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

Fourth Report by the United Kingdom under Article 17

on the implementation of the Directive
from January 2013 to December 2018

Supporting documentation for the
conservation status assessment for the habitat:

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

WALES

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this habitat, submitted to the European Commission as part of the 2019 UK Reporting under Article 17 of the EU Habitats Directive.
- The 2019 Article 17 UK Approach document provides details on how this supporting information was used to produce the UK Report.
- The UK Report on the conservation status of this habitat is provided in a separate document.
- The reporting fields and options used are aligned to those set out in the European Commission guidance.
- Explanatory notes (where provided) by the country are included at the end. These provide an audit trail of relevant supporting information.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; and/or (iii) the field was only relevant at UK-level (sections 10 Future prospects and 11 Conclusions).
- For technical reasons, the country-level future trends for Range, Area covered by habitat and Structure and functions are only available in a separate spreadsheet that contains all the country-level supporting information.
- The country-level reporting information for all habitats and species is also available in spreadsheet format.

Visit the JNCC website, https://jncc.gov.uk/article17, for further information on UK Article 17 reporting.

Report on the main results of the surveillance under Article 17 for Annex I habitat types (Annex D)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (Wales information only)**
1.2 Habitat code	**3150 - Natural eutrophic lakes with Magnopotamion or Hydrocharition - type**

2. Maps

2.1 Year or period	2001-2017
2.3 Distribution map	Yes
2.3 Distribution map Method used	Based mainly on extrapolation from a limited amount of data
2.4 Additional maps	No

BIOGEOGRAPHICAL LEVEL

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	**Atlantic (ATL)**
3.2 Sources of information	Baxter E, Stewart N. 2015. Macrophyte Survey of Welsh Lakes for Habitats Directive and Water Framework Directive Monitoring, 2014. NRW Evidence Report No: 52, 78pp, Natural Resources Wales. Burgess A, Goldsmith B, Hatton-Ellis T. 2006. Site Condition Assessments of Welsh SAC and SSSI Standing Water Features. CCW Contract Science Report 705. Bangor, CCW. Burgess A, Goldsmith B, Hatton-Ellis T, Hughes M, Shilland E. 2009. CCW Standing Waters SSSI Monitoring 2007-08. CCW Contract Science Report 855. Bangor, Countryside Council for Wales. Centre for Ecology and Hydrology (CEH). 2018. Glastir Monitoring and Evaluation Programme: Freshwater. Available online at https://gmep.wales/freshwater/ Dines T. (2008) A Vascular Plant Red Data List for Wales. 80pp. Salisbury, Plantlife Wales. Duigan CA, Reid S, Monteith DT, Bennion H, Seda JM, Hutchinson J. 1999. The past, present and future of Llangorse Lake - a shallow nutrient-rich lake in the Brecon Beacons National Park, Wales, UK. Aquatic Conservation: Marine & Freshwater Ecosystems 9: 329-341. Goldsmith B, Salgado, J, Shilland, J, Bennion, H, Yang, H & Turner, SD. 2014. Biodiversity Action Plan Lakes Survey 2012-14. NRW Evidence Report No: 27, 171pp. Bangor: Natural Resources Wales. Goldsmith B, Salgado, Bennion, H. & Goodrich. 2014. Lake Ecological Surveys (Wales) 2013 NRW Evidence Report No: 28.19 pp, Bangor: Natural Resources Wales. Goldsmith B, Shilland EM, Yang H, Shilland J, Salgado J & Turner SD. 2014. Condition Assessment of Eight Standing Waters in Sites of Special Scientific Interest (SSSIs). NRW Evidence Report No: 29, 147pp, Bangor: Natural Resources Wales. Goldsmith B, Turner S, Shilland E, Goodrich S. 2016. Ecological Surveys of Welsh Lakes 2015. NRW Evidence Report No 145. 25 pp, Bangor: Natural Resources Wales. Griffith JE. 1895. The flora of Anglesey and Caernarvonshire. Bangor: Nixon & Jarvis. Hatton-Ellis TW. 2011. Condition Assessment: Llyn Dinam SAC. Feature: 3150 Natural Eutrophic Lakes with Magnopotamion or Hydrocharition type

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Hatton-Ellis TW. 2016. Evidence Review of Lake Nitrate Vulnerable Zones in Wales. NRW Evidence Report No: 135, 163pp, Natural Resources Wales, Bangor.
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Whitehead PG, Wilby RL, Battarbee RW, Kernan M, Wade AJ. 2009. A review of the potential impacts of climate change on surface water quality. Hydrological Sciences Journal 54:101-123.
Willby NJ, Pitt J-A, Phillips G. 2009. The ecological classification of UK lakes using aquatic macrophytes. SC010080/SR. Bristol: Environment Agency.

4. Range

4.1 Surface area (in km²)			
4.2 Short-term trend Period			
4.3 Short-term trend Direction	Stable (0)		
4.4 Short-term trend Magnitude	a) Minimum	b) Maximum	
4.5 Short-term trend Method used			
4.6 Long-term trend Period	1995-2012		
4.7 Long-term trend Direction	Unknown (x)		
4.8 Long-term trend Magnitude	a) Minimum	b) Maximum	
4.9 Long-term trend Method used	Insufficient or no data available		
4.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown d) Method	No	
4.11 Change and reason for change in surface area of range	No change The change is mainly due to:		
4.12 Additional information			

5. Area covered by habitat

5.1 Year or period	2014-014-			
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value	8.64
5.3 Type of estimate	Best estimate			
5.4 Surface area Method used	Complete survey or a statistically robust estimate			

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5.5 Short-term trend Period	2007-2018		
5.6 Short-term trend Direction	Stable (0)		
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.8 Short-term trend Method used	Complete survey or a statistically robust estimate		
5.9 Long-term trend Period	1995-2018		
5.10 Long-term trend Direction	Stable (0)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Based mainly on extrapolation from a limited amount of data		
5.13 Favourable reference area	a) Area (km²) b) Operator c) Unknown No d) Method		
5.14 Change and reason for change in surface area of range	No change The change is mainly due to:		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum	0	Maximum	0
	b) Area in not-good condition (km²)	Minimum	8.28	Maximum	8.28
	c) Area where condition is not known (km²)	Minimum	0.36	Maximum	0.36
6.2 Condition of habitat Method used	Complete survey or a statistically robust estimate				
6.3 Short-term trend of habitat area in good condition Period	2007-2018				
6.4 Short-term trend of habitat area in good condition Direction	Stable (0)				
6.5 Short-term trend of habitat area in good condition Method used	Complete survey or a statistically robust estimate				
6.6 Typical species	Has the list of typical species changed in comparison to the previous reporting period?		No		
6.7 Typical species Method used					
6.8 Additional information					

7. Main pressures and threats

7.1 Characterisation of pressures/threats

Pressure	Ranking
Agricultural activities generating point source pollution to surface or ground waters (A25)	H
Invasive alien species of Union concern (I01)	H

Threat	Ranking
Agricultural activities generating point source pollution to surface or ground waters (A25)	H

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Management of fishing stocks and game (G08)	H
Invasive alien species of Union concern (I01)	H

7.2 Sources of information

7.3 Additional information

8. Conservation measures

8.1 Status of measures

a) Are measures needed? Yes

b) Indicate the status of measures Measures identified and taken

8.2 Main purpose of the measures taken: Restore the habitat of the species (related to 'Habitat for the species')

8.3 Location of the measures taken: Both inside and outside Natura 2000

8.4 Response to the measures: Long-term results (after 2030)

8.5 List of main conservation measures

Management, control or eradication of established invasive alien species of Union concern (CI02)

Reduce impact of mixed source pollution (CJ01)

8.6 Additional information

9. Future prospects

9.1 Future prospects of parameters

a) Range

b) Area

c) Structure and functions

9.2 Additional information

10. Conclusions

10.1. Range

10.2. Area

10.3. Specific structure and functions (incl. typical species)

10.4. Future prospects

10.5 Overall assessment of Conservation Status

10.6 Overall trend in Conservation Status

10.7 Change and reasons for change in conservation status and conservation status trend

a) Overall assessment of conservation status

No change

The change is mainly due to:

b) Overall trend in conservation status

No change

The change is mainly due to:

10.8 Additional information

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11. Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (in km² in biogeographical/ marine region)	a) Minimum b) Maximum c) Best single value 1.8
11.2 Type of estimate	Best estimate
11.3 Surface area of the habitat type inside the network Method used	Complete survey or a statistically robust estimate
11.4 Short-term trend of habitat area in good condition within the network Direction	Stable (0)
11.5 Short-term trend of habitat area in good condition within network Method used	Complete survey or a statistically robust estimate
11.6 Additional information	

12. Complementary information

12.1 Justification of % thresholds for trends	
12.2 Other relevant information	

Distribution Map

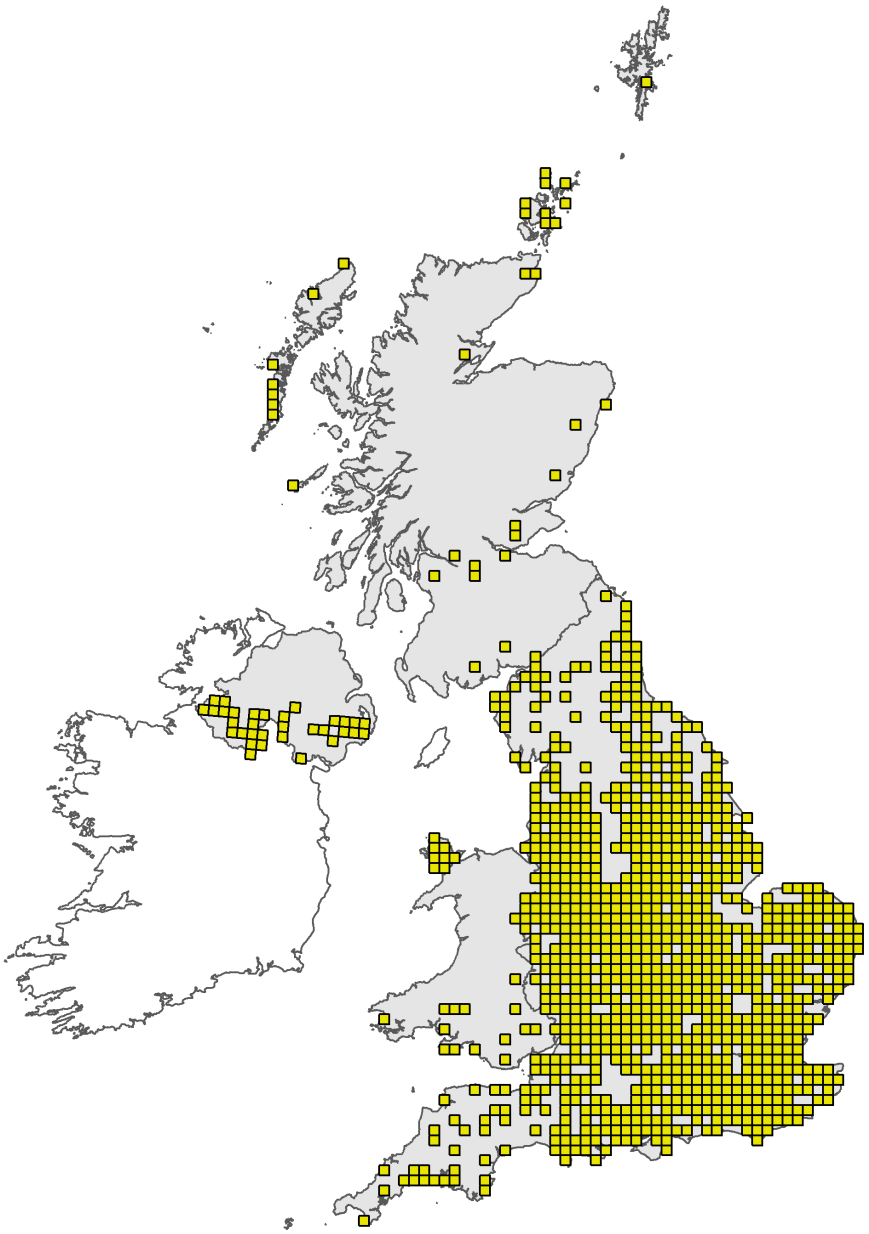

Figure 1: UK distribution map for H3150 - Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available habitat records which are considered to be representative of the distribution within the current reporting period. For further details see the 2019 Article17 UK Approach document.

Range Map

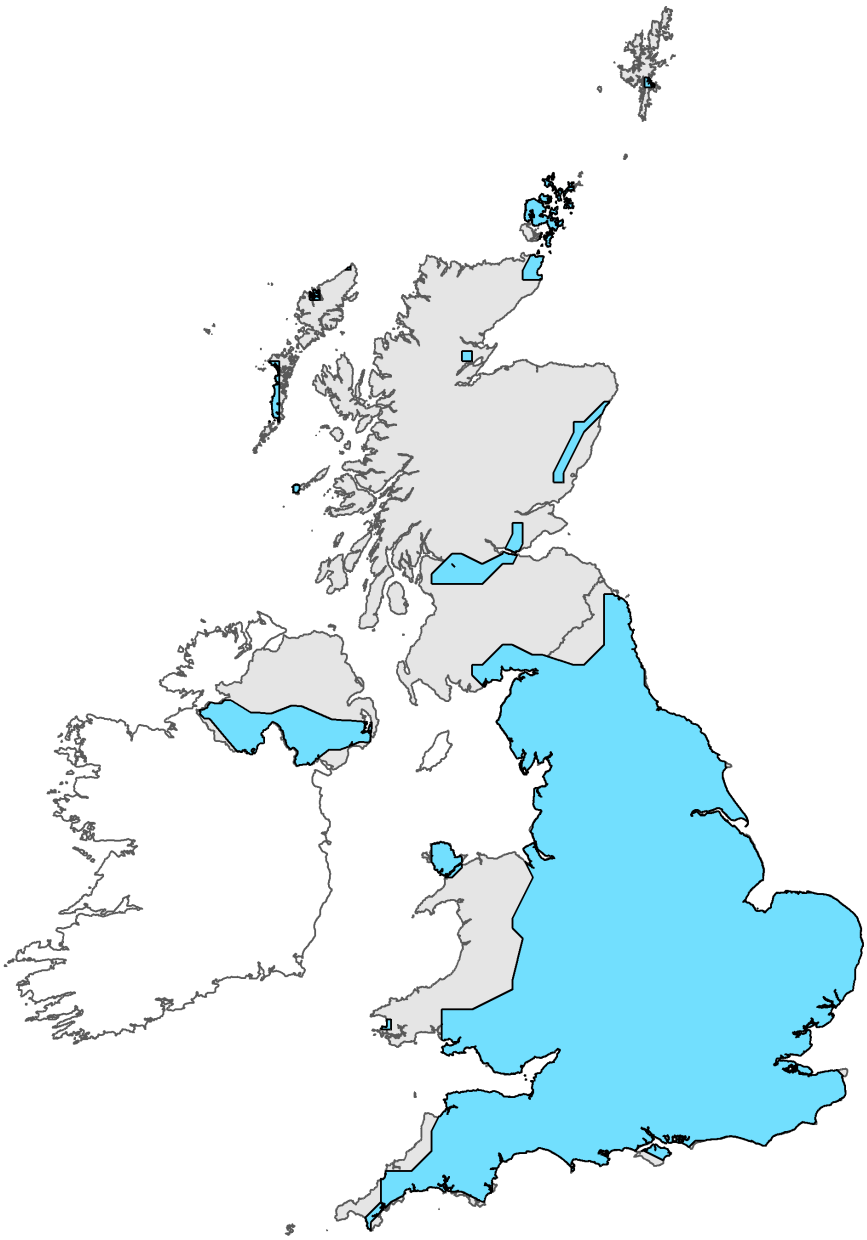

Figure 2: UK range map for H3150 - Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by applying a bespoke range mapping tool for Article 17 reporting (produced by JNCC) to the 10km grid square distribution map presented in Figure 1. The alpha value for this habitat was 25km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Habitat code: 3150

Field label	Note
2.1 Year or period	Most of the data is post 2007. The status of this and other Habitats Directive habitats in Wales were reviewed by Hatton-Ellis (2014).
2.3 Distribution map; Method used	Based on data from the Welsh updated lakes inventory (Hatton-Ellis, 2014). Uncertainties reflect the difficulty of correctly assigning water bodies to a Habitats Directive type, and the close relationship between this habitat and 3140 (see the report for 3140 and also JNCC 2007). Although fairly widely distributed in Wales, many squares are represented only by an isolated pond or lake, often in poor condition. Only on Anglesey, where there are several examples close together, is the habitat network more robust (Figure 1).

Habitat code: 3150 Region code: ATL

Field label	Note
4.1 Surface area	This habitat type occurs locally but is widely distributed across lowland Wales. It is particularly frequent on Anglesey. There are no examples in upland areas (i.e. above the limit of enclosure).
4.2 Short term trend; Period	The standard period has been used.
4.3 Short term trend; Direction	We have no clear evidence of a trend in range over the period specified. Many potential opportunities to establish water bodies of this type in lowland areas (e.g. new ornamental lakes, gravel pits) are missed due to intentional or accidental planting of non-native invasive species such as Elodea or Lagarosiphon spp.
4.4 Short term trend; Magnitude	Not applicable - see 4.3.
4.5 Short term trend; Method used	The monitoring network focusses mainly on larger examples of this habitat and on the protected site series (both SACs and SSSIs). The status of smaller ponds is mainly unknown. Due to the clumped pattern of occurrence of this habitat in Wales (Fig. 1), there is considerable uncertainty in relation to range.
4.7 Long term trend; Direction	The range of this habitat in Wales was not well known at the start of the trend period.
4.8 Long term trend; Magnitude	See 4.7.
4.11 Change and reason for change in surface area of range	No change in range is evident.
5.1 Year or period	This is based on Hatton-Ellis (2014).
5.2 Surface area	Three of the four largest examples are artificial and together these make up 68% of the total habitat area. The figure supplied is therefore highly sensitive to whether these artificial water bodies can be said to constitute natural eutrophic lakes or not and therefore would fit the habitat definition.

5.4 Surface area; Method used	Based on area data from the GB Lakes inventory. Area has been calculated by summing the area of lakes assigned to the eutrophic category. Much of this habitat is in unfavourable condition as it is eutrophied and contains little Magnopotamion and therefore would not meet structure and function criteria (IAFG 2015). This is a minimum area as it contains only sites with survey data indicating the presence of this habitat, and where we can exclude the possibility of the habitat being degraded H3140. An unknown number of unsurveyed small water bodies may also be H3150: nevertheless, it is unlikely that the extent of this habitat type in Wales exceeds 10km2. A large number of water bodies in Wales are artificial, especially in South Wales. Most of these are likely to be eutrophic but are unsurveyed. This has led to an increase in the potential area available as H3150. Whilst duckweeds and fine-leaved pondweeds readily colonise new habitat, many of the typical species seem to colonise more slowly. Uncertainties reflect the difficulty of correctly assigning water bodies to a Habitats Directive type; this is most problematic for large lakes which have a correspondingly larger effect on the estimate of surface area. This difference explains the apparent increase in estimated area since 2012.
5.6 Short term trend; Direction	No substantial eutrophic lakes have been filled in or have deteriorated so far that they do not meet the habitat description. Other changes are reported in structure and function (2.5). Higher levels of turnover may occur in smaller water bodies such as ponds and ornamental lakes. These do not contribute significantly to habitat area, however.
5.7 Short term trend; Magnitude	Not applicable - see 5.6.
5.9 Long term trend; Period	The standard period has been used.
5.10 Long term trend; Direction	Available data do not indicate a clear trend in surface area over the trend period.
6.2 Condition of habitat; Method used	Structure and function on protected sites (SACs and SSSIs) has been assessed using the Common Standards Monitoring approach (JNCC 2005, subsequently replaced by IAFG 2015), with appropriate modifications to take into account site-specific factors such as natural presence or absence of certain species. Information has also been collated from Water Framework Directive monitoring. Smaller water bodies not within the protected sites series will have been neglected using this approach and these constitute most of the 'Unknown' category. Monitoring results generally show that this habitat type in Wales is in poor condition, with elevated TP concentrations usually well above the 50ug/l limit, episodic algal blooms (Plate 1 a.), below expected transparency (Plate 1 c, d.) and low cover of typical species (Burgess et al. 2006, 2009, Hatton-Ellis 2011, 2012 a, 2012 b). However, few protected sites have deteriorated to the point where they are completely phytoplankton dominated.
6.3 Short term trend of habitat area in good condition; Period	The standard period has been used.
6.4 Short term trend of habitat area in good condition; Direction	None of the habitat surveyed is in good condition. However, some areas of habitat (Llangorse Lake, Llyn Penrhyn) may be improving slightly relative to previous reporting periods. On the other hand, Llyn Coron is apparently still deteriorating due to agricultural intensification (Hatton-Ellis 2016).

7.3 Additional information	Pressures: Nutrient runoff from agriculture (point and diffuse, A25 & A26 - Plate 1) is an important pressure on this habitat in Wales (Burgess et al. 2006; May et al. 2008; Hatton-Ellis 2015). Successful management of these pressures are key to achieving favourable conservation status of this nutrient sensitive habitat. Some lakes also have ongoing problems with other current or legacy nutrient sources (J01 and to a lesser extent F10, F11 and F12). Invasive non-native species (I01, I02) , especially Elodea spp. and Dikerogammarus villosus are the other most important pressure on this habitat type in Wales. These species also threaten other Habitats Directive lake types in particular H3140. Elodea spp. are a particular problem because they compete with native vegetation, substantially reducing its cover and thereby affecting structure and function (Plate 1 d.). Reduction in nutrient pressures may help to reduce their impact. The other major pressure on H3150 is climate change, which acts synergistically with nutrients and has similar effects (Whitehead et al. 2009). Due to relatively cool, windy summers, Welsh eutrophic lakes are generally in better ecological condition than their nutrient concentrations would suggest, but warmer conditions (N01) will enable phytoplankton to make more efficient use of nutrients (Mooij et al. 2005, 2007) and thereby increase the duration and severity of algal blooms (N05). Similarly, altered temperature regimes will improve recruitment of coarse fish species such as roach (Rutilus rutilus) and bream (Abramis brama), causing negative changes to structure and function (N05). Heavier and more extreme rainfall events are also expected to increase nutrient transport into lakes. Management of fish stocks (G08) is a long-standing and important issue for eutrophic lakes. Many of the coarse fish favoured by anglers have a strong negative impact on lake ecology (Moss et al. 1996). The current regulatory framework is generally effective for current practice, but management of situations where fish were introduced in lakes in the past is more problematic. This issue will become increasingly important with climate change (see above). Various other pressures affecting habitat structure exist, particularly relating to hydromorphology (A31, F31, K03, K05). These are not considered to be serious in their own right, but in some cases there may be opportunities to manage these in such a way as to reduce other pressures (e.g. to increase flushing of nutrients out of a lake, render habitat less suitable for invasive species, or improve structure and function of the shoreline). Threats: Threats to this habitat are similar to the pressures. The severity of all of the most important pressures is predicted to increase with climate change, as outlined above.

8.5 List of main conservation measures	Eutrophic lakes occur mainly in intensively farmed landscapes, and as a result are vulnerable to agricultural nutrient pressures (CA10, CA11). The achievement of FCS for H3150 in Wales cannot occur without the implementation of targeted agrienvironment measures that deliver genuine improvements for this habitat. Unfortunately, current patterns of the Welsh agrienvironment scheme (Glastir) uptake fall predominantly outside the range of this habitat (CEH, 2018). Previous policy approaches did not succeed because (i) they frequently depend on most or all farmers implementing best practice; (ii) many important measures and schemes are voluntary and uptake is therefore patchy (iii) schemes tend to try to deliver against a broad suite of environmental objectives, resulting in insufficiently focused measures and (iv) there are financial or administrative rules which hamper the delivery of many important measures, such as upgrades to slurry stores. Additionally, many of the measures required for lake conservation cannot easily be delivered via large-scale project funding (e.g. LIFE) due to the need to secure permission from landowners in advance and for long-term management. The adoption of Sustainable Management of Natural Resources under the Environment Act offers an opportunity for a revised policy approach based on a more resilient lake catchment incorporating landscape features that reduce the likelihood of nutrient-rich runoff reaching lakes. One or more individual, long-term projects are likely to be needed to deliver favourable outcomes in this area. Management of pollution from other sources (CF04, CF05, CJ01) also requires consideration, and is often best delivered in conjunction with agricultural projects if possible to maximise the likelihood of recovery and avoid the perception that an individual sector is being unfairly targeted. In some cases there are legacy pollution issues resulting in the accumulation of large quantities of phosphorus in lake sediments that are then recycled each year. These nutrients can either be removed by dredging the lake, or deactivated using a chemical treatment product. In either case, detailed technical studies would be needed to determined the most effective approach. Due to the high cost of such approaches, this needs to be done with care. Detection (CI01), control and management (CI02, CI03) of invasive alien species in freshwaters is exceedingly problematic. Whilst detection and monitoring of spread is comparatively straightforward, there are few effective options available for control and management that do not themselves have significant environmental impact. Further research in this area is urgently needed.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	All potentially eutrophic lakes within the SAC network have been surveyed. This therefore represents an exact figure, subject only to measurement error and natural fluctuations in water level.
11.4 Short term trend of habitat area in good condition within the network; Direction	None of the habitat within the protected site series is in good condition. However, sites protected under the SAC network are generally in better condition than both water bodies of the same type designated as SSSI under national legislation, or in the wider countryside.