European Red List of Freshwater Fishes

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IUCN Global Species Programme
IUCN Regional Office for Europe
IUCN Species Survival Commission

Published by the European Commission

This publication has been prepared by IUCN (International Union for Conservation of Nature).

Citation: Freyhof, J. and Brooks, E. 2011. European Red List of Freshwater Fishes. Luxembourg: Publications Office of the European Union.

Design & Layout by: Tasamim Design - www.tasamim.net
Printed by: The Colchester Print Group, United Kingdom
Picture credits on cover page: The European Mudminnow (*Umbra krameri*) is a European endemic found in the Danube and Dniestr basin. Its population has declined by more than 30% in the past 10 years due to river regulation and drainage of wetlands for agriculture which resulted in a reduced number of backwaters. This species is therefore classed as Vulnerable. Photograph © Andreas Hartl.

Available from: Publications Office of the European Union, http://bookshop.europa.eu
IUCN Publications Services, www.iucn.org/publications
A catalogue of IUCN publications is also available.

Cataloguing data can be found at the end of this publication.

Luxembourg: Publications Office of the European Union, 2011

ISBN 978-92-79-20200-1
doi:10.2779/85903

Printed in the United Kingdom

The text of this book is printed on 115 gsm FSC certified 100% recycled silk paper.

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Foreword

Europe is a continent rich in natural and cultural heritage, with a diverse range of habitat conditions from dry Mediterranean maquis in the south to the Arctic tundra of the far north.

Possibly more than anywhere else in the world the European landscapes have been changed by human activities so that now the continent is covered with a mosaic of natural and semi-natural habitats surrounding urbanized areas. Although bringing higher diversity, this modification has obviously also placed great pressures on our wildlife and natural areas. In consequence, biodiversity loss is an enormous challenge in the EU today, with around one in four species currently threatened with extinction and 88% of fish stocks over-exploited or significantly depleted.

In line with global commitments made in Nagoya in October 2010, where world leaders adopted a package of measures to address global biodiversity loss over the coming decade, the European Commission has adopted in May 2011 an ambitious new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020. There are six main targets, and 20 actions to help Europe reach its goal.

The six targets cover:

1. full implementation of EU nature legislation to protect biodiversity
2. better protection for ecosystems, and more use of green infrastructure
3. more sustainable agriculture and forestry
4. better management of fish stocks
5. tighter controls on invasive alien species
6. a bigger EU contribution to averting global biodiversity loss

Numerous scientific studies show that biodiversity in Europe has been declining rapidly for some time during periods of expansion and intensification of land use. The reporting process under Article 17 of the EU Habitats Directive underlines this fact as most species and habitats of community interest are still not under a favourable conservation status.

Regional European Red Lists are another important tool to scientifically assess and communicate the status of species. They usefully complement the reporting under the Habitats Directive as they usually address all species in a specific taxonomic group, not just those protected by EU legislation. They hence give important complementary and comprehensive information about the situation of biodiversity in Europe.

This first regional assessment of Europe's freshwater fishes has assessed the 531 described species present in Europe.

The assessment shows us that more than a third (37%) of these species are threatened. This compares with 44% of freshwater molluscs, 23% of amphibians, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, 9% of butterflies and 7% of the aquatic plants, the other groups that have been comprehensively assessed in Europe. Additional European Red Lists assessing a selection from species groups indicate that 20% of terrestrial molluscs, 12% of the crop wild relatives and 11% of the saproxylic beetles are also threatened.

Fishes are found in almost all European freshwater bodies. They are an important part of Europe's natural heritage and provide ecosystem services for tens of millions of people all over Europe, especially for commercial and recreational fisheries. Freshwater fishes are also crucial to almost all food chains in freshwater ecosystems. The current Red List publication shows that there are declining populations in 17% of Europe's freshwater fish and lamprey species, but for 76% of species the population trend is still unknown.

Unfortunately, the drivers for these declines are mostly still in place. Abstraction of water, invasive species, overfishing, dams and water pollution are the main threats for freshwater fishes in Europe.

What can we as Europeans do about this? First and foremost, we need to fully implement the existing European legislation. The EU Habitats and Birds Directives are the main pieces of legislation ensuring the protection of Europe's nature. The Natura 2000 network of protected sites and the efforts to conserve and restore biodiversity in the wider countryside are helping to guarantee its future conservation. But the challenge is a wider one, as the new EU Biodiversity Strategy shows. Sustainable use of our wider environment and the maintaining of ecosystem services have come to the centre of our attention.

I hope that this European Red List of Freshwater Fishes will add another piece of evidence for the fact that efforts aimed at halting the loss of biodiversity need a major boost in the coming years.

Pia Bucella
Director
Directorate B: Nature, Biodiversity & Land Use
European Commission

Acknowledgements

All of IUCN's Red Listing processes rely on the willingness of scientists to contribute and pool their collective knowledge to make the most reliable estimates of species status. Without their enthusiastic commitment to species conservation, this kind of regional overview would not be possible.

We would therefore like to acknowledge the committed work of Europe's ichthyologists who have provided information and expertise to this project. In particular we would like to thank Maurice Kottelat who along with the primary author of this report, provided the bulk of the species data and acted as the assessor or reviewer for the majority of the species. We would also like to thank the Freshwater Fishes Specialist Group, the Salmon Specialist Group and the Sturgeon Specialist Group, and all the other species assessors and reviewers who contributed to this project:

Arlati, G.; Arshad, U.; Atkinson, S.; Barbieri, R.; Beens, K.; Beresford, A.; Bianco, P.G.; Bin, Z.; Bogutskaya, N.; Bohlen, J.; Bronzi,P.; Brooks, E.; Carmona, J.; Cealich, E.; Chang, J.; Chebanov, M.; Chenery, A.; Collen, B.; Congiu, L.; Crivelli, A.J.; Darwall, W.; Devi, R.; Devrim, M.; Doadrio, I.; Doukakais, P.; Du, H.; Elvira, B.; Erk'akan, F.; Gadich, E.; Gesner, J.; Halkett, G.; Hammerson, G.; Haxton, T.; Hilton, E.; Karaji, A.; Karatash, A.; Ludwig, A.; Lukey, J.R.; Mrakovcic, M.; Mugue, N.; Munroe, T.A.; Nagshi, S.S.; Norouzi, M.; Noyon, M.; Pikitch, E.; Pourkazemi, M.; Povz, M.; Qiwei, W.; Rad, S.S.; Ram, M.; Richman, N.; Rochard, E.; Rosenthal, H.; Rossir, R.; Ruban, G.; Schreier, A.D.; Shakourian, M.; Shariat, F.; Skopets, M.; Smith, K.; Suciu, R.; Switzer, D.; Taati, R.; Tajan, M.N.; Van Tassell, J.L.; Wanzenböck, J.; Wickström, H.; Williot, P; Zerunian, S. and Zhang, H.

Co-ordination of the European freshwater fishes component of the European Red List was carried out by Kevin Smith and Emma Brooks (IUCN Global Species Programme, Freshwater Biodiversity Unit) with Annabelle Cuttelod (IUCN Global Species Programme, Red List Unit) and Ana Nieto (IUCN Regional Office for Europe) with support and guidance from Will Darwall and Jean-Christophe Vié.

We would like to thank Yichuan Shi and Adrian Hughes for providing support and advice in relation to GIS, and particularly to Andrew Ladle who undertook the GIS analysis for this report. Red List guidance was provided by Caroline Pollock and Maiko Lutz, and Melanie Bilz also deserves thanks for providing sound advice throughout the project. The finances of the project have also been efficiently managed by Maureen Martindell and Amy Burden.

The writing of this report was supported by the Biofresh Project (funded by the European Union under the 7th Framework programme, Contract No. 226874). We would especially like to thank Chester Zoo for their support in the organisation of the sturgeon workshop (through the IUCN/WI Freshwater Fishes Specialist Group).

The European Red List Assessment of Freshwater Fishes, and consequently this report, were made within the framework of a service contract with the European Commission (Service Contract No. 070307/2007/483305/MAR/B2). All opinions, results, conclusions and recommendations expressed in this material are those of the authors, and do not necessarily reflect the views of the European Commission, or the International Union for Conservation of Nature (IUCN).

Executive summary

Aim

The European Red List is a review of the conservation status of c. 6,000 European species to date (dragonflies, butterflies, freshwater fishes, reptiles, amphibians, mammals and selected groups of beetles, molluscs, and vascular plants) according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the regional level – in order that appropriate conservation action can be taken to improve their status. This Red List publication summarizes the results for all described native European freshwater fishes and lampreys (hereafter referred to as just freshwater fishes).

Scope

All species of freshwater fishes recorded from European freshwater waters are included. Marine migrants and species of brackish waters are also included if they regularly enter freshwater habitats. Species are only included if the record is based on individuals with locality data and reliable identification.

Red List assessments were made at two regional levels: for geographical Europe, and for the 27 current Member States of the European Union. The distribution of freshwater fishes is considered at the sub-river basin level. Therefore the distribution included here sometimes extends beyond the political boundaries.

Status assessment

The status of all species was assessed using the IUCN Red List Criteria, which are the world's most widely accepted system for measuring extinction risk. All assessments followed the *Guidelines for Application of IUCN Red List Criteria at Regional Levels*.

The status of species endemic to the Mediterranean basin is based on evaluations made during an IUCN workshop held in Malaga (Spain) in December 2004. All European sturgeons were assessed at a workshop held in Wuhan (China), during the 6th International Symposium on Sturgeon in October 2009. The status of all other European species has been evaluated when preparing the *Handbook of European Freshwater Fishes* during an IUCN workshop held in Berlin (Germany) in December 2006, in coordination with the IUCN Freshwater Biodiversity Assessment Unit. All species present in the 27 Member States of the EU were re-assessed for their regional conservation status in 2010. Assessments are available on the European Red List website and data portal: http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe.

The status of all European freshwater fish species has been reviewed. For certain species groups of Mediterranean river basins, the taxonomy has been revised since the 2004 Malaga workshop, requiring an update of their Red List status. Also, several species have been newly described since 2007. All this is leading to an improved understanding of their conservation status. Up-to-date information for all these species is included in this report. Evaluations have mostly been done through the formal IUCN validation procedure, except for a few species still awaiting comments by relevant specialist groups of the IUCN Species Survival Commission.

Freshwater fishes in Europe

As part of this Red List assessment, 531 native and described European species have been assessed, of which 381 are present in the 27 Member States of the European Union. Almost 80% of the European species are endemic to Europe (which means that they are unique to Europe and are found nowhere else in the world). About 50% of the species found in the 27 Member States of the EU are endemic to the EU. Seven species occur only marginally on the European continent, and are considered as Not Applicable in this assessment.

Results

Overall, at least 37% of Europe's freshwater fishes are threatened at a continental scale, and 39% are threatened at the EU 27 level. A further 4% of freshwater fishes are considered Near Threatened. This is one of the highest threat levels of any major taxonomic group assessed to date for Europe. The conservation status of Europe's eight sturgeon species is particularly worrying: all but one are Critically Endangered. By comparison, 44% of freshwater molluscs, 23% of amphibians, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, 9% of

butterflies and 7% of aquatic plants are threatened at the European level.

Despite a lack of good trend data for certain countries, the current assessment shows that about 17% of Europe's freshwater fish species have declining populations, whereas only 1% are on the increase, and 6% are considered stable. For the remaining 76%, the current level of knowledge is insufficient to define their population trends.

The highest levels of species diversity are found in the lower parts of the rivers draining into the Black and Caspian Seas. However, a number of species with restricted ranges are also encountered in the Alps, in Great Britain and Ireland, and around the Mediterranean and Black Seas. Most of the threatened species are confined to certain areas in southern Europe.

Most freshwater fishes are in some way affected by pollution of domestic, industrial and agricultural origin. Another primary threat to Europe's freshwater fishes is habitat loss due to over-abstraction of water. Additional major threats are the introduction of alien species, overfishing (particularly in the larger rivers of Eastern Europe) and a massive increase in the construction of dams, blocking migration and altering stream habitats.

Conclusions and recommendations

- Freshwater fishes are one of the most highly threatened species groups in Europe. At least 37% of all European species are threatened at a continental scale, and 39% are threatened at the EU 27 level. Of all assessed species groups, this level of threat is second only to the one for freshwater molluscs. The conservation status of Europe's eight sturgeon species is particularly worrying: all but one are Critically Endangered.
- There is an ongoing extinction crisis affecting Europe's freshwater fishes. At least 13 species are now globally Extinct. Five additional species are Possibly Extinct, but the information is currently inadequate to certify their extinction. Furthermore, several freshwater fish species are currently under immediate threat of extinction, amongst them several species of sturgeons, and certain species of the Mediterranean river basins.
- The high overall threat level of Europe's freshwater fishes is an indicator for the exceptional vulnerability of Europe's freshwater habitats, and of their poor state of protection. The main threats to Europe's freshwater fishes are pollution, habitat loss due to over-abstraction of water, and the introduction of alien species. Alien species introduction, especially where these are of European origin, is almost totally uncontrolled. The main vectors of alien species introduction are recreational fisheries and the connection of formerly separate river basins by man-made canals.
- An increased frequency and intensity of droughts is already impacting freshwater systems and the species that rely on them, especially in the Mediterranean region. The predicted impact of climate change is likely to worsen the situation in the future.
- While many freshwater fishes are protected under national legislation or under the EU Habitats Directive, the majority of threatened species still remain unprotected. Furthermore, where legal protection does exist, it often remains ineffective against threats such as alien species introduction or water abstraction.
- In order to improve the conservation status of European freshwater fishes and to reverse their decline, ambitious conservation actions are urgently needed. In particular: ensuring adequate protection and management of key freshwater habitats and of their surrounding areas, drawing up and implementing Species Action Plans for the most threatened species, establishing monitoring and *ex-situ* programmes, finding appropriate means to limit further alien species introductions, especially by anglers, and revising national and European legislation, adding species identified as threatened where needed.
- The identification, establishment and management of a network of Freshwater Key Biodiversity Areas in Europe is urgently needed.
- This project contributes to improving and updating the coverage of fishes on the global IUCN Red List, thanks to the assessment of endemic European freshwater fishes.

The largest of all sturgeon, the beluga, *Huso huso*, has formerly been the basis of an important commercial fishery. As a result of overfishing, and the creation of dams preventing it from reaching its spawning sites, this species has suffered a more than 90% population decline and is now assessed as Critically Endangered. Photo © A. Hartl.

1. Background

1.1 The European context

Europe stretches from the Arctic Circle in the north to the Mediterranean in the south, and from the Atlantic coast in the west to the Caspian steppes in the east – an area containing a great diversity of climates, landscapes and habitats and a very diverse flora and fauna. The Mediterranean part of Europe is particularly rich, not only in freshwater fish species, but also in plant and terrestrial animal species, and has been recognized as a global "biodiversity hotspot" (Mittermeier *et al.* 2004, Cuttelod *et al.* 2008).

Deforestation and cultivation of soils are the main human activities that have caused major modifications to inland waters since the Bronze Age, largely through changes in river discharge and sediment transport (Tockner *et al.* 2009). At least since medieval times, human activities have been dominant in shaping most European landscapes. Overfishing and translocation of freshwater fish species has been locally documented since the Roman times. The regulation of rivers and the drainage of wetlands started just as early, but have become more intense, thanks to improved technologies in the 19th and 20th centuries. With the industrialization of Europe in the late 19th century, the already strongly impacted rivers and lakes faced a massive pollution crisis which led to the extinction of several fish species. Starting from the 19th century but particularly since the second half of the 20th century, dams for electricity, flood control and irrigation have been built on almost all European rivers and streams, transforming them into impoundments. This trend is now again on the increase: within the frame of climate change mitigation, thousands of additional dams are currently being planned throughout Europe, posing an even greater threat to Europe's freshwater biodiversity.

The improvement of life conditions for Europeans has also led to more leisure time. Recreational fishing is still an expanding sector, especially in southern Europe. Where attractive sport fishes are scarce or missing, this is still leading to a massive introduction of alien, often predatory, species. As a result of this largely uncontrolled practise, certain rivers have lost as much as 100% of their native fish fauna.

Europe is a very diverse continent and the relative importance of different threats varies widely across its countries and bio-geographic regions. Even though considerable efforts have been made to protect and conserve European habitats and species (e.g. see Sections 4.1, 4.2, 4.3), biodiversity decline and the associated loss of vital ecosystem services (such as water purification, and provision of natural resources) continues to be a major concern all over Europe.

1.2 European freshwater fishes: diversity and endemism

Freshwater fishes represent about one quarter of the worlds vertebrates (see Box 1 for a definition of freshwater fishes). Freshwater fishes are also the most species-rich group amongst European vertebrates. European biodiversity includes 546 native species of freshwater fishes (Kottelat and Freyhof 2007), 489 species of birds (IUCN 2011), 260 species of mammals (Temple and Terry 2007, 2009), 151 species of reptiles, and 85 species of amphibians (Fauna Europaea 2004). In the definition used here (see Box 1), freshwater fishes are a composite of different taxonomic and ecological groups (see Table 1). For the purpose of this Red list assessment, lampreys have been defined as freshwater fishes. This small group of archaic vertebrates includes 42 species, and the European Continent, with its 14

A Wels Catfish, *Siluris glanis,* from the Danube drainage. This species has been widely introduced outside of its natural range and is now present throughout most of Europe. It is now one of the worst alien species in Europe. Photo © A. Hartl.

species, is one of the centres of diversity and evolution of lampreys in the world (Kottelat and Freyhof 2007). Another family of European importance are the sturgeons. As with lampreys, the diversity of European sturgeons is exceptionally high: eight of the 26 species globally known occur in the waters of Europe and the EU 27[1]. The lower Danube is the single most important spawning area globally for three of the world's sturgeon species, including the impressive beluga, *Huso huso*, which used to reach up to 8 meters in length and 3.2 tones in weight. Most sturgeon species are anadromous, meaning that they hatch and spawn in freshwaters but migrate to the sea for foraging, usually for 10 or more years, before they migrate back into the rivers to spawn for the first time. Anadromous species, all of which are included here in the group of freshwater fishes, are known from several fish families, including lampreys.

The majority of Europe's freshwater fish species are belonging to one of the following two taxonomic groups. The warm-water adapted Cypriniforms, such as carps, chubs, dace and loaches, have their highest level of species diversity in the southern and temperate parts of Europe, whereas the Salmoniforms, such as salmon, trout, grayling and whitefish, are most abundant and diverse in mountainous regions and in northern Europe. Both groups are well known for including many local endemics at species level. A third major group are the Percimorphs. Even though rather species-poor, they often occupy a key ecological role in freshwater ecosystems. Unfortunately, this group also includes several notorious alien invasive species, both within Europe and on other continents.

Over 80% of all European freshwater fish species are endemic to Europe, i.e. only found on this continent. Many of these species are range restricted, only found in one or few rivers or lakes.

1.3 Threatened status of species

The conservation status of plants and animals is one of the most widely used indicators for assessing the condition of ecosystems. The conservation status also provides an important tool in establishing priorities for species conservation. At the global scale, the best source of information on the conservation status of plants and animals is the IUCN Red List of Threatened Species (see www.iucnredlist.org). The Red List is designed to determine the relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that are facing a higher risk of extinction. It provides taxonomic, conservation status, and distribution information on

Box 1: Freshwater fishes

Biogeographers usually classify freshwater fish according to their tolerance to salt water. **Primary division families** are those whose members are strictly intolerant of salt water, at present and historically; examples include Cyprinidae, Cobitidae and most siluriform families. **Secondary division families** are those whose members now live in freshwater but are able, or supposedly once were able, to tolerate seawater for a short period; families of this group are supposed to be of marine origin; examples include Cottidae, Lotidae and Valenciidae.

In addition to these categories that apply to *entire families*, many species that occur in freshwaters do actually belong to primarily marine families:

- diadromous species are species that migrate between fresh and seawater at different periods of their life, either to spawn in the sea (catadromous, like the eel *Anguilla anguilla*) or in freshwater (anadromous, like the salmon *Salmo salar*);
- vicarious species are non-diadromous, strictly freshwater species of primarily marine families; examples are freshwater shad *Alosa agone*, the blenny *Salaria fluviatilis* and many Gobiidae;
- sporadic species are species that seem to be indifferent to salinity (i.e. euryhaline) and usually occur in estuaries; examples are many species of Mugilidae and the pipefish *Syngnathus abaster*;
- accidental species are defined as normally marine species that are very occasionally caught in inland waters; their occurrence is not predictable and there are usually only a few records of the species in freshwaters; an example is the single record of the flatfish *Citharinus linguatula* from Skadar Lake.

Source: Kottelat and Freyhof 2007.

1 One sturgeon species, *Acipenser oxyrinchus*, was known from the Baltic Sea but is no longer present in Europe (Kottelat and Freyhof 2007). It has therefore not been included in the European sturgeon assessments.

Table 1. Diversity and endemism in freshwater fish families*.

Class	Order	Family	Europe			EU 27		
			Number of species	Number of Endemics	% Endemics	Number of species	Number of Endemics	% Endemics
Actinopterygii	Acipenseriformes	Acipenseridae	8	2	25%	7	1	14%
	Anguilliformes	Anguillidae	1	0	0%	1	0	0%
	Atheriniformes	Atherinidae	1	0	0%	1	0	0%
	Clupeiformes	Clupeidae	18	10	56%	11	4	36%
	Cypriniformes	Balitoridae	8	7	88%	5	3	60%
		Cobitidae	35	31	89%	25	19	76%
		Cyprinidae	237	205	86%	162	127	78%
	Cyprinodontiformes	Cyprinodontidae	4	3	75%	4	3	75%
		Valenciidae	2	2	100%	2	2	100%
	Esociformes	Esocidae	1	0	0%	1	0	0%
		Umbridae	1	1	100%	1	0	0%
	Gadiformes	Lotidae	1	0	0%	1	0	0%
	Gasterosteiformes	Gasterosteidae	8	4	50%	7	3	43%
	Mugiliformes	Mugilidae	5	0	0%	5	0	0%
	Osmeriformes	Osmeridae	3	1	33%	1	1	100%
	Perciformes	Blenniidae	2	1	50%	2	1	50%
		Gobiidae	43	29	67%	22	8	36%
		Moronidae	1	0	0%	1	0	0%
		Percidae	15	12	80%	13	5	38%
	Pleuronectiformes	Pleuronectidae	3	1	33%	2	0	0%
	Salmoniformes	Salmonidae	102	93	91%	80	71	89%
	Scorpaeniformes	Cottidae	16	14	88%	16	11	69%
	Siluriformes	Siluridae	2	1	50%	2	1	50%
	Syngnathiformes	Syngnathidae	1	0	0%	1	0	0%
Cephalaspidomorphi	Petromyzontiformes	Petromyzontidae	13	9	69%	8	3	38%
Total			**531**	**426**	**80%**	**381**	**263**	**69%**

* This table includes all species that were assessed as part of this project, and that are native or were naturalised before AD 1500; species introduced after this date are not included. Species of marginal occurrence in Europe are included. For the EU 27 assessment those species which do not occur in the EU are excluded.

The Grayling, *Thymallus thymallus*, is a popular angling species found throughout Europe. It is assessed as Least Concern. Photo © A. Hartl.

taxa that have been evaluated using the IUCN Red List Categories and Criteria: Version 3.1 (IUCN 2001). There are nine Categories, ranging from Least Concern, for species that are not threatened, to the Extinct category, for species that have disappeared from the planet[2]. The IUCN Red List Categories are based on a set of quantitative criteria linked to population trends, population size and structure, and geographic range. Species classified as Vulnerable, Endangered and Critically Endangered are considered as 'threatened'. When conducting regional or national assessments, two additional categories are used (Regionally Extinct and Not Applicable) for non-native species (IUCN 2003) (Figure 1).

1.4 Objectives of the assessment

The European regional assessment has four main objectives:

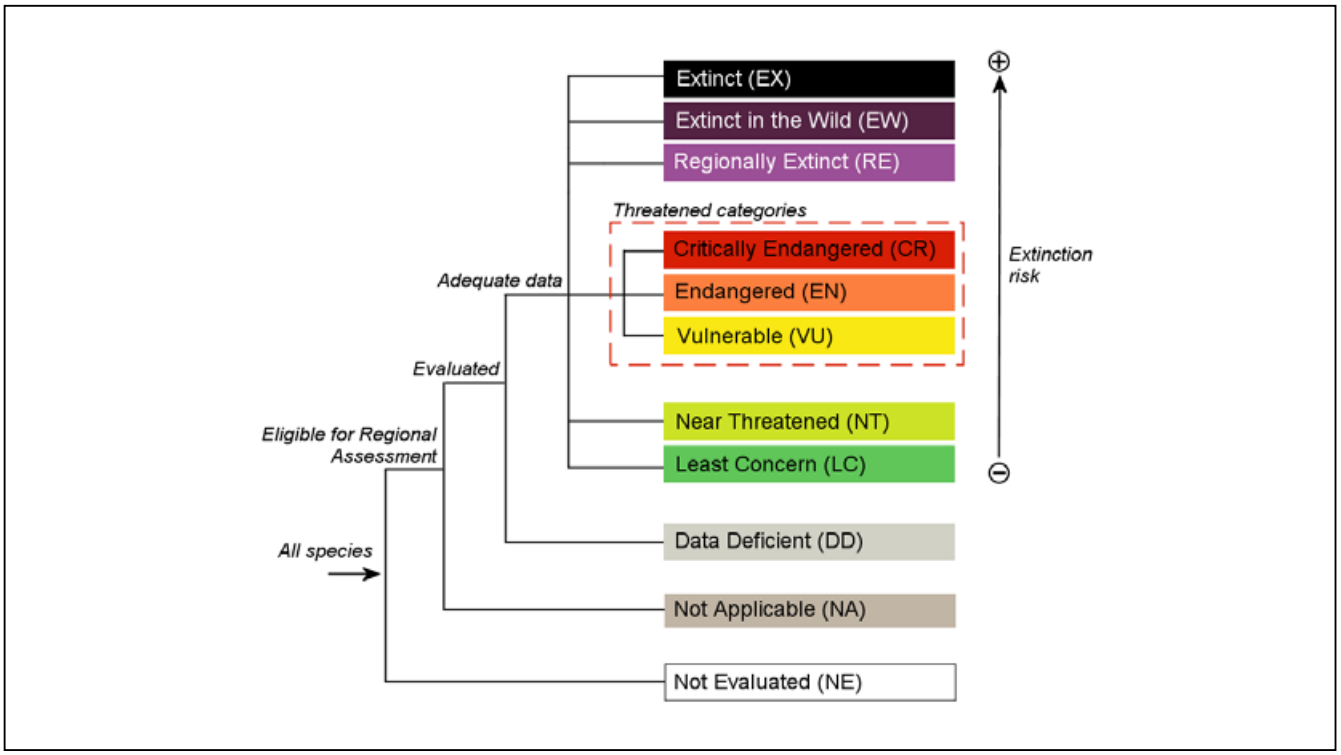
- To contribute to regional conservation planning through the provision of a baseline dataset describing the conservation status of Europe's freshwater fish species.
- To identify those geographic areas and habitats that need conservation measures to prevent extinctions and ensure that European freshwater fishes reach and maintain a favourable conservation status.
- To identify the major threats and propose mitigating measures and conservation actions to address them.
- To strengthen the network of experts focused on conservation of freshwater fishes in Europe, so that the assessments can be kept up-to-date, and expertise be targeted to address the highest conservation priorities.

The assessment provides three main outputs:

- This summary report on the status and distribution of European freshwater fishes; their main threats and recommendations for conservation measures.
- A freely available database holding the baseline data for monitoring the status and distribution of European freshwater fishes.
- A website and data portal (http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe) showcasing this data in the form of species factsheets for all European freshwater fishes, along with background and other interpretative material.

The data presented in this report provide a snapshot based on the knowledge available at the time of writing. The database will continue to be updated and made freely and widely available. IUCN will ensure a wide dissemination of these data to relevant decision makers, NGOs and scientists to strengthen and support the implementation of conservation actions on the ground.

Figure 1. IUCN Red List Categories at regional scale



2 For a description of each of the global IUCN Red List Categories go to: http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#categories

Box 2: How many species of freshwater fishes are there in Europe?

Every year 300-500 species of fishes are described as new to science and the number of new species seems only limited by the time and funding available to taxonomists. About 5-10 new freshwater fish species are also described every year from across Europe. Currently it is accepted that 18 of the 564 native European species are undescribed, but further still undescribed species are expected to be discovered over the coming years. In the future, the total number of native European freshwater fishes is most likely to stabilise around 700-800 species. The Mediterranean region of Europe has only been recognized as a hotspot of freshwater fish diversity in the last 20 years and many new species have been described from there. By the time of their scientific description, many of these newly described species are already threatened with extinction. Furthermore, as molecular methods are becoming increasingly important in the exploration of biodiversity, more and more cryptic species are now being recognised and described.

Since the 19th Century, standard books have typically listed between 160 and 270 species of freshwater fishes in Europe, depending on taxonomic and geographical definitions. The current Red List assessment is based on extensive studies and reviews of Kottelat and Freyhof (2007) who demonstrated that the species diversity of Europe's freshwater fishes is far higher than commonly believed. The recognition of the true scale of diversity within Europe is vital for an effective conservation planning, but also for our understanding of the freshwater ecosystems of this continent.

Species in the spotlight

The Ammerseekilch, *Coregonus bavaricus* (Critically Endangered)

Coregonus bavaricus (CR) is endemic to the subalpine lake Ammersee in the south of Germany. It is one of many species of whitefish that are endemic to one or few lakes in Europe. It is a small sized, deepwater and bottom dwelling species, similar to those that were previously or are still known to occur in Lake Bourget (*C. bezola*; Extinct), Lake Geneva (*C. hiemalis*; Extinct), Lake Thun (*C. alpinus*; Least Concern) and Lake Constance (*C. gutturosus*; Extinct). In several other lakes, as yet undescribed species of this group are suspected to exist. In the Danube drainage, to which Lake Ammersee belongs, *Coregonus bavaricus* is unique in being a summer spawner, while most other whitefish reproduce in autumn. More than 100 years ago, *C. bavaricus* was a species of commercial importance; today, only one or two individuals are caught each year. The species is obviously still suffering from the regulation of the inflow of the river Ammer into the lake and from high nutrient levels. However the species has survived the historic pollution peaks which led to the extinction or hybridization of various other *Coregonus* species of subalpine lakes. Besides *C. bavaricus*, Ammersee holds two other endemic species, a deepwater charr (*Salvelinus evasus*) and a perch (*Gymnocephalus ambriaelacus*). Currently, none of these species receives any attention or protection through legislation or fisheries management.

Coregonus bavaricus, a Critically Endangered whitefish endemic to Ammersee in southern Germany. Photo © U. Schliewen.

2. Assessment methodology

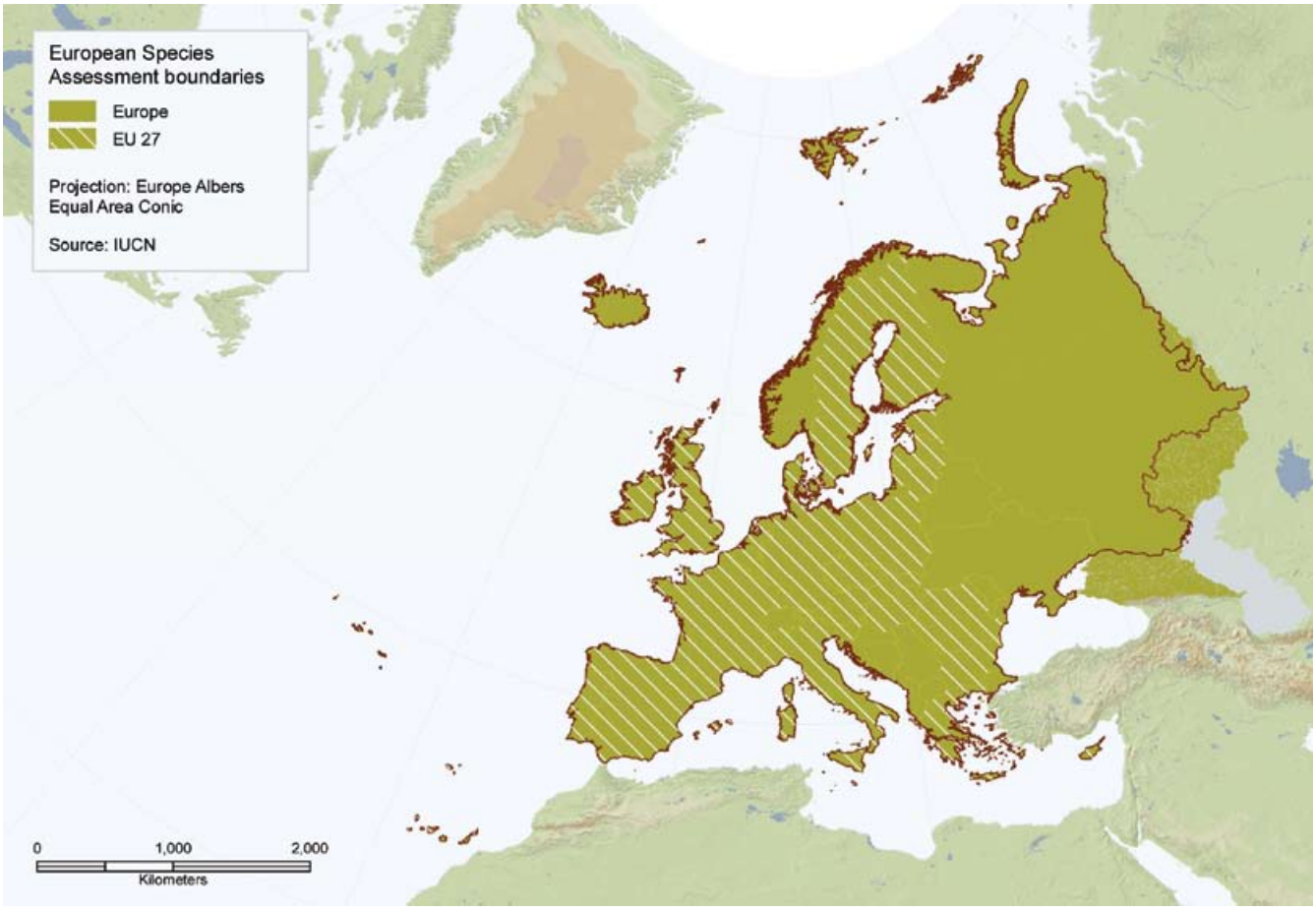
2.1 Global versus regional assessment

The extinction risk of a species can be assessed at global, regional or national level. One species can have a different category in the Global Red List and a Regional Red List. For example, a species that is common worldwide and classed as Least Concern (LC) in the Global Red List could face a high level of threat and fit the Endangered category (EN) in a particular region (see Figure 1 for the explanation of the IUCN categories). In order to avoid an over- or underestimation of the regional extinction risk of a species, the Guidelines for the application of IUCN Red List Criteria at Regional Level should be applied (IUCN 2003). Logically, an endemic species should have the same category at regional and global level, as it is not present in any other part of the world.

2.2 Geographic scope

The boundaries of Europe as defined for the purpose of this assessment are shown in Figure 2. This includes all sub-basin catchments that fall within geographical Europe (from Iceland in the west to the Urals in the east, including the European part of the Russian Federation, and from Franz Josef Land in the north to the Mediterranean in the south). Because sub-catchments do not always fall along political boundaries, the area covered extends sometimes beyond the geographical definition: the eastern boundary is drawn by the Baidaratsa Bay and the Ural Range divide as far south as Orsk. From Orsk southward, the perimeter is defined by the divide between the Ural River and the Or (a tributary entering the Ural at Orsk) and the Sagiz and Emba (two Caspian Sea tributaries). It also extends into the Caucasus, where its limits are defined by the

Figure 2. Regional assessments were made for two areas – geographical Europe and the EU 27. The brown line marks the extent of geographical Europe used by other taxonomic groups in the European Red Lists, but freshwater-related species' assessments have been extended to the northern Caucasus and the northern Caspian Sea basin.



Greater Caucasus range, which (approximately) starts to the west at the Black Sea near to the Russian city of Novorossiisk, then runs along the Caucasus divide until Baku (Azerbaijan) on the Caspian Sea. The upper-most reaches of the Terek in Georgia are also included, as is Turkey, north of the Bosphorus. In the Aegean Sea, the boundary follows the political border between Greece and Turkey. Crete and Malta, Cyprus, Spanish and Portuguese islands in the Atlantic Ocean are included but almost no native freshwater fishes occur in this area. Species occurring only in the saline or brackish parts of the Baltic, Black and Caspian Seas are not included (see Figure 2). Red List assessments were made at two regional levels: 1) for geographical Europe (limits described above); and 2) for the sub-catchments of the 27 Member States of the European Union, which again extend slightly beyond political boundaries, e.g. to include much of Switzerland.

2.3 Taxonomic scope

In total there are 603 species of freshwater fishes recognised within European river catchments (including non-natives, and as yet undescribed species). All described freshwater fish species native to Europe recognised at the start of the project were included, with some additional assessments added later following taxonomic changes. This resulted in 531 species being assessed, of which seven species that are of marginal occurrence in Europe were considered in this assessment, but were classed as Not Applicable (*Coregonus muksun, C. nasus, C. sardinella, Hypomesus olidus, Rhynchocypris czekanowskii, R. percnurus, Thymallus arcticus*). Taxonomy largely follows Kottelat and Freyhof (2007 – see Box 2).

2.4 Preliminary assessments and evaluation

In order to carry out an assessment, the following information was compiled for each species:

- Species' taxonomic classification
- Geographic range (including distribution map)
- Red List Category and Criteria
- Habitat preferences
- Major threats
- Conservation measures
- Other general information
- Key literature references

The status of species endemic to the Mediterranean basin is based on evaluations made during an IUCN workshop held in Malaga (Spain) in December 2004. All European Sturgeons were assessed at a workshop held in Wuhan (China), at the 6th International Symposium on Sturgeon in October 2009. The status of all other European species was evaluated when preparing the *Handbook of European Freshwater Fishes* (Kottelat and Freyhof 2007) during an IUCN workshop held in Berlin (Germany) in December 2006, in coordination with the IUCN Freshwater Biodiversity Assessment Unit. Following these meetings, the assessments were reviewed once again and adjustments

Knipowitschia mrakovcici is only found in Lake Visovac, Croatia. The species is experiencing a massive decline, but the reasons for this decline are not fully understood. Pollution from nearby towns is a potential threat, but research is ongoing to determine the causes of decline. It is currently listed as Critically Endangered. Photo © J. Freyhof.

were made. All species which are found in the 27 Member States of the EU were re-assessed by the primary assessors and evaluators for their regional conservation status in 2010 via email exchange.

As part of these assessments the population trend status for each species was considered. Due to a lack of centralised monitoring data for most species of freshwater fish, this status is largely qualitatively and not quantitatively determined, with a high level of uncertainty. This is reflected in the high number of species with an Unknown population trend.

Following the review workshops and the uncertainty discussion, the data were edited, and outstanding questions were resolved through communications with the experts and members of relevant Species Survival Commission Specialist Groups (e.g. Salmon Specialist Group).

Consistency in the use of IUCN Criteria was checked by IUCN staff from the IUCN Red List Unit. The resulting finalised IUCN Red List assessments are a product of scientific consensus concerning species status and are backed by relevant literature and data sources.

Species in the spotlight

The fate of the last *Acipenser sturio*

Acipenser sturio is one of the most threatened European fish species, strictly protected at the national level in most countries, at the EU level and by a number of international agreements. Its protection depends largely on the efficiency and attention of those in charge of enforcing fisheries laws. It is interesting to record the fate of the last sturgeons ...

... in the Black Sea: The last known individual of *A. sturio* in the Black Sea basin was caught by fishermen in 1991 in Georgia. It was recognized by scientists who tried to transport it alive to a research aquarium. On their way, they were stopped by a policeman, the fish was 'confiscated' and barbecued.

... in the Mediterranean Sea: The last known individual of *A. sturio* in the Mediterranean Sea basin was caught by fishermen in 1991 in Italy and sold at a local market.

... in Spain: The last known individual of *A. sturio* on the Iberian Atlantic coast was caught by fishermen in 1992 close to the Guadalquivir estuary, close to Doñana National Park and sold to a local restaurant. The chef took a last picture and the fish was then served to his guests.

... in Germany: The last *A. sturio* caught in the North Sea was reportedly caught in 1993 and was landed illegally in Germany. It was sold on the fish market and eaten in the canteen of the Ministry of Interior.

Acipenser sturio (CR) is one of the most threatened fish species in Europe. Photo © J. Freyhof.

... in Belgium: A juvenile *A. sturio* tagged in the Gironde estuary (France) was caught on 12 February 2007 off the Belgian coast. It was released shortly after catch. Hopefully, this animal will once return to the Gironde to reproduce. We hope this will be the fate of the sturgeons in future.

... in France: At present, the last wild *A. sturio* are occuring in the Gironde, a large estuary in south-western France. The population is still declining and the last recorded natural spawning occurred in 1994. By-catch and unintentional kills are still major threats. However, in 2007, French biologists managed to develop a system for artificial reproduction. Once this was in place, experimental stockings have been undertaken in France and Germany. There is now a reasonable hope that the species could survive as a "ranched" species, into a future where the fishing pressure in European marine water will be back to a sustainable level that would even allow the survival of long-living species.

Further reading: Kottelat and Freyhof 2007.

3. Results and discussion

3.1 Threat status of freshwater fishes

The status of freshwater fishes was assessed at two regional levels: geographical Europe and the EU 27.

At the European level, at least 37% of the species are considered as threatened, 12% of them being Critically Endangered, 10% Endangered and 15% Vulnerable (Table 2 and Figure 3). A further 4% of species are classified as Near Threatened.

Within the EU 27, 39% of the freshwater fishes are threatened with extinction, of which 13% are Critically Endangered, 11% Endangered and 15% Vulnerable. In addition, 4% of species are considered as Near Threatened (Table 2 and Figure 4).

Thirteen species are globally Extinct, 10 of which were endemic to the EU 27. Species classed as Extinct or threatened (Critically Endangered, Endangered and Vulnerable) at the European and EU 27 level are listed in Appendix 1. Seven species were considered as Not Applicable, due to their marginal occurrence in Europe.

Objective data on population trends over the last ten years (or three generations, as required by some of the IUCN criteria) are unavailable for many countries, including

Table 2. Summary of numbers of European freshwater fishes within each IUCN Red List category

	IUCN Red List categories	No. species Europe (no. endemic species)	No. species EU 27 (no. endemic species)
	Extinct (EX)	13 (13)	10 (10)
	Extinct in the Wild (EW)	1 (1)	0
	Regionally Extinct (RE)	0	0
Threatened categories	Critically Endangered (CR)	63 (53)	48 (39)
	Endangered (EN)	52 (49)	43 (37)
	Vulnerable (VU)	79 (75)	59 (55)
	Near Threatened (NT)	22 (20)	16 (16)
	Least Concern (LC)	266 (188)	185 (88)
	Data Deficient (DD)	28 (26)	21 (18)
	Total	**524 (425)**	**382 (263)**

Figure 3. IUCN Red List status of freshwater fishes in Europe. See Table 2 for abbreviations

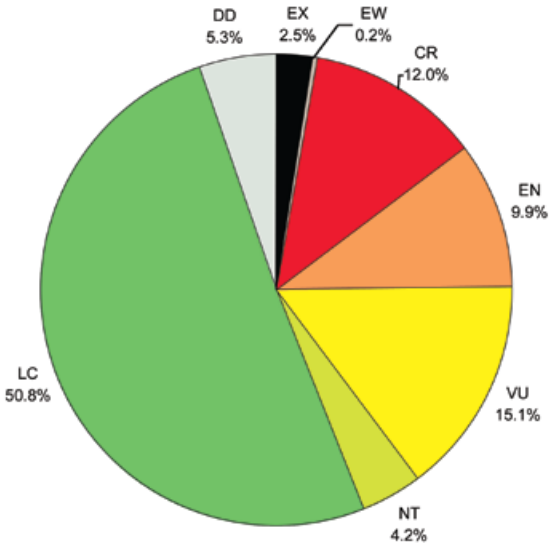
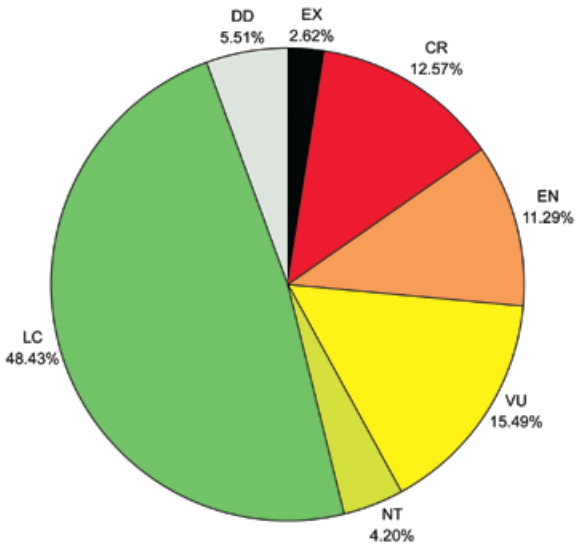


Figure 4. IUCN Red List status of freshwater fishes in the EU 27. See Table 2 for abbreviations



several eastern European countries that comprise a large part of the area covered by this assessment.

Better population trend data may be available through the monitoring schemes that have been established in the EU 27 countries for the Water Framework Directive, but these were not available for the assessment. It is possible that a more in depth analysis of the available river basin management plans would identify several more species as threatened. Where good trend data exists (in some countries such as Spain), a considerably greater proportion of freshwater fishes are classified as threatened (based on known population declines) as compared to other countries where similarly widespread but declining species may be listed as Data Deficient.

For many western European countries, major population declines of freshwater fishes occurred primarily between 1890-1990. In the past two or three decades the rates of decline have slowed, with certain populations even recovering. Therefore species that may have suffered large declines in the past are not listed as threatened as their risk of extinction is now reduced and populations have stabilised, albeit still at a low level.

Amongst all taxonomic groups assessed so far for a European Red List, the threat level of freshwater fishes (37%) is second only to freshwater molluscs at 44% (Cuttelod *et al.* 2011), followed by another, freshwater dependant group, the amphibians with 23% (Temple and Cox 2009). This is clearly highlighting the insufficient conservation of freshwater biodiversity in Europe. In contrast, 19% of reptiles, 15% of mammals and dragonflies, 13% of birds, 9% of butterflies and 7% of the aquatic plants are threatened at the European level (BirdLife International 2004a, Temple and Terry 2007, Cox and Temple 2009, Nieto and Alexander 2010, Kalkman *et al.* 2010, van Swaay *et al.* 2010, Bilz *et al.*

Table 3. IUCN Red List status (at the European level) of freshwater fishes by taxonomic family

Family	Total*	EX	EW	CR	EN	VU	NT	LC	DD	% Threatened*
ACIPENSERIDAE	8			7		1				100%
ANGUILLIDAE	1			1						100%
ATHERINIDAE	1							1		0%
BALITORIDAE	8			1		1		6		25%
BLENNIIDAE	2			1				1		50%
CLUPEIDAE	18			3	1	3		10	1	39%
COBITIDAE	35			5	5	6	3	16		46%
COTTIDAE	16			1		2		10	3	19%
CYPRINIDAE	236	3		23	35	38	14	119	4	41%
CYPRINODONTIDAE	6			3	2			1		83%
ESOCIDAE	1							1		0%
GASTEROSTEIDAE	8	1		1				6		13%
GOBIIDAE	43			4	2	3	1	30	3	21%
LOTIDAE	1							1		0%
MORONIDAE	1							1		0%
MUGILIDAE	5							5		0%
OSMERIDAE	2							2		0%
PERCIDAE	15			3			1	10	1	20%
PETROMYZONTIDAE	13	1		1			1	10		8%
PLEURONECTIDAE	3							3		0%
SALMONIDAE	98	8	1	9	7	24	2	32	15	41%
SILURIDAE	2							1	1	0%
SYNGNATHIDAE	1							1		0%
UMBRIDAE	1					1				100%
Total	**525**	**13**	**1**	**63**	**52**	**79**	**22**	**267**	**28**	**37%**

IUCN Red List Status: EX – Extinct, EW – Extinct in the Wild, CR – Critically Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient.

* Does not include species classed as Not Applicable (NA)

2011). Over 90% of threatened freshwater fish species are endemic to either Europe or the EU, highlighting the responsibility that European countries have to protect the entire global populations of these species. It should be noted that some groups of freshwater fishes show a much higher threat level than others. For example, all eight European sturgeon species assessed here are threatened, seven of which are Critically Endangered.

Finally, it should be noted that the percentages of threatened freshwater fishes represent minimum estimates. A more realistic value may be calculated based only on the surviving species which have been assessed for their extinction risk (i.e. omitting DD and EX from the total). In this scenario 40% of European freshwater fishes and 42% of EU 27 are threatened with extinction.

3.2 Status by taxonomic group

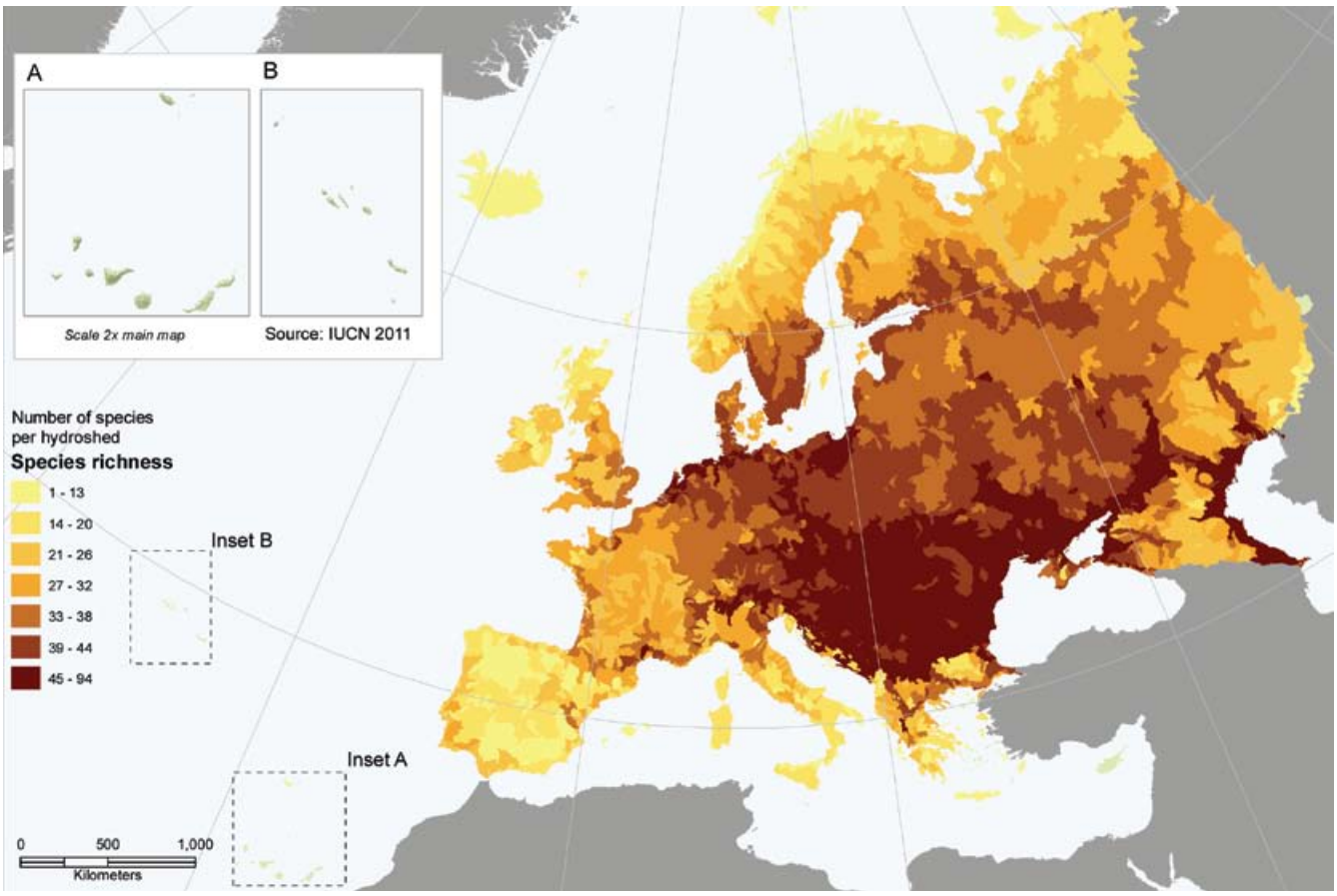
Europe's freshwater fish species belong to a number of different families (see Section 1.2), which are varying both in species numbers and in the relative threat status of their species (Table 3). The most threatened group are the sturgeons. All but one European sturgeon species depend on artificial reproduction and stocking for their survival. For *Acipenser naccarii*, *A. sturio* (both now restricted to the EU) and *A. persicus*, there has been no, or only very occasional, known natural reproduction in the wild for decades, and if ranching were to stop, these species would rapidly become Extinct. Others, such as *A. stellatus*, *A. gueldenstaedtii* and *Huso huso*, now have their only remaining spawning areas restricted to the EU, in the lower Danube. Another highly threatened group of species are the Mediterranean killifishes of the Cyprinidontidae family, victims of intensive development of Mediterranean coasts and threatened by invasive alien species, and the European Eel (now classified as Critically Endangered) which is the sole European representative of the Anguillidae.

3.3 Spatial distribution of species

3.3.1 Species richness

Figure 5 highlights areas with particularly high numbers of freshwater fish species. The areas of highest species richness clearly coincide with the lower parts of the large rivers flowing to the Black and Caspian seas, such as Danube, Bug, Dniestr, Dniepr, Don, Volga and Ural. Eastern and central Europe are also particularly rich, as is all of the Balkan Peninsula, and the catchments of the Elbe and the southern Baltic Sea basin.

Figure 5. Species richness of all European fishes



3.3.2 Distribution of threatened species

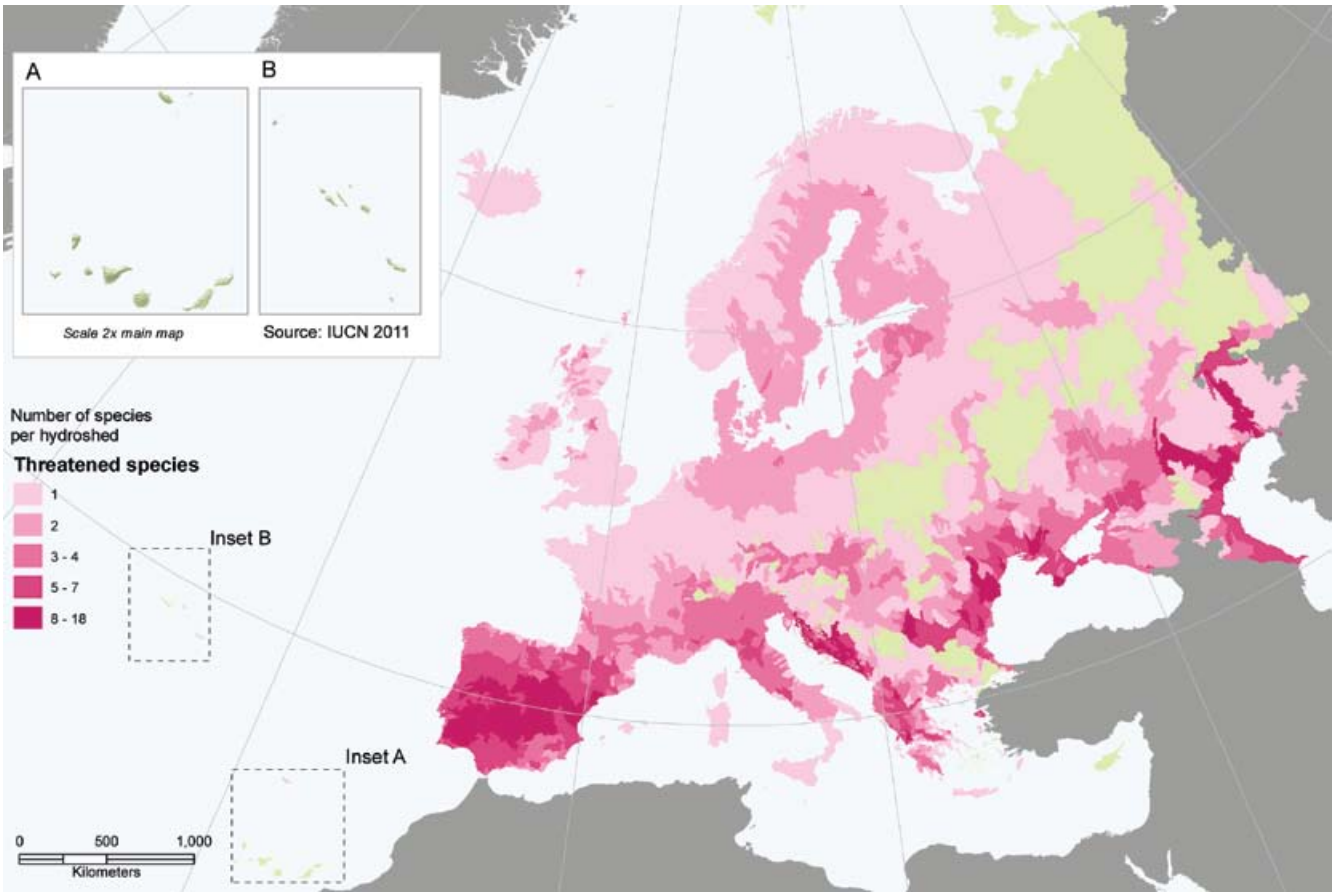
The distribution of threatened freshwater fishes in Europe (Figure 6) shows divergent patterns from the picture of the overall species diversity (Figure 5).

The highest concentrations of threatened freshwater fish species are found; (1) along the northern Mediterranean coast, (2) on the tip of the Crimean Peninsula, and (3) in coastal streams of Bulgaria and European Turkey. All three regions have many locally endemic species, with natural ranges limited to one or few streams, springs or rivers. In certain areas within these regions, almost every river has its own unique freshwater fish fauna composed of local endemics. Many of these endemic species have only recently been discovered and described, or have so far only been treated as synonyms of more widespread species. They are therefore still not well known to conservationists and national or regional governments. They are largely unprotected by any national legislation, nor are they covered by the EU Habitats Directive. Their distribution area is usually poorly documented and situated within protected areas only by chance. Many southern European freshwater fishes are still abundant within their often tiny natural ranges, but the protection they receive is limited to fishing restrictions, whilst their habitats are openly degraded, and anglers are free to stock alien species to their small natural ranges. In many Mediterranean countries, water abstraction remains unregulated or unsupervised in practise. As climate change is expected to bring higher temperatures and lower precipitation to the Mediterranean region, the pressure on remaining freshwater resources may further increase in the future.

Another hotspot of threatened freshwater fish species is in the lower parts of the river basins draining into the Black and Caspian Seas. Here, migratory fish species such as sturgeons, migratory herrings, migratory whitefish and cyprinids, are groups of major conservation concern.

In large parts of Europe the only threatened species is the still widespread (but declining) eel *Anguilla anguilla*, or there are no threatened species at all. Except for the lower parts of the large rivers flowing to the Black and Caspian Seas, the threat level in the species rich areas of central, eastern and northern Europe remains rather low. Here, anadromous species are threatened, such as the freshwater herring *Alosa alosa*, or the migratory whitefish *Coregonus mareana*. Other anadromous species such as the Atlantic

Figure 6. Distribution of threatened fishes in Europe



The European eel, *Anguilla anguilla*, may have suffered as much as a 99% decline of its European stocks since the 1980s. Photo © A. Hartl.

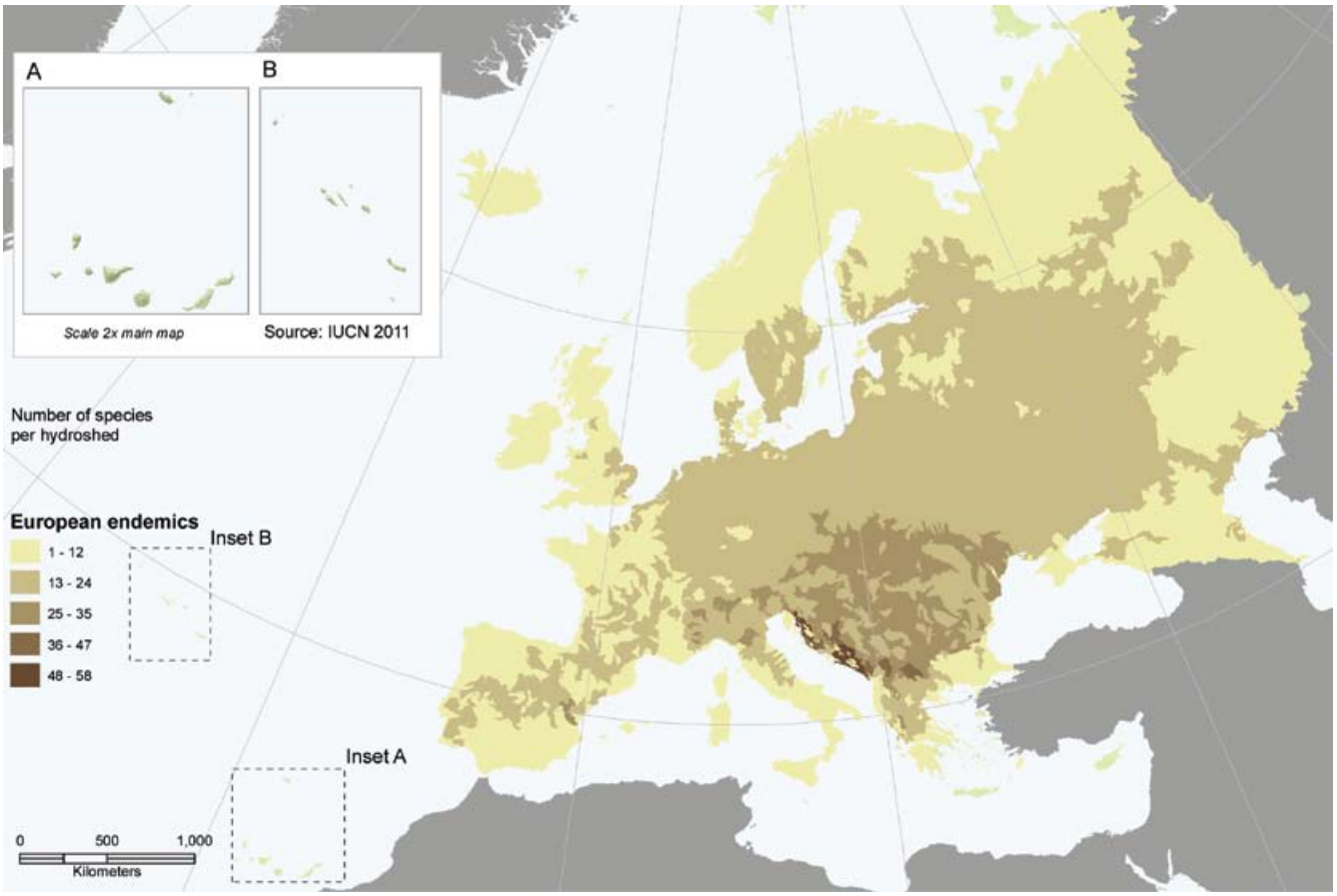
salmon *Salmo salar*, and the sturgeon *Acipenser sturio*, vanished from these areas during the 19th or 20th centuries. *Coregonus oxyrinchus*, which was endemic to this area, became globally Extinct in the 1940s. The Atlantic salmon is now only locally distributed and many "populations" largely depend on permanent artificial reproduction and stocking. *Acipenser sturio* is in an initial, experimental phase of re-introduction and no natural reproduction has occurred to date. In central, eastern and northern Europe, most threatened species are endemic to one or few lakes, from which eight species went Extinct in the 19th and 20th centuries due to lake level alterations and water pollution. The diversity of lake endemics in central and northern Europe was much higher than is now reported and modelling approaches suggest that many unrecognized and undescribed species may have been lost forever.

3.3.3 Endemic species richness

Figure 7 shows the distribution of endemic freshwater fish species (e.g. those that are unique to Europe and are found nowhere else in the world).

At 80%, the level of freshwater fish endemism within Europe is very high, so the overall distribution of European endemic species is similar to that of overall species richness at the European level. As described above, many species are restricted to one, or very few, waterbodies. This includes some famous examples, such as the Critically Endangered *Cottus petiti* in a spring in France, or *Romanichthys valsanicola*, currently known from just one single stream in Romania. The most important hotspot of endemism in central Europe is the region of subalpine lakes in Austria, Germany, Switzerland and France. Most of these lakes

Figure 7. Distribution of freshwater fishes endemic to Europe.



host one to four endemic species of *Coregonus* as well as endemic species of *Salvelinus*. Several of these endemic species became Extinct in the 20th century. Another centre of freshwater fish endemism exists in northern Europe, in Iceland, Ireland, Scotland, Wales, Norway, Sweden, Finland and Russia. Many postglacial lakes of that region are home to unique *Coregonus* and *Salvelinus* populations that are still not recognized as distinct conservation units.

In the tributaries of the Mediterranean and the western Black Sea coast and Crimea, the species diversity per water body is low, whereas the rate of endemism is high. Many species occur in just one catchment, in few springs or streams, and about 60% of all freshwater fishes assessed as Critically Endangered in Europe occur in this area. Overall, our knowledge about the diversity of Mediterranean freshwater fishes is still incomplete; many new species have been described in recent years. Well known hotspots of endemism include the *poljes* (plains) and streams of the Dinaric karst in Croatia and Bosnia-Herzegovina, the southern Balkan region of Greece, FYR of Macedonia, southern Bulgaria, the tip of Crimea and European Turkey. Almost every river in these regions hosts a unique fauna. Most of these river systems are currently unprotected, and their fish fauna exposed to high pressures from alien species or habitat destruction.

3.3.4 Data Deficient species

Figure 8 shows the distribution of Data Deficient (DD) freshwater fish species (e.g. those for which there is not enough information to assess them against the IUCN Red List criteria). The highest numbers of DD species are found in the Eastern Adriatic basin, especially in Albania, where the knowledge on the conservation status, distribution and taxonomy of freshwater fishes remains very poor.

3.4 Major threats to freshwater fishes in Europe

The major threats to each species were coded using the IUCN Threats Classification Scheme (see http://www.iucnredlist.org/technical-documents/classification-schemes). A summary of the relative importance of the different threatening processes is shown in Figure 9.

Figure 8. Distribution of Data Deficient fishes in Europe

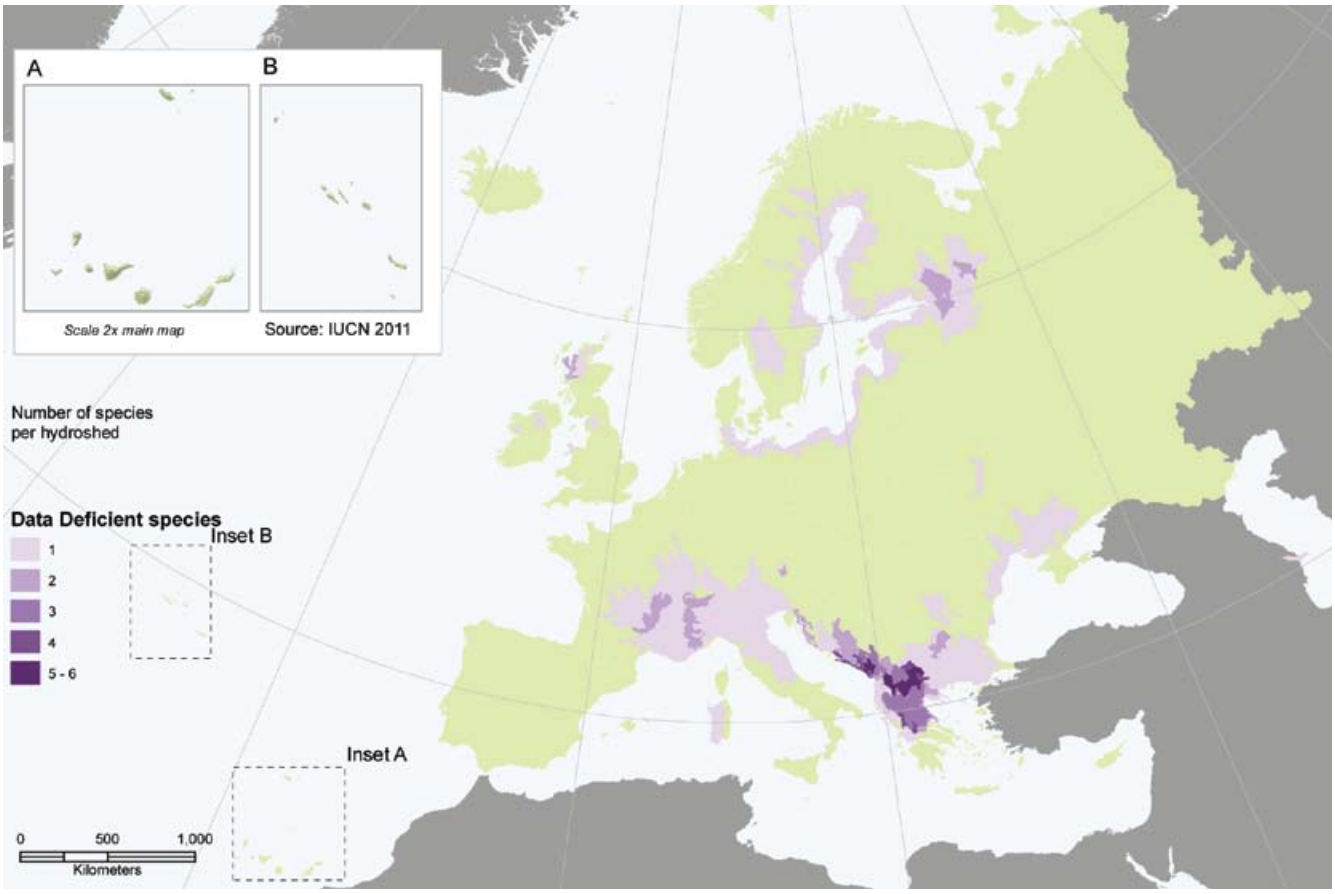
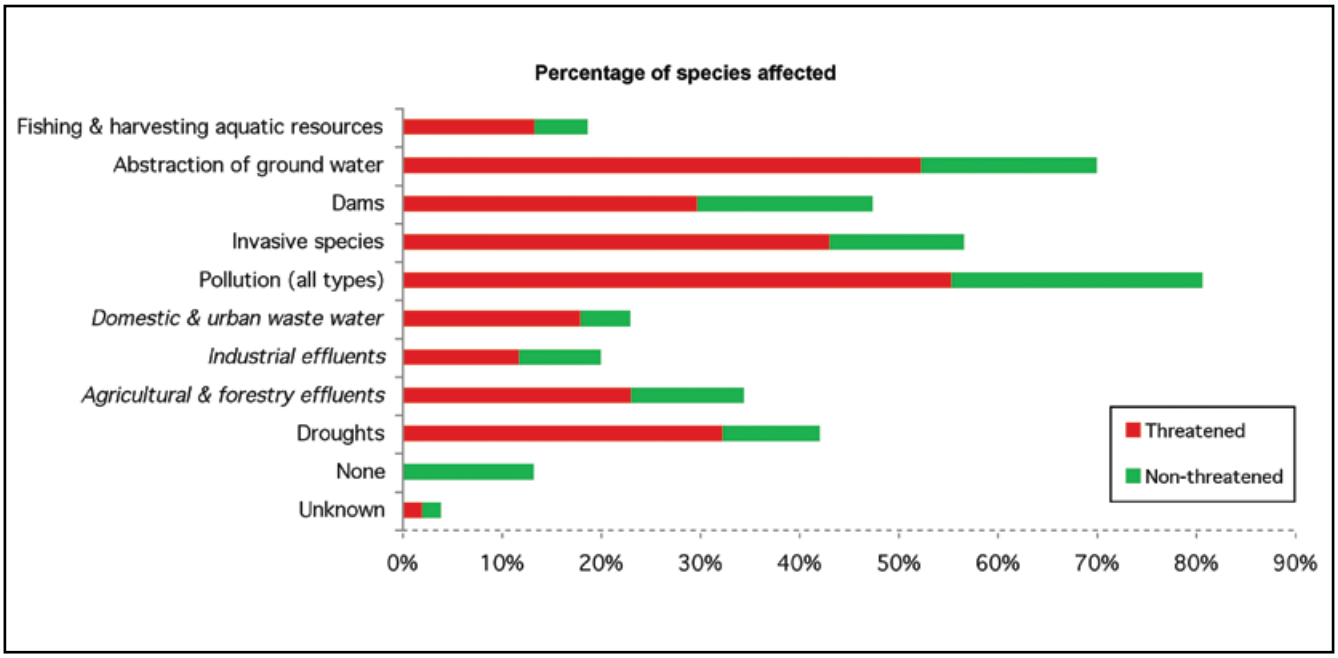


Figure 9. Major threats to freshwater fishes in Europe



Species in the spotlight

The Lez sculpin, *Cottus petiti* (Vulnerable)

This little, dull species is one of several freshwater fishes endemic to southern France. Its natural occurrence is limited to the headwaters of the Lez, close to the city of Montpellier. It is one of numerous Mediterranean local endemics that make this region such a biodiversity hotspot for freshwater fishes. The Lez is fed by a large resurgence draining a karstic plateau.

Water pollution and the introduction of the related *Cottus gobio* are the major threats to this species. Drinking water for Montpellier is extracted in large amounts from the sources of the Lez and there have been plans to take all the water from the Lez, which would have led to the extinction of this species.

While there has been some debate about its taxonomic distinctiveness, *Cottus petiti* is well distinguished by morphology from the more widespread *C. gobio* and even shows some unique behaviour and reproductive strategies. Due to the fact that this species also matures faster and reaches only a small size, it has recently found its way into the laboratories of evolutionary biologists as a model species.

The Lez sculpin, *Cottus petiti*, is restricted to just one stream in France. Photo © J. Freyhof.

Although pollution is one of the most widespread threats, impacting the highest number of species, it is not the most serious threat. Other significant threats such as water abstraction and the introduction of alien species are causing much more rapid population declines for some freshwater species. Below is a discussion of the most major threats to freshwater fishes in Europe, in order of severity.

3.4.1 Water abstraction

The single most important threat to European freshwater fishes is the abstraction of water; from underground, or from the streams and rivers themselves. Water is abstracted for many reasons (agriculture, drinking water, etc.). In the Mediterranean region of Europe, illegal water abstraction is widespread, and many countries still lack an effective enforcement of legislation that could limit the damages of excessive water abstraction to biodiversity. Commercial use of water is usually given priority over biodiversity concerns.

Freshwater resources are already very limited in many southern countries, such as Portugal, Spain, Italy, Greece and Turkey. While all these countries are home to high numbers of endemic and threatened species, their consumption of freshwater is expected to increase further in the coming years, both as a result of increasing demand and climate change (Alcamo *et al.* 2007, Bates *et al.* 2008). This is also true for the Crimean Peninsula where a highly endemic fish fauna is restricted to a few small streams, from which water is already extracted in large and unsustainable amounts.

In those parts of Europe subject to the highest levels of water abstraction, no baseline exists for identifying geographic hotspots for the conservation of freshwater biodiversity. The awareness about the existence of threatened freshwater fish species is often missing. Concepts and approaches in place usually ignore the limited and isolated distribution patterns of fish species. Strong efforts are needed for the conservation of freshwater fishes and associated biodiversity in these regions, in order to prevent catastrophic losses in the coming years.

3.4.2 Alien species

Many European fishes are highly susceptible to the impact of introduced alien species. These may be predators or competitors, especially under "insular" conditions of Mediterranean catchments, where rivers and streams may be naturally devoid of predatory fish, or where naturally species poor communities exist with little inter-specific competition. Local populations are easily wiped out from such catchments if ecologically more competitive species, from species-rich central and eastern European fish communities, invade their habitats. For example, in Montenegro, the connection between the Morava drainage (which is home to many endemic and threatened species) and the Danube that is currently planned in order to increase the supply of water for hydropower generators, is likely to wipe out most of the native species of the Morava-Lake Skadar basin.

It is a great challenge to control the introduction of alien fish species in Europe. It only takes a few anglers to stock trout to a small spring stream, and any endemic species could be wiped out, as has happened in Croatia and elsewhere. The rapid spread of *Pseudorasbora parva*, a Chinese invasive species, from Romania to all over Europe in just 40 years, shows what can happen if there are no legislative barriers for alien fish dispersal. Most of the alien species in Europe are however of European native origin. For example, the pike, *Esox lucius*, has been introduced to Spain (where it is alien) from France (where it is native). In Spain, its introduction is responsible for the local extinction of entire species assemblages.

Sadly, every impoundment is nowadays routinely stocked with alien fish species by anglers. Hence, impoundments are often the starting points of alien fish invasions into entire river basins. Impoundments offer suitable conditions for recreational fisheries, but in the Mediterranean, most angling species known by local anglers and tourists from angling magazines, are not native. Predatory species which are deemed to make good game for recreational fisheries are particularly problematic.

The poor condition of the major rivers of Italy, provide a good idea of the potential future of other large rivers in the Mediterranean. For the purpose of recreational fishing, alien predatory fishes (*Silurus glanis* and *Sander lucioperca*) have been intentionally (and often illegally) introduced by local anglers and tourists. Bait fishes, such as the central European *Alburnus alburnus*, *Rutilus rutilus* and *Abrams brama*, have been released and are now widespread in these river systems. Now no, or only few, native fish species remain in the main rivers. Another worst-case example is provided by the Ebro. To date, nearly all native freshwater fish species of the Ebro have been eradicated from the main channel and have been replaced by a central European fish assemblage. Whilst there has been an increased commercial benefit from recreational fisheries based on these alien species, it has

had a devastating effect on the native fish fauna, and the true toll on the biodiversity and ecosystem services of all these river systems is still unknown.

Where fish are only considered from a utilitarian point of view, "wanted fish" species must be introduced, "unwanted pest species" must be removed and commercially uninteresting species (usually threatened or endemic native species) are considered as being useless and unnecessary. In several European countries, certain species introduced for recreational fisheries, such as rainbow trout (*Oncorhynchus mykiss*) and carp (*Cyprinus carpio*), have even been declared native in order to allow unrestricted stocking.

3.4.3 Hydropower and water control dams

Most freshwater fishes are very sensitive to alterations of their natural habitat. In addition, many require long distance migrations to fulfil their life cycle.

No other group of European freshwater fishes show higher threat levels than anadromous species. This group includes, amongst others, lampreys (which have just recently recovered from a population decline in the 1970s and 1980s), sturgeons, herrings of the genus *Alosa*, salmonids, and some migratory whitefishes of the genus *Coregonus* and *Stenodus*.

Species in the spotlight

The horse barbel, *Barbus tyberinus* (Near Threatened)

As little as 20 years ago, this species was a very common inhabitant of all the Tyrrhenian rivers of Italy. It was found in any moderately fast flowing waters that weren't degraded by pollution. Sadly, this species has since become one of the victims of uncontrolled fish introduction. Recreational fishers have been stocking rivers in an effort to improve catches at low cost, with little concern for biogeographical borders, ignoring whether the stocked species are native to the catchment or not. Most of the rivers in Italy have now been stocked with fishes from northern Italy, where another species of barbel, *Barbus plebejus* is native. *B. plebejus* has now been introduced widely into the range of *B. tyberinus*. On top of this, fishes were also easily available from fish farms and dealers north of the Alps and so the northern species *Barbus barbus* was introduced to several Italian drainages. Good relationships with Spanish angler colleagues then lead to the introduction of *Luciobarbus graellsii* to central Italy.

Having been the only species of barbel in its natural range, *B. tyberinus* is unable to discriminate alien barbels from its own kind at spawning grounds, and at most sites today, only hybrids are found. Also, in competitive situations with the other barbels, the horse barbel has been losing territory step by step. Now, true horse barbels have lost the larger rivers within their range to the alien species, and are found only in isolated populations in headwaters. Even in northern Italy, native *B. plebejus* has lost most of its range to alien *B. barbus*.

There are still some rivers however where horse barbels are the only barbels and it is therefore assessed as Near Threatened. But unless fish stocking becomes effectively controlled, it is only a matter of time before this species will move into a higher threat category on the IUCN Red List.

The horse barbel, *Barbus tyberinus*, is severely impacted by introduced species, and is now categorised as Near Threatened. Photo © J. Freyhof.

There are few rivers in Europe that have not been impacted by dams for hydropower or irrigation purposes (see Figure 10). The first dam upriver of an estuary is now usually the end point for the migration of anadromous species, especially in Eastern Europe. Dams are also a major threat for catadromous species, such as the European Eel, which forage in freshwater and spawn at sea. In most cases, dams block the migration route of fishes. If they are well conceived, fish ladders can mitigate this impact, and allow migratory fishes to migrate further upriver. However, until now, very few rivers in Europe have been equipped with well-functioning fish ladders. Where several dams are built in a cascade, the cumulative effect of these dams can be devastating. Not only does this transform the river into a series of lakes over long distances, with unsuitable habitats for native species, but even where fish ladders are in place, multiple damming is further reducing the probability that migratory fish might reach their spawning grounds.

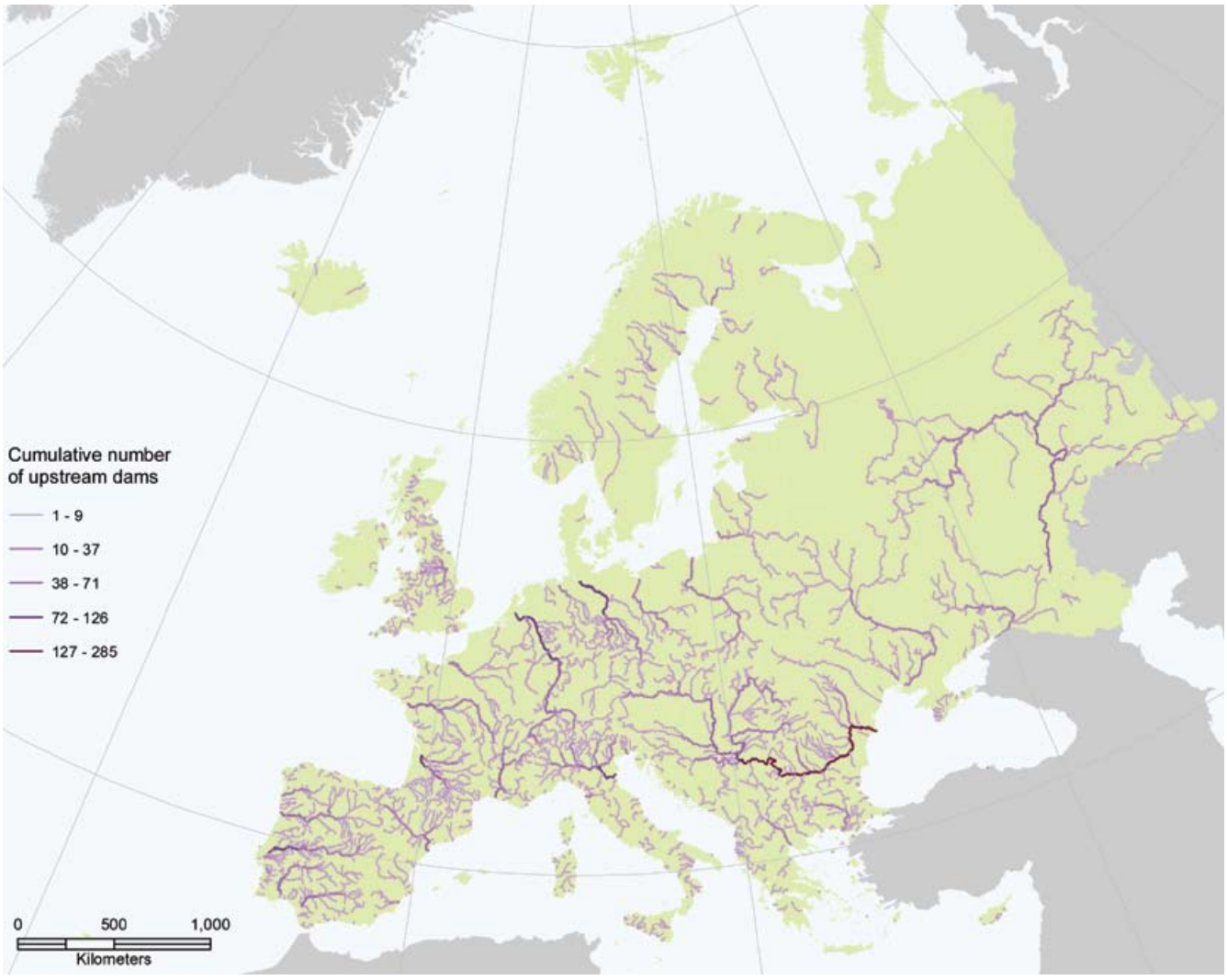
Anadromous and catadromous fish species not only need to find their way upriver, but must also travel downstream. Where hydropower dams are in place, there is still no known effective solution to prevent fishes from being caught by turbines and killed.

In Southern Europe, there is often no legal requirement for a permanent minimum water outflow from dams. This total lack of consideration for the river ecosystem has devastating consequences in summer: if the river downstream is not prevented from drying out, its entire fish fauna will be wiped out.

For hydropower purposes, the outflow from dams is often managed as regular flood pulses and downstream sections experience flash floods at regular intervals; a situation that is both devastating for fishes and for their freshwater habitat.

In some major European rivers such as the Rhine, the Danube and the Ural, the first dam is located so far upriver, that populations of anadromous species can still exist below the first dam. In other rivers, migratory species have lost all their spawning places: the beloribitsa,

Figure 10. Cumulative number of upstream dams on major European rivers. From Mulligan *et al.* 2009.



Stenodus leucichthys, a migratory species of the Caspian sea, formerly migrated 3,000 km upriver into the Volga to spawn. These spawning grounds are now all located above the Volgograd dam. In 1959, after the dam had been completed, only a few spawners remained. Up to 33 million juveniles were stocked annually during Soviet times, peaking in 1988. From 1996–99 only 600,000 juveniles were stocked and the spawning population again declined drastically. In 2004, only about 100 spawners were recorded below the Volgograd dam. The increase of illegal fishing activities on the Volga and in the Caspian Sea is now an additional, very critical concern, for this population.

Construction of new dams, especially for hydropower, is a major concern for freshwater biodiversity conservation in the future. Hydropower is considered as a green technology, its catastrophic effects on biodiversity being voluntarily ignored. Fish ladders are all too quickly considered as an effective means to mitigate the negative side effects of dams.

If the current scenarios for the construction of new dams become reality, the extinction risk will not only increase for migratory fishes, but also for many other species depending on larger rivers and streams with a continuous flow of water.

Dams, such as this one in northern Spain, have massive impacts on fish, particularly for migratory species. Not only do they limit or prevent fish from moving up and down the river between their feeding and spawning sites, but the habitat change caused by the creation of reservoirs means that suitable spawning sites are destroyed. Photo © Kevin Smith.

3.4.4 Pollution

Pollution was the major factor threatening freshwater fish species in Europe during the late 19th and in the 20th centuries, and is still a major driver of population decline and habitat loss for freshwater fishes in Europe. Pollution is caused by a number of sources, including domestic waste, industrial and agricultural effluent, river transportation, and sedimentation. At least eight of the 13 globally Extinct species of European freshwater fishes were the victims of water pollution and lake eutrophication. Migratory species such as sturgeons, migratory herrings and lampreys, salmon and several whitefish, as well as huge numbers of resident species, were exterminated from large parts of their former distribution areas at this time.

Since then, large-scale investments into water purification have helped improve the situation for many fish species. Some migratory species, such as the anadromous lampreys, have recovered well, while others as sturgeons, migratory herrings, salmon and whitefish, still remain imperilled by other threats. Water pollution remains of particular concern in the eastern and southern parts of Europe, where wastewater is still often flowing directly into streams and rivers without any treatment. To make matters worse, these are generally the areas where water is already limited and heavily abstracted for various reasons, often resulting in the only waters remaining in the streams being sewage and wastewaters.

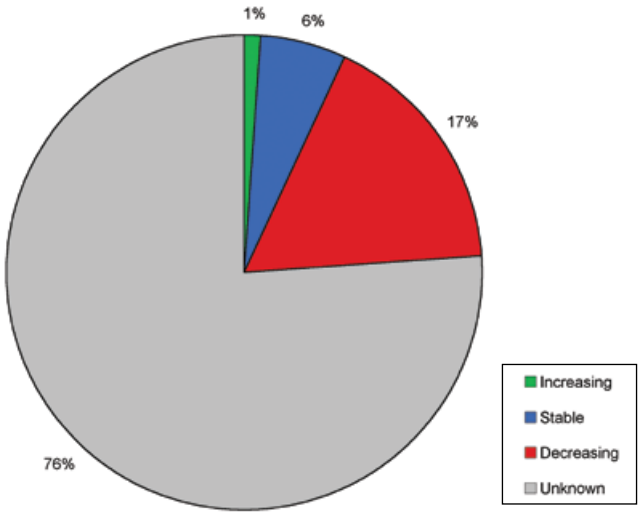
3.5 Population trends

Documenting its population trend is key to assessing a species' status. As part of this assessment, a special effort was made to determine which species are believed to be significantly declining, stable, or increasing.

About 17% of Europe's freshwater fishes are considered to be declining. Only 6% seem to have stable populations, while only 1% are increasing (Figure 11). As almost no population trend data exist from most European countries, population trends for 76% of all species still remain unknown. As explained in section 3.1, because of the lack of reliable data on trends, the actual percentage of species that is declining is thus most probably largely underestimated.

In comparison, 11% of freshwater molluscs (Cuttelod *et al.* 2011), 16% of aquatic plants (Bilz *et al.* 2011), 26% of dragonflies (Kalkman *et al.* 2010), 27% of mammal species, 42% of reptile species (Cox and Temple 2009) and 59% of amphibian species (Temple and Cox 2009) have declining populations. Just under a quarter (23%) of European birds are decreasing in number, based on population trends between 1990 and 2000 (BirdLife International 2004a). Freshwater species have the highest proportions of unknown population trends, with 76% of freshwater fishes falling into this category, and 83% of freshwater molluscs (Cuttelod *et al.* 2011). Monitoring data for freshwater fish species diversity and abundance collected within the frame of the EU Habitats Directive and the EU Water Framework Directive, should also be compiled and used in the future to determine objective population trends and improve the accuracy of future Red List assessments.

Figure 11. Population trends of European fishes



Valencia letourneuxi is assessed as Critically Endangered as this species has undergone a suspected population decline of at least 50% in the last 10 years due to the impact of introduced species and pollutants. The future decline is projected to be even more severe with an estimated decline of more than 80% over the next 10 years expected. The species is endemic to the coasts of southern Albania and western Greece. Photo © A. Hartl.

4. Conservation measures

4.1 Protection of habitats and species in Europe

European countries and EU Member States are signatories to a number of important conventions aimed at conserving biodiversity that are particularly relevant to freshwater fishes, including the 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats, and most importantly, the 1992 Convention on Biological Diversity. Many European countries and regions also afford freshwater fishes some form of protective species legislation.

The Bern Convention is a binding international legal instrument that aims to conserve wild flora and fauna and their natural habitats and to promote European cooperation towards that objective. It covers all European countries and some African states. In particular 12 species of European freshwater fishes are listed on Appendix II (strictly protected species) of the Bern Convention (see Appendix 1 and 2 of this report). Nine additional species have to be added to Appendix II as they were erroneously treated as populations of another Appendix II species. One hundred and fifty-seven species of freshwater fishes are also included in Annex III, most of which are not threatened according to the IUCN Red List criteria.

European countries and the EU have made the commitment to reduce (or halt) the loss of biodiversity within Europe. This means that not only should extinctions be prevented, but population declines should also be reversed and populations restored. The result of this Red List shows that this is a great challenge. The CBD targets for 2010 were not met, but this baseline data will aid efforts to meet the new targets for 2020.

4.2 Protection of habitats and species in the EU 27

EU nature conservation policy is based on two main pieces of legislation - the EU Birds Directive of 1979 and the EU Habitats Directive of 1992. The main objective of these two directives is to ensure the favourable conservation status (see Box 3) of the habitats and species found in the EU.

The Habitats Directive, which aims to protect natural habitats and wild species other than birds, equally applies to the EU's freshwater, terrestrial and marine

A spring in Cernica polje, Bosnia-Herzegovina; one of the few habitats of *Telestes metohiensis* (VU), the only fish species at this locality. Photo © J. Freyhof.

regions. Each Member State is required to identify sites of European importance and is required to put in place measures for their protection and for their management, combining long-term conservation needs with economic and social activities as part of a sustainable development strategy. These sites, together with those of the Birds Directive, make up the Natura 2000 network - the cornerstone of EU nature conservation policy. The Natura 2000 network has grown over the last 25 years and now includes more than 26,000 protected areas in all Member States combined, with a total area of around 850,000 km^2 – more than 17.5% of the total EU territory. The Habitats Directive contains a series of Annexes that identify habitats and species of European Community concern. Member States are required to designate Natura 2000 sites for the species listed on Annex II; Annex IV species are subject to a strict protection system. Appendix 2 identifies those freshwater fish species included in the relevant annexes of the Habitats Directive.

At present, there are 202 freshwater fish species listed on the Annex II and IV of the Habitats Directive, of which 85 are, according to the current Red List assessment, considered as threatened in Europe. This assessment also shows that there are 60 freshwater fish species threatened at the EU 27 level which are not covered by the relevant annexes of the Habitats Directive.

Box 3: Selected provisions of the EU Habitats Directive (92/43/EEC)

Article 1(i) defines the conservation status of a species as "the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations in the European territory of the Member States". It states that a species' conservation status will be taken as Favourable when:

- Population dynamics data on the species concerned suggests that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is likely to be reduced for the considerable future; and
- There is, and probably will continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The Water Framework Directive adopted by EU Member States requires that all inland and coastal waters must achieve a good ecological status by 2015. Ballachulish, Scotland. Photo © R. Holland/FBA.

One of the main tools to enhance and maintain this status is the Natura 2000 network of protected areas. EU nature conservation policy also foresees the integration of its protection requirements into other EU sectoral policies such as agriculture, regional development and transport.

It is key that this network of sites is defined to cover sites that are either especially vulnerable as they are holding threatened species or that are irreplaceable for example because they hold either endemic or restricted range species or are important spawning areas. Such sites should be identified through the KBA methodology (Holland *et al.* in press). The establishment and dissemination of a network of Freshwater Key Biodiversity Areas in Europe is one of the priority actions urgently needed.

Legal protection of sites under the Natura 2000 network has already helped to preserve the habitats of threatened species. This has also allowed the financing of many on-the-ground conservation projects, in particular through the EU conservation programmes LIFE and LIFE+, which has been a real step forward in conservation in Europe.

In the coming years, the EU's Water Framework Directive, adopted in 2000, is expected to become another major driver for achieving sustainable water management throughout Europe, and hence, hopefully, for the conservation of Europe's freshwater fishes. It requires that all inland and coastal waters within defined river basins shall reach a good ecological status by 2015 (i.e. that they have the biological community that would be expected in conditions of minimal anthropogenic impact). This directive includes requirements for increased monitoring of aquatic ecology by the EU Member States, and improved protection and recovery of European waterways. In particular, Member States are expected to tackle any remaining water pollution problems. It deals with surface and groundwater quality and quantity, and aims to enforce sustainable levels of water abstraction.

4.3 Conservation management of freshwater fishes in the EU

Important efforts have already been made to improve the conditions of freshwater bodies in Europe and fishes are important indicators to assess the status of freshwater habitats. The conservation of freshwater fishes is mostly carried out on regional and national levels and is often triggered by the interests of recreational fishermen, who often do a time consuming job with great enthusiasm and commitment.

The EU's LIFE+ programme offers financial support for species and habitats conservation projects throughout the EU. In particular, LIFE+ supports the implementation of the Birds and Habitats Directives and the establishment of the Natura 2000 network. Projects involve a variety of actions including habitat restoration, site purchases, communication and awareness-raising, protected area infrastructure and conservation planning.

Since 1992, LIFE has co-financed over 3,115 projects with a total budget of over €2 billion. According to the LIFE project database, 102 LIFE Nature projects have implemented concrete conservation actions that were directly targeting fish species in the EU. The majority of these projects are aimed at habitat or site level restoration and conservation, although 18 are species specific projects, with 10 of them focused on threatened species. Further to this, many more threatened species are benefitting from projects working at improving and restoring inland water habitats.

Overfishing is a threat to certain species of fish in Europe, both from recreational angling and commercial operations. Photos © J. Freyhof.

4.4 Extinction risk versus conservation status

The IUCN Red List Criteria classify species solely on the basis of their relative extinction risk (IUCN 2001). However, Unfavourable Conservation Status according to the EU Habitats Directive has a much broader definition. This is identified clearly in Article 1 of the Directive (see Box 3). No species meeting the IUCN Red List Criteria for one of the threatened categories at a regional level can be considered to have a Favourable Conservation Status in the EU. To be classified as Vulnerable (the lowest of the three IUCN threatened categories) a species must undergo a reduction in population size of at least 30% over ten years or three generations, have a restricted geographic range and a continuing decline, or have a small and declining population size; see the 2001 IUCN Red List Categories and Criteria version 3.1 for the full criteria and sub-criteria, available at http://www.iucnredlist.org/technical-documents/categories-and-criteria. It is difficult to claim that a species experiencing a decline of this magnitude is maintaining its population, that its range is stable, and that it remains a viable component of its habitat. Crucially, however, this does not mean that the opposite is true: species that are not threatened as defined by IUCN Red List Criteria do not necessarily have a Favourable Conservation Status (BirdLife International 2004a). Guidelines issued by the European Commission on the protection of animal species under the Habitats Directive reinforce this message that 'the fact that a habitat or species is not threatened (i.e. not faced by any direct extinction risk) does not necessarily mean that it has a favourable conservation status' (Anon. 2007).

Many freshwater fishes remain widely distributed in Europe, although their populations and ranges have suffered significant long-term decline as a result of habitat loss and degradation in conjunction with other threats (see Sections 3.4 and 3.5). The European Red List has highlighted the fact that 17% of freshwater fishes have declining populations and a staggering 76% have an unknown population trend (see Figure 11). It should however be noted that both the distribution and population size of some species has declined severely during the 20th century, but not in the timeframe indicated by IUCN methodology or at a rate that does not exceed 30%, and thus does not satisfy IUCN Red List Criteria for a threatened category. Therefore, although many of these species are categorised as Near Threatened or Least Concern, they should not be regarded as having Favourable Conservation Status.

4.5 Red List versus priority for conservation action

Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List Categories, generally precedes the setting of conservation priorities. The purpose of the Red List categorization is to produce a relative estimate of the likelihood of extinction of a taxon. Setting conservation priorities, on the other hand, normally includes the assessment of extinction risk, but also takes into account other factors such as ecological, phylogenetic, historical, economical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel, cost-effectiveness, and legal frameworks for conservation of threatened taxa. In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities. For example, it is important to consider not only conditions within the region but also the status of the taxon from a global perspective and the proportion of the global population that occurs within the region. A decision on how these three variables, as well as other factors, are used for establishing conservation priorities is a matter for the regional authorities to determine.

The Sea Lamprey, *Petromyzon marinus*, is Europe's largest lamprey. It is anadromous and migrates to rivers which have no dams or dams with a functioning fish pass. Sea lampreys declined strongly during the 20th century and had been listed as threatened by most countries where they occur. Since the late 20th century, the European population has recovered fast following the increasing water quality in many countries. It is assessed as Least Concern. Photo © A. Hartl.

5. Conclusion and recommendations

5.1 Overview and recommendations for conservation measures

Overall, at least 37% of all European freshwater fishes are threatened in Europe, and 39% are threatened at the EU 27 level. Thus, more than one third of freshwater fishes in Europe are threatened. This is the second highest threat level of any taxonomic group assessed so far and shows the immense problems in the conservation of freshwater habitats and species in Europe. This extraordinarily high threat level is only comparable with other assessments of larger freshwater fish faunas such as in North America (39%, Jelks *et al.* 2008). It should be noted that both the distribution and population size of numerous species declined severely during the 20th century (but not in the timeframe of 10 years or three generations taken into consideration by IUCN methodology). In some cases the few remaining populations in these countries are stable as a result of conservation measures, which means these species are not categorized here as threatened species.

The highest diversity of freshwater fishes is found in Eastern Europe, but most of the threatened species are rather confined to southern Europe. The main current threat to European freshwater fishes is direct habitat loss and loss of habitat connectivity, due to water abstraction, construction of dams and spread of alien species. Improving the conservation status of European freshwater fishes and reversing these negative trends is a very challenging task and conflicts with the interests of many other users. Further conservation actions are urgently needed and intelligent and detailed solutions have to be found. In particular:

- Use the European Red List of freshwater fishes to inform revisions of the relevant European, national and regional legislation, in particular for where this can help to improve the conservation status of threatened species.
- Establish a network of Freshwater Key Biodiversity Areas in Europe. In the European Union, these areas should be integrated into the Natura 2000 network.
- Draw up and implement Species Action (Recovery) Plans for all threatened European freshwater fish species.
- Assess and regulate the abstraction of waters in areas with threatened freshwater fish species and improve the enforcement of existing legislation on water abstraction.
- Impose a strict legal ban on any further introduction of fish species into lakes and river basins where they are not native.
- The loss of riverine habitat needs to be prevented to ensure the future of freshwater fish in Europe. This is especially important in consideration of new dam construction.
- Impose stricter requirements on environmental impact assessment for the construction of canals, dams and hydropower plants. The assessments should take full account of the often very serious threats that such infrastructure is posing to freshwater biodiversity.
- Support the development and maintenance of the network of ex-situ facilities, to halt the extinction of the most threatened species.
- Revise the list of threatened European freshwater fishes regularly, and when new data become available.
- Conduct further ecological research on threatened European species and the adequate management of their habitats to underpin conservation programmes.

Rutilus meidingeri was known from five sub-Alpine lakes, but has been wiped out from two of them, due to the damming of spawning tributaries. Photo © A. Hartl.

5.2 Application of project outputs

This freshwater fishes Red List is part of a wider project aimed at comprehensively assessing several taxonomic groups (mammals, amphibians, reptiles, butterflies, dragonflies), and selected beetles, molluscs and plants. It has gathered large amounts of data on population, ecology, habitats, threats and recommended conservation measures for each species assessed. These data are freely available on the IUCN Red List website (www.iucnredlist.org/europe), on the European Commission website (http://ec.europa.eu/environment/nature/conservation/species/redlist) and through paper publications (see the list of European Red List published at the end of this report). In conjunction with the data on European birds published by BirdLife International (BirdLife International 2004a, b), it provides key resources for decision-makers, policy-makers, resources managers, environmental planners and NGOs. This Red List is a dynamic tool that will evolve with time, as species are reassessed according to new information or situations. It is aimed at stimulating and supporting research, monitoring and conservation action at local, regional and international levels, especially for threatened, Near Threatened and Data Deficient species. The outputs of this project can be applied to inform policy, to identify priority sites and species to include in research and monitoring programmes and to identify internationally important areas for biodiversity.

5.3 Future work

Through the process of gathering and compiling freshwater fish data across Europe, several knowledge gaps have been identified. There are in particular significant geographical and taxonomical biases in the quality and quantity of data available on the distribution and status of species. If the freshwater fish assessments are periodically updated, they will enable the changing status of these species to be tracked through time via the production of a Red List Index (Butchart et al. 2004, 2005, 2006, 2007). To date, this indicator has been produced for birds, mammals, amphibians and reptiles at the European regional level and has been adopted as one of the headline biodiversity indicators to monitor progress towards halting biodiversity loss in Europe by 2010 (European Environment Agency 2007). By regularly updating the data presented here we will be able to track the changing fate of European freshwater fishes in the future and hopefully help to protect the species from becoming extinct.

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Appendix 1. Extinct and threatened freshwater fishes at the European and EU 27 level

Species endemic to European or to EU 27 sub-catchments are marked with an asterisk (*). Details on which Annexes within the Bern Convention (BC) and Habitats Directive (HD) each species appears on can be found in Appendix 2. IUCN Red List Status: EX – Extinct, EW – Extinct in the Wild, CR – Critically Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, NA – Not Applicable.

Family	Species	Red List status Europe	Red List status EU 27	Included in BC and/or HD Annexes
CYPRINIDAE	*Romanogobio antipai*	EX*	EX*	Yes
GASTEROSTEIDAE	*Gasterosteus crenobiontus*	EX*	EX*	No
SALMONIDAE	*Coregonus bezola*	EX*	EX*	Yes
SALMONIDAE	*Coregonus fera*	EX*	EX*	Yes
SALMONIDAE	*Coregonus gutturosus*	EX*	EX*	Yes
SALMONIDAE	*Coregonus hiemalis*	EX*	EX*	Yes
SALMONIDAE	*Coregonus oxyrinchus*	EX*	EX*	Yes
SALMONIDAE	*Coregonus restrictus*	EX*	EX*	Yes
SALMONIDAE	*Salvelinus neocomensis*	EX*	EX*	No
SALMONIDAE	*Salvelinus profundus*	EX*	EX*	No
CYPRINIDAE	*Chondrostoma scodrense*	EX*	NA	No
CYPRINIDAE	*Telestes ukliva*	EX*	NA	No
PETROMYZONTIDAE	*Eudontomyzon sp. nov. 'migratory'*	EX*	NA	No
SALMONIDAE	*Stenodus leucichthys*	EW*	NA	No
ACIPENSERIDAE	*Acipenser gueldenstaedtii*	CR	CR	Yes
ACIPENSERIDAE	*Acipenser naccarii*	CR*	CR	Yes
ACIPENSERIDAE	*Acipenser nudiventris*	CR	CR	Yes
ACIPENSERIDAE	*Acipenser stellatus*	CR	CR	Yes
ACIPENSERIDAE	*Acipenser sturio*	CR*	CR*	Yes
ACIPENSERIDAE	*Huso huso*	CR	CR	Yes
ANGUILLIDAE	*Anguilla anguilla*	CR	CR	No
CLUPEIDAE	*Alosa killarnensis*	CR*	CR*	Yes
CLUPEIDAE	*Alosa vistonica*	CR*	CR*	Yes
BALITORIDAE	*Oxynoemacheilus theophilii*	CR	CR	No
COBITIDAE	*Cobitis puncticulata*	CR	CR	No
COBITIDAE	*Cobitis stephanidisi*	CR*	CR*	Yes
CYPRINIDAE	*Alburnus macedonicus*	CR*	CR*	No
CYPRINIDAE	*Alburnus mandrensis*	CR*	CR*	Yes
CYPRINIDAE	*Alburnus vistonicus*	CR*	CR*	Yes
CYPRINIDAE	*Barbus euboicus*	CR*	CR*	Yes
CYPRINIDAE	*Iberochondrostoma almacai*	CR*	CR*	Yes
CYPRINIDAE	*Iberochondrostoma lusitanicus*	CR*	CR*	Yes
CYPRINIDAE	*Iberochondrostoma oretanum*	CR*	CR*	Yes
CYPRINIDAE	*Iberocypris palaciosi*	CR*	CR*	Yes
CYPRINIDAE	*Parachondrostoma arrigonis*	CR*	CR*	Yes
CYPRINIDAE	*Pelasgus epiroticus*	CR*	CR*	Yes

Family	Species	Red List status Europe	Red List status EU 27	Included in BC and/or HD Annexes
CYPRINIDAE	*Pelasgus laconicus*	CR*	CR*	Yes
CYPRINIDAE	*Scardinius graecus*	CR*	CR*	Yes
CYPRINIDAE	*Scardinius racovitzai*	CR*	CR*	Yes
CYPRINIDAE	*Scardinius scardafa*	CR*	CR*	No
CYPRINIDAE	*Squalius sp. nov. 'Evia'*	CR*	CR*	No
CYPRINODONTIDAE	*Aphanius almiriensis*	CR*	CR*	Yes
CYPRINODONTIDAE	*Valencia hispanica*	CR*	CR*	Yes
CYPRINODONTIDAE	*Valencia letourneuxi*	CR*	CR*	Yes
GASTEROSTEIDAE	*Pungitius hellenicus*	CR*	CR*	Yes
BLENNIIDAE	*Salaria economidisi*	CR*	CR*	Yes
GOBIIDAE	*Knipowitschia cameliae*	CR*	CR*	No
GOBIIDAE	*Knipowitschia milleri*	CR*	CR*	Yes
PERCIDAE	*Romanichthys valsanicola*	CR*	CR*	Yes
PERCIDAE	*Zingel asper*	CR*	CR*	Yes
PETROMYZONTIDAE	*Eudontomyzon hellenicus*	CR*	CR*	Yes
SALMONIDAE	*Coregonus bavaricus*	CR*	CR*	Yes
SALMONIDAE	*Coregonus hoferi*	CR*	CR*	Yes
SALMONIDAE	*Coregonus pennantii*	CR*	CR*	Yes
SALMONIDAE	*Coregonus trybomi*	CR*	CR*	Yes
SALMONIDAE	*Salmo carpio*	CR*	CR*	Yes
SALMONIDAE	*Salvelinus grayi*	CR*	CR*	No
SALMONIDAE	*Salvelinus lonsdalii*	CR*	CR*	No
SALMONIDAE	*Salvelinus obtusus*	CR*	CR*	No
COTTIDAE	*Cottus rondeleti*	CR*	CR*	Yes
ACIPENSERIDAE	*Acipenser persicus*	CR	NA	Yes
CLUPEIDAE	*Clupeonella abrau*	CR*	NA	No
COBITIDAE	*Cobitis illyrica*	CR*	NA	Yes
COBITIDAE	*Cobitis jadovensis*	CR*	NA	Yes
COBITIDAE	*Cobitis taurica*	CR*	NA	Yes
CYPRINIDAE	*Delminichthys jadovensis*	CR*	NA	Yes
CYPRINIDAE	*Delminichthys krbavensis*	CR*	NA	Yes
CYPRINIDAE	*Gobio delyamurei*	CR*	NA	No
CYPRINIDAE	*Luciobarbus brachycephalus*	CR	NA	No
CYPRINIDAE	*Phoxinellus dalmaticus*	CR*	NA	No
CYPRINIDAE	*Telestes fontinalis*	CR*	NA	Yes
CYPRINIDAE	*Telestes polylepis*	CR*	NA	Yes
CYPRINIDAE	*Telestes turskyi*	CR*	NA	Yes
GOBIIDAE	*Knipowitschia mrakovcici*	CR*	NA	Yes
GOBIIDAE	*Proterorhinus tataricus*	CR*	NA	Yes
SALMONIDAE	*Salmo ezenami*	CR*	NA	No
CYPRINIDAE	*Alburnus sarmaticus*	EN*	CR	Yes
COBITIDAE	*Cobitis arachthosensis*	EN*	EN*	Yes
COBITIDAE	*Cobitis calderoni*	EN*	EN*	No
COBITIDAE	*Cobitis hellenica*	EN*	EN*	Yes
COBITIDAE	*Cobitis trichonica*	EN*	EN*	Yes
COBITIDAE	*Cobitis vettonica*	EN*	EN*	No
CYPRINIDAE	*Achondrostoma occidentale*	EN*	EN*	Yes
CYPRINIDAE	*Achondrostoma salmantinum*	EN*	EN*	Yes
CYPRINIDAE	*Alburnus schischkovi*	EN*	EN*	Yes

Family	Species	Red List status Europe	Red List status EU 27	Included in BC and/or HD Annexes
CYPRINIDAE	*Alburnus volviticus*	EN*	EN*	Yes
CYPRINIDAE	*Anaecypris hispanica*	EN*	EN*	Yes
CYPRINIDAE	*Barbus caninus*	EN*	EN*	Yes
CYPRINIDAE	*Barbus pergamonensis*	EN	EN	Yes
CYPRINIDAE	*Chondrostoma soetta*	EN*	EN*	Yes
CYPRINIDAE	*Luciobarbus graecus*	EN*	EN*	Yes
CYPRINIDAE	*Parachondrostoma turiense*	EN*	EN*	Yes
CYPRINIDAE	*Pelasgus prespensis*	EN*	EN*	Yes
CYPRINIDAE	*Petroleuciscus smyrnaeus*	EN	EN	No
CYPRINIDAE	*Phoxinus strandjae*	EN*	EN*	No
CYPRINIDAE	*Phoxinus strymonicus*	EN*	EN*	No
CYPRINIDAE	*Romanogobio benacensis*	EN*	EN*	No
CYPRINIDAE	*Rutilus meidingeri*	EN*	EN*	Yes
CYPRINIDAE	*Rutilus ylikiensis*	EN*	EN*	Yes
CYPRINIDAE	*Squalius castellanus*	EN*	EN*	Yes
CYPRINIDAE	*Squalius cii*	EN	EN	No
CYPRINIDAE	*Squalius keadicus*	EN*	EN*	No
CYPRINIDAE	*Squalius lucumonis*	EN*	EN*	No
CYPRINIDAE	*Squalius malacitanus*	EN*	EN*	Yes
CYPRINIDAE	*Squalius moreoticus*	EN*	EN*	No
CYPRINIDAE	*Squalius torgalensis*	EN*	EN*	Yes
CYPRINIDAE	*Telestes beoticus*	EN*	EN*	No
CYPRINODONTIDAE	*Aphanius baeticus*	EN*	EN*	Yes
CYPRINODONTIDAE	*Aphanius iberus*	EN*	EN*	Yes
GOBIIDAE	*Economidichthys trichonis*	EN*	EN*	No
GOBIIDAE	*Knipowitschia thessala*	EN*	EN*	Yes
SALMONIDAE	*Coregonus pollan*	EN*	EN*	Yes
SALMONIDAE	*Coregonus stigmaticus*	EN*	EN*	Yes
SALMONIDAE	*Coregonus vandesius*	EN*	EN*	Yes
SALMONIDAE	*Hucho hucho*	EN*	EN*	Yes
SALMONIDAE	*Salmo peristericus*	EN*	EN*	Yes
SALMONIDAE	*Salvelinus willoughbii*	EN*	EN*	No
CLUPEIDAE	*Alosa volgensis*	EN*	NA	Yes
CYPRINIDAE	*Alburnus mentoides*	EN*	NA	Yes
CYPRINIDAE	*Aulopyge huegelii*	EN*	NA	No
CYPRINIDAE	*Chondrostoma phoxinus*	EN*	NA	Yes
CYPRINIDAE	*Gobio skadarensis*	EN*	NA	No
CYPRINIDAE	*Phoxinellus alepidotus*	EN*	NA	No
CYPRINIDAE	*Squalius microlepis*	EN*	NA	Yes
CYPRINIDAE	*Squalius tenellus*	EN*	NA	Yes
CYPRINIDAE	*Telestes croaticus*	EN*	NA	Yes
CYPRINIDAE	*Telestes sp. nov.*	EN*	NA	No
SALMONIDAE	*Salmo obtusirostris*	EN*	NA	No
CLUPEIDAE	*Alosa immaculata*	VU	EN	Yes
ACIPENSERIDAE	*Acipenser ruthenus*	VU	VU	Yes
BALITORIDAE	*Oxynoemacheilus pindus*	VU*	VU*	No
CLUPEIDAE	*Alosa macedonica*	VU*	VU*	Yes
COBITIDAE	*Cobitis meridionalis*	VU*	VU*	Yes
COBITIDAE	*Cobitis paludica*	VU*	VU*	Yes

Family	Species	Red List status Europe	Red List status EU 27	Included in BC and/or HD Annexes
COBITIDAE	*Cobitis punctilineata*	VU*	VU*	No
COBITIDAE	*Cobitis zanandreai*	VU*	VU*	Yes
COTTIDAE	*Cottus petiti*	VU*	VU*	Yes
COTTIDAE	*Cottus scaturigo*	VU*	VU*	Yes
CYPRINIDAE	*Achondrostoma arcasii*	VU*	VU*	Yes
CYPRINIDAE	*Alburnoides prespensis*	VU*	VU*	No
CYPRINIDAE	*Alburnus albidus*	VU*	VU*	Yes
CYPRINIDAE	*Alburnus belvica*	VU*	VU*	No
CYPRINIDAE	*Barbus haasi*	VU*	VU*	Yes
CYPRINIDAE	*Chondrostoma prespense*	VU*	VU*	No
CYPRINIDAE	*Cyprinus carpio*	VU	VU	No
CYPRINIDAE	*Gobio feraeensis*	VU*	VU*	No
CYPRINIDAE	*Gobio kovatschevi*	VU*	VU*	No
CYPRINIDAE	*Iberochondrostoma lemmingii*	VU*	VU*	Yes
CYPRINIDAE	*Iberocypris alburnoides*	VU*	VU*	Yes
CYPRINIDAE	*Ladigesocypris ghigii*	VU*	VU*	Yes
CYPRINIDAE	*Luciobarbus comizo*	VU*	VU*	Yes
CYPRINIDAE	*Luciobarbus guiraonis*	VU*	VU*	Yes
CYPRINIDAE	*Luciobarbus microcephalus*	VU*	VU*	Yes
CYPRINIDAE	*Luciobarbus steindachneri*	VU*	VU*	Yes
CYPRINIDAE	*Parachondrostoma toxostoma*	VU*	VU*	Yes
CYPRINIDAE	*Pseudochondrostoma duriense*	VU*	VU*	Yes
CYPRINIDAE	*Pseudochondrostoma willkommii*	VU*	VU*	Yes
CYPRINIDAE	*Rutilus panosi*	VU*	VU*	Yes
CYPRINIDAE	*Rutilus prespensis*	VU*	VU*	Yes
CYPRINIDAE	*Squalius aradensis*	VU*	VU*	Yes
CYPRINIDAE	*Squalius janae*	VU*	VU*	No
CYPRINIDAE	*Squalius valentinus*	VU*	VU*	Yes
CYPRINIDAE	*Tropidophoxinellus spartiaticus*	VU*	VU*	No
GOBIIDAE	*Padogobius nigricans*	VU*	VU*	Yes
SALMONIDAE	*Coregonus arenicolus*	VU*	VU*	Yes
SALMONIDAE	*Coregonus atterensis*	VU*	VU*	Yes
SALMONIDAE	*Coregonus candidus*	VU*	VU*	Yes
SALMONIDAE	*Coregonus clupeoides*	VU*	VU*	Yes
SALMONIDAE	*Coregonus confusus*	VU*	VU*	Yes
SALMONIDAE	*Coregonus danneri*	VU*	VU*	Yes
SALMONIDAE	*Coregonus lavaretus*	VU*	VU*	Yes
SALMONIDAE	*Coregonus lucinensis*	VU*	VU*	Yes
SALMONIDAE	*Coregonus maraena*	VU*	VU	Yes
SALMONIDAE	*Salmo fibreni*	VU*	VU*	Yes
SALMONIDAE	*Salmo nigripinnis*	VU*	VU*	No
SALMONIDAE	*Salmo pelagonicus*	VU*	VU*	Yes
SALMONIDAE	*Salmo stomachicus*	VU*	VU*	No
SALMONIDAE	*Salvelinus evasus*	VU*	VU*	No
SALMONIDAE	*Salvelinus fimbriatus*	VU*	VU*	No
SALMONIDAE	*Salvelinus gracillimus*	VU*	VU*	No
SALMONIDAE	*Salvelinus killinensis*	VU*	VU*	No
SALMONIDAE	*Salvelinus mallochi*	VU*	VU*	No
SALMONIDAE	*Salvelinus maxillaris*	VU*	VU*	No

Family	Species	Red List status Europe	Red List status EU 27	Included in BC and/or HD Annexes
SALMONIDAE	*Salvelinus perisii*	VU*	VU*	No
SALMONIDAE	*Salvelinus struanensis*	VU*	VU*	No
SALMONIDAE	*Salvelinus youngeri*	VU*	VU*	No
UMBRIDAE	*Umbra krameri*	VU*	VU	Yes
CLUPEIDAE	*Alosa sp. nov. 'Skadar'*	VU*	NA	No
COBITIDAE	*Cobitis dalmatina*	VU*	NA	Yes
COBITIDAE	*Cobitis narentana*	VU*	NA	Yes
CYPRINIDAE	*Alburnoides maculatus*	VU*	NA	Yes
CYPRINIDAE	*Alburnoides ohridanus*	VU*	NA	No
CYPRINIDAE	*Barbus tauricus*	VU*	NA	Yes
CYPRINIDAE	*Chondrostoma knerii*	VU*	NA	Yes
CYPRINIDAE	*Delminichthys adspersus*	VU*	NA	Yes
CYPRINIDAE	*Delminichthys ghetaldii*	VU*	NA	Yes
CYPRINIDAE	*Gobio krymensis*	VU*	NA	No
CYPRINIDAE	*Gobio ohridanus*	VU*	NA	No
CYPRINIDAE	*Luciobarbus capito*	VU	NA	No
CYPRINIDAE	*Phoxinellus pseudalepidotus*	VU*	NA	No
CYPRINIDAE	*Squalius svallize*	VU*	NA	Yes
CYPRINIDAE	*Telestes metohiensis*	VU*	NA	Yes
GOBIIDAE	*Knipowitschia croatica*	VU*	NA	No
GOBIIDAE	*Knipowitschia radovici*	VU*	NA	No
SALMONIDAE	*Salmo ohridanus*	VU*	NA	No
SALMONIDAE	*Salvelinus sp. nov. 'Fjellfrøsvatn'*	VU*	NA	No
COBITIDAE	*Cobitis pontica*	NT	EN	Yes
PERCIDAE	*Percarina demidoffii*	NT*	EN	No

Appendix 2. Bern Convention and Habitats Directive fish species

Fish species included on either Appendices II or III of the Bern Convention, or Annex II, IV or V of the Habitats Directive. Taxonomy is constantly being updated, and the species are listed by the scientific name as it is currently accepted, with the name it was listed under at the time added in parentheses. Please see the IUCN Red List website for up-to-date information. Since many of the species have been listed, they have been split into multiple species. These are listed in the final column, and both the Bern Convention and Habitats Directive apply to and protect species which were not on the original list, but are splits from those species that were. IUCN Red List Status: EX – Extinct, EW – Extinct in the Wild, CR – Critically Endangered, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern, DD – Data Deficient, NA – Not Applicable, NE – Not Evaluated.

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
ACIPENSERIDAE					
Acipenser gueldenstaedtii	CR	CR		V	
Acipenser naccarii	CR	CR	II	II, IV	
Acipenser nudiventris	CR	CR		V	
Acipenser oxyrinchus	NE	NE		V	
Acipenser persicus	CR	NA		V	
Acipenser ruthenus	VU	VU	III	V	
Acipenser stellatus	CR	CR	III	V	
Acipenser sturio	CR	CR	II	II, IV	
Huso huso	CR	CR	II, III	V	
BLENNIIDAE					
Salaria fluviatilis (as *Blennius fluviatilis*)	LC	LC	III		*Salaria economidisi* (CR)
CLUPEIDAE					
Alosa agone	LC	LC		II, V	
Alosa algeriensis	DD	DD		II, V	
Alosa alosa	LC	LC	III	II, V	
Alosa caspia	LC	NA		II, V	
Alosa fallax	LC	LC	III	II, V	*Alosa agone* (LC), *Alosa algeriensis* (DD), *Alosa killarnensis* (CR)
Alosa immaculata (as *Alosa pontica*)	VU	EN	III	II, V	*Alosa kessleri* (NA), *Alosa volgensis* (NA)
Alosa kessleri	LC	NA		II, V	
Alosa killarnensis	CR	CR		II, V	
Alosa macedonica	VU	VU		II, V	
Alosa maeotica	LC	LC		II, V	
Alosa tanaica	LC	LC		II, V	
Alosa vistonica	CR	CR		II, V	
Alosa volgensis	EN	NA		II, V	
COBITIDAE					
Cobitis calderoni (as *Sabanejewia calderoni*)	EN	EN	III		
Cobitis elongata	LC	LC	III	II	
Cobitis paludica (as *Cobitis hassi*)	VU	VU	III		*Cobitis vettonica* (EN)

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
Cobitis taenia	LC	LC	III	II	*Cobitis arachthosensis* (EN), *Cobitis bilineata* (LC), *Cobitis dalmatina* (NA), *Cobitis elongatoides* (LC), *Cobitis hellenica* (EN), *Cobitis illyrica* (NA), *Cobitis jadovaensis* (NA), *Cobitis meridionalis* (VU), *Cobitis narentana* (NA), *Cobitis ohridana* (NA), *Cobitis pontica* (EN), *Cobitis stephanidisi* (CR), *Cobitis tanaitic*a (NA), *Cobitis taurica* (NA), *Cobitis vardarensis* (LC), *Cobitis zanandreai* (VU)
Cobitis trichonica	EN	EN	III	II	
Misgurnus fossilis	LC	LC	III	II	
Sabanejewia aurata	LC	LC	III	II	*Sabanejewia balcanica* (LC), *Sabanejewia baltica* (LC), *Sabanejewia bulgarica* (LC), *Sabanejewia kubanica* (NA), *Sabanejewia vallachica* (NT)
Sabanejewia larvata	LC	LC		II	
COREGONIDAE					
Coregonus albellus	LC	LC	III	V	
Coregonus albula	LC	LC	III	V	
Coregonus alpinus	LC	LC	III	V	
Coregonus arenicolus	VU	VU	III	V	
Coregonus atterensis	VU	VU	III	V	
Coregonus autumnalis	LC	NA	III	V	
Coregonus baerii	DD	DD	III	V	
Coregonus bavaricus	CR	CR	III	V	
Coregonus bezola	EX	EX	III	V	
Coregonus candidus	VU	VU	III	V	
Coregonus clupeoides	VU	VU	III	V	
Coregonus confusus	VU	VU	III	V	
Coregonus danneri	VU	VU	III	V	
Coregonus fatioi	LC	LC	III	V	
Coregonus fera	EX	EX	III	V	
Coregonus fontanae	LC	LC	III	V	
Coregonus gutturosus	EX	EX	III	V	
Coregonus heglingus	DD	DD	III	V	
Coregonus hiemalis	EX	EX	III	V	
Coregonus hoferi	CR	CR	III	V	
Coregonus ladogae	LC	LC	III	V	
Coregonus lavaretus	VU	VU	III	V	
Coregonus lucinensis	VU	VU	III	V	
Coregonus lutokka	LC	LC	III	V	
Coregonus macrophthalmus	LC	LC	III	V	
Coregonus maraena (as *Coregonus oxyrhynchus*)	VU	VU	III	II, IV, V	
Coregonus maxillaris	LC	LC	III	V	
Coregonus megalops	LC	LC	III	V	
Coregonus muksun	NA	NA	III	V	
Coregonus nasus	NA	NA	III	V	
Coregonus nilssoni	LC	LC	III	V	
Coregonus nobilis	LC	LC	III	V	
Coregonus oxyrinchus	EX	EX	III	V	
Coregonus palaea	LC	LC	III	V	
Coregonus pallasii	LC	LC	III	V	
Coregonus peled	LC	NA	III	V	
Coregonus pennantii	CR	CR	III	V	
Coregonus pidschian	LC	NA	III	V	
Coregonus pollan	EN	EN	III	V	
Coregonus renke	DD	DD	III	V	

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
Coregonus restrictus	EX	EX	III	V	
Coregonus sardinella	NA	NA	III	V	
Coregonus stigmaticus	EN	EN	III	V	
Coregonus suidteri	LC	LC	III	V	
Coregonus trybomi	CR	CR	III	V	
Coregonus vandesius	EN	EN	III	V	
Coregonus vessicus	LC	NA	III	V	
Coregonus wartmanni	LC	LC	III	V	
Coregonus widegreni	DD	DD	III	V	
Coregonus zuerichensis	LC	LC	III	V	
Coregonus zugensis	LC	LC	III	V	
COTTIDAE					
Cottus gobio	LC	LC		II	*Cottus aturi* (LC), *Cottus duranii* (DD), *Cottus haemusi* (DD), *Cottus hispaniolensis* (LC), *Cottus koshewnikowi* (LC), *Cottus metae* (LC), *Cottus microstomus* (LC), *Cottus perifretum* (LC), *Cottus rhenanus* (LC), *Cottus rondeleti* (CR), *Cottus scaturigo* (VU), *Cottus transsilvaniae* (DD)
Cottus petiti	VU	VU		II	
Cottus poecilopus	LC	LC	III		
Triglopsis quadricornis	LC	LC	III		
CYPRINIDAE					
Achondrostoma arcasii (as Rutilus arcasii)	VU	VU	III	II	*Achondrostoma salmantinum* (EN)
Achondrostoma oligolepis (as *Rutilus macrolepidotus*)	LC	LC	III	II	*Achondrostoma occidentale* (EN)
Alburnoides bipunctatus	LC	LC	III		*Alburnoides devolli* (NE), *Alburnoides fangfangae* (NE), *Alburnoides ohridanus* (NA), *Alburnoides prespensis* (VU), *Alburnoides eichwaldii* (NA), *Alburnoides fasciatus* (NE), *Alburnoides gmelini* (NA), *Alburnoides kubanicus* (NA), *Alburnoides maculatus* (NA), *Alburnoides rossicus* (NA), *Alburnoides thessalicus* (NE)
Alburnus albidus	VU	VU	III	II	
Alburnus chalcoides (as *Chalcalburnus chalcoides*)	LC	NA	III	II	*Alburnus danubicus* (NE), *Alburnus istanbulensis* (NA), *Alburnus leobergi* (NA), *Alburnus mandrensis* (CR), *Alburnus mento* (LC), *Alburnus mentoides* (NA), *Alburnus sarmaticus* (CR), *Alburnus schischkovi* (EN), *Alburnus vistonicus* (CR), *Alburnus volviticus* (EN)
Anaecypris hispanica (as *Phoxinellus hispanicus*)	EN	EN	III	II, IV	
Ballerus ballerus (at *Abramis ballerus*)	LC	LC	III		
Ballerus sapa (as *Abramis sapa*)	LC	LC	III		
Barbus balcanicus	LC	LC		V	
Barbus barbus	LC	LC		V	
Barbus bergi	LC	LC		V	
Barbus caninus	EN	EN		V	
Barbus carpathicus	LC	LC		V	
Barbus ciscaucasicus	LC	NA		V	
Barbus cyclolepis	LC	LC		V	
Barbus euboicus	CR	CR		V	
Barbus haasi	VU	VU		V	
Barbus kubanicus	LC	NA		V	
Barbus macedonicus	DD	DD		V	
Barbus meridionalis	NT	NT	III	II, V	

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
Barbus peloponnesius (as *Barbus peloponesis*)	LC	LC	III	V	
Barbus pergamonensis	EN	EN		V	
Barbus petenyi	LC	LC		V	
Barbus plebejus	LC	LC	III	II, V	
Barbus prespensis	VU	VU		V	
Barbus rebeli	LC	NA		V	
Barbus sperchiensis	NT	NT		V	
Barbus strumicae	LC	LC		V	
Barbus tauricus	VU	NA		V	
Barbus tyberinus	NT	NT		V	
Barbus waleckii	LC	LC		V	
Chondrostoma kneri	VU	NA	III		
Chondrostoma nasus	LC	LC	III		
Chondrostoma phoxinus	EN	NA	III		
Chondrostoma soetta	EN	EN	III	II	
Delminichthys adspersus (as *Phoxinellus adspersus*)	VU	NA	III	II	*Delminichthys jadovensis* (NA), *Delminichthys krbavensis* (NA)
Delminichthys ghetaldii	VU	NA		II	
Delminichthys jadovensis	CR	NA		II	
Delminichthys krbavensis	CR	NA		II	
Iberochondrostoma lemmingii (as *Chondrostoma lemmingii*)	VU	VU	III	II	*Iberochondrostoma almacai* (CR), *Iberochondrostoma oretanum* (CR)
Iberochondrostoma lusitanicum (as *Chondrostoma lusitanicum*)	CR	CR	III	II	
Iberocypris alburnoides (as *Rutilus alburnoides*)	VU	VU	III	II	
Iberocypris palaciosi	CR	CR		II	
Ladigesocypris ghigii	VU	VU		II	
Leucaspius delineatus	LC	LC	III		
Aspius aspius	LC	LC	III	II, V	
Luciobarbus albanicus	LC	LC		V	
Luciobarbus bocagei (as *Barbus bocagei*)	LC	LC	III	V	
Luciobarbus comizo (as *Barbus comizao*)	VU	VU	III	II, V	
Luciobarbus graecus	EN	EN		V	
Luciobarbus graellsii	LC	LC		V	
Luciobarbus guiraonis	VU	VU		V	
Luciobarbus microcephalus (as *Barbus microcephalus*)	VU	VU	III	V	
Luciobarbus sclateri (as *Barbus sclateri*)	LC	LC	III	V	
Luciobarbus steindachneri (as *Barbus steindachneri*)	VU	VU	III	V	
Pachychilon macedonicus (as *Rutilus macedonicus*)	DD	DD	III		
Pachychilon pictum	LC	LC	III		
Parachondrostoma toxostoma (as *Chondrostoma toxostoma*)	VU	VU	III	II	*Parachondrostoma arrigonis* (CR), *Parachondrostoma miegii* (LC), *Parachondrostoma turiense* (EN)
Pelasgus epiroticus	CR	CR		II	
Pelasgus laconicus	CR	CR		II	
Pelasgus marathonicus (as *Pseudophoxinus marathonicus*)	NT	NT	III	II	*Pelasgus epiroticus* (CR), *Pelasgus laconicus* (CR)

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
Pelasgus minutus	DD	NA		II	
Pelasgus prespensis	EN	EN		II	
Pelasgus stymphalicus (as *Pseudophoxinus stymphalicus*)	LC	LC	III	II	
Pelasgus thesproticus	NT	NT		II	
Pelecus cultratus	LC	LC	III	II, V	
Protochondrostoma genei (as *Chondrostoma genei*)	LC	LC	III	II	
Pseudochondrostoma polylepis (as *Chondrostoma polylepis*)	LC	LC	III	II	
Pseudochondrostoma willkommi (as *Chondrostoma willkommi*)	VU	VU	III		
Rhodeus amarus (as *Rhodeus sericeus*)	LC	LC	III	II	*Rhodeus meridionalis* (LC)
Rhynchocypris percnurus (as *Phoxinus percnurus*)	NA	NA		II, IV	
Romanogobio albipinnatus (as *Gobio albipinnatus*)	LC	NA	III	II	*Romanogobio belingi* (LC), *Romanogobio tanaiticus* (NA), *Romanogobio vladykovi* (LC)
Romanogobio kessleri (as *Gobio kessleri*)	LC	LC	III	II	*Romanogobio antipai* (EX)
Romanogobio uranoscopus (as *Gobio uranoscopus*)	LC	LC	III	II	*Romanogobio elimeius* (LC)
Rutilus frisii	LC	NA	III	II, V	*Rutilus meidingeri* (EN)
Rutilus pigus	LC	LC	III	II, V	*Rutilus virgo* (LC)
Rutilus rubilio	NT	NT	III	II	*Rutilus aula* (LC), *Rutilus albus* (NE), *Rutilus basak* (NA), *Rutilus karamani* (NA), *Rutilus ohridanus* (NA), *Rutilus panosi* (VU), *Rutilus prespensis* (VU), *Rutilus ylikiensis* (EN)
Scardinius graecus (as *Rutilus graecus*)	CR	CR	III	II	
Scardinius racovitzai (as *Rutilus racovitzai*)	CR	CR	III		
Squalius illyricus (as *Leuciscus illyricus*)	NT	NA	III		
Squalius lucumonis (as *Leuciscus lucumonis*)	EN	EN	III	II	
Squalius microlepis (as *Leuciscus microlepis*)	EN	NA	III		*Squalius tenellus* (NA)
Squalius pyrenaicus (as *Leuciscus pyrenaicus*)	NT	NT	III		*Squalius aradensis* (VU), *Squalius carolitertii* (LC), *Squalius castellanus* (EN), *Squalius malacitanus* (EN), *Squalius torgalensis* (EN), *Squalius valentinus* (VU)
Squalius svallize (as *Leuciscus svallize*)	VU	NA	III		*Squalius zrmanjae* (NA)
Telestes croaticus	EN	NA		II	
Telestes fontinalis	CR	NA		II	
Telestes metohiensis	VU	NA		II	
Telestes polylepis (as *Leuciscus polylepis*)	CR	NA	III		*Telestes sp. nov.* (NA)
Telestes souffia (as *Leuciscus souffia*)	LC	LC	III	II	*Telestes montenigrinus* (NA), *Telestes muticellus* (LC)
Telestes turskyi (as *Leuciscus turskyi*)	CR	NA	III		

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
Vimba vimba (as *Abramis vimba*)	LC	LC	III		
CYPRINODONTIDAE					
Aphanius fasciatus	LC	LC	II, III	II	*Aphanius almiriensis* (CR)
Aphanius iberus	EN	EN	II, III	II	*Aphanius baeticus* (EN)
Valencia hispanica	CR	CR	II	II	
Valencia letourneuxi	CR	CR	II	II	
GASTEROSTEIDAE					
Pungitius hellenicus	CR	CR	III		
Puntitius platygaster	LC	LC	III		
GOBIIDAE					
Knipowitschia panizzae (as *Padogobius panizzae*)	LC	LC	II, III	II	*Knipowitschia goerneri* (DD), *Knipowitschia milleri* CR), *Knipowitschia radovici* (NA), *Knipowitschia mrakovcici* (NA), *Knipowitschia montenegrina* (NA)
Knipowitschia thessala (as *Gobius thressalus*)	EN	EN	III		
Neogobius fluviatilis (as *Gobius fluviatilis*)	LC	LC	III		*Neogobius pallasi* (NA)
Padogobius bonelli (as *Padogobius martensi*)	LC	LC	III		
Padogobius nigricans (as *Gobius nigricans*)	VU	VU	III	II	
Pomatoschistus canestrinii (as *Pomatoschistus canestrini*)	LC	LC	II, III	II	*Pomatoschistus montenegrensis* (NA)
Pomatoschistus microps	LC	LC	III		
Ponticola kessleri (as *Gobius kessleri*)	LC	LC	III		*Ponticola gorlap* (NA)
Proterorhinus marmoratus	LC	LC	III		*Proterorhinus nasalis* (NA), *Proterorhinus semilunaris* (LC), *Proterorhinus tataricus* (NA)
PERCIDAE					
Gymnocephalus baloni	LC	LC	III	II, IV	*Gymnocephalus ambriaelacus* (CR)
Gymnocephalus schraetzer	LC	LC	III	IV, V	
Romanichthys valsanicola	CR	CR		II, IV	
Sander volgense (as *Stizostedion volgense*)	LC	LC	III		
Zingel asper	CR	CR	II	II, IV	
Zingel balcanicus	DD	DD		II	
Zingel streber	LC	LC	III	II	
Zingel zingel	LC	LC	III	II, V	
PETROMYZONTIDAE					
Eudontomyzon danfordi	LC	LC		II	
Eudontomyzon hellenicus	CR	CR	III	II	
Eudontomyzon mariae	LC	LC	III	II	
Eudontomyzon stankokaramani	LC	NA		II	
Eudontomyzon vladykovi	LC	LC	III	II	
Lampetra fluviatilis	LC	LC	III	II, V	
Lampetra planeri	LC	LC	III	II	
Lampetra zanandreai (as *Lethenteron zanandreai*)	LC	LC	II, III	II, V	
Petromyzon marinus	LC	LC	III	II	

Protected species	European RL	EU 27 RL	Bern Convention Annexes	Habitats Directive Annexes	Newly described species (with EU 27 Red List Category) that receive the same level of protection as their parent species listed in the left hand column.
SALMONIDAE					
Hucho hucho	EN	EN	III	II, V	
Salmo macrostigma	NE	NE		II	*Salmo aphelios* (NA), *Salmo balcanicus* (NA), *Salmo carpio* (CR), *Salmo cenerinus* (NE), *Salmo cettii* (NT), *Salmo dentex* (DD), *Salmo farioides* (NE), *Salmo fibreni* (VU), *Salmo letnica* (NA), *Salmo lumi* (NA), *Salmo macedonicus* (DD), *Salmo montenigrinus* (NE), *Salmo pelagonicus* (VU), *Salmo peristericus* (EN), *Salmo rhodanensis* (DD), *Salmo taleri* (NA)
Salmo marmoratus	LC	LC		II	
Salmo salar	NE	NE	III	II, V	
SILURIDAE					
Siluris aristotelis	DD	DD	III	II, V	
Siluris glanis	LC	LC	III		
SYNGNATHIDAE					
Syngnathus abaster	*LC*	*LC*	*III*		
THYMALLIDAE					
Thymallus thymallus	LC	LC	III	V	
UMBRIDAE					
Umbra krameri	VU	VU	II	II	

Appendix 3. Red List status of European freshwater fishes

Order	Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser gueldenstaedtii*	CR	A2bcde	CR	A2bcde		
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser naccarii*	CR	A2bcde;B2ab (i,ii,iii,iv,v)	CR	A2bcde;B2ab (i,ii,iii,iv,v)	Yes	
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser nudiventris*	CR	A2cd	CR	A2cd		
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser oxyrinchus*	NE		NE			
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser persicus*	CR	A2cde	NA			
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser ruthenus*	VU	A2cde	VU	A2cde		
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser stellatus*	CR	A2cde	CR	A2cde		
ACIPENSERIFORMES	ACIPENSERIDAE	*Acipenser sturio*	CR	A2cde;B2ab (ii,iii,v)	CR	A2cde;B2ab (ii,iii,v)	Yes	Yes
ACIPENSERIFORMES	ACIPENSERIDAE	*Huso huso*	CR	A2bcd	CR	A2bcd		
ANGUILLIFORMES	ANGUILLIDAE	*Anguilla anguilla*	CR	A2bd+4bd	CR	A2bd+4bd		
ATHERINIFORMES	ATHERINIDAE	*Atherina boyeri*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Alosa agone*	LC		LC		Yes	Yes
CLUPEIFORMES	CLUPEIDAE	*Alosa algeriensis*	DD		DD			
CLUPEIFORMES	CLUPEIDAE	*Alosa alosa*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Alosa caspia*	LC		NA			
CLUPEIFORMES	CLUPEIDAE	*Alosa fallax*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Alosa immaculata*	VU	B2ab(v)	EN	B2ab(v)		
CLUPEIFORMES	CLUPEIDAE	*Alosa kessleri*	LC		NA		Yes	
CLUPEIFORMES	CLUPEIDAE	*Alosa killarnensis*	CR	B1ab(iii)	CR	B1ab(iii)	Yes	Yes
CLUPEIFORMES	CLUPEIDAE	*Alosa macedonica*	VU	D2	VU	D2	Yes	Yes
CLUPEIFORMES	CLUPEIDAE	*Alosa maeotica*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Alosa sp. nov. 'Skadar'*	VU	D2	NA		Yes	
CLUPEIFORMES	CLUPEIDAE	*Alosa tanaica*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Alosa vistonica*	CR	A2ace; B1ab(iii,v)	CR	A2ace; B1ab(iii,v)	Yes	Yes
CLUPEIFORMES	CLUPEIDAE	*Alosa volgensis*	EN	B2ab(iii,v)	NA		Yes	
CLUPEIFORMES	CLUPEIDAE	*Clupeonella abrau*	CR	B1ab(ii,iii,v) +2ab(ii,iii,v)	NA		Yes	
CLUPEIFORMES	CLUPEIDAE	*Clupeonella caspia*	LC		NA		Yes	
CLUPEIFORMES	CLUPEIDAE	*Clupeonella cultriventris*	LC		LC			
CLUPEIFORMES	CLUPEIDAE	*Clupeonella tscharchalensis*	LC		NA		Yes	
CYPRINIFORMES	BALITORIDAE	*Barbatula barbatula*	LC		LC		Yes	
CYPRINIFORMES	BALITORIDAE	*Barbatula quignardi*	LC		LC		Yes	Yes
CYPRINIFORMES	BALITORIDAE	*Barbatula sturanyi*	LC		NA		Yes	
CYPRINIFORMES	BALITORIDAE	*Barbatula zetensis*	LC		NA		Yes	
CYPRINIFORMES	BALITORIDAE	*Oxynoemacheilus bureschi*	LC		LC		Yes	Yes
CYPRINIFORMES	BALITORIDAE	*Oxynoemacheilus merga*	LC		NA		Yes	
CYPRINIFORMES	BALITORIDAE	*Oxynoemacheilus pindus*	VU	B1ab(iii) +2ab(iii)	VU	B1ab(iii) +2ab(iii)	Yes	Yes
CYPRINIFORMES	BALITORIDAE	*Oxynoemacheilus theophilii*	CR	B1b(iii)	CR	B1b(iii)		
CYPRINIFORMES	COBITIDAE	*Cobitis arachthosensis*	EN	B1ab(iii)	EN	B1ab(iii)	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis bilineata*	LC		LC		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis calderoni*	EN	A2ace+3ce	EN	A2ace+3ce	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis dalmatina*	VU	D2	NA		Yes	

Order	Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
CYPRINIFORMES	COBITIDAE	*Cobitis elongata*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis elongatoides*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis hellenica*	EN	B1ab(iii,v) +2ab(iii,v)	EN	B1ab(iii,v) +2ab(iii,v)	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis illyrica*	CR	B1ab(ii,iii)	NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis jadovensis*	CR	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis melanoleuca*	LC		NA			
CYPRINIFORMES	COBITIDAE	*Cobitis meridionalis*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis narentana*	VU	D2	NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis ohridana*	LC		NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis paludica*	VU	A2ce+3ce	VU	A2ce+3ce	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis pontica*	NT		EN	B1ab(iii) +2ab(iii)		
CYPRINIFORMES	COBITIDAE	*Cobitis puncticulata*	CR	B1ab(iii)	CR	B1ab(iii)		
CYPRINIFORMES	COBITIDAE	*Cobitis punctilineata*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis stephanidisi*	CR	B1ab(i,ii,iii,v) +2ab(i,ii,iii,v)	CR	B1ab(i,ii,iii,v) +2ab(i,ii,iii,v)	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis strumicae*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis taenia*	LC		LC		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis tanaitica*	LC		NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis taurica*	CR	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	COBITIDAE	*Cobitis trichonica*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis vardarensis*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis vettonica*	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Cobitis zanandreai*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	COBITIDAE	*Misgurnus fossilis*	LC		LC		Yes	
CYPRINIFORMES	COBITIDAE	*Sabanejewia balcanica*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Sabanejewia baltica*	LC		LC		Yes	
CYPRINIFORMES	COBITIDAE	*Sabanejewia bulgarica*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Sabanejewia caucasica*	LC		NA			
CYPRINIFORMES	COBITIDAE	*Sabanejewia kubanica*	LC		NA		Yes	
CYPRINIFORMES	COBITIDAE	*Sabanejewia larvata*	LC		LC		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Sabanejewia romanica*	NT		NT		Yes	Yes
CYPRINIFORMES	COBITIDAE	*Sabanejewia vallachica*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Abramis brama*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Achondrostoma arcasii*	VU	A3ce	VU	A3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Achondrostoma occidentale*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Achondrostoma oligolepis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Achondrostoma salmantinum*	EN	B1ab(ii,v) +2ab(ii,v)	EN	B1ab(ii,v) +2ab(ii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnoides bipunctatus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Alburnoides eichwaldii*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Alburnoides gmelini*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnoides kubanicus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnoides maculatus*	VU	B1ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnoides ohridanus*	VU	D2	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnoides prespensis*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnoides rossicus*	LC		NA		Yes	

Order	Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
CYPRINIFORMES	CYPRINIDAE	*Alburnus albidus*	VU	B2ab(i,ii,iii,iv,v)	VU	B2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus alburnus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Alburnus arborella*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus belvica*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus chalcoides*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Alburnus hohenackeri*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Alburnus istanbulensis*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Alburnus leobergi*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnus macedonicus*	CR	A3c; B1ab(i,ii,iii) +2ab(i,ii,iii)	CR	A3c; B1ab(i,ii,iii) +2ab(i,ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus mandrensis*	CR	B1ab(ii,iii)	CR	B1ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus mento*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus mentoides*	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnus neretvae*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnus sarmaticus*	EN	B2ab(v)	CR	B2ab(v)	Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnus schischkovi*	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus scoranza*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Alburnus sp. nov. 'Volvi'*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus thessalicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus vistonicus*	CR	B2ab(ii,iii)	CR	B2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Alburnus volviticus*	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Anaecypris hispanica*	EN	A2ace	EN	A2ace	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Aspius aspius*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Aulopyge huegelii*	EN	B1ab(iii,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Ballerus ballerus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Ballerus sapa*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Barbus balcanicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus barbus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus bergi*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus caninus*	EN	A2ace	EN	A2ace	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus carpathicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus ciscaucasicus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus cyclolepis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus euboicus*	CR	B1ab(i,ii)c(ii) +2ab(i,ii)c(ii)	CR	B1ab(i,ii)c(ii) +2ab(i,ii)c(ii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus haasi*	VU	A2ce+3ce	VU	A2ce+3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus kubanicus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus macedonicus*	DD		DD		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus meridionalis*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus peloponnesius*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus pergamonensis*	EN	B1ab(iii)	EN	B1ab(iii)		
CYPRINIFORMES	CYPRINIDAE	*Barbus petenyi*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus plebejus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus prespensis*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus rebeli*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus sperchiensis*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus strumicae*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus tauricus*	VU	B1ab(i,ii,iii,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Barbus tyberinus*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Barbus waleckii*	LC		LC		Yes	Yes

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CYPRINIFORMES	CYPRINIDAE	*Blicca bjoerkna*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Carassius carassius*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma knerii*	VU	D2	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma kubanicum*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma nasus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma oxyrhynchum*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma phoxinus*	EN	B1ab(i,ii,iii,iv,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma prespense*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma scodrense*	EX		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma soetta*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma vardarense*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Chondrostoma variabile*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Cyprinus carpio*	VU	A2ce	VU	A2ce		
CYPRINIFORMES	CYPRINIDAE	*Delminichthys adspersus*	VU	B2ab(iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Delminichthys ghetaldii*	VU	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Delminichthys jadovensis*	CR	B1ab(iii,iv)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Delminichthys krbavensis*	CR	B1ab(ii,iii,iv) +2ab(ii,iii,iv)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio alverniae*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio brevicirris*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio bulgaricus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio carpathicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio delyamurei*	CR	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio feraeensis*	VU	B1ab(i,ii,iii,iv,v)	VU	B1ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio gobio*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio holurus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio kovatschevi*	VU	B1ab(iii,v)	VU	B1ab(iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio krymensis*	VU	B1ab(ii,iii,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio kubanicus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio lozanoi*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio obtusirostris*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio occitaniae*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Gobio ohridanus*	VU	D2	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio sarmaticus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio skadarensis*	EN	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Gobio volgensis*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Iberochondrostoma almacai*	CR	B2ab(i,ii,iii)	CR	B2ab(i,ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Iberochondrostoma lemmingii*	VU	A2ace+3ce	VU	A2ace+3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Iberochondrostoma lusitanicus*	CR	A2ce	CR	A2ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Iberochondrostoma oretanum*	CR	A2ace; B2ab(ii,iii)	CR	A2ace; B2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Iberocypris alburnoides*	VU	A3ce	VU	A3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Iberocypris palaciosi*	CR	B1ab(ii,iii) +2ab(ii,iii)	CR	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Ladigesocypris ghigii*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Leucaspius delineatus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Leuciscus bearnensis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Leuciscus burdigalensis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Leuciscus danilewskii*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Leuciscus idus*	LC		LC			

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CYPRINIFORMES	CYPRINIDAE	*Leuciscus leuciscus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Leuciscus oxyrrhis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus albanicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus bocagei*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus brachycephalus*	CR	A2d	NA			
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus capito*	VU	A2cd	NA			
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus comizo*	VU	A2ce	VU	A2ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus graecus*	EN	B1ab(i,ii,iii,iv) +2ab(i,ii,iii,iv)	EN	B1ab(i,ii,iii,iv) +2ab(i,ii,iii,iv)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus graellsii*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus guiraonis*	VU	A3ce	VU	A3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus microcephalus*	VU	A2ce+3ce	VU	A2ce+3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus sclateri*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Luciobarbus steindachneri*	VU	A2ce	VU	A2ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pachychilon macedonicum*	DD		DD		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pachychilon pictum*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Parachondrostoma arrigonis*	CR	A2ace;B2ab (i,ii,iii,iv,v)	CR	A2ace;B2ab (i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Parachondrostoma miegii*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Parachondrostoma toxostoma*	VU	A2ce	VU	A2ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Parachondrostoma turiense*	EN	B2ab(i,iii,v)	EN	B2ab(i,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus epiroticus*	CR	A2be; B1ab(v)	CR	A2be; B1ab(v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus laconicus*	CR	B2ab(ii,iii,iv,v)	CR	B2ab(ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus marathonicus*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus minutus*	DD		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Pelasgus prespensis*	EN	B1ab(iii,iv,v) +2ab(iii,iv,v)	EN	B1ab(iii,iv,v) +2ab(iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus stymphalicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelasgus thesproticus*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pelecus cultratus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Petroleuciscus borysthenicus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Petroleuciscus smyrnaeus*	EN	B1ab(iii)	EN	B1ab(iii)		
CYPRINIFORMES	CYPRINIDAE	*Phoxinellus alepidotus*	EN	B2ab(ii,iii,iv)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Phoxinellus dalmaticus*	CR	B1ab(ii)+2ab(ii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Phoxinellus pseudalepidotus*	VU	D2	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Phoxinus bigerri*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Phoxinus colchicus*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Phoxinus lumaireul*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Phoxinus phoxinus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Phoxinus septimaniae*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Phoxinus strandjae*	EN	B1ab(ii,iii)	EN	B1ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Phoxinus strymonicus*	EN	B1ab(iii)	EN	B1ab(iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Protochondrostoma genei*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pseudochondrostoma duriense*	VU	A3ce	VU	A3ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pseudochondrostoma polylepis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Pseudochondrostoma willkommii*	VU	A3ce+4ce	VU	A3ce+4ce	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rhodeus amarus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Rhodeus meridionalis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rhynchocypris czekanowskii*	NA		NA			
CYPRINIFORMES	CYPRINIDAE	*Rhynchocypris percnurus*	NA		NA			
CYPRINIFORMES	CYPRINIDAE	*Romanogobio albipinnatus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio antipai*	EX		EX		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Romanogobio belingi*	LC		LC		Yes	

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CYPRINIFORMES	CYPRINIDAE	*Romanogobio benacensis*	EN	B2ab(i,ii,iii,iv,v)	EN	B2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Romanogobio ciscaucasicus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio elimeius*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Romanogobio kesslerii*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio parvus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio pentatrichus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio tanaiticus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Romanogobio uranoscopus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Romanogobio vladykovi*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus aula*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Rutilus basak*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Rutilus caspicus*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Rutilus frisii*	LC		NA			
CYPRINIFORMES	CYPRINIDAE	*Rutilus heckelii*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Rutilus karamani*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Rutilus meidingeri*	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus ohridanus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Rutilus panosi*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus pigus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus prespensis*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus rubilio*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus rutilus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Rutilus virgo*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Rutilus ylikiensis*	EN	B1ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Scardinius acarnanicus*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Scardinius dergle*	NT		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Scardinius erythrophthalmus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Scardinius graecus*	CR	B1ab(i,ii,iii,v) +2ab(i,ii,iii,v)	CR	B1ab(i,ii,iii,v) +2ab(i,ii,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Scardinius hesperidicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Scardinius knezevici*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Scardinius plotizza*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Scardinius racovitzai*	CR	B1ab(ii,iii) +2ab(ii,iii)	CR	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Scardinius scardafa*	CR	A3e	CR	A3e	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius albus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius aphipsi*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius aradensis*	VU	B2ab(iii,v)	VU	B2ab(iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius carolitertii*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius castellanus*	EN	B1ab(iii,v)	EN	B1ab(iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius cephalus*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Squalius cii*	EN	B1ab(iii)	EN	B1ab(iii)		
CYPRINIFORMES	CYPRINIDAE	*Squalius illyricus*	NT		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius janae*	VU	D2	VU	D2	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius keadicus*	EN	A2ce; B1ab (i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	EN	A2ce; B1ab (i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius laietanus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius lucumonis*	EN	B2ab(i,ii,iii,iv)	EN	B2ab(i,ii,iii,iv)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius malacitanus*	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius microlepis*	EN	B2ab(ii,iii)	NA		Yes	

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CYPRINIFORMES	CYPRINIDAE	*Squalius moreoticus*	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	EN	B1ab(ii,iii,v) +2ab(ii,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius orpheus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius pamvoticus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius peloponnensis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius platyceps*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius prespensis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius pyrenaicus*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius sp. nov. 'Aoos'*	NT		NT		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius sp. nov. 'Evia'*	CR	B1ab(ii,iii) +2ab(ii,iii)	CR	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius squalus*	LC		LC		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius svallize*	VU	D2	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius tenellus*	EN	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Squalius torgalensis*	EN	B1ab(ii,iii) +2ab(ii,iii)	EN	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius valentinus*	VU	B1ab(ii,iii,v)	VU	B1ab(ii,iii,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius vardarensis*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Squalius zrmanjae*	NT		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes beoticus*	EN	B1ab(i,ii,iii,iv,v)	EN	B1ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Telestes croaticus*	EN	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes fontinalis*	CR	B1ab(i,ii,iv) +2ab(i,ii,iv)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes metohiensis*	VU	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes montenigrinus*	LC		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes muticellus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Telestes pleurobipunctatus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Telestes polylepis*	CR	B1ab(ii,iii,v) +2ab(ii,iii,v)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes souffia*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Telestes sp. nov.*	EN	B2ab(i,ii,iii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes turskyi*	CR	B1ab(ii)+2ab(ii)	NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Telestes ukliva*	EX		NA		Yes	
CYPRINIFORMES	CYPRINIDAE	*Tinca tinca*	LC		LC			
CYPRINIFORMES	CYPRINIDAE	*Tropidophoxinellus hellenicus*	LC		LC		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Tropidophoxinellus spartiaticus*	VU	B1ab(ii,iii,iv,v) +2ab(ii,iii,iv,v)	VU	B1ab(ii,iii,iv,v) +2ab(ii,iii,iv,v)	Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Vimba melanops*	DD		DD		Yes	Yes
CYPRINIFORMES	CYPRINIDAE	*Vimba vimba*	LC		LC			
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Aphanius almiriensis*	CR	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	Yes	Yes
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Aphanius baeticus*	EN	A2ce	EN	A2ce	Yes	Yes
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Aphanius fasciatus*	LC		LC			
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Aphanius iberus*	EN	A2ce	EN	A2ce	Yes	Yes
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Valencia hispanica*	CR	A2ace	CR	A2ace	Yes	Yes
CYPRINODONTIFORMES	CYPRINODONTIDAE	*Valencia letourneuxi*	CR	A3ce; B2ab(i,ii,iii,iv,v)	CR	A3ce; B2ab(i,ii,iii,iv,v)	Yes	Yes
ESOCIFORMES	ESOCIDAE	*Esox lucius*	LC		LC			
ESOCIFORMES	UMBRIDAE	*Umbra krameri*	VU	A2c	VU	A2c	Yes	
GADIFORMES	LOTIDAE	*Lota lota*	LC		LC			

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GASTEROSTEIFORMES	GASTEROSTEIDAE	*Gasterosteus aculeatus*	LC		LC			
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Gasterosteus crenobiontus*	EX		EX		Yes	Yes
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Gasterosteus gymnurus*	LC		LC			
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Gasterosteus islandicus*	LC		NA		Yes	
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Pungitius hellenicus*	CR	B2ab(i,ii,iii,iv,v)	CR	B2ab(i,ii,iii,iv,v)	Yes	Yes
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Pungitius laevis*	LC		LC		Yes	Yes
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Pungitius platygaster*	LC		LC			
GASTEROSTEIFORMES	GASTEROSTEIDAE	*Pungitius pungitius*	LC		LC			
MUGILIFORMES	MUGILIDAE	*Chelon labrosus*	LC		LC			
MUGILIFORMES	MUGILIDAE	*Liza aurata*	LC		LC			
MUGILIFORMES	MUGILIDAE	*Liza ramada*	LC		LC			
MUGILIFORMES	MUGILIDAE	*Liza saliens*	LC		LC			
MUGILIFORMES	MUGILIDAE	*Mugil cephalus*	LC		LC			
OSMERIFORMES	OSMERIDAE	*Hypomesus olidus*	NA		NA			
OSMERIFORMES	OSMERIDAE	*Osmerus dentex*	LC		NA			
OSMERIFORMES	OSMERIDAE	*Osmerus eperlanus*	LC		LC		Yes	Yes
PERCIFORMES	BLENNIIDAE	*Salaria economidisi*	CR	B1ab(i,ii,iii)	CR	B1ab(i,ii,iii)	Yes	Yes
PERCIFORMES	BLENNIIDAE	*Salaria fluviatilis*	LC		LC			
PERCIFORMES	GOBIIDAE	*Babka gymnotrachelus*	LC		LC			
PERCIFORMES	GOBIIDAE	*Benthophiloides brauneri*	DD		DD			
PERCIFORMES	GOBIIDAE	*Benthophilus durrelli*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus granulosus*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus leobergius*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus macrocephalus*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus magistri*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus mahmudbejovi*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus nudus*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Benthophilus stellatus*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Caspiosoma caspium*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Economidichthys pygmaeus*	LC		LC		Yes	Yes
PERCIFORMES	GOBIIDAE	*Economidichthys trichonis*	EN	B1ab(ii,iii) +2ab(ii,iii)	EN	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
PERCIFORMES	GOBIIDAE	*Knipowitschia bergi*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia cameliae*	CR	A2b; B1ab(v)+2ab(v)	CR	A2b; B1ab(v)+2ab(v)	Yes	Yes
PERCIFORMES	GOBIIDAE	*Knipowitschia caucasica*	LC		LC			
PERCIFORMES	GOBIIDAE	*Knipowitschia croatica*	VU	B2ab(iii); D2	NA		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia goerneri*	DD		DD		Yes	Yes
PERCIFORMES	GOBIIDAE	*Knipowitschia longecaudata*	LC		NA			
PERCIFORMES	GOBIIDAE	*Knipowitschia milleri*	CR	B1ab(i,ii,iii) +2ab(i,ii,iii)	CR	B1ab(i,ii,iii) +2ab(i,ii,iii)	Yes	Yes
PERCIFORMES	GOBIIDAE	*Knipowitschia montenegrina*	DD		NA		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia mrakovcici*	CR	B1ab(v)	NA		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia panizzae*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia punctatissima*	NT		NT		Yes	Yes
PERCIFORMES	GOBIIDAE	*Knipowitschia radovici*	VU	D2	NA		Yes	
PERCIFORMES	GOBIIDAE	*Knipowitschia thessala*	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)	Yes	Yes
PERCIFORMES	GOBIIDAE	*Mesogobius batrachocephalus*	LC		LC			
PERCIFORMES	GOBIIDAE	*Neogobius fluviatilis*	LC		LC			
PERCIFORMES	GOBIIDAE	*Neogobius melanostomus*	LC		LC			
PERCIFORMES	GOBIIDAE	*Neogobius pallasi*	LC		NA			
PERCIFORMES	GOBIIDAE	*Padogobius bonelli*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Padogobius nigricans*	VU	B2ab(ii,iii,iv,v)	VU	B2ab(ii,iii,iv,v)	Yes	Yes

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PERCIFORMES	GOBIIDAE	*Pomatoschistus canestrinii*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Pomatoschistus microps*	LC		LC			
PERCIFORMES	GOBIIDAE	*Pomatoschistus montenegrensis*	LC		NA		Yes	
PERCIFORMES	GOBIIDAE	*Ponticola constructor*	LC		NA			
PERCIFORMES	GOBIIDAE	*Ponticola eurycephalus*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Ponticola gorlap*	LC		NA			
PERCIFORMES	GOBIIDAE	*Ponticola kessleri*	LC		LC		Yes	
PERCIFORMES	GOBIIDAE	*Ponticola syrman*	LC		NA			
PERCIFORMES	GOBIIDAE	*Proterorhinus nasalis*	LC		NA			
PERCIFORMES	GOBIIDAE	*Proterorhinus semilunaris*	LC		LC			
PERCIFORMES	GOBIIDAE	*Proterorhinus tataricus*	CR	B1ab(ii,iii) +2ab(ii,iii)	NA		Yes	
PERCIFORMES	MORONIDAE	*Dicentrarchus labrax*	LC		LC			
PERCIFORMES	PERCIDAE	*Gymnocephalus acerina*	LC		NA		Yes	
PERCIFORMES	PERCIDAE	*Gymnocephalus ambriaelacus*	CR	B1ab(v)	CR	B1ab(v)	Yes	Yes
PERCIFORMES	PERCIDAE	*Gymnocephalus baloni*	LC		LC		Yes	
PERCIFORMES	PERCIDAE	*Gymnocephalus cernua*	LC		LC			
PERCIFORMES	PERCIDAE	*Gymnocephalus schraetser*	LC		LC		Yes	Yes
PERCIFORMES	PERCIDAE	*Perca fluviatilis*	LC		LC			
PERCIFORMES	PERCIDAE	*Percarina demidoffii*	NT		EN	B1ab(iii)	Yes	
PERCIFORMES	PERCIDAE	*Percarina maeotica*	LC		NA		Yes	
PERCIFORMES	PERCIDAE	*Romanichthys valsanicola*	CR	B1ab(ii,iii) +2ab(ii,iii)	CR	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
PERCIFORMES	PERCIDAE	*Sander lucioperca*	LC		LC			
PERCIFORMES	PERCIDAE	*Sander volgensis*	LC		LC		Yes	
PERCIFORMES	PERCIDAE	*Zingel asper*	CR	B2ab(iii)	CR	B2ab(iii)	Yes	Yes
PERCIFORMES	PERCIDAE	*Zingel balcanicus*	DD		DD		Yes	Yes
PERCIFORMES	PERCIDAE	*Zingel streber*	LC		LC		Yes	
PERCIFORMES	PERCIDAE	*Zingel zingel*	LC		LC		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Caspiomyzon wagneri*	NT		NA			
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon danfordi*	LC		LC		Yes	Yes
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon hellenicus*	CR	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	CR	B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	Yes	Yes
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon mariae*	LC		LC		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon sp. nov. 'migratory'*	EX		NA		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon stankokaramani*	LC		NA		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Eudontomyzon vladykovi*	LC		LC		Yes	Yes
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Lampetra fluviatilis*	LC		LC		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Lampetra planeri*	LC		LC		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Lampetra zanandreai*	LC		LC		Yes	
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Lethenteron camtschaticum*	LC		NA			
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Lethenteron reissneri*	LC		NA			
PETROMYZONTIFORMES	PETROMYZONTIDAE	*Petromyzon marinus*	LC		LC			
PLEURONECTIFORMES	PLEURONECTIDAE	*Liopsetta glacialis*	LC		NA			
PLEURONECTIFORMES	PLEURONECTIDAE	*Platichthys flesus*	LC		LC			
PLEURONECTIFORMES	PLEURONECTIDAE	*Pleuronectes platessa*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus albellus*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus albula*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus alpinus*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus arenicolus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus atterensis*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus autumnalis*	LC		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus baerii*	DD		DD		Yes	Yes

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SALMONIFORMES	SALMONIDAE	*Coregonus bavaricus*	CR	B1ab(iii,v) +2ab(iii,v)	CR	B1ab(iii,v) +2ab(iii,v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus bezola*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus candidus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus clupeoides*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus confusus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus danneri*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus fatioi*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus fera*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus fontanae*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus gutturosus*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus heglingus*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus hiemalis*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus hoferi*	CR	B1ab(v)	CR	B1ab(v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus ladogae*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus lavaretus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus lucinensis*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus lutokka*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus macrophthalmus*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus maraena*	VU	A2cd	VU	A2cd	Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus maxillaris*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus megalops*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus muksun*	NA		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus nasus*	NA		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus nilssoni*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus nobilis*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus oxyrinchus*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus palaea*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus pallasii*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus peled*	LC		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus pennantii*	CR	B1ab(iii,v) +2ab(iii,v)	CR	B1ab(iii,v) +2ab(iii,v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus pidschian*	LC		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus pollan*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus renke*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus restrictus*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus sardinella*	NA		NA			
SALMONIFORMES	SALMONIDAE	*Coregonus stigmaticus*	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus suidteri*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus trybomi*	CR	B1ab(iii,iv) +2ab(iii,iv)	CR	B1ab(iii,iv) +2ab(iii,iv)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus vandesius*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus vessicus*	LC		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Coregonus wartmanni*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus widegreni*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus zuerichensis*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Coregonus zugensis*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Hucho hucho*	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo aphelios*	DD		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo balcanicus*	DD		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo carpio*	CR	A2bde	CR	A2bde	Yes	Yes

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SALMONIFORMES	SALMONIDAE	*Salmo cettii*	NT		NT		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo dentex*	DD		DD		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo ezenami*	CR	B1ab(iii,v) +2ab(iii,v)	NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo ferox*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo fibreni*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo labrax*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo letnica*	DD		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo lumi*	DD		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo macedonicus*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo marmoratus*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo nigripinnis*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo obtusirostris*	EN	B2ab(v)	NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo ohridanus*	VU	D2	NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo pelagonicus*	VU	B1ab(v)	VU	B1ab(v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo peristericus*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo rhodanensis*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo salar*	NE		NE			
SALMONIFORMES	SALMONIDAE	*Salmo schiefermuelleri*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo stomachicus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salmo taleri*	DD		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salmo trutta*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Salvelinus alpinus*	LC		NA			
SALMONIFORMES	SALMONIDAE	*Salvelinus colii*	NT		NT		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus evasus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus fimbriatus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus gracillimus*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus grayi*	CR	B1ab(iii,v)	CR	B1ab(iii,v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus inframundus*	DD		DD		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus killinensis*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus lepechini*	LC		LC		Yes	
SALMONIFORMES	SALMONIDAE	*Salvelinus lonsdalii*	CR	B1ab(v)+2ab(v)	CR	B1ab(v)+2ab(v)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus mallochi*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus maxillaris*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus murta*	LC		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salvelinus neocomensis*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus obtusus*	CR	B1ab(iii)	CR	B1ab(iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus perisii*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus profundus*	EX		EX		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus sp. nov. 'Fjellfrøsvatn'*	VU	D2	NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salvelinus struanensis*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus thingvallensis*	LC		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Salvelinus umbla*	LC		LC		Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus willoughbii*	EN	B1ab(iii) +2ab(iii)	EN	B1ab(iii) +2ab(iii)	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Salvelinus youngeri*	VU	D2	VU	D2	Yes	Yes
SALMONIFORMES	SALMONIDAE	*Stenodus leucichthys*	EW		NA		Yes	
SALMONIFORMES	SALMONIDAE	*Stenodus nelma*	LC		NA			
SALMONIFORMES	SALMONIDAE	*Thymallus arcticus*	NA		NA			
SALMONIFORMES	SALMONIDAE	*Thymallus thymallus*	LC		LC		Yes	
SCORPAENIFORMES	COTTIDAE	*Cottus aturi*	LC		LC		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus duranii*	DD		DD		Yes	Yes

Order	Family	Species	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
SCORPAENIFORMES	COTTIDAE	*Cottus gobio*	LC		LC		Yes	
SCORPAENIFORMES	COTTIDAE	*Cottus haemusi*	DD		DD		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus hispaniolensis*	LC		LC		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus koshewnikowi*	LC		LC		Yes	
SCORPAENIFORMES	COTTIDAE	*Cottus metae*	LC		LC		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus microstomus*	LC		LC		Yes	
SCORPAENIFORMES	COTTIDAE	*Cottus perifretum*	LC		LC		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus petiti*	VU	D2	VU	D2	Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus poecilopus*	LC		LC			
SCORPAENIFORMES	COTTIDAE	*Cottus rhenanus*	LC		LC		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus rondeleti*	CR	B1ab(ii,iii) +2ab(ii,iii)	CR	B1ab(ii,iii) +2ab(ii,iii)	Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus scaturigo*	VU	D2	VU	D2	Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Cottus transsilvaniae*	DD		DD		Yes	Yes
SCORPAENIFORMES	COTTIDAE	*Triglopsis quadricornis*	LC		LC			
SILURIFORMES	SILURIDAE	*Silurus aristotelis*	DD		DD		Yes	Yes
SILURIFORMES	SILURIDAE	*Silurus glanis*	LC		LC			
SYNGNATHIFORMES	SYNGNATHIDAE	*Syngnathus abaster*	LC		LC			

Appendix 4. Methodology for spatial analyses

Data were analysed at the hydroshed level. River basins were selected as the spatial unit for mapping and analysing freshwater species distributions as it is generally accepted that the river/lake basin or catchment is the most appropriate management unit for inland waters. Species distributions have been mapped to include brackish and marine ranges where appropriate, however the spatial analyses only include the inland ranges for the purposes of this report. Patterns of species richness (Figure 5) were mapped by counting the number of extant species in each hydroshed. Patterns of threatened species richness (Figure 6) were mapped by counting the number of threatened species (categories CR, EN, VU at the European regional level) in each hydroshed. Patterns of endemic species richness were mapped by counting the number of species in each hydroshed that were flagged as being endemic to geographic Europe as defined in this project (Figure 7).

Appendix 5. Example species summary and distribution map

The species summary gives all the information collated (for each species) during this assessment, including a distribution map. You can search for and download all the summaries and distribution maps from the European Red List website and data portal available online at http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/europe.

Acipenser sturio - Linnaeus, 1758

ANIMALIA - CHORDATA - ACTINOPTERYGII - ACIPENSERIFORMES - ACIPENSERIDAE - Acipenser - sturio

Common Names: Atlantic Sturgeon (English), Esturgeon Commun (French), Esturión Común (Spanish; Castilian), Baltic Sturgeon (English), Common Sturgeon (English)
Synonyms: No Synonyms

Taxonomic Note:
Archaelogical remains suggest that *A.sturio* colonised the Baltic Sea about 3000 years ago from the North Sea, and vanished from the Baltic Sea about 800 years ago. Climatic changes about 100 years ago (Little Ice Age) might have had an impact indirectly in favouring introgression by hybridization with *A. oxyrinchus*.

Red List Assessment

Red List Status

CR Critically Endangered, A2cde;B2ab(ii,iii,v) (IUCN version 3.1)

Possibly Extinct:	False
Possibly Extinct Candidate:	False
Date Last Seen:	

Assessment Information

Reviewed?	Date of Evaluation:	Status:	Reasons for Rejection:	Improvements Needed:
True	2009-10-24	Passed	-	-

Assessor(s): Kottelat, M., Freyhof, J., Gesner, J., Rochard, E. & Williot, P.

Reviewer(s): Smith, K. & Pourkazemi, M.

Assessment Rationale

Once a very wide ranging species from the North and (Eastern) north Atlantic and Mediterranean coast of Europe and the Black Sea (one record from the White Sea in the 1950s), the last remaining population (in the Garonne in France) is still declining. The species last spawned in 1994 in the Garonne, where dams, pollution and river regulation has degraded and destroyed spawning sites. There are also plans to start gravel extraction. The current population size is between 20-750 wild, mature individuals (in the past three years there has been substantial stocking, but these animals will not reproduce until ~2016). Under normal population circumstances, the average reproductive age is suspected to be about 25 years. There has been more than a 90% population decline in the past 75 years based mainly on loss of habitat, along with pollution and exploitation.

This species now remains in just one location, where 27 spawning grounds (less than 10 km^2) remain potentially accessible (the major threat to this species is bycatch). As this species continues to be caught as bycatch, the population is still decreasing.

Reasons for Change

No change: Same category but change in criteria

Distribution

Geographic Range

This species was once known from the North and Baltic Seas, English channel, European coasts of Atlantic, northern Mediterranean west of Rhodos, and western and southern Black Sea. It was occasionally recorded in Algeria, Morocco and Tunisia. The last record from the Rioni (Georgia) was in 1991, although further surveys have failed to find the species (J. Gessner, pers comm.). Today this species is restricted only to the Garonne River (France).

Biogeographic Realms

Biogeographic Realm: Palearctic

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Belgium	Extinct	Native	-	Resident
Denmark	Extinct	Native	-	Resident
France	Extant	Native	-	Resident
Germany	Extinct	Native	-	Resident
Italy	Extinct	Native	-	Resident
Netherlands	Extinct	Native	-	Resident
Norway	Extinct	Native	-	Resident
Portugal	Extinct	Native	-	Resident
Spain	Extinct	Native	-	Resident
Tunisia	Extinct	Native	-	Resident
United Kingdom	Extinct	Native	-	Resident

Population

The sturgeon was an important commercial fish until the beginning of the 20th century (Debus 2007). The last natural reproduction was in 1994 (previous reproduction in 1988). A population assessment in 2005 estimated 2,000 individuals remain. It is estimated that bycatch took around 200 fish per year (gill net and trawling at sea) (Rochard *et al.* 1997).

The size of the population today is much smaller (approximately 20-750 native wild adult fish, based on an assessment of the size the cohort before they leave the estuary). There are more individuals from stocking (7,000 in 2007; 80,000 in 2008; and 46,000 in 2009) (Rouault *et al.* 2008; Rochard 2010). These have not yet bred in the wild and first breeding (from the releases of 1995) is expected by 2014, F1 generation of 2007 and later releases around 2021. The limiting factor is the availability of females which won't reproduce until ~2016 (Rochard, pers. comm).

Habitats and Ecology

Biology: Anadromous (spends at least part of its life in salt water and returns to rivers to breed).

Males reproduce for the first time at 10-12 years, females at 14-18. There are indications for a reproduction at two year intervals for males and 3-4 years for females in April-July. Adults do not eat during migration and spawning. The distance of the spawning migration seems to be positively correlated with water level, and a distance of 1000 km or more may be covered during years of high water. Spent fishes immediately return to the sea (FAO 2009).

Potential spawning grounds have been mapped. Juveniles migrate downstream and are present in upper estuary at one year old. They continue a slow downstream migration and penetrate the sea at 2-3 years. For the next 4-6 years, they leave the sea to enter the lower estuary at summer time where movements and feeding were determined. At sea, this species feeds on a variety of molluscs, crustaceans and small fish. Atlantic population feed benthically.

IUCN Habitats Classification Scheme

Habitat	Suitability	Major Importance?
Marine Neritic -> Marine Neritic - Estuaries	Suitable	Yes
Marine Neritic -> Marine Neritic - Subtidal Loose Rock/pebble/gravel	Suitable	-
Marine Neritic -> Marine Neritic - Subtidal Muddy	Suitable	-
Marine Neritic -> Marine Neritic - Subtidal Sandy	Suitable	-
Marine Neritic -> Marine Neritic - Subtidal Sandy-Mud	Suitable	-
Wetlands (inland) -> Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)	Suitable	Yes

Life History

Age at Maturity: Female	Age at Maturity: Male	Average Reproductive Age	Maximum Size (in cms)
14-18 Years	10-12 Years	25 Years	350

Use and Trade

General Use and Trade Information

In the past (until late 19th century), juveniles of this species were harvested as animal food in Poland and Germany (Gessner, pers. comm.)

100% removal from the wild - This relates to the past only as commercial trade in this species is now prohibited.

Threats

Bycatch is the major threat and the extraction of gravel in the Garonne is a potential threat to the species. Dam construction, pollution and river regulation have led to loss and degradation of spawning sites.

Conservation

An ongoing in situ conservation programme is in place. Ex-situ conservation is carried out in France and Germany. Bern Convention Action Plans have been developed, while National Action Plans are to come.

Restocking was initiated in 1995 and later in 2007 until 2009. Survival rate for the 1995 stocking is 3-5%; the survival rate for recent releases is unknown. For the first time in 2007, progenies were obtained from farmed specimen (Williot *et al.* 2009).

There is a fisheries awareness programme co-ordinated between National Fishermen Associations in Atlantic North Sea and WWF.

This species was listed on CITES Appendix II in 1975, and moved to Appendix I in 1983.

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Acipenser sturio

range type

Historical

Native (resident)

national boundaries

subnational boundaries

lakes, rivers, canals

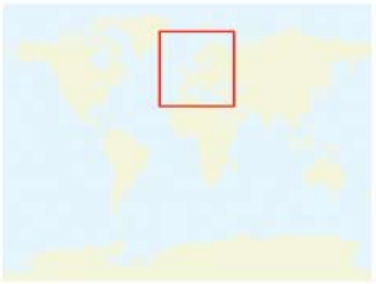
salt pans, intermittent rivers

data source:
IUCN Sturgeon Specialist Group

NE DD LC NT VU EN CR CRITICALLY ENDANGERED EW EX

azimuthal equal area central point: 0°, 0°

map created 03/03/2010



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European Commission

European Red List of Freshwater Fishes

Luxembourg: Publications Office of the European Union

2011 – viii + 60pp + 4pp cover. 210 x 297 mm

ISBN 978-92-79-20200-1
doi:10.2779/85903

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KH-32-11-735-EN-C

Publications Office

ISBN 978-92-79-20200-1