ANNEX 1

Global Assessment of Migratory Freshwater Fishes




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EXECUTIVE SUMMARY

1. Freshwater fishes are among the most imperilled vertebrates, and many migratory species now face declines driven by loss of connectivity, flow alteration, habitat degradation, exploitation, pollution, and interacting pressures across borders. Recognizing these trends and their transboundary nature, the Convention on the Conservation of Migratory Species of Wild Animals (CMS) has sought stronger, coordinated action for inland fishes that move across national jurisdictions.

2. The document builds on the original CMS review of migratory freshwater fishes published in 2011 (UNEP/CMS/Inf.10.33). Since then, IUCN Red List coverage of freshwater fishes has expanded from ~3,000 to nearly 15,000 assessed species, enabling a much more complete picture of status and trends. The current report was prepared in response to COP14 Decision 14.112(a), which requested the Scientific Council to update the 2011 review.

3. **Objectives**: The report (i) summarizes current knowledge on migratory freshwater fishes, (ii) identifies species that meet CMS criteria and could benefit from listing, and (iii) outlines practical options for CMS Parties and Range States to improve management and conservation through listings and cooperation instruments.

4. **Methods**: To generate a CMS-actionable list, we combined expanded IUCN assessments with a new global migratory fish dataset and additional sources, then applied CMS criteria for transboundary migration and 'unfavourable' conservation status. Key elements of the evidence base included:

   - the IUCN Red List for status, threats and trends, along with multiple databases (FishBase, GROMS, North American and regional migratory fish datasets, Mekong River Commission resources, Trans-European Swimways/Wetlands International, South Africa River Eco-classification, New Zealand Freshwater Fish Database) and recent peer-reviewed literature and expert knowledge;
   - transboundary confirmation, based on the intersection of species' inland ranges with connected, cross-border drainage networks, including marine phases where they create shared inland stocks; and
   - consideration of conservation status, which includes species categorized by the IUCN as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Data Deficient (DD), Not Evaluated (NE) and Least Concern (LC), with credible evidence of decline or risk, or where the IUCN determines the trend as 'Decreasing'.

5. **Results:** The analysis identified 349 migratory, transboundary freshwater fishes that potentially meet the criteria for listing on the CMS Appendices; 24 are already listed, leaving 325 candidate species for prospective action. Candidate occurrences are concentrated in Asia (n=205), with additional sets in South America (n=55), Africa (n=42), Europe (n=50), North America (n=32), and Oceania (n=6). Among non-listed taxa, 136 species meet CR/EN/VU/NT thresholds, and of these, 75 occur in two or more CMS Parties (strong near-term listing prospects).

6. **Priority regions:** Consistent with the global assessment and case studies in this report, several transboundary systems emerge as areas where CMS cooperation is both necessary and feasible:
    - the Amazon and La Plata–Paraná–Paraguay in South America (long-distance catfishes and characids; floodplain nursery protections; coordinated seasonal closures; high-gain barrier retrofits);
    - the Danube and connected European basins (potamodromous cypriniforms and remaining sturgeon/lamprey runs; sediment continuity and passage across multiple Parties);
    - the Congo, Niger–Lake Chad, and Nile in Africa (shared stocks, drought sensitivity, and fragmentation that calls for cooperative monitoring and flow/water-quality measures);
    - the Mekong and Ganges–Brahmaputra–Meghna in Asia (high biomass of migrants; dams and hydropeaking; harvest coordination via regional bodies with CMS alignment);
    - and regional anguillid eel measures in Oceania (passage standards; life-stage fishery regulation; shared recruitment indices).

7. **Regional and taxonomic gaps:** The Mekong River Basin represents a major gap. It supports globally significant freshwater biodiversity and numerous migratory species, including several that are Critically Endangered or Endangered. Dozens of Mekong species would likely benefit from coordinated international management, shared monitoring and connectivity safeguards. While the countries of the Lower Mekong are not currently Parties to CMS, closer engagement with and consideration of accession to the Convention would unlock access to established tools, technical support and a platform for sustained transboundary collaboration.

8. **Priority action pathways under CMS**: The report outlines complementary instruments that Parties and Range States can deploy singly or in combination: Listing on Appendix I/II**,** Concerted Actions**,** Single Species or Multi-Species Action Plans under COP Resolutions, and Memoranda of Understanding (MOUs) that flexibly engage Party and non-Party Range States.

9. **Integration with broader CMS work:** Freshwater fishes should be integrated into CMS themes on ecological connectivity and infrastructure, alongside technical guidance on fish passage/screening, environmental flows tied to migration and larval drift, bycatch mitigation, and mixed-stock management. These linkages create coherence across taxa and basins and can align with flagship CMS publications (e.g., the *Atlas of Animal Migration*, *Status of the World's Migratory Species*) where relevant.

10. **Cross-cutting foundations and collaboration:** Success depends on shared baselines and indicators; improved knowledge of migration routes and stock structure; maintaining/restoring connectivity and environmental flows; reducing habitat degradation and pollution; and inclusive, cross-sector governance with data sharing. The report highlights synergies with CBD**,** CITES, river-basin organizations, FAO and the IUCN Red List network to expand capacity and align incentives.

11. **Next steps for Parties:** In the near term, Parties can:
    - (i) prepare proposals for listing high-priority taxa (those occurring in two or more Parties with CR/EN/VU/NT status);
    - (ii) develop Concerted Actions**,** Action Plans or MOUs for listed species (e.g., catfish in the Amazon basin; listed sturgeon species), with clear workplans and technical advisory structures; and
    - (iii) mainstream freshwater fishes into CMS decisions, resolutions, working groups and cross-cutting products that advance connectivity and reduce bycatch and infrastructure impacts.

GLOSSARY

amphidromous	Fishes that regularly move between fresh water and the sea for purposes other than breeding.
anadromous	Fishes that spend most of their lives in the sea but breed in fresh water.
catadromous	Fishes that spend most of their lives in fresh water but breed in the sea.
diadromous	All fishes that migrate between the sea and fresh water.
panmictic species	Species where mating occurs randomly without any restrictions like geography, social structure or genetics. All individuals are potential mates.
potamodromous	Fishes that migrate wholly within fresh water.

1 INTRODUCTION

1.1 Background

Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) currently include 23 species of freshwater fish, comprising the European eel (*Anguilla anguilla*); three catfishes: the Mekong giant catfish (*Pangasianodon gigas*), the gilded catfish (*Brachyplatystoma rousseauxii*), and the laulao catfish (*Brachyplatystoma vaillantii*); and 19 species of Acipenseriformes (sturgeons and paddlefishes). The European sea sturgeon (*Acipenser sturio)* and the Mekong giant catfish are listed in Appendix I. The remaining 21 freshwater fish species are listed in Appendix II.

CMS Parties, recognizing the importance of migratory freshwater fish and the multiple threats to their populations and ecosystems, have called for strengthened measures for their protection. As part of this effort, the CMS Secretariat initiated a review of the conservation status of migratory freshwater fish to determine the current state of knowledge and to identify species that might benefit from listing on the CMS Appendices.

The original CMS review of migratory freshwater fishes was published in 2011 (UNEP/CMS/Inf.10.33). Since then, substantially more information has become available about migratory behaviour and conservation status. In 2011, approximately 3,000 freshwater fish species had been assessed by the IUCN Red List; today nearly 15,000 have been assessed. This assessment also draws on a recent global dataset on migratory freshwater fish compiled by experts worldwide. In response to COP14 Decision 14.112(a), which requested the Scientific Council to update the review found in UNEP/CMS/Inf.10.33, a major reassessment was undertaken; this report summarizes the results.

An IUCN information brief prepared for COP14 (January 2024) provided a concise review of freshwater fishes “of potential interest for inclusion in CMS”. Using the IUCN Red List (v2023-1), the analysis examined 14,898 inland-water fishes, identified 1,183 taxa with IUCN movement codes indicative of migration, and highlighted 891 migratory species occurring in two or more countries – of which 87 were threatened (CR, EN, VU). The brief summarized taxonomic, geographic and threat patterns, and noted important caveats, including that many species lack movement coding and that occurrence in multiple countries does not itself confirm cross-border migrations.

This 2025 report builds on and extends both the 2011 CMS review and the COP14 information document (UNEP/CMS/COP14/Inf.27.7.2) and is designed to produce a CMS-actionable list, as outlined in Chapter 4.1 Scope and Approach.

1.2 Rationale

Freshwater fish are among the most imperilled vertebrates (Dudgeon et al. 2006; Abell et al. 2007; Nilsson et al. 2005; Sayer et al. 2025). In North America, roughly two fifths of freshwater fishes are imperilled, with extinction rates many hundreds of times background levels (Jelks et al. 2008; Burkhead 2012). Large-bodied freshwater fishes have declined most steeply, with global populations of freshwater megafauna (including megafishes) collapsing since 1970 (He et al. 2019). Transboundary migratory stocks are faring particularly poorly – diadromous fishes, for example, have suffered widespread local extirpations and >90 per cent abundance reductions (Waldman and Quinn 2022).

Given the urgency of protecting migratory fish, identifying transboundary stocks is imperative. The scale of the issue is substantial: according to Varis et al. (2008), more than 250 transboundary rivers and lakes exist globally and over 47 per cent of the world's land area falls within a transboundary basin. Transboundary river basins occur on every continent and together encompass nearly half of the Earth's land area. In South America, vast regions fall within the Amazon and the La Plata Basin (including the Paraná and Paraguay Rivers). In Europe, most major rivers are transboundary, including the Danube, Rhine, Elbe and Dniester. Similar patterns occur across Africa and Asia, where the Nile, Congo, Niger, Zambezi, Mekong, Ganges–Brahmaputra–Meghna, Indus, Tigris–Euphrates, Amu Darya and Syr Darya cross borders. In North America, the Columbia, Great Lakes–St. Lawrence, Yukon, Colorado and Rio Grande link neighbouring countries. Australia and many island states, on the other hand, have few or no transboundary basins (Figure 1). Many of the world's largest rivers, including the Danube, the Nile and the Amazon, pass through several countries and cover significant portions of Europe, Africa and South America, respectively.

The transboundary nature of many migratory stocks presents unique challenges requiring coordinated management at local, national and international levels (Rabinowitz 1995). While core fishery management principles still apply, migratory species add further complications: routes can extend hundreds to thousands of kilometres across jurisdictions; pressures accumulate along entire corridors; barriers and flow alteration disrupt connectivity; fisheries operate in different places and seasons; non-native species and pollution compound impacts; and multiple life stages depend on habitats that range from headwaters to estuaries and coastal waters (Coates et al. 2000; Grill et al. 2019). Recent studies show that where migratory fish populations have declined, recovery hinges on restoring connectivity, coordinating habitat and harvest measures among states and nations, improving water quality and environmental flows, and adapting to climate-driven shifts in migration timing – all of which require transnational cooperation and shared monitoring frameworks (Tickner et al. 2020). The complexity of managing migratory species, together with persistent knowledge gaps in distribution, population status and exploitation along migration routes, underscores the importance of identifying species most in need of international cooperative action, and of outlining mechanisms, such as joint action plans and data-sharing agreements, to facilitate that cooperation.

1.3 Implications for CMS

The distribution and ecology of migratory freshwater fishes, combined with the geography of transboundary basins and the corridor-scale nature of threats, make international cooperation essential. CMS can add value by focusing Parties on shared stocks and bottleneck corridors; improving connectivity; reducing the impacts of linear infrastructure; facilitating technical standards for passage, screening and environmental flows; aligning mixed-stock harvest management; and establishing shared monitoring and data-sharing protocols, including basin-scale instruments such as Action Plans and MoUs (Dudgeon et al. 2006; Tickner et al. 2020).

1.4 Objectives

The objectives of this assessment, therefore, are to:

1. provide an overview of freshwater fish biodiversity and the current state of knowledge about migratory freshwater fishes;
2. identify migratory freshwater fish species that meet the criteria for and might benefit from CMS listing; and
3. provide recommendations on how CMS can best facilitate improved management and protection of migratory freshwater fishes.

2 DEFINITIONS

2.1 Definition of a (transboundary) migratory species under CMS

Article 1 of CMS defines a migratory species as “the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries”. For migratory freshwater fishes, this definition applies not only to crossings of national borders on land and at sea, but also to movements within shared transboundary rivers and lakes where a water body or watershed is divided between two or more countries.

Under this definition:

i) “Cyclically” refers to a cycle of any nature (for example, astronomical, life history or climatic) and of any frequency.

ii) “Predictably” indicates that the movement can be anticipated to recur under a given set of circumstances, though not necessarily at strictly regular intervals.

iii) National jurisdictional boundaries include land borders and water boundaries, including mid-river or mid-lake demarcations.

2.2 Definition of “unfavourable conservation status”

According to Article 1 of CMS, a migratory species is considered to have an unfavourable conservation status if one or more of the following apply:

1. population dynamics data indicate that the species is not maintaining itself on a long-term basis as a viable component of its ecosystems;
2. the range of the species is currently reduced, or is likely to be reduced, on a long-term basis;
3. there is not, or will not be in the foreseeable future, sufficient habitat to maintain the population on a long-term basis;
4. the distribution and abundance of the species do not approach historic coverage and levels to the extent that suitable ecosystems exist and to the extent consistent with wise wildlife management.

Many freshwater fishes meet more than one of these criteria because cumulative pressures, including river fragmentation and loss of longitudinal connectivity, reduced access to spawning and rearing habitats due to dams and altered flows, habitat degradation and pollution, and

unsustainable exploitation, continue to drive declines (Allan et al. 2005; Arthington et al. 2016; Casselman and Cairns 2009; Dudgeon et al. 2006; Froese and Torres 1999; Reid et al. 2019).

2.3 Freshwater fish: definition, diversity, taxonomy and nomenclature

For the purposes of this assessment, a freshwater fish is any species that spends some or all of its life in fresh water. Following FishBase usage, freshwater fishes may be: (1) exclusively freshwater; (2) occur in fresh and brackish waters; or (3) occur in fresh, brackish and marine waters. This includes obligate freshwater species and diadromous taxa (anadromous, catadromous and amphidromous). 'Potamodromous' fishes migrate wholly within fresh water; 'anadromous' fishes spend most of their lives in the sea but breed in fresh water; 'catadromous' fishes spend most of their lives in fresh water but breed in the sea; and 'amphidromous' fishes regularly move between fresh water and the sea for purposes other than breeding. All four groups are considered in this report.

Freshwater fishes today number roughly 19,000 described species globally, across about 250 families, representing approximately half of all fish diversity and about one quarter of vertebrate diversity. These totals exceed the 2008 baseline reported by Lévêque and colleagues (~207 families, 2,513 genera, ~13,000 species) and include diadromous groups (for example, salmon, sturgeons, sawfishes and anguillid eels) under widely used freshwater definitions. Recent compendia indicate 19,013 valid freshwater species in Eschmeyer's Catalog of Fishes and 18,898 recognized freshwater species in summaries by the IUCN/SSC Freshwater Fish Specialist Group. Taxonomic discovery remains rapid: 243 new freshwater species were described in 2023 and 260 in 2024, including several from Europe, underscoring that even well-studied regions are not fully catalogued.

3 FRESHWATER FISH DISTRIBUTION, ECOLOGY AND THREATS

3.1 Global distribution and transboundary context

Freshwater fishes occur on every continent except Antarctica and occupy nearly all inland aquatic habitats, from headwater streams and springs to large rivers, floodplains, lakes and wetlands, with faunas structured by drainage-basin boundaries that constrain dispersal and generate distinct regional assemblages; species richness is generally lowest in temperate zones and highest in the tropics (Dudgeon et al. 2006; Abell et al. 2007). Current syntheses recognize roughly 19,000 freshwater fish species (about half of all fishes and roughly one quarter of vertebrates) with exceptional diversity in large tropical basins such as the Amazon, Congo and Mekong (Winemiller et al. 2016; Sayer et al. 2025). For CMS, the salient feature is that many of these high-diversity systems are transboundary; shared rivers and lakes create shared stocks and necessitate international coordination for effective conservation and management (Varis et al. 2008).

Across the Americas, numerous large basins are transboundary. The Amazon spans eight countries and supports at least 2,700 described freshwater species, and it hosts the longest known strictly freshwater life-cycle migration: the dorado catfish *Brachyplatystoma rousseauxii* completes >11,000 km of movements between Andean headwaters and estuarine nurseries, crossing multiple borders (Barthem & Goulding 1997; Barthem et al. 2017). The La Plata–Paraná–Paraguay system links Brazil, Paraguay, Bolivia, Uruguay and Argentina, supporting long-distance potamodromous catfishes and characids that routinely traverse national boundaries (Carolsfeld et al. 2003). In North America, diadromous and potamodromous migrations in the

Columbia, Yukon and Great Lakes–St. Lawrence require binational coordination (Poff et al. 1997; Jelks et al. 2008).

Europe has lower overall richness but a high proportion of transboundary rivers – for example, the Danube connects 19 countries (Tockner et al. 2009; Grill et al. 2019). In Africa, diversity is at its highest in the Congo and the East African Great Lakes, with ongoing description of new taxa and expanding assessments that reveal both high endemism and significant data gaps (Levéque et al. 2008; Reid et al. 2019). In Asia, the Mekong supports one of the world's largest inland fisheries and numerous migrants moving between Cambodia, Lao PDR, Thailand, Viet Nam, Myanmar and China (Baran and Myschowoda 2009). Similar transboundary dynamics occur in the Ganges–Brahmaputra–Meghna and Indus systems (Dudgeon 2000, 2003). In Oceania, freshwater diversity is comparatively low and dominated by diadromous taxa; anguillid eels connect multiple island states and highlight the need for regionally coordinated passage standards and life-stage fishery management (Chang et al. 2020; Koster et al. 2021). In single island nations, obligate freshwater fish, whether migratory or not, do not meet the criteria for listing.

3.2 Migration ecology and life history

Migratory behaviour is widespread across freshwater fishes and cuts across major lineages. Diadromous fishes (anadromous, catadromous, amphidromous) link rivers to the sea, whereas potamodromous fishes migrate wholly within inland waters (Lucas and Baras 2001). In tropical systems, most migratory taxa are potamodromous and synchronize movements with monsoon or flood pulses (Baran and Myschowoda 2009). Many taxa undertake long-distance migrations: sturgeons and salmons in temperate systems; anguillid eels across ocean basins; and pimelodid/pangasiid catfishes and prochilodontids in South America and Southeast Asia, often covering hundreds to thousands of kilometres (Carolsfeld et al. 2003; Hogan et al. 2007; Lucas and Baras 2001). Despite the prevalence of migration, the scale and timing of movements remain poorly documented for many species and populations, particularly in the tropics, complicating stock delineation and cross-border management (Dudgeon 2000, 2003). These knowledge gaps reinforce the value of multi-source evidence (e.g. telemetry, mark–recapture, otolith microchemistry, genetics, basin inventories and expert/local knowledge) to establish transboundary status for CMS purposes (Coates et al. 2000; Reid et al. 2019).

Regional context matters for CMS application. In North America, many migrations occur in systems shared by only two countries, simplifying the cooperation landscape relative to Eurasia, Africa and South America (Jelks et al. 2008). In Europe, migration ecology is overprinted by centuries of river regulation; numerous diadromous and potamodromous runs have been lost, and restoration requires coordinated barrier mitigation and flow management across many countries (Holčík 1995; Tockner et al. 2009). In South America and parts of Asia, very large, still-functional migrations persist but face rapid development pressures; here CMS instruments could help maintain connectivity and harmonize management measures and conservation actions across jurisdictions (Carolsfeld et al. 2003; Baran & Myschowoda 2009).

3.3 Threats to migratory freshwater fish

Declines arise from cumulative drivers acting along entire migratory corridors. River fragmentation and altered flows (through dams, weirs and withdrawals) block or delay migrations, reduce floodplain access and sediment transport, and homogenize flow regimes, with well-documented impacts on sturgeons, salmons and, increasingly, on long-distance potamodromous taxa (Nilsson et al. 2005; Kottelat and Freyhof 2007; Barthem and de Brito Ribeiro 1991; Carolsfeld et al. 2003;

Grill et al. 2019). Habitat degradation, including deforestation, channelization, sand/gravel extraction and eutrophication, degrades spawning and nursery habitats, and transboundary pollutants and sediments move across borders (Allan et al. 2005; Lelek and Köhler 1990). Overexploitation and bycatch in mixed fisheries remove migrants at multiple life stages and along routes, necessitating coordinated seasons, gear and size limits among Parties (Jelks et al. 2008; Casselman and Cairns 2009). Non-native species and disease can restructure food webs and extirpate endemics, exemplified by Nile perch in Lake Victoria (Levéque et al. 2008; Goudswaard et al. 2008). Climate change is expected to shift migration timing, reduce snow- and glacier-fed flows, and alter estuary dynamics, increasing passage mortality and phenological mismatches (Xenopoulos et al. 2005; Poff et al. 2007; Thieme et al. 2010). Where declines have occurred, recovery hinges on restoring connectivity, coordinating habitat and harvest measures among states and nations, improving water quality and environmental flows, and adapting to climate-driven shifts – actions that require transnational cooperation and shared monitoring frameworks (Tickner et al. 2020).

In transboundary systems, the absence of coordination can lead to widespread loss of benefits (for example, passage investments offset by intensified harvest downstream) and to data asymmetries / gaps that hinder assessment. CMS instruments (i.e. Appendix listings, Concerted Actions, Action Plans and MOUs) offer pathways to align research, management and conservation priorities, set environmental-flow targets, coordinate fishery regulations, establish transboundary monitoring networks (run-timing indices, mark–recapture frameworks, genetic stock ID) and codify data-sharing among Parties (Dudgeon et al. 2006; Poff et al. 2007; Tickner et al. 2020).

3.4 Conservation status of freshwater fish already listed on CMS

Sturgeons and paddlefishes (Acipenseriformes)

Within CMS, the European sturgeon (*Acipenser sturio*) is listed on Appendix I and on Appendix II; eighteen additional sturgeons and the Chinese paddlefish are on Appendix II, underscoring the need for coordinated international management. The most recent IUCN reassessment identifies Acipenseriformes as the most threatened vertebrate group, with the majority of species Critically Endangered (CR) or Endangered (EN) and declining due to river fragmentation, illegal harvest and caviar trade, altered flows and degraded water quality. The Chinese paddlefish (*Psephurus gladius*) was confirmed extinct in 2022 – the first CMS-listed fish lost. In the Mediterranean / Adriatic, the Adriatic (Italian) sturgeon (*Acipenser naccarii*) is Critically Endangered (CR) and functionally reliant on captive broodstock and reintroductions; limited connectivity and degraded estuarine conditions constrain recovery. In the North Atlantic–Western Europe, *A. sturio* is effectively extirpated across most of its former range; Franco-German reintroductions report survival and occasional at-large recaptures but no self-sustaining wild population. In the Black Sea / Danube / Caspian region, key Appendix II taxa, *Huso huso, A. gueldenstaedtii, A. stellatus, A. nudiventris, A. ruthenus* (Danube population), and *A. persicus,* are largely CR / EN with collapsed recruitment; beluga persists mainly in the lower Danube and parts of the Caspian but faces poaching and truncated migrations at major dams (e.g. Iron Gate, Volgograd). In Siberia–Arctic drainages and the Amur–Ussuri, *A. baerii* (including the Baikal form), *A. schrenckii* and *Huso dauricus* are depleted by historical overfishing, hydropower fragmentation and pollution; the Baikal form remains conservation-reliant. In the Yangtze, Chinese sturgeon (*A. sinensis*) and Dabry's sturgeon (*A. dabryanus*) are now sustained largely by hatchery releases after cascade dams blocked historical migrations; natural reproduction is rare or absent in most years. In North America, Appendix II taxa include *A. oxyrinchus*, *A. fulvescens* and *A. medirostris*; status is mixed

but improves where harvest is closed and connectivity projects operate, though bycatch, altered flows and vessel strikes remain concerns.

From a CMS policy standpoint, high-value cooperative actions include reconnecting rivers via passages and ecologically timed dam operations; intensifying enforcement against illegal caviar with forensic product testing and market surveillance; reducing bycatch through time–area measures, gear modifications and rapid-release protocols; reforming stocking towards conservation hatcheries with genetic safeguards; and strengthening monitoring with population-unit genetics, acoustic or mark–recapture programmes and eDNA for rare spawners to inform transboundary management.

Mekong giant catfish (Pangasianodon gigas)

The Mekong giant catfish is Critically Endangered and listed on CMS Appendix I and CITES Appendix I, with a small, declining wild population. Persistent threats include incidental capture, habitat degradation and disrupted migration cues; mainstream and tributary dams pose an existential risk by fragmenting longitudinal connectivity and altering the flood pulse on which spawning and early life stages depend. Local knowledge and recent field studies corroborate severe long-term decline, with sporadic detections consistent with a highly depleted metapopulation.

Because its life history is transboundary, effective conservation requires cooperative measures among Cambodia, Lao PDR, Thailand and Viet Nam. In CMS terms, this points to coordinated safeguarding and restoration of migration corridors and deep-pool refugia, synchronized dam operations to provide environmental flows and passage windows, and harmonized seasonal closures and bycatch-release protocols at known hotspots. Data sharing on bycatch, tagging, genetics and eDNA, alongside transparent hydropower impact evaluation at basin scale, are recommended to guide adaptive, cross-border management.

European eel (Anguilla anguilla)

The European eel is listed on CMS Appendix II and assessed by IUCN as Critically Endangered. It is a widely distributed, panmictic species with spawning confined to the Sargasso Sea; continent-wide migrations create a single, shared stock across Europe and North Africa. Recruitment remains at a fraction of historical levels (glass-eel indices ≈0.4–1.1% of the 1960–1979 baseline in the North Sea and ≈7–9% elsewhere in Europe in 2023–2024), reflecting persistent basin-scale depletion and pervasive pressures from barriers, turbines, habitat loss, illegal fishing, disease and pollutants. The species is listed on CITES Appendix II, and the EU has prohibited extra-EU trade since 2010. At CMS COP14, Parties agreed to the development of a Single Species Action Plan for the European eel, which is under preparation.

Gilded catfish and piramutaba (Brachyplatystoma rousseauxii and B. vaillantii)

These long-distance, transboundary migrants (CMS Appendix II since COP14) occur as shared stocks across Bolivia, Brazil, Colombia, Ecuador and Peru. Otolith chemistry, larval drift and length-frequency studies show basin-scale life cycles, with spawning concentrated near the Andean piedmont and nurseries extending to the lower Amazon and estuary; *B. rousseauxii* completes the longest known strictly freshwater migration (~11,000–12,000 km), and *B. vaillantii* undertakes similarly extensive movements. Population signals are negative where connectivity has been disrupted: studies on the Madeira indicate the Jirau and Santo Antônio dams severely impeded upriver migrations, coinciding with sharp fishery declines; basin-wide assessments

highlight cumulative fishing mortality and hydropower expansion as principal pressures. With Appendix II in place, priority transboundary measures include research coordination and data sharing; maintaining and restoring longitudinal connectivity along Andean-to-estuary corridors; evaluating and mitigating barrier impacts (including fish passage performance and flow operations); harmonizing seasonal closures and size/gear controls along migratory routes; and instituting shared, standardized monitoring (landings, tagging, genetics, otolith/isotope baselines) to manage mixed stocks. Range States and partners are planning for a species-level Conservation Action Plan to guide these measures and complement national regulations and regional fishery frameworks across the Amazon basin.

Table 1: Conservation status of freshwater fish already listed on CMS

Species / Group	**CMS Appendix**	**IUCN Red List**	**Other Listings**	**Distribution / Range**	**Main Threats**
European sturgeon (*Acipenser sturio*)	I & II	CR	–	N. Atlantic – W. Europe (reintroductions in France/Germany)	Extirpated in most of range; dams blocking migration; habitat degradation
Other sturgeons (18 spp.)	II	Mostly CR / EN	–	Black Sea, Danube, Caspian, Siberia–Arctic drainages, Amur–Ussuri	Poaching (caviar), river fragmentation, pollution, overfishing
Chinese paddlefish (*Psephurus gladius*)	II	EX	–	Yangtze River	Extinct due to overfishing, dams blocking migration
Adriatic sturgeon (*A. naccarii*)	II	CR	–	Mediterranean / Adriatic	Reliant on captive broodstock; connectivity loss, estuarine degradation
Beluga (*Huso huso*)	II	CR	–	Danube, Caspian	Poaching, dams truncating migrations
Other key sturgeons (e.g., *A. gueldenstaedtii*, *A. stellatus, A. persicus*, *A. ruthenus*, *A. nudiventris*)	II	CR / EN	–	Black Sea, Danube, Caspian	Recruitment collapse, poaching, dam barriers
Siberian & Amur sturgeons (*A. baerii*, *A. schrenckii*, *Huso dauricus*)	II	EN / VU	–	Siberia–Arctic drainages, Amur–Ussuri	Hydropower fragmentation, overfishing, pollution
Chinese sturgeon (*A. sinensis*) & Dabry's sturgeon (*A. dabryanus*)	II	CR	–	Yangtze River	Cascade dams blocking spawning migrations, reliant on hatchery stocking
North American sturgeons (*A. oxyrinchus*, *A.*	II	VU / NT / mixed	–	N. America (Atlantic, Great Lakes, Pacific)	Bycatch, altered flows, vessel strikes

fulvescens, *A. medirostris*)					
Mekong giant catfish (*Pangasianodon gigas*)	I	CR	CITES I	Mekong Basin (Cambodia, Lao PDR, Thailand, Viet Nam)	Habitat fragmentation (dams), incidental capture, altered flood pulse
European eel (*Anguilla anguilla*)	II	CR	CITES II; EU trade ban	Europe, North Africa; spawns in Sargasso Sea	Barriers, turbines, habitat loss, illegal fishing, disease, pollution
Gilded catfish (*Brachyplatystoma rousseauxii*)	II	VU / declining	–	Amazon basin (Andes to estuary)	Dams blocking migrations, fisheries pressure
Piramutaba (*B. vaillantii*)	II	VU / declining	–	Amazon basin (Andes to estuary)	Same as above (dams, overfishing, hydropower expansion)

3.5 Priority regions for CMS cooperation

Consistent with the global assessment and case studies in this report, several transboundary systems emerge as areas where CMS cooperation is both necessary and feasible:

- the Amazon and La Plata–Paraná–Paraguay in South America (long-distance catfishes and characids; floodplain nursery protections; coordinated seasonal closures; high-gain barrier retrofits) (Carolsfeld et al. 2003; Barthem et al. 2017);
- the Danube and connected European basins (potamodromous cypriniforms and remaining sturgeon/lamprey runs; sediment continuity and passage across multiple Parties) (Kottelat and Freyhof 2007; Grill et al. 2019);
- the Congo, Niger–Lake Chad and Nile in Africa (shared stocks, drought sensitivity and fragmentation calling for cooperative monitoring and flow/water-quality measures) (Levéque et al. 2008; Reid et al. 2019);
- the Mekong and Ganges–Brahmaputra–Meghna in Asia (high biomass of migrants; dams and hydropeaking; harvest coordination via regional bodies with CMS alignment) (Baran and Myschowoda 2009; Dudgeon 2003);
- and regional anguillid eel measures in Oceania (passage standards, life-stage fishery regulation, shared recruitment indices) (Chang et al. 2020; Koster et al. 2021).

4 METHODS

4.1 Scope and approach

This report identifies migratory freshwater fishes that

(i) make cyclical and predictable movements,

(ii) occur in at least two countries within connected inland waters, and

(iii) have an unfavourable conservation status as defined by CMS – that is, are listed by the IUCN Red List as CR, EN, VU, NT, DD, NE or LC, where credible sources indicate risk or decline, or if the IUCN determines the trend as ‘Decreasing’.

In addition to IUCN movement data, the assessment integrates multiple sources to provide a broader evidence base for migratory behaviour. To ensure finer-scale spatial confirmation, species ranges are intersected with transboundary drainage networks using HydroRivers, with

buffering of point-only records where needed, in order to verify that migratory populations occur within connected inland waters crossing national borders. Eligibility is aligned with the CMS concept of 'unfavourable' conservation status, consistent with the IUCN categories and the extension to Least Concern (LC) species where credible sources, literature, trends or expert evidence indicate risk or decline.

The results are presented in a CMS-oriented format, organized by species, species group, region and river basin, and supported by case studies and cooperation options to facilitate listing proposals and instruments such as Action Plans or MOUs. The outcome is therefore a consolidated species list intended both for CMS listing consideration and for planning cooperative conservation measures.

4.2 Source list and data foundations

The starting list of migratory freshwater fishes used here was provided by Stoffers et al. (in prep.). Their compilation draws on eight databases and associated literature. As described by Stoffers and colleagues, the inputs include:

- IUCN Red List (status, threats, population trend)
- FishBase (distribution, biology, movement notes)
- Global Register of Migratory Species (GROMS)
- North American Freshwater Migratory Fish Database
- Mekong River Commission resources on key migratory species
- Trans-European Swimways / Wetlands International materials
- South Africa River Eco-classification
- New Zealand Freshwater Fish Database

They further consulted recent peer-reviewed studies (for example, Herrera-R. et al., 2023; Ngor et al., 2018; Yang et al., 2024; Zapata & Usma, 2013) and expert opinion to check migration evidence, taxonomy and distribution.

Building on the Stoffers et al. list, this report applied CMS-focused inclusion criteria (transboundary occurrence and unfavourable status as described above) and compiled per-species fields needed for CMS use (taxonomy, migration type, countries of occurrence, IUCN category and trend, and principal threats).

4.3 Defining criteria

Migratory species under CMS

Since 2011, the availability and resolution of information on migratory freshwater fishes have increased markedly. Nonetheless, determining whether a species qualifies as a CMS migratory fish remains challenging due to limited spatial data and the presence of multiple populations – some crossing international borders and others remaining within a single country (Coates et al. 2000). These issues are not unique to fishes and can be addressed by combining multiple lines of evidence and coordinating information-sharing across jurisdictions. Evidence used in this assessment includes published movement studies, basin monitoring and inventories, telemetry and mark–recapture data, otolith and genetic analyses, and carefully documented local knowledge to identify populations that undertake regular cross-border movements.

Transboundary occurrence
A species was considered transboundary when reliable sources indicate that its inland-water range spans at least two countries and that populations can move within connected rivers or lakes across those borders. For diadromous species, marine movements were considered where they create shared inland stocks among Parties.

Unfavourable conservation status
CMS Article 1 guided interpretation. For practical application in this assessment, species were included when the IUCN category was CR, EN, VU, or NT; or when the category was DD or NE and there is published or expert evidence of decline, fragmentation or significant threats; or when the IUCN determines the trend as 'Decreasing'. Species listed as LC with stable or increasing trends were excluded.

4.4 Compiling the CMS candidate list

For each candidate species the dataset records the scientific name and higher taxonomy, migration type (potamodromous, anadromous, catadromous, amphidromous where known), transboundary countries, the most recent global IUCN category and trend, and key threats relevant to CMS instruments (connectivity, environmental flows, harvest, pollution, invasive species). Synonyms were reconciled to current usage.

4.5 Amazon basin case study

Given the prevalence of long-distance migrants and shared stocks in the Amazon, a focused assessment refined the global list with basin-specific literature from 2021–2025 and structured expert consultation. This produced a more complete Amazon candidate set that remains aligned with CMS criteria. A summary of the case study is laid out in Chapter 6.

4.6 Use within CMS

The final database is a list of migratory freshwater fishes that are transboundary and of unfavourable status, organized for direct CMS application (Annex A). It is intended to support proposals to amend the Appendices, Concerted Actions and cooperation instruments such as Action Plans or Memoranda of Understanding.

4.7 Assumptions and limitations

Data are uneven among regions and taxa. Many species lack formal movement studies or recent assessments. Inclusion of DD and NE species requires corroborating evidence of risk. Transboundary determinations rely on the best available distribution information and documented connectivity; future updates should incorporate new research (e.g. telemetry, genetics, standardized range datasets) and IUCN Red List reassessments as they become available.

5 RESULTS

5.1 Migratory, transboundary fish of unfavourable conservation status

Using an integrated global dataset of migratory freshwater fishes, we identified 325 potential candidate species for listing on the CMS Appendices (excluding species already listed). These candidates occur predominantly in Asia (n = 205), with additional occurrences in South America (n = 55), Africa (n = 42), Europe (n = 50), North America (n = 32) and Oceania (n = 6) (Annex 1). Counts by continent exceed 325 because some species occur on multiple continents.

With respect to CMS Party coverage, 151 species occur in two or more CMS Parties, 31 occur in exactly one Party, and 143 occur only in non-Party countries. These distributions indicate two distinct implementation pathways:

(i) regions where listing and cooperative measures could proceed immediately (≥2 Parties present), and

(ii) (ii) regions where conservation need is high but CMS membership gaps currently limit implementation of CMS instruments, calling for parallel policy engagement to encourage non-Party Range States to consider signing the Convention.

The threat status of species not yet listed on the CMS Appendices demonstrates both the need for urgency and the opportunities for cooperative action. A total of 136 species are CR/EN/VU/NT; of these, 75 already occur in ≥2 CMS Parties (i.e., strong candidates for listing now), while 61 meet threat criteria but occur in ≤1 Party, signalling urgent need coupled with a requirement for expanded participation before CMS can be fully leveraged. Species-rich, highly transboundary systems such as the Danube and La Plata/Paraná (numerous threatened potamodromous taxa), the Amazon (long-distance characiforms and siluriforms), the Himalayan rivers (e.g., hilsa shad and other clupeids across Ganges–Brahmaputra–Indus), the Mekong (many high-priority migrants but membership gaps), and Oceania for anguillid eels (broad catadromous connectivity across island states) warrant particular attention.

5.2 Priority species and species assemblages

5.2.1 Priority species

This illustrative shortlist highlights 30 migratory freshwater fishes that are strong, near-term candidates for CMS Appendix action. Species were selected to (i) demonstrate clear transboundary movements or shared stocks and presence in ≥2 CMS Party jurisdictions (including across Party EEZs for diadromous taxa), (ii) emphasize unfavourable IUCN status (CR, EN, VU, or NT), and (iii) ensure geographic and ecological representativeness across Europe, Asia, Africa, South America and Oceania. The set spans key guilds and management challenges – e.g. salmonids and lampreys in mixed-stock, river–sea systems (e.g., *Salmo salar*, *Lampetra* spp.), long-distance potamodromous salmonids, cyprinids and characiforms (e.g., *Hucho hucho*, *Tor putitora*, *Brycon* spp.), large catfishes tied to floodplain nurseries and environmental flows (e.g., *Pseudoplatystoma* spp., *Bagarius yarrelli*), and anguillid eels whose catadromous life cycles demand coast-to-headwater passage and glass-eel management (e.g., *Anguilla* spp.). This list is designed for practical use, to prioritize immediate listing proposals.

Table 2: Priority freshwater fish species for listing on the CMS Appendices

Species	Summary (distribution, IUCN status, migratory and opportunities for cooperation)
Alburnus sarmaticus (Danube delta bleak)	**Countries:** Romania, Ukraine, Bulgaria, Croatia, Slovenia. **IUCN:** Endangered (2023). **Migratory:** Potamodromous in main-stem and delta channels sensitive to flow/habitat change. **Cooperation:** joint delta connectivity projects and harmonized estuarine bycatch reductions.
Alosa alosa (allis shad)	**Countries:** Portugal, Spain, France, Ireland, United Kingdom, Belgium, Netherlands, Germany, Denmark, Norway. **IUCN:** Least Concern globally (strong regional declines). **Migratory:** Anadromous adult runs from coastal waters into shared rivers; juveniles rear in estuaries and lower rivers. **Cooperation:** coordinate fish-pass retrofits at estuary and barrage nodes, harmonize spawning-season closures, and share juvenile monitoring across Parties.
Anguilla bengalensis (Indian mottled eel)	**Countries:** India, Bangladesh, Sri Lanka, Nepal, Pakistan, Myanmar, Indonesia; Kenya, Tanzania, Mozambique; Madagascar. **IUCN:** Near Threatened (2019). **Migratory:** Catadromous with oceanic spawning and broad freshwater growth phases. **Cooperation:** joint upstream/downstream passage standards and coordinated glass-eel harvest management across Parties.
Anguilla bicolor (shortfin eel)	**Countries:** Indonesia, Malaysia, Thailand, Viet Nam, Philippines, Papua New Guinea, Australia, Timor-Leste; Tanzania, Kenya, Mozambique, South Africa; India, Sri Lanka. **IUCN:** Near Threatened (2019). **Migratory:** Catadromous with widely dispersed leptocephali and transboundary recruitment. **Cooperation:** regional alignment on intake screening and turbine mitigation plus shared glass-eel monitoring indices.
Anguilla mossambica (African longfin eel)	**Countries:** South Africa, Eswatini, Mozambique, Tanzania, Kenya; Madagascar, Comoros, Mauritius, Réunion, Seychelles. **IUCN:** Near Threatened (2018). **Migratory:** Catadromous with oceanic spawning; recruitment and silver eel escapement are transboundary. **Cooperation:** regional eel-passage standards and coordinated recruitment/escapement monitoring across multiple small jurisdictions.
Anguilla rostrata (American eel)	**Countries:** Canada, United States, Mexico, Bahamas, Cuba, Jamaica, Dominican Republic, Haiti, Trinidad and Tobago, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Suriname. **IUCN:** Endangered (2020). **Migratory:** Catadromous with oceanic spawning in the Sargasso Sea and shared recruitment; silver eel escapement is cross-jurisdictional. **Cooperation:** shared recruitment indices, coordinated glass-eel harvest rules, and turbine-mortality mitigation.
Aspiolucius esocinus (pike asp)	**Countries:** Uzbekistan, Turkmenistan, Tajikistan, Kazakhstan, Afghanistan, Kyrgyzstan. **IUCN:** Endangered (2020). **Migratory:** Large-river migrant sensitive to regulation and abstraction. **Cooperation:** coordinated environmental-flow releases and protection of migration corridors across riparian Parties.
Bagarius yarrelli (goonch)	**Countries:** India, Nepal, Bangladesh, Pakistan, Myanmar, Thailand, Lao People's Democratic Republic, Cambodia, Viet Nam. **IUCN:** Vulnerable (2022). **Migratory:** Large predatory catfish of rapids and deep runs; sensitive to flow alteration and harvest. **Cooperation:** harmonized harvest rules and environmental-flow standards on shared main stems.
Brachyplatystoma filamentosum (piraíba)	**Countries:** Amazon–Orinoco–Guianas. **IUCN**: per database. **Migratory:** Iconic long-distance siluriform moving thousands of km

Species	Summary (distribution, IUCN status, migratory and opportunities for cooperation)
	river-to-estuary. **Cooperation:** basin-scale connectivity strategy; bycatch controls in mixed fisheries; protect migration bottlenecks.
Brycon orbignyanus (sábalo / piracanjuba)	**Countries:** Argentina, Uruguay, Paraguay, Brazil, Bolivia. **IUCN:** Endangered (2020). **Migratory:** Long-distance potamodromous characin linking spawning reaches and floodplain nurseries; dams and fishing pressure have driven declines. **Cooperation:** basin-wide seasonal closures, high-gain fish-pass retrofits, and floodplain nursery protections among Parties.
Chondrostoma nasus (common nase)	**Countries:** France, Italy, Switzerland, Germany, Austria, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Hungary, Romania, Bulgaria, Poland, Czechia, Slovakia, Ukraine. **IUCN:** Near Threatened (2023). **Migratory:** Potamodromous spawner on gravel riffles; sensitive to weirs and channelization. **Cooperation:** synchronized barrier mitigation and spawning-reach protections in shared catchments.
Chondrostoma soetta (South European nase complex)	**Countries:** Italy, Slovenia, Croatia. **IUCN:** Endangered (regional assessments). **Migratory:** Seasonal runs to gravel-spawning reaches; highly barrier-sensitive. **Cooperation:** bilateral passage upgrades and sediment-regime restoration on shared Alpine–Adriatic tributaries.
Genidens barbus	**Countries:** La Plata estuary & Atlantic shelf (Argentina–Uruguay–Brazil). **IUCN:** per database. **Migratory:** Estuary–river migrant / partial diadromy with shared coastal stocks. **Cooperation:** align coastal/estuarine bycatch and seasonal closures; protect turbid nursery plumes.
Hucho hucho (huchen)	**Countries:** Austria, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Romania. **IUCN:** Endangered. **Migratory:** Potamodromous migrations between holding, feeding and spawning reaches in the Danube system; highly barrier-sensitive. **Cooperation:** joint prioritization of barrier retrofits, sediment/gravel continuity restoration, and standardized run-timing monitoring among Danube Parties.
Lampetra fluviatilis (river lamprey)	**Countries:** Norway, Sweden, Finland, Estonia, Latvia, Lithuania, Poland, Germany, Denmark, Netherlands, Belgium, United Kingdom, Ireland, France, Italy. **IUCN:** Near Threatened (regional assessments). **Migratory:** Anadromous, moving between coastal waters and rivers to spawn; barrier- and bycatch-sensitive. **Cooperation:** standardize small-barrier retrofits on tributaries and align estuarine bycatch controls.
Lampetra planeri (brook lamprey)	**Countries:** United Kingdom, Ireland, France, Belgium, Netherlands, Germany, Denmark, Norway, Sweden, Finland, Poland, Czechia, Slovakia, Austria, Switzerland, Spain, Portugal, Italy, Slovenia. **IUCN:** Near Threatened (2023). **Migratory:** Short-range freshwater migrations to clean gravel; benefits from headwater connectivity. **Cooperation:** coordinated removal/retrofit of small barriers and riparian restoration in shared headwaters.
Luciobarbus brachycephalus (Aral barbel)	**Countries:** Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan, Iran. **IUCN:** Endangered. **Migratory:** Potamodromous runs to fast-flowing spawning grounds fragmented by dams and abstraction. **Cooperation:** cross-border environmental-flow rules and synchronized closures on shared spawning reaches.
Luciobarbus longiceps (long-snout barbel)	**Countries:** Türkiye, Syria, Israel, Jordan. **IUCN:** Endangered. **Migratory:** Potamodromous movements into tributaries to spawn; affected by abstraction and barriers. **Cooperation:** bilateral flow coordination and barrier mitigation on shared reaches.
Luciobarbus subquincunciatus	**Countries:** Türkiye, Syria, Iraq, Iran. **IUCN:** Critically Endangered. **Migratory:** Large potamodromous barbel now extremely rare due to

Species	Summary (distribution, IUCN status, migratory and opportunities for cooperation)
(Mesopotamian/leopard barbel)	overexploitation, dams and abstraction. **Cooperation:** multi-state environmental-flow agreements and priority fish-pass retrofits on shared main stems.
Megalops atlanticus (Atlantic tarpon)	**Countries:** United States, Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Trinidad and Tobago, Guyana, Suriname, Brazil; Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Gabon, Republic of the Congo, Angola. **IUCN:** Vulnerable (2018). **Migratory:** Coastal–estuarine migrant using river mouths and lagoons as nurseries; long coastal movements create shared stocks. **Cooperation:** align mixed-fishery harvest rules and protect shared estuarine nurseries with coast-wide tagging among Parties.
Pangasius sanitwongsei (giant pangasius)	**Countries:** Lower Mekong basin (Thailand–Lao PDR–Cambodia) and Chao Phraya. **IUCN:** Critically Endangered. **Migratory:** Long-distance potamodromous. **Cooperation:** cross-border seasonal closures; protect spawning aggregation sites; retrofit key main-stem barriers; coordinated enforcement against illegal harvest.
Probarbus jullieni (Jullien's golden carp)	**Countries:** Cambodia, Lao People's Democratic Republic, Thailand, Viet Nam (historically Malaysia). **IUCN:** Critically Endangered (2019). **Migratory:** Very large potamodromous spawner with seasonal main-stem aggregations; vulnerable to fishing and hydropeaking. **Cooperation:** transboundary seasonal closures at known aggregation sites and joint monitoring through regional river-basin bodies.
Pseudoplatystoma corruscans (spotted surubim)	**Countries:** Argentina, Brazil, Paraguay, Uruguay, Bolivia. **IUCN:** Near Threatened (2020). **Migratory:** Large migratory pimelodid dependent on longitudinal connectivity between spawning sites and nursery floodplains. **Cooperation:** joint passage upgrades at key dams and cross-border safeguards for floodplain nurseries.
Salmo marmoratus (marble trout)	**Countries:** Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro. **IUCN:** Vulnerable (2024). **Migratory:** Potamodromous in karstic rivers; threats include dams, sediment change, and hybridization with brown trout. **Cooperation:** cross-border genetic conservation and barrier mitigation in shared Adriatic tributaries.
Salmo salar (Atlantic salmon)	**Countries:** Canada, United States (Maine), Iceland, Norway, United Kingdom, Ireland, France, Spain, Portugal. **IUCN:** Near Threatened (2023). **Migratory:** Anadromous with extensive marine migrations and natal homing; mixed-stock fisheries and dams complicate management. **Cooperation:** align mixed-stock management and accelerate fish-pass upgrades on shared rivers.
Schizothorax plagiostomus (snowtrout)	**Countries:** Afghanistan, Pakistan, India, Nepal, Bhutan (western China in upper ranges). **IUCN:** Vulnerable (2022). **Migratory:** Potamodromous with seasonal runs to gravelly spawning reaches; sensitive to sediment and habitat alteration. **Cooperation:** headwater connectivity restoration and sediment-regime management across shared basins.
Steindachneridion scriptum (surubim-do-Iguaçu)	**Countries:** Brazil, Paraguay, Argentina, Uruguay. **IUCN:** Endangered (2023). **Migratory:** Large migratory pimelodid with movements along main stems; dams fragment spawning–nursery connectivity. **Cooperation:** joint barrier-retrofit priorities and floodplain nursery protections across borders.
Tenualosa ilisha (hilsa shad)	**Countries:** Bay of Bengal (India–Bangladesh–Myanmar; Pakistan via Indus). **IUCN:** per database. **Migratory:** Anadromous clupeid with

Species	Summary (distribution, IUCN status, migratory and opportunities for cooperation)
	transboundary river–delta runs. **Cooperation:** coordinated seasonal closures, gear/mesh harmonization and escapement targets across Parties.
Tor putitora (golden mahseer)	**Countries:** Afghanistan, Pakistan, India, Nepal, Bhutan, Bangladesh (records also from Myanmar and Thailand). **IUCN:** Endangered. **Migratory:** Long pre-monsoon migrations from main rivers to headwater spawning sites; dams and harvest drive declines. **Cooperation:** cross-border seasonal closures, tributary sanctuaries, and coordinated environmental-flow releases.
Zungaro jahu (jau)	**Countries:** Upper Paraná/Paraguay–Paraná. **IUCN:** per database. **Migratory:** Long-distance potamodromous catfish reliant on floodplain nurseries. **Cooperation:** transboundary passage retrofits; environmental-flow/peaking rules; sanctuaries at known spawning reaches.

5.2.2 Species assemblages

Large migratory pimelodid catfishes (Brachyplatystoma, Pseudoplatystoma, Zungaro; family Pimelodidae)

These species form shared, transboundary stocks in La Plata and Amazon tributaries and undertake seasonal, basin-scale movements linking upstream spawning corridors to floodplain nurseries, with widespread decline or local extirpation indicating unfavourable status in parts of their ranges (Carolsfeld et al. 2003; Agostinho et al. 2003). *Pseudoplatystoma corruscans* and *Pseudoplatystoma fasciatum* have contracted markedly in the La Plata system, with reports of extirpation in the upper Uruguay, overexploitation in the upper Paraguay, and reduced landings in the lower Paraná and Río de la Plata – patterns attributable to river regulation, fragmentation of routes, and intensified fishing of migratory adults (Carolsfeld et al. 2003; Quirós 2003; Agostinho et al. 2003). *Zungaro jahu* shows similar long-distance movements and sharp reductions, including sustained declines near Itaipu and near absence from lacustrine reaches, consistent with barrier effects on connectivity and floodplain access (Agostinho et al. 2003; Quirós 2003; Petrere et al. 2000). In the Amazon, *Brachyplatystoma* includes extreme long-distance migrants that rely on uninterrupted main-stem pathways and drift corridors, underscoring the need for cooperative, basin-wide measures where jurisdictions are shared by Argentina, Paraguay, Brazil, Bolivia and Uruguay (Agostinho et al. 2003; Carolsfeld et al. 2003). Appendix II listing could align cross-border stock assessment, fish passage performance standards, environmental flows for larval drift and protection of floodplain nurseries; where Party coverage is incomplete, cooperative measures can be developed in parallel with accession efforts (Agostinho et al. 2003; Quirós 2003).

Large migratory characids and serrasalmids (Brycon, Salminus, Piaractus; Prochilodus and Semaprochilodus; families Characidae, Serrasalmidae, Prochilodontidae)

These taxa form transboundary populations that execute long pre-spawning and spawning migrations, with pronounced declines indicating unfavourable conditions in multiple river reaches (Carolsfeld et al. 2003; Agostinho et al. 2003). *Salminus spp.* moves hundreds – and even up to more than a thousand – kilometres between estuarine and upriver reaches, including a documented movement of approximately 1,440 kilometres within the La Plata system, demonstrating the scale of cross-jurisdictional connectivity that management must address (Petrere 1985; Sverlij and Espinach-Ros 1986). Regional analyses report sharp abundance declines across the lower and middle Paraná and in upper-basin tributaries, with barrier effects and loss of riparian and floodplain habitats fragmenting routes and reducing recruitment,

consistent with an unfavourable trajectory (Agostinho et al. 2003; Quirós 2003). *Prochilodus* species, major detritivores with long-distance migrations that couple main stems to floodplains, are particularly sensitive to passage failure at dams and altered seasonal flows, reinforcing the case for coordinated management across Argentina, Uruguay, Paraguay and Brazil (Agostinho et al. 2003; Carolsfeld et al. 2003). Where multiple Parties share stocks, Appendix II measures can formalize seasonal closures on upriver runs, genetic stock identification and monitoring, and re-operation of hydropower to restore connectivity and flood pulses (Agostinho et al. 2003; Quirós 2003).

Pangasiid catfish of mainland Southeast Asia, including the Mekong (Pangasius, Pangasianodon; family Pangasiidae)

These species maintain shared stocks across national boundaries and show pronounced declines in portions of their ranges, meeting both migratory and unfavourable criteria in several cases (Ngor et al. 2018; Herrera-R et al. 2023). *Pangasianodon hypophthalmus*, assessed as Endangered, has declined severely in the Chao Phraya and shows large reductions in lower Mekong floodplain fisheries such as the Tonle Sap system. Seasonal movements include adult migrations upstream with the onset of monsoon flows and downstream drift of larvae to floodplain nurseries that extend across borders between Cambodia and Viet Nam and between Lao People's Democratic Republic and Thailand (So et al. 2006; Poulsen and Jørgensen 2000; Van Zalinge et al. 2002; Ngor et al. 2018). While *Pangasianodon gigas* is already listed on Appendix I, related pangasiids in the list satisfy threat and transboundary criteria and occur in Party jurisdictions, enabling Appendix II measures for shared monitoring, protection of spawning reaches, bycatch reduction in barrage and bagnet fisheries, and flow management to preserve larval drift windows. Where membership gaps exist, river commission frameworks can advance these actions pending accession (Ngor et al. 2018; Herrera-R et al. 2023).

Mekong megacarps (Probarbus, Catlocarpio; family Cyprinidae)

These long-lived cyprinids form shared main-stem stocks that aggregate to spawn in deep pools and disperse widely with the flood pulse, a transboundary dynamic that renders them highly susceptible to targeted fisheries and hydrological alteration across national borders (Ngor et al. 2018). *Probarbus* species spawn during the dry season in deep pools and are vulnerable to exploitation at predictable sites and times, while *Catlocarpio siamensis* depends on intact seasonal flow cues and connectivity, with declines linked to fishing pressure and changing discharge regimes in shared reaches of the lower and middle Mekong (Ngor et al. 2018). Where multiple Parties overlap, Appendix II measures can formalize deep-pool sanctuaries, seasonal closures at known spawning sites, and adaptive flow coordination. In non-Party stretches, similar measures can be advanced through sub-regional agreements while accession proceeds (Ngor et al. 2018).

Salmonids of the temperate Northern Hemisphere (Salmo, Hucho, Salvelinus, Coregonus; family Salmonidae)

These species include transboundary freshwater migrants with documented declines across multiple jurisdictions, indicating unfavourable status in several populations (Ocock et al. 2006). *Hucho taimen* exhibits basin-scale movements within the Amur and Eurasian Arctic drainages and has declined across Russia, Mongolia, and China due to overfishing, habitat degradation, water-quality pressures, and barrier effects; large adults are now rare in many historical reaches, and contractions have been reported from dammed rivers in western Russia and mining-affected waters in Mongolia (Ocock et al. 2006; Gilroy et al. 2010). In European transboundary catchments, some *Coregonus* and *Salmo* populations cross national borders, meeting the migratory criterion where threat status is also elevated; Appendix II measures could focus on

thermal refugia, gravel-spawning habitat, and cumulative hydropower effects that operate across boundaries (Ocock et al. 2006).

Anguillid eels (Anguilla; family Anguillidae)
These catadromous fishes link inland waters across multiple jurisdictions to oceanic spawning areas, creating inherently transboundary stocks that meet the migratory criterion and face unfavourable conditions in many places due to passage barriers, turbine mortality, exploitation of juvenile and adult stages, and changing ocean conditions (Yang et al. 2024). Because many ranges already include at least two Parties, coordinated Appendix II action can align inland passage standards, regulate life-stage-specific fisheries, and harmonize recruitment and escapement monitoring across countries, including Small Island States in Oceania where connectivity spans multiple sovereignties (Yang et al. 2024).

Clupeid shads in the subfamily Alosinae (Alosa, Tenualosa; family Clupeidae)
These anadromous migrants form shared estuary–river stocks and undertake seasonal runs into transboundary systems, with hilsa shad serving as a prominent example in South Asia, thereby meeting the migratory and shared-stock criteria and showing unfavourable conditions where exploitation and flow alteration are intense (Zapata and Usma 2013; Herrera-R et al. 2023). *Tenualosa ilisha* supports major fisheries in the Ganges, Brahmaputra and Meghna system shared by Bangladesh and India, and the strength and timing of runs and recruitment are sensitive to flow, salinity and estuarine habitat management across borders, reinforcing the value of coordinated measures where Parties co-occur (Zapata and Usma 2013). In shared Party waters, Appendix II approaches can harmonize seasonal closures, mesh regulation and environmental-flow management to protect upriver spawning tributaries and estuarine nursery conditions (Zapata and Usma 2013; Herrera-R et al. 2023).

Mahseer and allied mountain cyprinids (Tor, Neolissochilus, Naziritor; family Cyprinidae)
These riverine fishes execute upstream migrations from larger main stems into headwater tributaries to spawn and return downstream to feeding habitats, forming transboundary stocks across the Himalayan region and experiencing multiple pressures that indicate unfavourable status in portions of their ranges (Malik and Negi 2007; Jayaram 2005). *Tor putitora* is shared among Afghanistan, Pakistan, India, Nepal, Bhutan, Bangladesh, Sri Lanka and neighbouring countries, and faces overfishing, aggregate extraction, and the cumulative effects of dam cascades that fragment corridors and alter flow and temperature cues essential to migration (Malik and Negi 2007). Where two or more Parties share stocks, Appendix II measures can set performance targets for passage, protect spawning tributaries, coordinate dry-season environmental flows and regulate harvest of pre-spawning adults. In non-Party reaches, transboundary river agreements can advance similar measures pending accession (Malik and Negi 2007; Jayaram 2005).

Mullets, barbels, snowtrout, gobies, stingrays
Mullets are amphidromous migrants that link coastal and riverine habitats and form shared stocks across estuaries, implying benefits from coordinated management of tidal barrages and coastal–river connectivity where Parties overlap (Herrera-R et al. 2023). European barbels in *Luciobarbus* and African small barbs in *Enteromius* are potamodromous river specialists whose cross-border movements are impeded by weirs and medium dams, suggesting value in harmonized barrier mitigation across shared catchments (Herrera-R et al. 2023). Himalayan and Asian snowtrouts in *Schizothorax* depend on cold, fast-flowing reaches and exhibit seasonal movement patterns tied to flow and temperature that cross political boundaries, while amphidromous *Sicydium* gobies demonstrate headwater–estuary life cycles on tropical islands where numerous small barriers interrupt connectivity across jurisdictions (Herrera-R et al. 2023; Yang et al. 2024). Freshwater

stingrays in *Dasyatidae* in Asia occupy floodplain channels and sand-bottom habitats exposed to dredging and altered flows, with multiple countries sharing populations in large basins, reinforcing the need for transboundary measures (Carolsfeld et al. 2003; Herrera-R et al. 2023).

5.3 Priority river basins

5.3.1 Amazon basin (South America)

The Amazon supports basin-scale movements among large catfishes and characiforms, with connectivity extending from headwater spawning areas to extensive floodplain nurseries, often crossing national boundaries. Shared stocks are maintained by long, unbroken main-stem corridors and predictable hydro-climatic cycles. Recent pressures from hydropower cascades, channel dredging and large-mesh fisheries have increased risks to migratory adults and drifting larvae in transboundary segments, indicating unfavourable trajectories for several taxa (Carolsfeld et al. 2003). Cooperative measures should prioritize protection of bottleneck corridors used during adult migrations, safeguarding and mapping larval drift routes, and joint monitoring of passage efficiency and survival at existing and planned dams along international reaches (Carolsfeld et al. 2003). Within an Appendix II instrument, Parties could coordinate seasonal fishing regulations during upriver movements, standardize gear restrictions that minimize bycatch of large migrants, and align environmental-flow regimes to preserve floodplain inundation patterns critical for recruitment (Carolsfeld et al. 2003). Because several major tributaries cross borders shortly upstream of high-value floodplains, early protection of those nodes can deliver basin-wide benefits disproportionate to the geographic scope of the intervention (Carolsfeld et al. 2003).

5.3.2 La Plata and Paraná system (South America)

This system supports multiple long-distance, transboundary migrants among the large pimelodid catfishes and migratory characids and serrasalmids, with population connectivity spanning Argentina, Brazil, Paraguay, Uruguay and Bolivia. Priority species in this basin include *Brycon orbignyanus*, *Genidens barbus* and *Zungaro jahu*. Evidence of shared stocks and unfavourable status is strong: repeated reports of declines and local extirpations for *Pseudoplatystoma* and *Zungaro*, and sharp reductions in long-distance migrants such as *Salminus* and *Brycon* linked to barrier effects, floodplain disconnection and heavy exploitation during upriver movements (Agostinho et al. 2003; Carolsfeld et al. 2003; Quirós 2003). An Appendix II framework among Parties could coordinate seasonal closures on spawning runs, implement passage performance standards at priority dams in migration corridors, protect and restore floodplain nurseries, and align environmental-flow releases to maintain larval drift and recruitment pulses (Agostinho et al. 2003; Carolsfeld et al. 2003; Quirós 2003). Complementary actions include joint stock assessment protocols, genetic stock identification across jurisdictions and transboundary bycatch reduction in mixed-species fisheries where large migrants are vulnerable during pre-spawning aggregations (Agostinho et al. 2003; Quirós 2003). Where upriver and downriver segments are split by international borders, shared fishery-independent indices and coordinated compliance can reduce the risk of serial depletion along the migratory pathway (Carolsfeld et al. 2003).

5.3.3 Danube basin (Europe)

The Danube links a large number of Parties and supports assemblages of potamodromous cypriniforms that move across national boundaries to complete migrations between main-stem corridors, tributary spawning reaches and floodplain nurseries. These shared stocks have been fragmented by historical channelization, extensive weir and dam construction, and altered

sediment regimes, with documented population contractions and range breaks in several taxa consistent with unfavourable status (Ocock et al. 2006). Priority measures include restoring longitudinal connectivity at strategic barriers on the main-stem and key tributaries, re-establishing sediment continuity to stabilize spawning gravels, and coordinating environmental flows to reconnect floodplains and migration cues across borders (Ocock et al. 2006). Under Appendix II, Parties could formalize shared monitoring of run timing and recruitment, coordinated barrier-retrofit standards keyed to large-bodied migrants, and harmonized harvest regulations in transboundary reaches where cross-jurisdictional fisheries target pre-spawning adults (Ocock et al. 2006). Early actions should focus on high-payoff nodes where barrier removal or effective fish passage would reopen long river lengths while securing floodplain habitats with high juvenile-rearing value (Ocock et al. 2006).

5.3.4 Mekong basin (mainland Southeast Asia)

The Mekong concentrates many high-priority migrants that meet the criteria for listing, including pangasiid catfishes and long-lived megacarps, with shared stocks spanning Cambodia, Lao People's Democratic Republic, Thailand and Viet Nam. Evidence includes seasonal long-distance migrations of adults along the main stem, predictable spawning congregations at deep pools and transboundary larval drift into floodplain nurseries, accompanied by widespread declines in catch per fisher and reductions of large adults indicative of unfavourable status (Ngor et al. 2018). Although membership gaps currently limit formal Convention involvement, technical measures can proceed through the river commission and sub-regional agreements, including the establishment of deep-pool sanctuaries at known spawning sites, coordinated seasonal closures synchronized with monsoon hydrographs, and transboundary environmental-flow rules that preserve larval drift windows and temperature cues (Ngor et al. 2018). Where Party coverage exists, Appendix II instruments could standardize bycatch mitigation in barrage and bagnet fisheries, harmonize monitoring of recruitment pulses in the Tonle Sap system, and evaluate cumulative impacts of new barriers on cross-border movements with shared decision frameworks for fish passage and sediment management (Ngor et al. 2018).

5.3.5 Himalayan rivers: Ganges, Brahmaputra, Meghna and Indus systems

Anadromous and potamodromous migrants cross borders in these systems, with hilsa shad in the Ganges–Brahmaputra–Meghna and mahseer in Indus and Ganges tributaries providing clear examples of shared stocks and unfavourable trends where exploitation and barrier effects are intense. Hilsa migrations connect estuarine and riverine habitats across Bangladesh and India, and recruitment is sensitive to flow, salinity and estuarine management that operate across jurisdictions (Zapata and Usma 2013). Mahseer make upstream spawning runs into headwater tributaries and return to larger rivers for adult feeding, with cumulative impacts from dam cascades, aggregate extraction and targeted fishing reducing connectivity and spawning success in shared river reaches (Malik and Negi 2007). For Parties in these basins, Appendix II measures can align seasonal closures at upriver and estuarine nodes, protect and restore high-value tributary spawning habitats, and coordinate dry-season environmental flows to maintain migration cues and thermal regimes. Joint data collection on run timing, larval drift and juvenile recruitment can underpin adaptive regulation across borders (Zapata and Usma 2013; Malik and Negi 2007). Where non-Party jurisdictions are central to migration pathways, transboundary river agreements can advance compatible measures while accession is pursued (Zapata and Usma 2013; Malik and Negi 2007).

5.3.6 Oceania: regional eel corridors across island states

Anguillid eels in Oceania exhibit catadromous life cycles that connect multiple small island states through shared oceanic spawning areas and widespread freshwater growth habitats, forming inherently transboundary stocks. These species meet the migratory criterion and show unfavourable conditions where inland barriers and turbines reduce passage survival, life-stage fisheries target glass eels and yellow eels, and oceanic variability affects recruitment (Yang et al. 2024). A regional eel measure could standardize inland passage design and screening at intakes, harmonize season and size regulations across countries, and coordinate monitoring of recruitment pulses and silver eel escapement, building a shared evidence base to assess population status and the benefits of management (Yang et al. 2024). Because many islands are Parties, an Appendix II instrument could rapidly establish a common technical framework, while non-Party neighbours can be engaged through regional fisheries bodies and memoranda of cooperation pending accession (Yang et al. 2024).

6 ADDITIONAL SPECIES THAT MAY BENEFIT FROM CMS LISTING: A CASE STUDY OF MIGRATORY FISH OF THE AMAZON

6.1 Introduction and approach

To identify additional species that may benefit from CMS listing, an Amazon-specific assessment was undertaken that integrated a targeted review of recent scientific literature with consultation from regional experts. Using the CMS definition of migratory taxa (members of a population that cyclically and predictably cross one or more national jurisdictions), candidate species were compiled from four recent syntheses, taxonomic names were standardized, and taxa occurring solely outside the Amazon (for example, restricted to the Tocantins) were excluded. Conservation status was then evaluated against national Red Lists for Bolivia, Colombia, Peru, Ecuador and Brazil, as well as the IUCN Red List categories (CR, EN, VU, NT, DD) and ‘Decreasing’ population trends; evidence from recent decline studies was incorporated to capture additional at-risk taxa. The resulting list prioritizes species of unfavourable conservation status that undertake transboundary migrations and are most likely to benefit from coordinated international management under CMS.

6.2 Summary of results and candidate list

The report included expert assessment of 33 migratory freshwater fishes, identifying 20 migratory freshwater fishes that meet the CMS rationale: documented transboundary movements/shared stocks, unfavourable conservation concerns, and clear benefit from international cooperation. The set is dominated by long-distance siluriforms (e.g., *Brachyplatystoma filamentosum*, *B. juruense*, *B. capapretum*, *B. platynemum*; *Pseudoplatystoma tigrinum*; *Phractocephalus hemioliopterus*; *Pinirampus pirinampu*; *Platynematichthys notatus*; *Sorubim lima*; *Sorubimichthys planiceps*; *Zungaro zungaro*), medium- to long-distance characiforms (e.g., *Brycon amazonicus*, *B. falcatus*, *B. melanopterus*; *Prochilodus nigricans*; *Semaprochilodus insignis*; *Leporinus fasciatus*, *L. friderici*), and widely exploited serrasalmids (*Colossoma macropomum*, *Piaractus brachypomus*). Together, these species illustrate the principal management needs for CMS action in the Amazon system: basin-scale connectivity (barrier mitigation and flow management), coordinated seasonal closures for mixed-stock fisheries, bycatch controls, and shared monitoring/tagging to track cross-border movements and recruitment. The underlying evidence base synthesizes migration distances (often 100–1,500+ km, and more than 3,000–4,000 km for some Brachyplatystoma), shared-stock structure, and fishery or population declines documented in basin-wide studies and national assessments.

6.3 Full candidate list of Amazonian fish that meet the criteria for listing on CMS

Table 3: Priority Amazon migratory fishes meeting CMS Appendix II screening criteria. (Listed species satisfy all four filters used in the assessment: (i) evidence of migratory behaviour (transboundary movements or shared stocks); (ii) unfavourable conservation status or declining trend; (iii) clear expected benefit from international cooperation – e.g., coordinated fisheries measures, connectivity, joint monitoring).

Order	**Family**	**Species**
Characiformes	Bryconidae	*Brycon amazonicus; Brycon falcatus; Brycon melanopterus*
	Anostomidae	*Leporinus fasciatus; Leporinus friderici*
	Prochilodontidae	*Prochilodus nigricans; Semaprochilodus insignis*
	Serrasalmidae	*Colossoma macropomum; Piaractus brachypomus*
Siluriformes	Pimelodidae	*Brachyplatystoma capapretum; Brachyplatystoma filamentosum; Brachyplatystoma juruense; Brachyplatystoma platynemum; Pseudoplatystoma tigrinum; Phractocephalus hemioliopterus; Pinirampus pirinampu; Platynematichthys notatus; Sorubim lima; Sorubimichthys planiceps; Zungaro zungaro*

6.4 Notes on representative taxa

Brycon amazonicus and close congeners undertake medium- to long-distance basin migrations (commonly exceeding 500 km) and show signals of overfishing or vulnerability to growth overfishing. *Arapaima gigas* is Data Deficient globally but Vulnerable in several national assessments and listed on CITES Appendix II, with documented catch declines in parts of the Peruvian Amazon. Several *Brachyplatystoma* species exhibit continent-scale life histories, with spawning concentrated in the western Amazon and larval or juvenile drift to central and eastern nurseries, crossing multiple national jurisdictions. Collectively, the Amazon case study refines and expands the global shortlist by adding taxa substantiated through basin-specific movement ecology, fishery trends and expert review, yielding a set of 33 species for consideration under CMS Appendix II.

7 OPTIONS FOR MANAGEMENT OF TRANSBOUNDARY FRESHWATER FISH

7.1 International cooperation

International agreements and cooperation are long established for marine species, where many taxa routinely cross borders or use areas beyond national jurisdiction. Comparable cooperation for inland waters has lagged, in part because freshwater ecosystems have often been viewed as a matter of exclusive national sovereignty. Yet where stocks migrate across borders or are shared within international lakes and rivers, governance gaps leave migratory freshwater fishes vulnerable to overfishing (including at spawning sites and along corridors), loss of habitat and connectivity, and alteration of river regimes (flow, temperature, water quality).

CMS provides the only global convention designed specifically to facilitate the conservation and management of migratory species, including freshwater fishes. Although CMS membership is incomplete in some regions, its instruments can engage non-Parties and collaborate with other multilateral processes to deliver basin-scale outcomes.

7.2 Complementary pathways under CMS

Parties and non-Party Range States can combine the following CMS avenues to match regional context and readiness. They are complementary rather than sequential.

1. *Species listings on the CMS Appendices*:
   Use Appendix I for taxa at immediate risk where strict protection and bycatch reduction are needed; use Appendix II for taxa requiring coordinated management across borders (e.g., shared stocks, corridor safeguards, harmonized harvest and trade rules). Listings can be proposed singly or as assemblages when ecologies and pressures are shared.
2. *Single or Multi-Species Action Plans:*
   Time-bound plans annexed to a COP resolution can set basin-wide objectives, identify priority corridors and bottlenecks, specify measures for sustainable fisheries and trade, establish monitoring and reporting, and designate coordinating bodies.
3. *Memoranda of Understanding (MOUs) under Articles IV/V:*
   Non-legally binding frameworks that allow participation by Range States irrespective of CMS Party status. MoUs usually establish Meetings of Signatories, Technical Advisory Groups and rolling workplans, and can add species over time.
4. *Concerted Actions (CAs):*
   Focused, time-bound cooperation to deliver tangible field results (e.g., corridor mitigation pilots, harmonized closures, standardized monitoring, pollution-hotspot action). CAs are well suited as early, demonstrable steps and can bridge to Action Plans or MOUs.
5. *Integration with cross-cutting CMS themes.*
   Freshwater fish initiatives should be embedded in CMS work on migratory connectivity, bycatch mitigation, and linear infrastructure, including providing technical guidance on fish passage and screening, environmental flows linked to migration and larval drift, and mixed-stock fishery management.

7.3 Collaboration with the Convention on Biological Diversity (CBD)

CBD provides the overarching framework for biodiversity conservation and explicitly recognizes states' responsibilities to avoid transboundary harm. The Kunming-Montreal Global Biodiversity Framework (GBF), adopted on 19 December 2022, sets out the goals and targets for achieving a world living in harmony with nature by 2050. CMS actions for migratory fishes can support the implementation of the GBF, particular in relation to ecological connectivity, ecosystem restoration, sustainable use, area-based conservation, and the generation and sharing of knowledge. Joint work can include aligning indicators, co-designing connectivity strategies in river basins, and leveraging CBD National Biodiversity Strategies and Action Plans (NBSAPs) to support CMS measures for the conservation of fish.

7.4 Collaboration with CITES

CITES regulates international trade that could threaten species. Many migratory freshwater fishes of CMS interest (e.g., sturgeons, eels) also intersect with CITES processes. Joint approaches can align traceability, catch/trade documentation, IUU risk-based controls and recovery planning. Regional fishery commissions and bilateral bodies (e.g., in the Amur/Heilongjiang, Caspian, Azov, and lower Danube/Black Sea regions) illustrate how trade, harvest control and habitat measures can be coordinated for shared stocks.

7.5 Regional river-basin organizations

Agreements such as the Mekong Agreement and its Mekong River Commission demonstrate how basin organizations can convene states to coordinate water management, flows, connectivity and fisheries. Partnerships between CMS instruments and basin organizations can add species-level focus at modest cost by embedding migration assessments in hydropower planning, setting basin-wide environmental-flow rules and standardizing monitoring across borders.

7.6 The IUCN Red List Programme and expert networks

The IUCN Red List provides authoritative, regularly updated assessments of extinction risk and access to a global expert network. CMS proponents can use these assessments as the starting point to identify taxa of unfavourable status, commission gap-filling workshops on migratory behaviour and stock structure, and develop evidence packages for listings and Action Plans.

7.7 The FAO Code of Conduct for Responsible Fisheries

The FAO Code offers widely endorsed principles relevant to transboundary management. Of particular relevance:

- Article 6.12 urges cooperation at sub-regional, regional and global levels to ensure conservation and compatible measures across jurisdictions.
- Article 7.1.3 calls for states sharing transboundary stocks to cooperate – potentially via bilateral, sub-regional or regional organizations – to ensure effective conservation and management.

CMS fish instruments can cite the Code when developing harvest controls, bycatch mitigation and governance arrangements.

7.8 Illustrative application

For *Brachyplatystoma rousseauxii* and *B. vaillantii* (already listed on Appendix II) and other long-distance Amazon catfishes, CMS partners can choose one or more of the following available options, adapting scope and pace to Range State readiness:

- Action Plan (multi- or single-species): define objectives, map and safeguard priority corridors and bottlenecks, align seasonal/size/gear rules and bycatch reduction, develop catch/trade documentation, address mercury and sediment hotspots, and implement a standardized basin monitoring system (telemetry, genetics/otoliths, eDNA, fishery-dependent indices) with open data sharing.
- MOU: enable participation of all Range States (including non-Parties), establish Meetings of Signatories and a Technical Advisory Group, adopt rolling 2–3-year workplans and create a coordination mechanism for connectivity.
- Concerted Action: launch targeted projects addressing issues such as corridor mitigation at high-leverage reaches, harmonized harvest/trade measures at key landings, and pollution-hotspot actions, paired with communications and capacity-building; use results to inform development of an MOU or Action Plan.

These approaches can be pursued individually or combined; all should align with existing regional initiatives (e.g., Amazon Cooperation Treaty Organization, FAO/Global Environment Facility programmes) and national policies.

7.9 Foundational measures that strengthen management of migratory fishes

Irrespective of instrument or basin, the following measures are consistently effective and should be mainstreamed across CMS freshwater fish work:

1. *Baselines and targets.* Compile current and historical abundance information and run/recruitment indices to underpin listings, set objectives and evaluate progress.
2. *Migration ecology and stock structure.* Expand knowledge of routes, timing, life-stage habitats and shared stocks to anticipate impacts of dams, harvest and habitat change.
3. *Connectivity and infrastructure.* Prevent new fragmentation, assess migration impacts in project planning, retrofit or remove high-impact barriers, and set environmental-flow regimes tied to migration and larval drift.
4. *Habitat quality and pollution.* Reduce land-based pollution (e.g., mercury, sediments), protect and restore floodplains and estuaries, and prevent invasive species spread.
5. *Cooperative monitoring and data sharing.* Establish transboundary monitoring networks, harmonize methods and indicators, and share data through agreed protocols to enable adaptive management.
6. *Inclusive governance.* Create cross-sector platforms (fisheries, water, energy, transport, environment), ensure participation and benefit sharing with Indigenous Peoples and local communities, and build enforcement and compliance capacity.

8 RECOMMENDATIONS

1. Listings and cooperation instruments

- Prepare proposals to amend the Appendices for high-readiness taxa (occurring in two or more Parties and assessed as CR/EN/VU/NT).
- Initiate cooperation instruments for listed species – Concerted Actions, Species Action Plans (single or multi-species) and MOUs – with clear workplans and technical advisory structures.

2. Technical governance and expert support

- Establish an expert technical working group to advise the Scientific Council on migratory freshwater fishes (status reviews, listings, connectivity guidance and monitoring standards).

3. Evidence and assessment priorities

- Resolve assessment gaps by working with IUCN and the expert group to compile evidence for NE, DD and LC (decreasing trend) species flagged as likely meeting CMS criteria.
- Undertake Green Status (Green List) assessments for CMS-listed freshwater fishes and priority candidates identified in this report.
- Produce a status report summarizing the current conservation status and management progress for Appendix I freshwater fishes.
- Commission a global status review of migratory marine bony fishes (teleosts), mirroring the freshwater approach, to inform potential cross-realm actions.

4. Regional priorities

- Conduct targeted regional reviews (with expert consultation) in basins and regions with numerous transboundary migrants.
- Engage Lower Mekong countries to explore pathways for coordinated management and potential accession/participation in CMS instruments.
- Initiate a structured review for Africa, where transboundary migrants are under-represented in current analyses and data gaps are likely.

5. Integrating freshwater fishes within CMS thematic areas

- Integrate freshwater fishes into CMS decisions, resolutions, working groups, and cross-cutting initiatives on ecological connectivity, linear infrastructure and bycatch reduction.
- Contribute a dedicated freshwater fishes module to the *Atlas of Animal Migration* and incorporate key findings into *State of the World's Migratory Species* and related CMS communication products.

6. Coordination with other conventions and partners

- Undertake a gap analysis of activities undertaken by CITES, CBD, FAO, IUCN and river-basin organizations to identify where CMS adds the most value and to align actions on monitoring, connectivity safeguards and sustainable harvest/trade.

9 CONCLUSIONS

This assessment confirms that many migratory freshwater fishes meet the criteria for listing on the CMS Appendices: they undertake transboundary movements or form shared stocks and face unfavourable conservation status. Using a global dataset, complemented by basin-specific literature and expert input for the Amazon, we identify priority species and species groups, where they occur, and which meet CMS criteria for cooperative action. Threat patterns are consistent across regions. Loss of ecological connectivity, unsustainable harvest and trade, habitat degradation, and pollution drive declines, while opportunities for coordinated recovery are strongest where species occur in several countries and would benefit from cooperative management.

CMS can serve as an effective mechanism for the management and conservation of migratory freshwater fish by establishing baselines and shared indicators; improving knowledge of migration routes and stock structure; maintaining or restoring connectivity and environmental flows; reducing habitat degradation and pollution; and building inclusive, cross-sector governance with data sharing and participation by Indigenous Peoples and local communities. Collaboration with CBD, CITES, river-basin organizations, FAO processes and the IUCN Red List network can expand capacity and align incentives.

CMS offers a practical toolbox to address these needs. Appendix listings can focus attention and enable cooperative management; Action Plans and MoUs provide structured programmes that align fisheries measures, corridor safeguards, monitoring and reporting; and Concerted Actions can catalyse near-term action. Embedding freshwater fish within CMS themes on migratory connectivity and linear infrastructure strengthens coherence across taxa and basins.

The annexes to Document UNEP/CMS/COP15/Doc.25.6.1 provide the underlying species lists, model texts for cooperation instruments, and technical guidance to support Parties and partners. Taken together, these components offer an enduring framework for CMS to help secure migratory freshwater fishes over the coming decade.

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ANNEX A. MIGRATORY FRESHWATER FISHES THAT MEET THE CRITERIA FOR LISTING ON CMS

The full spreadsheet is available here.

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Aaptosyax grypus	Cyprinidae / Cypriniformes	CR	Mekong	Cambodia; Laos; Thailand
Acipenser oxyrinchus	Acipenseridae / Acipenseriformes	VU	Narva; Neman; Neva; Oder; Pregolya; Saint John (North America)	Canada; Estonia; Finland; Germany; Lithuania; Poland; Russia; Russia (Kaliningrad); United States of America
Acipenser transmontanus	Acipenseridae / Acipenseriformes	VU	Columbia; Skagit	Canada; United States of America
Ageneiosus pardalis	Auchenipteridae / Siluriformes	LC	Catatumbo	Colombia; Venezuela
Albula vulpes	Albulidae / Albuliformes	NT	Artibonite; Belize; Candelaria; Coco; Grijalva; Hondo; Motagua; San Juan; Sarstoon; Sixaola	Belize; Costa Rica; Dominican Republic; Guatemala; Haiti; Honduras; Mexico; Nicaragua; Panama
Alburnus sarmaticus	Leuciscidae / Cypriniformes	EN	Danube	Bulgaria; Moldova; Romania; Ukraine
Alburnus scoranza	Leuciscidae / Cypriniformes	NT	Buna; Vjosa	Kosovo[2]; Montenegro; North Macedonia
Alosa aestivalis	Alosidae / Clupeiformes	VU	Saint Croix	Canada; United States of America
Alosa alosa	Alosidae / Clupeiformes	CR	Douro; Foyle; Guadiana; Lima; Minho; Newry; Rhine; Vida	Denmark; France; Germany; Ireland; Netherlands; Portugal; Spain; United Kingdom
Alosa caspia	Alosidae / Clupeiformes	LC	Volga	Kazakhstan; Russia
Alosa immaculata	Alosidae / Clupeiformes	LC	Danube; Dniestr	Bulgaria; Moldova; Romania; Serbia; Ukraine
Alosa tanaica	Alosidae / Clupeiformes	LC	Coruh; Danube	Bulgaria; Georgia; Moldova; Romania; Türkiye; Ukraine
Altigena elegans	Cyprinidae / Cypriniformes	NT	Mekong	Laos; Thailand
Altigena yunnanensis	Cyprinidae / Cypriniformes	DD	Mekong; Salween	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Ambastaia nigrolineata	Botiidae / Cypriniformes	VU	Mekong	Cambodia; China; Laos; Thailand; Vietnam

[1] These species were selected according to the precautionary principle. Least Concern species were only included if they had a declining trend.
[2] All references to Kosovo in this document shall be understood in full compliance with United Nations Security Council Resolution 1244/99 and without prejudice to its status.

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Anaecypris hispanica	Leuciscidae / Cypriniformes	NT	Guadiana	Portugal; Spain
Anguilla bengalensis	Anguillidae / Anguilliformes	NT	Abbe-Awash; Amu Darya; Buzi; Congo; Dakatia; Dasht; Feni; Ganges-Brahmaputra-Meghna; Helmand; Incomati; Indus; Irrawaddy; Jubba; Kaladan; Karnaphuli; Lake Chilwa; Lake Rukwa; Limpopo; Maputo; Matamuhuri; Mekong; Naf; Natron; Nile; Okavango; Orange; Pakchan; Pangani; Rann of Kutch; Ruvuma; Salween; Save; Tarim; Turkana; Umba; Umbeluzi; Zambezi	Afghanistan; Bangladesh; Bhutan; Botswana; Burundi; China; Democratic Republic of Congo; Djibouti; Eritrea; Eswatini; Ethiopia; India; Iran; Kenya; Laos; Lesotho; Malawi; Mozambique; Myanmar; Namibia; Nepal; Pakistan; Rwanda; Somalia; South Africa; South Sudan; Sudan; Tajikistan; Tanzania; Thailand; Uganda; Zambia; Zimbabwe
Anguilla bicolor	Anguillidae / Anguilliformes	NT	Abbe-Awash; Beilun; Buzi; Ca/Lam/Song-Koi; Congo; Dakatia; Digul; Feni; Fly; Ganges-Brahmaputra-Meghna; Giang Thanh; Golok; Han; Incomati; Irrawaddy; Jubba; Kaladan; Karnaphuli; Lake Chilwa; Lake Rukwa; Limpopo; Ma; Mamberano; Maputo; Matamuhuri; Mekong; Merauke; Naf; Natron; Nile; Orange; Pakchan; Pangani; Pearl; Rann of Kutch; Red/Song Hong; Ruvuma; Saigon/Song Nha Be; Salween; Sambas; Save; Sembakung; Sepik; Song Vam Co Dong; Turkana; Umba; Umbeluzi; Yalu; Zambezi	Bangladesh; Bhutan; Burundi; Cambodia; China; Democratic Republic of Congo; Djibouti; Eswatini; Ethiopia; India; Indonesia; Kenya; Laos; Lesotho; Malawi; Malaysia; Mozambique; Myanmar; Nepal; North Korea; Pakistan; Papua New Guinea; Rwanda; Somalia; South Africa; South Korea; South Sudan; Tanzania; Thailand; Uganda; Vietnam; Zambia; Zimbabwe
Anguilla borneensis	Anguillidae / Anguilliformes	VU	Sembakung	Indonesia; Malaysia
Anguilla celebesensis	Anguillidae / Anguilliformes	DD	Sembakung	Indonesia; Malaysia
Anguilla interioris	Anguillidae / Anguilliformes	DD	Mamberano; Sepik	Indonesia; Papua New Guinea
Anguilla japonica	Anguillidae / Anguilliformes	EN	Beilun; Han; Pearl; Red/Song Hong	China; North Korea; South Korea; Vietnam
Anguilla megastoma	Anguillidae / Anguilliformes	DD	Digul; Fly; Mamberano; Merauke; Sepik	Indonesia; Papua New Guinea
Anguilla mossambica	Anguillidae / Anguilliformes	NT	Buzi; Congo; Incomati; Jubba; Lake Chilwa; Lake Rukwa; Limpopo; Maputo; Natron; Nile; Orange; Pangani; Ruvuma; Save; Turkana; Umba; Umbeluzi; Zambezi	Burundi; Democratic Republic of Congo; Eswatini; Ethiopia; Kenya; Lesotho; Malawi; Mozambique; Rwanda; Somalia; South Africa; South Sudan; Tanzania; Uganda; Zambia; Zimbabwe
Anguilla obscura	Anguillidae / Anguilliformes	DD	Digul; Fly; Mamberano; Merauke; Sepik	Indonesia; Papua New Guinea
Anguilla rostrata	Anguillidae / Anguilliformes	EN	Artibonite; Barima; Candelaria; Catatumbo; Changuinola; Coco; Hondo; Motagua; Orinoco; Rio Grande (North America); Saint Croix; Saint John	Belize; Canada; Colombia; Costa Rica; Dominican Republic; Guatemala; Guyana; Haiti; Honduras; Mexico; Nicaragua; Panama; United States of America; Venezuela

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
			(North America); Saint Lawrence; San Juan; Sarstoon; Sixaola	
Aplochiton taeniatus	Galaxiidae / Galaxiiformes	LC	Puelo; Valdivia	Argentina; Chile
Arabibarbus grypus	Cyprinidae / Cypriniformes	VU	Tigris-Euphrates/Shatt al Arab	Iran; Iraq; Syria
Arapaima gigas	Arapaimidae / Osteoglossiformes	DD	Amazon; La Plata	Bolivia; Brazil; Colombia; Ecuador; Guyana; Peru
Arius maculatus	Ariidae / Siluriformes	NE	Mekong	Cambodia; Vietnam
Aspiolucius esocinus	Cyprinidae / Cypriniformes	EN	Amu Darya; Syr Darya	Afghanistan; Kyrgyzstan; Tajikistan; Turkmenistan; Uzbekistan
Astyanax symmetricus	Acestrorhynchidae / Characiformes	DD	Amazon	Brazil; Colombia; Peru
Atherina boyeri	Atherinidae / Atheriniformes	LC	Bidasoa; Buna; Guadiana; Minho; Neretva	Albania; Bosnia and Herzegovina; Croatia; France; Montenegro; Portugal; Spain
Auchenipterus nuchalis	Auchenipteridae / Siluriformes	LC	Amazon; Courantyne; Essequibo; Maroni; Orinoco; Oyapock	Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Peru; Suriname; Venezuela
Bagarius bagarius	Sisoridae / Siluriformes	VU	Ganges-Brahmaputra-Meghna; Indus; Rann of Kutch	Afghanistan; Bangladesh; Bhutan; China; India; Myanmar; Nepal; Pakistan
Bagarius rutilus	Sisoridae / Siluriformes	DD	Ca/Lam/Song-Koi; Ma; Pearl; Red/Song Hong	China; Laos; Vietnam
Bagarius suchus	Sisoridae / Siluriformes	NT	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Bagarius yarrelli	Sisoridae / Siluriformes	VU	Ganges-Brahmaputra-Meghna; Mekong	Bangladesh; Cambodia; India; Laos; Myanmar; Nepal; Thailand; Vietnam
Bagrichthys majusculus	Bagridae / Siluriformes	DD	Mekong	Laos; Thailand
Barbus plebejus	Cyprinidae / Cypriniformes	NT	Po; Soca	Italy; Slovenia; Switzerland
Barbus prespensis	Cyprinidae / Cypriniformes	NT	Vjosa	Albania; Greece
Brachymystax lenok	Salmonidae / Salmoniformes	LC	Amur; Burla; Han; Karasuk-Studenoye; Malinovoye; Ob; Sujfun; Torey Lakes; Tumen; Ul Kensor; Uureg; Uvs/Ubsa-Nur; Yalu; Yenisey	China; Kazakhstan; Mongolia; North Korea; Russia; South Korea
Brachyplatystoma capapretum	Pimelodidae / Siluriformes	NT	Amazon	Brazil; Colombia; Peru
Brachyplatystoma filamentosum	Pimelodidae / Siluriformes	LC	Amazon; Courantyne; Essequibo; Maroni; Orinoco; Oyapock	Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Peru; Suriname; Venezuela

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Brycinus leuciscus	Alestidae / Characiformes	LC	Aby Lagoon-Bia-Tano; Chad; Corubal; Gambia; Geba; Komoe; Mono; Niger; Senegal; Volta	Benin; Burkina Faso; Cameroon; Chad; Côte d'Ivoire; Gambia; Ghana; Guinea; Guinea-Bissau; Mali; Mauritania; Niger; Nigeria; Senegal; Togo
Brycon atrocaudatus	Bryconidae / Characiformes	LC	Amazon; Chira; Tumbes; Zarumilla	Ecuador; Peru
Brycon orbignyanus	Bryconidae / Characiformes	EN	La Plata	Argentina; Brazil; Paraguay; Uruguay
Brycon whitei	Bryconidae / Characiformes	LC	Orinoco	Colombia; Venezuela
Capoeta barroisi	Cyprinidae / Cypriniformes	EN	Orontes	Syria; Türkiye
Catlocarpio siamensis	Cyprinidae / Cypriniformes	CR	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Catostomus platyrhynchus	Catostomidae / Cypriniformes	LC	Columbia; Mississippi; Skagit	Canada; United States of America
Chanda nama	Ambassidae / Perciformes	LC	Dakatia; Ganges-Brahmaputra-Meghna; Indus; Karnaphuli	Bangladesh; India; Nepal; Pakistan
Channa argus	Channidae / Anabantiformes	LC	Amur	China; Russia
Channa barca	Channidae / Anabantiformes	DD	Ganges-Brahmaputra-Meghna	Bangladesh; India
Chelon auratus	Mugilidae / Mugiliformes	NT	An Nahr Al Kabir; Besor; Bidasoa; Buna; Coruh; Danube; Erne; Foyle; Guadiana; Iddefjord; Lima; Maritsa; Minho; Neretva; Newry; Senegal; Vida	Albania; Bosnia and Herzegovina; Croatia; Denmark; France; Georgia; Germany; Greece; Ireland; Israel; Lebanon; Mauritania; Montenegro; Norway; Portugal; Romania; Senegal; Spain; State of Palestine; Sweden; Syria; Türkiye; Ukraine; United Kingdom
Chelon dumerili	Mugilidae / Mugiliformes	DD	Kunene; Mono; Oueme; Senegal	Angola; Benin; Mauritania; Namibia; Nigeria; Senegal; Togo
Chelon labrosus	Mugilidae / Mugiliformes	NT	An Nahr Al Kabir; Besor; Bidasoa; Buna; Coruh; Danube; Erne; Foyle; Gambia; Guadiana; Iddefjord; Lima; Maritsa; Minho; Neretva; Newry; Senegal; Vida	Albania; Bosnia and Herzegovina; Croatia; Denmark; France; Gambia; Georgia; Germany; Greece; Ireland; Israel; Lebanon; Mauritania; Montenegro; Norway; Portugal; Romania; Senegal; Spain; State of Palestine; Sweden; Syria; Türkiye; Ukraine; United Kingdom
Chelon ramada	Mugilidae / Mugiliformes	NT	An Nahr Al Kabir; Besor; Bidasoa; Buna; Coruh; Danube; Erne; Foyle; Guadiana; Iddefjord; Lima; Maritsa; Minho; Neretva; Newry; Senegal; Vida	Albania; Bosnia and Herzegovina; Croatia; Denmark; France; Georgia; Germany; Greece; Ireland; Israel; Lebanon; Mauritania; Montenegro; Norway; Romania; Senegal; Spain; State of Palestine; Portugal; Sweden; Syria; Türkiye; Ukraine; United Kingdom

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Chelon richardsonii	Mugilidae / Mugiliformes	NE	Kunene; Okavango; Orange	Angola; Namibia; South Africa
Chelon saliens	Mugilidae / Mugiliformes	NT	Aby Lagoon-Bia-Tano; Akwayafe; An Nahr Al Kabir; Besor; Bidasoa; Buna; Cavally; Congo; Coruh; Danube; Great Scarcies; Guadiana; Mano; Maritsa; Mono; Neretva; Ntem; Oueme; Senegal	Albania; Angola; Benin; Bosnia and Herzegovina; Cameroon; Côte d'Ivoire; Croatia; Democratic Republic of Congo; Equatorial Guinea; France; Georgia; Ghana; Greece; Guinea; Israel; Lebanon; Liberia; Mauritania; Montenegro; Nigeria; State of Palestine; Portugal; Romania; Senegal; Sierra Leone; Spain; Syria; Togo; Türkiye; Ukraine
Chelon tricuspidens	Mugilidae / Mugiliformes	NE	Kunene	Angola; Namibia
Chilobrycon deuterodon	Characidae / Characiformes	NT	Tumbes	Ecuador; Peru
Chiloglanis bifurcus	Mochokidae / Siluriformes	CR	Incomati	Eswatini; South Africa
Chiloglanis emarginatus	Mochokidae / Siluriformes	VU	Incomati; Maputo; Umbeluzi	Eswatini; Mozambique; South Africa
Chitala blanci	Notopteridae / Osteoglossiformes	NT	Mekong	Cambodia; Laos; Thailand; Vietnam
Chondrostoma kinzelbachi	Leuciscidae / Cypriniformes	EN	An Nahr Al Kabir; Orontes; Tigris-Euphrates/Shatt al Arab	Lebanon; Syria; Türkiye
Chondrostoma nasus	Leuciscidae / Cypriniformes	NT	Danube; Dnieper; Dniestr; Elbe; IJsselmeer; Meuse; Neman; Oder; Pregolya; Rhine; Vistula	Kosovo; Liechtenstein; Lithuania; Luxembourg; Moldova; Montenegro; Netherlands; Poland; Romania; Russia; Russia (Kaliningrad); Serbia; Slovakia; Slovenia; Switzerland; Ukraine
Chondrostoma soetta	Leuciscidae / Cypriniformes	CR	Po	Italy; Switzerland
Chromobotia macracanthus	Botiidae / Cypriniformes	LC	Sambas; Sembakung	Indonesia; Malaysia
Cirrhinus jullieni	Cyprinidae / Cypriniformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Cirrhinus microlepis	Cyprinidae / Cypriniformes	VU	Mekong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Cirrhinus molitorella	Cyprinidae / Cypriniformes	NT	Mekong; Pearl; Red/Song Hong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; China; Laos; Thailand; Vietnam
Citharinus eburneensis	Citharinidae / Characiformes	LC	Aby Lagoon-Bia-Tano; Komoe	Burkina Faso; Côte d'Ivoire; Ghana
Clarias macrocephalus	Clariidae / Siluriformes	DD	Golok; Mekong; Pakchan; Song Vam Co Dong	Cambodia; Laos; Malaysia; Myanmar; Thailand; Vietnam
Clarias magur	Clariidae / Siluriformes	EN	Dakatia; Feni; Ganges-Brahmaputra-Meghna	Bangladesh; India

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Clarias meladerma	Clariidae / Siluriformes	LC	Golok; Sambas	Indonesia; Malaysia; Thailand
Clupisoma naziri	Ailiidae / Siluriformes	NT	Indus	Afghanistan; India; Pakistan
Coilia mystus	Engraulidae / Clupeiformes	EN	Han	North Korea; South Korea
Coilia nasus	Engraulidae / Clupeiformes	EN	Han; Tumen; Yalu	China; North Korea; Russia; South Korea
Coilia ramcarati	Engraulidae / Clupeiformes	DD	Naf	Bangladesh; Myanmar
Colossoma macropomum	Serrasalmidae / Characiformes	NT	Amazon; Catatumbo; Essequibo; La Plata; Orinoco	Bolivia; Brazil; Colombia; Guyana; Peru; Venezuela
Coregonus albula	Salmonidae / Salmoniformes	LC	Angerman; Barta; Daugava; Firth; Gauja; Gota alv; Iddefjord; Indalsalven; Kem; Kemi; Lielupe; Narva; Neman; Neva; Oder; Paatsjoki; Peschanaya; Pregolya; Torne; Ume; Venta; Vistula; Yukon	Belarus; Canada; Estonia; Finland; Germany; Russia (Kaliningrad); Latvia; Lithuania; Norway; Poland; Russia; Sweden; United States of America (Alaska)
Coregonus nelsonii	Salmonidae / Salmoniformes	NE	Yukon	Canada; United States of America (Alaska)
Coregonus pidschian	Salmonidae / Salmoniformes	LC	Burla; Copper; Ebeyty; Firth; Karasuk-Studenoye; Kem; Malinovoye; Naatamo; Ob; Paatsjoki; Tuloma; Ul Kensor; Yenisey; Yukon	Canada; China; Finland; Kazakhstan; Mongolia; Norway; Russia; United States of America (Alaska)
Coregonus tugun	Salmonidae / Salmoniformes	LC	Burla; Ebeyty; Karasuk-Studenoye; Ob; Ul Kensor; Yenisey	Kazakhstan; Mongolia; Russia
Cosmochilus harmandi	Cyprinidae / Cypriniformes	LC	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Cycleptus elongatus	Catostomidae / Cypriniformes	LC	Rio Grande (North America)	Mexico; United States of America
Cyclocheilichthys enoplos	Cyprinidae / Cypriniformes	LC	Mekong	Cambodia; Laos; Thailand; Vietnam
Cynoglossus gracilis	Cynoglossidae / Pleuronectiformes	DD	Han	North Korea; South Korea
Cyphocharax magdalenae	Curimatidae / Characiformes	LC	Catatumbo; Chiriqui Viejo	Colombia; Costa Rica; Panama; Venezuela
Cyprinion macrostomum	Cyprinidae / Cypriniformes	LC	Orontes; Tigris-Euphrates/Shatt al Arab	Iran; Iraq; Syria; Türkiye
Cyprinus carpio	Cyprinidae / Cypriniformes	LC	Amu Darya; Atrek; Botkul-Solyonaya; Coruh; Danube; Dnieper; Dniestr; Don; Kura; Mius; Samur; Syr Darya; Terek; Ural; Volga	Kosovo; Kyrgyzstan; Moldova; Montenegro; Romania; Russia; Serbia; Slovakia; Slovenia; Switzerland; Tajikistan; Türkiye; Turkmenistan; Ukraine; Uzbekistan
Datnioides pulcher	Datnioididae / Lobotiformes	CR	Mekong	Cambodia; Laos; Thailand; Vietnam

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Datnioides undecimradiatus	Datnioididae / Lobotiformes	VU	Mekong; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Dicentrarchus labrax	Moronidae / Perciformes	NT	An Nahr Al Kabir; Besor; Bidasoa; Buna; Danube; Guadiana; Maritsa; Minho; Neretva; Newry; Vida	Albania; Bosnia and Herzegovina; Croatia; Denmark; France; Germany; Greece; Ireland; Israel; Lebanon; Montenegro; Portugal; Romania; Spain; State of Palestine; Syria; Türkiye; Ukraine; United Kingdom
Diptychus maculatus	Cyprinidae / Cypriniformes	LC	Balkhash-Ili; Ganges-Brahmaputra-Meghna; Indus; Syr Darya; Talas; Tarim	China; India; Kazakhstan; Kyrgyzstan; Nepal; Pakistan; Tajikistan; Uzbekistan
Doraops zuloagai	Doradidae / Siluriformes	LC	Catatumbo	Colombia; Venezuela
Elops hawaiensis	Elopidae / Elopiformes	DD	Beilun; Giang Thanh; Golok	Cambodia; China; Malaysia; Thailand; Vietnam
Elops senegalensis	Elopidae / Elopiformes	DD	Aby Lagoon-Bia-Tano; Akwayafe; Cavally; Chiloango; Congo; Cross; Great Scarcies; Mano; Mono; Muni; Ntem; Oueme; Senegal; Volta	Angola; Benin; Cameroon; Côte d'Ivoire; Democratic Republic of Congo; Equatorial Guinea; Gabon; Ghana; Guinea; Liberia; Mauritania; Nigeria; Senegal; Sierra Leone; Togo
Enteromius brevipinnis	Cyprinidae / Cypriniformes	NT	Incomati; Maputo	Eswatini; Mozambique; South Africa
Enteromius gurneyi	Cyprinidae / Cypriniformes	VU	Incomati	Eswatini; South Africa
Enteromius liberiensis	Cyprinidae / Cypriniformes	EN	Mano	Liberia; Sierra Leone
Enteromius litamba	Cyprinidae / Cypriniformes	DD	Zambezi	Malawi; Mozambique; Tanzania
Enteromius motebensis	Cyprinidae / Cypriniformes	NT	Limpopo	Botswana; South Africa
Entosphenus tridentatus	Petromyzontidae / Petromyzontiformes	LC	Alsek; Copper; Stikine	Canada; United States of America (Alaska)
Epalzeorhynchos frenatum	Cyprinidae / Cypriniformes	LC	Mekong; Song Vam Co Dong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Esomus longimanus	Cyprinidae / Cypriniformes	DD	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Esox lucius	Esocidae / Esociformes	LC	Alsek; Angerman; Barta; Botkul-Solyonaya; Burla; Coruh; Danube; Daugava; Dnieper; Dniestr; Don; Ebeyty; Elbe; Erne; Firth; Foyle; Gauja; Gota alv; Iddefjord; IJsselmeer; Indalsalven; Karasuk-Studenoye; Kem; Kemi; Kura; Lielupe; Malinovoye; Meuse; Mius; Narva; Nelson; Neman; Neva; Newry; Ob; Oder; Peschanaya; Pregolya; Rhine; Rhone; Saint Lawrence; Samur; Scheldt; Terek; Torne; Ul	Kosovo; Latvia; Liechtenstein; Lithuania; Luxembourg; Moldova; Mongolia; Montenegro; Netherlands; Norway; Poland; Romania; Russia; Russia (Kaliningrad); Serbia; Slovakia; Slovenia; Sweden; Switzerland; Türkiye; Ukraine; United Kingdom; United States of America; United States of America (Alaska);

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			Kensor; Ume; Ural; Venta; Vida; Vistula; Volga; Yenisey; Yukon	
Eudontomyzon morii	Petromyzontidae / Petromyzontiformes	NE	Yalu	China; North Korea
Eutropiichthys vacha	Schilbeidae / Siluriformes	LC	Ganges-Brahmaputra-Meghna; Karnaphuli	Bangladesh; India; Nepal
Fluvitrygon oxyrhynchus	Dasyatidae / Myliobatiformes	EN	Mekong	Cambodia; Laos; Vietnam
Fluvitrygon signifer	Dasyatidae / Myliobatiformes	EN	Golok	Malaysia; Thailand
Genidens barbus	Ariidae / Siluriformes	NE	Lagoon Mirim	Brazil; Uruguay
Geotria macrostoma	Geotriidae / Petromyzontiformes	LC	Azopardo; Gallegos-Chico; Rio Grande (South America)	Argentina; Chile
Gila elegans	Leuciscidae / Cypriniformes	CR	Colorado	Mexico; United States of America
Gonialosa modesta	Clupeidae / Clupeiformes	DD	Pakchan; Salween	Myanmar; Thailand
Gonialosa whiteheadi	Clupeidae / Clupeiformes	DD	Pakchan	Myanmar; Thailand
Gudusia chapra	Clupeidae / Clupeiformes	LC	Ganges-Brahmaputra-Meghna; Indus; Karnaphuli	Bangladesh; India; Nepal; Pakistan
Gymnogobius castaneus	Gobiidae / Gobiiformes	LC	Han	North Korea; South Korea
Gyrinocheilus aymonieri	Gyrinocheilidae / Cypriniformes	LC	Mekong	Cambodia; Vietnam
Helicophagus leptorhynchus	Pangasiidae / Siluriformes	DD	Mekong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Hemibagrus filamentus	Bagridae / Siluriformes	DD	Mekong; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Hemibagrus guttatus	Bagridae / Siluriformes	DD	Ma; Pearl; Red/Song Hong	China; Laos; Vietnam
Hemibagrus microphthalmus	Bagridae / Siluriformes	LC	Irrawaddy; Salween	China; India; Myanmar; Thailand
Hemitrygon laosensis	Dasyatidae / Myliobatiformes	EN	Mekong	Cambodia; Laos; Myanmar; Thailand
Henicorhynchus caudimaculatus	Cyprinidae / Cypriniformes	NE	Mekong	Laos; Thailand
Henicorhynchus entmema	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Laos; Myanmar; Thailand

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Henicorhynchus ornatipinnis	Cyprinidae / Cypriniformes	NE	Mekong	Laos; Thailand
Henicorhynchus siamensis	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Himantura marginata	Dasyatidae / Myliobatiformes	NE	Mono; Oueme	Benin; Nigeria; Togo
Hoplias aimara	Erythrinidae / Characiformes	LC	Amazon; Barima; Courantyne; Essequibo; Maroni; Orinoco; Oyapock	Brazil; Colombia; French Guiana; Guyana; Suriname; Venezuela
Hucho hucho	Salmonidae / Salmoniformes	VU	Danube	Austria; Bosnia and Herzegovina; Croatia; Germany; Hungary; Montenegro; Romania; Serbia; Slovakia; Slovenia; Switzerland; Ukraine
Hucho taimen	Salmonidae / Salmoniformes	VU	Amur; Burla; Ebeyty; Karasuk-Studenoye; Malinovoye; Ob; Sujfun; Torey Lakes; Ul Kensor; Yenisey	China; Kazakhstan; Mongolia; Russia
Hypophthalmichthys molitrix	Cyprinidae / Cypriniformes	NT	Amur; Danube; Dniestr; La Plata; Meuse; Rhine; Scheldt; Tumen; Volga	Argentina; Austria; Belgium; Brazil; Bulgaria; China; France; Germany; Hungary; Kazakhstan; Moldova; North Korea; Romania; Russia; Serbia; Slovakia; Ukraine
Hyporhamphus intermedius	Hemiramphidae / Beloniformes	NE	Han	North Korea; South Korea
Hyporhamphus sajori	Hemiramphidae / Beloniformes	NE	Tumen	China; North Korea; Russia
Hypsibarbus lagleri	Cyprinidae / Cypriniformes	VU	Mekong	Cambodia; Laos; Thailand; Vietnam
Hypsibarbus pierrei	Cyprinidae / Cypriniformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Ichthyoelephas humeralis	Prochilodontidae / Characiformes	NT	Mira	Colombia; Ecuador
Ilisha novacula	Pristigasteridae / Clupeiformes	DD	Irrawaddy	China; India; Myanmar
Incisilabeo behri	Cyprinidae / Cypriniformes	VU	Mekong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Johnius gangeticus	Sciaenidae / Acanthuriformes	DD	Ganges-Brahmaputra-Meghna	Bangladesh; India; Nepal
Joturus pichardi	Eleotridae / Gobiiformes	LC	Belize; Changuinola; Coco; Hondo; Motagua; San Juan; Sixaola	Belize; Costa Rica; Guatemala; Honduras; Mexico; Nicaragua; Panama
Kryptopterus dissitus	Siluridae / Siluriformes	DD	Mekong	Cambodia; Laos; Vietnam
Kryptopterus paraschilbeides	Siluridae / Siluriformes	DD	Mekong	Cambodia; Vietnam

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Kyataphisa caelata	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Vietnam
Labeo mesops	Cyprinidae / Cypriniformes	CR	Zambezi	Malawi; Mozambique
Labeo pangusia	Cyprinidae / Cypriniformes	NT	Ganges-Brahmaputra-Meghna	Bhutan; India; Nepal
Labeo pierrei	Cyprinidae / Cypriniformes	VU	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Vietnam
Labeo ruddi	Cyprinidae / Cypriniformes	DD	Incomati; Limpopo; Umbeluzi	Botswana; Eswatini; Mozambique; South Africa; Zimbabwe
Labeo victorianus	Cyprinidae / Cypriniformes	LC	Nile	Burundi; Kenya; Rwanda; Tanzania; Uganda
Labeobarbus johnstonii	Cyprinidae / Cypriniformes	LC	Zambezi	Malawi; Mozambique; Tanzania
Labeobarbus kimberleyensis	Cyprinidae / Cypriniformes	NT	Orange	Lesotho; Namibia; South Africa
Labeobarbus nelspruitensis	Cyprinidae / Cypriniformes	NT	Incomati; Maputo	Eswatini; Mozambique; South Africa
Labiobarbus lineatus	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Laos; Thailand; Vietnam
Lampetra fluviatilis	Petromyzontidae / Petromyzontiformes	NT	Angerman; Barta; Daugava; Elbe; Erne; Foyle; Gauja; Gota alv; Iddefjord; IJsselmeer; Indalsalven; Kemi; Lielupe; Meuse; Narva; Neman; Neva; Newry; Oder; Peschanaya; Pregolya; Rhine; Torne; Ume; Venta; Vida; Vistula	Belarus; Belgium; Czech Republic; Denmark; Estonia; Finland; France; Germany; Ireland; Latvia; Lithuania; Luxembourg; Netherlands; Norway; Poland; Russia; Russia (Kaliningrad); Slovakia; Sweden; Switzerland; Ukraine; United Kingdom
Lampetra planeri	Petromyzontidae / Petromyzontiformes	NT	Angerman; Barta; Daugava; Elbe; Erne; Foyle; Gauja; Gota alv; Iddefjord; IJsselmeer; Indalsalven; Kemi; Lielupe; Meuse; Narva; Neman; Neva; Newry; Oder; Peschanaya; Pregolya; Rhine; Rhone; Scheldt; Torne; Ume; Venta; Vida; Vistula	Austria; Belarus; Belgium; Czech Republic; Denmark; Estonia; Finland; France; Germany; Ireland; Latvia; Liechtenstein; Lithuania; Luxembourg; Netherlands; Norway; Poland; Russia; Russia (Kaliningrad); Slovakia; Sweden; Switzerland; Ukraine; United Kingdom
Laubuka caeruleostigmata	Cyprinidae / Cypriniformes	EN	Mekong; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Leiarius longibarbis	Pimelodidae / Siluriformes	DD	Amazon	Brazil; Peru
Leporinus bimaculatus	Anostomidae / Characiformes	DD	Amazon	Brazil; Colombia; Peru
Leporinus bleheri	Anostomidae / Characiformes	DD	Amazon	Bolivia; Brazil
Leptobarbus rubripinna	Cyprinidae / Cypriniformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam

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Leucopsarion petersii	Osmeridae / Osmeriformes	LC	Han	North Korea; South Korea
Liza grandisquamis	Mugilidae / Mugiliformes	DD	Ntem; Senegal	Cameroon; Equatorial Guinea; Mauritania; Senegal
Lobocheilos cryptopogon	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Laos; Vietnam
Luciobarbus brachycephalus	Cyprinidae / Cypriniformes	EN	Amu Darya; Kura; Samur; Syr Darya	Afghanistan; Azerbaijan; Georgia; Iran; Kazakhstan; Kyrgyzstan; Russia; Tajikistan; Turkmenistan; Uzbekistan
Luciobarbus capito	Cyprinidae / Cypriniformes	VU	Atrek; Kura; Samur; Terek; Volga	Armenia; Azerbaijan; Georgia; Iran; Kazakhstan; Russia; Türkiye; Turkmenistan
Luciobarbus caspius	Cyprinidae / Cypriniformes	LC	Kura; Samur; Terek; Volga	Armenia; Azerbaijan; Georgia; Iran; Kazakhstan; Russia; Türkiye
Luciobarbus esocinus	Cyprinidae / Cypriniformes	VU	Tigris-Euphrates/Shatt al Arab	Iran; Iraq; Syria; Türkiye
Luciobarbus graellsii	Cyprinidae / Cypriniformes	NT	Ebro	Andorra; Spain
Luciobarbus longiceps	Cyprinidae / Cypriniformes	EN	Jordan/Dead Sea	Israel; Jordan; State of Palestine; Syria
Luciobarbus subquincunciatus	Cyprinidae / Cypriniformes	CR	Tigris-Euphrates/Shatt al Arab	Iran; Iraq; Syria; Türkiye
Luciobrama macrocephalus	Cyprinidae / Cypriniformes	DD	Red/Song Hong	China; Vietnam
Luciocyprinus langsoni	Cyprinidae / Cypriniformes	VU	Pearl; Red/Song Hong	China; Vietnam
Luciocyprinus striolatus	Cyprinidae / Cypriniformes	EN	Mekong	China; Laos; Myanmar; Thailand
Lutjanus goldiei	Lutjanidae / Lutjaniformes	NE	Fly	Indonesia; Papua New Guinea
Macrhybopsis aestivalis	Leuciscidae / Cypriniformes	LC	Rio Grande (North America)	Mexico; United States of America
Macrochirichthys macrochirus	Cyprinidae / Cypriniformes	LC	Ca/Lam/Song-Koi; Giang Thanh; Golok; Ma; Mekong; Red/Song Hong; Saigon/Song Nha Be; Salween; Sambas; Sembakung; Song Vam Co Dong	Cambodia; China; Indonesia; Laos; Malaysia; Myanmar; Thailand; Vietnam
Macrospinosa cuja	Ariidae / Siluriformes	DD	Naf	Bangladesh; Myanmar
Mallotus villosus	Osmeridae / Osmeriformes	NE	Paatsjoki	Norway; Russia
Mastacembelus erythrotaenia	Mastacembelidae / Synbranchiformes	LC	Mekong; Song Vam Co Dong	Cambodia; Vietnam

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Mastacembelus undulatus	Mastacembelidae / Synbranchiformes	DD	Ma; Pearl; Red/Song Hong	China; Laos; Vietnam
Megalops atlanticus	Megalopidae / Elopiformes	VU	Hondo; Oyapock; San Juan; Sixaola	Belize; Brazil; Costa Rica; French Guiana; Mexico; Nicaragua; Panama
Megalops cyprinoides	Megalopidae / Elopiformes	DD	Beilun; Dakatia; Feni; Ganges-Brahmaputra-Meghna; Giang Thanh; Golok; Matamuhuri; Naf; Ruvuma; Umba	Bangladesh; Cambodia; China; India; Kenya; Malaysia; Mozambique; Myanmar; Tanzania; Thailand; Vietnam
Mekongina erythrospila	Cyprinidae / Cypriniformes	NT	Mekong	Cambodia; Laos; Thailand; Vietnam
Membras vagrans	Atherinopsidae / Atheriniformes	DD	Rio Grande (North America)	Mexico; United States of America
Metynnis orinocensis	Serrasalmidae / Characiformes	DD	Orinoco	Colombia; Venezuela
Micronema cheveyi	Siluridae / Siluriformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Mugil cephalus	Mugilidae / Mugiliformes	LC	An Nahr Al Kabir; Beilun; Besor; Bidasoa; Buna; Congo; Coruh; Danube; Dniestr; Douro; Gambia; Giang Thanh; Goascoran; Golok; Guadiana; Jordan/Dead Sea; Jurado; Kunene; Kura; Lima; Mano; Maritsa; Medjerda; Minho; Mius; Negro (North America); Neretva; Nestos; Orange; Orontes; Rio Grande (North America); Ruvuma; Senegal; Soca; Struma; Tijuana; Tumbes; Umba; Vardar; Vjosa; Zarumilla	Albania; Algeria; Angola; Bosnia and Herzegovina; Bulgaria; Cambodia; China; Colombia; Croatia; Democratic Republic of Congo; Ecuador; El Salvador; France; Gambia; Georgia; Greece; Honduras; Israel; Italy; Jordan; Kenya; Lebanon; Liberia; Malaysia; Mauritania; Mexico; Moldova; Montenegro; Mozambique; Namibia; Nicaragua; North Macedonia; Panama; Peru; Portugal; Romania; Russia; Senegal; Sierra Leone; Slovenia; South Africa; Spain; State of Palestine; Syria; Tanzania; Thailand; Tunisia; Türkiye; Ukraine; United States of America; Vietnam
Myleus pacu	Serrasalmidae / Characiformes	NT	Amazon; Courantyne; Essequibo	Brazil; Guyana; Suriname; Venezuela
Myloplus planquettei	Serrasalmidae / Characiformes	VU	Maroni	French Guiana; Suriname
Mystus bocourti	Bagridae / Siluriformes	VU	Mekong	Cambodia; Laos; Thailand
Mystus cavasius	Bagridae / Siluriformes	LC	Ganges-Brahmaputra-Meghna	Bangladesh; Bhutan; India
Mystus rhegma	Bagridae / Siluriformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Myxus elongatus	Mugilidae / Mugiliformes	NE	Buna	Albania; Montenegro
Namaquacypris hospes	Cyprinidae / Cypriniformes	NE	Orange	Namibia; South Africa

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Naziritor chelynoides	Cyprinidae / Cypriniformes	NE	Ganges-Brahmaputra-Meghna	India; Nepal
Neochelon falcipinnis	Mugilidae / Mugiliformes	DD	Aby Lagoon-Bia-Tano; Chiloango; Congo; Gambia; Kunene; Mono; Muni; Niger; Ntem; Oueme; Volta	Angola; Benin; Cameroon; Côte d'Ivoire; Democratic Republic of Congo; Equatorial Guinea; Gabon; Gambia; Ghana; Namibia; Niger; Nigeria; Senegal; Togo
Neolissochilus blanci	Cyprinidae / Cypriniformes	NT	Ca/Lam/Song-Koi; Mekong; Red/Song Hong; Salween	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Neolissochilus hexagonolepis	Cyprinidae / Cypriniformes	NT	Ganges-Brahmaputra-Meghna	Bangladesh; Bhutan; India; Nepal
Neosalanx brevirostris	Salangidae / Osmeriformes	DD	Beilun; Han; Ma; Pearl; Red/Song Hong; Yalu	China; Laos; North Korea; South Korea; Vietnam
Neosalanx hubbsi	Salangidae / Osmeriformes	DD	Han	North Korea; South Korea
Neosalanx jordani	Salangidae / Osmeriformes	LC	Yalu	China; North Korea
Notropis jemezanus	Leuciscidae / Cypriniformes	LC	Rio Grande (North America)	Mexico; United States of America
Odontesthes hatcheri	Atherinopsidae / Atheriniformes	VU	Baker; Puelo	Argentina; Chile
Ompok bimaculatus	Siluridae / Siluriformes	NT	Dakatia; Feni; Ganges-Brahmaputra-Meghna; Indus; Irrawaddy; Kaladan; Karnaphuli; Matamuhuri; Naf; Rann of Kutch	Afghanistan; Bangladesh; Bhutan; China; India; Myanmar; Nepal; Pakistan
Ompok pabda	Siluridae / Siluriformes	NT	Ganges-Brahmaputra-Meghna	Bangladesh; India
Ompok pinnatus	Siluridae / Siluriformes	DD	Mekong; Song Vam Co Dong	Cambodia; Vietnam
Oncorhynchus clarkii	Salmonidae / Salmoniformes	LC	Alsek; Chilkat; Columbia; Copper; Skagit; Stikine; Taku; Whiting	Canada; United States of America; United States of America (Alaska)
Opsaridium microcephalum	Cyprinidae / Cypriniformes	LC	Zambezi	Malawi; Mozambique; Tanzania
Opsaridium microlepis	Cyprinidae / Cypriniformes	VU	Zambezi	Malawi; Mozambique; Tanzania
Opsarius bendelisis	Cyprinidae / Cypriniformes	NE	Ganges-Brahmaputra-Meghna	Bangladesh; India; Nepal
Oreochromis macrochir	Cichlidae / Cichliformes	VU	Buzi; Etosha-Cuvelai; Kunene; Okavango; Zambezi	Angola; Botswana; Mozambique; Namibia; Zambia; Zimbabwe
Oreochromis mossambicus	Cichlidae / Cichliformes	VU	Buzi; Incomati; Limpopo; Maputo; Okavango; Save; Umbeluzi; Zambezi	Botswana; Eswatini; Malawi; Mozambique; South Africa; Zambia; Zimbabwe
Osphronemus exodon	Osphronemidae / Anabantiformes	VU	Mekong; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam

Species	Family / Order	IUCN Conservation Status[1]	Transboundary Basins	Countries
Osteobrama belangeri	Cyprinidae / Cypriniformes	NT	Irrawaddy; Salween	China; India; Myanmar; Thailand
Osteochilus melanopleurus	Cyprinidae / Cypriniformes	NE	Mekong	Cambodia; Laos; Thailand; Vietnam
Osteochilus schlegelii	Cyprinidae / Cypriniformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Osteoglossum bicirrhosum	Osteoglossidae / Osteoglossiformes	LC	Amazon; Orinoco; Oyapock	Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Peru; Venezuela
Osteomugil cunnesius	Mugilidae / Mugiliformes	NE	Save	Mozambique; Zimbabwe
Otolithoides biauritus	Sciaenidae / Acanthuriformes	DD	Naf	Bangladesh; Myanmar
Otolithoides pama	Sciaenidae / Acanthuriformes	DD	Naf	Bangladesh; Myanmar
Oxygaster pointoni	Cyprinidae / Cypriniformes	VU	Mekong; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Pangasianodon hypophthalmus	Pangasiidae / Siluriformes	EN	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Pangasius bocourti	Pangasiidae / Siluriformes	LC	Mekong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Pangasius conchophilus	Pangasiidae / Siluriformes	LC	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Pangasius elongatus	Pangasiidae / Siluriformes	DD	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Pangasius krempfi	Pangasiidae / Siluriformes	VU	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Pangasius larnaudii	Pangasiidae / Siluriformes	LC	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Pangasius pangasius	Pangasiidae / Siluriformes	LC	Ganges-Brahmaputra-Meghna; Mekong	Bangladesh; Cambodia; India; Laos; Thailand
Pangasius sanitwongsei	Pangasiidae / Siluriformes	CR	Mekong; Song Vam Co Dong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Pantosteus plebeius	Catostomidae / Cypriniformes	DD	Colorado; Rio Grande (North America); Yaqui	Mexico; United States of America
Parabramis pekinensis	Cyprinidae / Cypriniformes	LC	Amur; Beilun; Pearl	China; Russia; Vietnam
Parachondrostoma miegii	Leuciscidae / Cypriniformes	NT	Bidasoa; Ebro	Andorra; France; Spain
Parachromis dovii	Cichlidae / Cichliformes	LC	Choluteca; Coco; Negro (North America); San Juan	Costa Rica; Honduras; Nicaragua

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Percichthys trucha	Percichthyidae / Perciformes	LC	Baker; Gallegos-Chico; Puelo; Valdivia; Yelcho	Argentina; Chile
Petromyzon marinus	Petromyzontidae / Petromyzontiformes	LC	Barta; Bidasoa; Buna; Elbe; Erne; Foyle; Guadiana; Iddefjord; IJsselmeer; Lima; Medjerda; Meuse; Minho; Naatamo; Narva; Neman; Neretva; Newry; Oder; Paatsjoki; Pregolya; Rhine; Saint Croix; Saint Lawrence; Scheldt; Vida; Vistula	Albania; Algeria; Belgium; Bosnia and Herzegovina; Canada; Croatia; Czech Republic; Denmark; Estonia; Finland; France; Germany; Ireland; Latvia; Lithuania; Luxembourg; Montenegro; Netherlands; Norway; Poland; Portugal; Russia; Russia (Kaliningrad); Slovakia; Spain; Sweden; Switzerland; Tunisia; United Kingdom; United States of America
Piaractus mesopotamicus	Serrasalmidae / Characiformes	NT	La Plata	Argentina; Bolivia; Brazil; Paraguay
Piaractus orinoquensis	Serrasalmidae / Characiformes	VU	Orinoco	Colombia; Venezuela
Plagioscion surinamensis	Sciaenidae / Acanthuriformes	DD	Amazon	Bolivia; Brazil
Planiliza haematocheila	Mugilidae / Mugiliformes	NE	Han	North Korea; South Korea
Planiliza melinopterus	Mugilidae / Mugiliformes	NE	Tigris-Euphrates/Shatt al Arab	Iran; Iraq
Planiliza tade	Mugilidae / Mugiliformes	DD	Aby Lagoon-Bia-Tano; Beilun; Giang Thanh; Golok; Matamuhuri; Naf; Orange	Bangladesh; Cambodia; China; Côte d'Ivoire; Ghana; Malaysia; Myanmar; Namibia; South Africa; Thailand; Vietnam
Platygobio gracilis	Leuciscidae / Cypriniformes	LC	Mississippi	Canada; United States of America
Platysilurus malarmo	Pimelodidae / Siluriformes	NE	Amazon; Catatumbo; Orinoco	Bolivia; Colombia; Peru; Venezuela
Plecoglossus altivelis	Plecoglossidae / Osmeriformes	DD	Beilun	China; Vietnam
Pogonopoma obscurum	Loricariidae / Siluriformes	VU	La Plata	Argentina; Brazil
Polydactylus sextarius	Polynemidae / Polynemiformes	NE	Tigris-Euphrates/Shatt al Arab	Iran; Iraq
Polynemus paradiseus	Polynemidae / Polynemiformes	LC	Dakatia; Feni; Ganges-Brahmaputra-Meghna; Giang Thanh; Golok; Kaladan; Karnaphuli; Matamuhuri; Naf; Pakchan; Song Vam Co Dong	Bangladesh; Bhutan; Cambodia; India; Malaysia; Myanmar; Thailand; Vietnam
Potamorhina laticeps	Curimatidae / Characiformes	NE	Amazon; Catatumbo; Orinoco	Bolivia; Brazil; Colombia; Peru; Venezuela
Potamotrygon constellata	Potamotrygonidae / Myliobatiformes	DD	Amazon	Brazil; Colombia; Ecuador; Peru

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Potamotrygon hystrix	Potamotrygonidae / Myliobatiformes	NE	Amazon; La Plata; Maroni; Oyapock	Argentina; Brazil; Colombia; Ecuador; French Guiana; Guyana; Paraguay; Suriname
Potamotrygon motoro	Potamotrygonidae / Myliobatiformes	DD	La Plata	Argentina; Bolivia; Paraguay
Potamotrygon scobina	Potamotrygonidae / Myliobatiformes	DD	Amazon; Orinoco	Brazil; Colombia; Guyana; Venezuela
Probarbus jullieni	Cyprinidae / Cypriniformes	CR	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Probarbus labeamajor	Cyprinidae / Cypriniformes	EN	Mekong	Cambodia; Laos; Thailand; Vietnam
Probarbus labeaminor	Cyprinidae / Cypriniformes	NT	Mekong	Cambodia; Laos; Thailand
Prochilodus mariae	Prochilodontidae / Characiformes	LC	Orinoco	Colombia; Venezuela
Prochilodus reticulatus	Prochilodontidae / Characiformes	NE	Catatumbo; La Plata; Maroni	Argentina; Brazil; Colombia; French Guiana; Paraguay; Suriname; Venezuela
Procypris mera	Cyprinidae / Cypriniformes	DD	Pearl	China; Vietnam
Protosalanx chinensis	Salangidae / Osmeriformes	DD	Beilun; Han; Yalu	China; North Korea; South Korea; Vietnam
Pseudocurimata boulengeri	Curimatidae / Characiformes	NT	Zarumilla	Ecuador; Peru
Pseudocurimata peruana	Curimatidae / Characiformes	NT	Chira; Tumbes; Zarumilla	Ecuador; Peru
Pseudohemiculter dispar	Cyprinidae / Cypriniformes	VU	Beilun; Ca/Lam/Song-Koi; Ma; Mekong; Pearl; Red/Song Hong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Pseudoplatystoma corruscans	Pimelodidae / Siluriformes	NT	La Plata; Lagoon Mirim	Argentina; Bolivia; Brazil; Paraguay; Uruguay
Pseudoplatystoma fasciatum	Pimelodidae / Siluriformes	LC	Courantyne; Maroni; Oyapock	Brazil; French Guiana; Guyana; Suriname
Pseudoplatystoma metaense	Pimelodidae / Siluriformes	EN	Orinoco	Colombia; Venezuela
Pseudoplatystoma orinocoense	Pimelodidae / Siluriformes	EN	Orinoco	Colombia; Venezuela
Rasbora hobelmani	Danionidae / Cypriniformes	NE	Mekong	Cambodia; Laos
Rhinelepis aspera	Loricariidae / Siluriformes	NT	La Plata	Argentina; Brazil; Paraguay
Rhonciscus crocro	Haemulidae / Eupercaria incertae sedis	DD	Coco; Motagua; Oyapock; Rio Grande (North America); San Juan; Sarstoon; Sixaola	Belize; Brazil; Costa Rica; French Guiana; Guatemala; Honduras; Mexico; Nicaragua; Panama; United States of America

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Rutilus meidingeri	Leuciscidae / Cypriniformes	NT	Danube	Austria; Germany
Salanx chinensis	Salangidae / Osmeriformes	DD	Beilun	China; Vietnam
Salmo labrax	Salmonidae / Salmoniformes	LC	Danube; Dnieper; Dniestr; Don; Mius	Kosovo; Moldova; Montenegro; Romania; Russia; Serbia; Slovakia; Slovenia; Ukraine
Salmo macrostigma	Salmonidae / Salmoniformes	DD	Medjerda; Moulouya	Algeria; Morocco; Tunisia
Salmo marmoratus	Salmonidae / Salmoniformes	VU	Buna; Neretva; Po; Soca	Albania; Bosnia and Herzegovina; Croatia; Italy; Montenegro; Slovenia; Switzerland
Salmo salar	Salmonidae / Salmoniformes	NT	Barta; Daugava; Erne; Foyle; Gauja; Iddefjord; IJsselmeer; Lielupe; Minho; Naatamo; Narva; Neman; Newry; Paatsjoki; Peschanaya; Rhine; Saint Croix; Tana; Torne; Venta; Vida	Belarus; Canada; Denmark; Estonia; Finland; France; Germany; Ireland; Latvia; Lithuania; Luxembourg; Netherlands; Norway; Portugal; Russia; Russia (Kaliningrad); Spain; Sweden; United Kingdom; United States of America
Salvelinus alpinus	Salmonidae / Salmoniformes	LC	Altaelva; Angerman; Danube; Erne; Firth; Foyle; Naatamo; Paatsjoki; Rhine; Rhone; Saint John (North America); Tana; Torne; Tuloma; Ume; Yukon	Austria; Canada; Finland; France; Germany; Ireland; Liechtenstein; Norway; Russia; Sweden; Switzerland; United Kingdom; United States of America; United States of America (Alaska)
Salvelinus confluentus	Salmonidae / Salmoniformes	VU	Alsek; Chilkat; Columbia; Skagit; Stikine; Taku; Unuk; Whiting	Canada; United States of America; United States of America (Alaska)
Scaphirhynchus albus	Acipenseridae / Acipenseriformes	CR	Mississippi	Canada; United States of America
Scaphognathops bandanensis	Cyprinidae / Cypriniformes	VU	Mekong	Cambodia; Laos; Myanmar; Thailand; Vietnam
Schizocypris brucei	Cyprinidae / Cypriniformes	VU	Helmand	Afghanistan; Iran
Schizothorax esocinus	Cyprinidae / Cypriniformes	VU	Indus	Afghanistan; India; Pakistan
Schizothorax lantsangensis	Cyprinidae / Cypriniformes	DD	Mekong	China; Myanmar
Schizothorax plagiostomus	Cyprinidae / Cypriniformes	VU	Amu Darya; Dakatia; Dasht; Feni; Ganges-Brahmaputra-Meghna; Hari/Harirud-Murgab; Helmand; Indus; Irrawaddy; Kaladan; Karnaphuli; Rann of Kutch; Tarim	Afghanistan; Bangladesh; Bhutan; China; India; Iran; Myanmar; Nepal; Pakistan; Tajikistan; Turkmenistan; Uzbekistan
Schizothorax richardsonii	Cyprinidae / Cypriniformes	VU	Ganges-Brahmaputra-Meghna	Bhutan; China; India; Nepal
Scomberomorus sinensis	Scombridae / Scombriformes	NT	Mekong	Cambodia; Laos; Vietnam
Semaprochilodus varii	Prochilodontidae / Characiformes	LC	Maroni	French Guiana; Suriname

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Semiplotus manipurensis	Cyprinidae / Cypriniformes	DD	Irrawaddy	India; Myanmar
Serranochromis meridianus	Cichlidae / Cichliformes	EN	Incomati; Limpopo; Umbeluzi	Eswatini; Mozambique; South Africa
Setipinna brevifilis	Engraulidae / Clupeiformes	DD	Ganges-Brahmaputra-Meghna	Bangladesh; India; Nepal
Setipinna tenuifilis	Engraulidae / Clupeiformes	DD	Han; Naf	Bangladesh; Myanmar; North Korea; South Korea
Sicydium adelum	Gobiidae / Gobiiformes	EN	Sixaola	Costa Rica; Panama
Sikukia gudgeri	Cyprinidae / Cypriniformes	DD	Mekong	Cambodia; Laos; Thailand; Vietnam
Silhouettea sibayi	Gobiidae / Gobiiformes	EN	Umbeluzi	Eswatini; Mozambique
Silurus soldatovi	Siluridae / Siluriformes	LC	Amur	China; Russia
Steindachneridion scriptum	Pimelodidae / Siluriformes	EN	La Plata	Argentina; Brazil; Paraguay; Uruguay
Stenodus leucichthys	Salmonidae / Salmoniformes	NT	Volga	Kazakhstan; Russia
Syncrossus beauforti	Botiidae / Cypriniformes	NT	Golok; Mekong	Cambodia; China; Laos; Malaysia; Thailand
Systomus rubripinnis	Cyprinidae / Cypriniformes	DD	Mekong; Salween	Cambodia; Laos; Myanmar; Thailand
Tenualosa ilisha	Clupeidae / Clupeiformes	LC	Dakatia; Feni; Ganges-Brahmaputra-Meghna; Kaladan; Karnaphuli; Matamuhuri; Naf; Pakchan; Rann of Kutch; Salween	Bangladesh; Bhutan; India; Myanmar; Nepal; Pakistan; Thailand
Tenualosa reevesii	Clupeidae / Clupeiformes	DD	Beilun; Pearl; Red/Song Hong	China; Vietnam
Tenualosa thibaudeaui	Clupeidae / Clupeiformes	VU	Mekong	Cambodia; Laos; Thailand; Vietnam
Terapon puta	Terapontidae / Perciformes	NE	Besor; Giang Thanh; Tigris-Euphrates/Shatt al Arab	Cambodia; Iran; Iraq; Israel; State of Palestine; Vietnam
Thryssa scratchleyi	Engraulidae / Clupeiformes	DD	Fly; Merauke	Indonesia; Papua New Guinea
Thryssa stenosoma	Engraulidae / Clupeiformes	DD	Naf	Bangladesh; Myanmar
Tor laterivittatus	Cyprinidae / Cypriniformes	DD	Mekong; Red/Song Hong	China; Laos; Myanmar; Thailand; Vietnam
Tor polylepis	Cyprinidae / Cypriniformes	DD	Mekong	China; Laos; Myanmar

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Tor putitora	Cyprinidae / Cypriniformes	EN	Ganges-Brahmaputra-Meghna; Indus; Irrawaddy	Afghanistan; Bangladesh; Bhutan; China; India; Myanmar; Nepal; Pakistan
Tor sinensis	Cyprinidae / Cypriniformes	VU	Mekong	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Tor tambra	Cyprinidae / Cypriniformes	DD	Ca/Lam/Song-Koi; Giang Thanh; Golok; Ma; Mekong; Pakchan; Red/Song Hong; Saigon/Song Nha Be; Salween; Sambas; Sembakung; Song Vam Co Dong	Cambodia; China; Indonesia; Laos; Malaysia; Myanmar; Thailand; Vietnam
Tor tambroides	Cyprinidae / Cypriniformes	DD	Ca/Lam/Song-Koi; Giang Thanh; Golok; Ma; Mekong; Pakchan; Red/Song Hong; Saigon/Song Nha Be; Salween; Sambas; Sembakung; Song Vam Co Dong	Cambodia; China; Indonesia; Laos; Malaysia; Myanmar; Thailand; Vietnam
Tor tor	Cyprinidae / Cypriniformes	DD	Ganges-Brahmaputra-Meghna	India; Nepal
Toxotes blythii	Toxotidae / Carangaria incertae sedis	DD	Salween	China; Myanmar; Thailand
Trachidermus fasciatus	Cottidae / Scorpaeniformes	LC	Yalu	China; North Korea
Trichopodus pectoralis	Osphronemidae / Anabantiformes	LC	Ma; Mekong; Red/Song Hong; Saigon/Song Nha Be; Salween	Cambodia; China; Laos; Myanmar; Thailand; Vietnam
Triportheus elongatus	Triportheidae / Characiformes	NE	Amazon	Bolivia; Brazil; Colombia; Ecuador; Peru
Urogymnus polylepis	Dasyatidae / Myliobatiformes	EN	Dakatia; Feni; Ganges-Brahmaputra-Meghna; Karnaphuli; Matamuhuri; Mekong; Naf; Sambas	Bangladesh; Cambodia; India; Indonesia; Laos; Malaysia; Myanmar; Thailand; Vietnam
Vimba vimba	Leuciscidae / Cypriniformes	LC	Barta; Danube; Daugava; Dnieper; Dniestr; Don; Elbe; Gauja; Gota alv; Iddefjord; Lielupe; Mius; Narva; Neman; Oder; Peschanaya; Pregolya; Venta; Vistula	Kosovo; Latvia; Lithuania; Moldova; Montenegro; Norway; Poland; Romania; Russia; Russia (Kaliningrad); Serbia; Slovakia; Slovenia; Sweden; Switzerland; Ukraine
Wallago attu	Siluridae / Siluriformes	VU	Dakatia; Feni; Ganges-Brahmaputra-Meghna; Indus; Irrawaddy; Kaladan; Karnaphuli; Matamuhuri; Mekong; Naf; Rann of Kutch; Salween; Song Vam Co Dong	Bangladesh; Bhutan; Cambodia; China; India; Laos; Myanmar; Nepal; Pakistan; Thailand; Vietnam
Wallago micropogon	Siluridae / Siluriformes	DD	Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Xyrauchen texanus	Catostomidae / Cypriniformes	CR	Colorado	Mexico; United States of America
Yasuhikotakia eos	Botiidae / Cypriniformes	LC	Ca/Lam/Song-Koi; Mekong; Saigon/Song Nha Be; Song Vam Co Dong	Cambodia; Laos; Thailand; Vietnam
Yasuhikotakia longidorsalis	Botiidae / Cypriniformes	DD	Mekong	Laos; Myanmar; Thailand

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Zungaro jahu	Pimelodidae / Siluriformes	NT	La Plata	Argentina; Bolivia; Brazil; Paraguay; Uruguay