

Balancing freshwater fish and predators' conservation measures

Evidence-based and river-basin management approaches



This policy brief is based on research results and is addressed to EU, national and regional authorities responsible for freshwater biodiversity, river-basin management, protected-species management and conservation-status assessment.

The policy challenge

Europe's freshwater ecosystems are under increasing pressure from **habitat degradation, pollution, hydromorphological alterations and climate change**. As a result, freshwater fish are among the most threatened groups, with **39% of species at risk in the EU**. Despite restoration achievements and further ongoing efforts, many river fish species' conservation status remains poor.

A significant challenge lies in the **limited availability of harmonised monitoring data**, as well as insufficient understanding of population trends and pressures affecting protected fish and bird species. In recent years, **increasing predation pressure**, notably from the Great Cormorant (*Phalacrocorax carbo sinensis*), has emerged as an additional factor impacting freshwater fish populations. This has led to **persistent conflicts between biodiversity conservation objectives** (namely, bird conservation and fish conservation objectives), which have remained unresolved across many Member States.

Cormorant populations trends – Understanding regional trends to support evidence-based management

Analysis by ProtectFish partners – of i.e. population developments of cormorants in their core breeding regions (i.e. the Baltic Sea coasts) – show that **cormorant populations have generally stabilised in countries in the western part of the Baltic Sea** (Denmark, Northern Germany) **and in some of the countries further east** (e.g. Poland and Finland).

However, **marked increases have been observed in other countries** (e.g. in Sweden and Estonia) over the last decade – as indicated by ProtectFish partner Aarhus University.

The analysis shows that **cormorant population dynamics are strongly influenced by ecological and external factors**, especially by:

- *Access to food resources near the breeding colonies*
- *Predation and disturbance by White-tailed Sea Eagles*
- *Severe winter conditions limiting survival and living conditions before breeding*
- *Human activities and management actions at breeding sites*

Evidence of **density-dependent mechanisms** suggests that population growth may be naturally regulated in some areas.

Why this policy brief matters now?

The coming years will be critical for achieving the EU's freshwater biodiversity objectives. Member States are implementing the **Nature Restoration Regulation**, preparing the next cycle of **River Basin Management Plans** under the **Water Framework Directive**, and continuing to report on the conservation status of protected species under **Article 17 of the Habitats Directive**. At the same time, the **EU Biodiversity Strategy for 2030** calls for accelerated action to halt biodiversity loss and restore degraded freshwater ecosystems.

These policy processes take place against a backdrop of increasing pressures on freshwater ecosystems, including climate change, habitat degradation, altered flow regimes and growing conflicts between species conservation objectives. Ensuring that management decisions are based on robust scientific evidence has therefore become increasingly important.

ProtectFish contributes to these priorities by providing new evidence on the interaction between multiple stressors affecting threatened freshwater fish, improving ecological monitoring through innovative technologies, and developing practical tools to support more transparent conservation-status assessments and adaptive river basin management.

These findings can help inform the implementation of the **Nature Restoration Regulation**, improve the **reporting of Habitat Directive's Art.17**, and support evidence-based decision-making under the **Water Framework Directive**, while contributing to the objectives of the **EU Biodiversity Strategy for 2030**.



Key findings

- **Cormorant predation has direct and measurable impacts on fish populations**, including mortality of adult fish and significant non-consumptive mortality caused by stress or injuries.
- **Habitat complexity measures alone are insufficient** to substantially reduce predation pressure under conditions of high predator density.
- **Flow regime alteration, rising water temperatures and predation pressure** are identified as among the **strongest stressors** affecting the long-term stability of European grayling populations (the project's target species).
- An innovative method to estimate fish stocks for European grayling was developed by the project, supporting **more transparent and reproducible conservation status assessments** under Article 17 of the Habitats Directive.
- **Advanced monitoring technologies**, including AI-supported image analysis, PIT-tagging and GPS-tracking, are strengthening evidence-based management and large-scale ecological monitoring capacities.
- **Management effectiveness strongly depends on local ecological, administrative and societal conditions**, highlighting the need for flexible and context-specific approaches.
- Growing cormorant populations and increasing evidence of their impacts on freshwater fish highlight the **need for coordinated cross-border monitoring and adaptive management across Europe**.
- There is a **strong public interest in the matter of predator conflicts**, as reflected by the active participation of volunteers and local stakeholders (e.g. hunting & angling community) in activities conducted across several project areas.



Key policy recommendations by ProtectFish

- **Develop an EU-wide harmonised monitoring framework for cormorant and freshwater fish populations by coordinating existing national monitoring schemes**
 - *The European Commission – and Member States – should develop a harmonised framework for monitoring breeding and wintering cormorants, fish populations, predation pressure and management interventions*
- **Include predation as a recognised ecological pressure when assessing fish populations under River Basin Management Plans**
 - *Member States should assess predation alongside hydromorphology, temperature, connectivity, water quality and fishing pressure when diagnosing fish-population decline and designing restoration measures.*
- **Support pilot implementation of the ProtectFish “target-stock methodology” in Art. 17 of the Habitat Directive’s reporting across selected Member States**
 - *National and regional nature authorities should pilot the ProtectFish grayling methodology and evaluate its potential contribution to conservation-status assessment and management planning.*
- **Use adaptive, site-specific management**
 - *Authorities should combine habitat restoration, monitoring and proportionate predator-management measures according to local ecological conditions, legal requirements and stakeholder acceptance.*
- **Support shared guidance and exchange of good practices**
 - *The European Commission should facilitate an exchange among nature, water and fisheries authorities on monitoring standards, management effectiveness and predator–prey conflicts.*



Conclusion

ProtectFish's interim findings demonstrate that the **conservation of Europe's threatened freshwater fish species requires a more integrated and evidence-based management approach**. The project shows that declines in fish populations are driven by the cumulative effects of multiple interacting pressures, including habitat degradation, altered flow regimes, rising water temperatures and predation.

Project findings highlight that **addressing freshwater biodiversity loss cannot rely on isolated measures alone** but instead require coordinated river basin management strategies, considering ecological, social and governance dimensions.

The project also demonstrates how improved monitoring and innovative assessment tools can strengthen conservation decision-making. Advanced monitoring technologies, including AI-supported image analysis, PIT-tagging and GPS tracking, together with the ProtectFish target-stock methodology for European grayling, provide authorities with more transparent, reproducible and scientifically robust approaches for assessing population status, supporting Article 17 reporting under the Habitats Directive and identifying locally appropriate management measures.

In parallel, ProtectFish has generated large-scale empirical evidence demonstrating that cormorant predation can significantly affect fish populations, including through substantial non-consumptive mortality. The findings further indicate that habitat complexity measures alone are often insufficient to mitigate predation pressure where predator densities are high, underscoring the need for integrated management responses.

Overall, the project illustrates how combining scientific innovation with stakeholder engagement and policy dialogue can support more effective freshwater biodiversity conservation across Europe.

ProtectFish invites the European Commission, Member States and river-basin authorities to integrate these findings into future conservation planning, Habitat Directive's Article 17 reporting and River Basin Management Plans, ensuring that freshwater biodiversity policies are supported by robust scientific evidence and adaptive management approaches.



About ProtectFish

ProtectFish is an EU-funded research project under the Programme “Horizon Europe Research & Innovation”. Its objective is to conduct field studies on the efficiency of measures to protect threatened fish species in EU-rivers, fill data gaps, study management options and build dialogue among the stakeholders to deliver policy recommendations for the conservation of protected EU river fish populations.

The project's main objectives are to:

1. Evaluate the current conservation status, monitoring, reporting and protective measures of EU-listed river-fish species.
2. Update & expand the scientific knowledge of cormorant populations in the EU and assess effective, balanced, and feasible methods for their management.
3. Using current and new data on the status of fish and cormorant populations and their interactions, generate knowledge-based recommendations for balanced, integrative and adaptive management of river biodiversity.

The project's final output will be management recommendations on how to improve Europe's rivers' declining biodiversity. These recommendations will be resulting from the collection of EU-wide data, extensive field-experiments carried out with the help of hundreds of volunteers and discussions with local stakeholders on the basis of the preliminary results achieved. An External Advisory Board composed by key experts and stakeholders will be closely following the project's progress.

More information: [About the project - Protectfish](#)

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