Extract of the WePass Final Report

Section 9 "Achievements" incl. key results & messages for public information

FINAL REPORT

Reporting period:

23 November 2018 to 22 November 2021

PROJECT TITLE:

Study on environmental and ecological thematics in the framework of MRS and policy coordination with DG NEAR/ENV: Support for the Implementation of the Feasibility Study analysing options for fish migration at Iron Gate I & II (named *We Pass project*)

GRANT AGREEMENT N° 2018CE160AT019

PRIORITY AREA N° 4 *To restore and maintain the quality of waters*
PRIORITY AREA N° 6 *To preserve biodiversity, landscapes and the quality of air and soils*

Part I. Technical implementation report

A. Beneficiary

1. Name of the beneficiary

International Commission for the Protection of the Danube River (ICPDR)

2. Legal address

Street	VIC, Wagramer Strasse 5, D0412, PO BOX 500, 1400 Wien		
Postcode	1400	City	Vienna
Region	Vienna	Country	Austria
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Telephone	+43 1 260 60 5738	Fax	+43 1 260 60 5895

3. Legal representative *(person authorised to enter into legally binding commitment on behalf of the beneficiary)*

Family name *(Ms/Mr)*	Mr Zavadsky	First name	Ivan
Position/function	ICPDR Executive Secretary		

4. Person in charge of the project *(person to contact for questions on this report)*

Family name *(Ms/Mr)*	Ms Hödl	First name	Edith
Position/function	ICPDR Technical Expert - River Basin Management		
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5. Profile of the beneficiary

Legal status	☐ Private	X Public		
Type	☐ Non-profit	☐ NGO	☐ Public body at regional or local level	X other (International organisation)
Activity level	☐ Local	☐ Regional	☐ National	X European/International

6. Signature of the legal representative

I, the undersigned hereby certify that all information and financial data contained in this final report are full, real, accurately recorded and eligible in accordance with the grant agreement.

The beneficiary allows the European Commission to make available and use all data provided in this report for the purposes of managing and evaluating the Baltic Sea Strategy. All personal data collected for the purpose of this project shall be processed in accordance with Regulation (EC) N° 45/2001 of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data by the EU institutions and bodies.

Data subjects may, on written request, gain access to their personal data. They should address any questions regarding the processing of their personal data to the European Commission. Data subjects may lodge a complaint against the processing of their personal data with the European Data Protection Supervisor at any time.

Beneficiary

Name, stamp (if available): International Commission for the Protection of the Danube River (ICPDR)

Legal representative

Name in capital letters: Mr. IVAN ZAVADSKY

Place: Vienna Signature:

Date:

9. Achievements

The overall general objective of the We Pass project was to contribute to the implementation of the EU Strategy for the Danube Region (EUSDR) and its Priority Area 4, "To restore and maintain the quality of waters", and Priority Area 6, "To preserve biodiversity, landscapes and the quality of air and soils". The work in the We Pass project supported the implementation of the EU Water Framework Directive (WFD) in the Danube River Basin by means of activities undertaken by the International Commission for the Protection of the Danube River (ICPDR).

The specific objective of the project was the support for the implementation of activities identified in the Terms of Reference for the Feasibility Study analysing options for fish migration at Iron Gate I & II posing an obstacle for migratory fish, which was adopted by the ICPDR in December 2016.

Sturgeons represent a natural heritage of the Danube River Basin. Due to their sensitivity to environmental pressures, sturgeons are a key indicator and umbrella species of the ecological status of rivers and their environmental functionality. There are six species of sturgeons native in the Danube River Basin, but the survival of these ancient fish is threatened by a range of pressures. The ICPDR recognises that Danube sturgeons are “living fossils” representing a natural heritage of the Danube River Basin and endorsed Danube sturgeons as flagship species for the Danube River Basin to advance broad public awareness and political commitment for the Danube sturgeons and the ecosystem of the Danube River Basin as a whole. These facts are also embedded in the EUSDR Communication and the respective EUSDR Action Plan aiming “to secure viable populations of Danube sturgeon species and other indigenous fish species” by 2020 in the framework of macro-regional cooperation.

The Iron Gate Hydropower and Navigation System is one of the largest river engineering projects ever undertaken in Europe, built to provide cost effective and permanent utilization of available hydropower and to create adequate conditions for navigation along the Iron Gate stretch of the Danube. This system is built on the part of the Danube River shared by Serbia and Romania, and since 1963 jointly managed by the two countries, through the Joint Commission and its bodies, whose stakeholders should be included in this project.

Migratory fish, both anadromous such as sturgeon species and Danube shad, as well as freshwater species like Danube salmon, nase or barbel need to migrate up and down the Danube River in order to fulfil their life cycles. The EU Water Framework Directive provides legal requirements for the restoration of fish migration routes at both national and international levels to achieve the environmental objectives for European waters (Article 4 WFD on Environmental Objectives).

The EU Habitats Directive as well as the Bern Convention (see Sturgeon Action Plan, 2005) foster the protection and improvement of the sturgeon populations in the Danube River Basin. To secure viable populations of Danube sturgeon species and other indigenous fish species by 2020 is a specific target of the EU Danube Strategy (see also “Sturgeon 2020 - A Program for the protection and rehabilitation of Danube sturgeons”).

In principle, the project represented the preparatory project of a) a future in-depth migratory fish monitoring survey and b) the engineering, design, and construction process of fish migration solutions at the Iron Gate dams. In this regard tasks 2, 3 and 5 have achieved their objectives.

The ***key results and key messages*** of the project can be summarised as follows:

1. A comprehensive data base including a vast documentation of gathered and analysed data, information, maps, and documents was developed. The database includes the following data: hydrological data and analyses, hydropower plants and spillway operational data (IG I, IG II), legislation, including an analysis of current legislative framework in relevant ICPDR countries including multilateral environmental agreements, technical details of dams and surrounding infrastructure, geotechnical data, hydraulic data (flow patterns and flow velocity up- and downstream of the Iron Gate I& II) and data on the river morphology.

- A great number of data and information were collected from previous JCWI projects, Iron Gate I and II Hydro-information system (developed by JCWI), and IG HPNS.
- During the analyses of the gathered data, maps and documents, missing data for groundwater was identified within the project area. It was concluded that this has to be established during the next project stage (We Pass 2).
- With respect to the geotechnical maps, data and information are available only for the Serbian part of Iron Gate II.
- Topographic maps are available, while DTM is available only for the Serbian part, based on hydraulic model testing of Iron Gate 1 and Iron Gate 2 flow patterns and flow velocity up- and down

of dams. It was concluded that modelling data are not accurate for the existing flow and velocity patterns, due to various reasons, e.g., different purpose of model investigation, changed conditions, etc. To generate better and more accurate data on flow velocity, flow measurements at the selected cross sections were completed in November 2019 and crucial for a better understanding of the hydraulic conditions within the Iron Gate I and II area.

2. A literature Study with respect to Sturgeon migration behaviour was developed. The main aim of the study report was to summarize the experience on fish passage facilities designed for/used by sturgeon and the criteria for effective passage of sturgeon, to understand the constraints on passing sturgeons and other migratory species at the Iron Gate I and II dams that include both upstream and downstream migration, as well as to help in finding a viable solution for migratory fish passage at these dams. To support this aim, this report provides a brief survey on the efficiency of fish pass use by sturgeons in Russia, the USA and Canada in view of the lack of such experience in Europe. The survey of fish pass efficiency in Russia included all existing constructions, while the survey of fish pass in the USA and Canada was based on an extensive literature search and contacts with relevant experts, including almost all structures where the efficiency of fish passage was examined. The following key messages were concluded in the report:

- Although information on sturgeon passage across dams is still very scarce, examples documented in this report show that fish pass facilities are in general able to provide upstream passage for sturgeon species.
- In principle, different types of fish pass facilities, i.e., fish lifts, fish locks and conventional fish passes, are able to provide upstream passage for sturgeon species.
- In general, analysed fish locks are limited to small dams (head <5 m). Most analysed fish passes are also built at small weirs with some exceptions at large dams, while fish lifts can handle heads of >20 m.
- Regardless of the type of fish pass sturgeons use successfully, dimensions of facilities are much larger than those of other species.
- Efficiency varies considerably among case studies analysed and depends on a number of factors. Detailed case-specific knowledge on migratory behaviour at dam sites as well as current and bottom topography are required to design functioning fish pass facilities.
- As sturgeons mainly inhabit large rivers collection galleries are essential to guide fish to fish pass entrances. Entrances should be located at the parts of the river where sturgeon are expected to migrate and aggregate below the dam.
- There is consistent information that attraction flow velocity should be with the range of 0.8-1.4 m/s. Considering the dimensions of sturgeon fish pass facilities requirements for attraction and/or auxiliary flows go far beyond conventional fish passes.
- Analysed examples demonstrate that many sturgeon fish passes have been redesigned and/or adapted over time to increase efficiency. Therefore, options for adjusting key elements such as auxiliary flow, and improve flow patterns in the fish passage facilities should be implemented beforehand to enable adjustments during first years of operations. For construction elements that cannot be redesigned (slope, dimensions) it is recommended to plan for larger dimensions of the facility than for smaller. The case of beluga utilizing fish migration structures so that the fish avoid facilities that are too narrow/shallow and impair their navigation.
- For downstream migration, available information is limited and intensive research on this topic is necessary to fill this large knowledge gap as soon as possible. In few cases full-depth guidance structures leading to bypass channels on the dam have proven to be successful in protecting downstream migrant sturgeons.

3. As for the migration of fish monitoring, migratory fish was caught, tagged, and released below the Iron Gate 2 Dam which migrated up to the dam and were detected both on the Romanian and Serbian side in areas where water are released through the turbines. The result gives the first guide towards areas where entrances to fish passes can be located and found by upriver migrating fish. Also, fish caught below Iron Gate II and released into the lower part of the reservoir upriver Iron Gate II Dam migrated upriver, and in 2021 were recorded to move up to area just below the Iron Gate I Dam. This result demonstrates that migratory fish passing the Iron Gate II Dam in fish passes will continue the upriver migration and successfully negotiate the upriver movement through the entire reservoir created by the Iron Gate II Dam. In generally, it can be highlighted that a highly experienced team of experts from Romania, Serbia and Norway has been created, using acoustic tagging and tracking systems for the monitoring of upstream migration behaviour.

4. As for the survival rate of migratory fish passing through turbines, estimations were made for the first time at the IG II dam. One of the objectives of this project was to investigate the mortality rate of juveniles during and after turbine passage and thus to provide necessary data on the size at which it becomes critical to provide solutions for ensuring safe downstream migration. Initially, the tests were to be performed with fish released upstream of IG I equipped with inflatable pop-up tags. These tags were

developed by DDNI in the frame of the project and have been tested for performance prior to the initial trail planned on IG I. Unfortunately, the permission for the injection test was withdrawn by Hidroelectrica. In order to gain insight in the downstream migration and the effect of turbine passage on the fish, data on the release of the translocated fish that did not continue upstream migration at IG II were utilized. Despite the difficulty in accurately assessing the impact of turbine passage by migration data alone – a limitation further increased by the fact that only 38 fish were observed – the overall results of the trials with asp, barbel, nase, shad and vimba bream showed a high rate of obvious survival, reaching a level of almost 90%. The result further indicates that the critical size of fish seems to be species-dependent and was smaller in shad than in the other species. Furthermore, migration through turbines was the dominant route of migration, with some 85% of the fish using this pathway while only single individuals migrated through the ship locks. Based upon the initial observations, the follow up experiments in We Pass 2 will have to verify the results. Furthermore, the size of fish at which mortality increases in different species must be identified to determine the critical impact of turbine passage and the size limit up to which turbine passage can be permitted. Lastly, the results obtained at IG II will have to be repeated at IG I since the conditions of passage are more demanding there.

5. In conclusion of the International Expert Workshop in particular, consensus was reached that fish passes are technically feasible at the Iron Gate dams, in principle. Next, the site-specific application of suitable solutions and their technical elements need to be elaborated and their practicability assessed. The necessary subsequent activities and costs are described in the roadmap. The 3D-models developed will directly serve as a state-of-the-art data source for fishway preliminary design in the follow-on project We Pass 2 commissioned by the EC and can/will be supplemented with additional information/data during the further design and implementation process.

As for the communication activities, the project has created a memorable, dynamic, and long-lasting brand identity for the project, and formulated – and tested – some of the key messaging which will remain of use to any future phases. The communications activities increased in terms of reach as the project went on, and the fact that 53 attendees took part in the Final Conference (an impressive turnout for a technical project of this sort) demonstrates the success of this communications groundwork. Additionally, several key communications deliverables (website, animation video, name, identity, social media accounts, messaging) will be of direct use to the follow-up project ("We Pass 2").