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 species:

S6353 - Whitefish (*Coregonus lavaretus*)

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 species, 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 species 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; (iii) the field was not relevant to this species (section 12 Natura 2000 coverage for Annex II species) and/or (iv) the field was only relevant at UK-level (sections 9 Future prospects and 10 Conclusions).
- For technical reasons, the country-level future trends for Range, Population and Habitat for the species 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.

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NATIONAL LEVEL

1. General information

1.1 Member State	**UK (Wales information only)**
1.2 Species code	**6353**
1.3 Species scientific name	**Coregonus lavaretus Complex**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Whitefish

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2007-2018
2.3 Distribution map	Yes
2.4 Distribution map Method used	Complete survey or a statistically robust estimate
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No	
3.2 Which of the measures in Art. 14 have been taken?	a) regulations regarding access to property	No
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No
	c) regulation of the periods and/or methods of taking specimens	No
	d) application of hunting and fishing rules which take account of the conservation of such populations	No
	e) establishment of a system of licences for taking specimens or of quotas	No
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No
	g) breeding in captivity of animal species as well as artificial propagation of plant species	No
	h) other measures	No

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3.3 Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

b) Statistics/ quantity taken	Provide statistics/quantity per hunting season or per year (where season is not used) over the reporting period					
	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
Min. (raw, ie. not rounded)						
Max. (raw, ie. not rounded)						
Unknown	No	No	No	No	No	No

3.4. Hunting bag or quantity taken in the wild Method used

3.5. Additional information

BIOGEOGRAPHICAL LEVEL

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs

Atlantic (ATL)

4.2 Sources of information

Bean C. (2003) A standardised survey and monitoring protocol for the assessment of whitefish, Coregonus albula (L.) and C. lavaretus (L.), populations in the UK. JNCC, Peterborough, 43pp.
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Bennion H, Shilland E, Appleby PG. (2003). An assessment of recent environmental change in Llyn Tegid using the sediment record. In: The ecology, conservation and environmental history of the largest natural lake in Wales (eds RH Gritten, CA Duigan and H Millband). University of Liverpool, Liverpool.
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NRW Water Watch Wales map gallery. WFD cycle 1 comparison map.http://waterwatchwales.naturalresourceswales.gov.uk/en/
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Wilson, L, McCall R, Astbury, A, Bhogal A
and Walmsley. (2013). Climate Vulnerability Assessment of Designated Sites in Wales. CCW Contract Science Report No. 1017. Bangor. Countryside Council for Wales.
Winfield IJ, Fletcher JM, James JB. (2003) Gwyniad Translocation Project: Phase One - a condition assessment of the potential donor population in Llyn Tegid. CCW Contract Science Report 597. Bangor, Countryside Council for Wales.
Winfield IJ, Fletcher JM, James BJ. (2008) A review of recent research and translocation activities concerned with the gwyniad of Llyn Tegid. CCW Contract Science Report No. 840. CCW, Bangor.
Winfield IJ, Fletcher JM, James BJ. (2008a) Llyn Tegid Hydroacoustic Surveys 2007. CCW Contract Science No. 814. CCW, Bangor.
Winfield IJ, Fletcher JM, James BJ. (2008b) Long-Term monitoring plan for Llyn Arenig Fawr. CCW Contract Science no. 815. CCW, Bangor.
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Winfield IJ, Fletcher JM, James JB. (2013). Llyn Tegid Hydroacoustic Survey 2012. CCW Contract Science Report No. 1012. Bangor: Countryside Council for Wales.
Winfield, I. J., Fletcher, J. M., James, J. B. (2015). Llyn Tegid Hydroacoustic Survey 2014. NRW Evidence Report No: 41, 44pp, NRW, Bangor.

5. Range

5.1 Surface area (km²)		
5.2 Short-term trend Period		
5.3 Short-term trend Direction	Stable (0)	
5.4 Short-term trend Magnitude	a) Minimum	b) Maximum
5.5 Short-term trend Method used		
5.6 Long-term trend Period		
5.7 Long-term trend Direction		
5.8 Long-term trend Magnitude	a) Minimum	b) Maximum
5.9 Long-term trend Method used		

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5.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown d) Method	
5.11 Change and reason for change in surface area of range	No change The change is mainly due to:	
5.12 Additional information		

6. Population

6.1 Year or period	2014	
6.2 Population size (in reporting unit)	a) Unit	number of map 1x1 km grid cells (grids1x1)
	b) Minimum	
	c) Maximum	
	d) Best single value	13
6.3 Type of estimate	Best estimate	
6.4 Additional population size (using population unit other than reporting unit)	a) Unit	number of individuals (i)
	b) Minimum	49958
	c) Maximum	365451
	d) Best single value	135119
6.5 Type of estimate	95% confidence interval	
6.6 Population size Method used	Complete survey or a statistically robust estimate	
6.7 Short-term trend Period	2007-2018	
6.8 Short-term trend Direction	Decreasing (-)	
6.9 Short-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval	
6.10 Short-term trend Method used	Complete survey or a statistically robust estimate	
6.11 Long-term trend Period		
6.12 Long-term trend Direction		
6.13 Long-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval	
6.14 Long-term trend Method used		
6.15 Favourable reference population (using the unit in 6.2 or 6.4)	a) Population size b) Operator c) Unknown d) Method	

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6.16 Change and reason for change in population size	Genuine change	
	The change is mainly due to:	Genuine change
6.17 Additional information		

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)?	No
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	No
7.2 Sufficiency of area and quality of occupied habitat Method used	Complete survey or a statistically robust estimate	
7.3 Short-term trend Period	2007-2018	
7.4 Short-term trend Direction	Stable (0)	
7.5 Short-term trend Method used	Complete survey or a statistically robust estimate	
7.6 Long-term trend Period		
7.7 Long-term trend Direction		
7.8 Long-term trend Method used		
7.9 Additional information		

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
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

Threat	Ranking
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
Change of habitat location, size, and / or quality due to climate change (N05)	M
Other climate related changes in abiotic conditions (N09)	H

8.2 Sources of information

8.3 Additional information

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9. Conservation measures

9.1 Status of measures	a) Are measures needed?	Yes
	b) Indicate the status of measures	Measures identified and taken
9.2 Main purpose of the measures taken		Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population')
9.3 Location of the measures taken		Only outside Natura 2000
9.4 Response to the measures		Medium-term results (within the next two reporting periods, 2019-2030)

9.5 List of main conservation measures

Reinforce populations of species from the directives (CS01)

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

a) Range
b) Population
c) Habitat of the species

10.2 Additional information

11. Conclusions

11.1. Range

11.2. Population

11.3. Habitat for the species

11.4. Future prospects

11.5 Overall assessment of Conservation Status

11.6 Overall trend in Conservation Status

11.7 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:

11.8 Additional information

12. Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

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12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)	a) Unit b) Minimum c) Maximum d) Best single value
12.2 Type of estimate	
12.3 Population size inside the network Method used	
12.4 Short-term trend of population size within the network Direction	
12.5 Short-term trend of population size within the network Method used	
12.6 Additional information	

13. Complementary information

13.1 Justification of % thresholds for trends
13.2 Trans-boundary assessment
13.3 Other relevant Information

Distribution Map

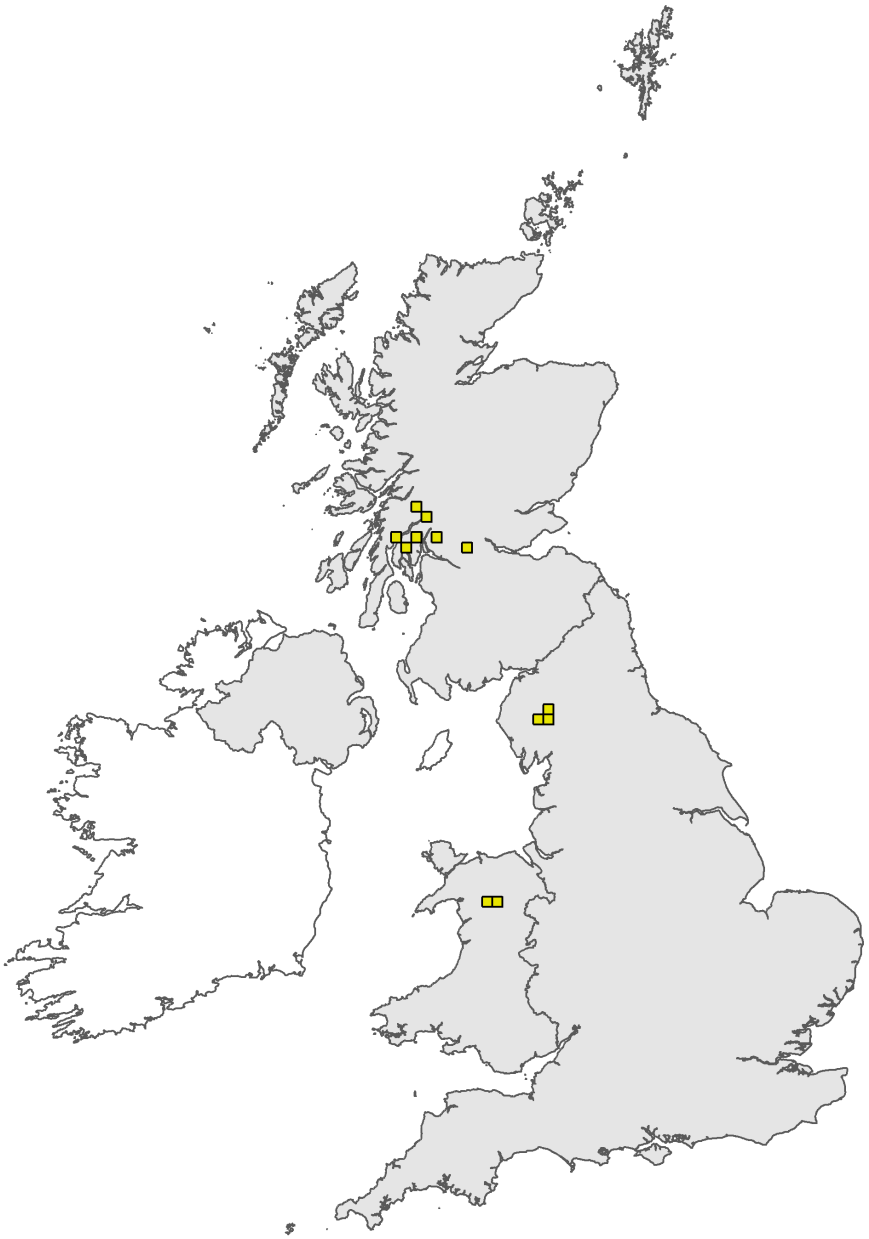

Figure 1: UK distribution map for S6353 - Whitefish (*Coregonus lavaretus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available species records within the current reporting period. For further details see the 2019 Article 17 UK Approach document.

Range Map

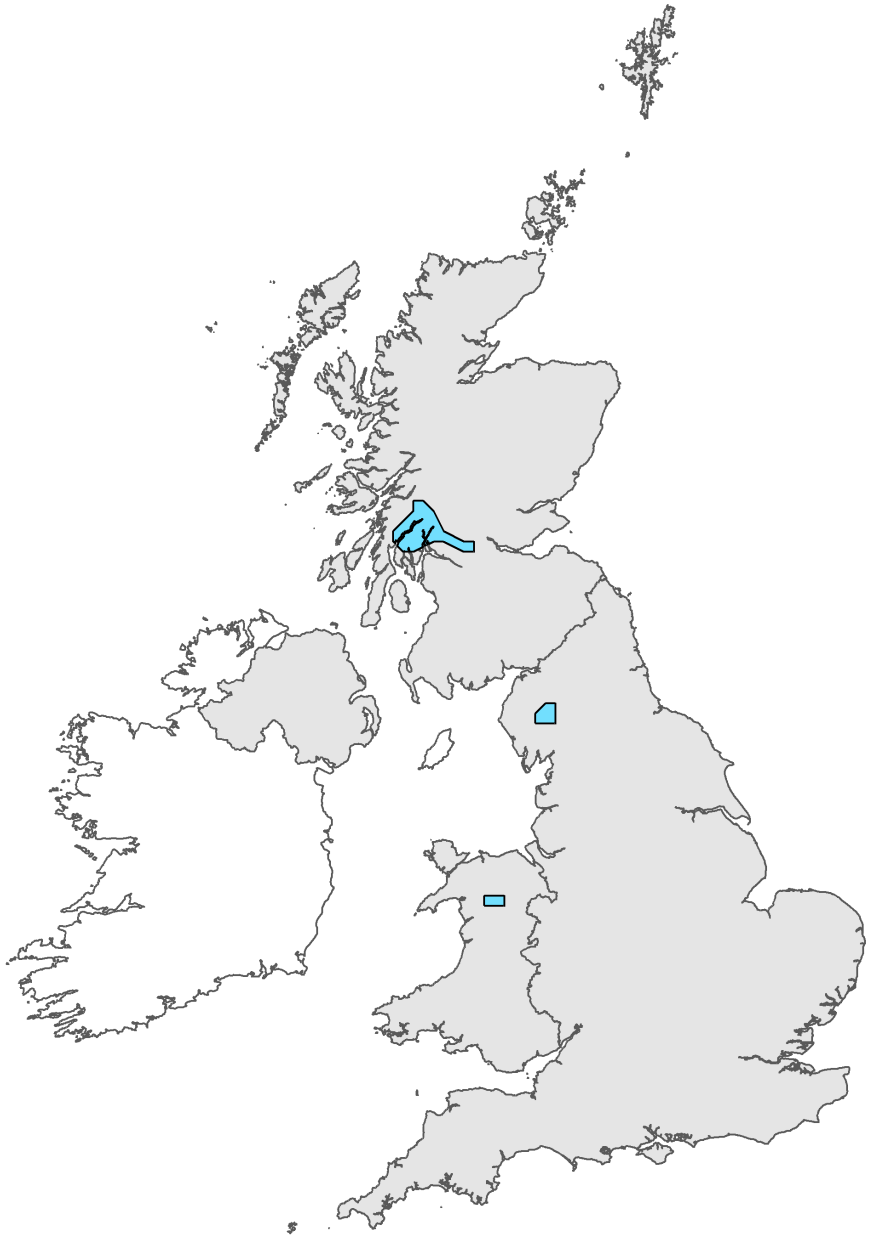

Figure 2: UK range map for S6353 - Whitefish (*Coregonus lavaretus*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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 species was 25km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Coregonus lavaretus Complex (6353) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	See 5.11
5.11 Change and reason for change in surface area of range	The evidence shows that the range has not changed since the previous Article 17 reporting for Habitats Directive in 2013. The range of the species is limited to the existing lakes because they do not migrate. The species was first translocated into a lake near to Llyn Tegid in 2003 to create a refuge population (Winfield et al, 2003; 2008).
6.2 Population size	This count includes the refuge population.
6.4 Additional population size	95% confidence limits of 49,958 and 365,451 individuals, respectively (Winfield et al, 2014). The gwyniad population density estimate can be converted to an absolute population estimate of 135,119 individuals. The population in Llyn Arenig Fawr is not included as it is very small (Winfield et al, 2010b).
6.8 Short term trend; Direction	Population estimates together with data on juvenile recruitment over the period suggests a population decline may be taking place.
6.9 Short term trend; Magnitude	See 6.8
6.17 Additional information	With regard to 6.18: Winfield et al. (2015) states 'Under the whitefish assessment protocol, gwyniad abundance passed its performance indicator in 2014 as it did in 2003, 2004, 2005, 2006, 2007, 2008, 2009 and 2012, while its population demographic structure failed due to a failure to record the required percentage (90%) of young fish, as it did in all earlier years with the exception of 2009'. The failure to detect the required percentage population of young fish would suggest that there is little recruitment, however, the population remains quite large. It is likely that the sampling method under-records juvenile size fish and does not fully reflect population recruitment.
7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)? No - area = Combined area of deeper water in Llyn Tegid (274ha) and the entire area of Llyn Arenig Fawr (35ha) = total habitat area of 309 ha. -quality = The dissolved oxygen in the hypolimnion & temperature profiles (2014, 2016 and 2017) showed generally acceptable to good conditions in terms of gwyniad requirements (Winfield et al, 2015). Llyn Tegid does continue to fail Total Phosphorous (TP) targets and there have also been regular reports of blue-green algal blooms, in 2009 - 2011 and 2015 (NRW, unpublished data). Although not all the environmental criteria recommended by Bean (2003) and JNCC (2015) were assessed this information shows there is some risk to the habitat quality. WFD cycle 2 ecological status classification for Llyn Tegid was Moderate, when Good ecological status is the minimum requirement for gwyniad. Overall = No. b) If NO, is there a sufficiently large area of occupied & unoccupied habitat of suitable quality (to maintain the species at FCS)? NO Gwyniad are at the southernmost part of their sub-arctic range. They have a highly specialised habitat requirement and no dispersal ability which means that the distribution range of this species is highly limited thus making it more vulnerable to the impacts of detrimental nutrient levels. Overall = No

8.1 Characterisation of pressures/ threats	Pressures: Water quality (A25, A26): The principal impact on Llyn Tegid is nutrient enrichment which has caused algal blooms and dissolved oxygen sags in the lake. There was an agri-environment scheme pilot (2005 - 2007) in part of the catchment which worked to improve poor quality farm infrastructure by separating clean and dirty water. Gwyniad also require clean gravels for spawning that could be affected by silt deposition via tributaries in the catchment. Other pressures of note include the following: Water quantity (N05, K04): gwyniad require deep, cool lake water and clean gravels. Both Llyn Arenig Fawr and Llyn Tegid are natural lakes which are managed as reservoirs with controlled outflows. The water levels in Llyn Tegid are kept artificially higher in summer and lower in winter to provide buffering capacity for flooding downstream of Bala town. A conservation water level was set in the 1950s when the Dee regulation scheme was set-up. It is not known whether these artificial hydrological regimes adversely affect the gwyniad. Invasive species (I02): Ruffe have been introduced to Llyn Tegid, and are considered potential predators of gwyniad eggs, but are not considered to be a serious problem at present. Threats: Water quality (A25, A26): Gwyniad are dependent on good water quality (especially oxygen) in the hypolimnion (deeper parts of the lake) in summer, because they cannot tolerate warmer surface waters. This means that they are vulnerable to warm dry summers that favour algal blooms and long periods of stratification. Nutrient enrichment exacerbates this situation by promoting phytoplankton growth. They are also vulnerable to flooding that may likewise stimulate algal blooms by washing nutrients into the water. Water quantity (N05, K04) & Climate change (N05 & N09): Gwyniad are at the most southernmost part of their sub-arctic range. They have a highly specialised habitat requirement and no dispersal ability which means that the distribution range of this species is highly limited thus making it more vulnerable to the impacts of climate change on nutrient levels, thermal & hydrological regimes in the lake. Other threats of note include the following: Invasive species (I02): Crassula helmsii / swamp stonecrop has been found in a pond near the lake. If it establishes in Llyn Tegid, it may overgrow spawning gravels and severely harm the population.
9.5 List of main conservation measures	CS01 - A refuge population has been set up in another lake.
10.1 Future prospects of parameters	Future trend for range: overall stable The range of gwyniad is expected to remain stable over the next 12 years.