

Status Review for Endangered Species Act consideration of five foreign sturgeon

ID249

Peer Review Comments

Draft Status review peer review was solicited from 12 potential reviewers. Seven people agreed to be reviewers, four provided reviews. Reviewer comments are compiled below from comments on drafts of the manuscript and are not in the order of the reviewer identification list below.

Reviewers were (listed alphabetically here):

Phaedra Doukakis
Ocean Associates, Inc., and
Scripps Institution of Oceanography
La Jolla, CA

Jorn Gessner
Leibniz-Institute for Freshwater Ecology and Inland Fisheries
Müggelseedamm 310
12587 Berlin
Germany

Arne Ludwig
Leibniz-Institute for Zoo- and Wildlife Research
Department Evolutionary Genetics
Alfred-Kowalke-Str. 17
10315 Berlin

Patrick Williot
Sturgeon Consultant Aquaculture & Conservation Biology
Expert près Ministère Enseignement Supérieur et Recherche
4, Rue du Pas de Madame
33980, Audenge, France

Reviewer #1:

“It was determined that five of the species fell within NMFS’ jurisdiction (*Acipenser naccarii* (Adriatic sturgeon) and *A. sturio* (Baltic sturgeon/common sturgeon) in the Western Europe region, *A. sinensis* (Chinese sturgeon) in the Yangtze River region, and *A. mikadoi* (Sakhalin sturgeon) and *Huso dauricus* (Kaluga sturgeon) in the Amur River Basin/Sea of Japan/Sea of Okhotsk region) because of significant use of estuarine and/or marine habitats.”

Can the authors give any recent examples for catches of *A. sinensis*, *A. mikadoi*, *H. dauricus* and *A. naccarii* in marine or brackish waters? I not know any such records.

Species in detail

Acipenser sturio is a marine species listed in CITES App. I and dozens of regional, national and international conventions. An additional listing under the US ESA will not improve its situation, because *A. sturio* is not found in national or international trade and any US efforts to improve the situation of the species cannot be expected. There is no release program for *A. sturio* in the Danube (Donau) River (report page 45). Likely the authors misunderstood the Romanian word “sturio” which means sturgeon. Restoration and release in Western Europe (esp. France and Germany) is on a promising way since 1990. These programs do not only produce specimens for release; they educate the public, involve local fisherman, include re-naturation efforts and river protection approaches and consequently have a huge and public political support.

Acipenser naccarii is dominantly freshwater species. Its adaptation on brackish waters and marine waters is poor (McKenzie *et al.* (2001) *Effects of acclimation to brackish water on the growth, respiratory metabolism, and swimming performance of young-of-the-year Adriatic sturgeon (Acipenser naccarii)*. *Canadian Journal of Fisheries and Aquatic Science*, 58, 1104–1112; McKenzie *et al.* (2001) *Effects of acclimation to brackish water on tolerance of salinity challenge by young-of-the-year Adriatic sturgeon (Acipenser naccarii)*. *Canadian Journal of Fisheries and Aquatic Science*, 58, 1113–1121). Regarding this fact, the responsibility of the ESA has to be questioned. Notable *A. naccarii* is a major player in European aquaculture, therefore reproduction and handling is well investigated. Release programs started in Italy in the 1990s. Illegal fishery or poaching is not described for Italy. Single specimens are caught during sport (angling) fishing in very rare events; but these specimens have to be released. The Albanian population is extinct. The native status of the Spanish population is under scientific discussion.

Acipenser sinensis has increasing importance present in Chinese aquaculture. Although populations declined in the recent past, Chinese authorities started huge efforts to protect all Chinese sturgeon species including *A. sinensis*. Several research institutes of the Chinese Academy of Sciences addresses release programs, protection efforts and public education. Novel spawning grounds below the Three Georges Dams were founded and used by the fish. Sturgeon fishery is under strict control. Poaching is less important. The situation looks promising.

Only weak data are available for *Huso dauricus* and much less data for *Acipenser mikadoi*. I am involved in genetic import/export control of caviar since twenty years. Regarding the outcome of these tests, I never encountered pure-breed individuals of either species and never found any *A.*

mikadoi in caviar trade. Recently, I discovered a hybrid between *H. dauricus* and *A. schrenckii*. This combination became frequent in Chinese aquaculture during last years. However, it was declared as aquaculture fish. Any discussion about the risks for both species without an inclusion of Russian and Chinese experts is only speculation. Both countries have developed a though management for their sturgeon species during last twenty years. Release programs, which dropped down after the Soviet times, are again on high levels.

General comments

“Moreover, it is very unclear whether the range countries for the petitioned sturgeon species have the resources and personnel to enforce existing regulatory measures as reports of poaching and illegal trade are widespread.”

All these countries have the resources and use them. Illegal trade and poaching may be exists but is rare and by no means widespread.

Threats Assessment

Who are the experts and why they are experts? Only three experts? A serious risk assessment analysis requires serious statistics and I cannot see that in this report.

For example looking on *A. naccarii*, I have seriously doubt on the expertise of the experts. Overutilization of the wild population? I guess no one of these experts was in Italy at the Po River and ask local scientists or fishermen. And so on Same for the other species. Subjective scoring; tendential interpretation.

Considering the number of major flaws in this report, I cannot recommend the listing of these species under the US ESA. A listing requires a serious basis which is not provided by this report. I would suggest including of local experts for the preparation of a revised version. Moreover the questionnaire's should be repeated based on a larger number of participants minimizing subjective scorings. The IUCN Sturgeon Specialist Group or the World Sturgeon Conservation Society can give support.

Reviewer #2

It looks great! I don't have the time to do a thorough review but I don't think that it needs one.

Reviewer #3

Executive Summary

Baltic sturgeon common name should be European sturgeon.

Stocking has been carried out during the past 15 years at least. So catches could originate from such stocking measures, aquaculture origin is too unspecific and implies escapement from farms which is proven for Italian farms in single cases but is difficult to differentiate.

Overutilization was the major impact upon populations in the past. Today, bycatch is the only fisheries related impact that remains which due to communication campaigns and low population size is at extremely low level.

Inadequate regulatory mechanism was also a past impact but not a relevant impact at the current time. It is rather the lack of enforcement which has contributed to the loss of individuals over the past 20-30 years despite regulations and agreements being in place.

The occurrence of hybrids might impact the population in the future but was not present in the past.

H. dauricus inhabited not the mountainous upper reach but at least the lower 2/3 of the river system .

Introduction

Kaluga would be a candidate for DPS

To which extent have the restoration activities been included in the “foreseeable future” scenarios?

There is (eventually with the exception of Kaluga) no commercial trade for the species mentioned

Life History and Ecology

There is only 1 publication that claims this group to be of relevance. The species were described as early as 1758 and 1815 with no attempt to change the segregation. [relationship of *A. sturio* and *A. oxyrinchus*]

Tiedemann et al. (2007) is outdated and erroneous due to methodology!

The [Greek] reintroduction was a singular release without any monitoring or scientific support and as such not a serious attempt to reintroduce the species.

As in all sturgeons! This is also true for the hatchlings. [Recent work shows that interstitial space is also critical to spawning habitat success (Du et al. 2011).]

How is generation length defined?

Analysis of the ESA Section 4(A)(1) factors

Coincidental with the replacement of *A. sturio* by *A. oxyrinchus* – is this really attributable to overexploitation? [archaeological decline data]

With an exponential growth in aquaculture? The catches are too low and the risk too high for such an endeavour! By the way, this is a suggestion by the review team, not the original author cited. [increasing trade demand]

At current only Kaluga would need sustainable management in all other cases restoration of populations is paramount.

Enforcement is only one problem. Compliance is another one and requires more consolidated efforts but currently the main problems are in the adverse impacts of water quality, habitat loss and hydrodevelopment that adversely affect also restoration actions. This is what needs to be addressed. For all other measures the time is over already due to population sizes.

Will the US therefore join the Kyoto protocol as a result of the EP[S]A listing?

This is past info! Protection only set in in the late 1980s. Today only bycatch persists. [naccarii overexploitation]

Silurus glanis is considered a potential predator. Habitat concurrence is a minor factor when considering the two species but there is no direct evidence due to low numbers in *A. naccarii*.

[Heavy metal] Effects are unknown! This only affects 50% of the [Garonne] river system!

3 main objectives [of the European action plan]: in situ conservation, ex situ measures and habitat restoration are the focal areas of the plan!

Reducing the spawning habitat by 90% has an effect on the recruitment! [A. sinensis]

State operated facilities utilize ex situ stocks to decrease the dependence on wild spawners for stocking as such

Damming of Tumnin River is under discussion. This would massively affect the reproduction of the species.

No CITES quota for wild caught fish are provided after 2008

Aquaculture of sturgeons is very limited in the Amur region climate so no main threat.

This is prior to CITES listing! [Birstein on *H. dauricus*]

Assessment of Extinction Risk

Were any members involved that revealed specific knowledge on the conditions in Italy

Conservation Efforts

This is a fake! Sturgeon release probably *H. huso*. (Hungary *A. sturio* releases)

Reviewer #4

Technical and scientific evaluation

Some General comments

The referee is not aware with the constraints (time, experience, and reference background, others ...) that are attached to the present investigation. Therefore, comments and suggestions should be placed under this umbrella.

Second, with some exception dealing mainly with primary data (instead of second hand) and/or with above and below comments, the list of references is rather extensive.

Third, in the present investigation, in the opinion of the referee, both conservation aspects and extinction risk are assessed in a restricted network of thoughts and reflections. Though never mentioned, the extinction risk of the present study, if any, is **in the wild at a given period**. There is no mention on the potential positive impact of ex situ conservation. The referee knows the many difficulties of such an approach. However, this is the only way to potentially save (at least for a period of time) some species from a complete extinction. And in the present case, *A.naccarii*, *A.sturio*, and *A.sinensis* are good examples of this strategy. Additionally, the conservation program was set up in France for long (late 1970s and early 1980s) with connected ecological studies (see for example Rochard et Jatteau, 1991; Castelnaud *et al.*, 1991, Williot *et al.*, 1997).

Some comments on species

The five sturgeon species are deeply unequally documented in their biological-ecological knowledge as well as in the restoration-conservation attempts. This is not outlined in the "Status review report".

Below are a few comments dealing with Adriatic sturgeon.

In contrast with the statement mentioned on top page 14, there are no more accessible spawning grounds for the species in Pô basin, see IUCN Bronzi *et al.* 2011 (version 2013.I). Additionally, recreational fishery is the main fish exploitation process in Italy with a short term consideration. Last, to the knowledge of the referee, there is no national action and/ plan to restore the species even some Life action were carried out under the umbrella of regional administrations. For all that, do we consider that the species is on the extinction? At present in the wild likely yes, but not in the absolute as the species is currently produced in different fish farms either in Italy or in Spain.

With regard to *A. sturio*, the following comments are relevant.

The correct spelling is either Common sturgeon and or European sturgeon BUT NOT Baltic sturgeon. The species presented the largest geographical natural area (Magnin 1962, Holčík 1989, Kottelat & Freyhof, 2007, Lassalle *et al*, 2011).

France, with Garonne basin, is somewhat unfortunately, the only European zone where a large range of spawning grounds are still accessible (in both Garonne and Dordogne Rivers) and potentially functional (Jego *et al.*, 2002). Additionally, *A. sturio* (at least the “French population”) is the best known in most of its characteristics as compared with other present studied sturgeon species. This was initiated long time ago, partly, by an extended and long-term tagging program that brought fundamental data on migrations and population dynamics of the population (Castelnaud *et al.*, 1991). And it’s still in work as illustrated by most recent works on the future of stocked progenies (Acolas *et al.*, 2012).

There are two rather ignored dimensions in the *A. sturio* recovering actions. Chronologically, the first deals with the will of building a brood stock in order to face with the deterioration of wild population status (Williot *et al.*, 1997; 2004; 2007; 2009 a & b) among others. In relation to that, studies on genetics (Ludwig *et al.*, 2004; Tiedemann *et al.*, 2011), endocrinology, Davail-Cuisset *et al.*, (2011), feeding in farming conditions (Williot *et al.*, (2005), Chèvre *et al.*, (2001) were promoted. More fundamentals studies are not mentioned. It is noteworthy that growth of wild/stocked fish was similar (Lochet *et al.*, 2004) and thus supported *a posteriori* the stocking program together with rather high survival ratios of stocked fish.

The second deals with the fact that a closed cooperation between France and Germany was set up in the late 1990s (Williot & Kirschbaum, 2011). It’s still in operation. The dynamics might be considered as a “guarantee” for both parts to not interrupt such a program.

A few comments on the Chinese sturgeon are below. First, a question of citation has to be mentioned (also valid with Kaluga sturgeon). References as Qiwei and Wei are related to the same scientist, the Pr Qiwei Wei. The referee strongly suggests using Wei as family name instead.

The available spawning grounds of the species are mostly concentrated in a small portion of Yangtze River below the Gezhouba dam (Deng Xin *et al.*, 1991; Deng Zhong-Ling and Xu Yungan Zhao Yan, 1991). The last study signalled for the first time the use of predation fish (*Pseudobagrus* sp & *Coreius* sp) on sturgeon eggs as a proof of the spawning activity of the Chinese sturgeon. In contrast with the relatively optimistic prospect of the two aforementioned investigations, the status of the species has deteriorated (Wei *et al.*, 1997) to such an extent that *ex situ* conservation efforts were then engaged.

The referee has no specific comments on the two other sturgeon species that are much less documented especially the Sakhalin sturgeon. To the knowledge of the referee, the Kaluga sturgeon which was (still is?) heavily exploited is not known to be the support of both farming and investigations efforts in contrast with the other sturgeon species inhabiting the basin, *Acipenser schrenckii* in China. The Amur River being a border line between two countries (China & Russia) makes difficult the common actions in favour of species exploitation and conservation. And this does not take into account the difficulties for the people living there, and then might not have care with species conservation. This remark is to highlight an extremely heavy driving motor for human facing survival conditions that are far from intellectual and supposed-scientifically-based analysis.

Comments on the extinction risk analysis

The intention of the authors in gathering in item 5, natural and human factors, is not clear. Human activity is so pregnant that we are founded to ask if Nature still exists at least in the present context. Second, the authors did not provide any key to rank the divers causes. Though, this might be a key potential (intellectually speaking) effect to better orient conservation-restoration actions (Williot *et al.*, 2002). Third, there is no mention of an eventual/potential interest of ex situ conservation. Fourth, the proposed analysis relies on that thinking establishing regulations would automatically solve the question. World Fisheries history is plenty of counterexamples. Fifth, interactions between the factors are not explicated and then, we are founded to wonder how this factor was effectively taken into account. Seventh, the proposed canvas is a static one that does not envisage the changes as well as the trends and or tendencies.

Some conclusions

Fisheries management, as well as conservation-preservation prognoses is a very complex issues. And also the uncertainties might be due to scientific failures, i.e. the non-recovery status of north–Eastern Atlantic cod population. This remark is to make convinced the authors of the present assessment of the very highly risky exercise. Therefore, scientists (I mean biologists) have to keep a modest attitude. The available references that based the present assessment do not fill the objective. Many remarks are provided by the referee.

Apart from the justification of the present analysis, there is a need for a prospective consideration in fisheries and fish species conservation analysis as well.

The figure 2 referred to as *A.sturio* is questionable. My feeling is the photo is likely an Adriatic sturgeon specimen.

Comments on the manuscript:

However, actions were carried out to avoid new occurrences [of bycatch in *A. sturio*] (Michelet N., 2011. Why, how and results from an awareness campaign within marine professional fishermen for the protection of large migratory fish, the European sturgeon *Acipenser sturio*. In: P. Williot et al (Eds): 489-498

Both species *A. sturio* and *A. oxyrinchus* were present in France from 3000 years BC (Desse-berset, 2009; Desse-Berset & Williot, 2011, Desse-Berset 2011)

References

- Castelnaud G, Rochard E, Jatteau P, Lepage M (1991). Données actuelles sur la biologie d'*Acipenser sturio* dans l'estuaire de la Gironde. In : Williot P (ed) *Acipenser*, Cemagref-publ, Antony, France, pp 251-275
- Chèvre P, Saint-Sevin J, Mercier D, Jacobs L, Williot P, 2011. Recent progress in larval rearing of European sturgeon *Acipenser sturio*. In: *Biology and Conservation of the European sturgeon Acipenser sturio* L. 1758. The reunion of the European and Atlantic sturgeons. Williot P, Rochard E, Desse-Berset N, Kirschbaum F, Gessner J (Eds), Springer, pp 449-453.
- Davail-Cuisset B, Rouault B, Williot P (2011) Estradiol, Testosterone, 11-Ketotestosterone, 17, 20 β dihydroxy-4-pregnen-3-one and vitellogenin plasma levels in females of captive European sturgeon. *J Appl. Ichthyol* 27: 666-672
- Deng Xin, Deng Zonglin and Cai Mingyan, 1991. Spawning population characteristics of *Acipenser sinensis* in Yangtze River just below Gezhouba dam. In : Williot P (ed) *Acipenser*, Cemagref-publ, Antony, France, pp 235-2242
- Deng Zhong-Ling and Xu Yungan Zhao Yan, 1991. Analysis on *Acipenser sinensis* spawning ground and spawning scales below Gezhouba hydro-electric dam by the means of examining the digestive contents of benthic fishes. In : Williot P (ed) *Acipenser*, Cemagref-publ, Antony, France, pp 243-250
- Desse-Berset N (2009) First archaeozoological identification of Atlantic sturgeon (*Acipenser oxyrinchus* Mitchill 1815) in France. *CR Palevol* 8: 717-724
- Desse-Berset N. and Williot P., (2011). Emerging questions from the discovery of the long term presence of *Acipenser oxyrinchus* in France. *Journal of Applied Ichthyology* 27: 263-268
- Holčík, J., Kinzelbach, R., Sokolov, L. I. & Vassilev, V. P. (1989). *Acipenser sturio* Linnaeus, 1758. In: Holčík J (ed) *The Freshwater Fishes of Europe*, Aula Verlag, Wiesbaden, pp 367-394
- Kirschbaum F, Ludwig A, Hensel E, Würtz S, Kloas W, Williot P, Tiedemann R, Arndt GM, Anders E, Norheim Hv, Gessner J (2004) Status of the project on protection and restoration of Atlantic sturgeon in Germany: Background, current situation, and perspectives. In: Gessner J & Ritterhoff J (eds), *Bundesamt für Naturschutz* 101: 36-53
- Kirschbaum F, Würtz S, Williot P, Tiedemann R, Arndt GM, Anders E, Bartel R, Gessner J (2006) Prerequisites for the restoration of Atlantic sturgeons, *Acipenser sturio* and *A. oxyrinchus*, in Germany – Report on the twelve-year preparatory period. *Verhandlungen der Gesellschaft für Ichthyologie*, 5: 79-93
- Lochet A., Lambert P., Lepage M. & Rochard E., 2004. Croissance de juvéniles d'esturgeons européens *Acipenser sturio* (Acipenseridae) sauvages et issus d'alevinage, durant leur séjour dans l'estuaire de la Gironde (France). *Cybium*, 28 : 91-98.

Magnin E., 1962. Recherche sur la systématique et la biologie des Acipenséridés *Acipenser sturio* L., *Acipenser oxyrinchus* Mitchill et *Acipenser fulvescens* Raf. Annales de la Station Centrale d'Hydrobiologie Appliquée, Tome 9, 7-242.

Rochard E. et Jatteau Ph. (1991) Amélioration de la méthode de détermination de l'âge de l'esturgeon commun, *Acipenser sturio* et premières applications. In : *Acipenser* (P. Williot Ed), Cemagref Publications, Antony, France : 193-208.

Rochard E. et Williot P., coord., 2006. Actions de recherches proposées pour contribuer au plan international de restauration de l'esturgeon européen *Acipenser sturio*. Etude Cemagref groupement cde Bordeaux n° 103, 51p.

Tiedemann R, Schneider A, Williot P, Kirschbaum F, 2011. Genetic variability of cultured European sturgeon. In: *Biology and Conservation of the European sturgeon Acipenser sturio* L. 1758. The reunion of the European and Atlantic sturgeons. Williot P, Rochard E, Desse-Berset N, Kirschbaum F, Gessner J (Eds), Springer, pp 455-464.

Trouvery M. Williot P., et Castelnaud G., 1984. Biologie et Ecologie d'*Acipenser sturio*. Etude de la pêcherie. *Cemagref, Etude n° 17, « Série Esturgeon n° 1 »*, 79 p.

Williot P and Kirschbaum F, 2011. The French-German cooperation: the key issue for the success of the preservation and restoration of the European sturgeon, *Acipenser sturio*, and its significance other sturgeon issues. In: *Biology and Conservation of the European sturgeon Acipenser sturio* L. 1758. The reunion of the European and Atlantic sturgeons. Williot P, Rochard E, Desse-Berset N, Kirschbaum F, Gessner J (Eds), Springer, pp 499-513.

Williot P, Rouault T, Brun R, Pelard M, Mercier D, Jacobs L, Kirschbaum F, 2011. Building a brood stock of *Acipenser sturio* in France. In: *Biology and Conservation of the European sturgeon Acipenser sturio* L. 1758. The reunion of the European and Atlantic sturgeons. Williot P, Rochard E, Desse-Berset N, Kirschbaum F, Gessner J (Eds), Springer, pp 425-438.

Williot P. & Rochard E. (coord), 2007. Biologie, exigences environnementales et éléments d'évaluation à priori du risque relatif à plusieurs espèces d'esturgeons susceptibles d'être élevées en pisciculture en France : phases 1 & 2. Etude Cemagref EPBx pour le Ministère de l'Environnement et du Développement Durable, 231p.

Williot P., Brun R., Rouault T., Pelard M. & Mercier D., 2005. Attempts at larval rearing of the endangered western European sturgeon, *Acipenser sturio* L. (ACIPENSERIDAE), in France. *Cybium*, **29**: 381-387.

Williot P., Rochard E., Kirschbaum F., 2009. Acceptability and prerequisites for the successful introduction of sturgeon species. In: *Biology, Conservation and Sustainable Development of sturgeons*. Carmona R., Domezain A., Garcia Gallego M., Hernando-Casal J., Rodriguez F., Ruiz Rejon M. Eds., pp.369-384 *Springer (Fish and Fisheries Series, 467p)*.

Williot P., Rochard E., Rouault T., Kirschbaum F., 2009. *Acipenser sturio* recovery research actions in France. In: Biology, Conservation and Sustainable Development of sturgeons. Carmona R., Domezain A., Garcia Gallego M., Hernando-Casal J., Rodriguez F., Ruiz Rejon M. Eds., pp. 247-263. *Springer (Fish and Fisheries Series, 467p)*.

Williot P., Rouault T., 2008. Basic management for spawning the cultured sturgeon, *Acipenser sturio* L., 1758, a critically endangered species. *Cybium* 32(2) suppl.: 334-335.

Williot P., Rouault T., Brun R., Pelard M. & Mercier D., 2002. Status of caught wild spawners and propagation of the endangered sturgeon *Acipenser sturio* in France: a synthesis. *International Review of Hydrobiology*, **87**: 515-524.

Williot P., Rouault T., Pelard M., Mercier D., Lepage M., Davail-Cuisset B., Kirschbaum F. & Ludwig A., 2007. Building a broodstock of the critically endangered sturgeon *Acipenser sturio* L.: problems associated with the adaptation of wild-caught fish to hatchery conditions. *Cybium*, **31**: 3-11.

Williot P., Rouault T., Rochard E., Castelnaud G., Lepage M., Gonthier P. & Elie P., 2004. French attempts to protect and restore *Acipenser sturio* in the Gironde: Status and perspectives, the research point of view. In: (J. Gessner & J. Ritterhoff, eds), *Bundesamt für Naturschutz*, **101**: 83-99.