



Parosphromenus alfredi by Wentian Shi



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A NOTE FROM OUR CHAIRS

Dear FFSG members,

It is a real pleasure to share the second issue of the updated Freshwater Fish Specialist Group newsletter. There are some fascinating and informative articles in this issue – focussing on a range of species and geographical locations from around the world.

It is exciting and sobering to learn about the findings of the recent Red List Assessment in Türkiye – with more species being discovered and yet sadly, many more under threat. The immense value of Red List assessments is demonstrated by the conservation prioritisation that follows these workshops.

Yet we have so much more baseline information to learn and understand to help with making accurate assessments. The work in the Western Amazon region, barcoding the DNA of many new species, will help in years to come when surveys continue to monitor populations of these now little-studied species. The work shows that we need to build accurate and extensive libraries of DNA if we are to fully understand the fish communities in these species rich habitats and protect them in the future.

Key Fish Species Identification in Central Asian Mountain Rivers for the Environmental Impact Assessment of Intensified Hydropower

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Sustainability is a crucial part of the developments in small-scale hydropower (SHP) in Central Asia, particularly ecological sustainability. Ecological impacts of SHP on aquatic ecosystems are numerous, such as hampered aquatic animal migration, altered flow regimes (reduced flow, fast flow changes), changed river morphology (sediment retention, increased embeddedness), habitat fragmentation or changes in physical-chemical water quality parameters. Investigations were performed by the consortium of partners from Europe: BOKU (Austria), EVINBO (Belgium), Hydrosolutions (Switzerland) and SJE (Germany) in cooperation with the local partner TIIAME (Uzbekistan) in the demonstration sites Shakimardan at Koxsu River in Uzbekistan, and Atbashy close to Naryn City at Atbashy river in Kyrgyzstan with a focus on the mitigation of ecological impacts.

The mountains of Central Asia consist of two major mountain ranges: the Pamir and the Tien Shan with a total area of about 860,000 km² covered, including the two demonstration sites Shakimardan and Atbashy. Much of the high biodiversity and ecosystems close to natural conditions are found in remote mountain areas and have still to be better studied. Therefore, any human impact directed on the change of aquatic habitat in these ecosystems has to be thoroughly assessed before implementation.

During 2021-2023 the current status and diversity of the ichthyofauna of mountain and foothill sections of rivers that were selected for the development of sustainable small-scale hydropower were studied. To assess this integral component of river ecology a special focus has been laid on the related habitat conditions.

One of the crucial elements to achieve sustainable SHP is the identification of target aquatic key-species, This first step is of high importance for further activities aiming for the protection of wildlife biodiversity. Collected field data on fish diversity, taxonomy and ecology in more than 50 river catchments in Kyrgyzstan and Uzbekistan have allowed to identify for the first-time five main key fish species in upstream sections of Central Asian mountain rivers (see illustrations below):

1. Snowtrout – *Schizothorax eurystomus* (Kessler 1872);
2. Sewertsow rare-scaly osman – *Diptychus sewerzowi* (Kessler 1872);
3. *Triplophysa ferganaensis* (Sheraliev & Peng 2021);
4. Stone loach – *Triplophysa* sp.;
5. *Glyptosternon oschanini* (Herzenstein 1889).

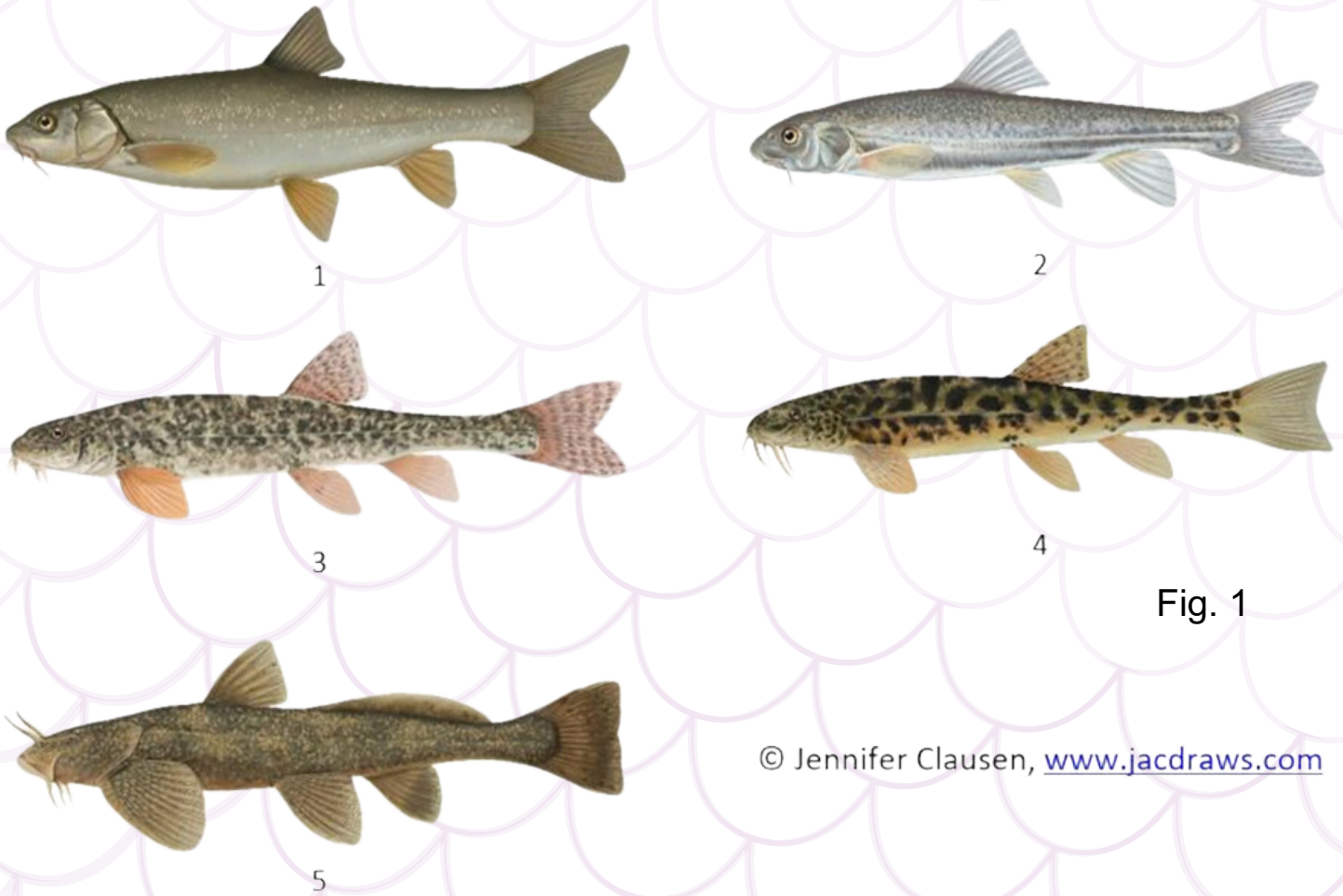


Fig. 1

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Figure 1. Central Asian fish species as target of SHP impact mitigation (in order of decreasing importance) (© Jennifer Clausen, www.jacdraws.com)

First findings have revealed that snow trout (*Schizothorax* sp.) species belong to the most important key fish species in Central Asia for the EIA of SHP and other human impacts. They are adapted to fast-flowing, high-sloped cold water mountain rivers. These fish, which reach up to 60 cm in length and 4 kg in weight, have a diet comprising algae, detritus, macroinvertebrates, and smaller fish. Their life cycle includes reaching sexual maturity at 3-4 years and a notable spawning period from April to September.

A habitat preference study of *Schizothorax eurystomus* in the Shakhimardan Basin performed by Hydro4U researchers using point electrofishing revealed that juvenile snow trout prefer shallow waters around 20-40 cm of depth, while sub-adults and adults favor deeper areas of >30 cm and >50 cm, respectively. All size classes showed a high plasticity for diverse flow velocities and inhabit various substrates, with juveniles showing a preference for mid-sized substrates. This research is significant as it expanded the known distribution range of *S. eurystomus* and provided baseline data for environmental flow assessments.

The information for the target species *S. eurystomus* has been used in Shakimardan for simulations with the habitat suitability model CASiMiR to find a seasonally adapted E-Flow providing fish habitats in adequate quality and availability when the HPP is diverting part of the natural flow. The existing weir will integrate a state-of-the-art fishway and a bypass installation that enables up- and downstream migration for snow trout.

In Atbashy the modernised irrigation weir, equipped with a shaft turbine, will also integrate upstream and downstream migration facilities. The attraction flow leading fish into the bypass channels and preventing them from entering the turbine inlet is being investigated using a newly developed module of CASiMiR to possibly optimize the inflow conditions. The findings from these studies, together with the results from the monitoring of the SHPs that go into operation during the project period will deliver information for the adaptive management as part of the Environmental Impact Assessment.

