

National Action Plan for the conservation and restoration of the Sturgeons of Turkey **(*Acipenser gueldenstaedtii*, *A. nudiiventris*, *A. stellatus*, *A. sturio*, and *Huso huso*)**

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Preamble

This Action Plan has been prepared in close cooperation and with substantial input from many Turkish scientists. Extensive information has also been provided by the respective local and national Agencies as well as NGOs. The information following has been included to the extent possible: (a) the available scientific knowledge on the biology of the species in the area of concern, (b) their requirements for survival in anthropogenic modified environments and (c) the existing information on the status of Turkish riverine and coastal habitats in which they once were abundant. The English version of the text was partly formulated and fully edited by the undersigning Board members of the World Sturgeon Conservation Society.

WSCS highly welcomes the initiative of Turkey and the FAO regional office to prepare such an Action Plan in order to approach the urgently required conservation of the endemic sturgeons in a coordinated and well planned manner. Nevertheless, this AP comes at the very last minute since the risk for extinction of the endemic sturgeons in Turkish waters is extremely high. The Turkish River systems draining to the Black Sea (which were once carrying abundant sturgeon populations) are mostly short and steep with numerous impacts in place already. These facts make sturgeon populations native to Turkey waters particularly vulnerable to human intervention and therefore, a successful implementation of a Turkish Action Plan could serve as a role model for adjacent Black Sea areas.

However, the Editors of this Action Plan are highly concerned about the potential failure of this plan as we recently learned that firm commitments exist for almost all river systems to massively expand their fragmentation by numerous additional hydro- and irrigation dams (with utilization rights for the next 49 years) that will seriously disrupt the hydrological regimes thereby not only negatively affecting the outcome of the Sturgeon Action Plan but also impacting almost all other major watershed functions. The concern is further nourished by the fact that Turkey has applied a national NATURA 2000 programme but in this plan the river habitats were not included. Therefore, we consider the will, expressed with the support for this Action Plan, as the last chance to render the desolate situation. One of the mitigation options could be the selection of at least a few systems that should be protected entirely while also serving as a backup to counterbalance the anticipated massively increasing extinction risks for sturgeons through continued dam-construction. We also point out the need for the national authorities to implement appropriate actions as proposed in this Plan immediately and without delay. Otherwise the Turkish sturgeon populations will definitely be lost in the near future.

However, if implemented in a timely fashion, the measures can put Turkey on the forefront of the Black Sea range states with sturgeon rehabilitation programmes (which are underway particularly in the Danube River watershed and in central Europe) while also serving as a supporting link to countries of the eastern Black Sea. Without a doubt, international co-operation and co-ordination of programmes are needed in a long-term for the success of the various regional and national recovery plans. Such cooperation can also serve as a role model for other sectors of marine and coastal/estuarine management in an enclosed sea where the resources (such as fish stocks) have to be managed jointly.

Neu Wulmstorf and Berlin, September, 03, 2013

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Executive summary

The five sturgeon species historically native to Turkish rivers and coastal waters (***Acipenser gueldenstaedtii*, *A. nudiventris*, *A. stellatus*, *A. sturio*, and *H. huso***) are anadromous (migratory) fish, spending most of their life span in marine environments while utilizing their native rivers for reproduction. Until the 1970s sturgeons were well known species with high economic importance across the Turkish coastal waters. They migrated into all larger Turkish rivers in large numbers and supported a substantial fishery with centres in Carsamba, Bafra and Karasu as well as in Istanbul. The status of the species has completely changed during the last 40 years. Today the sturgeon species have become functionally extinct or are at the brink of extinction in Turkey.

Besides man-made changes imposed on rivers such as embankments, the construction of hydrodams (which block the upstream migration to spawning sites), and pollution, overharvest has been identified to be one of the key elements that caused the dramatic decline of the populations in Turkish waters. Recently, the situation for migratory fish species in Turkey has dramatically worsened since the expansion of hydropower facilities, neglecting international commitments of Turkey with regard to biodiversity conservation, massively reduce available habitats and limit migration routes for the species in question.

Turkish obligations to protect and save the species derive from international agreements and conventions which the country signed as a member of the international community and these obligations have to be fulfilled urgently and without delay. Serious implications for ongoing developments (hydropower) as will be outlined in this National Action Plan. Additionally, the international coordination needs will allow interacting effectively with Black Sea partner countries in a concerted and well-focussed manner.

There are **four primary problem areas** impacting on survival and reproductive efficiency of the species (ranked in approximate order of importance):

- ✓ ♂ accidental catch (bycatch) and illegal fishing (poaching) are critical to the survival of very limited number of remaining individuals;
- ✓ ♂ drastic changes of hydrologic and hydrodynamic regimes in rivers and estuaries (i.e. sand and gravel extraction, dyking and channelization, hydrodams and migration barriers) are affecting spawning and nursery habitats and block migration to spawning sites;
- ✓ ♂ environmental pollution (i.e. agricultural, domestic and industrial wastes in rivers and estuaries) drastically affects the reproductive success;
- ✓ ♂ restriction of the chances for natural populations to effectively reproduce due to very small size of the highly dispersed remaining population (Allee effect); this would be enhanced even further with continued catches further reducing the mating probability

Additionally, climate change may also have an impact on future performance characteristics of the species.

The current situation in Turkey with very small remnant populations of only three species (*A. gueldenstaedtii*, *A. stellatus* and *H. huso*), is dramatic. Although the size of the endemic population remains unknown it is commonly admitted that they are probably limited to no more than a few hundred individuals if ever. **All indicators concur that these are some of the most threatened fish species in Turkey, being in critical danger of extinction.**

Small populations are subjected to a higher risk of extinction than large ones since continuous environmental change (environmental stochasticity), requires a minimal potential for adaptation. It is more likely that a larger population contains the entire genetic diversity, providing a better fitness for adaptation to environmental alterations. The longer the period with a critically small population lasts (genetic bottleneck), the higher the risk for loss of fitness for survival and subsequent risk of extinction. 8

Additionally, the Allee effect (Myers *et al.* 1995) predicts a negative growth rate at extremely low population sizes even if all environmental factors are favourable. Low numbers limit the chances for spawning encounters. This effect is compounded for sturgeons since adults only reproduce at long intervals. It is estimated that females mate only two or three times per decade, additionally limiting the encounters of mature fish at low population size.

Even the loss of one single adult specimen is a significant impact, compromising the future of the species at the currently critical state of the population.

Therefore, action is needed now to halt this continuous downward trend and rebuild the populations from the last few remaining individuals.

The Action Plan covers all species previously known to have occurred in Turkish Waters of the Black Sea. Priority for immediate conservation actions will be given to three species (*Acipenser gueldenstaedtii*, *Acipenser stellatus* and *Huso huso*), except for ex-situ conservation, where specimens of any of native Black Sea species will be taken to build a founder population, provided fish have actively entered into the rivers prior to catch.

To support self-sustaining populations of the endemic sturgeons of Turkey is an obligation to which the country has made a variety of serious and legally binding international commitments which if brought into force also would allow the re-establishment of the species in key areas of its former natural range. These measures would also provide an important contribution to maintain biodiversity. This species with its diverse habitat requirements and high longevity can also serve as an indicator species, integrating over space and time the effectiveness of conservation measures.

Presently, a multi-task approach seems to offer the most promising options to rescue and recover the species. It is concluded that:

- a) A consequent and massively supported **ex-situ conservation programme** to take advantage of the specimens already secured is inevitable,
- b) An **in-situ conservation programme** aggressively enforced is needed to prevent further loss of the remaining specimens and also to recover them for improving the genetic diversity of the *ex-situ* brood stock,
- c) A **strategic (long-term) programme on habitat rehabilitation** is required to assure that nursing and spawning sites meet the needs of the species and are accessible for the respective life cycle stages and
- d) A **re-establishment programme** needs to be carried out to build up self-sustaining populations in selected key areas within the historic range with genetically suitable material from the endemic populations that thrive in Turkish waters.

This Action Plan aims at preventing extinction of the sturgeon species in Turkey while subsequently reconstituting viable populations at least of three sturgeon species (*A. gueldenstaedtii*, *A. stellatus*, *H. huso*) in their historic range through close national and international co-operation of range States, at all organisational levels. The sequence of actions listed in **this chapter** does not resemble a priority listing. Many of the issues mentioned require simultaneous implementation of several actions.

The plan has nine main conservation objectives which may be grouped under four general components. Details of the required measures for each of the actions are listed in Annex 1 under each of the objectives. Included are the responsible organisations, indicators of success and specific milestones to be reached. These components are:

- ☿ **Component 1** : *In-situ* conservation of the endemic sturgeons in Turkey
- ☿ **Component 2** : Protection and restoration of essential sturgeon habitats

- ⚡ **Component 3** : *Ex-situ* conservation and re-introduction of selected sturgeon species
- ⚡ **Component 4**: National and International cooperation

The specific objectives and related actions for each of these components have been identified as follows:

COMPONENT 1: IN-SITU CONSERVATION OF TURKISH STURGEON SPECIES

Objective 1: Significant reduction of fishing mortality

The support of fishermen to a programme of reduction of accidental captures and of *in-situ* monitoring of the species is critical to success of the Action Plan. The experience in France clearly demonstrates that this is both practicable and possible.

Objective 2: Effective protection of natural reproductions

Since natural reproductions are still observed in two of the Turkish River systems, it is essential to protect the remaining spawning sites and spawning events from anthropogenic impacts such as poaching, pollution or hydroconstruction. This might be a unique and final chance to protect the genotype of the endemic sturgeon species of Turkey.

Objective 3: Effective control of allochthonous species

The introduction and transfer of non-indigenous species poses a critical threat to changes of biodiversity, a fact of equal importance to the loss of native species. The present rate of increasing reports of exotic sturgeon species (including hybrids) within the native range of *the endemic sturgeons* is alarming, as these non-native species may negatively affect the integrity of ecosystems.

COMPONENT 2: PROTECTION AND RESTORATION OF ESSENTIAL STURGEON HABITATS

Objective 4: Protecting and improving the quality and continuity of essential riverine and estuarine sturgeon habitats

Habitats previously utilized by *the different sturgeon species* as spawning and nursery grounds in riverine and coastal waters are largely unknown, the access to the upriver reaches that historically have served as spawning grounds has been blocked by a series of dams on the larger rivers. Currently only limited spawning habitat is available below the dams and regulators, coming under extreme pressure by additional constructions. The options for rehabilitation of historic spawning grounds are scarce to non-existing. There is an urgent need to improve the knowledge base on the subject while also seriously addressing issues on habitat fragmentation and needs for interconnections (“ecological stepstones”).

Objective 5: Improvement of water quality

Water quality objectives play an important role in habitat restoration and species recovery programmes. Our knowledge on requirements of various life cycle stages of sturgeons in terms of chemical and biological water quality criteria is to some extent fragmentary but sound baselines can be used from aquaculture experiences.

COMPONENT 3: EX-SITU CONSERVATION AND RE-INTRODUCTION OF ENDEMIC STURGEON SPECIES

Objective 6: Ex-situ conservation of endemic sturgeon species 10

Presently there seems to be no alternative but to pursue *ex-situ* conservation to save the Turkish sturgeon species from becoming extinct while building up broodstocks of sufficient size from catches preferably from the rivers that are entered for reproduction still to cope with the genetic limitations of in- and outbreeding to facilitate mass reproduction and develop rearing programmes for release of produced juveniles into restored habitats.

Objective 7: Release of sturgeons for re-establishment or enhancement

The ultimate goal of this objective is to re-establish self-sustaining populations in as many river systems of their natural range as possible. These releases have to be (a) substantial in number because of the high natural mortality, (b) long-lasting (for decades) because of the late maturity of the species and its extreme longevity, (c) at the right “time-size-release window” to minimize mortalities, and (d) at habitats of strategic importance for nursing and imprinting (homing).

COMPONENT 4: NATIONAL AND INTERNATIONAL COOPERATION

The seven conservation objectives above have to be complemented by the establishment of an appropriate co-operation mechanism between all stakeholders, including governmental agencies, research institutions and NGOs in range states actively involved in sturgeon conservation projects and long-term programmes. Therefore, it is proposed to set up a Black Sea group possibly comprising such active members from range States, to specifically discuss and co-ordinate the implementation of the Action Plan and relevant national actions. The composition of the group may vary, depending on the number of ongoing projects and programmes in participating range states.

Actions, Indicators and Milestones

All of the respective Actions, the measures needed to fulfil them, the groups or organisations to whom these actions are addressed and finally the milestones and indicators that can serve to follow the progress and success of the Action Plan are presented in great detail in the Table in Annex 1.

Gaps in science and technology to be urgently addressed

Certain gaps in Science and Technology need to be urgently filled to properly implement the Action Plan for sturgeon conservation. Some of the required knowledge base has an overarching significance for several of the Actions and their required measures. While they are mostly included or implied in the proposed measures presented in Annex 1, they have to be addressed flexibly and directly within the proposed measures and/or independently carried out with national and international support for research projects. Such actions will greatly assist the achievement of the milestones and indicators in a timely fashion, thereby contributing to the survival and restoration of the Turkish sturgeons as a national heritage.

The Action Plan is not a static product but the starting point of a dynamic and continuous process during which the changes in the underlying conditions and the effectuated results have to be integrated in the continuous development of the plan. Deficits that are still evident in this plan are to be overcome and knowledge gaps to be filled during this process. As such the AP is considered a working document that is to serve also as the foundation for the river specific management plans.