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

Supporting documentation for the Third Report by the United Kingdom under Article 17

on the implementation of the Directive
from January 2007 to December 2012
Conservation status assessment for

Species:

S1163 - Bullhead. (*Cottus gobio*)

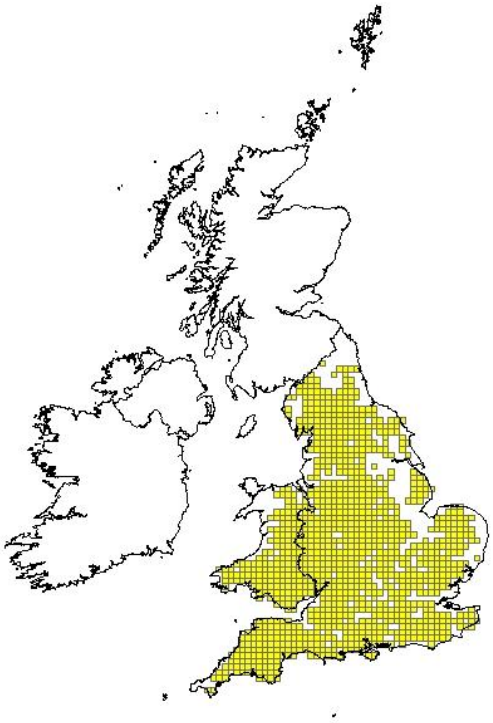
IMPORTANT NOTE – PLEASE READ

- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Natural England** and refers only to the state of the habitat/species in **England** - it does not constitute an assessment for the whole of the UK.
- The Article 17 UK Approach document provides details on how this information has been used and, combined with information supplied by other Statutory Nature Conservation Bodies
- The format of the document is closely aligned to that set out by the European Commission for Member State reporting – as a result, some of the fields are not applicable at a country-level and have deliberately been left blank – in addition, the content of most fields is constrained by the EC reporting categories.

Reporting format on the 'main results of the surveillance under Article 11' for Annex II, IV & V species

Field name	*Brief explanations*	
0.2 Species	**0.2.1 Species code**	**S1163**
	0.2.2 Species scientific name	***Cottus gobio***
	0.2.3 Alternative species scientific name Optional	
	0.2.4 Common name Optional	**Bullhead, Miller's Thumb**

1.1 Maps			
1.1.1 Distribution map		**Sensitive**	**False**
	The bullhead is a very common and widely distributed species in England. The map is a good reflection of its distribution.		



1.1.2 Method used - map	**Estimate based on partial data with some extrapolation and/or modelling**
1.1.3 Year or period	**2002-2012**
1.1.4 Additional distribution map	**False**

1.1.5 Range map	

2.1 Biogeographical region & marine regions	**ATL**
2.2 Published sources	**"DAVIES, C.E., SHELLEY, J., HARDING, P.T., MCLEAN, I.F.G., GARDINER, R. AND PEIRSON, G. 2004. Freshwater Fishes in Britain - the species and their distribution, 176pp. Colchester: Harley Books.** **MAITLAND, P.S. 1972. Key to British Freshwater Fishes. Ambleside: Freshwater Biological Association.** **TOMLINSON, M.L. & PERROW, M.R. 2003. Ecology of the Bullhead. Conserving Natura 2000 Rivers Ecology Series No. 4. Peterborough: English Nature** **Environment Agency (2012) Summary of outcomes of the Review of Consents on water-related SACs. Excel spreadsheet.** **Natural England (2012) England Catchment Sensitive Farming Initiative. Http://www.naturalengland.org.uk/ourwork/farming/csf/default.aspx.** **Wheeldon, J (2012) River Restoration Planning and implementation on River Sites of Special Scientific Interest in England. Internal Natural England paper.** **Mainstone, C.P., Dils, R.M. and Withers, P.J.A. (2008). Controlling sediment and phosphorus transfer to receiving waters – A strategic management perspective for England and Wales. Journal of Hydrology, 350, 131-143.** **Mainstone, C.P. and Holmes, N.T. (2010) Embedding a strategic approach to river restoration in operational management processes – experiences in England. Aquatic Conservation: Marine and Freshwater Ecosystems. Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/aqc.1095** **Mainstone C.P. (2008) The role of specially designated wildlife sites in freshwater conservation – an English perspective. Freshwater Reviews, 1, 89-98.** **Chris Mainstone & Alastair Burn (2011) Relationships between ecological objectives and associated decision-making under the Habitats and Water Framework Directives. Discussion paper, Natural England.** **Mainstone, C.P. and Clarke, S.J. (2008) Managing multiple**

	stressors on sites with special protection for freshwater wildlife – the concept of Limits of Liability. Freshwater Reviews, 1, 175-187."

2.3 Range		
2.3.1 Surface area Range		
2.3.2 Method used Surface area of Range	**Estimate based on partial data with some extrapolation and/or modelling**	
2.3.3 Short-term trend Period	**2001-2012**	
2.3.4 Short term trend Trend direction	**stable**	
	There is no evidence of any recent trend in range and no reason to suspect a decline.	
2.3.5 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	
2.3.6 Long-term trend Period	**1989-2012**	
2.3.7 Long-term trend Trend direction	**stable**	
	There is no evidence of any trend in range over this longer time period and no reason to suspect a decline.	
2.3.8 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
2.3.9 Favourable reference range	**a) Value in km²**	
	The current range is the same as the known historical range, and is assumed to be the same as the favourable reference range.	
	b) Operator for FRR	

	c) FRR is unknown (indicated by "true")	**False**
	d) Method used to set FRR	
2.3.10 Reason for change Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to…	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.4 Population		
2.4.1 Population size estimation (using individuals or agreed exceptions where possible)	**a) Unit**	
	b) Minimum	
	c) Maximum	
2.4.2 Population size estimation (using population unit other than individuals) Optional *(if 2.4.1 filled in)*	**a) Unit**	**number of map 1x1 km grid cells**
	b) Minimum	**2248**
	Awareness of this inconspicuous species is high due to the Habitats Directive, and recording effort is consequently good. This said, records at 1km are patchy and a good deal of this will be due to patchiness in recording effort.	
	c) Maximum	
2.4.3 Additional information on population estimates / conversion Optional	**a) Definition of "locality"**	
	b) Method to convert data	

	c) Problems encountered to provide population size estimation	
2.4.4 Year or period	**2002-2012**	
2.4.5 Method used Population size	**Estimate based on partial data with some extrapolation and/or modelling**	
2.4.6 Short-term trend Period	**2001-2012**	
2.4.7 Short-term trend Trend direction	**stable**	
	There is no evidence of any recent trend and no reason to suspect a decline.	
2.4.8 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
2.4.9 Short-term trend Method used	**Estimate based on expert opinion with no or minimal sampling**	
2.4.10 Long-term trend – Period	**1989-2012**	
2.4.11 Long-term trend Trend direction	**stable**	
	There is no evidence of any trend in range over this longer time period and no reason to suspect a decline.	
2.4.12 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	

	c) Confidence interval	
2.4.13 Long term trend Method used	**1**	
2.4.14 Favourable reference population	**a) Number of individuals/agreed exceptions/other units**	
	No estimate is available.	
	b) Operator	
	c) FRP is unknown indicated by "true"	**True**
	d) Method used to set FRP	
2.4.15 Reason for change Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.5 Habitat for the species	
2.5.1 Area estimation	It has not been possible to estimate habitat surface area. In order to make an estimate a simple natural habitat suitability model would need to be constructed and applied to the English river (and lake) network.
2.5.2 Year or period	
2.5.3 Method used Habitat for the species	

2.5.4 Quality of the habitat	a) Habitat quality	Moderate

The bullhead requires swift, shallow flowing water over mixed coarse substrates, with good habitat complexity within the river channel (woody debris, macrophyte cover, riparian trees) to provide cover and flow refugia, and uninterrupted passage within the river to allow recolonisation of upstream areas following acute mortality events (e,g, drought in headwaters). In lakes their requirements are similar, with hydraulic scour and hence coarse substrates being provided by lake margins exposed to wave action. The English river and lake network is subjected to a range of pressures that interfere with the provision of these conditions. Factors such as siltation, nutrient enrichment, organic pollution, hydrological modifications and historical physical habitat modifications all have a bearing on habitat quality.

The Article 17 report on H3260 provides a general assessment of river habitat quality, since H3260 is a key habitat for bullhead and both the habitat and the species are widely distributed in England. Key points from that report are provided below.

Assessment of the condition of rivers designated SAC for H3260 (which is the majority of the SAC river network in England) is based on evaluation of the environmental integrity of the habitat (in relation to water quality, hydrology, morphology, non-native species and some aspects of the status of the characteristic biological community. By habitat area, around 11% is recorded as favourable, 45% as Unfavourable recovering, and 43% as Unfavourable no change. There are typically multiple reasons for Unfavourable condition, which need to be addressed in a coordinated way to move SACs to Unfavourable recovering and ultimately Favourable condition. The large percentage of area recorded as Unfavourable recovering reflects the complex planning and lengthy timescales needed to resolve many of the key pressures on river systems.

Within the wider network of nationally designated (SSSI) rivers designated for their river habitat, some 42% is recorded as Favourable, 33.5% as Unfavourable recovering, and 21% as Unfavourable no change. The higher proportion of area in Favourable condition relative to SACs is likely to be an artefact of the data, partly due to the inclusion of adjacent floodplain habitat in the figures which is often recorded as being in Favourable condition even though the adjacent river channel and its banks are not.

Beyond SACs and nationally designated sites, the main source of data on habitat condition is the Water Framework Directive (WFD). The WFD reports on the ecological status of rivers that form part of defined 'waterbodies'. Ecological status is defined in terms of a number of biological quality elements: the phytobenthos (algae and submerged higher plants), macroinvertebrates and fish, as well as the nutrient status of waterbodies. A number of environmental standards are also defined that support ecological status. Status categories are high, good, moderate, poor and bad. Where significant anthropogenic modifications are present in a waterbody, which cannot be removed to restore good

	ecological status, the waterbody is designated as heavily modified under the WFD and an objective is assigned in terms of ecological potential. There is no simple relationship between favourable condition of SAC/SSSI river habitat and ecological status classes. However, for most biological and environmental indicators that both assessment methods use, favourable condition is most closely associated with high ecological status. See Mainstone and Burn, (2011) in 2.2 for further explanation. Levels of habitat condition consistent with ecological potential objectives are set in relation to site-specific constraints and cost-benefit considerations and are not amenable to general comparison with favourable condition as defined for SACs and SSSIs. Mainstone (2011) provides summary statistics of WFD ecological status data across the English river network. About a third (30.3%) of all WFD river waterbodies in England have been designated as heavily modified and therefore have objectives relating to ecological potential rather than ecological status. Of those waterbodies not designated as heavily modified, around 70% were at less than good ecological status (ges) in the 2009 WFD baseline assessment, and only 4 waterbodies were at high ecological status (hes). This assessment is based on the worst performing quality element making up the assessment (biological quality elements and nutrient levels).	
	b) Assessment method	**Condition assessment of SAC rivers, ecological status assessment of the wider river network under the Water Framework Directive. See Article 17 report on H3260 habitat.**
2.5.5 Short-term trend Period	**2001-2012**	
2.5.6 Short-term trend Trend direction	**increase**	
	The picture is complex but there has been significant progress with alleviating a number of pressures, including nutrient enrichment, organic pollution, acidification and industrial pollution. This said, the pressure from non-native species (signal crayfish) has increased across much of the bullhead's range in England.	
2.5.7 Long-term trend Period	**1989-2012**	
2.5.8 Long-term trend Trend direction	**increase**	
	The picture outlined in 2.5.6 is also apparent over this longer time period.	
2.5.9 Area of suitable habitat for the species	**a) Value in km²**	
	No estimate is available.	
	b) Absence of data indicated as '0'	
2.5.10 Reason for change Is the difference between the	**a) Genuine change?**	**False**

value reported at 2.5.1 and the previous reporting round mainly due to		
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.6 Main pressures		
a) Pressure	**b) Ranking**	**c) Pollution qualifier**
	H = high importance M = medium importance L = low importance	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	H	X
J02: human induced changes in hydraulic conditions	H	
J03: Other ecosystem modifications	H	
A01: Cultivation	M	
F02: Fishing and harvesting aquatic resources	M	
I01: invasive non-native species	M	

A02/H01 - Many English rivers suffer from enhanced loads of fine sediment and nutrients, with fine sediments generated largely from the catchment and nutrients generated from both catchment sources and effluents. Other pollutants of concern include organic pollution from point sources and agriculture, biocides and oestrogenic substances.

F02 - Some lowland bullhead rivers are intensively stocked with trout, which can lead to enhanced predation levels.

I01 - Signal crayfish have spread across most river systems in England and are known to predate on bullhead eggs. Signals reach very high population densities so predation can be severe. Signal crayfish can also have serious impacts on physical habitat conditions, destabilising banks and causing riparian habitat damage and in-channel siltation.

J02 - The English river network is subjected to considerable amounts of flow regime modification, including headwater impoundment and flow regulation, and groundwater and direct river abstraction.

J03 - The English river network has been extensively physically modified, leading to habitat simplification and loss of habitat niches and flow refugia. There are many in-channel structures that cause impoundment and siltation and restrict the free movement of fish and other species. Free movement is particularly important for bullheads in recolonising headwater streams following mortality events (e.g. drought) - weirs

of only 10-15cm drop can be sufficient to prevent upstream movement of bullheads.	
2.6.1 Method used – Pressures	**based exclusively or to a larger extent on real data from sites/occurrences or other data sources**

2.7 Threats		
a) Threat	**b) Ranking**	**c) Pollution qualifier**
	H = high importance M = medium importance L = low importance	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	H	X
J02: human induced changes in hydraulic conditions	H	
J03: Other ecosystem modifications	H	
A01: Cultivation	M	
F02: Fishing and harvesting aquatic resources	M	
I01: invasive non-native species	M	

All of the pressures listed in 2.6 are set to continue in the future. Measures in place or being planned will reduce some of them whilst others may increase, particularly in the face of climate change. For instance, water resource demands are set to increase as a result of increased probabilities of drought and a rising human population. Non-native species threats are also likely to increase, particularly considering the complexities and costs of adequate prevention and control programmes.	
2.7.1 Method used – Threats	**expert opinion**

2.8 Complementary information	
2.8.1 Justification of % thresholds for trends	
2.8.2 Other relevant information	
2.8.3 Trans-boundary assessment	

2.9 Conclusions *(assessment of conservation status at end of reporting period)*
Please refer to the United Kingdom assessment for this species.

3 Natura 2000 coverage & conservation measures - Annex II species
(only applies to species listed under Annex II of the Directive)

3.1 Population		
3.1.1 Population size Estimation of population size included in the SAC network	**a) Unit**	**number of map 1x1 km grid cells**
	b) Minimum	**37**
	The SAC river network supports a large number of bullhead populations. It is likely that the recorded figure for population size is a considerable under-estimate caused by patchy recording at 1km resolution. It should therefore be seen as a minimum estimate, with no maximum estimate available.	
	c) Maximum	
	No maximum estimate is available.	
3.1.2 Method used	**Estimate based on partial data with some extrapolation and/or modelling**	
3.1.3 Trend of population size within the network (short-term trend)	**stable**	

3.2 Conservation measures				
Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.				
3.2.1 Measure	**3.2.2 Type**	**3.2.3 Ranking** H = high importance	**3.2.4 Location** where the measure is PRIMARILY applied	**3.2.5 Broad evaluation of the measure**

	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off	M = medium importance L = low importance	a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown	f) Not evaluated
:															
1.2: Measures needed, but not implemented				Y	Y	M			Y		Y	Y			
2.2: Adapting crop production		Y	Y	Y		M			Y		Y	Y			
4.0: Other wetland-related measures		Y	Y	Y	Y	H			Y		Y	Y			
4.1: Restoring/improving water quality	Y				Y	H			Y		Y	Y			
4.2: Restoring/improving the hydrological regime		Y	Y	Y	Y	H			Y		Y	Y			
4.3: Managing water abstraction	Y				Y	M	Y				Y	Y			
7.2: Regulation/ Management of fishery in limnic systems	Y		Y			M	Y				Y	Y			

Within the English river SAC network, and to a lesser extent the wider network of nationally designated rivers, considerable effort has been expended on the development and implementation of strategic plans aimed at restoring the condition of the river habitat (see Mainstone and Clarke 2008 in 2.2 for an explanation of the strategy adopted). More widely, management measures for freshwater habitat are planned and implemented under the Water Framework Directive. Within the first round of river basin management planning, a considerable amount of WFD-related effort is being expended on confirming, and investigating the causes of problems with, ecological status. Better harmonisation of plans and activities under the WFD and Habitats Directive is needed (see Mainstone 2008 for further discussion of harmonisation issues).

An account of each type of conservation measure is given below.

2.2 The England Catchment Sensitive Farming Initiative is continuing to promote a range of best agricultural practices to reduce pollution loads to priority aquatic sites, including a range of river SACs and nationally designated rivers (see link in 2.2 for further details). The initiative is voluntary and uses awareness-raising and incentives to bring about management change. Modelling has predicted benefits in terms of reduced pollution loads, but it is still unclear how far a voluntary approach will go towards achieving favourable conditions for freshwater habitats.

4.0 Since the last Article 17 report, a major programme of physical restoration has been implemented on the designated river network, involving the development of a long-term strategic plan for each river and its programmed implementation over suitable timescales (see references in 2.2 for details of the programme). These plans address key issues such as dams and weirs, channelisation, flood embankments, bank reinforcements, lack of riparian habitat, lack of riparian trees and lack of woody debris in the channel. The development and implementation of these plans is providing an important strategic focus for river restoration on the designated river network, and is valuable in promoting a strategic approach on the wider river network. Outside of the designated site network, practical measures have focused on addressing the many weirs and dams on the river network in England. The general WFD aim is to remove problem structures where possible, or to reduce their impacts on fish migration.

4.1 In addition to Catchment Sensitive Farming, work has continued to implement the review of discharge consents affecting the Natura network in England. Further phosphorus removal processes have been fitted to sewage effluents under the water industry's programme of strategic improvements. In respect of discharge consents affecting SAC rivers, 108 are being modified, 7 are being revoked and one is being surrendered. However, further investigations are needed into the application of new best available technology for phosphorus removal, as well as the need for action on rural unsewered populations. Plans are being drawn up for addressing these issues in relation to SACs and nationally designated sites.

4.2/4.3 The review of abstraction licences affecting the Natura network in England has been completed. In respect of those licences affecting SAC rivers, 10 are being served closure notices, 111 are being modified, 15 are being revoked and 9 are being surrendered. However, agreement is needed on further action on abstraction to ensure that the flow regime of SAC rivers and other nationally designated rivers are properly protected.

7.2 Attention is paid to the intensity of trout stocking in SAC rivers to try and ensure that competition and predation on characteristic communities is controlled at acceptable levels. This is handled through the regulatory regime controlling fish stocking to natural freshwaters.

No measures (1.2) - An area where there is no satisfactory management meaures in place is the control of signal crayfish. Whilst mitigation measures have been taken to create ark site for white-clawed crayfish populations, which have been eliminated by signal crayfish, there are no viable methods of controlling signal crayfish populations once they have invaded a site. A range of methods have been tested and efforts are still made to trap signals, but these have no effect on recruitment. Unless viable methods can be found then heavy predation of bullheads and many other native species will continue.