

**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:

S5085 - Barbel (*Barbus barbus*)

IMPORTANT NOTE – PLEASE READ

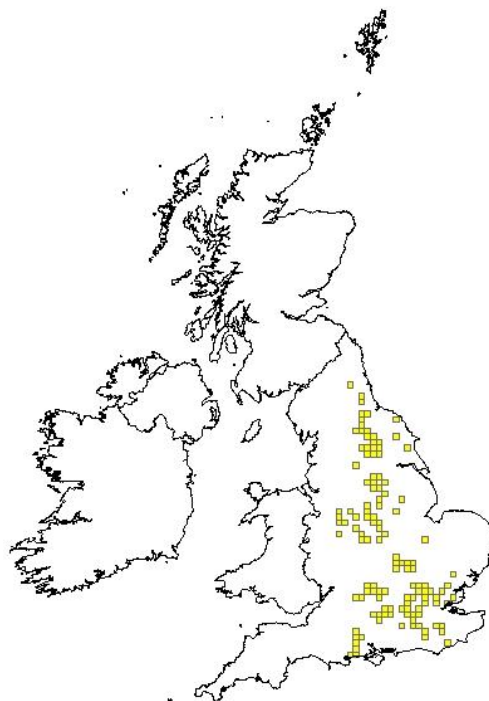
- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Natural England** and refers only to the state of the habitat/species in **England** - it does not constitute an assessment 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

<i>Field name</i>	<i>Brief explanations</i>	
0.2 Species	0.2.1 Species code	S5085
	0.2.2 Species scientific name	<i>Barbus barbus</i>
	0.2.3 Alternative species scientific name Optional	
	0.2.4 Common name Optional	Barbel

1.1 Maps		
1.1.1 Distribution map		Sensitive False
	<p>The species' natural distribution is limited to rivers in the south and east of England that during the periglacial period formed part of the catchment of the Proto-Rhine, along with rivers of north western Europe such as the Schelde that now run into the North Sea and/or English Channel. Owing to its angling interest, the species has been distributed by anglers into other English rivers, most notably in the Severn system and the Bristol Avon. Northwards the species is restricted by climate as well as natural barriers to movement, although climate change may alter the species' climate space. Records that relate to artificial extensions of range caused by introductions by anglers have been removed from the distribution map, as they are beyond the natural range of the species.</p> <p>Within the natural range, there is an absence of records from East Anglia - this may be due to patchy recording, natural lack of suitable habitat, local post-glacial colonisation difficulties, some interruption in habitat suitability in the post-glacial past at a time from which recolonisation has not been possible, or a more recent loss of suitable habitat caused by channel modifications and other pressures. The barbel is a species of swift-flowing, sizeable rivers, and this habitat is in short supply in East Anglia. The River Wensum SAC in East Anglia has been shown to be marginally suitable for barbel - whilst there are no historical records of the species on the Wensum that indicate natural presence, a stocking programme produced a small population with low-level and sporadic natural recruitment. The current programme of physical restoration on the River Wensum SAC may ultimately provide more suitable conditions for a self-sustaining and thriving population within that part of the species' broad natural range.</p> <p>The absence of barbel on the River Test SSSI and River Itchen SAC is also worthy of comment, since these are also rivers historically connected to the Proto-Rhine and the neighbouring River Avon has a thriving barbel population. The species has never been reported on the Test and Itchen, so it would appear to be natural absence. This absence does not appear to be related to current habitat suitability - lower river sections seem to be highly suitable. There have in fact been illegal introductions of barbel into the lower Itchen in recent years, and fish farm escapes, and the</p>	

	<p>likelihood is that the species is becoming established.</p> <p>Beyond the natural range of the species indicated on the map, the barbel is widely distributed in the Severn catchment in suitable habitat, as well as in the Bristol Avon.</p>
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1.1.2 Method used - map	Estimate based on partial data with some extrapolation and/or modelling
1.1.3 Year or period	2000-2011
1.1.4 Additional distribution map	False
1.1.5 Range map	

2.1 Biogeographical region & marine regions	ATL
2.2 Published sources	<p>"DAVIES, C. E., SHELLEY, J., HARDING, P. T., MCLEAN, I. F. G., GARDINER, R. & PEIRSON, G., eds. 2004. Freshwater fishes in Britain - the species and their distribution. Colchester: Harley Books.</p> <p>MAITLAND, P.S. 2004. Keys to the Freshwater Fish of Britain and Ireland with notes on their distribution and ecology. Freshwater Biological Association, Scientific Publication No. 62, pp.245.</p>

MAITLAND, P. S. & CAMPBELL, R. N. 1992. Freshwater Fishes of the British Isles. London: HarperCollins.

Mainstone, C.P. (2010) An evidence base for setting nutrient targets to protect river habitat. Natural England Research Reports, Number 034. Available at: <http://publications.naturalengland.org.uk/publication/30027?category=440349>

Mainstone, C.P. (2010) An evidence base for setting organic pollution targets to protect river habitat. Natural England Technical Information Note 076. Available at: <http://publications.naturalengland.org.uk/publication/33008?category=440349>

Mainstone, C.P. (2010) An evidence base for setting flow targets to protect river habitat. Natural England Research Reports, Number 035. Available at: <http://publications.naturalengland.org.uk/publication/9025?category=440349>

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](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 Within its natural range in England, the range of the species is considered to be stable. Beyond its natural range, range has increased considerably in recent years.
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 Within its natural range in England, the range of the species is considered to be stable. Beyond its natural range, range has increased considerably in recent years.
2.3.8 Long-term trend Magnitude Optional	a) Minimum
	b) Maximum
2.3.9 Favourable reference range	a) Value in km²
	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 (<i>if 2.4.1 filled in</i>)	a) Unit	number of map 1x1 km grid cells
	b) Minimum	151
	c) Maximum	This estimate is considered to be a considerable under-estimate of population size due to the patchiness of recording at 1km resolution.
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	2000-2011	
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	unknown Trend in population size is unknown but there is a perceived decline in many of the major rivers within the species' natural range, whilst outside of the natural range, population size has increased considerably and the species is perceived to be thriving.	
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	unknown The comments in 2.4.7 also apply here.	
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	
	b) Operator	
	c) FRP is unknown indicated by "true"	True
	It has not been possible to estimate the favourable reference population, either in terms of the population unit used in 2.4.2 or numbers of individuals. In order to make an estimate a simple natural habitat suitability model would need to be constructed and applied to the English river network. This could be converted into numbers of individuals by applying typical abundance figures.	
	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

	<p>make an estimate a simple natural habitat suitability model would need to be constructed and applied to the English river network. A fish typology has been developed for use in England and can be applied to the river network using a predictive model based on a few fundamental river characteristics (such as stream order, catchment area and baseflow index). This has been applied to routine sampling points in England - community types that relate to the presence of barbel are predicted to be reasonably extensive within the species' natural range, somewhat more extensive than the distribution of species records. This is a crude estimate and may be misleading, or perhaps species records are incomplete. Equally, some rivers within the natural range with apparently suitable habitat may never have been colonised, or else became unsuitable at some time after the periglacial land bridge to the continent was broken and recolonisation was not possible. Unfortunately it is not possible to generate an estimated habitat area from this information.</p>	
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
	<p>The barbel favours sizeable rivers with swift flows, extensive clean coarse substrates, good water quality, patchy beds of macrophytes, and physical habitat complexity that provides shallow water and flow refuges for juveniles and deeper water for adults. The English river network is subjected to a range of pressures that interfere with the provision of these conditions. There is a perceived decline in barbel populations within the species' natural range, although the species is expanding its range beyond its historical boundaries and appears to be thriving in these locations. It is likely that factors such as siltation, nutrient enrichment, flow modifications, historical physical habitat modifications and possibly (in some lowland salmonid angling rivers) active fishery management are combining to constrain both the occurrence and abundance of the species within its natural range.</p> <p>The Article 17 report on H3260 provides a reasonable basis for characterising habitat quality for barbel, since H3260 is a widespread habitat in England and the natural range of barbel is reasonably wide. Key points from that report are provided below.</p> <p>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.</p>	

	<p>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.</p> <p>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.</p> <p>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).</p>	
	b) Assessment method	Condition assessment of SAC rivers, wider assessment of ecological status under the Water Framework Directive. See Article 17 report on H3260.
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 and organic pollution.	
2.5.7 Long-term trend Period	1989-2012	
2.5.8 Long-term trend Trend direction	increase	
	The improving trend in some pressures is also apparent over this longer-term 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 value reported at 2.5.1 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

2.6 Main pressures		
a) Pressure	b) Ranking	c) Pollution qualifier
	H = high importance M = medium importance L = low importance	
A01: Cultivation	M	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	X
J02: human induced changes in hydraulic conditions	M	
J03: Other ecosystem modifications	M	
F02: Fishing and harvesting aquatic resources	L	
K03: Interspecific faunal relations	L	

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 agriculture, biocides and oestrogenic

substances.

F02 - There is no commercial exploitation of barbel - the traditional angling practice for cyprinids in England is catch-and-release. However, on some lowland salmonid rivers there has historically been a tradition of removal of rheophilic cyprinids on the basis that they compete with salmonids. Fishery management has become much more enlightened in recent years so such practices are less of a concern now. It is unlikely that such removals had any lasting effect on barbel populations.

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. Flow modification can reduce both current velocities (with consequences for substrate conditions and water quality) and habitat extent.

J03 - The English river network has been extensively physically modified. Simplification of physical habitat provision has a range of impacts including reducing the availability of shallow water and flow refugia for juveniles, and water depth for adults. Impounding structures can reduce current velocities and enhance siltation of coarse substrates. Barbel make upstream spawning migrations in search of suitable spawning habitat, and weirs can potentially interfere with these migrations.

K03 - There have been complaints of serious damage to barbel fisheries by enhanced levels of predation caused by the return of the otter to lowland England. This constitutes the return of a natural pressure and so is not a concern to the conservation of the species. It is likely that, in the absence of otters, barbel specimens have grown to a large size in habitat that possibly provides insufficient protection against otters. A new balance between the species will be established, with consequent shifts in age and size structure in barbel populations.

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	
A01: Cultivation	M	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	X
J02: human induced changes in hydraulic conditions	M	
J03: Other ecosystem modifications	M	
F02: Fishing and harvesting aquatic resources	L	
M01: Changes in abiotic conditions	L	

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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, although some may intensify or fail to be reduced as climate change proceeds. For instance, whilst significant new impounding structures are unlikely in England, small-scale hydropower generating is creating a potential new use for many structures that were being earmarked for removal to restore natural river processes and access. Water resource demands are also set to increase as a result of increased probabilities of drought and a rising human population, leading to the potential for further flow reductions in rivers.

2.7.1 Method used – Threats	expert opinion
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2.8 Complementary information

2.8.1 Justification of % thresholds for trends	
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2.8.2 Other relevant information	
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2.8.3 Trans-boundary assessment	
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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	
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b) Minimum	
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c) Maximum	
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3.1.2 Method used

3.1.3 Trend of population size within the network (short-term trend)	

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 M = medium importance L = low 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		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown	f) Not evaluated

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