European Community Directive
on the Conservation of Natural Habitats
and of Wild Fauna and Flora
(92/43/EEC)

Second Report by the United Kingdom under Article 17

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

Conservation status assessment for :

H3160: Natural dystrophic lakes and ponds

Please note that this is a section of the report. For the complete report visit http://www.jncc.gov.uk/article17

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H3160 Natural dystrophic lakes and ponds

Audit trail compiled and edited by JNCC and the UK statutory nature conservation agencies Freshwater Lead Coordination Network.

This paper and accompanying appendices contain background information and data used to complete the standard EC reporting form (Annex D), following the methodology outlined in the commission document "Assessment, monitoring and reporting under Article 17 of the Habitats Directive, Explanatory Notes and Guidelines, Final Draft 5; October 2006". The superscript numbers below cross-reference to the headings in the corresponding Annex D reporting form. This supporting information should be read in conjunction with the UK approach for habitats (see 'Assessing Conservation Status: UK Approach').

1. National-biogeographic level information

1.1 General description and correspondance with National Vegetation Classification (NVC) and other habitat types

Table 1.1.1 provides a summary description of H3160 and its relations with UK classifications.

Dystrophic systems are often associated with blanket bogs (H7130) and may include isolated seasonal pools, random collections of irregularly-shaped, more-or-less permanent waters, and ordered linear or concentric arrays of pools and small lakes. Dystrophic pools may also be found on raised bogs, situated mainly on plains and valley bottoms. Although often associated with lowland sites, dystrophic (Group A) standing waters have been recorded from 0 to 920 m altitude, the mean altitude of 222 sites surveyed in Great Britain being 259 m (Duigan *et al*. 2006).

Most examples of dystrophic standing waters are small (less than 5 ha in extent), shallow, and contain a limited range of flora and fauna. The water of dystrophic lakes has a high concentration of humic substances, which leach from peat or peaty soils in catchment areas. Peaty lake substrates and high concentrations of humic substances define the habitat. In addition to their effects on water chemistry, humic substances result in the brown coloration of the water, which leads to poor transmission of light through the water column. These water bodies are very acidic and poor in available plant nutrients. Extremely peaty substrates may be unsuitable for macrophyte growth.

In northern Scotland, small dystrophic waters may be known as 'dubh lochans'. Typically, these water bodies are dominated by bog-mosses *Sphagnum* spp. Other species associated with this type of water body include *Utricularia minor*, *Juncus bulbosus*, *Sparganium angustifolium* and *Potamogeton polygonifolius*. At some sites, a 'schwingmoor' is present - bog-mosses are found in association with cottongrass *Eriophorum angustifolium*. Dystrophic pools are naturally species-poor and low in productivity. Although fringing vegetation is characteristic of the habitat, a littoral zone is often absent. In terms of botanical classification of this type of water body, they correspond with Type 1 (Palmer *et al*., 1992) and Group A (Duigan *et al*. 2006), although botanical classification can be unsatisfactory as there may be no plants at all in the water bodies.

Several notable dragonfly species such as *Ceriagrion tenellum* and *Leucorrhinia dubia* are associated with dystrophic lakes and ponds.

It is possible to distinguish two types in the UK – upland examples which are under no real threat (e.g. Scotland) and lowland examples which are under heavy pressure (e.g. meres and mosses pools).

Table 1.1.1 Summary description of habitat H3160 and its relations with UK vegetation/habitat classifications

Classification	Correspondence with Annex I type	Comments
British Lakes Classification (Duigan *et al.* 2006)	Lake groups: A, B.	Group A sites represent small dystrophic peat or heathland pools, dominated by *Sphagnum*. Group B sites represent acid moorland or heathland pools, and small lakes, also with an impoverished flora, which may include *Sphagnum*, so may contain dystrophic waters. There may also be overlap of other Groups characterised by low nutrient status.
Phase 1 Habitat Classification	G1.4 Standing water: dystrophic.	
BAP	Broad reporting category: Standing open water and canals. Priority habitat type: blanket bog.	The UK is currently considering addition of a HAP for lakes of low nutrient status, to those for mesotrophic lakes and eutrophic standing waters.
NVC	(A24): *Juncus bulbosus* community (M1): *Sphagnum auriculatum* bog pool community (M2): *Sphagnum cuspidatum*/*recurvum* bog pool community (M3): *Eriophorum angustifolium* bog pool community	NVC communities are inadequate to describe lake environments, but aquatic community A24 and the mire communities M1 to 3 come closest to describing the lake and pool communities of the dystrophic lake type.
EU Interpretation Manual	PAL.CLASS.: 22.14 Description: natural lakes and ponds with brown tinted water due to peat and humic acids, generally on peaty soils in bogs or in heaths with natural evolution toward bogs. pH is often low, from pH 3 to 6. Plant communities belong to the *Utricularietalia*.	PAL.CLASS: Palaearctic codes from the classification of Palaearctic habitats, based upon the CORINE classification.
CSM reporting categories	For SACs, the corresponding Annex I habitat is identified as H3160. For SSSIs, the closest corresponding feature categories, as used for 2006 reporting to JNCC are: dystrophic loch and dystrophic and oligotrophic types present.	
Water Framework Directive (WFD) lakes typology	Peat, Low Alkalinity (LA) (part).	In the WFD typology peat water bodies are classified on the basis of >75% peat in the catchment area. However, there may be a proportion of water bodies which have been classified as LA which fall into the dystrophic category.

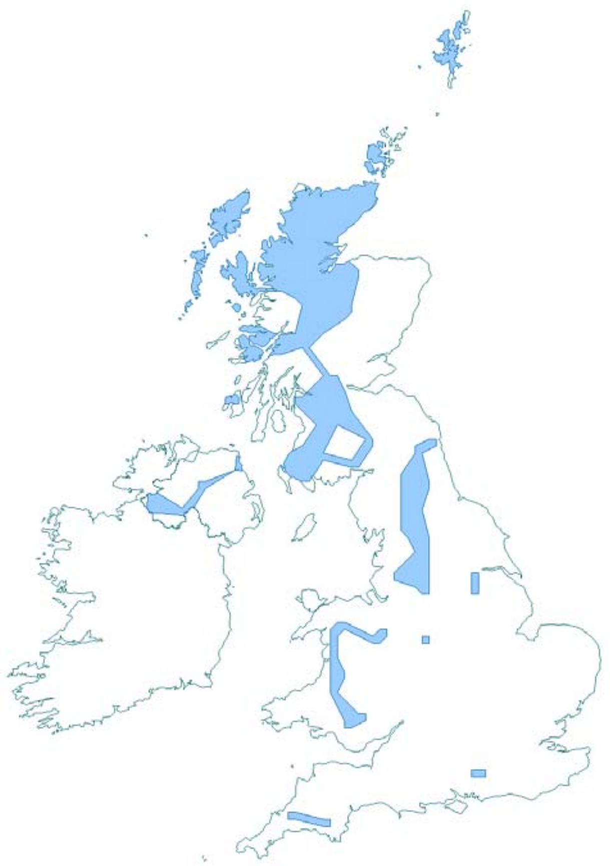
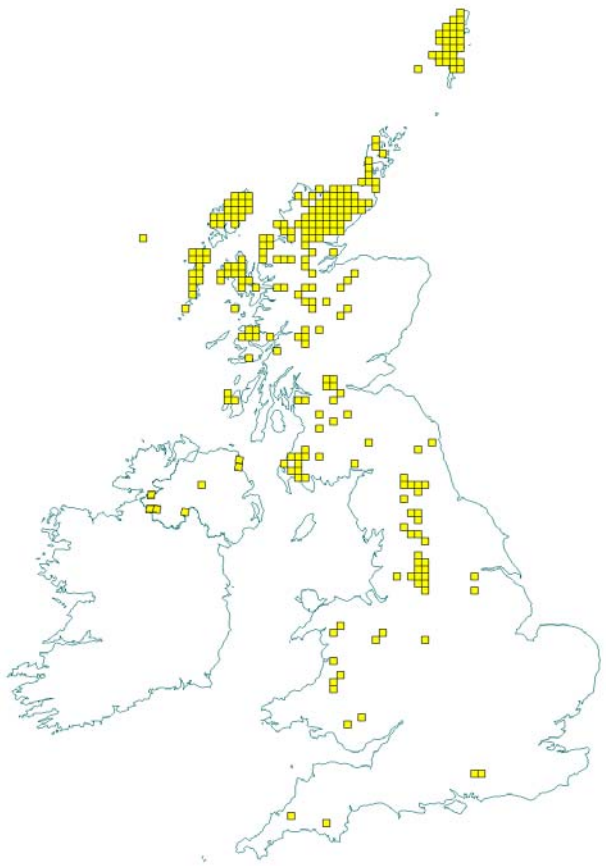
2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: **51,996 km²**
Date calculated [2.3.2]: **May 2007**
Quality of data [2.3.3]: **Moderate**

The surface area estimate was calculated within alpha hull software, using extent of occurrence as a proxy measure for range (see Map 2.1.1). The value of alpha was set at 25 km; the alpha was clipped to include inland areas only.

Maps 2.1.1 and 2.1.2 show the range and distribution of H3160 in the UK. Natural dystrophic lakes and ponds are widespread in the north-west of the UK, but scarce in the south of the UK state. The majority of the resource is located in Scotland, particularly to the north and west of the Highland Boundary Fault, but also to the south-west of the central lowlands. This type of water body would not necessarily be found in the central or eastern lowlands of Scotland, where different solid and drift geology result in a variety of lake types. Dystrophic standing waters are widespread in Scotland, sites occurring in the Northern and Western Isles, as well as in north and south mainland. They are particularly numerous in the peatlands of Caithness, Sutherland and Lewis, but may also occur in eastern uplands. In England, Northern Ireland and Wales, occurrence is more localised, examples being located in Lincolnshire, Hampshire, Cheshire Conwy, Gwynedd, mid Wales, Antrim and Fermanagh.

Map 2.1.1 Habitat range map [1.1] for H3160	**Map 2.1.2** Habitat distribution map [1.2] for H3160
	
Range envelope shown in blue/grey shade in above map is a minimum convex polygon constructed using JNCC Alpha Shapes tool (see Technical Note I for details of methodology).	Each yellow square represents a 10x10km square of the National Grid and shows the known and/or predicted occurrence of this habitat. 10-km square count**:** 264

See Section 7.1 for map data sources

2.2 Trend in range since c.1994

Trend in range[2.3.4]:	**Stable**
Trend magnitude[2.3.5]:	**Not applicable**
Trend period[2.3.6]:	**1994-2006**
Reasons for reported trend[2.3.7]:	**Not applicable**

Lakes are rarely 'lost' in the conventional sense, although small water bodies may be in-filled or drained. However, many lakes have been severely degraded to the extent that they no longer support characteristic plant or animal communities. As a consequence, area and range assessments show no significant change over time in spite of nutrient enrichment. Degraded sites are not considered lost because of the way in which lake types are defined. Dystrophic waters remain throughout much of the original range. In maintaining range, it is particularly important to safeguard sites in England, Northern Ireland and Wales, where there are significantly fewer examples of this habitat. The broad range of H3160 is considered to have remained stable since 1994.

2.3 Favourable reference range

Favourable reference range[2.5.1]: 52,000 km^2

Section 3.2.1.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference range estimates for habitats have been determined in the UK. Based on this approach, the current surface area, 52,000 km^2, has been set as the favourable reference area. Reasons for this are discussed below.

Dystrophic systems occur on blanket bogs (H7130) and other peatlands. However, it should be noted that although dystrophic waters are found in areas of peatland/blanket bog, in practice, without survey or monitoring data for individual sites, it can be difficult to distinguish dystrophic from oligotrophic standing waters. Many oligotrophic systems contain waters which are coloured, due to the presence of humic substances leached from the catchment area. Humic substances leach not only from peat, but from a variety of peaty soil types. In moorland areas, water bodies may be dystrophic, oligotrophic (possibly Group B, rather than Group C1 or C2), or systems with mixed influences. It may also be difficult to predict where small water bodies will occur within peatlands/blanket mire. Owing to the extensive time required for peat formation, and the changed hydrology of the sites involved, this loss is likely to be irreversible. However, the dystrophic habitat type appears to occur through much of its original range and the remaining area potentially supporting dystrophic waters is significant. The blanket bog HAP gives approximate figures for cover of blanket peat soil as 215,000 ha in England, 140,000 ha in Northern Ireland, 1,060,000 ha in Scotland and 70,000 ha in Wales.

In addition to lost habitat, there may be a number of enriched dystrophic lakes and pools, where agricultural or forested land, or septic tanks, exist in the catchment. No data are presently available on this issue, but peaty soils have poor phosphorus (P) sorption characteristics – phosphorus may also be lost to dystrophic waters in surface run-off, where soil drainage is poor, or through field drains. Degraded sites, however, are not necessarily classed as lost, as it may be possible to restore individual water bodies. The potential range has decreased, through drainage for forestry and agriculture, and peat removal for a variety of purposes. Although peat removal created new dystrophic pools, they are not considered natural. These activities have existed since at least the 18th Century. Further losses would be attributable to the planting of forests in the 20th Century. Where management of hydrology has taken place, the terrestrial environments created remain. In cases where peat has been removed, the substrates necessary to create the conditions of a dystrophic water body no longer remain. Afforestation was the most commonly occurring cause of loss in Scotland, but considerable losses due to forestry also occurred in Wales and similar pressures have occurred in Northern Ireland.

In the northern part of the range, dystrophic lakes are relatively common and little fragmentation is apparent. However, in the southern part of the range this habitat has suffered from increasing fragmentation due to development pressure and agricultural impacts.

2.4 Conclusions on range

Conclusion[2.6.i]: Favourable

There has been a long history of loss of range, and that loss is irreversible. However, dystrophic lochs and pools remain throughout much of the historical range, and it is likely that loss has slowed considerably, with peat cutting being limited and forestry no longer encouraged in new areas. Since 1994, it is likely that the range of H3160 has remained broadly stable. However, owing to lack of data on dystrophic systems, confidence in this conclusion is low.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **114.7km²**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **3 = ground based survey**
Quality of data [2.4.4]: **Moderate**

Table 3.1.1 provides information on the area of H3160 in the UK. The estimate of 11,470 is based on the sum of the above, but it is likely to be an underestimate, due to the large number of small pools which do not appear on maps.

Note that surface area is an inadequate variable to describe the standing water habitat, as it takes no account of depth, volume, flushing rate, area of substrate available for colonisation by macrophytes, nor the fact that management anywhere in the catchment may affect the entire habitat of the lake. The latter is more relevant to lakes than to terrestrial habitats. In addition, other than in terms of viability, area is not generally a consideration when assessing the value of individual lakes. These factors result in standing waters normally being discussed in terms of number of lakes, rather than area of surface water. A further complication related to using areal data from Scottish Special Area of Conservation (SAC) or Site of Special Scientific Interest (SSSI) assessments is that generally, only one lake per SSSI (whether underpinning SAC or not) was examined. If a lake was found to be in unfavourable condition, the site was also described this way. However, this means that in sites with more than one lake per feature, it cannot be assumed that the entire area of the qualifying feature within the site is in unfavourable condition.

Table 3.1.1 Area of H3160 in the UK

	Area (ha)	Method [2.4.3]	Quality of data [2.4.4]
England	1000	3	Moderate
Scotland	10000	3	Moderate
Wales	400	3	Moderate
Northern Ireland	70	3	Moderate
Total UK extent [2.4.1]	11,470	3	Moderate

Method used to estimate the habitat surface area: 1 = only or mostly based on expert opinion; 2 = based on remote sensing data; 3 = ground based survey. Only the most relevant class is given if more than one applies.
Quality of habitat surface area data: ‘Good’ e.g. based on extensive surveys; ‘Moderate’ e.g. based on partial data with some extrapolation; ‘Poor’ e.g. based on very incomplete data or on expert judgement

3.2 Trend in area since c.1994

Trend in area[2.4.5]: **Unknown**
Trend magnitude[2.4.6]: **Not applicable**
Trend period[2.4.7]: **1994-2006**
Reasons for reported trend[2.4.8]: **Not applicable**

Lakes are rarely ‘lost’ in the conventional sense, although small water bodies may be in-filled or drained. However, many lakes have been severely degraded to the extent that they no longer support characteristic plant or animal communities. As a consequence area assessments show little significant change over time in spite of nutrient enrichment. Degraded sites are not considered lost because of the way in which lake types are defined.

There may have been losses of lakes or ponds, which could have been offset by creation of water bodies on adequate substrate. It is possible that the area of individual lakes in some areas has been reduced through drainage and water abstraction.

Historically there has been no systematic monitoring of lakes in the UK. Recently (post 2005) the introduction of Common Standards Monitoring (CSM) protocols has driven a programme of SAC and SSSI lake monitoring using a single consistent method. These data are insufficient to estimate trends in area since 1994.

3.3 Favourable reference area

Favourable reference area[2.5.2]: Unknown

Dystrophic systems occur on blanket bogs (H7130) and other peatlands. However, it should be noted that although dystrophic waters are found in areas of peatland/blanket bog, in practice, without survey or monitoring data for individual sites, it can be difficult to distinguish dystrophic from oligotrophic standing waters. Many oligotrophic systems contain waters which are coloured, due to the presence of humic substances leached from the catchment area. Humic substances leach not only from peat, but from a variety of peaty soil types. In moorland areas, water bodies may be dystrophic, oligotrophic (possibly Group B, rather than Group C1 or C2), or systems with mixed influences. It may also be difficult to predict where small water bodies will occur within peatlands/blanket mire. The two habitat types, H3160 and H3130 intergrade which makes assessing area difficult.

The habitat is well represented in Scotland, and is not considered to be scarce. Dystrophic standing waters are uncommon in England and Wales, so are important in terms of maintaining southern examples of the habitat. In the northern part of the range, dystrophic lakes are relatively common and little fragmentation is apparent. However, in the southern part of the range this habitat has suffered from increasing fragmentation due to development pressure and agricultural impacts. Recreation of H3160 requires the recreation of the underlying blanket bog habitat, which can be problematic. However, blanket bogs are an annex I habitat and are conserved as such.

There is insufficient data to reach any judgement on viability for this habitat in terms of area. The viability of this habitat type within the UK is largely dependent on the current and future condition of structures and functions; this is discussed in detail in section 4.

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: Unknown

Historical losses are likely to have been significant. Existing data on H3160 is considered insufficient to assess a trend in area since 1994 and to determine if the area is viable.

4. Specific structures and functions (including typical species)

4.1 Main pressures [2.4.10]

There is little information on current factors affecting the habitat. In Scotland, pressures were not recorded for the SAC and SSSI dystrophic features during CSM monitoring. This is not unexpected, since all were described as favourable maintained. As dystrophic waters in Scotland are generally situated distant from large centres of population, are located in areas of poor soil, and are small, acid and highly coloured, pressure on the resource is not normally high. WFD-related risk assessments refer to all types of water body, not only dystrophic waters. Of 309 water bodies in the Scotland River Basin District, 167 were at risk (54.1%). The reasons for this were changes in morphology (37%) and abstraction and flow regulation (34%), diffuse pollution (17%), point source pollution (11%) and alien species (1%). Of 32 lake water bodies assessed in the Solway-Tweed RBD, 21 (65.6%) were at risk. The reasons for this were

again changes in morphology (33%) and abstraction and flow regulation (27%), diffuse pollution (31%), point source pollution (5%) and alien species (5%).
The main factors affecting H3160 are listed below. The related EC codes are shown in brackets.

- Pollution (**421 disposal of household waste, 701 water pollution, 952 Eutrophication**)

Nutrient enrichment is the major factor affecting lakes in the UK with evidence that over 80% of lakes in England are affected (Carvalho and Moss 1995) – but these are overwhelmingly other lake types. At individual sites, diffuse pollution from agriculture and forestry within the catchment is possible. In rural areas with no main-line sewer, wastewater goes to septic tanks, so there is also potential for this to adversely affect dystrophic waters. Pressures in Northern Ireland and Wales would be expected to be similar.

- Non-native species (**954 invasion by a species, 971 competition**)

There are a number of non-native plant species with the propensity to become invasive in aquatic habitats. In particular Australian swamp stonecrop (*Crassula helmsii*) and parrot's feather (*Myriophyllum aquaticum and M. brasiliense*) seem to be able to rapidly colonise and change the ecology of small standing water habitats.

- Air pollution (**702 Air pollution**)

Although naturally acid, acid deposition from air pollution can affect the chemistry and ecology of dystrophic lakes. They are generally considered less sensitive than oligotrophic lakes, because high DOC levels in the water column help to buffer against acid episodes. However, it has not been possible to undertake an assessment of potential impact based on critical loads because of the poor equivalence between this habitat and those for which critical loads are set (see Technical Note III).

4.2 Current condition

4.2.1 CSM condition assessments

Condition assessments based on CSM (see http://www.jncc.gov.uk/page-2199) provide a means to assess the structure and functioning of H3160 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat:

- Extent.
- Composition of macrophyte community.
- Macrophyte community structure.
- Water quality.
- Hydrology.

SAC condition assessments

Table 4.2.1 and Map 4.2.1 summarise the CSM condition assessments for UK SACs supporting habitat H3160. These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 1% of the area and 12% of the number of assessments was unfavourable; and
- less than 1% of the total UK habitat area was in unfavourable condition.

On SACs designated for their dystrophic standing water features, there are two sites in England, four sites in Northern Ireland, 16 sites in Scotland and one site in Wales. The English SACs for this lake type account for four water bodies, these being Cranmer Pond in Woolmer Forest SAC, a water body at Clarepool Moss and two pools at Abbots Moss, in the West Midlands Mosses SAC. In Wales, Llyn Tryweryn and Llyn y Dywarchen are the two water bodies representing the dystrophic habitat of the SAC, though some other water bodies may also be dystrophic. Sites in Scotland include Caithness and Sutherland Peatlands and Lewis Peatlands, both of which support numerous dystrophic waters.

Presently, assessments are available for 17 sites. All sites monitored in Scotland were described as favourable. Although the Scottish SACs include sites which have numerous dystrophic water bodies, limitation of resources meant that only one water body in each underpinning SSSI feature could be surveyed, unless waters were extremely small. However, relevance of results was ensured by monitoring the standing waters which were a) most at risk or b) known to be typical of the lakes incorporated in the site. Both sites in England were in unfavourable condition: one was declining, the other was recovering as a management agreement scheme is in operation at this site.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H3160. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining		
	No change		
	Unclassified	20	1
	Recovering	04	1
	Total	24	2
	% of all assessments	***1%***	***12%***
	% of total UK resource	***0%***	***unknown***
Favourable	Maintained	1,666	13
	Recovered		
	Unclassified	23	2
	Total	1,689	15
	% of all assessments	***99%***	***88%***
	% of total UK resource	***15%***	***unknown***

Notes
1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006. NB: these include additional and some up-date data form those used in the six year report produced by JNCC. (Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC).
3. Only assessments made for qualifying interest features on SAC have been included in this analysis.
4. Area figures for CSM assessments have been calculated using the data presented on the standard Natura 2000 data forms submitted to the EU.

SSSI/Area of Special Scientific Interest (ASSI) condition assessments

Table 4.2.2 and Maps 4.2.2 and 4.2.3 summarise the CSM condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical Note II for details of methodology behind this). These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 10% of the strongly indicative assessments were unfavourable.

Table 4.2.2 CSM condition assessment results for UK SSSI/ASSIs that were judged to be either strongly or weakly indicative of the condition of H3160 on SSSI/ASSIs. See notes below table and Technical Note II for further details

Condition	**Condition sub-categories**	**Number of assessments**	
		Strongly indicative assessments (Category 1)	**Weakly indicative assessments (Category 2)**
Unfavourable	Declining		
	No change	1	
	Unclassified		
	Recovering		
	Total	1	
	% of all assessments	***10%***	***%***
Favourable	Maintained	6	
	Recovered		
	Unclassified	3	
	Total	9	
	% of all assessments	***90%***	***%***

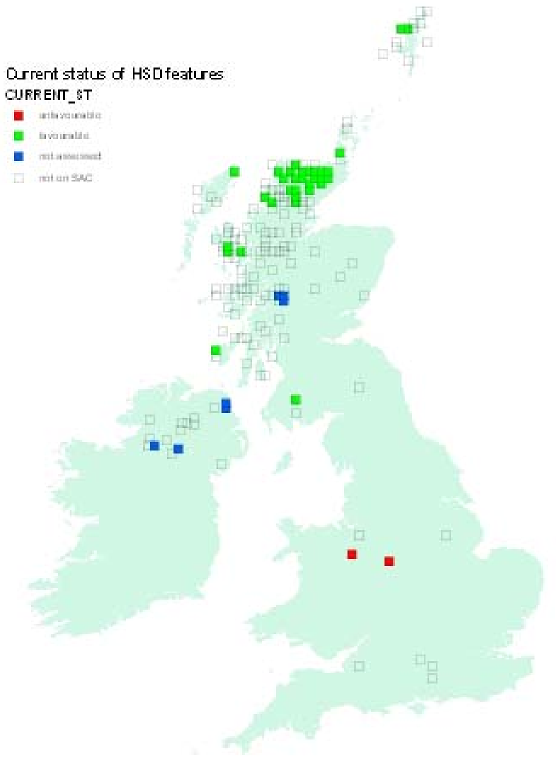
Notes
1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006.

Wider resource condition assessment

There is a lack of monitoring data for the wider countryside, unless lakes have been examined in individual projects, or have been assessed by other organisations. It is probable that dystrophic water bodies have received the least attention of all the freshwater lake habitat types. Risk assessments published in 2005, as part of the characterisation process for WFD purposes, provide information on pressures on all lake types across the UK, and monitoring has been instigated to provide supporting evidence. Prior to implementation of WFD-related monitoring, the UK's statutory environmental agencies monitored the water chemistry of lakes to which there was a discharge, covered under the Control of Pollution Act 1974. Invertebrates were also examined in certain water bodies. However, data from monitoring of dystrophic waters, outwith the CSM programme and the JNCC Standing Waters Database are limited.

Current Condition of H3160 based on CSM condition assessments (See Sections 4.2 and 7.2 for further information)

Map 4.2.1 SAC assessments



Map 4.2.2 Assessments strongly indicative of the condition on SSSI/ASSI(excluding English records)

Map 4.2.3 Assessments weakly indicative of the condition on SSSI/ASSIs

Not applicable

Key
<u>Red = unfavourable</u>, i.e. the square contains at least one SAC where this habitat feature is present and has been judged to be unfavourable
<u>Green = favourable</u>, i.e. the square contains at least one SAC where this habitat feature is present and has been assessed as favourable but there are no unfavourable SAC features
<u>Blue = SAC not assessed</u>, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
<u>Transparent = SAC feature not present</u>, i.e. the square does not contain any SAC features of this habitat type

Key*
<u>Green</u> – 80 – 100% of assessed features on 10km square are favourable
<u>Yellow</u> - 50 – 80% of assessed features on 10km square are favourable
<u>Orange</u> - 20 – 50% of assessed features on 10km square are favourable
<u>Red</u> - 0 – 20% of assessed features on 10km square are favourable
*This is the same key as was used for JNCC CSM Report 2006

4.3 Typical species

Typical species[2.5.3]: **None used**

Typical species assessment[2.5.4]: **Not applicable**

Examples of characteristic plants (typical species) listed in the EU Interpretation Manual for dystrophic lakes include: *Utricularia* spp., *Rhynchospora alba*, *R. fusca*, and *Sphagnum* species. As indicated above, typically in the UK, this habitat type supports *Sphagnum* species, *Utricularia minor*, *Juncus bulbosus*, *Potamogeton polygonifolius*, *Sparganium angustifolium* (JNCC 2006). However, although these taxa are typical of dystrophic waters, they may also be found in oligotrophic lakes. In any individual dystrophic lake, the number of macrophyte species may be limited to one or two, with a proportion of dystrophic water bodies supporting no macrophyte taxa. However, this is not an unnatural or uncharacteristic situation. If considering only dystrophic water bodies supporting macrophyte species, for which there are data in the JNCC Standing Waters Database, *Sphagnum* species are present in all group A dystrophic waters (Duigan *et al*. 2006). All plant species characteristic of dystrophic waters in the UK were recorded during CSM of standing water features of SAC and SSSI. The following information on occurrence of species is presented in the *New Atlas of the British and Irish Flora* (Preston *et al*. 2002), but losses compared with the 1962 Atlas are not necessarily linked to dystrophic waters, as indicated above. Although overall records of *Utricularia minor* are fairly stable, there has been a decrease in records from southern and eastern England. *Sparganium angustifolium* records have increased, though there have been some losses in eastern Scotland. *Potamogeton polygonifolius* has declined in south-west England, but remains a commonly recorded plant elsewhere. Records for *Juncus bulbosus*, which include submerged and edge plants, indicate stability, though there has been a slight decline, mainly in England.

None of the species for which trends are available are particularly faithful to the habitat, so available trend data at the UK-level is not particularly meaningful and has not been utilised here. Without more specific information, no firm conclusions can be drawn about the status of typical species for this habitat.

Table 4.3.1 Trends and faithfulness of selected typical species for H3160

Typical species	Faithfulness to habitat H3160 (based on analysis of NVC synoptic tables)	Trend over last 25 years from BSBI atlas – based on change in 10 km square occupancy across UK (see http://www.jncc.gov.uk/page-3254)
Sparganium angustifolium	Low	Significant increase, of >=25% in 25years
Potamogeton berchtoldii	Very low	Significant increase, of >=25% in 25years
Potamogeton gramineus	Very low	Significant increase, of >=25% in 25years
Juncus bulbosus	Very low	Significant increase, but <25% in 25years
Potamogeton obtusifolius	Very low	Significant increase, of >=25% in 25years

4.4 Conclusions on specific structures and functions (including typical species)

Conclusion[2.6.iii]: **Favourable**

The EC Guidance states that where “structures and functions are in good condition and no significant pressures exist”, the conclusion should be Favourable. In the UK, this was generally taken to mean that less than 5% the habitat area was in unfavourable condition.

Presently, structure and function of the existing habitat is mainly good. CSM site condition assessments show that nearly all of SACs for this habitat are in favourable condition. Comparable data for ASSIs/SSSIs show that 90% of features assessed are considered favourable. As quantitative data on dystrophic lakes and pools are limited, the confidence in this conclusion is low.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

- Protection within designated sites

Part of the resource of H3160 lies within SACs with management measures specifically aimed at maintaining and enhancing the features for which they are designated, and to address some of the pressures listed within section 4.1 and the future threats listed in section 5.1.2. A proportion of the resource of this habitat also lies within the SSSI/ASSI series where similar management measures are in place. In accordance with the WFD, SAC waters are in a protected sites register. Although the WFD has a size threshold of 50 ha for lakes – and therefore excludes every dystrophic lake in the UK – for characterisation, it is intended for the protection of all surface waters – but the Environment Agency are considering SAC water bodies to a minimum size of 5 ha, which is still bigger than most dystrophic lakes. In addition, protection of dystrophic waters of SSSIs is likely to occur through the provisions of the Nature Conservation (Scotland) Act 2004, in which there is a duty for all public bodies to consider biodiversity, but also specific duties for Scottish Environment Protection Agency (SEPA) in safeguarding the SSSI series, and in considering pollution, not only within boundaries of SSSIs, but also in the catchment areas of water features.

- Water Framework Directive

In addition to the drive for improvement generated by the SAC and SSSI network, the Water Framework Directive (WFD) is adding considerable impetus for widespread action on issues affecting the resource of this habitat such as abstraction licences and pollution. However, size thresholds make it extremely doubtful that WFD will have much impact (see above).

- CARs

The Water Environment and Water Services (Scotland) Act 2003 has led to the provisions of the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CARs), which allow for different levels of authorisation for engineering, abstraction and polluting activities, including septic tanks. There are also possibilities for reducing impacts of the built environment, through use of conditions and agreements in the Planning process. It is proposed that diffuse agricultural pollution will be addressed in a similar manner to the processes involved with the CARs. There will also be Land Management Contracts and voluntary action. However, there will be challenges in ensuring compliance, particularly with the widespread General Binding Rules (GBRs). In a recent Scottish Executive consultation on proposed GBRs, conservation and environmental bodies judged these to be inadequate.

5.1.2 Main future threats[2.4.11]

WFD-related risk assessments refer to all types of water body, not only dystrophic waters. Of 309 water bodies in the Scotland River Basin District, 167 were at risk (54.1%). The reasons for this were changes in morphology (37%), abstraction and flow regulation (34%), diffuse pollution (17%), point source pollution (11%) and alien species (1%). Of 32 lake water bodies assessed in the Solway-Tweed RBD, 21 (65.6%) were at risk. The reasons for this were again changes in morphology (33%), abstraction and flow regulation (27%), diffuse pollution (31%), point source pollution (5%) and alien species (5%).

The most obvious major future threats to H3160 are listed below, several of which are referred to in Section 4.1. The related EC codes are shown in brackets.

- Pollution (**421 disposal of household waste, 701 water pollution, 952 Eutrophication**)

- Non-native species (**954 invasion by a species, 971 competition**)

Presently, a coordinated approach to the way in which non-native species are dealt with is absent and despite the requirement for good ecological status, these will not necessarily be dealt with under WFD. A number of invasive alien species has been added to Schedule 9 of the Wildlife and Countryside Act, whilst the Scottish Executive is also considering a no-sale order under the Nature Conservation (Scotland) Act. However, as these species have already been recorded in the UK, it is likely they will continue to spread and deliberate planting is difficult to prove. The main invasive species is the Australian swamp stonecrop *Crassula helmsii*.

- Air pollution (**702 Air pollution**)

Although naturally acid, acid deposition from air pollution can affect the chemistry and ecology of dystrophic lakes. They are generally considered less sensitive than oligotrophic lakes, because high DOC levels in the water column help to buffer against acid episodes. However, it has not been possible to undertake an assessment of potential impact based on critical loads because of the poor equivalence between this habitat and those for which critical loads are set (see Technical Note III).

5.2 Future condition (as regards range, area covered and specific structres and functions)

5.2.1 CSM condition assessments

The CSM condition assessments reported in Sections 4.2.1-2 provide a basis to predict the potential future condition of H3160 in the UK. This involved treating all assessments currently identified as either favourable or unfavourable recovering as future-favourable: remaining categories were treated as future-unfavourable – see Table 5.2.1.1. There are a number of caveats to this approach, which are set out beneath this table.

SAC condition assessments

Table 5.2.1 and Map 5.2.1 summarise the predicted potential future condition of H3160 on UK SACs. This is based on the approach described above. The maps give an impression of the overall spread of where future-unfavourable and future-favourable sites are predicted to occur (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 99% of the area and 94% of the number of assessments fall within the future-favourable category; and
- at least 15% of the total UK habitat area falls within the future-favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H3160 based on current CSM condition assessments. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Future condition	Present condition	Area (ha)	Number of site features
Future-unfavourable	Unfavourable declining		
	Unfavourable no change		
	Unfavourable unclassified	20	1
	Total	20	1
	% of assessments	***01%***	***06%***
	% of total UK extent	***0%***	***Unknown***
Future-favourable	Favourable maintained	1,666	13
	Favourable recovered		
	Unfavourable recovering	04	1
	Favourable unclassified	23	2
	Total	1,693	16
	% of assessments	***99%***	***94%***
	% of total extent	***15%***	***Unknown***

Note that the scenario presented above is based on the same information as used to construct the Table 4.2.1. It is based on the following premises:
(i) the unfavourable-recovering condition assessments will at some point in the future become favourable;

(ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;

(iii) sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.

IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

SSSI/ASSI condition assessments

Table 5.2.2 and Maps 5.2.2 and 5.2.3 summarise the predicted potential future condition of H3160 on UK SSSI/ASSIs. This is based on the approach described above and utilises condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical Note II for details of methodology behind this). The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 100% of strongly indicative assessments fall within the future-favourable category.

Table 5.2.2 Predicted future condition of H3160 on SSSI/ASSIs based on CSM assessments that were judged to be either strongly or weakly indicative of the condition. See notes below table and Technical Note II for further details

Future condition	Present condition	Number of assessments	
		Strongly indicative assessments (Category 1)	**Weakly indicative assessments (Category 2)**
Future-unfavourable	Unfavourable declining		
	Unfavourable no change	1	
	Unfavourable unclassified		
	Total		
	% of assessments	***10%***	***%***
Future-favourable	Favourable maintained	6	
	Favourable recovered		
	Unfavourable recovering		
	Favourable unclassified	3	
	Total	9	
	% of assessments	***90%***	***%***

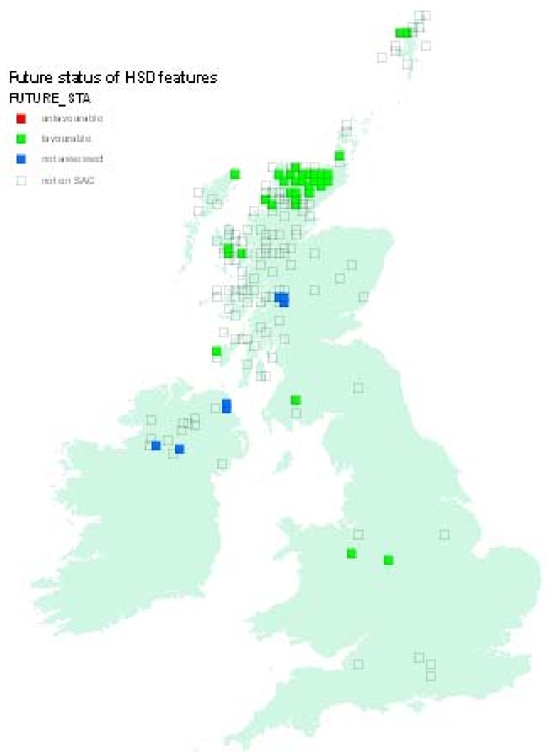
Note that the scenario presented above is based on the same information as used to construct the Table 4.2.2. It is based on the following premises:

(i) the unfavourable-recovering condition assessments will at some point in the future become favourable;

(ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;

(iii) sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.

IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

Predicted Future Condition of H3160 based on CSM condition assessments (See Sections 5.2 and 7.2 for further information on these maps)		
Map 5.2.1 SAC assessments	**Map 5.2.2** Assessments strongly indicative of the condition on SSSI/ASSIs (excluding English records)	**Map 5.2.3** Assessments weakly indicative of the condition on SSSI/ASSIs
		Not applicable
Key Red = future-unfavourable, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable Green = future-favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type	Key* Green – 80 – 100% of assessed features on 10km square are favourable Yellow - 50 – 80% of assessed features on 10km square are favourable Orange - 20 – 50% of assessed features on 10km square are favourable Red - 0 – 20% of assessed features on 10km square are favourable *This is the same key as was used for JNCC CSM Report 2006	

5.3 Conclusions on future prospects (as regards range, area covered and specific structres and functions)

Conclusion[2.6.iv]: Favourable

The EC Guidance states that where “habitat prospects are good with no significant impacts from threats expected and long-term viability assured”, the judgement should be Favourable. In the UK, this was generally taken to mean that range and/or area are stable or increasing, and more than 95% of the habitat area is likely to be in favourable condition in 12-15 years.

Presently, structure and function of the existing habitat is mainly good. CSM site condition assessments show that nearly all of SACs for this habitat are in expected to remain in favourable condition. Comparable data for ASSIs/SSSIs show that 90% of features assessed are expected to remain favourable. In Northern Ireland, range has stabilised, whilst area losses are now normally due to natural processes. Throughout the UK, range and area in the wider countryside have been lost to drainage, forestry and peat removal and losses are unlikely to be restorable. However, the decline of the associated blanket bog habitat has been slowing, so it is assumed that prospects for the remaining habitat and associated dystrophic waters are improved. It is likely that decline is slowing and there are drivers for attempting to address threats and to improve dystrophic lakes. However, dealing with threats will remain problematical. Lost range and area are unlikely to be restorable, degraded designated sites may take a long time to address, and risks remain in the wider countryside. Alien species will remain an extremely difficult issue.

6. Overall conclusions and judgements on conservation status

Conclusion[2.6]: Favourable

All parameters have been assessed as Favourable, with the exception of habitat area, which was unknown.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Current range is stable and not less than the favourable reference range.	3
Area covered by habitat type within range	Unknown	Insufficient information to make a judgement.	3
Specific structures and functions (including typical species)	Favourable	Structures and functions considered to be in good condition with no significant pressures.	3
Future prospects (as regards range, area covered and specific structures and functions)	Favourable	Habitat prospects over the next 12-15 years considered to be good with no significant impacts from threats expected and long-term viability assured.	3
Overall assessment of conservation status	Favourable	Three individual judgements are Favourable, one is Unknown.	3

Key to confidence in judgement: 1 = High; 2 = Medium; 3 = Low

7. Annexed material (including information sources used 2.2)

7.1 References

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Map data sources

JNCC International Designations Database. Joint Nature Conservation Committee.

UK Lakes Database (compiled by the Inter-agency Freshwater Specialist Working Group). Joint Nature Conservation Committee.

7.2 Further information on CSM data as presented in Sections 4.2 and 5.2

Table 7.2.1 Summary of the coverage of the data shown in Tables 4.2.1 and 5.2.1

Data	Value
Number of SACs supporting feature (a)	23
Number of SACs with CSM assessments (b)	17
% of SACs assessed (b/a)	74
Extent of feature in the UK – hectares (c)	11,470
Extent of feature on SACs – hectares (d)	2,410
Extent of features assessed – hectares (e)	1,713
% of total UK hectarage on SACs (d/c)	21
% of SAC total hectarage that has been assessed (e/d)	71
% of total UK hectarage that has been assessed (e/c)	15

Notes

1. Extent of features on SACs (d) includes only those features that have been submitted on the official Natura 2000 data form as qualifying features. This figure is based on the habitat extent figures presented on standard Natura 2000 data forms.
2. The data included are from CSM assessments carried out between April 1998 and December 2006. NB: these include additional and some up-date data form those used in the six year report produced by JNCC (Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC)

Table 7.2.2 Summary of grid square map data shown in Maps 4.2.1-3 and 5.2.1-3

Status	Number of squares	Proportion of all squares
Current – Unfavourable (red)	2	1%
Current – Favourable (green)	32	19%
On SAC but not assessed (blue)	7	4%
Not on SAC (transparent)	128	76%
Total Number of 10km squares (any colour)	169	100%
Future – Unfavourable (red)	0	0%
Future – Favourable (green)	34	20%