

# CASE STUDY

## CUSTOMER

Regulators and water industry

## DELIVERABLE

Scientific assessment, monitoring and understanding

## OUTCOMES

Improved understanding and informed management



*CEH's expertise has made major contributions to the assessment, understanding and monitoring of rare fish populations in England, Scotland and Wales which now underpins their evidence-led management in response to a range of environmental threats including climate change, eutrophication, species introductions and water abstraction."*

**Prof Colin W. Bean**

Senior Adviser -  
Policy and Advice  
Scottish Natural Heritage



## Rare fish conservation – assessing and managing the elusive and fragile

Innovative development of sampling techniques and their robust applications have greatly improved our understanding and management of rare fish

### The problem

The quantitative sampling and consequently the study and informed management of fish in large lakes and reservoirs is notoriously difficult. Such research is particularly challenging for rare fish species including Arctic charr (*Salvelinus alpinus*), vendace (*Coregonus albula*) and whitefish (*Coregonus lavaretus*), all of which are protected by conservation legislation in the UK and elsewhere but all of which also face a range of environmental threats. In addition, some key established sampling techniques are inherently destructive.

### The research

Working with environmental regulators, the water industry and collaborators throughout the UK, CEH has led the development of quantitative, minimum-impact sampling techniques for rare fish populations and the fish communities within which they reside. Moving away from a complete reliance on destructive gill netting, national and international protocols have been developed and standardised which include a minimum of biological sampling and an increased use of hydroacoustics for the study of such fish and aspects of their habitats. More recently, we have also collaborated on the development of passive hydroacoustics and environmental DNA techniques for the non-destructive biological sampling of fish.





*CEH enjoys a worldwide reputation for the application, development and standardisation of hydroacoustic techniques for non-destructive quantitative assessments of fish populations and communities in large lakes and reservoirs."*

**Dr Jon Hateley**  
Senior Technical Specialist,  
Environment Agency



Arctic charr detail



Vendace

## The outcomes

We have used the above developments in innovative sampling techniques to assess, monitor and understand rare fish populations and their communities throughout the UK and so to guide their robust management in the face of a range of threats from issues including eutrophication, climate change, predators, reservoir level fluctuations and species introductions.

- Long-term monitoring of rare fish populations and their communities in large lakes in England, Scotland and Wales to meet statutory requirements and to understand impacts from eutrophication, climate change and species introductions.
- Modelling of Arctic charr and whitefish populations to understand and predict short- to long-term impacts from reservoir level fluctuations, predation by cormorants (*Phalacrocorax carbo*) and alternative management options.
- Establishment and subsequent quantitative assessments of refuge populations of rare fish in upland lakes away from immediate local threats and robust against the anticipated future effects of climate change.
- Novel applications of underwater photography and videography, hydroacoustics and other techniques to detect, quantify the extent and assess the condition of spawning grounds of rare fish populations.
- Advances in the uses of passive hydroacoustics and environmental DNA techniques for the non-destructive biological sampling of lake fish populations, with the latter being developed towards operational deployments by statutory bodies.

*The CEH projects described here have multiple partners across the UK, Europe and worldwide that are too numerous to mention individually. Please examine our website for partner details.*

