



# Solutions and proposals for wild fish populations conservation and recovery, in Romanian fishery

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**Abstract.** In Romania, the main commercial fish species reported by the commercial fishermen were carp, sturgeon, catfish, shads, zander, pike, pontic shad and turbot. If at the beginning of the 20<sup>th</sup> century the quantities reported by commercial fishermen were on average 19,287 tonnes year<sup>-1</sup>, in the period 1990-2021 they reached at only 3,277 average tonnes year<sup>-1</sup>. The commercial catches of the main commercial fish species, *Cyprinus carpio*, decreased by almost 95%, from 6 thousand tonnes in 1909 to only 142 tonnes after a century. The main causes that have affected wild fish populations are overfishing, disruption of migration routes, destruction of spawning and feeding grounds, through the construction of dikes and dams. Practically, in the last century fish populations have been overexploited, creating an imbalance between total mortality and natural productivity, so that some species have been severely affected and others have even disappeared. In such a situation, where the fish stocks are rapidly declining, fisheries management must intervene with concrete measures to ensure a sustainable level of fishing mortality, by reducing fishing effort, wetland renaturation and by promoting a multiannual program for restocking and stock enhancement. First, the legal framework must be adapted as a basis for any repopulation or supportive action in natural waterbodies from Romania, to plan and coordinate in the short, medium and long term the multi-annual program for restocking and stock enhancement, in natural waterbodies.

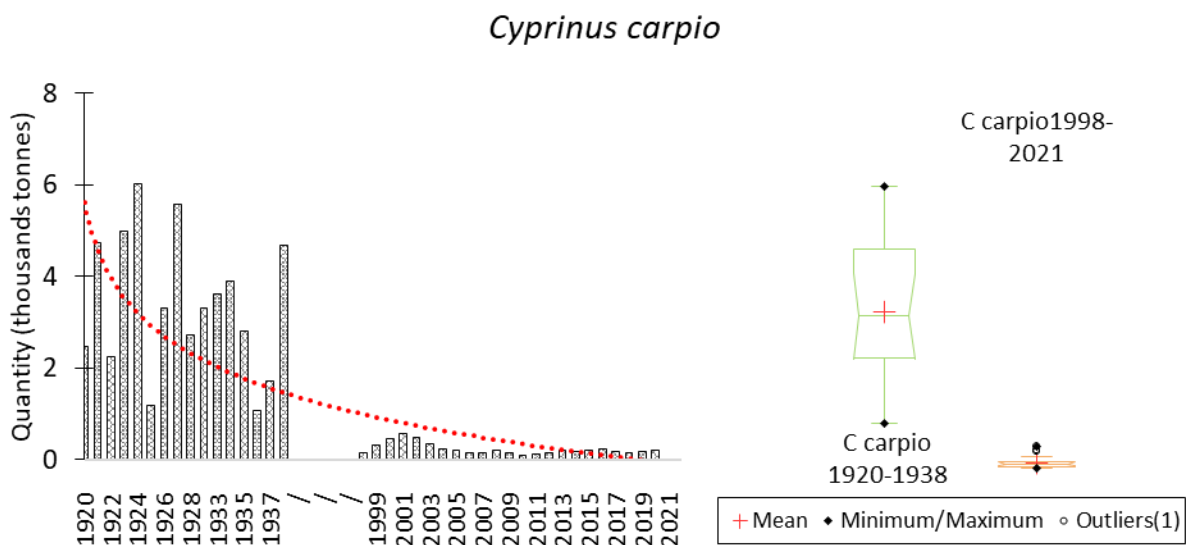
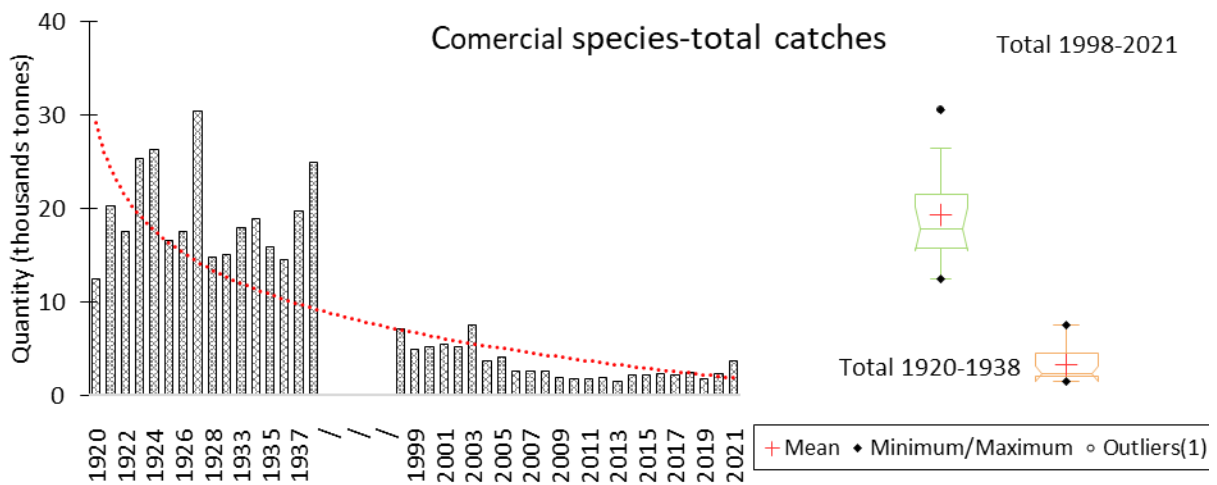
**Key Words:** Danube fish species, overfishing, poaching, restocking, recovery.

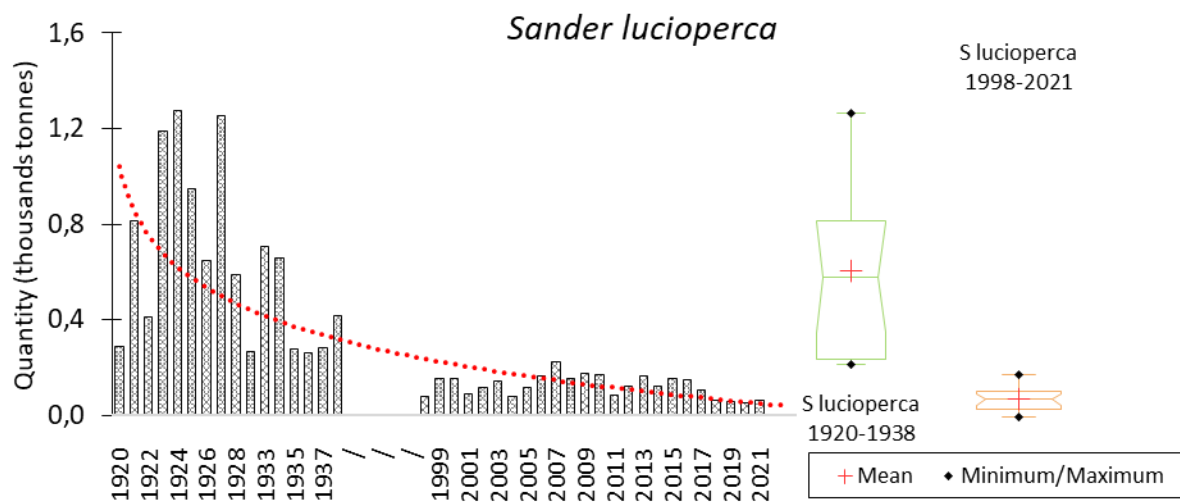
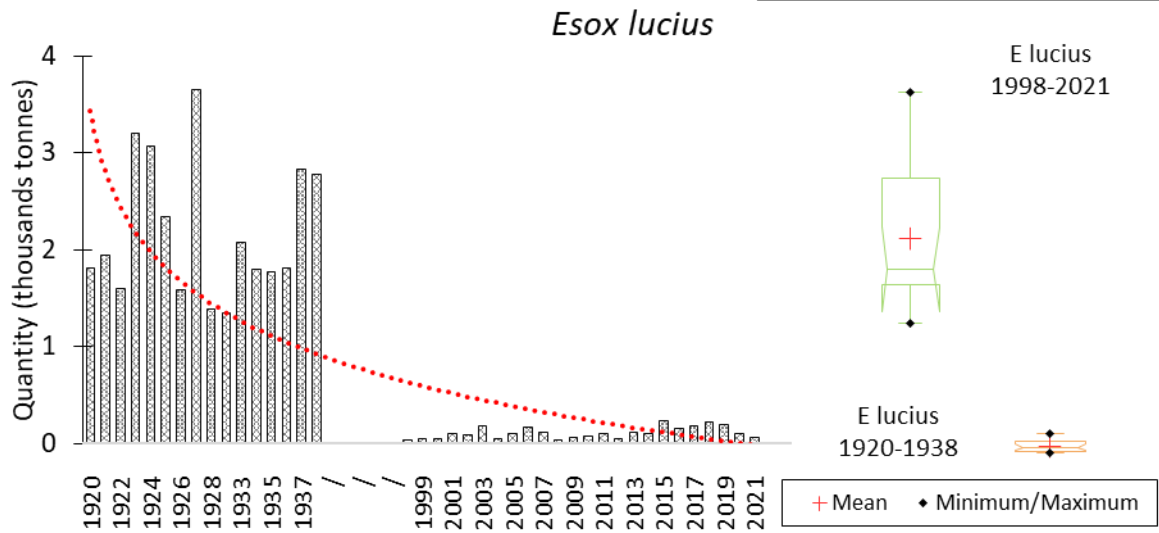
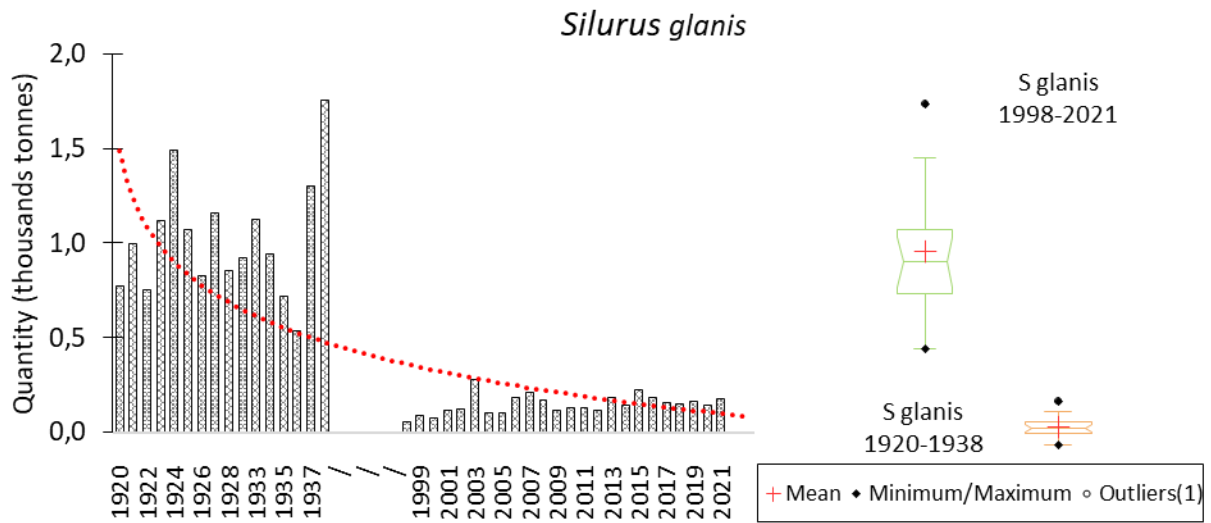
**Introduction.** In the last 100 years, aquatic ecosystems and species have suffered a constant deterioration and biodiversity has been affected by devastating anthropogenic measures and actions. For some species, like for example sturgeons, the disaster was more pronounced because of overfishing and poaching, being commercial species with high economic value (Ionescu 2019). In recent years, biodiversity has become a global priority, the habitats restoration and species conservation are an important component in the long-term strategy of the European Union. When we talk about aquatic biodiversity, we also include fishery resources which are neither infinite or indestructible. In an equilibrium population, increases in stock and biomass equal losses through natural mortality or fishing (Răzlog 2008). A manager's responsibility is to keep the population above a certain level that allows the species to self-sustain. High fishing mortality (overfishing and poaching), combined with the decrease of natural productivity (habitat loss), lead to a decrease of fish species population and implicitly to a reduction in genetic diversity, which affects the productive potential and decreases the power of reaction to environmental changes of a species (Răzlog 2008).

**Fish stocks data.** According to official data on catches from commercial fishing (Figure 1), but also from research carried out in recent years, fish stocks have decreased dramatically

in the last century (Daia 1926; Teodorescu 1927; Teodorescu 1928; Teodorescu 1929; Teodorescu 1931; Teodorescu 1932; Teodorescu 1933; Teodorescu 1935; Manuila 1937; Manuila 1939; Manuila 1940; A.R.B.D.D. 2022; A.N.P.A. 2022). For the total catches reported in the period 1998-2021, only the native species were used, eliminating non-native species (*Rapana venosa*, *Carassius gibelio* and Asian cyprinids) because in the period 1920-1938 were not found in Romanian waters. Average change in the abundance of monitored migratory freshwater fishes (anadromous, catadromous, amphidromous, diadromous or potamodromous) decreased between 1970 and 2016 in Europe with 93% (Heukelum 2020).

All species reported by commercial fisheries decreased in catches by 83% from 1920-1939 compared to 1998-2022. The main high value species had the same decreasing trend, *C. carpio* by 93%, from the average amount per year of 3,400 tonnes to only 232 tonnes, *Esox lucius* by 95%, from 2,186 tonnes to 108 tonnes/average/year. It is interesting for *Alosa immaculata* whose reported catches remained almost similar between the two periods.





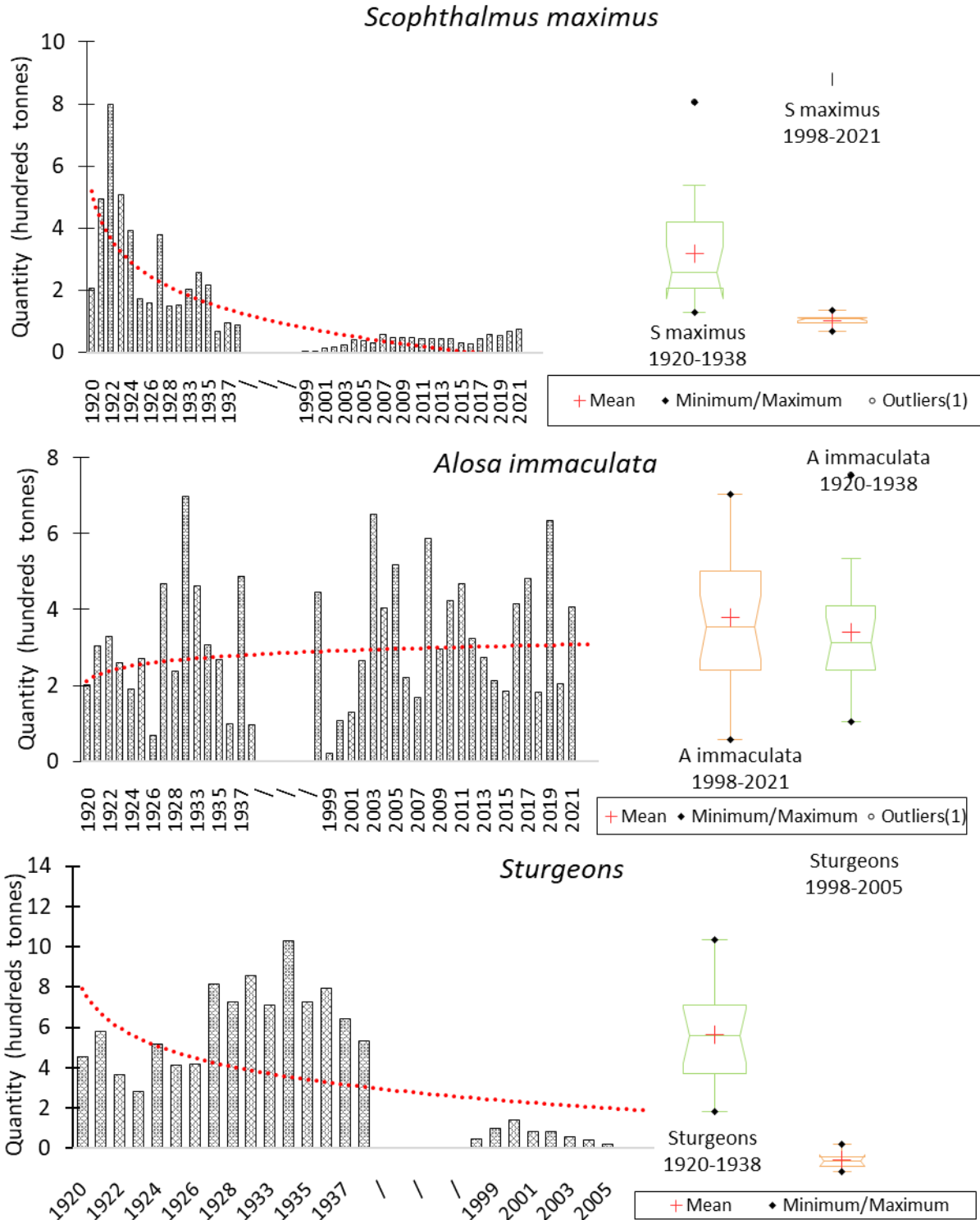


Figure 1. The dynamics of commercial catches of the main fish species, reported in Romania between 1920 and 2020 (Statistical brute data from Daia 1926; Teodorescu 1927; Teodorescu 1928; Teodorescu 1929; Teodorescu 1931; Teodorescu 1932; Teodorescu 1933; Teodorescu 1935; Manuila 1937; Manuila 1939; Manuila 1940; A.R.B.D.D. 2022; A.N.P.A. 2022).

Commercial fishing of Danube sturgeons was stopped in 2005 due to population decimation because the commercial catches decreased by 88%. But if we analyse the data since the beginning of the 20<sup>th</sup> century, when Antipa drew attention about the sturgeon decline (Antipa 1898), the decline is with 99.7% for *Acipenser guldenstaedtii* and 97% for *Huso huso*, comparing the commercial catches from 1909 with those from 2003-2004 (Ionescu 2019). When such a situation is identified, the fisheries management must intervene urgently and reduce fishing mortality by reducing fishing effort, but also increase natural productivity by restoring habitats and implementing restocking and stock enhancement programs. The issue of restocking and stock enhancement activities are extremely delicate things, because of the complexity of an anthropic intervention in natural waterbodies.

**Legislative considerations.** Due to the legislation gap and the financial situation, stoking programs were made without rules and without logic, in recent years. This model has been perpetuated in Romania and it has reached the point of large-scale non-native species introduction (*Carassius gibelio*, *Oncorhynchus mykiss* etc.). Practically through all these actions, a major imbalance was created in the qualitative structure of the ichthyofauna, and mostly of these species replacing the native species (e.g. *Carassius carassius*, *Salmo trutta fario*) or modified in the structure of food chain. The released fish must have the identical fitness (genetic, physiological, behavioural) in line with the natural population so that there is no risk of any outbreeding depression (Chebanov et al 2011). In the case of endangered species, the establishment of live gene banks is necessary (Ionescu 2020).

The protection of aquatic biodiversity is directly related to fishing and implicitly to the legislative regulations of this field. In 2021 a series of proposals were made to improve the fishing legislation, necessary for conservation and recovery of aquatic biodiversity. These changes want to restore the balance between the fisherman - habitats and aquatic resource, which materializes in a better protection of aquatic species and, implicitly, in the increase of the well-being of the traditional fishing communities. All this proposal has materialized in a new Fishing Law, a legislative initiative that aims to regulate fishing in Romania, registered at the Chamber of Deputies with no. Pls no. 548/2021 (Kocsis & Bola 2021).

The main proposals, both in the legislative draft and in the subsequent amendments, were: restoration by designating areas for aquatic renaturation, comprising the land areas that will be dedicated to renaturation, ensuring the multiple benefits and allocating the budget necessary for the renaturation (floodplain, fish pass); regulating of the fishing effort to better protect aquatic species by eliminating the overfishing; introducing strict rules for reporting catches, for commercial fisherman, anglers or fish traders; fisheries digitalization, development of IT tools for reporting, traceability and information related to fisheries; developing the necessary green infrastructure and transform fishing into a sustainable activity; creating green infrastructure for boats and exempting 50% of the taxes of fishermen who will use electric motors; inventory and tracking of fishing gear to reduce marine litter and ghost fishing nets, including actions to recover them from the sea; regulation of fish traceability and development of the SUMAP software (integrated fish mass tracking information system); mandatory reporting of commercial and recreational fish catches; sale of fish caught illegally will be considered theft; a clear list of protected species; increase the minimum landing size for certain fish species in order to facilitate the recovery of affected populations; defining, regulating and encouraging artisanal fishing; organizing traditional fish market and fish gastronomic points; development of an EX SITU facility for the conservation of Danube Sturgeons ("Live Gene Bank"); reducing the bycatches by mandatory reporting of protected species bycatch; regulation of fishing gear and fishing activity to reduce bycatches; regulation and stopping the illegal, unregulated

and unreported (IUU); protecting endangered species, especially sturgeon, by defining poaching and trafficking in these fish species as an aggravating act (imprisonment between 5 and 8 years and prohibition of fishing rights); redefining scientific fishing by strictly regulating this activity in order to stop the poaching activities covered by the scientific monitoring activity; the protection of aquatic habitats through the identification of spawning and feeding grounds for endangered species and their transformation in protected areas; protecting the sturgeon juvenile in the Black Sea, by increasing the mesh size of fishing nets from a maximum of 40 mm (as it is now) to 60 mm, and the establishment of protection zones; implementation of the traceability of sturgeons originating from aquaculture; reform of angling.

It is of main importance the regulation and implementation of the Multiannual Program for Restocking and Stock Enhancement for fish, in natural aquatic habitats. Implicitly its financing of at least 35% year<sup>-1</sup>, from the revenues collected, to the state budget, from the issuance of angling permits, from the amounts collected for commercial fishing practice and from the amounts obtained from the contracts for the use of living aquatic resources for angling practice. The programme shall include the evaluation of ichthyofauna from natural waterbodies, restocking and stock enhancement program, the monitoring and evaluation of restocking and stock enhancement actions, the development of the chain of hatcheries for endemic fish broodstock and raising awareness of the importance of aquatic biodiversity and the need for the protection of aquatic species. Because of the drastic decline in the numbers of wild spawners, the broodstock built in the hatchery must serve as prime sources of population replenishment in their previous natural range. Representative conservation species gene pools and intraspecific groups (spatial, seasonal) must be ensured in the established hatchery broodstock intended for release either to re-establish a fish species in its previous natural range or to replenish natural stocks that are at risk (Chebanov et al 2011).

The practice of releasing hatchery-reared fish into existing populations to augment fishing (stock enhancement) or restore depleted spawning biomass (restocking) has occurred around the world for decades with varying degrees of success. The underpinning concept is to produce and release fish into wild populations to increase their abundance, catch rates and/or fishery yields (Department of Fisheries 2013). Restocking or stock enhancement proposals must also be considered against factors such as: the potential ecological impacts on the wild component of the target stock, other stocks and the ecosystem; transfer of disease, pathogens and parasites; impacts on genetic diversity or fitness; and undesirable social outcomes (such as access conflicts). Successful restocking is more likely where there is evidence that overfishing or recruitment limitation cannot be overcome effectively by other fisheries management tools and limiting factors are understood (Department of Fisheries 2013). Fish release programs are an important tool in the management of fisheries, whether for commercial, recreational or conservation purposes (Cowx et al 2012). However, the threats posed by fish stock enhancement programs, especially introductions, are particularly insidious, therefore they must be carried out according to a coherent plan and to eliminate all possible threats.

For these reasons, the Multiannual Program for Restocking and Stock Enhancement that would eliminate all possible hazards and that would contribute to the aquatic biodiversity conservation and recovery was proposed.

### ***Multiannual program for restocking and stock enhancement.***

I.

I.1. This proposal is the legal basis for any restocking or stock enhancement in natural waterbodies from Romania, in order to plan and coordinate, in short, medium and long

- term, the multi-annual program of stoking and restocking with fish, in natural waterbodies;
- I.2. These provisions shall apply only to restocking and stock enhancement in natural waterbodies;
  - I.3. It is forbidden to release non-native fish species of natural waterbodies;
  - I.4. Aquaculture farms shall implement measures to avoid accidental discharges of aquatic species into natural waterbodies;
- II.
- II.1. Within a maximum of 90 days law approval, a Masterplan shall be drawn up at national level, regarding the Multiannual Program for Restocking and Stock Enhancement;
  - II.2. The Masterplan on the Multiannual Program for Restocking and Stock Enhancement shall include the multiannual management of restocking and stock enhancement programs, as well as the multiannual strategies for wild fish conservations, in natural waterbodies, in order to ensure aquatic biodiversity in accordance with national and international requirements;
  - II.3. The Multiannual Program for Restocking and Stock Enhancement program shall include 5 major objectives:
    - II.3.1. The multiannual strategy for monitoring of fish population status (abundance, spawning potential, catch trend, size/age composition etc.) in the in natural waterbodies, through specialized studies;
    - II.3.2. Framework methodology for restocking and stock enhancement programs in natural waterbodies;
    - II.3.3. The multiannual strategy for monitoring and evaluation of restocking and stock enhancement actions;
    - II.3.4. The short, medium, and long-term multiannual strategy for research, conservation or aquaculture units, which will be part of the chain of "live gene bank" hatcheries units,;
    - II.3.5. Raising awareness of the importance of aquatic biodiversity and the need to protect aquatic species;
  - II.4. The person responsible for the elaboration of the Masterplan is the fisheries management, in consultation with The Ministry of Environment, Water and Forests (MEWF), research and educational institutions, specialized companies, associations and non-governmental organizations, specialists from the field;
- III.
- III.1. The Masterplan on the Multiannual Program for Restocking and Stock Enhancement shall include the following fundamental aspects, for each of the major objectives, stipulated in II 3;
  - III.2. The multiannual strategy for monitoring fish population status (abundance, spawning potential, catch trend, size/age composition etc.) in the in natural waterbodies, through specialized studies, will be based on the following fundamental aspects:
    - III.2.1. The strategy will include the guideline of the multiannual fish monitoring and research programs for establish the abundance, spawning potential, catch trend, size/age composition of fish, from a particular aquatic habitat, to determine fish population status and the need to apply some release action;
    - III.2.2. The fisheries management will launch transparent competitions, through which he will select institutions, companies or organizations whose object of activity is monitoring, research and evaluation of fish population;
    - III.2.3. The fisheries management will establish the terms and conditions of institutions, companies or organizations selected for fish monitoring and research actions;

- III.2.4. Designated bodies will do the fish population status through scientific fishing and the data will be scientifically interpreted and statistically validated with specific methods;
- III.2.5. These studies must include also the degree and type of exploitation of fishes, the possible anthropic factors that have an impact of aquatic biodiversity;
- III.2.6. The fisheries management will draw up GIS maps with all the results of monitoring and research actions;
- III.2.7. The fisheries management will also encourage and support other actions for fish population status, financed from other sources;
- III.3. The framework methodology for restocking and stock enhancement with fish, in natural waterbodies shall be based on the following fundamental aspects:
  - III.3.1. The multi-annual strategy of restocking and stock enhancement activities, in natural waterbodies, will be elaborated by the fisheries management;
  - III.3.2. Restocking and stock enhancement shall not have a negative impact on the aquatic habitat or wild populations of the same or different species;
  - III.3.3. The fingerlings released in natural waterbodies, from the protected species, are obligatory to be tagged with individual tags (ex. PIT Tag or CWT), to be identifiable for monitoring and evaluation purposes;
  - III.3.4. A unique tagging system will be established and that can be changed in the context of technological development;
  - III.3.5. Restocking and stock enhancement shall not have a negative impact on the genetic biodiversity of the target species in natural waterbodies;
  - III.3.6. Restocking and stock enhancement must not affect existing wildlife in natural waterbodies, by accidental introduction, together with biological material, of pests, diseases and pathogens;
  - III.3.7. The fisheries management shall approve the restocking and stock enhancement actions and will ensure that the biological material, of the target species, which are the object of these actions, will comply with all the conditions included in the Master Plan;
  - III.3.8. The fisheries management shall elaborate and impose the conditions of approval for the entities that want to carry out repopulation or support population actions, in natural waterbodies;
  - III.3.9. The draft approval for stoking and restocking actions in natural waterbodies shall contain at least: target species, number of specimens, age, average size (length, weight), source of fish for release, genetical history, program and place of release, health certificate for biological material, the method of transport of fingerlings;
  - III.3.10. The fisheries management shall ensure the qualitative and quantitative structure of fingerlings for release purposes, is in accordance with the result of fish monitoring study;
  - III.3.11. There is no private ownership of fish released into natural waterbodies;
  - III.3.12. The fisheries management will make awareness and will inform the stakeholders, regarding the release action;
  - III.3.13. The fisheries management will draw up GIS maps, regarding all the details related to the release actions;
  - III.3.14. The restocking and stock enhancement actions must be transparent, the entities that will manage these activities will make the events public and will invite the interested parties to participate in the action
  - III.3.15. The extension of restocking and stock enhancement actions will take into account the recommendations of monitoring and evaluation studies;



- III.4. The multi-annual strategy for monitoring and evaluation of restocking and stock enhancement actions, will be based on the following fundamental aspects:
- III.4.1. The multi-annual strategy on monitoring and evaluation of restocking and stock enhancement actions will be elaborated, through specialized studies carried out in natural waterbodies, in order to monitoring and evaluate the stoked fish accommodation and development;
  - III.4.2. The fisheries management will launch transparent competitions, through which he will select institutions, companies or organizations whose object of activity is monitoring, research and evaluation of fish population;
  - III.4.3. The fisheries management will establish the terms and conditions of institutions, companies or organizations selected for monitoring and evaluation of release actions;
  - III.4.4. Designated bodies will do the monitoring and evaluation of release actions, through scientific fishing and the data will be scientifically interpreted and statistically validated with specific methods;
  - III.4.5. Within these studies will be analysed the impact of the restocking and stock enhancement actions on the aquatic biodiversity from natural waterbodies;
  - III.4.6. The monitoring and evaluation program may vary in time, depending of the improvement of the status of the target species;
  - III.4.7. The fisheries management will draw up GIS maps with all the results from for monitoring and evaluation of release actions;
  - III.4.8. The fisheries management will also encourage and support other monitoring and evaluation of release actions, financed from other sources;
- III.5. The short, medium, and long-term multiannual strategy for research, conservation or aquaculture units which will be part of the chain of "live gene bank" hatchery units, in order to provide fingerlings for restocking and stock enhancement programs, shall be based on the following fundamental aspects:
- III.5.1. The hatchery units or ex-situ facility, described in chapter VI, in the case of sturgeons, which will be part of the chain of units described above, may catch wild breeders for reproduction and forming broodstock, in order to provide fish for restocking and stock enhancement actions;
  - III.5.2. For protected fish species (e.g. sturgeons) it is prohibited to catch wild breeders for reproduction and forming broodstock, during spawning period or up-stream migration for reproduction;
  - III.5.3. Wild breeders, use for reproduction, will be released alive, back into the wild, within a maximum of one month after breeding;
  - III.5.4. Hatchery units, which will be part of the chain of units, aimed to build functional cultured broodstock that are maintained to meet long-term release objectives for either re-establishment, restocking or stock enhancement objectives, will carry out their activity on the basis of a special reproduction license, issued by the fisheries management;
  - III.5.5. The research, conservation or aquaculture units may be dedicated for broodstock management and reproduction, in order to ensure fish for restocking and stock enhancement, or partial and in this variant are necessary special conditions and distinct separation from the aquaculture activities;
  - III.5.6. The specific conditions that must be met, by the research, conservation or aquaculture units, that will be part of the chain of hatcheries units for broodstock management and reproduction, will be established by the fisheries management in a guideline;
  - III.5.7. The breeders, that will be used to obtain fingerlings for restocking and stock enhancement actions, must include different intrapopulation ecological forms to

- conserve the genetic and ecological structure of natural populations. Genotypes of broodstock specimens should accurately represent the genetic structure of the natural population and complete genetic characterization of all specimens before use;
- III.5.8. This must apply in all circumstances, unless there is a relevant reason why the breeders must come from a different area, for example the reintroduction of an extinct species or whose wild population does not allow the formation of a broodstock;
  - III.5.9. For restocking and stock enhancement actions, only F1 or F2 generations will be used, coming from the wild parents, selected for this purpose.
  - III.5.10. Each fish group should be marked by tags of corresponding series number and related information recorded and registered in the pedigree documentation;
  - III.5.11. The broodstock, used for restocking and stock enhancement activities, cannot be traded;
  - III.5.12. Under special conditions, hatchery units should operate collaboratively, sharing broodstock breeders, only with the approval of the fisheries management;
  - III.5.13. It will support build functional cultured broodstock for all protected fish species but also for species of high economic importance, that are subject to commercial, family and recreational fishing;
  - III.5.14. Optimal living conditions will be ensured for broodstock, as close as possible to those in the natural environment without anthropic stress factors (low stocking density, natural photoperiod, minimum ambient-factor influence, optimal hydrochemical parameters and water supply);
  - III.5.15. Must be ensured the genetic biodiversity of fingerlings selected for release into natural waterbodies;
  - III.5.16. The breeding scheme will include a sufficiently large number of breeders so as to ensure the genetic diversity of released fingerlings and development of optimal crossing protocols (mode of mating) to prevent inbreeding and outbreeding depression of populations;
  - III.5.17. The selection of the of fingerlings, released into natural waterbodies, as future breeders, should be avoided;
  - III.5.18. Health testing and certification shall be mandatory for all fingerlings, released into natural waterbodies;
  - III.5.19. The testing will be done on a representative sample of at least 10% of the specimens to be released;
  - III.5.20. The fish resulted from the broodstock, selected for restocking and stock enhancement programs, may be traded for aquaculture purposes, only with the approval of the fisheries management;
  - III.5.21. A database will be set up for all hatchery unit, which will include: rearing species, broodstock characterization, genetic profile of each breeder, cross-breeding scheme used etc.;
  - III.5.22. The fisheries management will draw up GIS with all details of the hatcheries unit;
- III.6. Raising awareness of the importance of aquatic natural habitats and aquatic biodiversity and the need of aquatic species conservation, will be based on the following fundamental aspects:
- III.6.1. The multi-annual strategy for the award of micro-grants, hereinafter referred to as BIODIVERS Grants, will be developed, with the main objective of raising awareness of the importance of protection of aquatic biodiversity, species and habitats;

- III.6.2. The fisheries management, in consultation with specialists from the field, will elaborate the guidelines for BIODIVERS grants;
- III.6.3. BIODIVERS grants may not exceed the amount of 10,000 Euro per grant and will have a 0 Euro co-financing;
- III.6.4. BIODIVERS grants are dedicated exclusively for students, from grades 1-12, and will be applied by schools or high schools, where students are enrolled;
- III.6.5. A maximum of 2 teachers will be included in the implementation team;
- III.6.6. The eligible activities, in accordance with the main objective of the grants, will be: specific creative activities (fine arts, theatre, film, music, digital technology, etc.), thematic competitions, awareness-raising activities, greening activities, development of specific IT applications;
- III.6.7. All BIODIVERS grants will include activities for raise awareness about the importance of protection of aquatic biodiversity, species and habitats;
- III.6.8. The eligible expenses for the implementation of micro-grants will be: materials specific to the project objectives, travel, daily allowances, promotion;
- III.6.9. The designated eligible projects will receive an advance payment of maximum 90% of the requested amount
- III.6.10. BIODIVERS grants will focus on the results obtained and on the social impact of the projects, the fiscal implementation rules will be simplified;
- III.6.11. The submission of funding applications and reports for BIODIVERS grants will be done exclusively electronically through a dedicated application managed by the fisheries management;
- III.6.12. At least one submission session will be organized per year for BIODIVERS grants;
- III.6.13. The fisheries management will manage the financing and implementation of the BIODIVERS grants;
- III.6.14. A commission for evaluating the applications will be set up, consisting of 5 persons, two persons appointed by the fisheries management and 3 specialists in the field;
- III.6.15. The Commission will also have the role of evaluating the results of each BIODIVERS grant;
- III.6.16. The specialists of the commission will be selected following a public procedure, based on specific competencies;
- III.6.17. The budget allocated for commission will not exceed 5% of the annual budget of BIODIVERS grants;
- III.6.18. The fisheries management will create a dedicated page for the submission of financing applications and project reports;

#### IV.

- IV.1. An annual budget for the Multiannual Program for Restocking and Stock Enhancement, the major objectives "II 3.1.", "II 3.2.", "II 3.3." and "II 3.4.", will be at least 25% / year from the revenues collected to the budget by the fisheries management, from the issuance of recreational fishing permits, from the amounts collected for the commercial fishing and from the amounts obtained from the contracts for the use of living aquatic resources for the recreational fishing;
- IV.2. The multiannual budget for the major objectives "II 3.1.", "II 3.2.", "II 3.3." and "II 3.4." will be broken down, for each major objective, in consultation with MEWF, research and training institutions, specialized companies and non-profit organizations, specialists in the field and will be included in the Masterplan.
- IV.3. An annual budget for the Multiannual Program for Restocking and Stock Enhancement, the major objective " II 3.5", of at least 5%/year from the revenues collected to the state budget, by the fisheries management, from the issuance of recreational fishing

- permits, from the amounts received for commercial fishing and from the amounts obtained from contracts for the use of living aquatic resources for recreational fishing;
- IV.4. The multiannual budget for all major objectives will be forecast by the fisheries management, in consultation with MEWF, research and training institutions, specialized companies and non-governmental organizations, specialists in the field and will be included in the Masterplan, it can be updated annually according to revenues; and the unspent budget will be allocated for the following year;
  - IV.5. The fisheries management will be allocated 5% of the revenues collected to the state budget, from the issuance of recreational fishing permits, from the amounts collected for the commercial fishing and from the amounts obtained from the contracts for the use of living aquatic resources for recreational fishing, to cover the administrative costs of the Multiannual Program for Restocking and Stock Enhancement;
  - IV.6. The fisheries management shall encourage and support all actions, which have as a source of funding other than that provided for in this regulation;
  - IV.7. The fisheries management must access other sources of funding (eg European funds) to supplement the annual budget for the Multiannual Program for Restocking and Stock Enhancement;

## V.

For native sturgeon species in the Danube and the Black Sea, the institutions in charge will take the necessary steps to establish international conventions with the Danube and Black Sea countries, to establish cross-border restocking and stock enhancement, monitoring and evaluation programs, in compliance with the rules described in this document;

## VI.

- VI.1. For the migratory fish species, of the order ACIPESERIFORMES, native in the Danube and the Black Sea, the International Station for Danube Sturgeon's Conservation and Migratory Fish Research, hereinafter referred to as the Station, will be established (Ionescu 2020);
- VI.2. The station will be a public institution of national interest, with legal personality and shall have as main objective the development of an EX SITU facility for the conservation of Danube Sturgeons ("Live Gene Bank"), unique at national level,
- VI.3. The station will have in objectives IN Situ and Ex Situ monitoring and researching programs, of migratory fish species from the Danube and the Black Sea;
- VI.4. The station will implement multi-annual sturgeons restocking and stoking actions as well monitoring, research and evaluation programs;
- VI.5. The station will be of national, regional and European strategic interest, in the context of native sturgeon species, is a common resource whose habitats are spread over several Danube and Black Sea countries;
- VI.6. The station will enter into partnerships with other Ex situ sturgeon conservation facilities to facilitate collaboration, exchange and transfer of knowledge, scientific data etc.;
- VI.7. The station will be managed by a director, supervised by a board and a scientific council made up of international recognized sturgeon experts;
- VI.8. The director of the station will be an expert in sturgeons, with internationally recognized specialized studies;
- VI.9. The station will establish partnerships with national and international institutions and organizations;
- VI.10. The development of the ex-situ facility will be done with European and national funding, in partnership with specialized institutions and organizations, national and international as well with international sturgeon experts;
- VI.11. The Ex-Situ Facility, within the International station for Danube Sturgeons Conservation and Migratory Fish Research, will be a dedicated construction for

sturgeons, which will provide living conditions similar to the natural environment both for rheophiles and migratory species (it will have access to both fresh and salt water supply), it will include a breeding station and breeding containers for their relocation along the Danube, in the historical spawning areas;

VI.12. The facility will operate on a 'Live Gene Bank' basis, in accordance with the Pan European Sturgeon Action Plan (WSCS & WWF 2018) and the recommendations of internationally recognized sturgeon experts (Chebanov et al 2011; GSC19 2019);

VI.13. Operating costs will be provided from national funds, projects with different sources of funding, as well as from the Multiannual Program for Restocking and Stock Enhancement;

VII.

VII.1. Restocking refers to the production and release of fish into wild population(s) where the species historically occurred naturally, to restore severely depleted spawning biomass to a level where it can once again provide regular yields or to restore self-sustaining populations in the wild. (Department of Fisheries 2013).

VII.2. Stock enhancement refers to the production and release of fish into wild population(s) where the species historically occurred naturally, in order to support existing wild populations to a optimal level of self-supporting (Department of Fisheries 2013);

VII.3. Ex-situ conservation facility - special hatchery unit for broodstock conservation operating as "live gene bank", design special to ensure fish species gene pools conservation, aimed for reproduction and growth of fry and fingerlings for restocking objectives

**Conclusions.** Long-term application of the restocking and stock enhancement multiannual program would make the fish populations from the lower Danube, the Danube Delta and the other inland waters from Romania to recover and reach a level of sustainability. Also, the fishery management would obtain valuable data on the state of the fish stocks, as well as on the efficiency of stocking actions. The fact that the program requires the establishment of ex-situ broodstock facilities will offer the possibility of genetic biodiversity conservation of the main fish species from Romanian natural waterbodies. And finally, the involvement of children in conservation and recovery activities of aquatic biodiversity would ensure the future for this domain.

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**Conflict of interest.** The authors declare no conflict of interest.

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