

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

**Second Report by the United Kingdom under  
Article 17  
on the implementation of the Directive  
from January 2001 to December 2006**

**Conservation status assessment for :  
S2492: *Coregonus albula* - Vendace**

Please note that this is a section of the report. For the complete report visit <http://www.jncc.gov.uk/article17>

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## **S2492 *Coregonus albula* Vendace**

*Audit trail compiled and edited by JNCC and the Freshwater Inter-Agency Working Group*

This document is an audit of the data and judgements on conservation status in the UK's report on the implementation of the Habitats Directive (January 2001 to December 2006) for this species. Superscript numbers accompanying the headings below, cross-reference to headings in the corresponding Annex B reporting form. This supporting information should be read in conjunction with the UK approach for species (see 'Assessing Conservation Status: UK Approach').

### **1. Range Information<sup>2.3</sup>**

*Coregonus albula* is currently found in three lakes within the UK. Bassenthwaite and Derwentwater, located in the English Lake District, are the only naturally extant populations. One new population has recently been established at Loch Skeen in Scotland and four others may exist, at Daer reservoir (Lanarkshire), Black Loch (Galloway), Loch Earn (Tayside) and Sprinkling Tarn (Cumbria), following planned introductions. However, it is too early to consider these components of species range. Hence, for this reporting round, they do not inform judgments on range, or other parameters.

#### **1.1 Surface area of range<sup>2.3.1</sup>** **500 km<sup>2</sup>**

The above estimate was calculated within Alpha Hull software, using extent of occurrence as a proxy measure for range (as shown in the map below). Alpha was set at 25 km to reflect the mobility of this species. The alpha hull (range area) was clipped to exclude marine habitat. Although Bassenthwaite has been included in this calculation, based on expert opinion, this may have already been lost.

#### **1.2 Date of range determination<sup>2.3.2</sup>** **1994**

Current range was calculated using records from 1965 to 2003 (from the Database for the Atlas of Freshwater Fishes). Grid references for Mill and Castle Lochs (dated 1965) were excluded on the basis that both are now known to be extinct.

Due to uncertainties regarding Bassenthwaite, it can not confidently be reported that Map 1.1 represents the 2007 range. However, based on expert opinion, it is likely to be representative of the range in 1994.

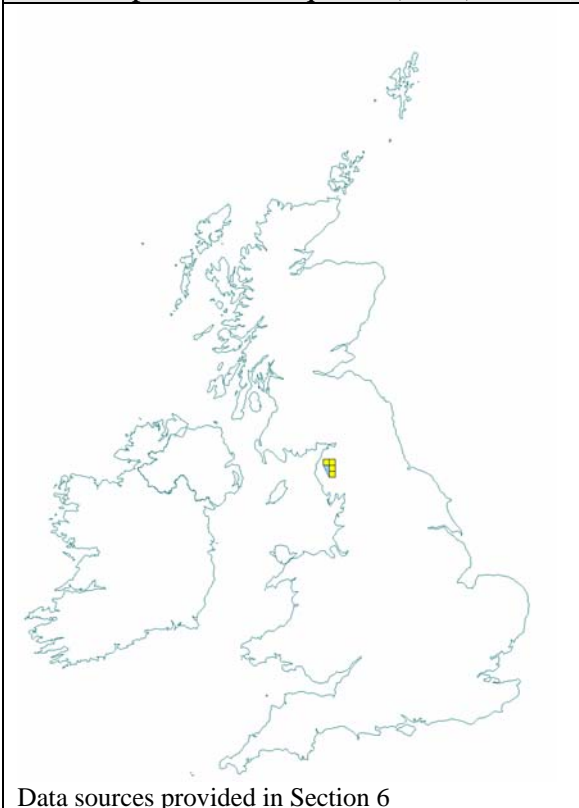
#### **1.3 Quality of range data<sup>2.3.3</sup>** **Moderate**

At a 10 km resolution, the freshwater fish database (Davies *et al.*, 2004) provides a relatively good data source for fish across Britain. However, because it comprises records collected from a variety of sources over a large time frame, rather than from a blanket survey in 1994, data quality is reported as moderate rather than good.

#### **1.4 Range trend<sup>2.3.4</sup> and range trend magnitude<sup>2.3.5</sup>** **Unknown**

Species experts report that Bassenthwaite (one of the two remaining naturally extant populations) is now in critical condition due to nutrient enrichment, the introduction of non-native fish and macrophyte species and a general decline in water quality, and may have already been lost. However, without confirmation of this, it is not known whether range has remained stable, or decreased, since the Directive came into force. Therefore, in the absence of further information, range trend has been reported as unknown.

**Map 1.1.** Current extent of occurrence and occupied 10-km squares (1994)



**1.5 Range trend period** <sup>2.3.6</sup>  
**1994 – 2006**

**1.6 Reasons for reported trend in range** <sup>2.3.7</sup>  
**Not applicable**

**1.7 Favourable reference range** <sup>2.7.1</sup>

**>600 km<sup>2</sup> (Current is more than 10% below the favourable reference range)**

The decision tree in Note 1 has been used as a guide in determining the favourable reference range estimate (see ‘Assessing Conservation Status: UK Approach’).

This species has always had a restricted distribution in the UK; *C. albula* was historically known in four UK water bodies, but was lost from Mill Loch and Castle Loch in the late 1960s. However, of the two remaining naturally extant populations, one (Bassenthwaite) is considered to be in critical condition and has possibly been lost. Due to the condition at Bassenthwaite, the current range is not considered sufficiently large to allow the long-term survival of the species.

Based on expert opinion, the favourable reference range is not likely to be met until viable populations have been established across a wider range of suitable waterbodies within Cumbria and Southern Scotland. This would require range to be extended by at least one, additional 10 km square, thus increasing the favourable reference range to at least 600km<sup>2</sup>. Based on this, the current estimate has confidently been reported as more than 10% below the favourable reference value.

Based on available information, it would be inappropriate to suggest an upper threshold for the favourable reference range at the present time.

## 1.8 Range conclusion<sup>2.8</sup>

### Unfavourable – Bad

The current range is more than 10% below the favourable reference range. Therefore in accordance with guidance, the conclusion for range is Unfavourable – Bad.

## 2. Population of the Species<sup>2.4</sup>

### 2.1 Population estimate<sup>2.4.1</sup>

#### 1,418 - 43,601 individuals

Naturally extant populations are known at two sites (Bassenthwaite and Derwentwater) and UK abundance estimates range from 1,418 to 43,601 (see Tables 1.2 below).

**Table 2.1** Absolute abundance of individuals in natural populations

Site	Time period	Absolute abundance (individuals)	Method used	Reference(s)
Bassenthwaite Lake	1995 - 2006	0 – 18,131	Gill nets with quantitative hydroacoustics	Winfield, I. J., Fletcher, J. M. & James, J, B. 2006. The Urban Waste Water Treatment Directive: Monitoring <i>C. albula</i> populations of Bassenthwaite Lake and Derwent Water, 2005. <i>Report to Environment Agency, North West Region</i> . LA/C01752/16. 46 pp. As above
Derwent Water	1998 - 2006	1,418 – 25,470		
UK TOTAL	1995 - 2006	1,418 – 43,601		

### 2.2 Date of population estimate<sup>2.4.2</sup> 2006

### 2.3 Method of population estimate<sup>2.4.3</sup>

#### 2 = Extrapolation from surveys of part of the population, sampling

Quantitative data relating to the number of sites is of good quality, however for the sites, data relating to the actual number of individuals is less comprehensive. The preferred method of data collection for *C. albula* involves the use of quantitative hydroacoustics and targeted short-duration gill netting. This approach has not been allowed to be used in Cumbrian lakes because of concerns over the use of gill nets. Within Loch Skeen, data has been collected

using gill net data only, although there are plans to carry out a full quantitative hydroacoustic survey during 2007/8.

Data are derived from hydroacoustic estimates of all fish species equal to or greater than 40 mm in length, partitioned to the coregonid of interest on the basis of catch composition of offshore survey gill nets.

## **2.4 Quality of population data<sup>2.4.4</sup>**

### **Moderate**

The Environment Agency (in conjunction with the Centre for Hydrology & Ecology) and Scottish Natural Heritage monitor *C. albula* populations in England and Scotland respectively. Monitoring of this species is driven by the UK Biodiversity Action Plan Steering Group and is resource dependent. Some sites are better sampled than others, but without the ability to carry out a full assessment, using suitable techniques, data quality is (at present) less than ideal (however this may change once resources become available through the Species Action Framework). For this reason, data quality is reported as moderate, rather than good.

## **2.5 Population trend<sup>2.4.5</sup> and population trend magnitude<sup>2.4.6</sup>**

### **Decreasing**

Since the Habitats Directive came into force, evidence suggests that both populations have suffered declines in abundance. Bassenthwaite is now thought to be in critical condition, and may have been lost already. There is also significant concern that *C. albula* numbers may be declining within Derwentwater, due to the presence of an increasing number of ruffe (*Gymnocephalus cernuus*) – a fish species known to consume the eggs of coregonids - and other factors.

Trend magnitude is Unknown, however.

## **2.6 Population trend period<sup>2.4.7</sup>**

**1994 – 2006**

## **2.7 Reasons for reported trend in population<sup>2.4.8</sup>**

### **3 = Direct human influence (restoration, deterioration, destruction)**

Nutrient enrichment and general decline in water quality. Within Bassenthwaite Lake this has been exacerbated by siltation of spawning grounds and the introduction of non-native fish and macrophyte species. Within Derwentwater, the increasing number of ruffe (*Gymnocephalus cernuus*) may be a contributing factor.

## **2.8 Justification of % thresholds for trends<sup>2.4.9</sup>**

**Not applicable**

## **2.9 Main pressures<sup>2.4.10</sup>**

*C. albula* are present in a very small number of waterbodies and have been either lost or in critical condition in all but one site where they have been recorded. Despite their restricted distribution, they are, or can be, subject to a wide range of pressures. These main ones include:

**701 Water pollution** - deterioration in water quality

**910 Silting up** - silting up of spawning habitats

**954 Invasion by a species** - loss of spawning habitat by growth of invasive non-native species of plant

**966 Antagonism arising from introduction of species** - direct competition or predation by introduced species of fish

## **2.10 Threats<sup>2.4.11</sup>**

**701 Water pollution** - deterioration in water quality

**910 Silting up** - silting up of spawning habitats

**954 Invasion by a species** - loss of spawning habitat by growth of invasive non-native species of plant

**966 Antagonism arising from introduction of species** - direct competition or predation by introduced species of fish

## **2.11 Favourable reference population<sup>2.7.2</sup>**

### **Unknown**

The negative trend, which cannot be attributed to natural fluctuation, indicates that populations are not viable. However, because the difference between the minimum and maximum current estimates is relatively large (1,418 and 43,601 individuals, respectively), it is not considered appropriate to calculate a minimum favourable reference value at this time.

## **2.12 Population conclusion<sup>2.8</sup>**

### **Unfavourable – Bad and deteriorating**

Although the favourable reference population is unknown, the European Commission recommends that a declining trend be used to indicate that population structure is deviating from norm. Hence, a judgement of Unfavourable is triggered; since Bassenthwaite is now considered to be in critical condition and Derwentwater is under threat, a conclusion of Unfavourable – Bad is most appropriate for *C. albula* populations (i.e. populations strongly deviate from norm).

## **3. Habitat for the Species in the Biogeographic Region or Sea<sup>2.5</sup>**

This species is found in good quality standing water habitat; that is, clean well-oxygenated spawning substrate containing coarse boulder/cobble/pebble/sand substrates. It also requires an abundant supply of zooplankton and macroinvertebrate prey items.

### **3.1 Surface area of habitat<sup>2.5.2</sup>**

**10.63km<sup>2</sup>**

10.63km<sup>2</sup> is the combined surface area of Bassenthwaite and Derwentwater, and this is the surface area of habitat currently available to natural populations of vendace within the UK.

### **3.2 Date of estimation<sup>2.5.3</sup>**

**2006**

### **3.3 Quality of data on habitat area<sup>2.5.4</sup>**

#### **Moderate**

The reported estimate is the combined surface area of the two waterbodies in which *C. albula* is found; it is not necessarily the area of habitat used by this species.

### **3.4 Habitat trend<sup>2.5.5</sup>**

**Stable**

*C. albula* has suffered from agricultural intensification, and other point source pollution sources, which, historically, have caused a general deterioration in habitat quality. Other potential sites for translocation have also become degraded as a result of a range of impacts such as acidification, agrochemical pollution, wider changes to local land use and catchment management.

Many of these issues have now been addressed; in recent years, water quality within existing and translocation sites has improved through the implementation of measures to reduce diffuse and point source pollution. However, full recovery may take years. Further, invasive non-native plant species, such as New Zealand pigmyweed (*Crassula helmsii*) have now become established in some of the shallow littoral areas where *C. albula* is known to spawn.

However overall, since the Habitat Directive came into force in 1994, habitat has, at best, remained stable.

### **3.5 Habitat trend period<sup>2.5.6</sup>** **1994 – 2006**

### **3.6 Reasons for reported trend in habitat<sup>2.5.7</sup>** **Not applicable**

### **3.7 Suitable habitat for the species (in km<sup>2</sup>)<sup>2.7.3</sup>** **Unknown**

Despite extensive survey of potential *C. albula* habitat, sites which may have many of the physical and biological attributes necessary to sustain a population of translocated *C. albula*, may not be suitable. This is exemplified by Daer Reservoir in Scotland, a site considered to be ideal for *C. albula* translocated from Derwentwater. Juvenile fish stocked into this water failed to become established. (However, there could be a number of reasons for this – such as the level of stocking. This would have nothing to do with the suitability of the site and a return, using adult fish, has recently taken place).

### **3.8 Habitat conclusion<sup>2.8</sup>** **Unfavourable – Inadequate and deteriorating**

Habitat quality, although improved, has not yet recovered fully from historic decline. Further, there are growing concerns over the presence of non-native plant species in *C. albula* spawning sites. For this reason, it cannot confidently be reported that “habitat quality is suitable for the long term survival of the species”, and thus the judgment for this parameter is Unfavourable-Inadequate, and (due to the presence of non-native plant and fish species) deteriorating.

## **4. Future Prospects<sup>2.6</sup>** **Poor prospects**

Species is likely to struggle unless conditions change.

*C. albula* is the subject of a Species Action Plan under the UK Biodiversity Action Plan (and is included on the revised UKBAP list.) However since the Bassenthwaite vendace population is now thought to be in critical condition (if not lost already), the prospects for naturally extant populations is bad. However, this may be ameliorated by the Loch Skeen introduction site in Scotland. In 1997 and 1999 *C. albula* eggs were translocated from

Bassenthwaite to Loch Skeen and have since become established. Further, in 2006, 134,480 eggs were then taken from Derwentwater to Sprinkling Tarn in Cumbria. However, the success of this is not yet known. Additional Derwentwater fish have also been re-stocked into Daer Reservoir. Fish from Loch Skeen were recently (2007) translocated to a holding site at Black Loch in the Galloway Forest.

However, irrespective of these sites, over the next 12 years the presence of invasive non-native species will continue to be a major concern for *C. albula* populations within the UK; the presence of ruffe and New Zealand pigmyweed are specific examples. Once established it may be impossible for these species to be eliminated.

On this basis, future prospects have been judged as poor.

#### 4.1 Future prospects conclusion<sup>2,8</sup>

Unfavourable – Inadequate

### 5. Overall Conclusion<sup>2,8</sup>

Unfavourable – Bad and deteriorating

Although range shows some signs of recovery from historic damage through the establishment of refuge populations, the population, habitat area and quality, and future prospects are, in naturally extant sites, Inadequate or Bad. The overall assessment is thus Unfavourable – Bad and deteriorating.

**Table 5.1.** Summary of conclusions

Parameter	Judgement	Grounds for Judgement (in accordance with Annex C)	Reliability*
Range	Unfavourable – Bad	Current range is more than 10% below favourable reference range	1
Population	Unfavourable – Bad and deteriorating	Current populations are more than 25% below favourable reference population	1
Habitat	Unfavourable – Inadequate and deteriorating	Habitat quality may not be suitable for the long term survival of the species Presence of invasive species means that habitat is deteriorating	2
Future Prospects	Unfavourable – Inadequate	Main pressures and threats to the species may be significant; species may not remain viable on the long-term	2
Overall Assessment	Unfavourable – Bad and deteriorating	One or more Unfavourable-Bad	2

\*1=High, 2=Moderate, 3=Low

High – Expert opinion is that the concluding judgement accurately reflects the current situation based on a professional understanding of the species. For range, population, and habitat, quality of data used to establish the current estimate has been identified as good data used to inform trends is comprehensive and up to date.

Moderate – A greater understanding of the feature, or the factors affecting it, is required before a confident concluding judgement can be made by experts. For range, population, and habitat, the current estimate and/or trend are based on recent, but incomplete or limited survey data; or alternately, a comprehensive, but outdated (pre-1994) review.

Low – Judgements, and comprising estimates, are based predominately on expert opinion.

N/A – Assessment conclusion is unknown, on the basis of insufficient reliable information

## 6. References

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.* Harley Books, Colchester

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### Map Data Source

Biological Records Centre - Database for the Atlas of Freshwater Fishes (via the NBN Gateway)

C. Bean, Scottish Natural Heritage (*pers comm.*)