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:

H3160 - Natural dystrophic lakes and ponds

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	**3160 - Natural dystrophic lakes and ponds**

2. Maps

2.1 Year or period	2007-2018
2.3 Distribution map	Yes
2.3 Distribution map Method used	Complete survey or a statistically robust estimate
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. Bangor: 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. Burgess A, Goldsmith B, Hatton-Ellis TW. 2013. Condition Assessments of Welsh SAC Lakes, 2007-2012. CCW Contract Science Report No. 983. Bangor, Countryside Council for Wales. Evans CD, Monteith DT, Cooper DM. 2005. Long-term increases in surface water dissolved organic carbon: Observations, possible causes and environmental impacts. Environmental Pollution, 137, 55-71. Goldsmith B, Bennion H, Hughes M, Jones V, Rose C, Simpson G. 2006. Integrating Habitats Directive and Water Framework Directive Monitoring: Baseline Survey of Natura 2000 Standing Water Habitats in Wales. CCW Contract Science Report 704. Bangor, Countryside Council for Wales. Goldsmith B, Salgado, J, Shilland, J, Bennion, H, Yang, H & Turner, SD. 2014a. Biodiversity Action Plan Lakes Survey 2012-14. NRW Evidence Report No: 27, 171pp, Natural Resources Wales, Bangor Goldsmith B, Shilland EM, Yang H, Shilland J, Salgado J & Turner SD. 2014b. Condition Assessment of Eight Standing Waters in Sites of Special Scientific Interest (SSSIs). NRW Evidence Report No: 29,147pp, Natural Resources Wales, Bangor. 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. Hatton-Ellis TW. 2014. Lake BAP Priority Areas in Wales - a strategic overview. Wales Biodiversity Partnership, Cardiff. Available online at http://www.biodiversitywales.org.uk/File/340/en-GB Interagency Freshwater Group. 2015. Common Standards Monitoring Guidance for Freshwater Lakes. JNCC, Peterborough. Available online at

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http://jncc.defra.gov.uk/pdf/0315_CSM_Freshwater_lakes.pdf
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
Kernan M, Battarbee RW, Curtis CJ, Monteith DT, Shilland EM 2010. Recovery of lakes and streams in the UK from the effects of acid rain. UK Acid Waters Monitoring Network 20 Year Interpretative Report. Report to Defra. ISSN: 1366-7300. http://awmn.defra.gov.uk/resources/interpreports/20yearInterpRpt.pdf
Monteith DT, Stoddard JL, Evans CD, de Wit HA, Forsius M, Hogasen T, Wilander A, Skelkvale BL, Jeffries DS, Vuorenmaa J, Keller B, Kopacek J, Vesely J. 2007. Dissolved organic carbon trends resulting from changes in atmospheric deposition chemistry. Nature, 450, 537-540.
Natural Resources Wales. 2013. Habitat: H3160 - Natural dystrophic lakes and ponds. Available online at http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H3160_WALES.pdf

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	1994-2018		
4.7 Long-term trend Direction	Uncertain (u)		
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 No d) Method		
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	2007-2017		
5.2 Surface area (in km²)	a) Minimum 0.5	b) Maximum 1	c) Best single value 0.65
5.3 Type of estimate	Best estimate		
5.4 Surface area Method used	Complete survey or a statistically robust estimate		
5.5 Short-term trend Period	2007-2018		
5.6 Short-term trend Direction	Increasing (+)		
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.8 Short-term trend Method used	Based mainly on expert opinion with very limited data		
5.9 Long-term trend Period	1994-2018		
5.10 Long-term trend Direction	Increasing (+)		

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5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Based mainly on expert opinion with very limited 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 0.19	Maximum 0.19
	b) Area in not-good condition (km²)	Minimum 0.31	Maximum 0.31
	c) Area where condition is not known (km²)	Minimum 0.15	Maximum 0.15
6.2 Condition of habitat Method used	Based mainly on extrapolation from a limited amount of data		
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	Based mainly on expert opinion with very limited data		
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
Forestry activities generating pollution to surface or ground waters (B23)	M
Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (B27)	M
Drainage for use as agricultural land (A31)	H
Mixed source air pollution, air-borne pollutants (J03)	H

Threat	Ranking
Forestry activities generating pollution to surface or ground waters (B23)	M
Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (B27)	M

Drainage for use as agricultural land (A31)	H
Mixed source air pollution, air-borne pollutants (J03)	M

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, but none yet taken

8.2 Main purpose of the measures taken

8.3 Location of the measures taken

8.4 Response to the measures

8.5 List of main conservation measures

Manage drainage and irrigation operations and infrastructures in agriculture (CA15)
Reduce impact of mixed source pollution (CJ01)
Restore habitats impacted by multi-purpose hydrological changes (CJ03)
Reduce diffuse pollution to surface or ground waters from forestry activities (CB10)
Manage/reduce/eliminate air pollution from resource exploitation and energy production (CC10)
Manage/reduce/eliminate air pollution from transport (CE03)
Reduce/eliminate air pollution from industrial, commercial, residential and recreational areas and activities (CF06)

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:

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	b) Overall trend in conservation status No change The change is mainly due to:
10.8 Additional information	

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 0.354
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

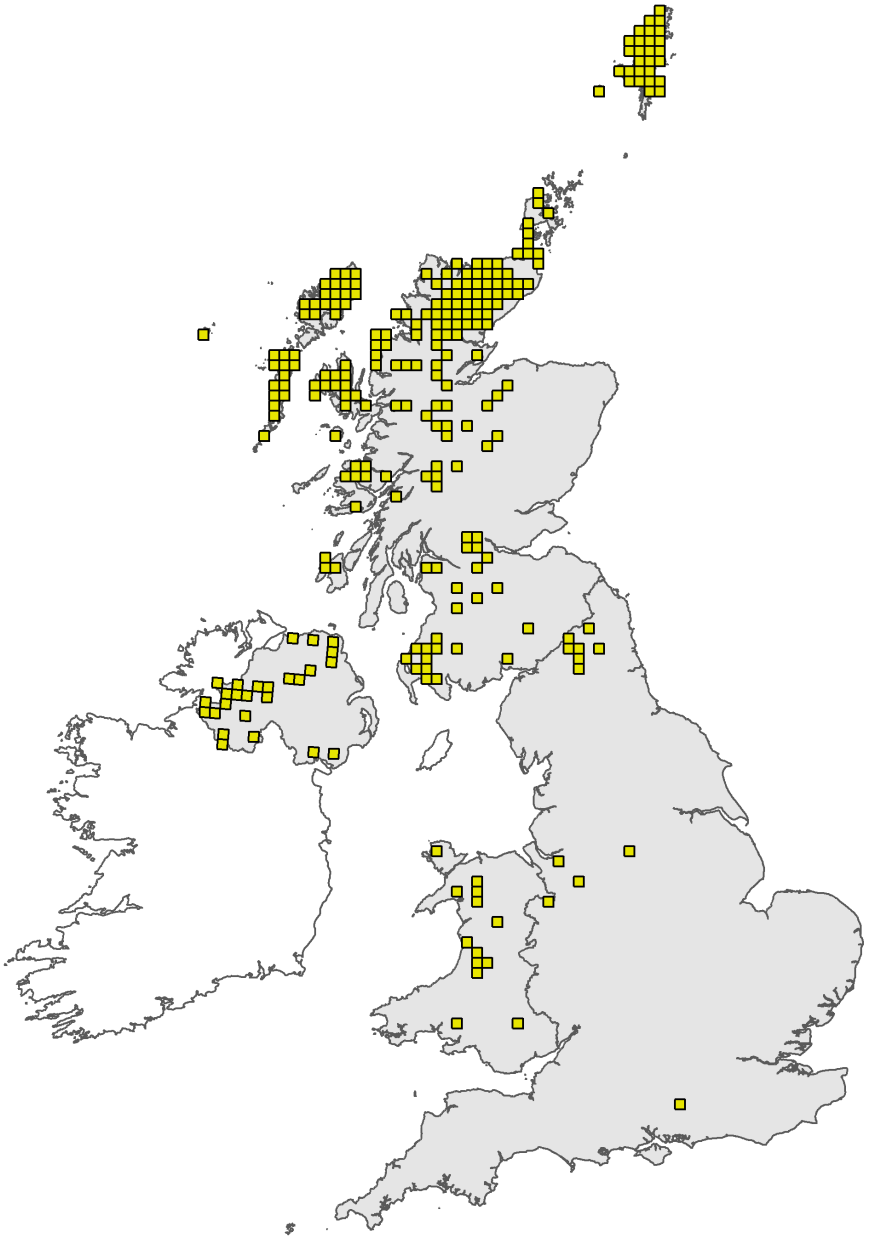

Figure 1: UK distribution map for H3160 - Natural dystrophic lakes and ponds. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

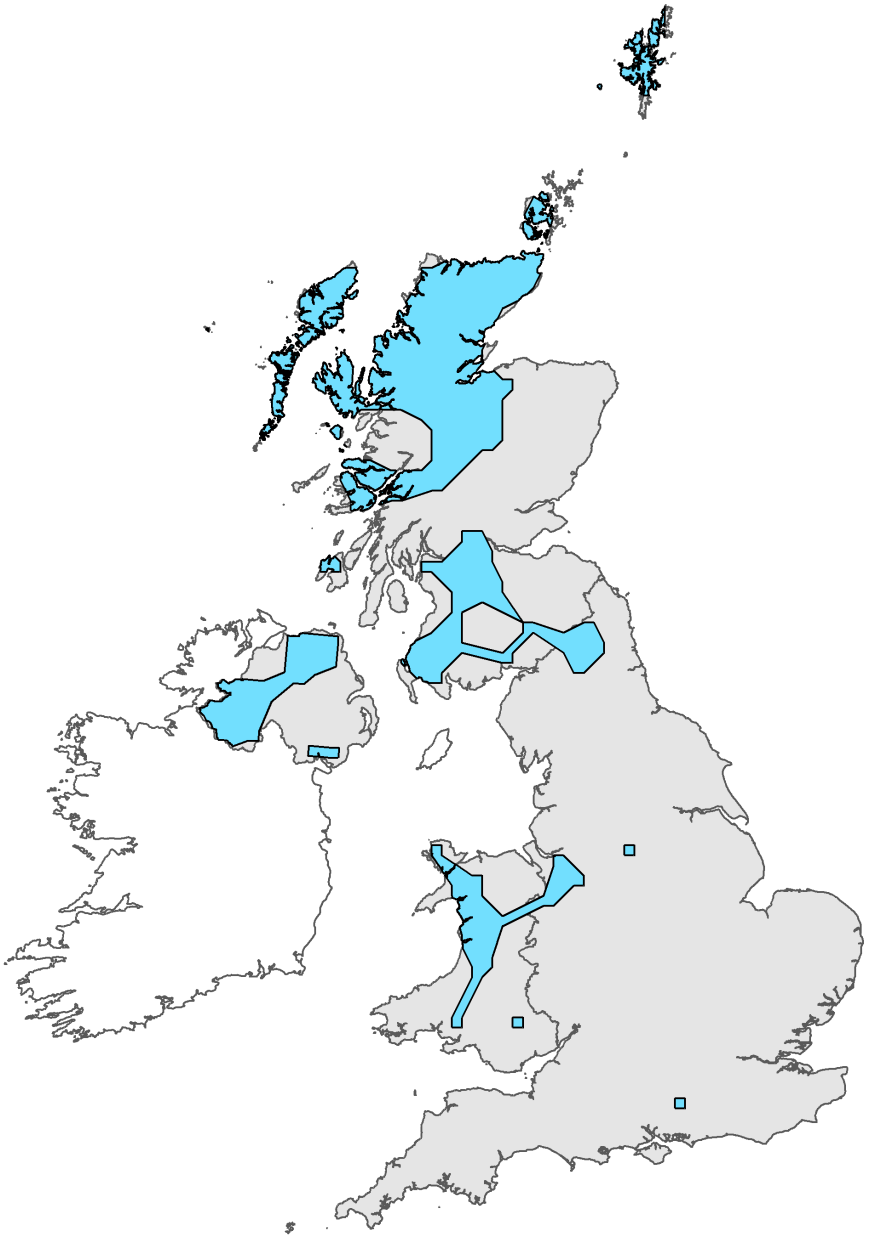

Figure 2: UK range map for H3160 - Natural dystrophic lakes and ponds. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 3160

Field label	Note
2.3 Distribution map; Method used	Data is based on Hatton-Ellis (2014) and subsequent surveys that were not included in that assessment (Goldsmith et al. 2014a, 2014b; Baxter & Stewart 2015; Goldsmith et al. 2016). The 10km square data is reasonably complete for larger examples of this habitat (Figure 1). However, small peaty ponds and pools are much more likely to occur in smaller fragments of bog and acid fen and these could not be included. This is likely to have a disproportionate effect on the 10km square distribution, though it is unlikely to be very significant in terms of overall conservation status because the areas involved are so small.

Habitat code: 3160 Region code: ATL

Field label	Note
4.1 Surface area	The surface area of H3160 in Wales is unlikely to have changed significantly. Difference between this and the previous report reflect improved information.
4.2 Short term trend; Period	The standard period has been used.
4.3 Short term trend; Direction	The range is not considered to have changed significantly between reporting periods.
4.4 Short term trend; Magnitude	Not applicable.
4.5 Short term trend; Method used	The range data is considered to be robust and representative of the general picture, although it is possible that some smaller peaty bog pools may have been overlooked. See text under 2.3.
4.6 Long term trend; Period	The standard period has been used
4.7 Long term trend; Direction	Uncertain The long-term range trend for this habitat cannot be assessed adequately, due to a lack of data at the start of the trend assessment period.
4.8 Long term trend; Magnitude	Unknown
4.9 Long term trend; Method used	There is insufficient data to assign a long-term trend in range for dystrophic lakes.
4.11 Change and reason for change in surface area of range	Is there a change between reporting periods? NO If yes, provide the nature of that change. More than one option (a to d) can be chosen. The change is mainly due to (select one of the reasons above): Improved knowledge or more accurate data It is not likely that the range of this habitat has changed substantially over the last 20 years as this would require creation of new water bodies in or adjacent to peat areas, or the loss of all examples within a 10km square. Apparent changes in range generally reflect newly surveyed sites.

5.2 Surface area	a) Minimum = 0.5 km2 b) Maximum = 1.0 km2 There is uncertainty regarding the exact area of H3160 in Wales but there is little doubt that very peaty lakes are rather scarce. Although deep blanket peat that might support dystrophic lakes is fairly widespread in Wales, there is no extensive peat pool landscape and candidate dystrophic lakes have been reasonably well surveyed. The total area of this habitat has been revised upwards since 2012, following more extensive data review (Hatton-Ellis 2014) and clarification of the definition of humic lake types in Britain (FTT 2014). Hatton-Ellis (2014) reviewed the extent of this and other lake types. A reassessment of the status of Llyn Llech Owain (5ha) and survey of Llyn Coch Hwyad (9.5ha) (Goldsmith et al. 2014a, b) also results in them being included within the scope of this type. For clarity, the current list of dystrophic lakes included within the scope of this assessment is included in Annex 1. The Favourable Reference Area in Wales should also be revised upwards to 0.5 km2. Annex 1 lists lakes in Wales that are currently considered to be dystrophic.
5.4 Surface area; Method used	We have used survey data where possible to determine the location of dystrophic lakes. Where this was not available we have identified candidate dystrophic lakes >1ha in area using grid references from the UK Lakes inventory and comparing them with polygons containing blanket peat in the Cranfield University National Soils map. Only lakes with 100% blanket peat were included, as field data (Burgess et al. 2006) indicated that where other soil types were present the lake was often a different type. Due to time constraints it has not been possible to carry out an exhaustive analysis, and further ground truthing work is required. Dystrophic systems occur on blanket bogs (H7130) and other peatlands. However, without survey or monitoring data for individual sites, it can be difficult to distinguish dystrophic from oligotrophic standing waters (H3130). Many oligotrophic systems contain waters which are to some extent 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 , 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. Acidification has caused decreases in DOC concentrations that are now being reversed as lakes recover (Monteith et al. 2007). Consequently, some lakes previously considered H3130 may become peatier and be better considered as H3160. In Wales, an example of this might be Llyn Conwy (41ha), which would have a significant effect on the overall total.
5.5 Short term trend; Period	Recommended period used for this assessment.
5.6 Short term trend; Direction	The main reason for an increase in the reported habitat area is due to improved survey information and consequent discovery of several new dystrophic lakes, together with a clearer definition of the habitat. It is possible that habitat area may be increasing due to recovery from acidification, resulting in increases in dissolved organic carbon in freshwaters. This could result in some lakes switching from oligotrophic clear-water lakes (H3130) to dystrophic lakes in Wales. However, we do not have specific results that demonstrate such a switch occurring at any lake within the relevant period.
5.7 Short term trend; Magnitude	Unknown.
5.9 Long term trend; Period	The standard period has been used.
5.11 Long term trend; Magnitude	Not applicable
5.14 Change and reason for change in surface area	Since 2013 further lakes have been surveyed, some of which fall within the dystrophic lakes category.
6.1 Condition of habitat	Good: Max 0.19 km2 Min 0.19 km2 (30%) Not Good: Max 0.31 km2 Min 0.31 km2 (48%) Not Known: Max 0.15 km2 Min 0.15 km2 (23%)

6.2 Condition of habitat; Method used	Dystrophic lakes are mainly small water bodies in relatively remote locations, and therefore subject to relatively few pressures. Consequently, they receive relatively little monitoring.
6.5 Short term trend of habitat area in good condition; Method used	The dataset is too small and the time period too short to assess trend with any confidence.
6.6 Typical species	Revised Common Standards Monitoring Guidance was published in 2015 (IAFG, 2015). No changes were made to the list of typical species for this habitat type.
6.7 Typical speces; Method used	IAFG (2015) identified nine typical species: Drepanocladus spp; Eleogiton fluitans; Juncus bulbosus; Menyanthes trifoliata; Nymphaea alba; Potamogeton polygonifolius; Sparganium angustifolium; aquatic Sphagnum spp.; and Utricularia spp. Due to the highly variable nature of dystrophic lake communities, the target was set as no loss of characteristic (=typical) species.
7.1 Characterisation of pressures/ threats	Pressures: The most important pressures on this habitat are drainage of surrounding peatland habitats for forestry (B23) or agriculture (A31) (mostly unenclosed sheep grazing) and acidification caused by air pollution (J03). On forested areas, drainage also acts to transport sediment and pollutants from forestry activities. Both forestry and agricultural drainage ditches are predominantly long-standing, though they are re-excavated in some locations for maintenance purposes. Acid deposition affected a wide range of acid sensitive habitats during the 20th Century, including dystrophic lakes. Although naturally acid, dystrophic lakes are also well-buffered by the weak humic acids causing their brown water colour, and so can support a much wider range of life than acidified lakes. Measures to reduce sulphate emissions from power stations, industry and to a lesser extent transport have all helped to reduce acid deposition to within the critical load over much of Wales and as a result dystrophic lakes are slowly recovering. Most dystrophic lakes are nitrogen limited so nitrogen deposition (mostly A27, E06, J03) could potentially be having a eutrophication as well as an acidifying impact. The extent and nature of this is not clear and critical loads are not available, so these have not been included as pressures at this time. Threats: Threats are largely the same as pressures. Drains in the catchment (B27, A31) are expected to be an ongoing pressure in future. Forestry drainage impacts may reduce due to measures such as the UK Forest Standard, which is introducing better practice with regard to hydrological management compared with many older forest blocs. Responsibility for land drainage consents was moved from the Environment Agency to Local Authorities in 2012, which created an increased risk of administrative errors due to miscommunication. Since that time Local Authorities across Wales have faced increasingly challenging budgetary constraints. As a consequence, resources available for administration and enforcement of drainage consents are very low.
8.1 Status of measures	Although some small-scale measures have been taken in catchments of dystrophic lakes, a structured programme of ditch blocking and forest redesign in relevant catchments is needed. Measures to control acidification have been in place for about two decades, and recovery is slowly occurring.
8.5 List of main conservation measures	The principal actions required for dystrophic lakes are the restoration of blanket bogs in their catchments to stabilise water levels and reduce peat erosion. This mainly involves ditch blocking (CA15, CJ03, CB10). Conservation management programmes for blanket bog (H7130) often include ditch blocking programmes, which if appropriately sited could also benefit dystrophic lakes. Future upland restoration projects in Wales should take greater account of dystrophic lakes when planning conservation measures. The improving quality seen in H3160 lakes is due to ongoing actions under the Convention on Long Range Transboundary Air Pollution (CC10, CJ01), originally signed in the late 1970s, and also due to the decline in heavy industry in western Europe between 1960 and 2000 (CE03, CF06).

9.1 Future prospects of parameters	9.1a Future prospects of - range. Unknown Due to the small size and isolated locations of many dystrophic lakes and ponds, contractions in range are possible due to succession, draining of wetlands or eutrophication especially in lowland areas. These impacts are much less likely in upland areas. 9.1b Future prospects of - area Overall Stable There is no reason to expect a significant reduction in area of this habitat. 9.1c Future prospects of - structure and function Negative There are ongoing problems with structure and function for many examples of this habitat, and technical and operational obstacles to restoring them. On the other hand, restoration of H3160 should be linked to ditch blocking programmes to restore H7130.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	This revised area has been calculated based on Hatton-Ellis (2014) and subsequent survey data. It is approximately 50% higher than the estimate previously reported (NRW 2013).
11.4 Short term trend of habitat area in good condition within the network; Direction	There is no evidence for a change in condition for any of the SAC lakes (Burgess et al. 2006; Burgess et al. 2013). Welsh SAC examples are natural lakes without modifications to their outflow that could affect area.
11.5 Short term trend of habitat area in good condition within the network; Method used	It should be noted that assessments are from early in the monitoring cycle. More recent data are available but have not yet been processed.