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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

38th meeting
Strasbourg, 27-30 November 2018

PAN-EUROPEAN ACTION PLAN FOR STURGEONS

Document prepared by
the World Sturgeon Conservation Society and WWF

Pan-European Action Plan for Sturgeons

Multi Species Action Plan for the:

Russian sturgeon complex (*Acipenser gueldenstaedtii, A. persicus-colchicus*),
Adriatic sturgeon (*Acipenser naccarii*),
Ship sturgeon (*Acipenser nudiventris*),
Atlantic/Baltic sturgeon, (*Acipenser oxyrinchus*),
Sterlet (*Acipenser ruthenus*),
Stellate sturgeon (*Acipenser stellatus*),
European/Common sturgeon (*Acipenser sturio*),
and
Beluga (*Huso huso*).

Geographical Scope: European Union and neighbouring countries with shared basins such as the Black Sea, Mediterranean, North Eastern Atlantic Ocean, North Sea and Baltic Sea

Intended Lifespan of Plan: 2019 – 2029

Russian Sturgeon complex

Adriatic Sturgeon

Ship Sturgeon

Atlantic or Baltic Sturgeon

Sterlet

Stellate Sturgeon

European/Common Sturgeon

Beluga

Supported by

IUCN SSC Species Survival Commission

UN environment

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GEOGRAPHICAL SCOPE:

The Action Plan in general addresses the entire Bern Convention scope (51 Contracting Parties, including the European Union) and in particular the countries with shared sturgeon waters in Europe. **As such, it focuses primarily on the sea basins in Europe: Black Sea, Mediterranean, North-East Atlantic, North Sea, Baltic Sea, and the main rivers with relevant current or historic sturgeon populations (see Table 2).**

Figure 1: Past and present distribution of diadromous European sturgeon species (excluding A. ruthenus)

Given the common regulatory framework and shared authorities of the European Union, this Action Plan emphasizes details in terms of legal or funding instruments for EU Member States.

PURPOSE OF THIS PLAN:

The current plan is intended to serve as a guiding framework on the Pan-European level. It shall not replace national or regional plans in existence; on the contrary, it shall serve as a guiding framework for their development or renewal. National and/or regional plans on the level of river basins can provide more detailed analysis of threats, countermeasures to be taken as well as milestones, addressing progress on specific results. They can also address and incorporate the roles of responsible organisations in more detail.

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DATE OF ADOPTION: 30 NOV 2018 BY BERN CONVENTION

INTENDED LIFESPAN OF PLAN: 2019 – 2029

MILESTONES DURING THE PRODUCTION OF THE PLAN

- March/April 2018: Initial 1st draft from a drafting team of WSCS and WWF
- May/June 2018: Revision process with 40 international experts
- July 2018: 2nd draft sent out to the Bern Convention Focal Points as well as participants of the "European Sturgeon Conference"
- July 2018: The "European Sturgeon Conference – Contribution to preserve European's cultural and natural heritage", co-organised by the Austrian Federal Ministry of Sustainability and Tourism and the International Commission for the Protection of the Danube River (ICPDR), under the auspices of the Austrian EU Presidency provided further input and resulted in strong support of the Action Plan
- September 2018: 3rd draft sent out to all previous contributors and participants of the Vienna conference
- October 2018: Final Draft submitted to Bern Secretariat
- 30 November 2018: Adoption at the 38th Standing Committee Meeting of Bern Convention while final amendments were introduced by the EU Member States. These are highlighted in Italics in the text since some interpretations may deviate from the authors' views.

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1. INTRODUCTION – RATIONALE FOR THIS ACTION PLAN

The 37th Standing Committee of the Bern Convention in 2017 clearly expressed its concern about the status of sturgeons[1], particularly in the Danube River basin, and encouraged contracting parties to scale up implementation of the Danube Sturgeon Action Plan of 2005[2]. There are at least seven other Action Plans in existence (see Annex 7 for references) for sturgeons in Europe, e.g. one under the Bern Convention for the European Sturgeon (*Acipenser sturio*) and two Action Plans currently under preparation by the Baltic Marine Environment Protection Commission (HELCOM), also known as Helsinki Commission for the Baltic Sturgeon (*Acipenser oxyrinchus)* and by the Netherlands for the Rhine River. The Bureau of the Bern Convention welcomed the development of this new Action Plan at its meeting on March 19, 2018. But why is this new multi-species Action Plan under the Bern Convention needed? There are several reasons.

The conservation status of all sturgeon species in Europe has become highly critical without showing signs of recovery, indicating that previous action has not been successful. Several experts have claimed four main reasons for the insufficient implementation of existing action plans: lack of simplicity, lack of coordination and clear responsibility, lack of resources, lack of public and political awareness. While formulating the framework of action for this plan, these deficits have been taken into account, providing special emphasis on the coordination and funding of the implementation.

Sturgeons are excellent flagship species for ecologically healthy rivers and seas due to their size, longevity, diverse habitat utilization and their migratory life cycle that connects coastal waters to the upper reaches of riverine ecosystems. Therefore, their **protection needs a holistic approach, connecting international waters, coastal areas, and often multi-national river systems**. While previous Action Plans focused on specific species and/or regions, the principal geographic scope for this plan comprises all countries with rivers and seas in Europe that have sturgeon as resident or vagrant elements of their fauna. This will create a guiding framework for a better coordination and pooling of resources among national states, with international or regional conventions interested in preserving a shared resource and heritage.

The conservation of sturgeons needs a **comprehensive and integrated approach, as well as secured and long-term funding of priority conservation measures in order to suit these long-lived species**. This has been a challenge so far. Since some of the most important measures - such as habitat protection, restoration or enforcement of fisheries regulations - are in conflict with economic interests, implementation has proven to be particularly difficult. Therefore, this plan aims to attract the attention and support of political decision makers as well as to engage a broad range of stakeholders with clear responsibilities for the implementation of necessary mitigation measures.

This plan under the Bern Convention also **particularly emphasises the establishment of immediate *ex situ* measures** for safeguarding, recovery, and re-establishment of all species in an attempt to prevent their extirpation, while at the same time implementing measures to increase the *in situ* protection.

According to the text of the Bern Convention treaty, "Each Contracting Party shall take appropriate and necessary legislative and administrative measures to ensure the special protection of the wild fauna species specified in Appendix II"[3]. The European Commission, as a Contracting Party, pledged in its communication "An Action Plan for nature, people and the economy" to increase the implementation of the Habitats Directive and among others "further develop Species and Habitats Action Plans for the most threatened species and natural habitats"[4]. **The implementation of an Action Plan for all European sturgeons as freshwater flagship species would illustrate what concerted conservation efforts across Europe can mean in practice.**

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[1] https://rm.coe.int/list-of-decisions-and-adopted-textes-of-the-37th-meeting-of-the-bern-c/168076f40f
[2] Bloesch et al. 2005.
[3] https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/0900001680078aff
[4] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions An Action Plan for nature, people and the economy COM/2017/0198 final

2. BASIC CONSIDERATIONS

Overview of sturgeon species of Europe and causes for their vulnerability to threats and adverse impacts

Sturgeons and paddlefishes (the order of Acipenseriformes) comprise the extant families of Acipenseridae and Polyodontidae, representing a unique phylogenetic entity of ancient fish. **Worldwide, there are 27 recent species known, all of them endemic to the Northern hemisphere.** Sturgeons are of significant ecological, commercial and recreational value and importance. Since all European seas and all major rivers entering these seas used to be populated by sturgeons (see Table 2), this Action Plan deems applicable for most countries signatory to the Bern Convention. Therefore, all eight species present in these waters are covered by this Action Plan (see Table 1).

The threats adversely affecting sturgeon populations are closely linked to their biological and ecological requirements. **All sturgeons share specific traits, like late maturation, longevity, low specific fecundity and expressed homing behaviour that render them extremely susceptible to anthropogenic impacts such as fisheries, obstruction of migration routes and destruction of physical habitats** (see also Annex 2). While combinations of threats may differ regionally as well as change with time and population status, their principal impacts remain.

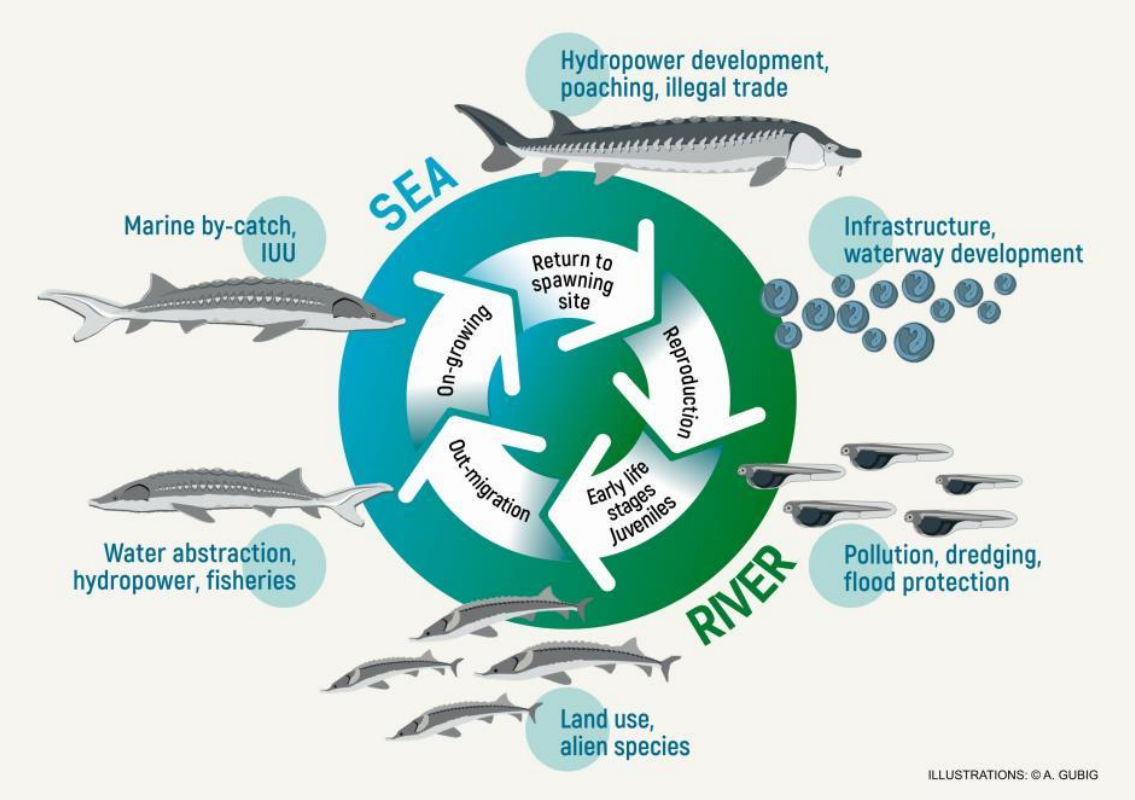

Figure 2: Schematic life-cycle and main threats predominantly impacting the various stages

All sturgeons spawn in freshwater and are migratory (anadromous or potamodromous, depending on species and reproductive type). They repeatedly move between different habitats for spawning, feeding and wintering to complete their life-cycle. This migration often covers long distances and crossing of borders in international watersheds when returning to their natal rivers for spawning. Thus, the lack of integrated cross-border management of populations is a major issue.

Sturgeon life-cycles are long, since the fish mature late, while reaching high maximum ages, sometimes even exceeding 100 years. As a result, to make use of their effective reproduction potential, the individuals have to become rather old (minimum twice the age of first maturation). In contrast to other fish species, sturgeons are in need for long-term recovery programmes, lasting several decades, and a population management well adapted to the respective species biology and ecology.

Many factors cause the decline of sturgeon populations, such as: overexploitation, destruction of key habitats, blocking of migration routes, low water quality, water abstraction, predation by exotic species and changes in hydrological regime.

Fisheries: Sturgeon products, such as meat and especially caviar, are valuable goods and consequently have been subject to **formerly high legal (but unsustainable) and nowadays mainly illegal fishing pressure.** The long generation intervals (late maturation) and their size render the sturgeon species especially vulnerable to fishing, both directed and bycatch. **Illegal catch and caviar trade** is still occurring as of today within and outside of Europe, massively affecting the chances for effective population recovery. Throughout Europe, sturgeons have been reduced to a level where every sturgeon counts.

Habitat loss: River modification through navigation measures, hydropower operation, water abstraction and flood protection as well as transformation of wetlands restricts the availability and quality of habitats. Water pollution and sediment extraction impose additional stressors. Annual spawning success and recruitment largely depend on availability of **suitable** habitats. Migration distance, substrate quality, flow and temperature regimes provide essential cues for spawning.

Hybridization has the potential to become a problem once exotic sturgeon species, genotypes or hybrids are introduced deliberately or unintentionally. Hybridization causes the loss of genetic integrity of native species, compromises its adaptation to a given set of habitat features and has detrimental effects on population fitness by outbreeding depression.

Loss of genetic diversity is caused either by a demographic bottleneck in natural populations through excessive fisheries impact, adverse environmental conditions, or by careless selection of breeders in stocking or *ex situ* conservation programs. This loss of genetic diversity reduces the adaptive potential of populations and in extreme cases can cause in- or outbreeding depression.

Although it is difficult to generally prioritize threats for all sturgeon populations, it is safe to state that most populations have already suffered from **overexploitation** in the past and still carry this historical burden today. They have not recovered anywhere near their original population sizes due to drawbacks in their habitats as well as continuous bycatch or poaching.

The sturgeon species of the family Acipenseridae are red-listed by the IUCN and are more threatened than any other group of species globally (IUCN 2010[5]).

Sturgeons are covered by various legal protection mechanisms (see Annex 5). Protection exists according to nature protection and fishery laws of national states, overarching EU regulations and by various international conventions such as Bern Convention, Convention of Migratory Species or Convention on the International Trade in Endangered Species. But the implementation of these regulations is either not legally binding or not actively monitored and verified.

Poaching is known inside and outside the EU: poached Beluga from Ukraine © M. Yakovlev Danube Biosphere Reserve

Demand for wild caviar still fuels illegal trade © WWF/ E. Duncan

Large dams block the migration routes © WWF/ P. Glendell

[5] https://www.iucn.org/content/sturgeon-more-critically-endangered-any-other-group-species

Table 1: Species covered by this Action Plan, their conservation status according to ICUN and respective listings in main conventions

Species	IUCN Red List* Status (2011)	CITES (1998) **	EU Habitats Directive (1992) ***	Bern Convention (1979)****	Bonn Convention CMS (1979) *****
Russian sturgeon complex (*Acipenser gueldenstaedtii, A. persicus (colchicus))*	CR (Critically Endangered)	Appendix II	Annex V	not listed	Appendix II (no subspecies)
Adriatic Sturgeon *(Acipenser naccarii)*	CR (Critically Endangered)	Appendix II	Annex II and IV	Appendix II	Appendix II
Ship sturgeon (*A. nudiventris*)	CR (Critically Endangered)	Appendix II	Annex V	not listed	Appendix II
Atlantic or Baltic sturgeon (*A. oxyrinchus)*	Globally NT (Near Threatened) Baltic Population CR/EX	Appendix II	treated as *A. sturio*	Not listed since the species was discriminated from *A. sturio* in 2002 only	Appendix I and II treated as *A. sturio*
Sterlet (A. *ruthenus*)	VU (Vulnerable)	Appendix II	Annex V	Appendix III	Appendix II (Danube population)
Stellate sturgeon (*A. stellatus*)	CR (Critically Endangered)	Appendix II	Annex V	Appendix III	Appendix II
European/Common sturgeon (*A. sturio*)	CR (Critically Endangered)	Appendix I	Annex II and IV	Appendix II	Appendix I and II
Beluga (*Huso huso*)	CR (Critically Endangered)	Appendix II	Annex V	Appendix II (Mediterranean population), Appendix III	Appendix II

* IUCN list of categories ranging from LC (least concern), VU (vulnerable), NT (near threatened), EN (endangered), CR (critically endangered), to EX (extinct) based on their population development, their range, and population status as described by the Assessment Guideline (IUCN 2016)

** CITES Appendices I and II differentiate species for which international trade is forbidden or restricted to few exemptions due to their population status (Appendix I) and species for which international trade requires an agreed upon system of permits based upon population assessments and harvest quotas (Appendix II).

*** The species listed in the EU Habitats Directive's Annexes are protected in various ways[6]: Annex II: core areas of their habitat are designated as sites of Community importance (SCIs) and included in the Natura 2000 network to be managed in accordance with the ecological needs of the species. Annex IV: a strict protection regime must be applied across their entire natural range, within and outside Natura 2000 sites. Annex V: Member States must ensure that their exploitation and removal from the wild is compatible with maintaining them in a favourable conservation status.

**** The Bern Convention lists species in different Appendices based upon the degree of protection for the different species at the time of listing. Appendix II comprises highly protected species while Appendix III includes species with protection status.

***** The Convention on the Conservation of Migratory Species of Wild Animals (CMS) or Bonn Convention Appendix I lists migratory species threatened with extinction. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Appendix II lists migratory species that need or would significantly benefit from international cooperation. For this reason, the Convention encourages the Range States to conclude global or regional agreements.

[6] http://ec.europa.eu/environment/nature/legislation/habitatsdirective/

Scope of the Action Plan – the sturgeon rivers in Europe

All sturgeon species and forms spawn in rivers. Rivers, therefore, are pivotal elements in the sturgeon life-cycle. Populations can be defined by assigning them to distinct spawning populations in specific rivers, which represent independent entities. This is of special importance for their management in marine catchments with presence of sturgeons from the same species yet different riverine watersheds.

Table 2: List of river catchments with current or historic importance as reproduction habitat for sturgeon species in Europe and the status of sturgeon species based upon the compilation of Holcik et al. 1989.

Key rivers marked with an Asterisk* still have reproducing populations or restoration of populations is ongoing or have had an outstanding historic importance for the species with regard to the population size. Shared stocks by country and species are provided in Annex 3 of CITES Resolution Conf. 12.7 (Rev. CoP17; https://www.cites.org/sites/default/files/document/E-Res-12-07-R17.pdf).

Legend: The current status is coded as follows:
RP = Reproducing populations, SR = supportive release (supporting existing individuals), RE = Reintroduction, U = Unknown (no records of individuals available for 10 years), NP = Occasional sightings, reproduction not proven, EX = Extinct

Sea Basin	River catchment	Species	Status
Black Sea			
	Danube*	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. ruthenus* *A. stellatus* *A. sturio*	RP, SR U/SR U RP/ SR RP EX
	Dniester*	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. ruthenus* *A. stellatus* *A. sturio*	EX U EX RP U EX
	Dnjeper*	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. ruthenus* *A. stellatus* *A. sturio*	EX U/SR EX RP U EX
	Don*	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. ruthenus* *A. stellatus*	EX U/SR EX RP U
	Kuban	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. ruthenus* *A. stellatus*	U/SR U/SR EX U/SR RP/SR
	Enguri	*H. huso* *A. gueldenstaedtii* *A. persicus colchicus* *A. nudiventris*	EX EX EX EX

		A. stellatus *A. sturio*	EX EX
	Tskhenistskali	*H. huso* *A. gueldenstaedtii* *A. persicus colchicus* *A. nudiventris* *A. stellatus* *A. sturio*	EX EX EX EX EX EX
	Rioni*	*H. huso* *A. gueldenstaedtii* *A. persicus colchicus* *A. nudiventris* *A. stellatus* *A. sturio*	RP RP RP U RP U
	Coruh	*A. gueldenstaedtii* *A. persicus colchicus* *A. stellatus*	EX U U
	Yesilirmak	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. stellatus*	U U EX EX
	Kizilirmak	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. stellatus* *A. sturio*	EX U EX EX EX
	Sakarya*	*H. huso* *A. gueldenstaedtii* *A. nudiventris* *A. stellatus* *A. sturio*	EX U EX RP EX
	Büyük Cekmeca	*A. sturio*	EX
	Kücük Cekmeca	*A. sturio*	EX
	Ewros	*H. huso* *A. gueldenstaedtii* *A. stellatus* *A. sturio*	EX U U EX
Mediterranean			
	Strymon	*A. sturio*	EX
	Nestos	*A. sturio*	EX
	Peloponnisos	*A. sturio*	EX
	Archeloos	*A. sturio*	EX
	Drin	*A. sturio*	EX
	Zeta	*A. sturio*	EX
	Moraca	*A. sturio*	EX
	Buna	*A. naccarii* *A. sturio*	U EX
	Neretva	*A. naccarii* *A. sturio*	EX EX
	Soca	*A. sturio*	EX
	Sangro	*A. sturio*	EX
	Pescara	*A. sturio*	EX
	Vomano	*A. sturio*	EX
	Adige	*A. naccarii*	U/SR

	Bacchiglione	*A. naccarii*	EX
	Livenza	*A. naccarii*	EX
	Sile	*A. naccarii*	U/SR
	Piave	*A. naccarii*	U
	Tagliamento	*A. naccarii*	U
	Po*	*H. huso* *A. naccarii* *A. sturio*	EX U/SR EX
	Tiber	*A. sturio*	EX
	Rhone	*A. sturio*	EX
	Ebro	*A. sturio*	EX (RE planned)
Atlantic NE			
	Guadalquivir	*A. sturio*	EX
	Guadiana	*A. sturio*	EX
	Minho	*A. sturio*	EX
	Tagus	*A. sturio*	EX
	Douro	*A. sturio*	EX
	Gironde*(Garonne / Dordogne)	*A. sturio*	SR
	Seine	*A. sturio*	EX
	Severn	*A. oxyrinchus* *A. sturio*	NP NP
North Sea			
	Tees	*A. sturio*	NP
	Ouse	*A. sturio*	NP
	Trent	*A. sturio*	NP
	Thames	*A. sturio*	NP
	Schelde	*A. sturio*	NP
	Meuse	*A. sturio*	EX
	Rhine	*A. sturio*	EX (RE planned)
	Ems	*A. sturio*	EX
	Weser	*A. sturio*	EX
	Elbe*	*A. sturio*	RE
	Eider	*A. sturio*	EX
Baltic Sea			
	Oder*	*A. oxyrinchus*	RE
	Vistula*	*A. oxyrinchus*	RE
	Pregolia	*A. oxyrinchus*	EX
	Nemunas	*A. oxyrinchus*	RE
	Daugava	*A. oxyrinchus*	RE
	Gauja	*A. oxyrinchus*	RE
	Venta	*A. oxyrinchus*	RE
	Salaca	*A. oxyrinchus*	RE
	Narva	*A. oxyrinchus*	RE
	Neva	*A. oxyrinchus*	EX
	Volchov	*A. oxyrinchus*	EX

3. FRAMEWORK FOR ACTION

Overall Goal (the long-term aim to which the Action Plan will contribute):

To restore all existing sturgeon populations to "least concern" (IUCN) or "favourable" (Habitats Directive) status and re-establish self-sustaining sturgeon populations as well as their life-cycle habitat in their historic range to an extent that ensures species survival and representation of the subpopulations where possible.

Population indicator: Sturgeon populations are rated "least concern" (LC) in IUCN criteria or FV (favourable)[7] for the EU Habitats Directive

Verification: IUCN assessment; EU Habitats Directive, Article 17 Reporting

Habitat indicator: Life-cycle habitats are protected and/or restored in riverine and coastal areas with migration being facilitated

Verification: The national monitoring of the Water Framework Directive shows good ecological status/potential for rivers and coastal areas for the biological quality element "fish"

Purpose of the plan:

This plan is most probably the last chance to save Europe's sturgeon species from extinction and therefore, during its lifespan (until 2029), the plan aims to have effective and coordinated recovery/reestablishment programs in place, which will:

- Stop the decline of existing populations and secure genetic diversity;
- Establish ex situ living gene banks for each species and relevant subunits;
- Eliminate overexploitation and illegal trafficking of sturgeons and their products;
- Ensure sufficient monitoring of sturgeon populations;
- Identify and effectively protect existing habitats, while potential habitats are mapped and restoration is ongoing;
- Restore historic migration corridors;
- Establish a coordination structure for the implementation of this plan, which decides on its continuation based on thorough evaluation and revision.

Limitation: What is to be realized in 10 years? Priorities have to be set by the national states, based on the presence of remaining sturgeon populations, existence of potential donor stocks, historic role of the catchment for sturgeon species, suitability of existing habitat or potential to restore habitat and migration routes. This priority setting must be coordinated through a basin-wide process.

Effects of inaction

For the plan to succeed, it will be essential to immediately implement first steps for safeguarding the species in question. The do-nothing-option, often claimed to be the most natural approach to test the ability of populations to recover, will not work for sturgeons as long as the causes for the decline have not been reverted. Natural recovery through straying fish from neighbouring populations is not an option, as neighbouring populations are also threatened and far below the carrying capacity of their river system. In addition, sturgeons show a strong homing to their natal rivers, further limiting potential exchange between rivers without healthy populations in place. Fragmentation of rivers also impedes recolonization or recovery from neighbouring populations. **The most conservative assessment for the results of the do-nothing-option would be a continuation of the negative linear trend, interpolated over the last three generations of sturgeon populations.** When unregulated removal, persisting

[7] Article 1 (i) of the Directive: "*conservation status will be taken as 'favourable' when: population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.*"

adverse impacts and Allee effect (i.e., correlation between the population size and mean fitness of a population) are considered, **the speed of the decline increases, further revealing a dynamic trend the more the population is diminished.** This was observed in the decline of *A. sturio* in the Elbe River at the end of the 19th century as well as in *A. gueldenstaedtii* once the most abundant sturgeon in the Danube, over the last 10 years, which has been almost eradicated. The fate of other sturgeon populations will follow this model if effective attempts for mitigation and restoration are not carried out immediately.

Framework for Action: Objectives, results and activities

The structure of the Action Plan follows logic of other Species Action Plans using the following definitions:

Objectives relate to a direct threat driving the population decline. The objectives should express a reduction in the impact of the threat or address important organisational or research issues.

Results are the underlying conditions that need to be achieved in order to accomplish each objective. Results are the direct consequences of successfully implemented actions and results should address important drivers of the threat or problems identified in the problem analysis.

Actions are implemented in order to achieve the results. Justification for each action should be self-evident from the way it is formulated. Timescales and priorities for each action are stated:

Time lines:

Immediate	launched within the next year
Short-term	launched within the next 3 years
Medium-term:	launched within the next 5 years
Long-term:	launched within the next >5 years
Ongoing:	currently being implemented and should continue
Rolling	to be implemented perpetually (any action above from immediate to ongoing can be also qualified as rolling)

Priorities

Low	Beneficial to have in place but does not require short-term action
Moderate	Measure is important for the overall implementation of the plan
High	Measure is essential for the overall implementation of the plan
Tbd	Priority of action not clear yet/might vary from case to case

Main actors /organisations responsible for coordinating, implementing or supporting actions:

- **International Conventions**: Bern Convention, Convention on the International Trade in Endangered Species (CITES), Convention on Migratory Species (CMS)
- **EU Institutions**: EU Commission, DG AGRI, DG DEVCO, DG ENER, DG ENV, DG MARE, DG MOVE, DG REGIO including **Macroregional Strategies**: Danube Strategy (EUSDR), Baltic Strategy (EUBalt), Adriatic and Ionian Strategy (EUSAIR)
- **Intergovernmental institutions/Platforms**: Regional Fisheries Management Organizations (most importantly NEAFC, NAFO, ICCAT and GFCM) and Advisory Councils, Regional River and Seas Commissions, Cooperation platforms such as Conventions and their respective working groups, UN associated organisations (UN Environment, FAO)
- **National Governments**: ministries responsible for water, fisheries and environment, including their administration and institutions (e.g. national agencies for fisheries and for conservation, Protected Areas Management Authorities; national rivers or basin or sea authorities), ministries responsible for transport, energy and development, ministries responsible for law enforcement, border controls
- **Scientific Institutions**: research institutes, universities
- **Civil Society Organisations (CSOs)**: stakeholder organizations (navigation, fisheries, hydropower), foundations, NGOs

1. **OBJECTIVE: REMAINING WILD POPULATIONS ARE PROTECTED FROM ACCIDENTAL AND DIRECTED REMOVAL OF INDIVIDUALS**				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
1.1. **Directed removal of individuals is eliminated**	1.1.1 Fishing of sturgeon species is/remains prohibited until viable populations are established and is allowed only at levels that prevent the populations to drop below VU level	High	Immediate	National ministries (environmental, marine and inland fisheries authorities, border police) RFMOs and Advisory Councils
	1.1.2 Effectively monitor catch allowance for establishment of *ex situ* populations and for scientific purposes according to objective 2.1.4	High	Immediate	National ministries (inland fisheries and environmental authorities) RFMOs and Advisory Councils
	1.1.3 Strengthen implementation and enforcement of existing legislation to prevent illegal, unregulated and undocumented fisheries in marine and freshwater	High	Ongoing	National ministries (marine and inland fisheries and environmental authorities) RFMOs and Advisory Councils
	1.1.4 Provide adequate resources as well as continuous capacity building and targeted training for relevant enforcement authorities	High	Ongoing	National ministries (marine and inland fisheries and environmental authorities); enforcement agencies, customs, customer protection; UN Environment RFMOs and Advisory Councils
	1.1.5 Involve fishermen and develop alternative income sources for affected fishing communities	High	Immediate	National ministries (marine and inland fisheries and environmental authorities); Enforcement agencies RFMOs and Advisory Councils
1.2 Accidental removal is reduced to levels allowing population recovery	1.2.1 Identification of bycatch and its impacts in marine- and freshwater	High	Immediate	National ministry (marine and inland fisheries authority); Study implementation supported by scientific institutions RFMOs and Advisory Councils

	1.2.2 Identification and implementation of management options (technical solutions, fishery restriction, closed areas, closed season) and gear modifications to reduce bycatch in marine and inland fisheries	Medium	Short-term	National ministry (marine and inland fisheries authority); RFMOs and Advisory Councils Implementation supported by scientific institutions, CSOs
	1.2.3 Monitoring of compliance with bycatch avoidance measures and adaptive management	Medium	Mid-term	National ministry (marine and inland fisheries authority) RFMOs and Advisory Councils
1.3 Level of accidental losses of individuals by ship strikes, hydropower and water abstraction facilities is assessed and reduced.	1.3.1 Identification of locations and extent of losses of fish through ship strikes, hydropower and water abstraction facilities	Medium	Short-term	National ministry (water authority); Study implementation supported by scientific institutions
	1.3.2 Implementation of avoidance measures for fish losses through ship strikes, hydropower and water abstraction facilities	Medium	Mid-term	National ministry (water authority); Study implementation supported by scientific institutions
1.4 Regional coherence of measures is secured	1.4.1 Facilitate regional coordination of protection measures mentioned above	High	Immediate	Regional River and Sea Commissions

2. OBJECTIVE: POPULATION STRUCTURE IS ACTIVELY SUPPORTED TO REVERSE THE DECLINE.				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
2.1. ***Ex situ* brood stocks are established to secure genetic diversity of all sturgeon populations**	2.1.1. Establish basin-wide *ex situ* programmes following best practice guidelines for husbandry (such as IUCN 2013, FAO 570)	High	Immediate (all species and forms) except Ongoing (for *A. sturio*, *A. oxyrinchus*, partially *A. naccarii*)	National ministries; Technical advisory: scientific institutions; Civil society organisations (additional support)
	2.1.2. Secure funding for construction and operation of *ex situ* facilities	High	Short-term	EC, national ministries, civil society organisations
	2.1.3. Build *ex situ* facilities (jointly managed by catchment countries non-commercial/non-private)	High	Medium-term	National ministries; Scientific institutions (technical and advisory support); Civil society organisations (additional support)
	2.1.4. Establish *ex situ* stocks of all (sub-) populations, which are locally critically endangered, using animals genetically certified for species purity and degree of relatedness	High	Long-term	National ministries; Scientific institutions (technical and advisory support)
	2.1.5. Perform regular quality control of husbandry practice	Moderate	Rolling	Independent institutes, not being involved in the establishment and running of *ex situ* operations, or independent body/board established for this purpose (recommended if collaborative effort)

	2.1.6. Establishment of long-term breeding plans to preserve all available genetic diversity	High	Short-term /Rolling	National ministry (fisheries authority); Study implementation supported by scientific institutions
2.2. **Reproduction and release programmes are in place and being implemented**	2.2.1. Reproduce and rear juveniles following best practice guidelines (such as FAO 570)	High	Long-term /Ongoing (Species specific)	National ministries; Scientific institutions (technical and advisory support)
	2.2.2. Science-based continuous release of offspring to recover historic population structure	High	Long-term /Ongoing (Species Specific)	National ministries; Scientific institutions (technical and advisory support)
	2.2.3. Design, implement and carry out monitoring for control of success rate of release actions	High	Medium-term	National ministries; Scientific institutions (technical and advisory support)
	2.2.4. Prohibit uncontrolled stocking (i.e. exotic species and genotypes), through adequate jurisdiction and enforcement; Increase safeguarding measures to prevent escapement from rearing facilities	High	Immediate	National ministries (marine and inland fisheries and environmental authorities)
2.3. **Regional coherence of measures is secured**	2.3.1. Establish a basin wide coordination body to coordinate and supervise all *ex situ* restoration and monitoring actions	High	Immediate	Regional River and Sea Commissions; National ministries

3. OBJECTIVE: STURGEON HABITATS ARE PROTECTED AND RESTORED IN KEY RIVERS.				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
3.1. **Existing habitats are identified and protected from deterioration**	3.1.1. Identify existing critical habitats (time and location/conditions and resources) leading to a common database	High	Immediate	National ministries (water and environment authorities); Scientific institutions, civil society organizations (CSOs) support identification
	3.1.2. Ensure legal protection of identified priority habitats and their functions	High	Short-term	National ministries (water and environment authorities)
	3.1.3. Identify conflicts and common interests between economic development plans, identified habitats and their functionality	High	Rolling	EU, macro-regional strategies, regional river and sea commissions with national governments (ministries of environment, transport, energy…), CSOs
	3.1.4. Mitigate conflicts between economic development and ecological requirements and functions of sturgeon habitat	High	Rolling	EU, macro-regional strategies, regional river and sea commissions with national governments (ministries of environment, transport, energy…), CSOs
3.2. **Habitats restored <u>in key rivers</u>**	3.2.1. Identify habitat restoration possibilities	High	Short-term	National ministries (water and environment authorities); Scientific institutions, CSOs support identification
	3.2.2. Develop an integrated concept for restoration of key habitats to reach near natural ecosystem functions providing sufficient carrying capacity for self-sustaining sturgeon population in a given river basin	Moderate	Rolling	National ministries (water and environment authorities); Scientific institutions, CSOs support development of concept
	3.2.3. Implement pilot restoration actions	High	Short-term	National ministries (water and environment authorities) Scientific institutions, CSOs can support implementation

	3.2.4.	Monitor the habitat quality in pilot restoration actions, with special emphasis on criteria relevant for sturgeons	High	Long-term	Main responsibility for monitoring in reference with Water Framework monitoring: national ministries (water and environment authorities); Technical advice and if contracted implementation: scientific institutions
3.3 Sturgeon habitat is protected and well restored in all sturgeon rivers	3.3.1	Countries identify suitability of rivers for sturgeon restoration by: - Existing sturgeon populations - Existing material for reintroduction - Favourable habitat, resources and conditions -Good potential for the restoration of habitats		Action 3.3.1 within AP time frame; Result 3.3 outside of 10 year time frame	National ministries (water and environment authorities); Technical advice and if contracted implementation: scientific institutions
3.4 Regional coherence of measures is secured	3.4.1	Facilitate coordination and supervision of habitat protection, restoration and monitoring actions	High	Immediate	Regional river and sea commissions, national ministries

4. OBJECTIVE: STURGEON MIGRATION (UP- AND DOWNSTREAM) IS SECURED OR FACILITATED.				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
4.1. **No further migration obstacles are built in key sturgeon rivers.**	4.1.1. Prohibit any further construction of migration obstacles based on existing legislation, laws, treaties and conventions	High	Immediate	National ministries (water authorities); Scientific institutions (technical and advisory support); CSOs
	4.1.2. Establish legal prerequisites for future in-river construction development including a minimum bypass with suitable conditions for fish migration of 30% of the discharge at all times	High	Short-term	National ministries (water authorities); Scientific institutions (technical and advisory support); CSOs
4.2. **Migration restored in key sturgeon rivers**	4.2.1. Identify relevant obstacles for sturgeon migration	High	Immediate	National ministries (water and environment authorities); Scientific institutions, CSOs support identification
	4.2.2. Prioritize mitigation of migration obstacles according to criteria such as: existing stocks, former habitat, existing or former spawning sites, river length, existing habitat, and recolonization potential	High	Immediate	National ministries (water and environment authorities); Scientific institutions, CSOs support identification
	4.2.3. Conduct feasibility studies (comprising hydrological and hydrodynamic monitoring and modelling and fish monitoring (telemetry, Didson sonar, etc.)) for facilitating up and downstream migration at highest priority barriers (based on results of 4.2.2)	High	Short-term	National ministries (water authorities); Scientific institutions, CSOs, hydropower operators support feasibility study

	4.2.4. Allocate funds for feasibility studies as well as mitigation measures	High	Short-term	Hydropower operators, macro-regional strategies, embedding platforms (INTERACT, EuroAccess), national governments, civil society organisations
	4.2.5. Mitigation measures such as sediment and flow management are established as an integral part of the concession for new or reiterated riparian water rights (mitigation measures to be included into rentability analysis of hydropower developments)	High	Rolling	National ministries (water authorities); Regional river commission
	4.2.6. Implement functional passage solutions (proven by monitoring results)	High	Long-term	National ministries (water authorities), hydropower operators; Technical advice and implementation: scientific institutions
	4.2.7. Establish monitoring guidelines, identify suitable devices and implement programmes to assess fish pass efficiency	High	Medium-term	National ministries (water authorities), hydropower operators, establish a technical commission
4.3. **Restore migration in <u>all</u> sturgeon rivers following items 4.1 and 4.2**		Out of Action Plan time line		
4.4. **Regional coherence of measures is secured**	4.4.1 Coordinate and supervise migration facilitation	High	Immediate	Regional river commissions, national ministries
	4.4.2 Monitoring of distribution, migration patterns and behaviour of sturgeon populations on a catchment basis in marine- and freshwaters	*Moderate*	*Immediate*	*National Ministries/Water Authorities*

5. OBJECTIVE : TIMELY AND CONTINUOUS DETECTION OF POPULATION SIZES AND CHANGES IN REMAINING WILD STOCKS				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
5.1. **Monitoring programs are designed and implemented**	5.1.1. Identify or create competent authorities to establish monitoring on a catchment basis in marine- and freshwaters	High	Immediate	National ministries (fisheries and environment authorities)
	5.1.2. Define criteria and develop design of monitoring programmes for all life stages (see fact box on monitoring in Annex 3)	High	Short-term	National ministries (fisheries and environment authorities); Technical advice: scientific institutions
	5.1.3. Secure funding for long-term commitment	High	Mid-term	EC, macro-regional strategies, national governments
	5.1.4. Implement pilot actions	High	Short-term	National ministries (fisheries and environment authorities)
	5.1.5. Regularly evaluate and adapt management of monitoring programmes *including DNA analysis*	High	Rolling	National ministries (fisheries and environment authorities); Technical advice: scientific institutions, civil society organisations
5.2. **Implement regular monitoring of all stocks in all sturgeon rivers**	5.2.1. Outside of AP		Long-term	
5.3. **Regional coherence of measures is secured**	5.3.1. Coordinate and supervise monitoring measures to secure a basin wide approach	High	Immediate	Regional rivers and seas commissions, national ministries

6. OBJECTIVE: ELIMINATE ILLEGAL TRADE OF ALL STURGEON PRODUCTS.				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible/ Recommendations***
6.1. Increased enforcement and stronger prosecution is achieved	6.1.1. Establish and make available forensic tools to differentiate species and origin of caviar and sturgeon products in processing and trade	High	Short-term	CITES Secretariat for Decision 16.136;[8]; Scientific institutions; Law enforcement authorities
	6.1.2. Routinely perform market and trade controls on domestic, intra EU and international levels to assess level of illegal trade	High	Immediate	National ministries (authorities responsible for marine and inland fisheries, customs CITES and Trade); Facilitate European-wide data exchange: EU and neighbouring countries; Technical advice: scientific institutions, CSOs
	6.1.3. Drastically increase enforcement of existing legislation through fostering of inter- agency cooperation & data sharing (EU TWIX) as well as capacity building for enforcement agencies	High	Rolling	National ministries (incl. authorities responsible for CITES and police); Facilitate European-wide data exchange: EU and neighbouring countries; Technical advice: scientific institutions, CSOs
	6.1.4. Improve caviar labelling requirements in CITES regulations (esp. fraud resistance) and enhance implementation in intra-EU and domestic trade	High	Short-term	CITES Secretariat and National CITES authorities
	6.1.5. Sanctions should take into account the value of the prejudice to the environment and the fishing resources	High	Medium-term	National governments (jurisdiction); National law enforcement institutions and agencies

[8] Decision 16.136 SC70 Doc. 44.2 IDENTIFICATION OF STURGEONS AND PADDLEFISH SPECIMENS IN TRADE REPORT OF THE ANIMALS COMMITTEE https://cites.org/sites/default/files/eng/com/sc/70/E-SC70-44-02.pdf

6.2. Higher awareness of all stakeholders in the caviar trade chain is achieved	6.2.1. Assess attitudes and mind sets of consumers and traders in a scientific study to develop adequate awareness raising tools	Medium	Short-term	Scientific institutions; CSOs
	6.2.2. Target group-oriented communication campaigns are tested, refined and implemented	Medium	Medium-term	Scientific institutions; CSOs
	6.2.3. Raise awareness and knowledge of prosecutors and judges to enable adequate sanctions	High	Short-term	National governments (jurisdiction); National law enforcement institutions and agencies; Support through CSOs

7. OBJECTIVE: SECURE ADEQUATE FUNDING AND REGULATIONS TO ENABLE THE IMPLEMENTATION OF ACTION PLAN				
Result	***Action***	***Priority***	***Time scale***	***Organisations responsible***
7.1 Adequate funding instruments for long-term actions are in place	7.1.1 Develop a coordinated funding plan for the main actions of this plan, utilizing existing EU funding, national governments or other donors	High	Immediate	EC DG ENV to coordinate with other EU funding instruments, national governments; Supported by CSOs, foundations
	7.1.2 National programming of EU funds need to include measures for sturgeon conservation, according to this Action Plan	High	Short-term	EU Member States
7.2 Legal prerequisites support sturgeon conservation measures	7.2.1 Revisit listing of species in conventions and regulations following the current IUCN red list status	Medium	Short-term	IUCN, Bern Convention Secretariat and Contracting Parties, CITES, EU (DG ENV)
	7.2.2 Adapt reference conditions for national WFD monitoring criteria (Water Framework Directive) to better represent long-distance migrants and umbrella species	High	Short-term	National governments of Member States and EU
	7.2.3 Develop and adapt inland waterway transportation plans, taking into account the protection of sturgeon habitats	High	Long-term	EC, DG Move, national governments of Member States

8. OBJECTIVE: STURGEONS SERVE AS FLAGSHIP SPECIES FOR HEALTHY RIVER ECOSYSTEMS. SUPPORT FROM PUBLIC, POLITICAL ACTORS, AUTHORITIES AND RELEVANT STAKEHOLDERS FOR CONSERVATION MEASURES HAS INCREASED.				
Result	***Activity***	***Priority***	***Time scale***	***Organisations responsible***
8.1 Awareness for sturgeons and the urgency of conservation measure is increased	8.1.1 Develop and implement targeted communication strategy to raise stakeholder and national authority awareness and keep the Action Plan high on the political agenda	High	Short-term	CSOs, Bern Convention, UN Environment; Regional strategies by regional river and sea commissions such as ICPDR
8.2 International exchange between relevant stakeholders is increased.	8.2.1 Strengthen inter-agency and inter-sectoral cooperation, such as of river basin and regional seas authorities, nature conservation and fisheries agencies to develop a common approach towards sturgeon conservation	Medium	Short-term	On international level: Bern Convention, CITES, CMS, UN Environment DG ENV between other relevant DGs or between regions, regional river and sea commissions; Supported by CSOs
	8.2.2 Organize regular European and/or basin-wide expert meetings to increase knowledge on sturgeon conservation and to organize transfer of knowledge and knowhow from science to managers and stakeholders	Medium	Short-term	On international level: EC (DG ENV), Bern, CITES, UN Environment or other international conventions; On regional level: regional river and sea commissions; Supported by CSOs, scientific institutions

9. OBJECTIVE: MONITOR AND EVALUATE ACTION PLAN IMPLEMENTATION TO ALLOW ADAPTIVE MANAGEMENT				
Result	Activity	***Priority***	***Time scale***	***Organisations responsible***
9.1 Responsibilities for AP implementation clarified and regular monitoring and evaluation conducted	9.1.1 States; river basin and sea commissions and EC authorities nominate a focal point/coordinator responsible for monitoring the implementation of the AP	High	Immediate	EC, national governments regional river and sea commissions
	9.1.2 Convene a working group (comprising all focal points) to support the implementation of the Action Plan and agree on regular meetings	High	Immediate	Secretariat of Bern Convention, supported by EC (DG ENV)
	9.1.3 Reporting schedule and reporting mechanism agreed (aligned to other legally required reporting), regular reports of focal points are presented at annual Standing Committee meetings of Bern Convention	High	Short-term	Coordination: Bern Convention
	9.1.4 Mid-term (5yrs) and final (10yrs) evaluation of the AP leading to adaptive management decisions, or continuations of activities	High	Long-term	Coordination by Bern Convention, Contribution by national governments (appointed national focal points) Support through CSOs and scientific institutions

ANNEX 1. BIOLOGICAL ASSESSMENT

There are only a few high-quality data available on population sizes and population trends of the different sturgeon species by country or river basin. **A revision of the IUCN Red List Assessment is planned for European sturgeon species in 2019**.

The reporting system under Art.17 of the EU Habitats Directive obliges EU Member States to report the conservation status of species listed in the Habitats Directive according to 4 parameters: range of species, population, suitable habitat and future prospect. All four parameters result in an overall assessment (see Table 3). It must however be noted that these reports are of variable quality and most often refer to chance sightings rather than systematic monitoring. Availability of population data for range countries outside the EU is not existing or not comparable.

Table 3: Overall assessment 2007-2012 of sturgeon species according to Habitats Directives
https://bd.eionet.europa.eu/article17/reports2012/species/progress/?period=3&group=Fish&conclusion=overall+assessment

	Bio-geographical and Marine Region*:							
Species	**Alpine**	**Atlantic**	**Black Sea**	**Continental**	**Mediterranean**	**Pannonian**	**Steppic**	**Marine Atlantic**
Acipenser gueldenstaedtii			U2	U2			U2	
Acipenser naccarii				U2	XX			
Acipenser nudiventris				U2				
Acipenser oxyrinchus				U2				
Acipenser ruthenus	U1			U2		U1	U2	
Acipenser stellatus			U2	U2	U2		U2	
Acipenser sturio		U2		XX	U2			U2
Huso huso			U2	U2			U2	

Legend: FV = Favourable, U1 = Unfavourable inadequate (change in management or policy is required to return the species to favourable status but there is no danger of extinction in the foreseeable future), U2 = Unfavourable bad (serious danger of becoming extinct, at least regionally), XX = 'Unknown' class, which can be used where there is insufficient information available to allow an assessment

* as per guidance from the European Topic Center for the 2007-2012 reporting: All anadromous fish except *Acipenser sturio* should be reported for terrestrial regions.

DESCRIPTION OF THE SPECIES:

Russian sturgeon complex, Danube sturgeon (*A. gueldenstaedtii*, Brandt 1833) and Colchic sturgeon (*A. persicus colchicus*, Arthukin & Zarkua, 1986)

The Russian sturgeon complex is a good example of the high morphological variability of the Acipenseridae and the resulting confusion deriving thereof. Several taxonomic solutions were proposed for the species to recognize its characteristics and the resulting position in nomenclature. Following the separation of *A. gueldenstaedtii* (Brandt 1833) and A. *persicus* (Borodin 1897) in the Caspian Sea and its tributaries, Berg 1933, re-classified *A. persicus* as *A. gueldenstaedtii persicus*. The occurrence of similar substructures in the populations was confirmed for the Black Sea populations of Russian sturgeon. As a result, Marti 1940 proposed to make the Colchic sturgeon a subspecies of the Russian sturgeon and named it *A. gueldenstaedtii colchicus*. Artyukhin and Zarkua (1986) changed the status of the Colchic sturgeon to a subspecies of *A. persicus*. In 2007 in an attempt to avoid the differentiation of species into various subspecies, Kottelat and Freyhof assigned the taxon *A. colchicus* to the species. However, officially the taxonomic question has not affected any changes e.g. to CITES, the IUCN Red List and National Red List of Georgia and other international documents.

Species description:

Sizes: max. length: 2.4m; max weight: 110kg; average length: 1.3-1.6m

Age: max. > 50 years; Maturation: ♀ 10-16 years, ♂ 8-13 years

Range: Black, Caspian and Azov Seas and their larger tributaries

Migration pattern: anadromous, hiemal and vernal forms. Former resident form in the Danube is under discussion

Past distribution:

The species used to occur in the Black Sea and its tributaries: the Danube and its tributaries (Olt, Sava, Tisza, Drava, Mura, Morava) and Dnjester, Dnjeper, Don, and Kuban rivers. It is rare in the South Eastern Black Sea rivers and tributaries, but *A. persicus* is common, also described as a local subspecies (*A. persicus colchicus*) in Enguri, Rioni, Tskhenistskali, Coruh. In Yesilirmask, Kizilirmak and Sakarya as well as in Evros River the species assignment is not clear. According to fish market data in the past, it is considered to be one of the most numerous sturgeon species in the Danube River Basin.

Present Distribution & Status in Europe:

A small wild stock in the Danube is restricted to the Lower Danube below the Iron Gate Dams and the Black Sea. There is an ongoing dramatic decline in numbers due to poaching and bycatch in the Danube and the Black Sea. Natural reproduction exists at a small scale in the Danube, but is decreasing over the past decades and is becoming sporadic. *A. gueldenstaedtii* is rare in the Rioni while *A. persicus colchicus* is still the most abundant sturgeon species and reproduction is confirmed. The last reproduction in the Sakarya River was in 2009, according to anecdotal evidence. In Ukraine there is no natural reproduction confirmed.

Figure 3: Past and present distribution map of Acipenser gueldenstaedtii and A. persicus colchicus (inserted map)© IHG BOKU[9]

Management:

Large-scale release programmes are carried out to support fisheries in Ukraine.

Fishing bans are in place in the Lower Danube River (LDR) (from 2006 until 2020) and the Black Sea watershed, but lack effective enforcement. There are no coordinated basin-wide restoration actions in place. F-1 specimens of the Danube stock are available *ex situ* stocks in private farms in Romania and Bulgaria, but so far only used little (Bulgaria) or not at all (Romania) for controlled propagation to produce offspring for supportive stocking. After natural recruitment was lacking in the LDR since 2004 a small-scale preparatory supportive stocking was initiated as part of a recovery programme, initiated by the ban on commercial fishery in year 2006. Stocking was discontinued between 2010 – 2012 and in 2016.

Stocking ceased in Sea of Azov (Russian Federation).

Remarks:

During April 2018, four Russian sturgeon males carrying a Coded Wire Tag in their pectoral fins, originating from restocking activities conducted during 2006 - 2009, were accidentally captured while fishing for adult beluga to be used in a COFASP funded genomics project. This is the first evidence that supportive stocking may contribute to the recovery of stocks of this species.

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[9] Distribution maps are based on CCM River and Catchment Database,© European Commission - JRC, 2007; Vogt J.V., Soille, P., De Jager A., Rimaviciute E., Mehl W., Foisneau S., Bodis K., Dusart J., Paracchini M.L., Haastrup P., Bamps C. (2007): A pan-European River and Catchment Database. European Commission - JRC, Luxembourg, (EUR 22920 EN) 120 pp.

Romania considers using results from recent evaluations of survival, growth and distribution of stocked Russian sturgeons in the Black Sea coastal waters, conducted in the framework of the Fishery Operational Programme for Romania during 2013 – 2015, and revising stocking procedures based on results on genetic diversity obtained in the Era Net COFASP project DASTMAP, to restart the supportive stocking in cooperation with Bulgaria and Ukraine.

There is an urgent need for coordinated efforts for stock enhancement, centralized *ex situ* facilities and procurement of stocks from captivity and wild, as well as legislation and enforcement to stop poaching.

Adriatic sturgeon (*Acipenser naccarii*, Bonaparte 1836)

Size: max. length: 2.0m; max weight: 90kg; average length: 1.4-1.8m

Age: max. > 50 years; Maturation: ♀ 9-13 years, ♂ 6-8 years

Range: Adriatic Sea and tributaries. Possible past occurrence on Iberian Peninsula is under discussion

Migration pattern: anadromous at sea, but remains mostly in coastal/brackish waters. A resident form in Ticino River is under discussion

Past distribution in European Union:

A. naccarii was endemic in the Northern part of the Adriatic Sea, the River Po and its tributaries as well as Adige, Brenta, Bacchiglione, Piave, Livenza, Tagliamento, Sile, Nereteva, Buna and Drin Rivers, and Skodra Lake on the Albania – Montenegro border. It was rarely reported between the Greek coast of the Ionian Sea and Corfu. In the Po River the species was less common than *A. sturio* until the 1970s, and followed the dynamics of decline of all the Italian sturgeon species.

Present Distribution & Status in European Union:

A small stock exists in the River Po, to a large part originating from and supported by stocking. Specimens exist in Adige, Piave, Sile and Tagliamento Rivers, probably originating from the Po or are locally restocked. The status in Buna and Drin Rivers are unclear. No natural reproduction within the territory of the EU has been confirmed, at least since the early 1980s.

Management:

Ex situ stocks are available in several hatcheries in Italy, originating from about ninety wild fish caught in the 1970s. Restocking is in place since the end of the 1980s. The genetic population structure of the brood stock in Italy is well documented, but the available breeding plan is not fully implemented. The differences between Albanian and Italian populations have been assessed, resulting in the proclamation of separate Distinct Population Segments. Several restoration actions are being carried out by different entities, but no coordinated basin-wide restoration actions are in place. Fishing is banned throughout its range (DPR 08/09/1997, n.357).

There is an urgent need for coordinated efforts in conservation, specifically a coordinated restoration plan and monitoring throughout its range.

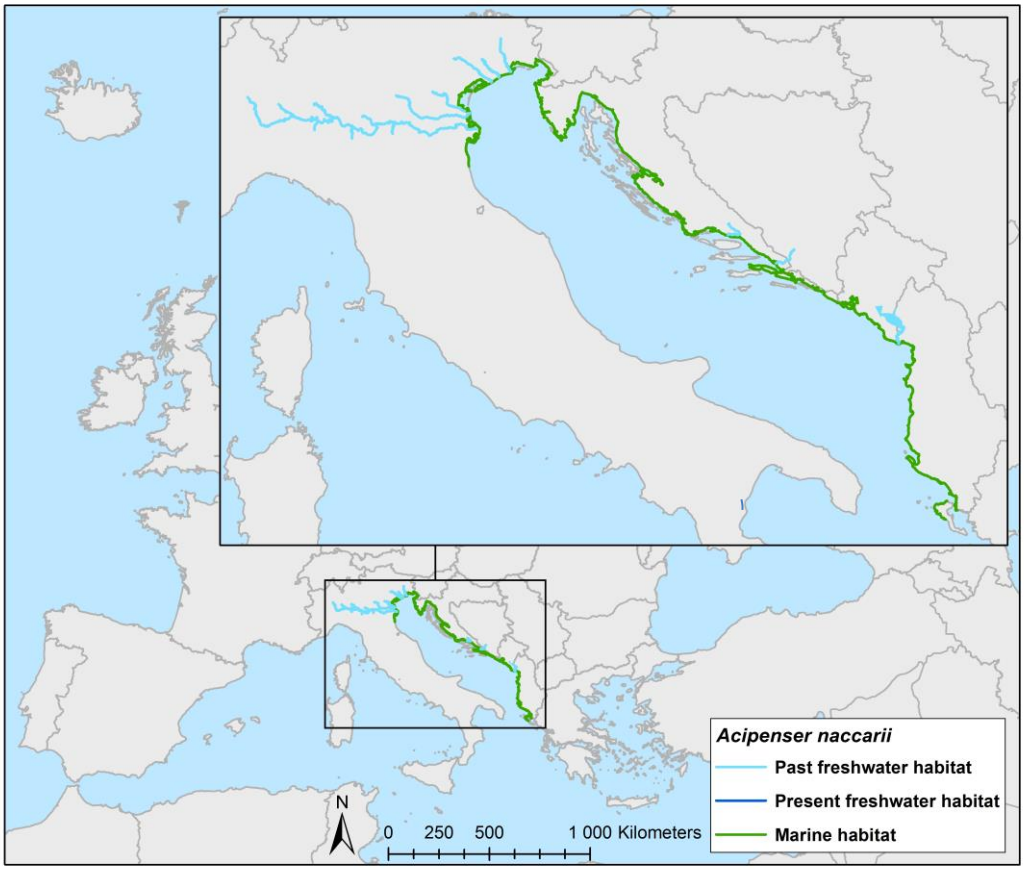

Figure 4: Past and present distribution map of Acipenser naccarii © IHG BOKU [9]

Ship sturgeon / Fringebarbel sturgeon (*Acipenser nudiventris*, Lovetzky 1828)

Species description:

Size: max. length: 2.2m; max weight: 120kg; average length: 1.2-1.5m

Age: max. >36 years; Maturation: ♀ 12-18 years, ♂ 6-12 years

Range: Black, Caspian, Azov and Aral Seas and tributaries.

Migration pattern: potamodromous in the Danube, anadromous forms exist in other catchments

Past distribution in Europe:

In the Black Sea area the species was common in the Danube and its tributaries: Sava, Tisza, Drava, Mura, Vah, Morava, Prut and Siret. Since 1900 it is considered rare in the Danube. Historically was also present in Dnjester, Don, Kuban, Enguri, Rioni and Sakarya Rivers.

Present Distribution & Status in Europe:

Considered as "possibly extinct" in the Danube River Basin. Three known specimens have been caught since 2000: one was poached, one released and one died in captivity. Rare records are reported from Rioni, but the species' status is unclear.

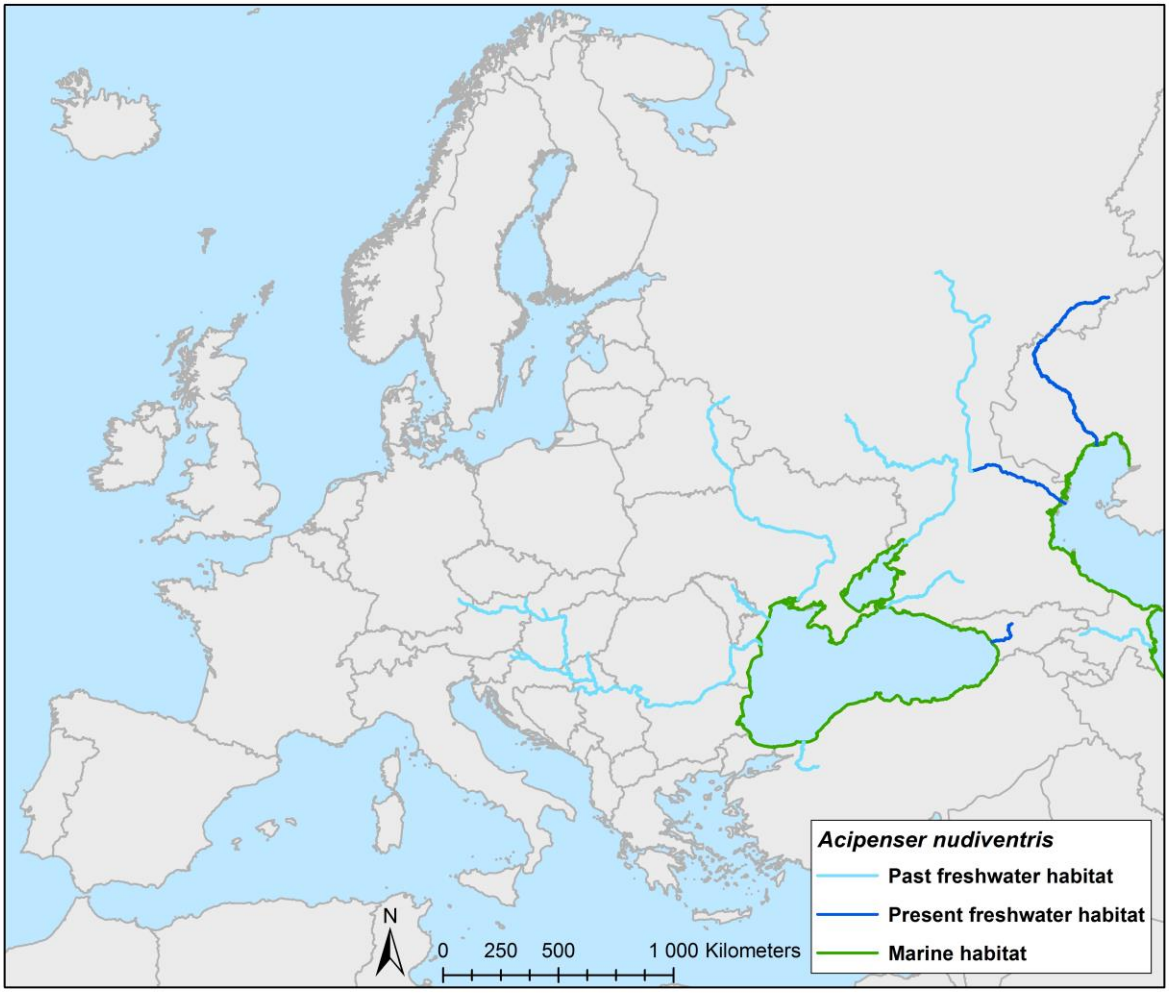

Figure 5: Past and present distribution map of Acipenser nudiventris © IHG BOKU [9]

Management:

Fishing is banned throughout its range in Europe.

Ex situ stocks are available from Caspian but not Danubian/Pontian stocks in living gene banks. There are no coordinated basin-wide restoration actions in place.

There is an urgent need for coordinated efforts and centralized *ex situ* facilities to restore if remaining wild stocks.

Atlantic or Baltic sturgeon (*Acipenser oxyrinchus*, Mitchill 1815)

Species description:

Size: max. length: >4.3m; max weight: 370kg; average length: 1.7-2.5m

Age: max. >100 years; Maturation: ♀ 7-30 years, ♂ 5-24 years

Range: North American Atlantic Coast and its tributaries, Baltic Sea and tributaries in Germany, Poland, Estonia, Latvia, Lithuania and the Russian Federation

Migration pattern: anadromous, hiemal and vernal forms

Past distribution in Europe:

Although the species is widely distributed along the east coast of North America from Florida to Labrador, in Europe it is confined to the Baltic Sea and its tributaries: Odra, Lovat, Musa, Narva, Neman, Newa, Notec, Pregolya, Venta, Vistula, Volkhov with Lake Ladoga. The extent of the historic range in Europe is currently being discussed. Evidence exists that the species was widespread in the Eastern Atlantic and the North Sea between 3500 to 1500 bp. Over the last 1000 years the species was confined to the Baltic Sea and eventually to the British Isles (Severn River).

Present Distribution & Status in Europe:

The populations in the Baltic Sea were present until the mid-20th century, when it was extirpated in the wild through overharvest, hydro-constructions, and pollution. Re-introduction efforts in the Baltic Sea are ongoing and focus on the southern tributaries to the Baltic Sea such as Odra, Vistula, Prgolya, Nemunas, Daugava and Narva, with more than 3 million of fish of various sizes released as of 2018.

Management:

Although it is not explicitly listed under the Habitats Directive, it is considered included under Annex II and V, because it was unknown to be a separate species in the Baltic region when the Directive was compiled. Similarly, the Baltic population of the Atlantic sturgeon should be considered listed on Appendix III of the Bern Convention.

Centralised *ex situ* stocks are available and restocking is in place in the Baltic Sea range countries, namely in Germany and Poland, with releases also carried out in the Baltic States. Coordinated efforts on a regional scale are temporarily in place but are subject to political changes and project funding.

Fishing is banned throughout its range in Europe. Bycatch in commercial fisheries (gill netting) hampers reintroduction efforts.

There is an urgent need to secure long-term coordinated efforts for habitat restoration and reduction of bycatch.

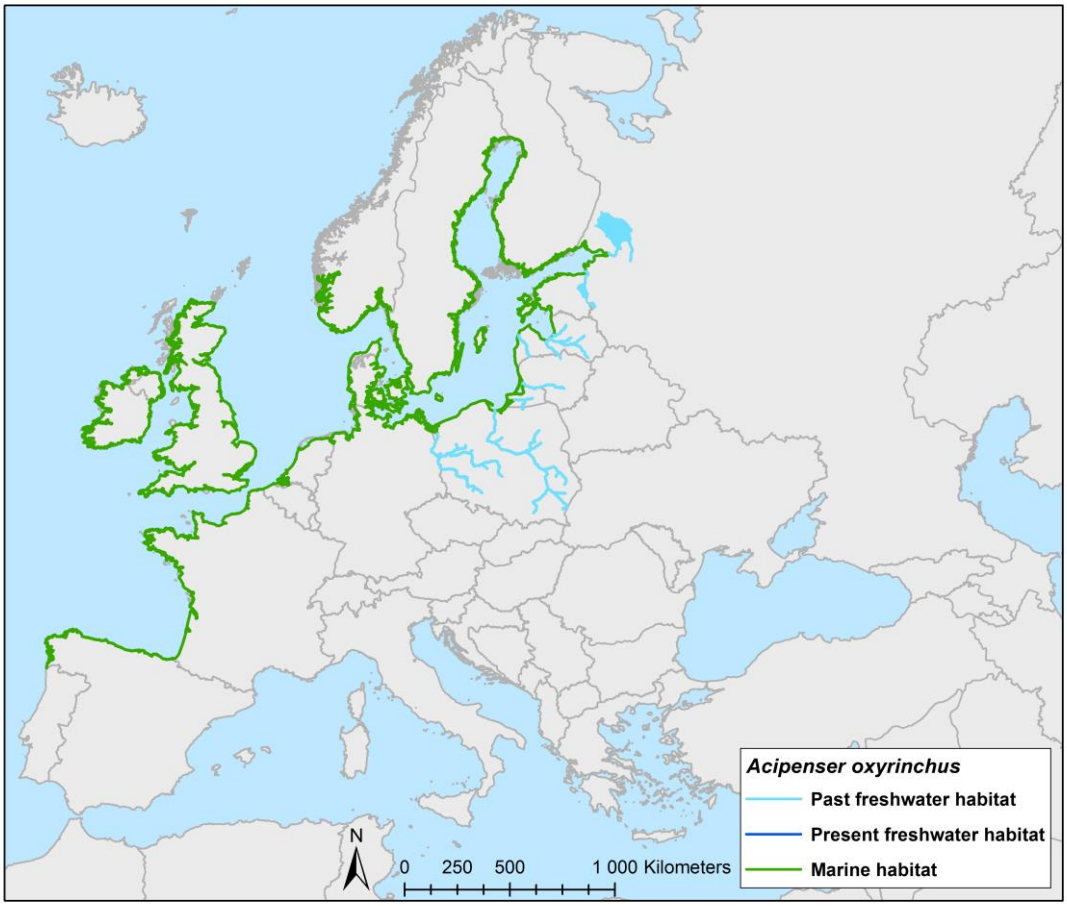

Figure 6: Past and present distribution map of Acipenser oxyrinchus © IHG BOKU [9]

Sterlet (*Acipenser ruthenus*, Linnaeus 1758)

Species description:

Size: max. length: 1.2m; max weight: 16kg; average length: 0.5-1m

Age: max. >25 years; Maturation: ♀ 5-8 years, ♂ 3-5 years

Range: tributaries of Black, Caspian, Azov, Kara and White Seas

Migration pattern: potamodromous

Past distribution in Europe

In the Danube and its tributaries: Sava, Alt, Tisza, Drava, Mura, Vah, Morava, Inn, Isar; Dnjeper, Dniester, Don, Kuban and their main tributaries in the Black Sea range.

Present Distribution & Status in Europe:

One small isolated population with limited reproduction occurs in the fragmented section of the Upper Danube. There has been a sharp decline of population sizes in the Middle Danube after the construction of the Gabcikovo powerplant and a moderate decline in the Lower Danube. The species is exposed to poaching in the Middle and Lower Danube. There is also an isolated population in the Tisza with limited reproduction. Dniester, Dnjeper, Prut, and Don all have naturally reproducing populations of *A. ruthenus* in their middle sections. In the Kuban River massive stocking measures are being carried out.

Figure 7: Past and present distribution map of Acipenser ruthenus © IHG BOKU [9]

Management:

Coordinated restoration actions are in place only on a regional scale and medium term. Centralized *ex situ* stocks are under discussion but not yet implemented. Breeding plan is not available.

The first results of an EU project (Kohlmann et al. 2018) revealed the existence of high relict genetic diversity at mtDNA level in the stocks of the LDR and a process of ongoing genetic admixture at nDNA level threatening the LDR stocks. It is suspected that the phenomenon is caused by uni-directional downstream migration of young sterlets from the Middle Danube stock that cross the Iron Gate Dams to feed but are unable to return to their home range for spawning since 1974.

Fishing bans are in place in most areas but enforced only locally.

There is an urgent need for coordinated efforts regarding legislation and enforcement to stop poaching.

Stellate or starry sturgeon (*Acipenser stellatus*, Pallas 1771)

Species description:

Size: max. length: 2.9m; max weight: 80kg; average length: 1.2-1.8m

Age: max. >35 years; Maturation: ♀ 8-14 years, ♂ 6-12 years

Range: Black, Caspian, Azov, Aegean Seas and their tributaries

Migration pattern: anadromous, hiemal and vernal forms

Past distribution in Europe :

The Black Sea and: the Danube and its tributaries: Sava, Tisza, Drava, Mura, Jiu, Olt, Siret, Prut; Dnjeper, Dniester, Don, Kuban, Enguri, Rioni, Tskhenistskali, Coruh, Yesilirmak, Kizilirmak Sakarya, as well as in Struma and Evros Rivers and the Aegean Sea.

Present Distribution & Status in Europe:

It is considered extinct in the Aegan Sea. A small wild stock in the Danube is restricted to the Lower Danube below the Iron Gate Dams and the Black Sea. There is an ongoing dramatic decline in numbers due to poaching and bycatch in the Danube and the Black Sea. Natural reproduction exists on a small scale in the Danube, but is sporadic and the population size decreases. Reproduction in the Rioni River was confirmed in 2018 by single catches of young of the year fish.

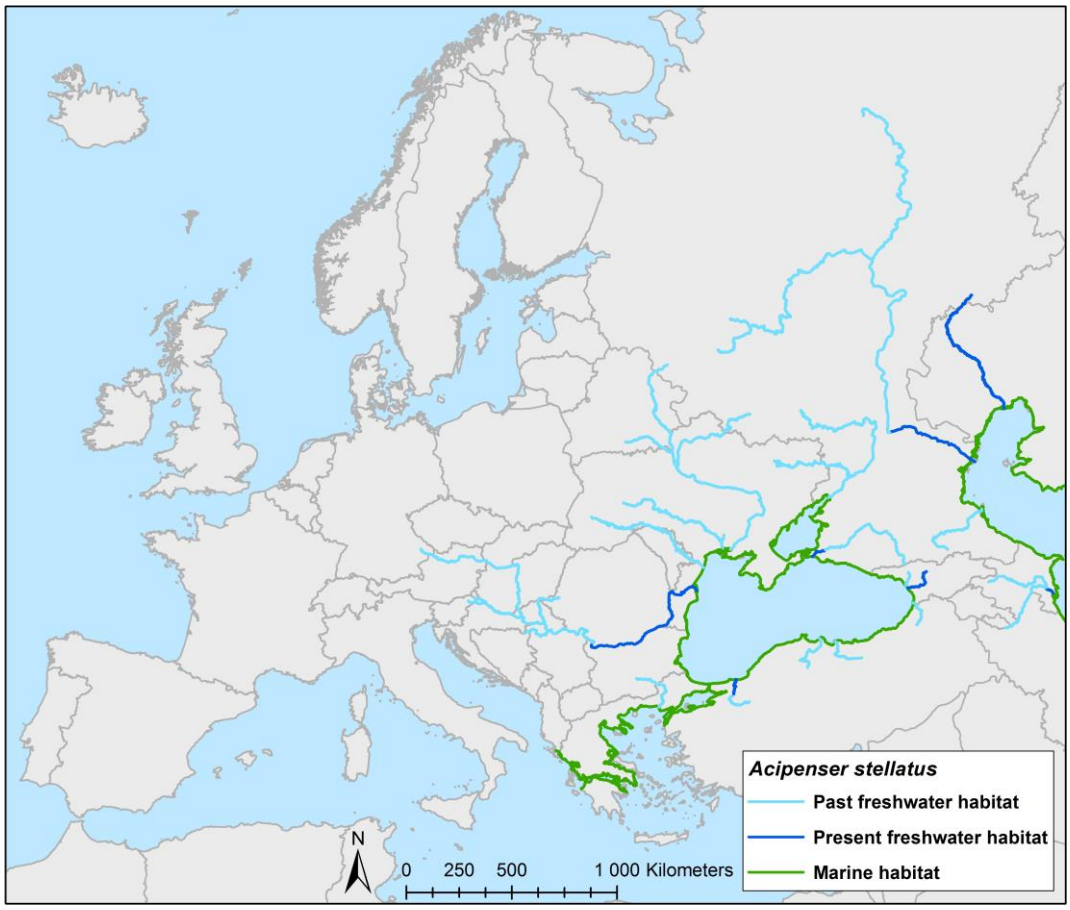

Figure 8: Past and present distribution map of Acipenser stellatus © IHG BOKU [9]

Management:

Fishing bans are in place in the Lower Danube (until 2020) and the Black Sea watershed, but with lack of enforcement. No coordinated basin-wide restoration actions are in place. Limited releases of stellate sturgeons took place in the Lower Danube after the onset of the fishing ban in 2006.

Remarks:

Romania considers undergoing a revision of the stocking procedures based on recent results on genetic diversity and supportive stocking programmes, in order to restart it in cooperation with Bulgaria and Ukraine.

During May 2018, stellate sturgeon males carrying a Coded Wire Tag in their pectoral fins, originating from stocking activities conducted during 2006 - 2009, were accidentally captured while fishing for adult beluga to be used in a COFSP funded genomics project. This the first evidence that the supportive stocking is contributing to the recovery of stocks of this species.

Ex situ stock of Caspian and Sea of Azov populations are available in Russia. Stocking ceased in Sea of Azov (Russian Federation).

There is an urgent need for coordinated efforts, centralized *ex situ* facilities and procurement of stocks from captivity and wild as well as legislation and enforcement to stop poaching.

European Atlantic sturgeon / Common sturgeon (*Acipenser sturio*, Linnaeus 1758)

Species description:

Size: max. length: 6m; max weight: 850kg; average length: 1.5-3m

Age: max. >60 years; Maturation: ♀ 13-16 years, ♂ 10-12 years

Range: White, North, Baltic, Black Seas, Atlantic Coast, Mediterranean Sea and its rivers

Migration pattern: anadromous, hiemal and vernal forms

Past distribution in Europe:

The North Sea with tributaries Eider, Elbe, Weser, Ems, Rhine, Maas, Scheldt, Thames, Trent, Severn, Seine; the Atlantic Coast with tributaries Loire, Gironde-Garonne-Dordogne, Adour, Douro, Guadiana, Guadalquivir; the Mediterranean Sea with its tributaries Ebro, Rhone, Saone, Tiber; the Adriatic Sea with tributaries Po, Adige, Isonzo, Nereteva, Drin, Buna, Pinios; the Aegan Sea with tributaries Struma, Meric, Ewros, Black Sea with tributaries Danube, Rioni, Ingouri, Kizilirmak, Sakarya.

Present Distribution & Status in Europe:

The species is extirpated from all of its range except the Gironde-Dordogne-Garonne Basin, with its marine distribution area extending from the Bay of Biscay to the North Sea. No detailed population estimates are available, but the stock is considered to consist of <800 wild mature individuals. No natural reproduction has been observed since 1994, when the last spawning took place in the Gironde watershed. Supportive stocking exists since 1995, the reintroduction efforts use fish from Gironde Basin in Elbe. A reintroduction program in the Rhine is under preparation.

The last record from the Rioni River was in Georgia in 1991. Subsequent sampling campaigns in recent years have failed to prove its continuous existence.

Figure 9: Past and present distribution map of *Acipenser sturio* ***© IHG BOKU*** [9]

Management:

A Management Plan is adopted under the Bern Convention and on a national scale in France. Coordinated restoration actions are in place only on a regional scale and medium term. Centralized *ex situ* stocks in France and Germany are available. A breeding plan is available, however, only partially useful due to the extremely low number of brood stock and infrequent maturation of breeders. Fishing is banned throughout its range. Bycatch in commercial fisheries (benthic trawling) hampers reintroduction efforts.

There is an urgent need to secure long-term coordinated efforts and reduction of bycatch.

Beluga / great sturgeon (*Huso huso*, Linnaeus 1758)

Species description:

Size: max. length: 8m; max weight: 2000kg; average length: 2.2-3.5m

Age: max. >100 years; Maturation: ♀ 14-20 years, ♂ 10-16 years

Range: Black, Caspian, Azov and Adriatic Sea and tributaries.

Migration pattern: anadromous, hiemal and vernal forms.

Past distribution in Europe:

The Black Sea: the Danube and its tributaries: Sava, Tisza, Drava, Mura, Jiu, Morava, Olt; Dnjepr, Dniester, Don, Kuban, Enguri, Rioni, Coruh, Yesilirmak, Kizilirmak and Sakarya Rivers; Adriatic Sea and the River Po.

Present Distribution & Status in Europe:

The species is extirpated in the Adriatic Sea. A small wild stock in the Danube is restricted to the lower part of the river, downstream of the Iron Gate power plants and in the Black Sea. There is an ongoing dramatic decline through poaching and bycatch in the Danube and the Black Sea. Natural reproduction exists on a small scale in the Danube, but is sporadic and the population size decreases. There is sporadic reproduction in the Rioni River. *Based on information from Romania recent unpublished data suggest there is evidence that since the introduction of the ban on commercial fisheries in 2006, the number of beluga sturgeon females succeeding to produce viable offspring has increased over the years. This is interpreted as a clear sign of a positive recovery trend of stocks of this species in the Lower Danube River.*

Figure 10: Past and present distribution map of Huso huso © IHG BOKU [9]

Management:

Fishing bans are in place in the Lower Danube (until 2020) and the Black Sea watershed, but with lack of enforcement. No coordinated basin-wide restoration actions are in place. Single specimens are available for *ex situ* stocks in de-centralized private farms, which is unfeasible for sustainable management. A breeding plan is under development. Occasional stocking exist based on captive stocks and recaptures in the Lower Danube Region. Stocking ceased in the Sea of Azov (Russian Federation).

There is urgent need for coordinated efforts, centralized *ex situ* facilities and procurement of stocks from captivity and wild as well as legislation and enforcement to stop poaching.

ANNEX 2. PROBLEM ANALYSIS

All 27 sturgeon species native to the rivers and coastal waters of the Northern Hemisphere are red-listed by the IUCN and several of these species have recently reached critical status.

What renders sturgeons this vulnerable? Basically, the same traits that have secured sturgeon survival through eons of change and evolution for more than 250 million years are also responsible for the species´ susceptibility towards current impacts. Sturgeons are extremely long-lived, reaching ages of up to 160 years. They mature late in their lives, at an age between 8-25 years. They spawn only infrequently, and in order to do so, sturgeons leave their foraging grounds (mostly in the marine waters off the continental shelf area) to return to the rivers and spawning sites where they were born. This strategy allows them to build up large multi-generation populations over long periods of time. But this migratory behaviour also makes the species vulnerable to directed harvest as well as to blocked migration routes.

A general loss of biodiversity is observed in almost every habitat, but freshwater habitats experience a far greater decline than most terrestrial habitats, since they are focal areas of human settlements and serve as sinks for the landscape by collecting all wastes and their metabolites in the watercourses. This is a threat that affects sturgeons to a high degree, through various impact channels, since river habitats are home to the most vulnerable phases of sturgeon development.

Thus, the strong impacts of structural and functional modification of river basins - including dams, unsustainable gravel extractions, and water withdrawal for agricultural or industrial purposes as well as pollution and invasive aquatic species - adversely affect the reproduction and the early life phases of sturgeons. Rivers, and with them sturgeons, often range across administrative and political boundaries thereby requiring collaborative forms of protection, which are lacking in many cases.

A brief overview of the most pressing impacting factors is provided in the following text.

1. Overexploitation (including legal, illegal fishery and bycatch)

Overexploitation originates from targeted fisheries or from bycatch in fishing gear, employed to catch other commercial species. Targeted legal but unsustainable harvest in the past has led to a dramatic decline in many sturgeon populations. Today, bycatch and ongoing illegal catches further decrease the number of spawners, which reduces a population's reproductive potential, its genetic diversity and also it's adaptability towards environmental change. Populations in Europe have been reduced to such an extent that uncoordinated and unsustainable removal of wild spawners for controlled propagation and scientific purposes potentially contribute to population decline.

2. Migration obstacles

The effects of migration obstacles on sturgeon populations, as on many other diadromous species, have been documented to be significant. However, their impact might affect populations differently, depending on the position in the river network, and on the effectiveness of mitigation measures. Obstacles to upstream migration restrict the spawning migration, preventing fish with historic spawning habitats upstream of the barrier to complete their life-cycle. If consequently these fish spawn below a barrier, the artificial overlap of habitat can result in intraspecific hybridization.

If the upstream movement across the barrier is facilitated, downstream migration barriers for spent adults remain an issue, since so far, no major dam has been equipped with sufficient guidance and downstream migration facilitation devices. Thus, the spent adults are trapped in the upstream sections, which typically do not provide sufficient feed resources and increase the potential for poaching as well as for cannibalism on the offspring.

The impacts of downstream migration barriers on juveniles differ as well, reaching from direct mortality during turbine passage to adverse impacts on the migration in reservoirs. Such as lack of water flow for orientation and for the coverage of large distances, oxygen deficiencies in reservoirs and increased predation through altered predator communities.

The impacts of dams depend on their sizes, their mode of operation and their function as e.g. water dividers, energy producers or both. Typically, dams increase the water surface area of a river, permitting increased energy uptake through radiation, resulting in increased temperature in the upper layer of the

stratified waterbody. At the same time, a decrease in temperature and oxygen concentration are observed in the deeper water layers, due to anaerobic decay of sedimented materials and the fallout from the phototrophic layer.

Upstream effects: Downstream drifting early life phases of fish are entering habitats with adverse conditions that lead to mass mortalities. Increasing temperatures also increase the energy turnover in fish and generate higher demand for feed, which is limited due to the stratification of the water body in the impoundment.

Due to the decreased flow velocity, the reservoir also serves as a sediment trap. The nutrients reaching the reservoir are fuelling an increased production, which, in combination with the altered hydrology, leads to changing community structures and altered predation patterns upon migrating fish, further increasing mortality rates. Water withdrawal causes misleading migration triggers and leads fish into e.g. irrigation canals instead of migrating in the main channel, leading to reduced survival and adverse effects on recruitment.

A special case of dam impacts originates from hydropower generation, which commonly does not provide suitable guidance structures to bypass downstream migrating fish. While large fish would be collected on trash-racks where they become impinged, juveniles typically would be turbinated on their movement downstream. Turbine passage effects on fishes depend on turbine type, rotation speed, number of blades, shape of blades, pressure difference between up- and downstream section, water intake type and depth, as well as head. While in larger fish, which are still able to pass the trash-racks, size largely determines the risk of blade-strike and thus mortality, for smaller early life phases, the pressure difference up- and downstream of the blades, gas supersaturation, as well as cavitation forces largely determine tissue damage and thus mortality. In the worst case a complete mortality and loss of migrants can be encountered. It is fair enough to say that migration solutions that facilitate upstream migration but do not address downstream migration adequately at the same time are factually counterproductive for the population. It must be mentioned that to facilitate migration, functional habitats are an essential prerequisite in the upstream reaches.

Besides hydropower generation, the utilization of dams to divert large proportions of the river discharge for its utilization as cooling water, irrigation, or flood protection, all include the risk of entrapment of downstream migrants, provided that no functional guiding and protection devices are implemented.

Downstream effects: Hydropower generation is seeking to satisfy a demand for energy that varies daily and seasonally. Because of this, the reservoir serves as storage with varying capacity. Generally, storage capacity less than 1.5 days of discharge is considered run of the river and everything exceeding this capacity is a storage plant. As such, the effects of retaining peaks in discharge and delaying release at times of high demand varies according to the storage capacity. With increasing storage capacity, flow is decoupled from the annual precipitation cycle, adversely affecting the timing of migration, the relocation of gravel on the spawning sites, the production cycle of feed organisms, leading to a mismatch between riverine habitat conditions, larval hatch and occurrence of all early life phases. This effect is further aggravated when cold water from the deeper layers of the reservoir is released, upsetting the natural temperature regime by constantly lowering water temperatures over the course of the year. Furthermore, the withdrawal or storage of water in daily patterns causes a discontinuation of discharge patterns downstream of the dam. Hydropeaking leads to insufficient or excessive ecological flow. Reduced flow, due to water withdrawal, may result in similar effects as observed in cases of poor management of flow from reservoirs.

An additional effect adversely affecting the reproduction efficiency of gravel spawners downstream of the dams is the retention of coarse sediment, which causes scouring of the riverbed, decoupling the floodplain from the river and reducing overall productivity. Gravel sites like bars and banks also become reduced downstream. Due to progression effects, this loss of potential spawning grounds disperses over time from the vicinity of the dam to river stretches further downstream.

The retention of nutrients as well as suspended solids in the dam’s reservoir drastically affects the communities in the downstream sections because their adaptation becomes counterproductive. The food-base for early life phases changes with regard to species composition and abundance, thus altering

the productivity of the entire system. Again, the terminal points of the food-web respond to these changes by reduced reproduction success and decreasing survival of early life phases actively feeding in the area.

3. Flood protection and navigation

Over the past decades, large sections of sturgeon habitats have been impacted by infrastructure-induced hydromorphological changes in order to achieve or maintain good conditions for inland navigation and flood management.

Interventions targeting navigation aim to remove shallows or to elevate the water table in the navigation channels to increase efficiency of river transportation during dry periods or by reducing curvatures as safety measures. Traditionally, this had involved such measures as bank fixation or cutting off side channels in order to concentrate the water flow on one main channel and provide sufficient drag to move sediments downstream. As a consequence, habitat dynamics driven by changes like annual catastrophic, yet ecologically important events (floods or draughts) have been limited. Many of the most dynamic sections of rivers - where erosion and deposition used to reach a steady state and generate high habitat diversity with regard to water depth, current patterns, sediment diversity, and temperature - have disappeared. Through the loss of floodplains and side channels, wetted areas are lost on a large scale, having an impact on the diversity and maximum amount of benthic organisms and thus on the elements of the food web that can prey on them. Consequently, conditions for benthic organisms and fish, like sturgeons, have deteriorated. Groyne fields and narrowed thalweg sections have increased the flow velocity under low navigable water conditions and with it the energy requirement of migrants swimming against it. The permanent removal of sediments (for embankment structures) without regeneration causes higher erosion and incision of the riverbed, and a drop in groundwater level, which leads to the loss of lateral connectivity and to decreased productivity of ecosystems, because macrozoobenthos cannot establish in larger aggregations under such circumstances.

The lack of suitable foraging and sheltering grounds have increased the downstream migration of juvenile fish and thus reduced the carrying capacity of river sections. Dredging, to remove aggregations of finer sediments, has impacted benthic fish assemblages, especially when suction pumps are used. Increased shipping frequency can also directly impact sturgeons through hull-and propeller-strikes, vibration and noise that provoke evasive reactions, as well as wave-action and shore-wash, which is detrimental to earlier life phases aggregating in warmer shallower waters.

That said, it must be noted that modern engineering know-how has greatly increased possibilities of designing navigation measures with low impact on freshwater ecosystems. There are good practice examples of how the improvement of navigation conditions can be combined with river restoration measures, with the best example coming from the Austrian Danube. Here, active sediment management, adapted groyne design and reconnection of side arms have demonstrated that habitats and conditions for juvenile fish can actually be significantly improved in the short term. Yet, this approach needs to be rolled out to other stretches of the Danube as well as other rivers in Europe. A major challenge that remains is to find solutions for natural rivers without past navigation interventions where grey infrastructure interventions cannot be compensated by restoration measures and are likely to cause at least a certain deterioration of environmental quality.

An additional adverse impact on a river's ecological integrity is associated with the measures directed towards the protection of arable or habitable lands from flooding. They drastically restrict active floodplains, resulting in massive decreases in the production of invertebrates that serve as feed for fish populations. Flood protection results in similar effects as navigation-oriented structural modifications; reduction of habitat types and its floodplains along the river, which leads to a reduction of in-river productivity due to reduced nutrient retention and turnover. This has significant effects on community structure and – being part of this community – on sturgeon populations.

4. Stocking

The management of fish populations for recreational and commercial harvest frequently utilizes the stocking of early life phases of valued species to increase abundance or to add potentially valuable species to the community and to increase output. However, stocking can also be a measure of critical importance to maintain, and in the longer term, to help to restore fish populations such as sturgeons, if no other measures to save the species are available. Recent research has documented that specific conditions have to be ensured to have the desired effects. *Preliminary research results in the framework of the project POP 18/ 22.04.2013, «Evaluation of survival and distribution in the Black Sea of young sturgeons stocked experimentally in the Lower Danube», Romania (2013-2015) show that more than the 99% of the returned CWT tagged sturgeon youth were recorded in the Danube River and the North-Western part of the Black Sea. During said research there also were identified cases of tagged individuals in Turkey near the mouth of the Sakarya River (South-West part of the Black Sea). No information, however, was received from the Black Sea countries concerning tagged individuals in the Eastern part of the Black Sea (Georgia).*

In several species, the population status is in continuous decline, and there are no other measures to save the species from extinction other than to immediately initiate *ex situ* measures for the remaining specimens and to expand the *ex situ* stock over time. Due caution must be taken to maintain genetic differentiation and diversity of subpopulations. In any given scenario, the source and production of the stocking material must substantially represent the population's genetic diversity. *Ex situ* measures should be established in a timely fashion when sturgeon species or populations become classified as at-risk of extinction, and where other management measures taken (e.g. *in situ* conservation) do not immediately reverse the trend of an ongoing decline. The establishment of *ex situ* programs should rely on the state of the art scientific knowledge at all levels of the process, including construction or adaptation of facilities, selection of breeders, fertilization and incubation protocols, rearing methodologies, tagging and releasing strategies.

Adverse impacts of badly planned and implemented *stocking* measures are numerous:

a. Introduction of same sturgeon species with native origin but from an uncontrolled source has the potential to change the population structure;

b. Introduction of same sturgeon species but of non-native origin causes intraspecific concurrence, which can lead to hybridization, and as a result, to outbreeding of desired, adaptive traits;

c. Introduction of non-native sturgeon species can result in interspecific competition and potential transfer of pathogens, against which the native population has not developed resistance;

d. Introduction of exotic species (non-sturgeon) for e.g. game purposes can impose interspecific competition and predation.

Hybridization has been mentioned for several introduction scenarios with various outcomes. This point is especially relevant because sturgeons have been shown to hybridize freely, which did not affect intact populations. However, under stress, the effects of hybridization might be more detrimental and thus lead to the genetic extirpation of rare species.

5. Pollution

Pollution in this context refers to the increased disposal of materials of anthropogenic origin in water bodies, utilized by sturgeons. Differences between substances are evident, but generally affect the most sensitive phases of the development, such as: maturation of the parental fish, reproduction, eggs, eleutheroembryo, and early juveniles. The pathways for the interaction differ; heavy metals and pesticides, as well as hydrocarbons and organochlorides accumulated by the parental individuals (mainly the females) can cause atresia and organ malfunction, while endocrine active substances affect the sexual differentiation. Some substances can also be incorporated in the eggs, affecting the performance of the embryo either through accumulation in the tissues, disruption of control processes (for instance in cell division and tissue differentiation) or by blocking enzymatic processes.

Nutrients and organic load increase the oxygen demand in the waterbody for breakdown, leading to suboptimal oxygen concentrations, especially for embryonic development. In addition, nutrient load serves as substratum for bacterial and fungal infestations, adversely affecting the egg, utilizing it as nutrient source and leading to mass mortalities of offspring. This process is further intensified if egg deposition is restricted to small areas of reduced quality (e.g. gravel overgrown with algae or aquatic plants or with insufficient interstitial flow).

6. Climate Change

Climate change is postulated to have played a significant role in the decline of *A. sturio* in the Baltic region during the Little Ice Age between the 16th and 19th centuries. Today, the decreasing precipitation and increasing temperatures might contribute to alteration of environmental conditions for migration and reproduction of this species.

Temperature is an important constraint for the distribution of anadromous fish in Western Europe. Recent research has shown that temperatures above 25°C lead to reduced survival in juveniles. As such, changes in annual temperature trends, especially summer water temperature in combination with altered river discharge patterns, are considered as massive adverse impacts for sturgeon populations with a substantial effect both on spawning, migration and riverine residence of juveniles.

7. Allee Effect

A small population has a higher risk of extinction than a large one. It is because continuous environmental change (environmental stochasticity) requires a certain potential for adaptation. A larger population, representing a larger genetic diversity, provides the necessary adaptive capacity to potentially deal with environmental alterations. Furthermore, the longer a critical situation lasts, the higher the risk of extinction.

The Allee effect (Myers et al. 1995) predicts a negative growth rate at extremely low population sizes even if all environmental factors are favourable for the thriving of a population. This is due to the fact that the low number of individuals limits the chances for spawning encounters. This effect is intensified in sturgeons since adults only reproduce at long intervals. It is estimated that females mate only two or three times per decade, thus additionally limiting the encounters of mature fish when population size is low.

ANNEX 3. JUSTIFICATION OF CONSERVATION OBJECTIVES – VIENNA DECLARATION

Recognizing the complexity of threats imposed on sturgeons, the World Sturgeon Conservation Society (WSCS) jointly with WWF and about 300 sturgeon specialists from 32 countries, participating in the 8th International Symposium on Sturgeon (ISS8) in September 2017, have developed the Vienna Declaration[10], outlining the guiding principles for measures urgently needed to ensure the sturgeons' future. It addresses the main threats and provides the most current insight into the urgent needs of sturgeon conservation by listing 23 recommendations aiming at increased effectiveness of conservation and restoration for sturgeons under six main topics. These recommendations are given below and are amended with regard to feasibility aspects and key knowledge to be acquired.

Main Topic 1: Habitat Quality and Restoration

Subtopic 1a: Habitat protection, river regulation, flood protection, and inland navigation

Recommendation 1: Recovery measures through *ex situ* conservation and re-stocking programs require urgent and vigorous *in situ* protection and habitat restoration measures: (a) all spawning habitats of Acipenseriformes must be identified and effectively protected through national and eventually international legislation; (b) The legal frameworks such as the EU Habitats Directive as well as conventions such as RAMSAR, Biological Diversity, Bern, Oslo-Paris, Helsinki, Bucharest, and Barcelona must be fully implemented to effectively enhance the conservation status of the species through improvements of their extended habitats.

Recommendation 2: Flood protection and inland navigation infrastructure have to be planned in an integrated fashion aiming to maintain to the greatest extent possible the natural hydrodynamics as well as to ensure connectivity and functionality of ecosystems. Infrastructure projects that have not been designed in such an integrated fashion must not be implemented.

Feasibility and required key knowledge: Habitat protection and restoration require a detailed knowledge of sturgeon habitat use and respective characteristics throughout the life-cycle. It is important to note, that habitat is not only defined by location and timing. It is also always a set of conditions and resources, suitable or even obligatory for the performance of different sturgeon life-stages. Comprehensive knowledge of these conditions and resources, as well as their nature of interaction with specific developmental stages is essential for any quality assessments, quantification, mitigation, and for the restoration of habitats. Depending on the knowledge and expertise available for different sturgeon populations and forms in the respective catchment area, additional assessments and research might become necessary.

Subtopic 1b: Damming

Recommendation 3: New dams on sturgeon and paddlefish rivers should not be constructed. However, if unavoidable, they must be designed with state-of-the-art mitigation measures, such as properly designed passage facilities accommodating free up- and downstream migration of all life phases of sturgeons (adults up to several meters long as well as fragile early life phases), other faunal elements, as well as permit sediment transport. Furthermore, these measures must also protect habitats and benthic communities in the upstream and downstream sections. Design considerations must incorporate climate change effects, anticipating the dynamic changes in precipitation patterns (e.g. extreme floods and extreme droughts) over a time horizon of at least 50 to 80 years, further reducing the proportion of the flow available for energy generation.

Recommendation 4: Dams have eliminated river habitat availability for sturgeons in spawning and overwintering habitats upstream or downstream of the installations. The existing facilities have to be retrofitted with structures for effective fish protection and passage both upstream and downstream (for early life phases and adults). Other dam impacts, for instance, on sediment transport and discharge

[10] http://www.wscs.info/news/news/sturgeon/vienna-declaration.aspx

(e.g. out of season peak discharge, hydro-peaking, changes in temperature regime) require mitigation as well. Side channels with at least 30% of the flow under any conditions would massively reduce the impact of such facilities.

Recommendation 5: Where the construction of efficient fish passage is not viable as a result of the low capacity of the existing facilities, the removal of such facilities must be considered.

Recommendation 6: Prioritization of conservation and mitigation measures on sturgeon rivers should be applied at catchment level to maintain the ecological functions and to ensure the highest feasibility and the lowest adverse impact of technical infrastructure.

Feasibility and required key knowledge: As there are no off-the-shelf solutions for restoring migration and fish passage at barriers, feasibility studies to determine passing solutions at existing significant migration barriers like dams, sills and weirs have to be conducted. These have to take the individual conditions with regard to topography and hydrology into account for any barrier and its impacts on populations and habitat conditions and deliver possible passing solutions.

Dams block migration routes, Upper Danube, Freudenau, Austria © T.Friedrich

Migration facilitation at Geestacht, River Elbe, Germany © T.Friedrich

Fact-box: Fish migration / Migration barriers / Feasibility studies for passing solutions

Almost all fish species migrate on a regular basis, covering distances between a few meters to thousands of kilometres, while moving within one or between various ecosystems. Fish and other aquatic organisms migrate for different reasons, with feeding and reproduction being two of the most common ones. Fish do not choose to be migratory; it is a fundamental, intrinsic trait, which varies between species and subpopulations.

A migration barrier is a structure that prevents or limits the movement of fish. Any man-made structure in the aquatic environment can potentially have an impact on fish migration. Examples for migration barriers are hydropower dams, perched culverts and passages, emerged and submerged sills as well as weirs and sedimentation zones with reduced oxygen contents or steep temperature gradients on the longitudinal axis of the river. River embankments, flood protection dams, and the disconnection of lateral sidearms and the floodplain, in many cases interconnected with hydropower dams, also hamper migration on a lateral axis.

Each barrier is unique, with regard to its impacts on the environment, individual history, purpose, layout and ecological setting and no off-the-shelf specifications or "one-size-fits-all" passing solutions are available.

Therefore, it is mandatory to conduct a feasibility study for each migration barrier, describing and analysing the current state and allowing to develop a predictive balance of different passing solutions for the safe up- and downstream passage of all aquatic species and life stages, including quantifications of important aspects of the targeted system for decision-making.

Such aspects comprise impacts of the barrier on general ecological aspects such as e.g. hydrological and temperature regime as well as sediment transport. Also, specific impacts on the presence of fish species and populations up- and downstream the barrier and on aquatic habitat and habitat use, fish behaviour up- and downstream the dam and main routes of approach, the location of entrances and alternatives in the technical layout of passage ways have to be addressed. Supplementary additional mitigation measures, such as habitat restoration in the vicinity of the obstacle or the construction of additional new habitat (e.g. artificial spawning grounds) should be included. Further mitigation measures for general ecological impacts of the barrier, also considering additional impacts on the system like e.g. climate change and future infrastructural development and use, should also be included.

The key for the function of any passing solution is the amount of water and space which is made available.

Main Topic 2: Fisheries Management

Recommendation 7: Fisheries management (e.g. planning, inspection, supervision, protection, and enforcement) and other conservation actions must be properly integrated at all levels to ensure that both aspects are adequately implemented by personnel with appropriate expertise and resources, backed up by an efficient and integrated legal framework.

Recommendation 8: The legal prerequisites of fisheries regulations must reflect the dimension that poaching imposes on conservation efforts and on populations of long-lived species. Therefore, substantial fines and/or custodian sentences have to be in place. The judiciary should be adequately informed about the context and implications of such offenses to ensure that substantial penalties are imposed.

Recommendation 9: Communities that traditionally relied on sturgeon fisheries for their livelihood have to be supported in generating alternative means of income in order to facilitate compliance with fisheries bans or harvest slots.

Recommendation 10: Fisheries researchers and managers are advised to rapidly develop and implement more selective harvesting methods, thereby preventing (or greatly reducing) the by-catch of sturgeons in fisheries for other target species.

Sturgeons for sale at the Odessa fish market © WWF/N.Gozak

Illegal fishing in the Danube © E.Polonskiy

Feasibility and required key knowledge: Any fisheries and sturgeon management, including synchronized conservation actions, have to be based on population monitoring. Basic prerequisite for such monitoring is the detailed knowledge of the populations, their structure, life-cycle characteristics, habitat requirements and habitat use (see also "Subtopic 1a: Habitat protection, river regulation, flood protection, and inland navigation", "Main Topic 3: Species Survival and Repositories" and "Main Topic 4: Restocking, Recovery and Re-introduction Actions"). These types of activities depend on the availability and presence of expertise and well-trained personnel.

Additional assessments of populations and habitat, research on sturgeon-friendly fishing methods and gear, as well as alternative sources of income for fishing communities might become necessary. The need for capacity building, training programmes and the acquisition of additional expertise from outside the catchment area might also arise.

Fact-box: Assessments and Monitoring

The management and conservation of a sturgeon population requires detailed knowledge of the population status and its resources, the detection of changes within this system and the identification of the underlying causes and impacts, as well as the power to conduct remediation actions.

Population and habitat assessments lay the foundation for population monitoring. In contrast to assessments, population monitoring is designed as the systematic continuous or repeated observation, measurement and evaluation of fish population parameters or indices according to predefined goals.

A monitoring program has to possess a strong analytical or diagnostic power to allow for both early warning of changes within the monitored system, calling for early control of the effectiveness of measures, activities and remedial actions as well as to prevent possible future damage.

For migratory fishes like sturgeons, which often live in international waters and cross borders, such activities have to be mutually planned and implemented by all range countries and by jointly adopted methodology.

A monitoring program consists of the following main components:

The monitoring objectives are the assessment of the current state and the detection of changes in the monitored system. Further objectives concern the desired precision, confidence, spatial resolution, time scale and identification of causes of detected changes.

Objects and variables describe ecological states and trends in the monitored system. These can be categorized into three basic types, depending on the rationale for choosing them; 1) Final variables, which are variables describing valued endpoints; 2) Intermediate variables, which appear earlier in a causal chain; 3) Indicators, which are variables functioning as surrogates for either intermediate or final variables.

The sampling strategy includes decisions concerning the methods of site selection (specific, representative, regular or random) and possible subdivisions of the total monitoring area (stratification). The sampling strategy is closely related to the purposes and objectives of the monitoring program; to detect change and identify the underlying causes as well as to provide data for the intended subsequent statistical analysis.

The data collection contains a complete sampling scheme, including the appropriate technology and field methodology to be applied, total effort and its allocation over time and space like e.g. the number and location of sites and the frequency of measurements.

Data handling includes data storage, analysis of data, including statistics, interpretation and presentation of the results. The potentially large amount and continuous flow of data calls for an efficient and fully operational database to be designed and elaborated, well in advance and in place and functional before the data flow gets underway. This also means, that the methods for statistical analyses to be applied must be determined in advance and have to be checked for compatibility with choices concerning objects and variables, sampling strategy and data collection, made earlier during the design process of the monitoring program.

Maintenance includes a regular quality control of the collected and stored data, their handling as well as a regular evaluation of the entire monitoring programme with regard to changes in the information needs and changes in the monitored ecological system. Methodology and frequency of such evaluations must be anticipated already during the design process.

Organization comprises all management aspects of the components of an operational program like data collection, data handling and maintenance.

Monitoring of young sturgeons, Lower Danube © R. Reinartz

Stellate sturgeon caught and tagged during monitoring of sturgeon habitats in Bulgaria © WWF Bulgaria

Main Topic 3: Species Survival and Repositories

Recommendation 11: Preparation of activities to preserve the diversity of sturgeon populations outside of their natural habitat (*ex situ* conservation to save the remaining genetic heterogeneity and to develop potential brood stocks for sturgeon species that are on the brink of extinction) must receive priority and timely support in sturgeon rehabilitation programs.

Recommendation 12: Effective organization of *ex situ* stocks must be shared between range countries to reflect the joint responsibility for population management. This will also help to distribute associated costs of restoration as well as to reduce the risk of losses due to local negative events.

Feasibility and required key knowledge: Basic prerequisite for *ex situ* activities is a detailed knowledge of the biology and the requirements of the species in question. Population structure with regard to biological and ecological characteristics like genetics and migration behaviour must be accounted for. This is essential for the determination of management entities (Distinct Population Segments or DPSs) to be preserved. Depending on the knowledge that is available, additional research on the populations and their structuring might become necessary. Also, the methodologies for husbandry, controlled propagation and nursing have to either be developed or fine-tuned according to ecological requirements. The development of funding possibilities for such long-term activities is of high importance.

Main Topic 4: Restocking, Recovery and Re-introduction Actions

Recommendation 13: Stocking as a compensation measure is considered a temporary tool to overcome adverse environmental conditions causing recruitment failure or to initiate self-sustaining populations. A management structure at the national or regional level, according to the species distribution, must be established to coordinate the actions and standardize the methodologies for reproduction, rearing and release.

Feasibility and required key knowledge: Restocking or the release of suitable juveniles from *ex situ* propagation or relocation respectively, calls for detailed knowledge of populations, their life-cycle and habitat requirements to enable the development and adjustment of release procedures and strategies as well as to avoid potential detrimental impacts on the existing populations (see also "Subtopic 1a: Habitat protection, river regulation, flood protection, and inland navigation", "Main Topic 3: Species Survival and Repositories"). The re-introduction of sturgeons into previously inhabited watersheds or river stretches requires a detailed knowledge of the causes of former population decline, as well as of the potential of the respective water body to support a self-sustaining sturgeon population. As such, it has to be in accordance with the relevant IUCN re-introduction guideline. Additional assessments of population substructures, the absence or presence of impacts and potential habitat structures and conditions might become necessary. A documentation of reintroduction performance and population monitoring has to be established and implemented.

Protective measures and law enforcement need to be improved. This also depends on the availability and presence of expertise and well-trained personnel and funding. The need for capacity building, training and funding programmes and the acquisition of additional expertise from outside the catchment area must be considered.

Main Topic 5: Trade Control

Mislabelled caviar at sale in Austria, DNA test revealed wrong species declared © WWF/J.Jahrl

Sterlet found in Serbian restaurant, May 2018 © D.Gmizic

Recommendation 14: Due to the detrimental impact of uncontrolled, illegal fishing on natural populations, the illegal trade in caviar, sturgeon meat and other products from sturgeons must be a focal area of enforcement actions nationally, regionally, and internationally. Therefore, it has to include the provision of sufficient resources (including manpower, equipment, operational costs, etc.) for all relevant law enforcement agencies to effectively prevent sturgeon species from over-exploitation.

Recommendation 15: Responsible national authorities (e.g. CITES scientific and management authorities, customs, food inspections, law enforcement agencies) are requested to establish formal or informal inter-agency groups (with the participation of scientific institutions, customs, police, and financial crime specialists) to develop common approaches and harmonized means of tackling illegal wildlife trade, supporting each other in the respective activities and backing up competencies in dealing with legal fraud.

Recommendation 16: Inspections in production and trade are to be carried out unannounced. They must use state-of-the-art techniques (e.g. DNA and isotope analysis) that are necessary to identify the species and origin, and thereby guarantee effective monitoring of trade in caviar and other sturgeon commodities. This also needs to include caviar containers with CITES labels, as long as manipulations cannot be ruled out completely.

Recommendation 17: Close cross-border coordination of enforcement actions concerning illegal trade of sturgeon products is required to cope with international criminal networks.

Recommendation 18: Enforcement authorities should increase their attention to the presence and authenticity of labels in line with the latest CITES labelling systems. The professional preparation and the method of application of labels must be standardized at an improved level to prevent misuse and loss of labels during packaging, transport, and storage. Also, the printing quality of the CITES codes should be improved to minimize fraud.

Recommendation 19: To ensure full acceptance in court cases, analytical methods should be harmonized using appropriate scientific and laboratory standards, preferably with regular inter-calibration exercises between laboratories performing DNA and other investigatory analyses.

Main Topic 6: Aquaculture

Recommendation 20: Sturgeon species produced by aquaculture operations should be routinely monitored in line with national or regional (EU) regulations with regard to environmental compatibility and product safety. To identify and prevent illegal import or laundering of illegally caught fish through aquaculture, the production and trade of sturgeons requires specific monitoring and control measures within the aquaculture industry. To prevent negative interaction between farmed and natural populations/species (e.g. hybridization, disease transmission, misidentification in case of by-catch), effective measures to prevent escapement from the farms should be implemented.

Recommendation 21: The aquaculture industry involved in sturgeon production is strongly encouraged to collaborate in identifying tracking approaches to support enforcement authorities in trade control actions. It is suggested to establish tissue repositories identifying captive stocks to allow a more efficient and fast commercialization of legal sturgeon products.

Recommendation 22: Commercial farms, culturing sturgeons for consumer markets, may in exceptional cases be important partners in conservation programs to bridge the time-window until the required public infrastructure for *ex situ* conservation is in place. Those farms may become conditionally involved and receive support for maintaining publicly owned broodstock of sturgeon species at brink of extinction, if the following prerequisites are fulfilled:

(a) Supervision of the rearing process is carried out under the national/regional conservation authorities implementing the sturgeon recovery programs;

(b) The wild fish (until F2 generation) are not owned by the farm, but belong to the national or regional sturgeon recovery program, and the farmer is held fully reliable for their survival and availability;

(c) The breeders are selected for reproduction based on prior genetic analysis and an agreed upon breeding plan. The rearing of offspring is separated from production, implementing the recommendations for *ex situ* rearing;

(d) Utilization of the surplus production of progeny for commercial purposes must take into consideration the demand arising from restoration programs in the catchment before commercial use is permitted in a case-by-case decision by the coordinating body.

Feasibility and required key knowledge: Such activities depend on the availability and presence of expertise and well-trained personnel. The need for capacity building, training programmes and the acquisition of additional expertise from outside the catchment area might arise.

Sound and independent management structures need to be established, verifying the fulfilment of the key prerequisites for the involvement of the aquaculture industry.

Main Topic 7: Policy Integration and Awareness-Raising

Recommendation 23: Public awareness will need to be raised in order to support and push for political action towards implementation of all the above-mentioned recommendations. The general public in sturgeon range countries should be made aware of the value of sturgeons to people and nature and their threat status. In particular, caviar consumers must learn how to avoid illegal products. Key stakeholders from various sectors need targeted information about sturgeon conservation. Awareness of key decision makers will have to be raised about the need for integrated policy responses and implementation of above-mentioned recommendations.

Information booth at Seafood Expo, Brussels © WWF/J.Jahrl

"High Level Conference for the Protection of Sturgeons" hosted under the Austrian Presidency of the EU, July 2017, Vienna, Austria ©BMNT

Feasibility and required key knowledge: The recommended activities require a detailed knowledge of societal and political patterns and processes, as well as of the respective stakeholder community. Such activities also depend on funding, the availability and presence of expertise and well-trained personnel. The need for capacity building, training and funding programmes and the acquisition of additional expertise from outside the catchment area might arise. Opinion-forming and decision-making processes are of particular interest and might require additional research in the fields of social and political sciences and structures.

ANNEX 4. POPULATION TARGETS – POTENTIAL HARVEST PREREQUISITES

Population size varies between rivers in intact populations due to differences in carrying capacity resulting from available habitat for spawning, the development of free embryos, first feeding and subsequently nourishing juveniles during outmigration. Historic, undisturbed populations of sturgeons comprised of few thousand to millions of individuals. To eliminate the high variability during the juvenile phases we refer here only to adults when addressing population size. With a maximum lifespan in sturgeons reaching from 40 years to over 150 years, depending on latitude, population models have to consider both maximum age as well as onset of sexual maturity, again varying from 6 to 28 years and the frequency of reproductions, both depending on species and latitude.

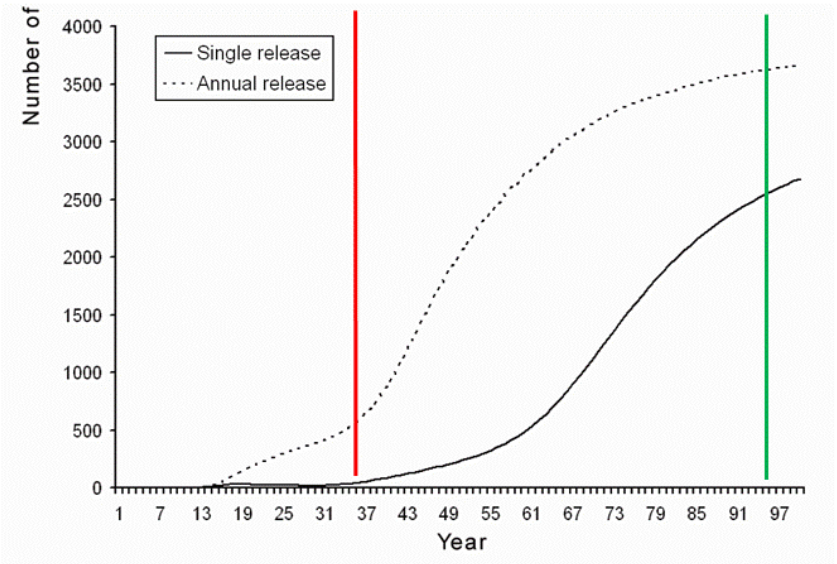

Figure 11: Modelled temporal delay of A. sturio population response towards stocking on a continuous basis (dashed line) and for a single reintroduction under conditions of zero fisheries mortality (Jaric & Gessner 2013)

While it is mandatory to apply a specific model for the species and the range in question to determine the respective specific target population sizes, for the purpose of the Action Plan we use a more general approach, based on the minimum genetic diversity to define an overall minimum population size that should be used as a proxy while setting up a detailed model approach. Based on a minimum effective population size per reproduction of 10 fish, an average age at first reproduction of 10 years, a reproduction cycle of 4 years and a maximum age of a given sturgeon of 60 years, a given female sturgeon would reproduce 12 times during its life-time. If one considers that at each of these reproductions the breeders would not encounter the previous mating partners each time, the minimum number resulting is 120 fish over the period of 50 years, times 4, for one reproduction cycle per year. As an approximation, the adult population should comprise a minimum of 500 fish per reproductive group of fish (e.g. winter, spring, early summer and autumn run, where applicable), which translates into spawning runs of 100 fish annually. Compared to the historic genetic diversity of the populations

in question, this is a very moderate approach, which can serve as a starting point for the reestablishment in the first decade of AP implementation. The populations still exceeding these figures must be maintained at higher levels not to risk the diversity currently encountered. This overall target should be adapted to the carrying capacity of the system when incorporated in a population model.

The above-mentioned population size comprises the minimum number of individuals to maintain the population on a long-term basis despite the losses due to natural mortality, bycatch associated mortality or illegal fishing. To assess the level of total mortality, annual spawning runs should be assessed, but due care must be applied to not stress the fish through capture and handling, since mature sturgeons are extremely susceptible to stress, resulting in an interruption of migration and reproduction for the given year.

It is recommended to apply a forecasting approach based on the previous years of spawning migration to forecast current population trends, according to the methods described for the IUCN Red List Assessments (IUCN 2016). **The long-term target would be to restore the populations in question to a status meeting the IUCN criteria for VU, not exceeding a 25% reduction of the initial population level over the last 3 generations.** Generally speaking, the total allowable mortality depends on the age at first maturity, the maximum age and the reproduction frequency. Exceeding these maximum allowable mortalities hampers the reestablishment of fully functional populations and leads to increased risk of losing the population in question. To reach this aim, most populations do not tolerate annual mortalities above 5%, some not more than 2.5%

As a result of the population targets given above, controlled and managed fisheries in marine- and freshwaters can only be operated once the population targets have been exceeded. **Fishery should only remove excessive individuals to a degree that still allows the population to increase until reaching the final maximum population size, which might require 60 to 100 years of rather undisturbed development**. Under adverse impacts, the recovery might also require much longer time spans, preventing any legal removal of fish from the population.

ANNEX 5. LEGAL FRAMEWORKS

Overall, a good legislation is in place for the protection of sturgeons in the wild, especially across the EU, but also beyond, but there are major shortcomings in its implementation.

This following text focuses on relevant international conventions and EU policies and legislation with direct implications for the protection and management of European sturgeons.

5.1 Global instruments

5.1.1. 2030 Agenda for Sustainable Development

The 2030 Agenda set out 17 goals and 169 targets that will stimulate action until 2030 in areas of critical importance for humanity and the planet. The Sustainable Development Goal 15 is devoted to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". It also includes freshwater biodiversity and the proposed action in this Action Plan aligns well with some of its targets mentioned below:

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements;

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species;

15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products;

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts;

15.a. Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems;

15.c. Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities.

5.1.2. The Convention on Biodiversity (CBD)

The Convention on Biological Diversity promotes in its strategic plan 2011-2020 the following mission: *"take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this,* ***pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used*** *and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner;* ***adequate financial resources are provided, capacities are enhanced****, biodiversity issues and values mainstreamed,* ***appropriate policies are effectively implemented****,* ***and decision-making is based on sound science and the precautionary approach****."*

CBD Parties must also integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans and policies. This provision of **Article 6** is of direct relevance to this Action Plan, as it implies that biodiversity concerns, such as the conservation of sturgeons, need to be integrated into the fisheries policies of range states. **Article 8** of the CBD includes provisions for *in situ* conservation of biological diversity:

- To rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, including through the development and implementation of plans or other management strategies (Article 8(f));
- To prevent the introduction, control or eradication of those alien species which threaten ecosystems, habitats or species (Article 8(h));
- To develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations (Article 8(k)).

Article 9 obliges signatories to take provisions in the field of *ex situ* conservation, which are intended "predominantly for the purpose of complementing *in situ* measures". This includes to establish and maintain facilities for the *ex situ* conservation of components of biological diversity, preferably in the country of origin of such components, while similarly adopt measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats under appropriate conditions.

Conservation programs should be part of the National Biodiversity Strategies and Action Plans. For instance, in the framework of implementing the CBD, the French government has included the European sturgeon in its National Biodiversity Strategy, as a **priority species**. As such, a national restoration plan needs to be developed and implemented, in line with obligations under other international conventions. This reflects a crosslink between the Bern Convention obligation and the CBD process.

Target 6 of the Aichi targets for 2020 (UNEP/CBD/COP/10/27/Add.1 19 December 2010) has high relevance for the protection of sturgeons since it indicates that "*by 2020, all fish and invertebrate stocks and aquatic plants* ***are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems*** *and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits*".

5.1.3. The Convention on Migratory Species (CMS, Bonn Convention, 1979)

As an environmental treaty under the aegis of the United Nations Environment Programme, CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the Range States through which migratory animals pass and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. In particular, the Parties should promote, cooperate in and support research relating to migratory species. These species are listed in two Appendices.

Appendix I lists migratory species that have been assessed as being in danger of extinction throughout all or a significant portion of their range. **In 2005, COP-8 decided to uplist *Acipenser sturio* to Appendix I.**

Range states of Appendix I species must endeavour to:

- Conserve and where feasible, restore the habitats of the species which are important to prevent their extinction;
- Prevent, remove, compensate for or minimise, when appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species;
- Prevent, reduce or control factors that endanger or are likely to endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced, exotic species.

Appendix II lists migratory species, which have an unfavourable conservation status and which require international agreements for their conservation and management that benefit the species, its population or any geographically separate part of the population of any species members of which periodically cross one or more national jurisdiction boundaries. All European sturgeon species were listed under Appendix II of the CMS in 1999, by the 6th meeting of the Conference of the Parties (COP-6) to the CMS.

In this respect, CMS acts as a framework convention from which separate instruments evolve. The Agreements may vary from legally binding treaties (Agreements in the proper sense) to less formal instruments, such as Memoranda of Understanding, Action Plans or Species Initiatives, covering to the extent possible the entire migratory range of the species concerned.

The measures to be taken include:

- Promote, cooperate in and support research related to migratory species;
- Endeavour to provide immediate protection for Appendix I species, including the prohibition of taking of animals of that species (exceptions for research purposes are possible).

Furthermore, Resolution 7.7 on the implementation of existing agreements and the development of future agreements, adopted in 2002, **called upon the Range States of sturgeons listed in the appendices of the CMS, to take the lead to develop an appropriate CMS instrument on sturgeons,** but up to date no range state has taken such an initiative. UNEP/CMS/Resolution 10.2 on migratory freshwater fish[11] adopted in 2011, also specifically mentioning sturgeons, requests parties to strengthen protection measures, improve monitoring and calls on parties to engage in international cooperation. It also instructs the Secretariat to engage and seek cooperation with FAO and CITES as well as other international fora dealing with migratory freshwater fish.

5.1.4. The Convention on International Trade in Endangered Species (CITES, Washington Convention, 1973)

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora, also known as the Washington Convention) is a multilateral treaty to protect endangered plants and animals. It was drafted as a result of a resolution adopted in 1963 at a meeting of members of the International Union for Conservation of Nature (IUCN). The Convention was opened for signature in 1973 and CITES entered into force on 1 July 1975. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 35,000 species of animals and plants.

CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the (high) sea of species covered by the Convention have to be authorized through a licensing system. According to Article IX of the Convention, Management and Scientific Authorities, each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of CITES-listed species.

Roughly 5,000 species of animals and 29,000 species of plants are protected by CITES against overexploitation through international trade. Each protected species or population is included in one of three lists, called appendices (explained below). The Appendix that lists a species or population reflects the extent of the threat to it and the controls that apply to the trade.

The European sturgeon (*A. sturio*) was first listed in Appendix II, but transferred to Appendix I in 1983[12]. Appendix I lists species threatened with extinction and it implies that international trade of the species, in any form, is subject to particularly stringent regulations, in order not to further endanger its survival. Trade can only be authorised in exceptional circumstances, such as for scientific research or if the fish originates from captive breeding.

All other sturgeon species were listed on Appendix II in 1998 when the decline of stocks and the unregulated trade in sturgeon commodities started to threaten the Black Sea and Caspian stocks.

The Resolution Conf. 12.7 (Rev. CoP14) on 'Conservation and trade in sturgeons and paddlefish' (adopted in 2002 and amended in 2004 and 2007), urged range States to:

- Encourage scientific research and adequate monitoring of the status of stocks;
- Curtail the illegal fishing of and trade in sturgeon and paddlefish specimens;
- Explore ways of enhancing the participation of the representatives of all agencies responsible for sturgeon and paddlefish fisheries conservation and sustainable use programmes of these species;
- Promote regional agreements between range States of sturgeon and paddlefish species aiming at proper management and sustainable use of these species;

[11] https://www.cms.int/sites/default/files/document/10_12_freshwater_fish_e_0_0.pdf
[12] https://www.cites.org/eng/prog/sturgeon/history.shtml

- For range states of sturgeons in the Eurasian region, take into account the recommendations in document CoP12 Doc 42.1 when developing regional conservation strategies and action plans.

This Resolution also **introduced a universal labelling system for the trade in and identification of caviar**. All primary sturgeon caviar containers – for all sturgeon species or hybrids, from wild or farmed origin, to commercial or non-commercial purposes, and **to domestic or international trade** - have to bear a non-reusable CITES label with a specified code which must either seal the container or permit visual evidence of any opening. The label must contain a code for the species or hybrid of origin, for the source of the caviar (e.g. wild-caught, farmed), for the country of origin, for the year of harvest or re-packaging, for the processing or re-packaging plant as well as a lot identification number. This resolution has not been implemented for domestic trade in most countries outside the EU, such as Ukraine, Georgia or Russia.

The European Union implements CITES and provides additional measures for the conservation of species in trade through the European Union Wildlife Trade Regulations[13], Council Regulation (EC) No. 338/97, Commission Regulation (EC) No 865/2006 (as amended by Commission Regulation (EC) No 100/2008, Commission Regulation (EU) No 791/2012 and Commission Implementing Regulation (EU) No 792/2012) laying down detailed rules concerning the implementation of Council Regulation (EC) No 338/97, and Commission Implementing Regulation (EU) No 792/2012 of 23 August 2012 laying down rules for the design of permits, certificates and other documents provided for in Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating the trade therein and amending Regulation (EC) No 865/2006 (the Permit Regulation). The aim of the EU Wildlife Trade Regulation is to protect wild animals and plants currently or likely to become threatened by international trade, by regulating the trade in these species.

In agreement with the CITES listing, *A. sturio* is listed under Annex A while all other Acipenseriformes species are listed under Annex B of Council Regulation (EC) 338/97. **Despite these regulations and the fact that no quota for caviar of wild origin has been granted except for two US species, illegal trade with sturgeon products, mainly caviar, is still ongoing within and outside the EU.** The 2016 European Commission Communication on an EU Action Plan against Wildlife Trafficking (COM/2016/087 final) so far has failed to foster strict enforcement, coordinated approaches of the relevant agencies involved and transboundary collaboration curbing illegal trade.

However, recent research[14] on Huso huso, Acipenser stellatus and A. gueldenstaedtii, reveals a high degree of distributional overlap ("population sharing") across the Black Sea coastal waters between sturgeons originating from the lower part of the Danube River (below the Iron Gate dam) and the North-Western part of the Black Sea. Besides, the North-Western shelf of the Black Sea comprises the main wintering and nursery grounds for the Danube populations of anadromous sturgeons[15]. In this respect, maintaining the current Annex 3 of CITES Resolution Conf. 12.7 (Rev. CoP 17) unchanged is an important precondition for the operational purpose of the Action Plan, as well as the protection of these sturgeon populations, despite the CITES Animal Committee recommendation[16].Also, despite the proposal of Russia for amendments to Annex 3 of CITES Resolution Conf. 12.7 (Rev. CoP 17)[17], as recommended during CITES COP 18 and based on the genetic analysis conducted in recent years, Annex 3 remains unchanged.

In addition, illegal wildlife trade is high on **the agenda of UNEP**. The needs for action and possible means of implementation have been emphasized by the UN General Assembly Resolution A/RES/69/314 on "Tackling the Illicit Trafficking in Wildlife" of 2015. In addition, the UN

[13] http://ec.europa.eu/environment/cites/legislation_en.htm

[14] Project "Evaluation of survival and distribution in the Black Sea of young sturgeons stocked experimentally in the Lower Danube", The Managing Authorities of the E.U. Fisheries Operational Programme for Romania, Project 18/2013

[15] AC29 Doc. 20.1 Annex Responses pursuant to Decision 17.182 related to the table contained in Annex 3 of Resolution 12.7 (Rev. CoP17) on Conservation of and trade in sturgeons and paddlefish

[16] See the Recommendation 1 (iv) of the CITES Animal Committee in AC29 Com. 4 (Rev. by Sec.), p. 2, where AC29 recommends to the Standing Committee "to consider the option of proposing amendments to the table in Annex 3 of CITES Resolution Conf. 12.7 (Rev. CoP 17) as follows "Black Sea and Lower Danube stock"

[17] AC29 Com. 4 (Rev. by Sec.)

Environment Resolutions UNEA-1 Resolution 1/3 on "Illegal trade in wildlife" adopted at the first session of the United Nations Environment Assembly (UNEA) in 2014 and UNEA-2 Resolution 2/14 on "Illegal trade in wildlife and wildlife products" of 2016 are addressing the issue prominently and represent an urgent call for action.

5.1.5. The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971)

Ramsar is concerned about the increasing loss and degradation of wetland habitat for migratory water birds. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

COP-6 of the Ramsar Convention, held in 1996, adopted Resolution VI-2, adding two specific criteria, based on fish, for **identifying wetlands of international importance" (criteria 7 and 8).** In addition, the convention requires parties to consult with each other about the implementation of their obligations, in particular when a wetland or water system is shared between them. In this case, they must endeavour to coordinate and support present and future policies and regulations on the conservation of wetlands, and their flora and fauna (Article 5).

Paragraphs 30 and 34 of Resolution IX-4 on "the Ramsar Convention and conservation, production and sustainable use of fisheries resources", adopted in November 2005, urge parties to take the necessary measures within their frameworks for integrated river basin and coastal zone management, to:

- **Maintain or reinstate aquatic biota migration pathways;**
- Reduce the impacts of point source and diffuse pollution in all its forms; and
- **Protect critical spawning and nursery grounds.**

In addition, this Resolution strongly urged Parties to:

- Review their policies, laws and programmes for **regulating the introduction of aquatic biota for aquaculture and the aquarium industry**;
- Control the accidental movement of species; and
- Avoid introduction of invasive and/or alien species.

It should be noted that many of the habitats protected under the Ramsar Convention include also coastal habitats of the littoral zone, an area where most of the juveniles and adults of sturgeons thrive.

Conclusion: Although of limited direct relevance to sturgeons, the Ramsar Convention could be used as a powerful tool to protect the habitats that are also important for sturgeons. As such, sturgeon could serve as an umbrella species under the Ramsar Convention to push protection and improved management for a variety of other species.

5.2 Global Management support systems: The United Nations Food and Agriculture Organisation (FAO)

The necessity to combat the degradation and depletion of fish stocks, both in the zones under national jurisdiction and in the high seas, as well as its causes, such as overfishing and excess fishing capacity, bycatch and discards, has been tackled by the FAO through the 1995 Code of Conduct for Responsible Fisheries. The Code provides a framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment. The FAO Committee on Fisheries (COFI) is charged with monitoring and updating the Code. A set of technical guidelines has been produced by FAO in support of the implementation of the Code.

In the context of the Code of Conduct for Responsible Fisheries and its overall objective of sustainable fisheries, the issue of illegal, unreported and unregulated (IUU) fishing is of serious and increasing concern, as it undermines efforts to conserve and manage fish stocks. The International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing was adopted in 2001 and, as the Code of Conduct, has a non-legally binding nature. This so far has not been used to tackle sturgeon related IUU. Another tool developed within the framework of the Code of Conduct is the 2003 Strategy for Improving Information on Status and Trends of Capture Fisheries. The Strategy is a voluntary instrument whose overall objective is to provide a framework and plan for the improvement

of knowledge and understanding of fishery status and trends as a basis for policy-making and management for the conservation and sustainable use of fishery resources within ecosystems.

Activities to improve conservation-oriented hatcheries for release resulted in a Technical Paper (Tech Series 570) and a handbook (Tech Series 568) describing best practice approaches and technologies.

5.3 Regional instruments

5.3.1 The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

The European sturgeon (*A. sturio*), Adriatic sturgeon (*A. naccarii*) and the Mediterranean population of *H. huso* are listed as a strictly protected species (Appendix II) by the Bern Convention while *Acipenser ruthenus, Acipenser stellatus,* and *Huso huso* are listed under Appendix III. The other species are not listed under the Bern Convention.

Listing of species under the Appendices II and III results in different obligations for the contracting parties to ensure their protection and management. For species under Appendix II, each Contracting Party shall take appropriate and necessary legal and administrative measures to ensure conservation and in particular prohibit (Article 6):

- Its deliberate capture, keeping and killing;
- Deliberate damage to or destruction of breeding or nesting sites;
- The deliberate disturbance of wild fauna, particularly during the period of breeding, rearing and hibernation, insofar as disturbance would be significant in relation to the objectives of this convention;
- The deliberate destruction or taking of eggs from the wild or keeping these eggs even if empty;
- The possession of and internal trade in these animals, alive or dead, including stuffed animals and any readily recognisable part or derivative thereof, where this would contribute to the effectiveness of the provisions of this article.

Parties have to coordinate their efforts to ensure the conservation of these species throughout their range (Article 10). They commit themselves to:

- Cooperate whenever appropriate and in particular where this would enhance the effectiveness of measures taken under other articles of this convention, and to encourage and coordinate research related to the purposes of this convention;
- Encourage the reintroduction of native species of wild flora and fauna when this would contribute to the conservation of an endangered species, provided that a study is first made in the light of the experiences of other Contracting Parties to establish that such reintroduction would be effective and acceptable (Article 11).

The Standing Committee of the Bern Convention has adopted the Action Plan for Conservation of Sturgeons in the Danube River Basin[18] through Recommendation No.116 (2005) and the Action Plan for Conservation and Restoration of the European Sturgeon (*Acipenser sturio*)[19] through Recommendation No.127 (2007), asking Parties to consider drafting and implementing national action plans for the sturgeon species listed in the Recommendation. **So far there has been little monitoring on progress with action planning and implementation but** the 37th Standing Committee of the Bern Convention has clearly expressed its concern about the sturgeons' status (https://rm.coe.int/list-of-decisions-and-adopted-textes-of-the-37th-meeting-of-the-bern-c/168076f40f), particularly in the

[18] https://rm.coe.int/1680746946
[19] https://rm.coe.int/168074646f

Danube River basin, and encourages states to scale up implementation of the Danube Action Plan. The Bureau of the Bern Convention also welcomed the development of this new Action Plan, at its meeting from March 19th 2018.

5.3.2 The Convention on the Protection of the Marine Environment of the Baltic Sea (Helsinki Commission /HELCOM)

HELCOM (Baltic Marine Environment Protection Commission) is the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, known as the Helcom Convention. HELCOM's vision for the future is a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities.

The HELCOM Baltic Sea Action Plan, adopted in 2007, aims to coordinate and harmonise various ongoing initiatives at the international and national level, including the EU Marine Strategy Directive, the EU Maritime Policy and the Maritime Doctrine of the Russian Federation. It represents the framework **to achieve good environmental status in the Baltic Sea by 2021. Specifically with the focus on migratory species, the Action Plan requests the signatory parties to** classify and prepare an inventory of rivers with historic and existing migratory fish species (e.g. salmon, eel, sea trout and sturgeon) and the development of restoration plans (including restoration of spawning sites and migration routes) in suitable rivers to reinstate migratory fish species. Furthermore, they are to develop long-term plans for protecting, monitoring and sustainably managing coastal fish species, including the most threatened and/or declining, including anadromous ones (according to the HELCOM Red list of threatened and declining species of lampreys and fishes of the Baltic Sea, BSEP No. 109), to develop a suite of indicators with region-specific reference values and targets for coastal fish as well as tools for assessment and sustainable management of coastal fish. This has been done for the Baltic Sturgeon, and HELCOM actively supports contracting parties in implementing programs for its restoration.

A sturgeon Action Plan under the HELCOM Convention is under development.

5.3.3 The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') of 1992 obliges Contracting Parties to take, individually as well as jointly, the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected. The protection of ecosystems and biological diversity is focused on in Annex V.

The OSPAR Biological Diversity and Ecosystems Conservation Strategy comprises four elements: ecological quality objectives, protection of species and their habitats; the creation of an ecologically coherent network of well-managed marine protected areas, and programmes to reduce the potential detrimental effects of human activities in the maritime area covered by the Convention. ***Acipenser sturio*** **is the only sturgeon species listed** in the OSPAR List of Threatened and/or declining Species and Habitats specifically for the OSPAR regions "North Sea and Bay of Biscay."

OSPAR has passed a recommendation in 2014 to increase the protection of *A. sturio* at all life stages in order to recover its population, to improve its status and to ensure that the population is effectively conserved in Regions II and IV of the OSPAR maritime area.

In this recommendation the signatories agree to

a. Verify the possibility of introducing legislation to protect the European sturgeon in all their life stages in Regions II and IV of the OSPAR maritime area;

b. Implement the Action Plan for the conservation and restoration of the European sturgeon and the resulting National Action Plans adopted within the framework of the Bern Convention, by taking relevant conservation measures particularly in "key areas" and those other areas where significant numbers of this species still occur or are reintroduced;

c. Establish information campaigns in accordance with the above National Action Plans, particularly addressing commercial and recreational fishermen and fisheries observers, about the identification, conservation and protection status of the European sturgeon. Such campaigns may serve the purpose of data collection on European sturgeon occurrence, including information about size and condition of the fish, location and date and further identify its critical habitats and incidental catches in order to reveal areas where this species still occurs;

d. Establish whether any of the key areas justify selection and designation as marine protected areas for the protection of relict populations of and critical habitats for the European sturgeon and whether such areas may become a component of the OSPAR network of marine protected areas;

e. Promote monitoring of the European sturgeon within existing monitoring programmes;

f. Act for the fulfilment of the purpose of this recommendation within the framework of relevant competent authorities;

g. Take appropriate measures, drawing upon the actions and measures suggested in the background document (OSPAR publication 2009/417), to address the threats from:

   (i) habitat alteration, such as construction of dams, dug channels and gravel extraction, having a direct effect on reproductive success;

   (ii) poaching;

   (iii) introduction of non-indigenous sturgeons from accidental release and intentional stocking.

h. In accordance with Article 4 of Annex V of the OSPAR Convention, or where coordination and cooperation with other international organizations and bodies is appropriate, draw the question of strengthening the protection of the European sturgeon to the attention of the authority or international body competent for that question, and encourage that authority or international body to take appropriate measures, drawing upon the actions and measures suggested in the background document (OSPAR publication 2009/417), to address the threats such as:

   (i) bycatch in fisheries;

   (ii) inappropriate handling and release methods resulting in low survival rates; where this is necessary for the conservation and recovery of the European sturgeon.

OSPAR thus specifies a variety of detailed actions in favour of the European sturgeon, and as such, acts as a role model for sturgeon conservation in its natural habitats. **The implementation of these recommendations remains with the countries but a monitoring tool is foreseen to verify the progress of the implementation.**

5.3.4 The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention, 1976)[20]

As a part of UNEP's Regional Seas Programme, the Barcelona Convention is relevant for all Mediterranean countries, including current and former sturgeon range states: Spain, France, Greece, Italy and Turkey. The convention has given rise to seven protocols, one of them is the "Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean[21]", in which parties agree to protect areas of special natural value as well as "protect, preserve and manage threatened or endangered species". Various protection measures are listed in this protocol, **specifically including *ex situ* reproduction, and states are called to coordinate their efforts through multilateral action, including agreements for the protection and recovery of migratory species.** Annex II of this protocol includes the concerned species and explicitly lists *Acipenser naccarii*, *A. sturio* and *Huso huso*.

[20] http://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/barcelona-convention/index_en.htm

[21] http://drustage.unep.org/unepmap/5-specially-protected-areas-protocol-spa-and-biodiversity-protocol

5.3.5 The Convention on the Protection of the Black Sea against Pollution (Bucharest Convention)

The Convention on the Protection of the Black Sea against Pollution was signed by the countries bordering the Black Sea, in Bucharest, in April 1992, and is therefore also referred to as "Bucharest Convention".

The Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea was adopted in Sofia, Bulgaria, 17 April 2009 and represents an agreement between the six Black Sea Coastal states (Bulgaria, Georgia, Romania, the Russian Federation, Turkey and Ukraine) to act in concert to assist in the continued recovery of the Black Sea. The document expands on the original (1996) Black Sea Strategic Action Plan (BS SAP). It includes Ecosystem Quality Objectives (EcoQOs); short-, medium- and long-term targets, and legal and institutional reforms and investments necessary to solve main environmental problems. The vision for the Black Sea is to preserve its ecosystem as a valuable natural endowment of the region, whilst ensuring the protection of its marine and coastal living resources as a condition for sustainable development of the Black Sea coastal states, well-being, health and security of their population. The following EcoQSOs directly address issues of relevance for sturgeon conservation. *EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources; EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources; and EcoQO 2a: Reduce the risk of extinction of threatened species. The BS SAP contains management targets to reach the mentioned objectives.*

Commercially important marine living resources have been greatly affected by alien species introductions, eutrophication, over-fishing and habitats change/damage. For example, various fisheries have revealed a dramatic decline with slight recovery tendencies, but sturgeons remain endangered. The contribution of illegal fishing activities to damage/change of marine living resources is not clearly understood, but there is a general acceptance that this is a causative factor.

Sturgeons are explicitly included in the problem analysis and the management goals of the Action Plan. A harmonized approach towards the management goals is implemented, while the verification of the actions undertaken and the resulting outcome are currently missing.

5.4 European Community laws and regulations

All 23 European Union coastal Member States once encountered sturgeons in their territorial waters, either as migrants or as self-sustaining populations. The European sturgeon species include species for which the European Community has a particular responsibility, since the whole range of the species lies to a very large extent within the limits of the European Community. This is especially true for *A. sturio* and *A. naccarii*. With the population decline of the other sturgeon species, the European populations have become increasingly important to prevent the extirpation of the species globally (*A. nudiventris, A. gueldenstaedtii, A. colchicus, A. stellatus,* and *H. huso*), while locally adapted populations are undergoing a high risk of extinction. The relevant Community law addressing this responsibility is the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992).

5.4.1 European Directive on the Protection of Flora, Fauna and Habitats – Habitats Directive (92/43/EEC) [22]

The Habitats Directive aims to ensure bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies. Measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest. Measures taken pursuant to this Directive shall take account of economic, social and cultural requirements and regional and local characteristics.

The Habitats Directive is among the key instruments for reaching the goals of the **EU Biodiversity Strategy** to halt the loss of biodiversity and habitat degradation in the EU and help stop global biodiversity loss by 2020. It is also a key instrument for reaching the global Aichi Targets of 2010 under the Convention on Biodiversity (CBD).

[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

Species listed in the Directive's Annexes are protected in various ways: For species listed under Annex II (*A. sturio* and *A. nacarii*, both as priority species), core areas of their habitat are designated as sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species. In regards to European sturgeon, eleven areas have been designated up to now and six others are in the process of being approved which includes some of the NATURA 2000 sites.

For species listed under Annex IV, a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites. (*A. sturio* and *A. nacarii* are also listed here).

For species listed under Annex V, Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status [23].(all other sturgeon species in Europe are listed here).

DG Environment expressed their view in a letter that due to the late separation of the species, that the Baltic sturgeon (*A. oxyrinchus*) factually should be considered similarly as *A. sturio*, with regard to its listing and everything that implies. All other sturgeon species in the EU (namely, *A. gueldenstaedtii, A. nudiventris, A. ruthenus, A. stellatus* and *H. huso*) are listed on Annex V of the Habitats Directive.

Article 6 is the main provision of the Habitats Directive targeting species conservation measures. It provides that Member States must take appropriate steps to avoid the deterioration of natural habitats and of the habitat of species for which the habitat has been designated, as well as disturbance of those species if such disturbance could be significant in relation to the objectives of the Directive.

Member States are required under the Habitats Directive (Article 17) to monitor the conservation status of the habitat types and species covered by the Directive and to report their findings, as well as compensation or derogation measures they may have applied to the strict protection measures, to the Commission every 6 years. The reporting database can be accessed online[24].

The new explanatory notes and guidelines for the period 2013–2018[25] also state that bearing in mind the lack of knowledge about the marine stages of the life cycle of most anadromous fish, and the fact that the same populations occur in marine areas and rivers (so the status in adjacent biogeographical and marine regions is closely linked), the status of anadromous fish should only be assessed in terrestrial biogeographical regions. As the only exception to the rule, four sturgeons are mentioned: *A. sturio*, *A. stellatus*, *A. gueldenstaedtii*, and *Huso huso*.

5.4.2 Action Plan for nature, people and the economy

Based on the findings of a fitness check of the Habitats Directives, the EU Commission developed the Action Plan for nature, people and the economy on April 2017[26], which aims to rapidly improve practical implementation of the Nature Directives and accelerate progress towards the EU 2020 goal of halting and reversing the loss of biodiversity and ecosystem services.

Various detailed recommendation derive from this Action Plan, such as:

- Enhance monitoring and fill the gaps in knowledge on the conservation status and trends of species and habitats;
- Building political ownership and strengthening compliance;
- Including bilateral dialogue with Member States and stakeholders, aimed at improving the implementation of Natura 2000 and promoting cooperation in its management across the different biogeographical regions of Europe;

[23] http://ec.europa.eu/environment/nature/legislation/habitatsdirective/
[24] https://bd.eionet.europa.eu/article17/reports2012/species/summary/?period=3&group=Fish&subject=Acipenser+oxyrinchus&region
[25] http://cdr.eionet.europa.eu/help/habitats_art17
[26] Brussels, 27.4.2017 COM(2017) 198 final: http://ec.europa.eu/environment/nature/legislation/fitness_check/action_plan/communication_en.pdf

- "Further **develop Species and Habitats Action Plans for the most threatened species and natural habitats**";
- Improve synergies with the common fisheries policy and the integrated maritime policy, including more effective use of the financing opportunities available;
- For strengthening Member States' compliance with the Nature Directives, other measures in the broader area of environmental policy, training of national judges and prosecutors, access to justice, and assuring compliance with EU environmental law, will also be very relevant;
- Facilitate interactions between Regional Seas Conventions and regional fisheries management organisations in developing conservation measures to comply with environmental legislation;
- Bring together public authorities and stakeholders from different Member States at the biogeographical region level to address common challenges, including cross-border issues.

5.4.3 EU Water Framework Directive (WFD) (Directive No. 2000/60/EC of 23 October 2000)

The Water Framework Directive (WFD) sets ambitious environmental targets, aiming for "good status" of all freshwater, transitional and coastal water bodies, as well as for groundwater by 2027 at the latest, and introduces the principle of preventing any further deterioration of status. Ecological status assessments[27] in the WFD inter alia focus on conditions for aquatic plants and animals and these are used as indicators to determine the overall structure and functioning of the aquatic ecosystem. The Directive requires Member States to identify river basins in their territories, assign responsible authorities, assess and monitor the status of the river basins and produce and implement river basin management plans (RBMPs) as well as programs of measures to fulfil the objective of the Directive. These can include integration of sturgeon conservation objectives (where relevant) with other water uses such as navigation or hydropower generation.

Annex V of the WFD lists "composition, abundance and partially age structure" of a water body's fish fauna among the key elements for classifying the ecological status of surface waters. In this context, monitoring of the status of the sturgeon populations is an important component when assessing the ecological status in the various river basins, taking into account the historical distribution area in the EU. Due to their complex life-cycle and long lifespan, sturgeons form an excellent indicator for the ecological status of rivers and coastal waters. However, River Basin Management Plans need to be improved in order to appropriately address remaining or prospective sturgeon spawning rivers and include measures for sturgeons as long-distance migrants. Wherever possible, exchange of monitoring results, under the Habitats and Water Framework Directives, should be arranged in order to save resources and provide for a comprehensive assessment of the status of sturgeon populations and their habitats. This is also advisable in a transboundary context.

The normative definitions included in Annex V define good ecological status (GES) as meaning "only slight changes in species composition, abundance and age structure from type-specific reference condition communities". For Artificial and Heavily Modified Water Bodies, the hydro-morphological conditions at Maximum Ecological Potential have to be consistent with the only impacts on the surface water body being those resulting from the artificial or heavily modified characteristics of the water body once all mitigation measures have been taken to ensure the best approximation to ecological continuum, in particular with respect to migration of fauna and appropriate spawning and breeding grounds. The biological quality elements at Good Ecological Potential are defined with only slight changes in the values of the relevant biological quality elements as compared to the values found at maximum ecological potential.

The WFD and the target of Good Ecological Status/Potential can only be employed as drivers for restoration measures where it can be proven that sturgeons did form part of the pristine, historical reference condition.

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[27] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Annex 5; COMMON IMPLEMENTATION STRATEGY FOR THE WATER FRAMEWORK DIRECTIVE (2000/60/EC), Guidance Document # 13, Overall Approach to the Classification of Ecological Status and Ecological Potential

It is therefore vitally important that countries develop robust historic distribution databases. The WFD also states that its implementation must achieve compliance with the environmental objectives laid down in other EU legislation for protected areas, notably under the Habitats Directive. As the European and Adriatic sturgeons are priority species listed in the Annexes of the Habitats Directive, the achievement of a favourable conservation status for these species would also be an important indicator for successful implementation of the WFD.

5.4.4 The Marine Strategy Framework Directive

The DIRECTIVE 2008/56/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 June 2008 establishes a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

As most sturgeon species are diadromous and repeatedly spawn in freshwater while migrating over long distances to and in marine areas for feeding in certain extended phases of their live cycles, conservation efforts have to include marine and coastal habitats. The Marine Directive aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. It is the first EU legislative instrument related to the **protection of marine biodiversity**, containing the explicit regulatory **objective that "biodiversity is maintained by 2020"**, as the cornerstone for achieving Good Ecological Status. Member States shall, in respect of each marine region or sub-region concerned, identify the measures need to be taken in order to achieve or maintain good environmental status, as determined pursuant to Article 9(1), in their marine waters. However, the Directive does not specifically address individual species. It is up to the Member States to include the species in their reporting (such as Italy or the UK) and take measures if necessary.

5.4.5 Community Regulation concerning the Common Fisheries Policy (CFP)

Regulation (EU) No 1380/2013 on the Common Fisheries Policy[28] sets the framework for the exploitation of living aquatic resources including anadromous and catadromous species during their marine life. The CFP aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. It is taking into account the impact of fishing activities on the environment. The precautionary approach to fisheries management is applied as a strict prerequisite, taking sound management measures to conserve target species, associated or dependent species, as well as non-target species.

The Common Fisheries Policy and the control regulation require EU Member States to ensure sustainable exploitation, management and conservation of marine biological resources and the marine environment including reduction of capture of endangered, threatened and protected species and enforcement of measures against IUU in European waters.

To achieve sustainability objectives, the EU Council must establish Community-specific measures to reduce the impact of fishing activities on marine ecosystems and non-target species (chapter II, article 4, item (g), indent (iv) of the 2002 Regulation). Therefore, sturgeons should not be ignored in these considerations, despite the fact that commercial harvest of the different species is not permissible due to the poor conservation status. Applying the precautionary approach, all measures possible have to be employed to ensure that bycatch is prevented to facilitate a recovery of these populations[29] .

5.4.6 Council Regulation concerning use of alien and locally absent species in aquaculture

The Council of the European Union adopted Regulation (EC) No 708 in June 2007 concerning the use of alien and locally absent species in aquaculture[30]. This regulation aims to better control the introduction of non-native species in aquaculture in order to prevent negative impacts on native species and ecosystems. This regulation builds on the voluntary Codes of Practice developed over the past decades by intergovernmental organisations such as ICES (International Council for the Exploration of the Sea), EIFAC (European Inland Fisheries Advisory Commission of FAO) and IOE (International

[28] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1380&from=EN
[29] http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_358/l_35820021231en00590080.pdf
[30] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007R0708&from=EN
http://eur-ex.europa.eu/LexUriServ/site/en/oj/2007/l_168/l_16820070628en00010017.pdf

Office of Epizooties). The Regulation stipulates that Member States shall ensure that all appropriate measures are taken to avoid adverse effects to biodiversity, and especially to species, habitats and ecosystem functions, which may be expected to arise from the introduction or translocation of aquatic organisms and non-target species in aquaculture and from the spreading of these species into the wild. Safekeeping of these animals is an urgent prerequisite to minimize the adverse impact of escapement, accidental or deliberate releases caused by transfer of pathogens, concurrence and hybridization potential.

Unfortunately due to the increasing utilization of sturgeons in the farming industry, large-scale transfers of alien species have taken place in the past 3 decades throughout Europe.

5.4.7 Communication from the Commission: Our life insurance, our natural capital: an EU biodiversity strategy to 2020[31]:

The EU Biodiversity Strategy aims to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. It reflects the commitments taken by the EU in 2010, within the international Convention on Biological Diversity. The mid-term review[32] of the Strategy assessed whether the EU is on track to achieve this objective. It showed some progress but also highlighted the need for much greater effort. For 5 out of 6 targets set in the strategy, the progress has been insufficient. On 16 December 2015, the Environmental Council adopted Conclusions on the mid-term review of the EU Biodiversity Strategy to 2020.

On 2 February 2016, the European Parliament adopted a Resolution on the mid-term review of the EU Biodiversity Strategy to 2020[33], in which it called on the Commission and Member States, as a matter of urgency, to give higher priority to achieve the 2020 targets, and/or the EU to reduce its biodiversity footprint worldwide. […] Members stressed that full implementation, enforcement, and adequate financing of the nature directives are vital prerequisites for ensuring the success of the strategy as a whole and meeting its headline target. They called on the Commission to: (i) improve the guidelines, which should facilitate the full implementation and enforcement of the directives; (ii) identify and compile the relevant national budget lines without delay.

5.4.8 Macroregional Strategies

Three of the EU´s currently four 'macroregional strategies' support implicitly or explicitly sturgeon conservation. A 'Macroregional strategy' is an integrated framework, endorsed by the European Council, to address common challenges faced by a defined geographical area, relating to Member States and third countries located in the same geographical area, which thereby benefit from strengthened cooperation, contributing to achievement of economic, social and territorial cohesion.

In addition to the fact that they serve as cooperation platforms connecting several policies and helping to identify possible funding sources, the concept also helps to raise and to keep political commitment of all respective countries involved, puts EU Member States and third countries at an equal footing, which plays a crucial role to push implementation and to build administrative capacity for instance in the Western Balkans. This is highly important, especially for the Danube Region or the Adriatic-Ionian Region.

The EU Strategy for the Danube Region (EUSDR) specifically mentions sturgeon conservation as a target in Priority Area 6 (Biodiversity) and Priority Area 4 (Water Quality) by highlighting the topic at the same time as a horizontal priority of the EUSDR. The sturgeon has become a symbol of the Strategy and raises its visibility in a very concrete way. A dedicated Task Force (Danube Sturgeon Task Force) was put in place as sub-group of PA 6, which adopted the Sturgeon 2020 Strategy. The way the objective of sturgeon conservation has catalysed policy integration under the EUSDR and made tangible the benefit of cooperation, is a best-practice example and could serve as inspiration to the EU Strategy for the Baltic Sea Region and the EU Strategy for the

[31] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52011DC0244&from=EN
[32] http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A8-2016-0003&language=EN
[33] http://www.europarl.europa.eu/oeil/popups/summary.do?id=1422145&t=e&l=en

Adriatic-Ionian strategies and to mobilize action for sturgeon conservation across Europe. The platform INTERACT can hereby play a crucial role in making better use of synergies and in supporting the share/transfer of experience

At the same time, Member States can play a crucial role in the mobilization of respective funding sources. Each of the strategies is aligned with a transnational INTERREG programmes whose projects could – due to their interlinking character across borders – potentially trigger funding sources for related follow-up actions, especially now as the offset of the next EU funding period 2021-2027. It has been proven several times, that next to LIFE, the European Fund for Regional Development and the Cohesion Fund serve as main funding instrument for environmental related projects at EU Level. In this respect, the cooperation between EC Services (across DGs), Managing Authorities and beneficiaries is crucial. Macro-regional and sea-basin-strategies address the topic of the alignment of funding and can play a crucial role in this context.

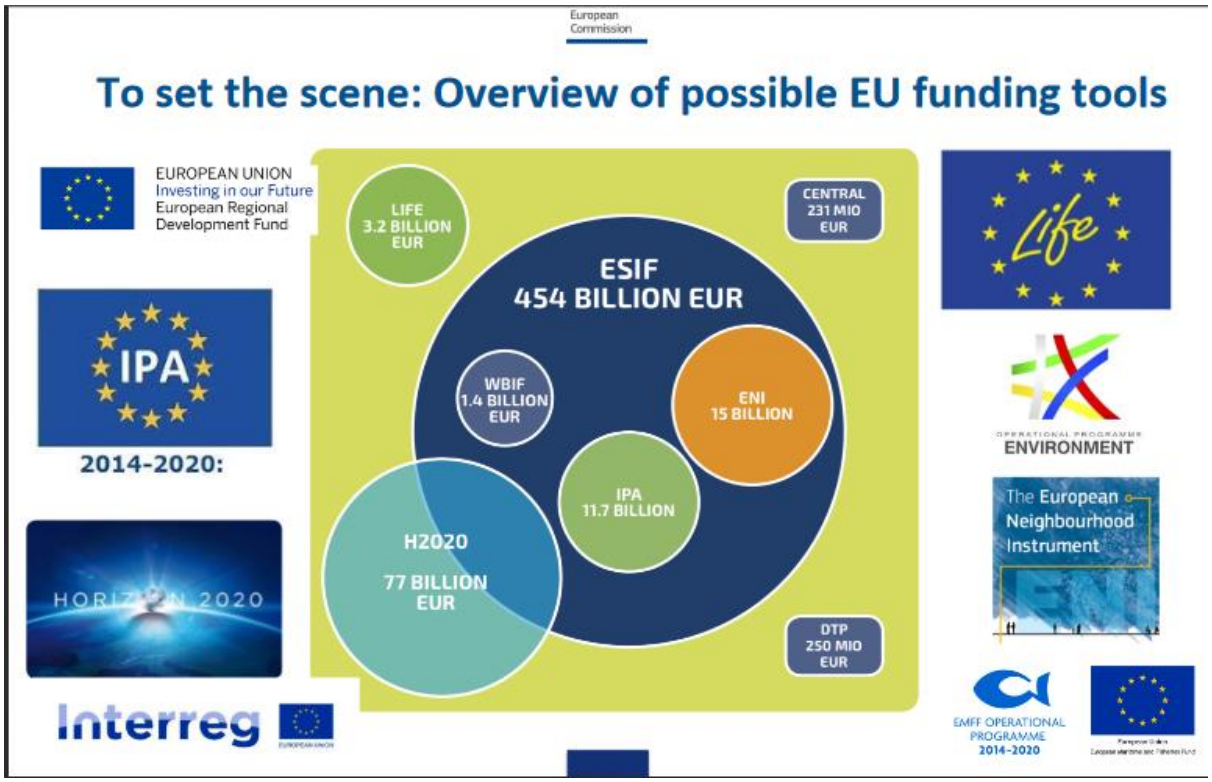
ANNEX 6. FUNDING POSSIBILITIES – AN OVERVIEW

As outlined in Objective 7, "s**ecuring adequate funding … to enable the implementation of the Action Plan"** is seen as one of the key ingredients to success. Ideally, sturgeon conservation programmes would require long-term funding security, but this is hardly available, except in some national programmes. Nevertheless, working with species displaying such a long-life-cycle as sturgeons, requires a longer term perspective when securing funding for e.g. *ex situ* facilities, restoring populations, or population monitoring programmes. Therefore the AP suggests as one of its immediate actions "7.1.1 to develop a coordinated funding plan for the main actions of this plan, utilizing existing funding from the European Commission, National Governments or other donors". The following list of funding instruments, may serve as input to this funding plan, and basis for prioritizing fundraising activities.

Selected EU funding instruments

During time of writing, the next Multiannual-Financial-Framework (MFF 2020-2027) was under discussion, thus all EU funding tools will be subject to future political decisions and respective changes.

The EU designs policy and legal frameworks and puts in place respective funding programmes within the MFF. However, it is partly up to Member States and regions to decide how the funds allocated to them are spent. This programming process happens with involvement of stakeholders and is a prime, time-limited opportunity for ensuring that sturgeon conservation measures as outlined in this Action Plan are included in the strategies and objectives of the various funding programmes.



The MFF combines funding instruments under different headings. The relevant heading "Sustainability, environment protection and fight against climate change" shall be strengthened through the new MFF.

1. **The LIFE programme** with its current sub-programme "**LIFE Environment**" is the European Union's financial instrument supporting environmental and nature conservation projects throughout the Union. The Commission is proposing to increase funding by almost 60% for LIFE in the next funding cycle. Under the sub-programme LIFE Environment 2, priority areas seem best fit for sturgeon conservation projects: LIFE Nature and Biodiversity; LIFE Environmental Governance and Information.

LIFE projects shall take place in the territory of the European Union Member States. The LIFE Programme may also finance activities outside the EU, provided that the coordinating beneficiary is based in the EU and strong evidence is provided that the activities to be carried out outside the EU are necessary to achieve EU environmental objectives and to ensure the effectiveness of interventions carried out in the Member State territories to which the Treaties apply (e.g. actions supporting migratory species or actions implemented on a transboundary river).

Since 1992, 12 projects were financed that directly (10) or indirectly (2) through habitat measures contributed to conservation measures of sturgeons or their habitat. Co-financing rates for traditional Nature and Biodiversity Projects are 60%, but 75% for projects targeting priority habitats and species according to the Habitats Directive, Annex II. However, only *Acipenser naccarii* and *Acipenser sturio* are listed in Annex II, thus despite their dramatic state, conservation projects for the other six sturgeon species have to provide 40% co-financing from non-EU sources, which creates a high hurdle.

Another option is to include sturgeon related actions within **the integrated LIFE project funding stream,** aiming at the implementation of plans, programmes or strategies required by EU environmental or climate legislation or pursuant to other acts or developed by MS authorities. The basis for this could be a Priority Action Framework (PAF) under the Habitats Directive, if it includes sturgeon measures or a River Basin Management Plan that refers to sturgeon conservation.

2. **European Structural Investment Funds (ESIF):** The European Structural and Investment Funds (ESIF) are the European Regional Development Fund (ERDF), the Cohesion Fund (CF), the European Social Fund (ESF), the European Agricultural Fund, Rural Development (EAFRD), and the European Maritime and Fisheries Fund (EMFF), aiming to invest in job creation and a sustainable and healthy European economy[24]. The ESIF is also the main EU funding instrument for water related and environmental projects. Member States will be required to submit strategic-level Partnership Agreements to the European Commission, setting out how the funds will be used during the next funding period at the national level. Specific investment programmes detail how funds will be spent in the different regions and through projects in policy areas concerned. The ERDF and CF (which form together with the European Social Fund the so-called Cohesion Policy) are managed through Operational Programmes, which cover an entire Member State or regions therein. Cohesion Policy[25] is an important source of funding for projects in the field of environment, including biodiversity. Efforts should be increased, so that in the next set of programmes, conservation measures are included in the respective operational programmes.

3. **Cooperation / INTERREG:** Macroregional strategies are an integrated framework endorsed by the European Council, which may be supported by EU Structural Investment Funds (ESIF) to address common challenges faced by a defined geographical area (EU Member States and other countries). Macroregional Strategies have the big potential to serve cooperation platforms by bringing together various actors, linking them up across sectors and with the political level. However, they are not funding sources, but tools for strengthened cooperation. Each of the 4 existing strategies are aligned with a transnational INTERREG programme, whose projects could - due their interlinking character across borders – potentially trigger funding sources for related follow-up actions, especially now when the next EU funding period 2021-2027 is being shaped, for example the Danube Transnational Programme (DTP), or the one for the Adriatic region (ADRION).

4. **European Neighbourhood Instruments**: Joint Operational Programmes under the European Neighbourhood Instrument (ENI), such as those between Romania and Ukraine or Romania and Moldova, aim to move a region towards prosperity and good relations with its neighbours, achieved through cross border cooperation actions. Joint bodies of the two countries are designed to identify the common development priorities of the two countries in the border area as well as the list of large infrastructure projects, which is to be attached to the program. Projects targeting sturgeon conservation could be designed and submitted under Thematic objective 2: Support to education, research, technological development and innovation. The Black Sea Basin Joint Operational Programme (https://blacksea-cbc.net/black-sea-basin-2014-2020/jop/) for example sets an objective for environmental protection and improved environmental monitoring.

5. **IPA: The Instrument for Pre-accession Assistance** (IPA) is the means by which the EU supports reforms in the 'enlargement countries' with financial and technical help. They help the beneficiaries make political and economic reforms, preparing them for the rights and obligations that come with EU membership, also regarding EU environmental law. For instance, under the Interreg IPA CBC Romania – Serbia programme, projects targeting sturgeon conservation can be submitted under Priority area 2.1.Environmental protection and sustainable use of natural resources. The IPA 2014–2020 framework for Turkey (IPA II) could also be an option under the Environment and Climate Action policy area.

6. **Horizon 2020**: http://ec.europa.eu/programmes/horizon2020/ Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. It provides nearly €80 billion of funding over seven years (2014 to 2020). The Area of "Environment & Climate Action" mainly focuses on research aiming to achieve a resource, water, efficient and climate change resilient economy and society, not deemed to fit for measures under this action plan. The Area of "Aquatic resources" aims to sustainably exploit and manage aquatic living resources to maximise the social and economic benefits from Europe's oceans and seas. It does support research contributing to competitive and environmentally friendly fisheries and aquaculture. However, reoccurring and long-term conservation measures such as populations monitoring and habitat identification, using well -established techniques or set-ups, are not eligible. The programme is designed for complex and innovative research methods, requiring an international consortium of research institutes for application.

7. **European Maritime and Fisheries Fund (EMFF).** The EMFF is part of the European Structural Investment Fund and the financial instrument to support the objectives of the reformed Common Fisheries Policy (CFP) and the EU Integrated Maritime Policy (IMP), including the social dimension. It rests on six main priorities: (1) sustainable fisheries, (2) sustainable aquaculture, (3) implementing the CFP through data collection and enforcement of fisheries legislation, (4) marketing and processing of seafood, (5) employment, i.e. to support coastal and inland fishing communities in diversifying their economies, (6) integrated maritime policy, such as improving knowledge and better planning. The EMFF allocates a share of the total budget to each country, and leaves it to each national authority to choose the projects and solutions that work best for their own economy. The operational programmes adopted by the EU countries can vary widely - please refer to the national fact sheets (https://ec.europa.eu/fisheries/cfp/emff/country-files/) for a summary of each country's operational programme. Theoretically it may be possible to support fishing communities on sturgeon rivers and seas through this fund or tackle bycatch of sturgeons at seas.

8. **The Internal Security Fund (ISF**) was set up for the period of 2014-20, with a total of EUR 3.8 billion for the seven years. The Fund promotes the implementation of the Internal Security Strategy such as law enforcement cooperation and management of the Unions external borders. It also includes a focus on combating environmental and wildlife crime. Objectives include boosting intelligence-led, cross-border and regionally focused investigations to tackle environmental crime, developing detection and investigation methodologies including the use of forensic techniques, information exchange and training. More information: https://ec.europa.eu/home-affairs/financing/fundings/security-and-safeguarding-liberties/internal-security-fund-police_en. It appears possible that measures of this Action Plan addressing illegal caviar trade or poaching can be funded under this programme.

Other international funding possibilities

The following funds are specifically designed for endangered species conservation, but their grant sizes are rather small.

1. The **National Geographic Society** awards grants for conservation, education, research, storytelling, and technology through its Committee for Research and Exploration. One focus in collaboration with IUCN is on the recovery of species on the brink of extinction and encourages projects focusing on priority actions to avert a species decline. Such projects shall support priorities of IUCN SSC Species Conservation Plans (e.g. Action Plans, Conservation Strategies, Population and Habitat Viability Assessments) as well as conservation actions that are endorsed by the relevant IUCN SSC Species Specialist Group. Applications must explicitly address priorities defined in published action plans, Funds are not restricted by taxon or region; One of the few global grants for species conservation, proposals can only amount to max 30-50.000 USD, Competition is said to be high. https://www.nationalgeographic.org/grants/grant-opportunities/species-recovery/

2. **Mohamed bin Zayed Species Conservation Fund**: the Fund provides grants for the conservation of endangered species, anywhere in the world. Generally the Fund is primarily interested in providing support to *in situ* conservation work in the field (such as survey work and data gathering, direct action, recovery management, training and the like), focusing on the species in its natural habitat. The maximum grant size is restricted to 25.000 USD, thus can only contribute a fraction of the real needs for conservation measures. More information on: http://www.mbzspeciesconservation.org

3. **Foundation Segré:** The mission of this private foundation is to help protect the biodiversity of our planet through the active conservation of threatened species and their habitat and the restoration of degraded ecosystems. The Foundation either directly undertakes conservation projects or alternatively offers financial support to partner organisations. In the latter case, projects are developed jointly with the partner to set the terms and conditions and the time horizon, which can extend over several years. Awareness raising, education, alternative livelihood and research activities will only be accepted if part of a broader conservation project. Grant amounts are not specified.

4. **The Global Environment Facility (GEF)** : The Global Environment Facility (GEF) Trust Fund was established on the eve of the 1992 Rio Earth Summit, to help tackle our planet's most pressing environmental problems. GEF funding to support the projects is contributed by donor countries. These financial contributions are replenished every four years (see GEF Replenishment documents) by the GEF 39 donor countries. GEF funds are available to developing countries and countries with economies in transition to meet the objectives of the international environmental conventions and agreements. GEF support is provided to government agencies, civil society organizations, private sector companies, research institutions, among the broad diversity of potential partners, to implement projects and programs in recipient countries.

ANNEX 7. REFERENCES

A list of the most relevant literature used for the preparation of the Action Plan is provided. Emphasis was laid on titles providing an overview, as well as on sources taking a topic to an advanced level.

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