

Table 1.3. Nutrient nitrogen exceedance statistics for the UK – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	54573	14932	27.4	742620
Calcareous grassland	10163	0	0	0
Heathland	9914	5497	55.5	254224
Coniferous woodland	7379	6473	87.7	687225
Deciduous woodland	10330	9891	95.8	1378905
All ecosystems	92359	36793	39.8	3062974

Table 1.4. Nutrient nitrogen exceedance statistics for the UK – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	15241	10241	67.2	544794
Calcareous grassland	3577	2763	77.2	96160
Dwarf shrub heath	24820	8627	34.8	406862
Bog	5541	2526	45.6	188505
Montane	3129	2580	82.5	88953
Coniferous woodland (managed)	7979	7415	92.9	869392
Broadleaved woodland (managed)	7584	7418	97.8	1224371
Unmanaged woods (ground flora)	3386	3180	93.9	488267
Atlantic oak (epiphytic lichens)	822	694	84.5	74317
Supralittoral sediment	2128	1114	52.4	30865
All habitats	74209	46560	62.7	4012485

1.4.5 1km individual habitat exceedance maps

In addition to the statistics generated, 1km exceedance maps for each updated (Feb 2003) habitat have been produced. These are consistent with the UK results described above, since they are based on the same critical loads and deposition data. The 1km acidity exceedance maps are shown in Figures 1.5 to 1.8 and the nutrient nitrogen maps in Figures 1.10 to 1.14.

1.4.6 10km acidity exceedance map for freshwaters

The statistics on the area of freshwaters exceeded for acidity are given above. The latest exceedance map based on the screened data set is shown in Figure 1.9.

1.5 Exceedance statistics by country and habitat

Exceedance statistics are also calculated for each country: England, Wales, Scotland and Northern Ireland. The distribution of sensitive habitats varies from one country to another, so the area for which critical loads are mapped, also varies for each country.

The areas mapped for acidity and nutrient nitrogen critical loads in each country and the percentages they represent of each country are given in Table 1.5. This shows that the highest percentage of habitats sensitive to acidification and eutrophication occur in Scotland and Wales.

Table 1.5. The areas (km²) mapped for critical loads by country. Values in parentheses are the percentage area of each country for which critical loads are mapped.

Data set & year	England	Wales	Scotland	Northern Ireland
Acidity – 2001	30995 (23.8%)	9260 (44.6%)	51717 (65.7%)	4063 (28.7%)
2003	18198 (14.0%)	6745 (32.5%)	43825 (55.7%)	3507 (24.8%)
Nitrogen – 2001	29485 (22.4%)	9000 (43.4%)	50004 (63.5%)	3870 (27.3%)
2003	20351 (15.6%)	7098 (34.2%)	43177 (54.8%)	3583 (25.3%)
Country area*	130360	20760	78750	14150

* The Times Atlas of the World, Eighth Edition, 1991, Times Books, London.

The highest percentages of sensitive habitats with critical loads exceedance are also found in Wales (Table 1.6). The values are lower for Scotland because of the lower deposition in the far north of Scotland (Figures 1.3 & 1.4). Whilst there may not be a high percentage of sensitive habitats in England, the percentage exceeded is still relatively high, because of the high deposition across the area (Figures 1.3 & 1.4).

Table 1.6. The percentage area of sensitive habitats exceeded by country based on 1995-97 deposition data.

Data set & year	England	Wales	Scotland	Northern Ireland
Acidity – 2001	67.4%	93.4%	69.3%	67.1%
2003	72.2%	94.5%	59.8%	67.6%
Nitrogen – 2001	57.4%	70.0%	23.4%	48.1%
2003	94.1%	96.9%	41.0%	78.3%

For acidity, the exceeded areas are very similar using the February 2001 and the February 2003 data. For nutrient nitrogen the percentage of habitats exceeded has increased significantly following the review of nutrient nitrogen critical loads (Main Report, Chapter 7).

Table 1.7 summarises the changes in percentage area exceeded and accumulated exceedance for each country and for the UK. It is important to consider both of these, since the percentage area exceeded may be similar for Feb 2001 and Feb 2003, but the accumulated exceedance (ie, the measure of exceedance that takes account of both the exceeded area and the magnitude of exceedance) may be considerably different, for example, acid grassland (Table 1.1). For acidity (Table 1.7) the percentage area exceeded has increased by a small amount in England, Wales and NI, but decreased in Scotland. However, for all countries a large decrease in the accumulated exceedance is seen (13.2 – 27.4%). For nutrient nitrogen the percentage area exceeded and the accumulated exceedance have all increased significantly.

Table 1.7. Summary of percentage changes to exceedance results by country

	% area exceeded	Accumulated Exceedance
<i>Acidity</i>		
England	↑ 4.8%	↓ 27.4%
Wales	↑ 1.1%	↓ 20.7%
Scotland	↓ 9.5%	↓ 26.6%
NI	↑ 0.5%	↓ 13.2%
UK	↓ 4.4%	↓ 25.4%
<i>Nutrient N</i>		
England	↑ 36.7%	↑ 23.7%
Wales	↑ 26.9%	↑ 14.3%
Scotland	↑ 17.6%	↑ 32.1%
NI	↑ 30.2%	↑ 17.8%
UK	↑ 22.9%	↑ 23.7%

The full exceedance statistics for each habitat for each country are given in Tables 1.8 to 1.23. For acidity, acid grassland or heathland had the highest percentage exceeded in each country in February 2001. In this Update, acid grassland still has the highest percentage area exceeded in NI, while in England, Wales and Scotland the montane habitat has the highest percentage area exceeded. This partly reflects the sensitive nature of this upland habitat, but the area it occupies is small and hence the exceeded areas and AE values are also relatively small compared to those for other habitats. For nutrient nitrogen the woodland habitats tend to have the highest percentage area exceeded in all countries, closely followed by montane, bog and dwarf shrub heath.

It should be noted that the changes observed in this comparison exercise are due to a combination of changes in (a) the habitats mapped; (b) the areas of the habitats mapped; (c) the data and methods used in the calculation of critical loads.

1.6 Main conclusions

The Update includes changes in the habitats mapped and their distributions as well as revisions to the critical loads data and methods in light of new scientific information. The impact of these changes alone on critical loads exceedance for the UK are summarised below.

- The habitat area exceeded for acidity has decreased by 29.4%.
- The percentage area of habitats exceeded for acidity has decreased by 4.4%.
- The accumulated exceedance (ie, magnitude of exceedance) for acidity has decreased by 25.4%.
- The habitat area exceeded for nutrient nitrogen has increased by 21%.
- The percentage area of habitats exceeded for nutrient nitrogen has increased by 22.9%.
- The accumulated exceedance (ie, magnitude of exceedance) for nutrient nitrogen has increased by 23.7%.

The differences between the previous (Feb 2001) exceedance results and those in this update (Feb 2003) are due to the changes made to the habitats mapped and revisions

to the data and methods used to calculate critical loads; *they are not the result of a change in the pollution climate.*

ENGLAND – acidity exceedance statistics

Table 1.8. Acidity exceedance statistics for England – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	11260	10046	89.2	1672771
Calcareous grassland	8550	2563	30.0	171315
Heathland	1395	1292	92.6	175872
Coniferous woodland	1810	1516	83.8	191422
Deciduous woodland	6470	5160	79.8	871881
Freshwaters	1509	326	21.6	48000
All ecosystems	30995	20904	67.4	3131260

Table 1.9. Acidity exceedance statistics for England – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	2625	2509	95.6	492337
Calcareous grassland	1718	0	0	0
Dwarf shrub heath	2462	2281	92.6	336098
Bog	1006	934	92.8	191789
Montane	1.91	1.90	99.8	576
Coniferous woodland (managed)	1702	1463	86.0	275420
Broadleaved woodland (managed)	5632	4150	73.7	720376
Unmanaged woodland	2392	1533	64.1	210475
Freshwaters	660	265	40.1	45650
All habitats	18198	13137	72.2	2272722

ENGLAND – nutrient nitrogen exceedance statistics

Table 1.10. Nutrient nitrogen exceedance statistics for England – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	11260	7280	64.7	435600
Calcareous grassland	8550	0	0	0
Heathland	1395	1368	98.1	91799
Coniferous woodland	1810	1810	100	253846
Deciduous woodland	6470	6465	99.9	954771
All ecosystems	29485	16923	57.4	1736016

Table 1.11. Nutrient nitrogen exceedance statistics for England – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	2620	2590	98.9	213951
Calcareous grassland	3312	2615	79.0	90183
Dwarf shrub heath	2466	2442	99.0	171535
Bog	1007	1007	100	109569
Montane	2	2	100	359
Coniferous woodland (managed)	1704	1704	100	271638
Broadleaved woodland (managed)	5654	5654	100	996588
Unmanaged woods (ground flora)	2252	2252	100	371134
Atlantic oak (epiphytic lichens)	150	150	100	29437
Supralittoral sediment	1183	741	62.6	22000
All habitats	20351	19157	94.1	2276395

WALES – acidity exceedance statistics

Table 1.12. Acidity exceedance statistics for Wales – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	4609	4457	96.7	665623
Calcareous grassland	144	82	57.2	5797
Heathland	1114	1066	95.6	139080
Coniferous woodland	766	728	95.0	78695
Deciduous woodland	2367	2214	93.5	340447
Freshwaters	260	99	38.1	7441
All ecosystems	9260	8645	93.4	1237082

Table 1.13. Acidity exceedance statistics for Wales – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	3143	3101	98.7	498012
Calcareous grassland	45	0	0	0
Dwarf shrub heath	1078	1049	97.2	130049
Bog	56	52	93.1	9308
Montane	18	18	100	4505
Coniferous woodland (managed)	1039	1011	97.3	172126
Broadleaved woodland (managed)	793	709	89.4	111966
Unmanaged woods	395	350	88.6	49110
Freshwaters	179	83	46.4	6261
All habitats	6745	6373	94.5	981337

WALES – nutrient nitrogen exceedance statistics

Table 1.14. Nutrient nitrogen exceedance statistics for Wales – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	4609	2087	45.3	74385
Calcareous grassland	144	0	0	0
Heathland	1114	1079	96.9	64135
Coniferous woodland	766	766	100	113674
Deciduous woodland	2367	2367	100	320728
All ecosystems	9000	6299	70.0	572921

Table 1.15. Nutrient nitrogen exceedance statistics for Wales – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	3146	3088	98.2	196509
Calcareous grassland	171	134	78.0	5730
Dwarf shrub heath	1094	1089	99.5	83359
Bog	56	56	100	5354
Montane	18	18	100	3006
Coniferous woodland (managed)	1043	1043	100	169907
Broadleaved woodland (managed)	801	801	100	130157
Unmanaged woods (ground flora)	228	226	99.3	39859
Atlantic oak (epiphytic lichens)	171	171	100	28399
Supralittoral sediment	369	255	68.9	6145
All habitats	7098	6881	96.9	668424

SCOTLAND – acidity exceedance statistics

Table 1.16. Acidity exceedance statistics for Scotland – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	37384	28047	75.0	1830311
Calcareous grassland	0	0	0	0
Heathland	7100	4249	59.9	269623
Coniferous woodland	4297	2476	57.6	203587
Deciduous woodland	1225	857	70.0	97597
Freshwaters	1712	216	12.6	15520
All ecosystems	51717	35846	69.3	2416638

Table 1.17. Acidity exceedance statistics for Scotland – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	8336	6683	80.2	590686
Calcareous grassland	7	0	0	0
Dwarf shrub heath	20190	9824	48.7	430403
Bog	3959	2659	67.2	121909
Montane	3034	2627	86.6	179962
Coniferous woodland (managed)	4724	3025	64.1	319427
Broadleaved woodland (managed)	1130	748	66.2	82932
Unmanaged woods	1016	433	42.6	33295
Freshwaters	1430	199	13.9	15666
All habitats	43825	26197	59.8	1774281

SCOTLAND – nutrient nitrogen exceedance statistics

Table 1.18. Nutrient nitrogen exceedance statistics for Scotland – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	37384	4648	12.4	176680
Calcareous grassland	0	0	0	0
Heathland	7100	2822	39.7	83905
Coniferous woodland	4297	3419	79.6	259053
Deciduous woodland	1225	821	67.1	66786
All ecosystems	50004	11710	23.4	586424

Table 1.19. Nutrient nitrogen exceedance statistics for Scotland – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	8283	3735	45.1	104349
Calcareous grassland	24	4	17.1	81
Dwarf shrub heath	20284	4337	21.4	115825
Bog	4005	1042	26	50346
Montane	3109	2560	82.4	85588
Coniferous woodland (managed)	4724	4167	88.2	356108
Broadleaved woodland (managed)	1130	964	85.3	97625
Unmanaged woods (ground flora)	570	427	75.0	34944
Atlantic oak (epiphytic lichens)	501	373	74.5	16481
Supralittoral sediment	547	105	19.1	2518
All habitats	43177	17715	41.0	863866

NORTHERN IRELAND – acidity exceedance statistics

Table 1.20. Acidity exceedance statistics for Northern Ireland – February 2001
critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	1321	1261	95.5	120559
Calcareous grassland	1469	610	41.6	34011
Heathland	306	276	90.3	28751
Coniferous woodland	506	386	76.3	56569
Deciduous woodland	268	194	72.2	33918
Freshwaters	193	8	3.9	445
All ecosystems	4063	2728	67.1	274253

Table 1.21. Acidity exceedance statistics for Northern Ireland – February 2003
critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	1187	910	76.7	81095
Calcareous grassland	42	0	0	0
Dwarf shrub heath	973	676	69.5	52877
Bog	442	309	70.0	26747
Montane	0	0	0	0
Coniferous woodland (managed)	506	349	69.0	58184
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woods	208	119	57.4	18608
Freshwaters	149	8	5.1	473
All habitats	3507	2371	67.6	237984

NORTHERN IRELAND – nutrient nitrogen exceedance statistics

Table 1.22. Nutrient nitrogen exceedance statistics for Northern Ireland – February 2001 critical loads

Ecosystem	Ecosystem Area (km ²)	Exceeded Area (km ²)	Percentage area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	1321	917	69.5	55955
Calcareous grassland	1469	0	0	0
Heathland	306	229	74.8	14386
Coniferous woodland	506	477	94.2	60653
Deciduous woodland	268	239	89.1	36620
All ecosystems	3870	1862	48.1	167614

Table 1.23. Nutrient nitrogen exceedance statistics for Northern Ireland – February 2003 critical loads

Broad Habitat	Habitat Area (km ²)	Exceeded Area (km ²)	Percentage Area Exceeded	Accumulated Exceedance (keq year ⁻¹)
Acid grassland	1192	827	69.4	29985
Calcareous grassland	69	10	13.7	165
Dwarf shrub heath	976	760	77.9	36143
Bog	473	421	89.1	23236
Montane	0	0	0	0
Coniferous woodland (managed)	508	500	98.5	71739
Broadleaved woodland (managed)	0	0	0	0
Unmanaged woods (ground flora)	336	274	81.5	42329
Atlantic oak (epiphytic lichens)	0	0	0	0
Supralittoral sediment	29	15	51.2	201
All habitats	3583	2807	78.3	203800

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