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:

H3180 - Turloughs

NORTHERN IRELAND

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 (Northern Ireland information only)**
1.2 Habitat code	**3180 - Turloughs**

2. Maps

2.1 Year or period	2013-2018
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	Curtis T, Downes S and Ni Chathain B (2009). The ecological requirements of water-dependent habitats and species designated under the Habitats Directive. Biology and Environment: Proceedings of the Royal Irish Academy, 109B, No. 3, 261-319. Fogg, T and Kelly, J.G. Karst Geomorphology of Northern Ireland. A report to Environment Service, Department of the Environment, Northern Ireland. May 1995. Gunn, J. Karst hydrological investigations at Fardrum and Roosky Turloughs, County Fermanagh. An interim report on research funded by the Environment and Heritage Service. (Contractor: University of Huddersfield, Limestone Research Group) Unpublished report to Environment and Heritage Service, Belfast (LRG Report, No. 2003/01). Gunn, J. Karst hydrological investigations at Fardrum and Roosky Turloughs, County Fermanagh. 2005 - 2008. (Contractor: Limestone Research and Consultancy). Unpublished report to Northern Ireland Environment Agency, Belfast (LRC Report 2009/03). Gunn, J. Karst hydrological investigations at Fardrum and Roosky Turloughs, County Fermanagh. 2009 - 2010. (Contractor: Limestone Research and Consultancy). Unpublished report to Northern Ireland Environment Agency, Belfast (LRC Report 2011/13). Kelly, JG, Enlander, I, Kelly, AM & Fogg, T (2002). The geological setting, hydrology and ecology of Roosky Turlough, Ely, Co. Fermanagh, Northern Ireland. Cave and Karst Science, 29(3), 105-110 Langford, R and Brown, L. April 2016 DOE Water Quantity Monitoring, Topographic Survey, Data Analysis and Reporting for Fardrum and Roosky Area of Special Scientific Interest (ASSI) / Special Area of Conservation (SAC). Unpublished Report for NIEA, Belfast. Moran J, Sheehy Skeffington M and Gormally M (2008). The influence of hydrological regime and grazing management on the plant communities of a karst wetland (Skealoghan turlough) in Ireland. Applied Vegetation Science, 11(1), 13 - 24 National Parks and Wildlife Service: Turlough (3180) Conservation Status Assessment Report. 2007 Sheehy Skeffington M, Moran J, Connor A'O , Regan E, Coxon CE, Scott NE and

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Gormally M (2006). Turloughs - Ireland's unique wetland habitat. Biological Conservation, 133, 265 - 290.
Sheehy Skeffington M and Gormally M (2007). Turloughs: a mosaic of biodiversity and management systems unique to Ireland. ACTA CARSOLOGICA, 36 :217-222
Trinity College Dublin, Turlough Conservation Project: www.tcd.ie/Botany/research/turlough_conservation/index.php
Waldren, S. 2015, Ed. Turlough Hydrology, Ecology and Conservation (Part 1). Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
Waldren, S. 2015, Ed. Assessing the Conservation Status of Turloughs: Site Reports (Part 2). Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

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		
4.7 Long-term trend Direction		
4.8 Long-term trend Magnitude	a) Minimum	b) Maximum
4.9 Long-term trend Method used		
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	2013-2018		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 0.0396
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	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	1994-2018		
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	Complete survey or a statistically robust estimate		

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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	0.0396	Maximum	0.0396
	c) Area where condition is not known (km²)	Minimum	0	Maximum	0
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
Intensive grazing or overgrazing by livestock (A09)	M
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Agricultural activities generating point source pollution to surface or ground waters (A25)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	H
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	H
Modification of hydrological flow (K04)	H
Mixed source air pollution, air-borne pollutants (J03)	M
Increases or changes in precipitation due to climate change (N03)	M

Threat	Ranking
Intensive grazing or overgrazing by livestock (A09)	M

Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Agricultural activities generating point source pollution to surface or ground waters (A25)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	H
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	H
Modification of hydrological flow (K04)	H
Mixed source air pollution, air-borne pollutants (J03)	M
Increases or changes in precipitation due to climate change (N03)	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: Only inside Natura 2000

8.4 Response to the measures: Medium-term results (within the next two reporting periods, 2019-2030)

8.5 List of main conservation measures

Maintain existing extensive agricultural practices and agricultural landscape features (CA03)
Adapt mowing, grazing and other equivalent agricultural activities (CA05)
Reduce/eliminate point pollution to surface or ground waters from agricultural activities (CA10)
Reduce diffuse pollution to surface or ground waters from agricultural activities (CA11)
Adapt/manage extraction of non-energy resources (CC01)
Restore habitats impacted by multi-purpose hydrological changes (CJ03)
Implement climate change adaptation measures (CN02)
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

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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	

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 0.0396
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 H3180 - Turloughs. 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 H3180 - Turloughs. 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: 3180

Field label	Note
2.2 Distribution map	Turloughs are seasonally-flooded lakes in karstic limestone areas, that are principally filled by subterranean waters via ephemeral springs or estavelles, and drain back into the groundwater table via swallets or estavelles - they have no natural surface outlet. Most examples flood in autumn and then drain between April and July leaving a dry floor (apart from residual pools). However, some may flood at any time of year after rainfall and drain again in a few days. Their maximum water depth is at least 0.5 m, up to several metres depth. The water is calcium-rich, and the nutrient status ranges from ultra-oligotrophic to eutrophic. Turloughs are typically larger than most seasonal ponds, ranging in size from<1 ha to over 650 ha, and because they receive no surface water inputs, they are less prone to siltation than other standing waters and can therefore be very ancient. The vegetation of turloughs usually has a distinct zonation determined by water depth and frequency and duration of filling. In Ireland, the vegetation mainly belongs to the alliance Lolio - Potentillion anserinae, but also includes Caricion davallianae mires. Turlough organisms are well-adapted to environmental variation. Their survival strategies include aerial adult forms, production of resting stages, resistance to desiccation, or an amphibious lifestyle. Some turloughs are important feeding-grounds for wintering
2.3 Distribution map; Method used	Map based upon fieldwork by NIEA staff at Fardrum and Roosky Turloughs - the only known site for the habitat in NI. NIEA staff have visited the SAC during the reporting period.

Habitat code: 3180 Region code: ATL

Field label	Note
10.6 Overal trend in Conservation Status	Stable assessment based upon no change in status since last assessment.
4.1 Surface area	Survey work has covered Fardrum and Roosky Turloughs, which are believed to be the only turloughs in NI. There has been no loss in range.
4.5 Short term trend; Method used	Stable range assessment based upon regular condition monitoring of the habitat at Fardrum and Roosky SAC. It is believed that this represents the only occurrence of the habitat in NI.
5.2 Surface area	The figure for NI of 3.96 ha of Turloughs is an estimate based upon survey work by NIEA staff. It was recalculated for the 2013 Report : i.e. figure of 3.96 ha includes 2.26ha of +/- permanent water (swamp and aquatic macrophyte communities) and 1.70ha inundation communities.
5.4 Surface area; Method used	The figure for NI of 3.96 ha of Turloughs is an estimate based upon survey work by NIEA staff.
5.6 Short term trend; Direction	Assessment of stable based upon recent condition assessment work undertaken by NIEA staff at Fardrum and Roosky SAC. No change in extent noted.
5.8 Short term trend; Method used	Assessment of stable based upon recent condition assessment work undertaken by NIEA staff at Fardrum and Roosky SAC. No change in extent noted.
5.10 Long term trend; Direction	Long term trend in extent believed to be stable. No loss in area noted at Fardrum and Roosky SAC.
5.12 Long term trend; Method used	Long term trend believed to be stable - based upon fieldwork at the only known site for the habitat in NI - Fardrum and Roosky SAC. Hence method assessed as Complete survey or a statistically robust estimate.

6.1 Condition of habitat	Recent condition assessment data for Fardrum and Roosky show that the habitat is unfavourable. This represents the total known resource of Turlough habitat in NI. However, there are signs of improvement in the condition of the site, and it is hoped that there will soon be more favourable management regime in place.
6.2 Condition of habitat; Method used	Condition has been assessed from data taken from the most recent Common Standards Monitoring of Turloughs at Fardrum and Roosky SAC.
6.4 Short term trend of habitat area in good condition; Direction	Stable assessment based upon Condition Assessment of the habitat at Fardrum and Roosky SAC. The habitat is still in unfavourable condition.
7.1 Characterisation of pressures/ threats	Condition Assessment data for Fardrum and Roosky SAC suggest that grazing has been an issue in the past, with both under- and over-grazing occurring. The former can result in rank vegetation, thatch build-up and scrub encroachment - and is being addressed by a review of the management agreement. Historical over-grazing at other parts of the site appears to have been effectively addressed through management agreement. Changes in hydraulic conditions - historical quarrying activities have impacted on the natural karstic hydrology of the system. Current monitoring programme is informing a planned restoration scheme (capping selected artificial springs). Currently impact reduces flooding extent (spatial and temporal) within at least one of the turlough basins. Fertilisation - limited 'within site' - but wider karst catchment considerations are likely to be more of an issue. Both N and P loadings have been identified as being of potential concern. Pollution to groundwater (point sources and diffuse sources) - turloughs mainly dependant on groundwater recharge which represents groundwater and sheet flow over a large catchment. Catchment extent may typically not be fully understood so contributing areas may vary enormously in terms of nutrient loading. Climate change will inevitably have some effects on the habitat, through changing patterns of rainfall and temperature. It is difficult to predict what the long-term effects of this will be. However, turlough functionality is strongly influenced by precipitaiton - therefore significant changes in this will result in changes to the flooding regime, particularly with regard to extent and duration of flooding. As far as aerial deposition of Nitrogen is concerned, the habitat is currently listed as one for which no established critical load estimate is available. However, like most wetland systems nutrient enrichment can have a significant impact on the composition of the vegetation. Fardrum and Roosky SAC has a predicted annual rate of 7.9 kg/N/ha/year (average figure), which is relatively low by NI standards. However, it should be noted that this is likely to have a cumulative impact with other Nitrogen sources.
7.2 Sources of information	Threats and pressures assessed from the most recent Common Standards Monitoring of Turloughs at Fardrum and Roosky SAC, in addition to ongoing research into hydrological functioning of the site. Threats based upon current pressures and expert judgement on future trends.
8.1 Status of measures	As discussed above, recent monitoring of Turloughs at Fardrum and Roosky SAC has shown that the habitat is in unfavourable condition. However, measures have been put in place to improve condition through management agreements with landowners.
8.2 Main purpose of the measures taken	Measures aimed at reducing damaging impacts from current pressures and future threats. The habitat is very rare in NI and restricted to a very narrow environmental range. There is therefore little opportunity to extend the range or extent of the habitat. There is little doubt that past quarrying in close proximity to the site has tended to reduce the distinctive features of this vegetation, inparticular its hydrological functioning. Hence, this is reported as Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions') - i.e. in particular to restore the former hydrological function of this habitat type.
8.3 Location of the measures taken	Management measures have been taken at Fardrum and Roosky SAC. The site is believed to be the only location for the habitat in NI.

9.1 Future prospects of parameters	Judged to be overall stable. Extent and range are stable, with no loss in either recorded. Management measures are in place to improve condition, but it will be challenging to fully restore the hydrological functionality of the system and ensure that water quality is good.
10.1 Range	In NI, Turloughs are a very rare habitat limited to one known site. NIEA staff have visited the site in the last few years and there is no evidence that the range of the habitat has declined; therefore the current range is judged to be equal to the Favourable Reference Range - therefore Favourable assessment.
10.2 Area	In NI, Turloughs are a very rare habitat limited to one known site. NIEA staff have visited the site in the last few years and there is no evidence that the extent of the habitat has declined; therefore Favourable assessment for extent.
10.3 Specific structure and functions	The habitat is in unfavourable condition, although a series of management measures have been taken to improve condition. Given the complexity of restoring hydrological functioning and tackling eutrophication issues in the wider catchment, assessment for Structure and Function is still Unfavourable Bad.
10.4 Future prospects	Despite some positive developments at Fardrum and Roosky SAC, the structure and function of the habitat is currently bad. Future prospects are uncertain in the light of potential impacts of climate change and the complexities of fully restoring the habitat - hence an Unfavourable Inadequate assessment.
10.5 Overall assessment of Conservation Status	Range is Favourable; Extent is Favourable; Structure and function is bad, although indications are that this is improving with more favourable management. Future prospects are Unfavourable Inadequate (despite improving management, restoring hydrology complex and climate change impacts currently unpredictable) . Hence an overall Unfavourable bad assessment.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	Extent of habitat at Fardrum and Roosky SAC is 3.96 ha. This is the only known location for the habitat in NI.
11.3 Surface area of the habitat type inside the network; Method used	The figure for NI of 3.96 ha of Turloughs is an estimate based upon survey work by NIEA staff. It was recalculated for the 2013 Report : i.e. figure of 3.96 ha includes 2.26ha of +/- permanent water (swamp and aquatic macrophyte communities) and 1.70ha inundation communities. No recent loss in extent has been recorded.
11.4 Short term trend of habitat area in good condition within the network; Direction	Assessment of stable based upon recent condition assessment data, in addition to a consideration of current pressures and future threats. Expert judgement is that these may counterbalance each other.
11.5 Short term trend of habitat area in good condition within the network; Method used	Assessment based upon recent condition assessment data, in addition to a consideration of management measures and threats and pressures.