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 :

H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation

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

Please cite as: Joint Nature Conservation Committee. 2007. *Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006*. Peterborough: JNCC. Available from: www.jncc.gov.uk/article17

H3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation

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 H3150 and its relations with UK classifications.

Natural eutrophic lakes have moderately high background nutrient levels resulting in higher natural productivity than other lakes, and are typically species-rich. They are typically found within catchments with sedimentary rocks or where there are significant drift deposits. These catchments supply lakes with levels of nutrients sufficient to support extensive growths of submerged and floating plants. However, many such lakes have been damaged by nutrient enrichment, resulting in hypertrophic conditions and a reduction in species-richness. In some cases submerged plants have been lost altogether and filamentous algae, or more commonly, phytoplankton have become dominant.

In the UK, natural eutrophic lakes typically contain aquatic macrophyte communities dominated by pondweeds *Potamogeton* spp., spiked water-milfoil *Myriophyllum spicatum*, yellow water-lily *Nuphar lutea*, and occasionally by associations of stoneworts *Chara* spp. This habitat type and H3140 (Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.) share many of the same characteristic species, but differ in the proportions in which they occur. H3140 lakes have a lower background nutrient status and productivity and are found in areas of base-rich geology, often on limestone but also on drift deposits where these are rich in calcium or other cations. However, it is difficult to reliably distinguish between these lake types, and indeed mildly enriched *Chara* lakes may have a flora indistinguishable from natural eutrophic lakes. Equally, many newly created waterbodies in lowland catchments may develop extensive *Chara* beds within a short time but these are naturally replaced by more eutrophic species due to succession.

Except in the most northerly areas, most eutrophic lakes are fringed by reedmace - common reed *Scirpo - Phragmitetum* associations. More northern shorelines may have reed-canary grass - shoreweed - spike-rush *Phalaris - Littorella - Eleocharis* associations. Most eutrophic lakes are formed on soft rocks and have relatively fine substrates but wave-washed rocky shores can form an important part of the habitat on larger lakes. There is a coastal variant of this habitat type where periodically brackish conditions can occur due to saline influences. Many examples are very shallow (<3 m mean depth) due to modes of lake formation on soft rock geology. Shallow lakes present particular challenges for management due to the interaction of top-down (trophic interactions) and bottom-up (nutrient supply) controls on productivity (e.g. Scheffer *et al*. 1993).

Therefore, three main sub-types of eutrophic lake can be identified in the UK:

- Southern eutrophic lakes which often support extensive marginal or hydroseral communities.
- Northern or western eutrophic lakes with more exposed shorelines and *Phalaris* - *Littorella* – *Eleocharis* shore communities.
- Coastal eutrophic lakes which receive occassional salt and nutrient inputs from sea spray and may be subject to brackish periods.

Table 1.1.1 Summary description of habitat H3150 and its relations with UK vegetation/habitat classifications.

Classification	Correspondence with Annex I type	Comments
British Lakes Classification (Duigan *et al.* 2006)	Lake groups: E (part), G (part) and I (part).	The lakes classification does not correspond directly with H3150 but the type is represented by lakes across these three vegetation groups. Within these three vegetation groups there are many lakes which have a poor representation of *Magnopotamion* or *Hydrocharition* assemblages).
Phase 1 Habitat Classification	G1.1 Standing water: eutrophic (part).	There is reasonable good correspondence between this Phase 1 habitat type and H3150.
BAP	Broad reporting category: Standing open water and canals. Priority habitat type: eutrophic standing waters.	The priority BAP habitat 'eutrophic standing waters' broadly corresponds with H3150.
EU Interpretation Manual	PAL.CLASS.: 22.13 x (22.41 or 22.421) Description: Lakes and ponds with mostly dirty grey to blue-green, more or less turbid, waters, particularly rich in dissolved bases (pH usually > 7), with free-floating surface communities of the *Hydrocharition* or, in deep, open waters, with associations of large pondweeds (*Magnopotamion*).	PAL.CLASS: Palaearctic codes from the classification of Palaearctic habitats, based upon the CORINE classification.
Water Framework Directive (WFD) Lakes Typology (UKTAG 2004)	High Alkalinity (all depth subtypes) (part). Brackish (all depth subtypes) (part).	The majority of H3150 lakes will correspond closely with the high alkalinity type lakes in the UK WFD typology. However, this WFD type also includes some *Chara* lakes (3140). Some coastal examples may correspond to the WFD brackish type.

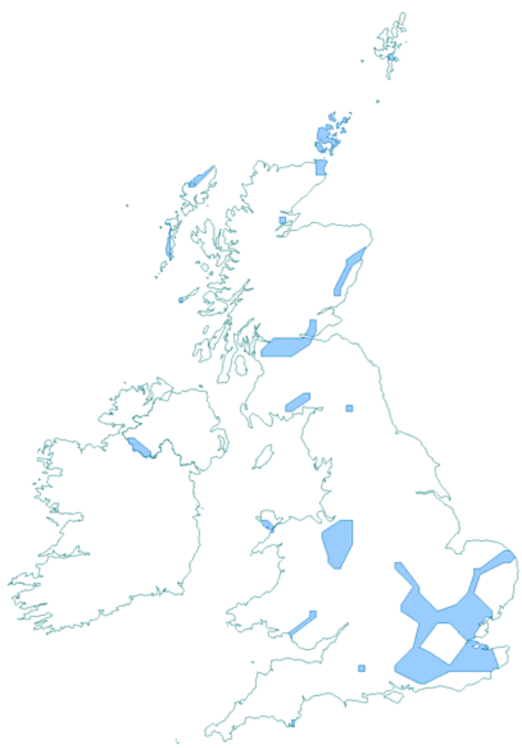
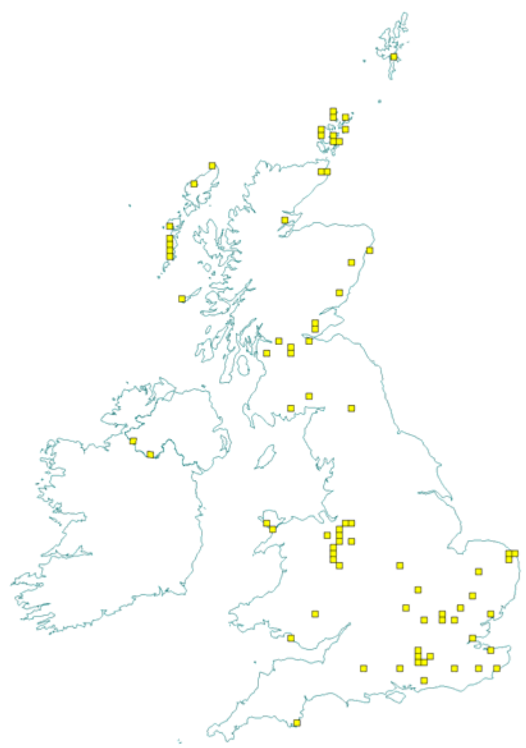
2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: **25,228 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 H3150 in the UK. Natural eutrophic lakes which display characteristics typical of reference conditions (extensive and species rich submerged plant communities) are rare throughout the EU, due to pollution, but the exact status of the habitat type is unknown. Natural eutrophic lakes are widespread but fairly uncommon being restricted to particular geological conditions. Palaeolimnological work has indicated that some high alkalinity lakes traditionally considered within this category may have supported extensive *Chara* beds and hence might correspond more closely to H3140 (*Chara* lakes). Good examples of H3150 are now rare although do have a wide and scattered distribution. Many sites including those designated as Special Area of Conservation (SAC)/ Site of Special Scientific Interest (SSSI) are degraded to some extent and require restoration, with the best examples of *Magnopotamion* vegetation occurring in northern Britain where agricultural pressures are less. *Hydrocharition*-type vegetation is rare in lakes and in the UK seems to be confined to Northern Ireland. In the rest of the UK the most species-rich expression of this community type is found in the Norfolk Broads; however, most of the lakes are enriched and relict *Hydrocharition* communities persist in the peripheral grazing marsh and ditch systems. The following maps may underestimate the potential number of H3150 lakes but are thought to be a good indication of range and distribution.

Map 2.1.1 Habitat range map [1.1] for H3150	**Map 2.1.2** Habitat distribution map [1.2] for H3150
	
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: 79

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. Very small water bodies may have been lost through land drainage activity and some examples in coastal location may have been lost as a result of dynamic processes but in general the number of lakes is likely to have remained constant. However, many water bodies of this type are severely degraded as a result of nutrient enrichment. Consequently, in many areas of the range there are now no good examples of this habitat type and the characteristic vegetation is restricted to small waters (ponds and ditches) within catchments with lower anthropogenic pressure. The broad range of H3150 is considered to have remained stable since 1994.

2.3 Favourable reference range [2.5.1]

Favourable reference range: **25,228 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, 25,228 km^2, has been set as the favourable reference area. Reasons for this are discussed below.

It is very difficult to estimate the potential range of this habitat with any certainty and Maps 2.1.1 and 2.1.2 are only indicative. At a broad level, the potential range of this habitat type corresponds with the extent of soft rock or drift geology in the UK. This is broadly analogous to the lowland areas and there are very few examples which occur above 300 m. However, within this range there are lakes with a strong base-rich hydrological influence and hence lower nutrient status which might be expected to support extensive *Chara* rather than *Magnopotamion* vegetation. Determining the background nutrient status of water bodies is difficult particularly where there is a long history of nutrient enrichment and degradation.

At an individual lake level it is possible to use palaeolimnological techniques to reconstruct past conditions but to establish a picture of the overall resource a more global approach is necessary. The geology of the catchment is an indicator of the potential background status of a site but establishing the exact make up of geology and soils within a catchment requires in-depth survey and the link between geology and nutrient load is complex.

This habitat is widely distributed across the UK, and the range shows little fragmentation. The concern is mainly the quality of the existing water bodies which have been impacted rather than lost. Given the wide range and distribution therein, the range is considered to be sufficient for H3140 to maintain itself. The range is considered to equate the potential range and the favourable reference range.

2.4 Conclusions on range

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

The potential range of this habitat has not changed significantly (in that the underlying geology remains unchanged) since 1994 but the extent of good examples is now restricted to a limited part of the range.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **Unknown**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **1 = only or mostly based on expert opinion**
Quality of data [2.4.4]: **Poor**

Table 3.1.1 provides information on the area of H3150 in the UK. There are no comprehensive data available for the extent of this habitat type in England, Scotland and Wales, as it is difficult to distinguish natural eutrophic lakes from degraded (nutrient enriched) lakes using existing data sources. For Northern Ireland, comprehensive data are available from the Northern Ireland Lakes Survey (Wolfe-Murphy *et al*.

1992). The figure includes lakes types XII, XIII and XIV as described by the survey, and Upper Lough Erne. Lough Neagh has not been included as it is not naturally eutrophic. The method employed by the UK Lakes Habitat Action Plan (HAP) steering group which equates naturally eutrophic lakes with ‘high alkalinity’ (>1000 μ_{eq}/l) lakes (see Section 2.2) generates a total area of 41,224 ha for England, Scotland and Wales (GB). However, this is likely to be an overestimate because it is not possible to distinguish naturally eutrophic lakes from *Chara* lakes (i.e. H3140) on the basis of alkalinity data. Hindcast data suggests that perhaps as little as 7% of the total number of high alkalinity lakes may be natural eutrophic lakes, but there is considerable uncertainty around this figure. The account for H3140 discusses this problem in greater detail.

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 SAC or 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 H3150 in the UK

	Area (ha)	**Method** [2.4.3]	**Quality of data** [2.4.4]
England	Present	-	-
Scotland	Present	-	-
Wales	Present	-	-
Northern Ireland	4,420	3	Moderate
Total UK extent [2.4.1]	Unknown	1	Poor

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 [2.5.2]

Favourable reference area: **Unknown**

The potential range is considered to be where conditions exist for having or restoring good examples of this habitat.

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**

The area of H3150 is difficult to estimate accurately due to the problems in distinguishing naturally eutrophic lakes from other lakes which have suffered enrichment. Existing data on H3150 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]

Many of the factors affecting this habitat type are common to other standing water types in the UK and across Europe as a whole. The pressures may operate at the catchment level and hence largely be related to land use and management practices or be 'in-lake' pressures such as fish stocking and invasive plant species. The following overview indicates the key factors, highlighting particular issues for H3150 where appropriate. The related EC codes are shown in brackets.

- Pollution (**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 1998). Palaeolimnological techniques have been applied to a number of lakes of this type with reference and historic nutrient conditions inferred from diatom transfer functions (e.g. Bennion *et al*. 2004). This palaeolimnological work supports the widely held view that many lakes in lowland UK have suffered considerable enrichment. However, there are problems with applying this approach to shallow eutrophic lakes due to dominance of non-planktonic diatoms in cores and poor preservation (Sayer 2001) Nevertheless, analysis of plant macrofossils from sediment cores does indicate significant shifts in plant community composition which appear to correspond to changes in trophic status.

The main driver of this eutrophication is phosphorus although there is increasing evidence that (in some lakes at least) increased nitrogen may reduce submerged plant diversity (e.g. James *et al*. 2005). Nitrate may become increasingly important as a driver if lakes already have elevated phosphate levels.

These nutrients have both point source and diffuse origins. Significant progress has been made in reducing significant point sources through investment in phosphorus stripping at major waste water treatment works. However, few lakes receive such discharges directly. Small discharges, many of which are unconsented, are generally of greater significance for smaller standing waters. Diffuse sources are more difficult to manage and are of particular concern for this habitat type. Generally H3150 is found in catchments with fine easily erodable soils combined with intensive land management practices. Recovery of sites impacted by elevated nutrient loads is generally slow due to the limited flushing potential of many smaller lakes and internal loading issues. The functioning of shallow lakes and the potential for alternative stable states (plant dominated, clear water or algal dominated, turbid water) to persist at moderate levels of enrichment (Scheffer *et al*. 1993) has the result that tackling enrichment problems is complex. Remedial action may require both reductions in nutrient load and biomanipulation to address top-down processes (grazing of phytoplankton). Recent work has indicated that in the Norfolk Broads an extensive area of this habitat type, pollution from tributyltin (TBT) used as a boat anti-fouling agent may have played a role in causing a regime shift from plant dominated conditions (Sayer *et al*. 2006). In the UK this issue is likely to be specific to the Norfolk Broads as TBT has not been used widely elsewhere in freshwaters.

In England and Wales, a review of all discharge consents affecting SACs is being undertaken, which may lead to reductions in pollution stress on this Annex 1 habitat. In Scotland, work has been undertaken transferring consents under COPA to consents under the Controlled Activities Regulations. A considerable amount of improvement work is also being undertaken on SSSI lakes under national legislation. The EU Water Framework Directive (WFD) is unlikely to drive further improvements for many lakes other than those already designated as SAC due to a 50 ha size threshold being applied in the UK. Note that in Scotland the 50 ha threshold refers to characterisation, but smaller water bodies will be protected. WEWS (Scotland) and the associated Controlled Activities Regulations apply to all surface waters, groundwaters and wetlands. In England, a major supportive campaign (the England Catchment Sensitive Farming Delivery Initiative, ECSFDI) has been launched to help farmers adopt practices that control nutrient and silt pollution, in advance of the application of new policies including reserve regulatory powers. The ECSFDI is focused on the catchments of SACs and SSSIs under particular threat from agricultural pollution. Incomplete understanding of the relative importance of diffuse loads for many lakes may require this initiative to be broadened in scope at a later stage. It is likely that the supportive approach of the ECSFDI will bring about limited improvement, and that new regulatory measures will need to be applied to control agricultural sources effectively. In Scotland, it is intended that diffuse pollution will be addressed with a system similar to the CARs (i.e. having General Binding Rules, Registration or Licensing, and possibly targeted controls covering particular areas (the consultation is ongoing), but also voluntary action and Land Management Contracts.

- Hydrological Pressures (**853 Management of water levels, 920 Drying up, 930 submersion**)

The location of many lakes of this type coincides with high population density and intensive arable land use. Consequently there is generally a high anthropogenic demand on already scarce water resources. Abstractions from ground and surface water can lead to reduced flushing rates and changes in water level fluctuations in some lakes. The impacts of hydrological pressures are generally associated with damage to marginal or hydroseral communities or changes in residence time, which interacts with water quality. Sites with characteristic hydrological regimes such as the groundwater-fed naturally fluctuating water bodies in Breckland, Norfolk are particularly susceptible to abstraction pressure. Global climate change may exacerbate these hydrological pressures. Some water bodies of this type are threatened by sea level rise, in particular the Norfolk Broads are predicted to become brackish or saline over the next 50-100 years.

- Recreation Pressures (**220 Leisure fishing**)

The major recreational pressure affecting this habitat type is angling and the associated stocking of many lakes with benthic feeding fish, particularly carp. In recent years there has been huge growth in this area of coarse angling and most lakes which are easily accessible to anglers have some level of stocking (legal or illegal). The impact of high biomass of benthivorous fish is well documented and in England there is an agreement on stocking to designated water bodies. However, in many circumstances stocking is historic or illegal and there are currently no mechanisms or funds to remove fish or reduce biomass to an appropriate level. A localised issue is the conflict between recreational water sports and conservation interests where abundant growths of aquatic plants interfere with recreation. This is generally dealt with on a site specific basis.

- 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 spicatum*) seem to be able to rapidly colonise and change the ecology of small standing water habitats. *Crassula* is now widespread in much of England (>10,000 sites) and there are increasing numbers of records from Scotland and Wales. Both introduced *Elodea* species (*E. canadensis* and *E. nuttallii)* are now widespread in lakes in the UK. Although in some areas these species seem to behave as a natural component of the flora, new introductions can cause significant problems as these species spread north.

Tackling non-native species issues is difficult and the emphasis must be on preventing problems. The withdrawal of diquat for aquatic use has further restricted control options for species such as *Crassula*. There is an increasing awareness of non-native species as a problem in the UK but as yet there is no organisation with overall responsibility for control of problems. A strategic approach to managing both problems and risks with the full support of all stakeholders is being advocated as the appropriate response.

- Grazing (**140 Grazing**)

The presence of large numbers of feral geese is a localised issue which may be significant where it occurs. Large congregations of geese (usually Canada geese *Branta canadensis*) can exert considerable grazing pressure on submerged vegetation and also import nutrients when feeding elsewhere. Additionally, geese can cause considerable damage to marginal and emergent fringing vegetation.

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

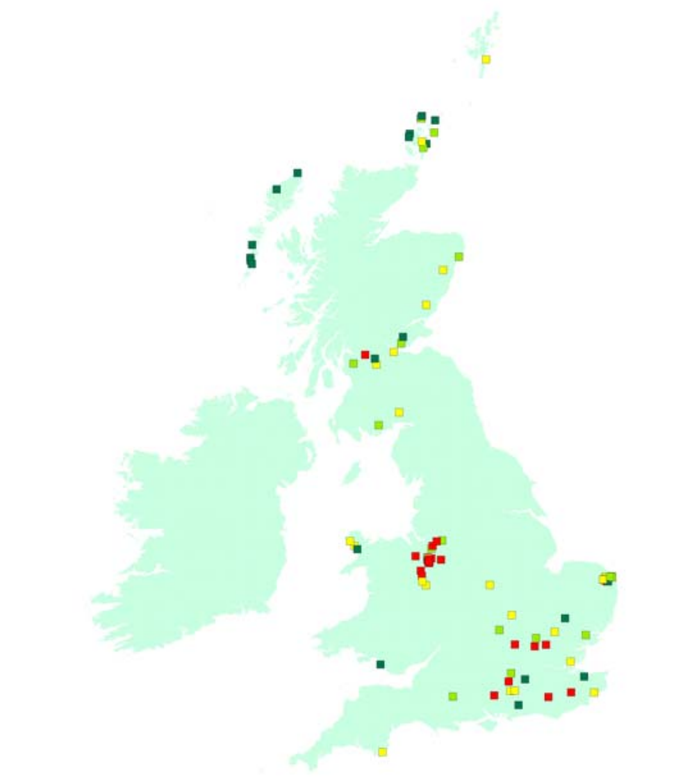
Based on an assessment of relevant literature, this habitat is potentially sensitive to air pollution, but it has not been possible to undertake an assessment of potential impact based on critical loads because of the poor equivalence between this habitat and those for which critical loads are set (see Technical note III). Acidification arising from atmospheric deposition is unlikely to a major issue for H3150 as there is generally good buffering capacity within catchment soils. Managing acidification risk is focused on the determination of critical loads for sites and predicted exceedance of these loads. There has been a general trend of declining SO_X deposition in the UK but NO_X loads continue to increase with possible implications for eutrophication as well as acidification.

4.2 Current condition

An analysis of data collated in the GB Lakes Inventory (Hughes *et al*. 2004) has generated Map 4.2.1.

Map 4.2.1 was generated by screening for lakes with modelled reference (not impacted) total phosphorus concentrations of 25µg/l P to exclude high alkalinity lakes that are naturally mesotrophic. There are errors and uncertainties around the modelling approach for reference phosphorus and where these data were not available it was not possible to map lakes. Notwithstanding the uncertainties surrounding this analysis, Map 4.2.1 does suggest that the range of good quality examples of H3150 has reduced significantly. The modelled current phosphorus concentrations indicate that 44% of H3150 is currently unfavourable due to nutrient enrichment (the main pressure affecting this habitat type). This decline in the range of good quality examples can probably be associated with increasing population growth, particularly in England and the widespread intensification of agriculture. Map 4.2.1 supports the view that there are very few good examples of H3150 across large areas of the range. In particular, examples of the southern variant as described in section 1 that could be considered to be in favourable condition are now very rare. The majority of H3150 lakes that have escaped severe nutrient enrichment are in the northern and western parts of the range.

Map 4.2.1 Condition of H3150 as determined by modelled reference phosphorus concentration (>25µg/l P).



Coloured points correspond to modelled current total phosphorus concentration (export coefficient modelling). Modelled total phosphorus concentrations can be broadly equated with condition (as affected by nutrient enrichment):

- <50µg/l (blue): favourable (high confidence)
- 50-100µg/l (green): favourable (low confidence)
- 100-200µg/l (yellow): unfavourable (medium confidence)
- >200µg/l (red): unfavourable (high confidence)

Note: Many of the water bodies shown here are <5ha in area.

Data source: All data from GB Lakes Inventory (Hughes *et al*. 2004).

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 H3150 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 H3150. 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:

- 39% of the area and 43% of the number of assessments was unfavourable.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H3150. 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	391	3
	Unclassified	41	2
	Recovering	122	1
	Total	554	6
	% of all assessments	***39%***	***43%***
	% of total UK resource	***unknown***	***unknown***
Favourable	Maintained	777	7
	Recovered		
	Unclassified	79	1
	Total	856	8
	% of all assessments	***61%***	***57%***
	% of total UK resource	***Unknown***	***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

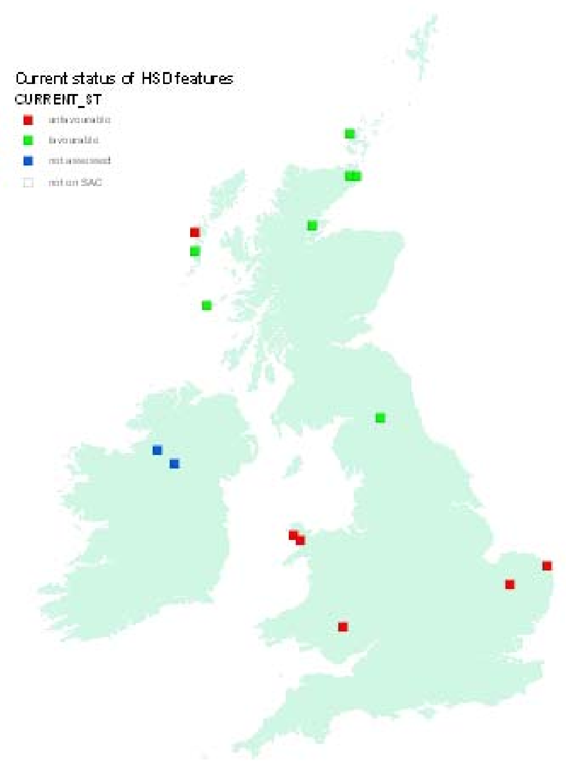
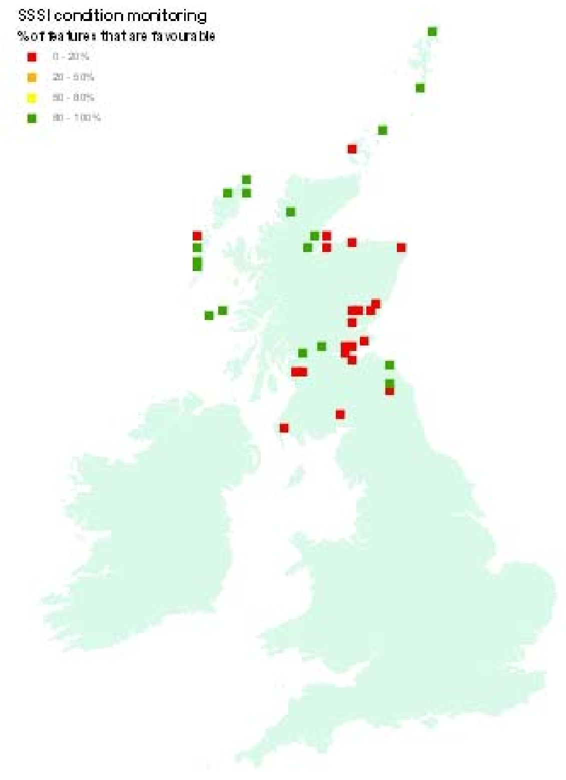
Tables 4.2.2, 4.2.3, 4.2.4 and Maps 4.2.2 and 4.2.3 summarise the CSM condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs. This was based on expert sub-setting of SSSI data in each country agency, there were no relevant ASSI assessments available for Northern Ireland. 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:

- 60% of strongly indicative assessments and 31% weakly indicative assessments in Scotland were unfavourable;
- 48% of the area of strongly indicative assessments in England was unfavourable; and
- 100% of the area of strongly indicative assessments in Wales was unfavourable.

Table 4.2.2 CSM condition assessment results for SSSI/ASSIs in England, Scotland and Wales that were judged to be either strongly or weakly indicative of the condition of H3150 on SSSI/ASSIs. See notes below table and Technical note II for further details

Condition	**Condition sub-categories**	**Strongly indicative assessments (Category 1)**		**Weakly indicative assessments (Category 2)**
		England and Wales (area)	**Scotland (count)**	**Scotland (count)**
Future-unfavourable	Declining	54.26	9	2
	No change	1273.36	11	1
	Unclassified			
	Recovering	156.41	1	2
	Total	1484.03	*21*	*5*
	% of assessments	***55%***	***60%***	***31%***
Future-favourable	Maintained	1215.84	14	11
	Recovered			
	Unclassified			
	Total	1215.84	14	11
	% of assessments	***45%***	***40%***	***69%***

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.
(iv) 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.
(v)The data included are from CSM assessments carried out between April 1998 and December 2006
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.

<table>
<tr><td colspan="3">Current Condition of H3150 based on CSM condition assessments (See Sections 4.2 and 7.2 for further information)</td></tr>
<tr><td>Map 4.2.1 SAC assessments</td><td>Map 4.2.2 Assessments strongly indicative of the condition on SSSI/ASSIs in Scotland</td><td>Map 4.2.3 Assessments weakly indicative of the condition on SSSI/ASSIs in Scotland</td></tr>
<tr><td>
</td><td>
</td><td>
</td></tr>
<tr><td><u>Key</u>
<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</td><td colspan="2">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</td></tr>
</table>

4.3 Typical species

Typical species[2.5.3]: None used
Typical species assessment[2.5.4]: Not applicable

Many of the characteristic species also occur across a range other standing water habitats – ponds, ditch systems and canals and hence any data on the distribution of these species is likely to overestimate the extent of H3150. Nevertheless, the *New Atlas of the British and Irish Flora* (Preston *et al*. 2002) clearly demonstrates losses of sites for *Stratiotes aloides* (47 10 km^2 occurrences pre-1970 compared with 15 during 1987-99). The other typical species show little change or indeed minor increases in numbers of 10 km^2 occurrences but this is largely a reflection of greatly increased survey effort for aquatic species in latter years and a consequence of interpreting records at the 10 km^2 scale. All of the typical species are widely held to have declined in actual numbers of sites occupied; in part this is likely to be linked to deterioration of type H3150 standing waters. However, it was not possible to assess the faithfulness of these species to the habitat, so available trend data at the UK-level is not particularly meaningful and has not been utilised here.

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

Conclusion[2.6.iii]: Unfavourable – Bad

The EC Guidance states that where "more than 25% of the area of the habitat is unfavourable as regards its specific structures and functions", the conclusion should be Unfavourable – Bad. In the UK this was generally taken to mean that more than 25% of the habitat area in unfavourable condition.

The current status of structures and functions of H3150 is unfavourable. In common with most lake types in the UK natural eutrophic lakes have suffered significantly from nutrient enrichment with between 44% and 59% likely to be unfavourable due to eutrophication pressures (see sections 2 and 3). In addition some lakes are affected by in-lake pressures such as stocking with benthic feeding fish or the impact of feral geese but there is no national level data to quantify this.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

- Protection within designated sites

Around 62% of the resource of H2110 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 significant proportion of the resource of this habitat also lies within the SSSI/ ASSI series where similar management measures are in place.

- 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. Considerable progress has been made in reducing the contribution of large waste water treatment works to nutrient loading but diffuse sources and the cumulative effect of small discharges continue to cause problems for many sites. Tackling these remaining nutrient sources will require a shift in land management practices and the regulatory regimes for small point sources. Pilot projects (such as ECSFDI, see Section 4.1) are beginning to demonstrate how such problems may be addressed but a step change is required before these solutions result in real ecological benefits on a broad scale. Measures currently being developed to deliver the WFD in the UK will have some benefit for H3150 beyond the SAC network but the net benefit of these measures may depend upon how widely there are applied outside of the very limited WFD 'water body' network.

- UK BAP

The habitat is covered by the *Standing open waters and canals action plan* under the UK Biodiversity Action Plan (see http://www.ukbap.org.uk), as well as under country and local biodiversity action plans and strategies, with targets to maintain, improve, restore and expand the resource.

5.1.2 Main future threats[2.4.11]

The most obvious major future threats to H3150 are listed below, several of which are referred to in Section 4.1. The related EC codes are shown in brackets.

- Pollution (**701 Water pollution, 952 Eutrophication**)
- Hydrological Pressures (**853 Management of water levels, 920 Drying up, 930 submersion**)
- Recreation Pressures (**220 Leisure fishing**)
- Non-native species (**954 invasion by a species, 971 competition**)
- Grazing (**140 Grazing**)
- Air pollution (**702 Air pollution**)

Based on an assessment of relevant literature, this habitat is potentially sensitive to air pollution, but it has not been possible to undertake an assessment of its potential future 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).

- Climate change (**853 Management of water levels, 954 invasion by a species**)

Based on the literature review (Technical note IV) climate change is considered a major threat to the future condition of this habitat especially in the long term. Global climate change and increasing population growth within the south-east of the UK are factors which are likely to increase in importance in the short –medium term and together these factors may have serious implications for the hydrological integrity of H3150 lakes. Increased demand for water (and for opportunities for recreation) in the south east may directly impact upon these lakes many of which are close to large urban areas. The potential for climate change to exacerbate the threat posed by non-native invasive species is significant. However, there is a high degree of uncertainty in defining future climate threats on habitats and species due to uncertainty in: future greenhouse gas emissions; the consequential changes in climatic features (for instance temperature, precipitation CO_2 concentrations); the responses of habitats and species to these changes (for instance location, phenology, community structure) and the role of other socio-economic drivers of environmental change. The scale of change in habitats and species as a result of climate change will vary across ecosystems. Small changes in the climate are more likely to have a substantial impact on habitats and species which exist within a narrow range of environmental conditions. The future impacts of climate change on UK biodiversity will be exacerbated when coupled with other drivers of environmental change.

5.2 Future condition (as regards range, area covered and specific structures 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 H3150 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 H3150 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:

- 69% of the area and 6% of the number of assessments fall within the future-favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H3150 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	391	3
	Unfavourable unclassified	41	2
	Total	432	5
	% of assessments	***31%***	***36%***
	% of total UK extent	***unknown%***	***Unknown***
Future-favourable	Favourable maintained	777	7
	Favourable recovered		
	Unfavourable recovering	122	1
	Favourable unclassified	79	1
	Total	979	9
	% of assessments	***69%***	***64%***
	% of total extent	***unknown%***	***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.

Table 5.2.2 Predicted future condition of H3150 on SSSI/ASSIs in England, Scotland and Wales 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

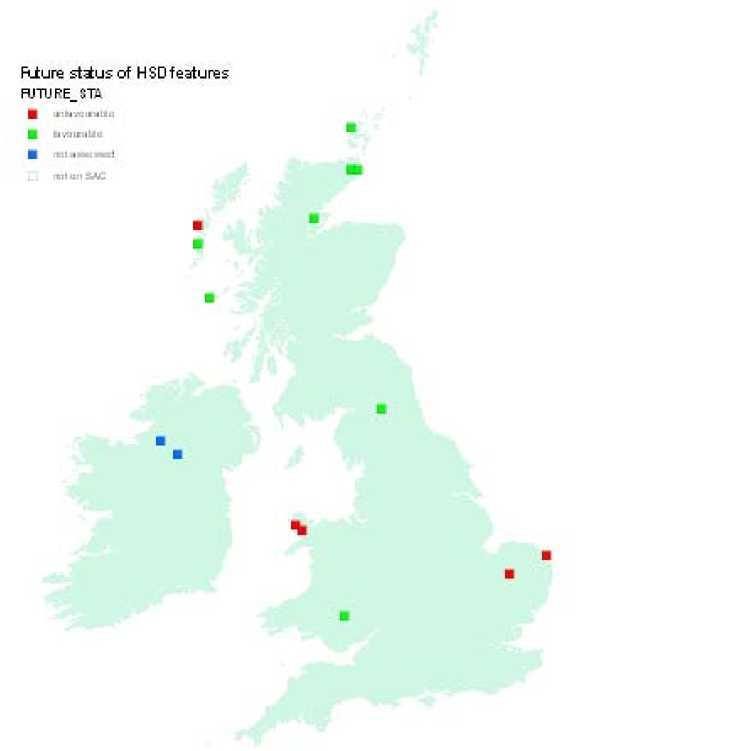
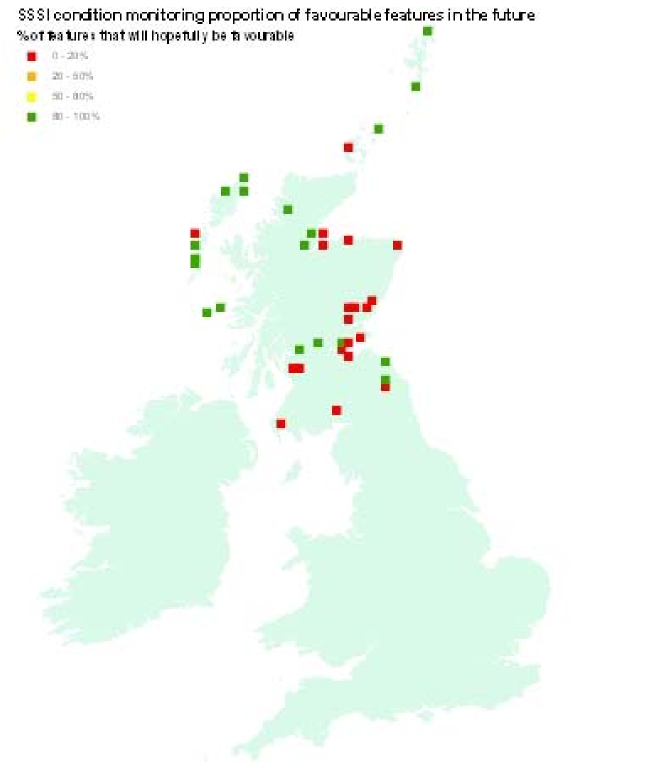
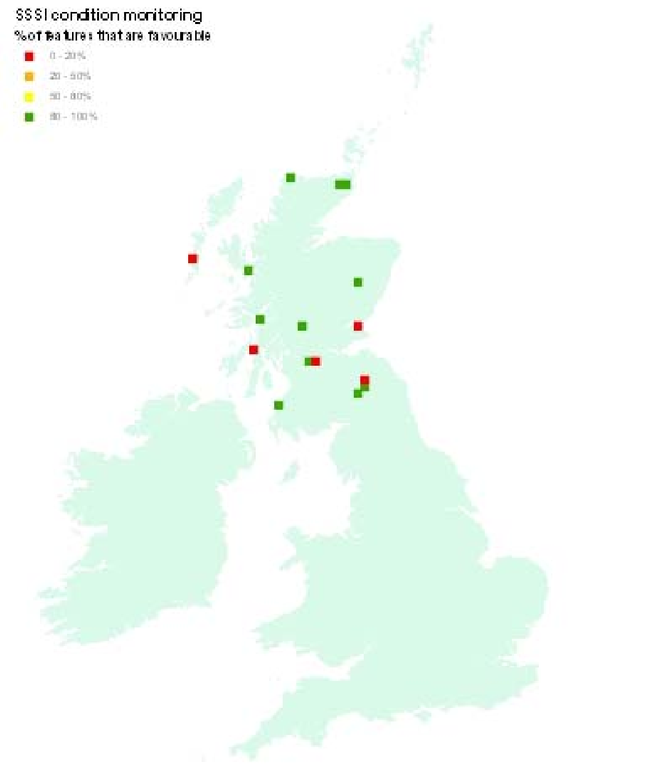
Future condition	**Present condition**	**Strongly indicative assessments (Category 1)**		**Weakly indicative assessments (Category 2)**
		England/Wales (area)	**Scotland (count)**	**Scotland (count)**
Future-unfavourable	Unfavourable declining	54.26	9	2
	Unfavourable no change	1273.36	11	1
	Unfavourable unclassified			
	Total	1327.62	*20*	*3*
	% of assessments	***49%***	***57%***	***19%***
Future-favourable	Favourable maintained	1215.84	14	11
	Favourable recovered			
	Unfavourable recovering	156.41	1	2
	Favourable unclassified			
	Total	1372.25	15	13
	% of assessments	***51%***	***43%***	***81%***

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.
(iv) 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.
(v)The data included are from CSM assessments carried out between April 1998 and December 2006
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

Tables 5.2.2, 4.2.3, 5.2.4 and Maps 5.2.2 and 5.2.3 summarise the predicted potential future condition of H3150 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:

- 43% of strongly indicative assessments and 81% weakly indicative assessments in Scotland fall within the future-favourable category;
- 48% of the area of strongly indicative assessments in England falls within the future-favourable category; and
- 100% of the area of strongly indicative assessments in Wales falls within the future-favourable category.

Predicted Future Condition of H3150 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 **in Scotland**	**Map 5.2.3** Assessments weakly indicative of the condition on SSSI/ASSIs **in Scotland**
		
Key <u>Red = future-unfavourable</u>, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable <u>Green = future-favourable</u>, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable <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	

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

Conclusion[2.6.iv]: Unfavourable – Bad

The EC Guidance states that where "habitat prospects are bad, with severe impacts from threats expected and long-term viability not assured", the judgement should be Unfavourable – Bad. In the UK, this was generally taken to mean that habitat range and/or area are in decline, and/or less than 75% of the habitat area is likely to be in favourable condition in 12-15 years.

The judgement for H3150 is Unfavourable – Bad due to pressures that are difficult to resolve – e.g. agricultural diffuse pollution and inadequate protection for the wider resource (outside SAC/SSSI). Under current proposals for EU Water Framework Directive implementation in England and Wales many examples of this type may receive little protection and there will be no drivers for enhancement or restoration. In Scotland current proposals will result in all waters receiving some degree of protection but restoration of the many degraded sites is likely to be both difficult and costly. Even within the designated network long term viability depends on resolving issues such as diffuse nutrient inputs and invasive species.

6. Overall conclusions and judgements on conservation status

Conclusion[2.6]: Unfavourable – Bad

On the basis of the Structure and Function and Future Prospects assessments, the overall conclusion for this habitat feature is Unfavourable – Bad.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Range is stable and not less than the favourable reference range.	2
Area covered by habitat type within range	Unknown	Insufficient information to make a judgement.	2
Specific structures and functions (including typical species)	Unfavourable – Bad	More than 25% of the habitat area is considered to be unfavourable as regards its specific structures and functions.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable – Bad	Habitat prospects over next 12-15 years considered to be bad, with severe impact from threats expected and long term viability not assured.	2
Overall assessment of conservation status	Unfavourable – Bad	Two judgements are Unfavourable – Bad.	2

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

7. Annexed material (including information sources used 2.2)

7.1 References

AIR POLLUTION INFORMATION SYSTEM. 2004. www.apis.ceh.ac.uk

CORINE. Biotopes manual, Habitats of the European Community. EUR 12587/3, Office for Official Publications of the European Communities, 1991.

DEVILLERS, P. & DEVILLERS-TERSCHUREN, J. 1993. *A classification of Palaearctic habitats*. Strasbourg: Council of Europe.

DUIGAN, C.A., KOVACH, W.L. & PALMER, M. 2006. *Vegetation communities of British lakes: a revised classification,* Online only, ISBN 1 86107 575 8. http://www.jncc.gov.uk/page-3703

EUROPEAN COMMISSION DG ENVIRONMENT. 2003. *Interpretation manual of European Union habitats* (version EUR25). European Commission DG Environment, Brussels. http://ec.europa.eu/environment/nature/nature_conservation/eu_enlargement/2004/pdf/habitats_im_en.pdf

HAINES-YOUNG, R.H. *et al.* 2000. *Accounting for nature: assessing habitats in the UK countryside.* DETR, Rotherham.

HUGHES, M., HORNBY, D.D., BENNION, H., KERNAN, M. & HILTON, J. *et al*. 2004. The development of a GIS-based inventory of standing waters in Great Britain together with a risk-based prioritisation protocol. *Water, Air and Soil Pollution: Focus* 4:73-84

JACKSON, D.L. & MCLEOD, C.R. (eds.) 2002. Handbook on the UK status of EC Habitats Directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. *JNCC Report* No. 312. Version 2. www.jncc.gov.uk/page-2447

JAMES, C., FISHER, J., RUSSELL, V., COLLINGS, S. & MOSS, B. 2005. Nitrate availability and hydrophyte species richness in shallow lakes. *Freshwater Biology*, **50**, 1049-1063.

JOINT NATURE CONSERVATION COMMITTEE. 2003. *2002 Reporting system for Lead Partners*. Joint Nature Conservation Committee, Peterborough. www.ukbap.org.uk

JOINT NATURE CONSERVATION COMMITTEE. 2005. *Common Standards Monitoring CSM)*. Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/page-2217

MCLEOD, C.R., YEO, M., BROWN, A.E., BURN, A.J., HOPKINS, J.J. & WAY, S.F. (eds.) 2007. *The Habitats Directive: selection of Special Areas of Conservation in the UK*. 2nd edn. Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/SACselection

SAYER, C.D. 2001. Problems with the application of diatom-total phosphorus transfer functions: Examples from a shallow English Lake. Freshwater Biology **46**, 743-757.

SAYER, C.D., HOARE, D.J., SIMPSON, G.L., HENDERSON, A.C.G., LIPTROT, E.R., JACKSON M.J., APPLEBY, P.G., BOYLE, J.F., JONES J.I. & WALDOCK, M.J. 2006. TBT causes regime shift in shallow lakes. *Environmental Sceince and Technology* **40(**17) 5269-5275.

SCHEFFER, M., HOSPER, S.H., MEIJER, M.L., MOSS, B. & JEPPESEN, E. 1993. Alternative equilibria in shallow lakes. *Trends in Ecology and Evolution* **8**, 275-279.

WILLIAMS, J.M. (ed.) 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Joint Nature Conservation Committee, Peterborough. http://www.jncc.gov.uk/page-3520

WOLFE-MURPHY, S.A., LAWRIE, E.W., SMITH, S.J. & GIBSON, C.E. 1992. *Northern Ireland Lakes Survey*. Unpublished report to Northern Ireland Department of Environment, Belfast.

Map data sources

JNCC International Designations Database. 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)	16
Number of SACs with CSM assessments b)	14
% of SACs assessed b/a)	88
Extent of feature in the UK – hectares c)	
Extent of feature on SACs – hectares d)	5,260
Extent of features assessed – hectares e)	1,410
% of total UK hectarage on SACs d/c)	
% of SAC total hectarage that has been assessed e/d)	27
% of total UK hectarage that has been assessed e/c)	

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)	6	40%
Current – Favourable green)	7	47%
On SAC but not assessed blue)	2	13%
Not on SAC transparent)	0	0%
Total Number of 10km squares any colour)	15	100%
Future – Unfavourable red)	5	33%
Future – Favourable green)	8	53%