Coalition Clean Baltic

REPORT

River Barriers to remove or mitigate in the Baltic Sea region

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actions to strengthen salmonid populations and other migrating species

Credit picture: canvaimages

April 2021

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I Abstract - summary

This report describes identified potential dams/barriers in Baltic Sea river systems in Russia, Estonian, Latvian, Lithuanian, Belarus and Poland to be removed/mitigated to support valuable native salmonid populations. Actions with the proposed dams/barriers would support implementation of the HELCOM BSAP decsions on salmonid protection from 2007 and later. The report also gives views on trends and development of policies and measures taken in Baltic Region countries on this topic, and also address the problems with beaver dams for salmonids. Proposal for policy and action measures are also presented.

II Foreword

CCB started in 2019 a Project ”Return salmonids to small Baltic Rivers”, with support from Baltic Sea Conservation Fund (BaltCF) and EC LIFE NGO-programme.

The goal is to launch restoration of Baltic salmonid populations in small Baltic Sea rivers, by collecting knowledge on migration barriers’ mitigation methods and cases, By means of identifying rivers with valuable wild salmonid populations (salmon and sea-trout) where barriers and dams limit spawning possibilities, proposals for mitigation and removal of dams and barriers will be presented. Such studies have been made in Estonia, Latvia, Lithuania, Belarus, Poland (mainly Pomeranian coast) and in Russian Gulf of Finland.

A draft version of the inventory of dams/barriers in Baltic Sea river systems has earlier been presented at the CCB website in 2020, including a map where dam objects were described.

Preliminary map “Potential Dam-barrier objects for removal to support wild salmonid populations in Baltic Sea Region rivers” | Coalition Clean Baltic (ccb.se)

Authors of the report

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III Introduction

Baltic salmon populations reproduce in at least 43 river systems of which at least 29 rivers hold an original salmon population or are partly mixed with other populations following stocking practices.

Baltic Sea drainage basin and its river systems contains approximately 1,000 sea trout populations of which about 500 reproduce naturally in Baltic rivers. 300 original sea-trout populations are in urgent need of recovery measures.

Many of these salmonids have problem because of bad river management, historically and in present times. Construction of dams and barriers, for hydropower, irrigation ponds, dams for

recreation and sportfishing etc, have prevented salmonids to migrate freely in rivers to reach their spawning areas. Nowadays many of these dams/barriers are obsolete and do not have any purpose or useage any longer. Such barriers should be removed, with priority when they stop migration of salmonids to upstreams spawning.

Small hydropower plants (HPPs) often constitute a problem for fish migration of salmonids. There are plenty of small HPPs in Baltic river systems, which depending on where in the river system these are located, can prevent fish migration to quite big areas of spawning bottoms/production areas. HPPs in the lower parts of a river systems is usually a bigger problem, as these can stop migration to most of the upstream river system. The value of the electricity produced by small HPPs can many times be less than the value of potential salmonid production upstream, with its potential for sportfishing development.

According to EU Water Framework Directive (WFD), for EU-countries river management, all rivers have to take action to restore biodiversity/connectivity/water quality and reach a Good Ecological Water Status. This is also relevant for Heavily Modified Water Bodies (HMWB), where the river ecosystems have been changed by constructions in water, e.g. via dams and barriers. Each case must be considered individually to seek best possible solution and take mitigation measures so the river ecosystem can function as natural as possible, e.g. for fish migration.

IV Hydropower and the effects on river ecosystems

Hydropower is a renewable climate friendly source for energy but with several negative, devastating effects on rivers and the freshwater ecosystems and could never be accepted as "green" without mitigation measures to reduce the negative effects on riverine ecosystems.

Water temperature in rivers will be raised with dams and sedimentation will change, which could cause erosion problems and new sedimentation problems.

Bottoms with gravel and stones will be covered with sediments that will cover important spawning and feeding grounds for fish.

The shores with vegetation adapted to changes of the water levels will change to more stable riparian forest with negative effects for the wildlife and flora.

The transport of nutrients and minerals downstream to the sea will change effecting not only the river as such but also the coast and the sea. For instance less silica will reach the sea but end up in dams instead which reduces the silica algae blooming in spring and leaving more nutrients for summer algae blooming.

Water living organisms up and downstream of dam will have a total different ecosystem as river connectivity is broken and flora and fauna will change.

Sustainable hydropower must have modern environmental time-limited (max years before renewed) permits, to make it possible to renew requirements for mitigation with up-to-date environmental standards.

Measures needed, if dam removal not is possible, are bypasses/adapted fishways/fauna-passages, and environmental flows. As all river systems are unique measures must be based on and adapted to local conditions.

V Criteria for national Ranking-priority proposals for barriers removal/mitigation

Within the project CCB has developed a "Ranking format for potential barriers/dams for removal/mitigation for selection of national priority barriers/dams" to be used in the selection process. National coordinators in the project have, after development of candidate dams/barriers, organised comments to the various dam-objects from stakeholders (fisheries-river management experts, sportfishing NGOs, municipalities, and other knowledgeable persons on this topic). Sometimes via a national meeting/seminar (e.g. Latvia) or via direct contacts to the stakeholder to receive national feed-back on the prepared list of dams/barriers. In this way the ranking will reflect a wider views and interests from concerned experts/citizens.

The ranking has been made in relation to eleven aspects, and the ranking scale has been 1-5. Ranking aspects have been of both "objective" and "subjective" characters. More "objective" characters have been:

1. Upstream the barrier/dam is relative good suitable spawning bottoms for salmonids, with an area size that will give relative good increase of smolt production and the waterflow upstreams is not regulated so potential spawing areas will become wetted so salmonid egg/fry can survive.

2. The river has salmonid presence downstreams the barrier/dam, preferably nearby the barrier/dam

3. Water quality is good enough for salmonid reproduction upstream the barrier/dam (no known pollution from industry, agriculture etc)

Other more "subjective" characters have been:

4. Barrier/dam owner is not against removal (or has a positive interest for removal) (If no owner: set point 3, or higher if so evaluated)

5. Barrier/dam owner has a positive interest for other mitigation measures than removal (if no owner set point 3, or higher if so evaluated)

6. Physical removal of the barrier is not very complicated

7. Support for removal/mitigation measures from administrations (Municipality, County / regional level, ministry)

8. Support or positive engagement for removal/mitigation measures from the local residents

9. The barrier/dam is not classified as a valuable cultural-historical object. Barrier of low interest for cultural-historical values.

10. The permit process for removal/mitigation measures is easy (estimated to 1 year: 5 points; estimated to 2 years: 4 points; estimated to 3 years: 3 points; (and so on))

11. Financial support for removal/mitigation measures can be available via national funding, incl. EU financial resources

VI Conflict solving of Cultural interests/considerations and local compensation for dam removals

Dams and barriers can sometimes have a very old history, where the reminiscences of old constructions can have a historical-cultural value.

To keep cultural dam structures you should of course only remove as much of the old construction that is necessary, to reach a sufficient fish up-and down-migration. An opening in a barrier, big enough as an effective fauna passage, which most times can be a good solution to avoid conflicts. But sometimes if you remove a part of a dam structure, the support structure for the historical part will dissapear, and would then threaten the cultural values. In such case you need to find a solution that support as well an effective fauna-passage as the preservation of cultural-historical values. Eventual cultural value of a dam pond cannot be solved in such cases.

In some cases the conflict with contradictory cultural-environmental interests has been considered in a legal process, in accordance with environmental legislation. In Sweden in 2021 the Environmental Court decided that an old dam and corresponding pond, with a 500-year history (classified as National cultural interest), shall be removed because the environmental values for migration of trout and freshwater pearl mussle upstreams were ranked higher than the dam historical interests (Järle mill, Nora municipality).

Dams that create a pond may have been used by local residents for swimming and recreation, e.g. sport-fishing. In such cases you may need at removal a compensation measure for mitigation, e.g. to construct a swimming-pool on land nearby the dam pond, or with an excavation, to provide a new pond in the new riverbed after removal.

VII Financing of Dam removals – views on potential sources and recommendations

The best example in BSR where EU Cohesion Funds have been used for dam removal can be found in Estonia. In lower part of Pärnu river a 150 m wide and 4,5 m high dam was constructed in 1975, which prevented upstream migration of salmon, seatrout, vimba etc. In 2019 the dam was removed in a big project with a total budget of 15 million Euro, where 85% was paid via EU Cohesion Funds and the rest via Estonian state budget. Pärnu river, that drains 20% of the Estonian territory, opened the main stream with another 100 km, and reached 144 km length.

Estonia has had a very cleaver policy how to use EU Cohesion Funds for infrastructure projects. A dam removal in the size of Sindi dam with a total budget of 15 mill Euro, would probably never happened, if only national budget resources would be used. Other EU BSR-countries should learn from Estonia, and apply a national policy so dam removals can become a high priority for the usage of EU Cohesion Fund. Lithuania has also decided to use Cohesion Funds for dam removals/mitigation.

Financing for dam removal/mitigation could also be supported by various financing sources. Some private funds, rich sportfishing interested persons, Environmental & Narure Conservation Funds and e.g. EU LIFE funds. For smaller project "Crowd-financing" (collection of private contribution via social media) can be a way forward to finance removel of barriers. In Lithuania an old weir barrier, in a tributary to Neris river, was succesfully removed with crowd-financing in 2020.

VIII Beaver dams - Management of "Natural" migration obstacles

Text developed by Andris Urtans, Latvia

Each Baltic Sea Region Country has historically and legally developed approach to solve or mitigate migration barrier problem. During the Project assessment of man made dams, issue of beaver dams and their impact were identified. According to literature Beaver dam as a structure beside positive features as water storage during low water conditions, display as well adverse impacts interrupting river connectivity and halting aquatic invertebrate and fish migration, promoting water warming and bottom siltation[1]. The last ones are crucial due to negative effect in short time period, as beaver enters the stream stretch suitable as well for salmonid migration or spawning. And, followingly stopping or even destroying given rhitral (fast flowing) stream stretch as native habitat for large number of oxygen sensitive invertebrates that avoid silty bottoms. Finally in short time period turning Salmonid stream into an ordinary Cyprinid one.

The analysis of earlier studies allows to state that in last decades the Eurasian beaver population grew by approximately 17%. The largest populations, which had a minimum of 100,000 individuals each, were observed in the European parts of Russia, Sweden, Poland and Latvia[2]. Considerable populations of beaver are also present in Estonia, Lithuania and Belarus.

Notwithstanding the fact, that Beaver dams/ponds can have positive impact on river ecosystem, like recharging groundwater, which keeps streams running when rain and snowmelt are scarce and spreading water across the floodplain so it can grow more green plants that feed terrestrial wildlife.

Salmon and trout have some adaption and can sometimes jump over or swim around beaver dams, depending on e.g. dam height. In return for the extra effort navigating upstream past

[1] Majerova M. etall. 2020. Beaver dam influences on streamflow hydraulic properties and thermal regimes. https://doi.org/10.1016/j.scitotenv.2019.134853;
[2] Wrobel M. 2020. Population of Eurasian beaver (*Castor fiber*) in Europe. https://doi.org/10.1016/j.gecco.2020.e01046;

dammed waterways, native fish benefited from the bountiful food and shelter created by beaver ponds. Dams can also create and add complexity to stream habitats, giving fish more places to hide, rest, or spawn.

In literature sometimes is mentioned measures to support salmonids to jump/slip over beaver dams, and avoid the fish to get trapped at the beaver dam construction. The measure to cover some strech of the beaver dam with canvas cloth, where salmonids are likely to try to jump over the dam. The effectiveness of such measures are unclear.

Beaver as a problem for Salmonid population status is already mentioned in ICES Baltic region related working documents[3].

The given problem is identified as well in other Baltic Sea Region countries. "Nature Inventory" Project in Latvia, in 2019 stated that from observed 500 m long river sections in 976 rivers corresponding to a habitat of EU importance to reach Good Ecological Water Status, 472 river sections or 48% displayed beaver activity[4]. Information from Estonia states 18000 beavers with 4000–7000 beaver dams and need to remove 500-700 of them for fish needs[5]. In Estonia, beaver activity at the current level is considered a factor influencing the deterioration of water quality as well in accordance with goals of the Water Framework Directive. A watercourse is considered hydromorphologically heavily affected, if there is on average one beaver dam per a 2 km long reach in fast flowing rivers, and very heavily affected, if the density of beaver dams is one dam per kilometre. Slow rivers are considered heavily affected, if there are one or more beaver dams per 1 km long river reach[6].The same criteria are proposed to follow in Latvia[7].

There is no joint European plan or guidelines for management of Beaver population. To deal with Beaver as a problem in forestry, a Toolbox Beaver is elaborated[8]. Unfortunately, given Toolbox already mentioning valuable migratory fishes, do not score high rates for in-stream migratory and connectivity criteria, because it was mainly developed for beaver-forestry conflicts.

According to previous trend we may assume that the Eurasian beaver population in the Baltic Sea Region Area will continue to grow in the future, creating additional number of

[3] Report of the Workshop on Sea Trout (WKTRUTTA) 12–14. November 2013, ICES Headquarters, Copenhagen, Denmark (see p.48);
https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/SSGEF/2013/WKTRUTTA2013.pdf

[4] Vizule-Kahovska L. 2019. Presentation on habitat inventory in Latvia ("Nature count");

[5] Järvekülg R. 2020. Opening of fish migration routes. Estonian experience. https://wbwb.eu/wp-content/uploads/2020/03/opening-of-fish-migration-routes.-estonian-experience..pdf

[6] Jarvet A. 2014.Morphological assessment of the quality of running water bodies for water management planning . Tartu University;

[7] Urtāns A. V. (ed.) Protected Habitat Management. Guidelines for Latvia. Volume 2 Rivers and Lakes. (see p. 140-141).

https://nat-programme.daba.gov.lv/public/eng/documents_and_publications/

[8] Toolbox Beaver https://www.skogsstyrelsen.se/en/wambaf/beaver-dams/

unsurpassable obstacles for salmonids and shall increase breaks in general connectivity as such.

Having in mind Sea trout preferences for smaller streams, our project promote “low hanging fruit” approach in further activities in the Baltic Region – undertaking beaver dam management in Salmonid rivers, involving various stakeholders (land and forest owners, angler and hunter associations, NGOs and single individuals). Promoted activities should include various activities, such as:

(a) Identify and list river basins/tributaries of special importance for salmon, sea-trout and grayling where beaver dams can be a threat to endangered/threatened/native salmonid stocks of high value,

(b) temporary beaver dam opening at least during Sea trout migration period,

(c) removal of beavers from salmonid stream stretches, or compensating their populations in Cyprinid streams. River stretches, where beaver dams are recommended to be removed, should be documented and marked on maps. Administrations implementing current WFD River District Management Plans should also allocate resources for actions/programmes to remove beaver dams, with start in river basins with salmonid populations of high value.

Release of beaver dam.
Clean-up of Kurlinupe river on July 31, 2020 by removing beaver dam to improve the condition of freshwater and its species and freeing up fish migration routes. Sea trout have been seen several times, looking for spawning grounds in the river. The little river is located in the northern part of Latvia and flows directly into the Gulf of Riga at coordinates 57.5735345, 24.3652403.

IX HELCOM decisions on protection of Baltic Sea salmonids

When BSAP was adopted in 2007 Baltic ministers agreed to develop

- the classification and inventorying of rivers with historic and existing migratory fish species (e.g. salmon, eel, sea trout and sturgeon), no later than by 2012;

- the development of restoration plans (including restoration of spawning sites and migration routes) in suitable rivers to reinstate migratory fish species, by 2010;

- the active conservation of at least ten endangered/threatened wild salmon river populations in the Baltic Sea region as well as the reintroduction of native Baltic Sea salmon in at least four potential salmon rivers, by 2009

These were the most concrete actions for fish biodiversity in BSAP.

Inventory and classification of Baltic region salmonid rivers were implemtented until 2011 with a very good comprehensive report (SALAR project), but the active conservation of at least ten endangered/threatened wild salmon river populations in the Baltic Sea region as well as the reintroduction of native Baltic Sea salmon in at least four potential salmon rivers, and development of restoration plans (including restoration of spawning sites and migration routes) have never been implemented/reported in a comprehensive way to HELCOM.

Helcom Recommendation 32-33/1, June 2011: CONSERVATION OF BALTIC SALMON (SALMO SALAR) AND SEA TROUT (SALMO TRUTTA) POPULATIONS BY THE RESTORATION OF THEIR RIVER HABITATS AND MANAGEMENT OF RIVER FISHERIES, spells

”To make assessments of man-made migration hindrances for salmon or sea trout. The assessments should be made for the historical distribution areas of salmon and sea trout in the river systems and cover the feasibility of removing the hindrances, providing fishways and/or transporting fish over them or of enhancing the functioning of current fishways. Passage through the rivers for salmon and sea trout should be provided where the results of the assessment justifies it”

HELCOM ministerial declaration 2013 decided and reads:

WE AGREE to prioritise and intensify implementation of HELCOM BSAP (2007) conservation goals for the Baltic salmon and sea trout to be met by 2015, based on HELCOM Recommendation 32-33/1 “Conservation of Baltic Salmon (Salmo salar) and Sea Trout (Salmo trutta) populations by the restoration of their river habitats and management of river fisheries”

The implementation of Helcom decisions are still halting.

X Recommendations for coming actions for Baltic salmonid protection and migration hindrances for Baltic salmonids

Each Baltic region country with wild salmon rivers should develop restoration plans for active conservation of salmon populations in relation to at least its proportion of wild salmon rivers. Safeguarding of wild salmon rivers, in each Baltic country with salmon rivers, will also support and secure the genetic biodiversity of the wild Baltic salmonids.

Reintroduction of native Baltic salmon in potential salmon rivers would be most appropriate to implement in countries with former wild salmon rivers or with very few wild salmon rivers, such as Denmark (most appropriate Gudenå, with support of native stock from west-coast

Sweden), Poland (most appropriate in Pomeranian rivers) and in Finland (Finland keep some wild Baltic salmon strains in hatcheries).

Proposals for new actions for the updated BSAP:

- the development of restoration plans (including restoration of spawning sites and migration routes) for the active conservation of endangered/threatened wild salmon river populations in Finland (1 river); Russia (1 river); Estonia (2 rivers); Latvia (3 rivers); Lithuania (1 river) and Sweden (4 rivers), with implementation start of actions by 2022.

-the development of restoration plans (including restoration of spawning sites and migration routes) for reintroduction of native salmon in appropriate rivers in Denmark (1 river); Poland (2 rivers) and Finland (1 river), with implementation start of actions by 2022.

Dams and barriers are a major problem for salmonid populations (salmon and sea trout) to thrive. Removal/mitigation of barriers are fundamental to restore Baltic river systems and to reach Good Ecological Water status and biodiversity goals in accordance with WFD. The Baltic Sea contains approximately 45 wild salmon populations and 1000 sea trout populations of which about 500 reproduce naturally in Baltic rivers (these populations do not include resident populations of brown trout). A programme for dam removal/mitigation should be introduced in all Baltic Sea Region countries to support native salmonid population and other aquatic fauna, and make priorities for native salmonid rivers with good potential for production upstream migration barriers.

- identification of at least three dams for removal/mitigation in native salmonid rivers in each Baltic Sea Region country, with its practical implementation start of action by 2022

XI Summary of the National reports on Potential Dam-barrier objects for removal/mitigation to support wild salmonid populations

Russian National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Summary of proposed dams/barriers for removal in Russia (Gulf of Finland area)

Leningrad region has a lot of dams of former and obsolete small hydropower stations, that were built in most cases by Finland on its former territory of Karelia . These dams are located on the rivers with trout and salmon populations. Atlantic salmon occurs occasionally, beacause main wild populations inhabit large rivers, such as Neva, Luga and Narva. But small rivers flowing to the Baltic Sea still have suitable spawning and nursery areas for Atlantic salmon and trout and also carry the barries for fish migration. Three small salmonid rivers have in this study been prioritised for barriers removal: river Seleznevka, river Buslovka, river Tarhanovka/Velikaya.

National criteria and arguments for Ranking-priorities proposals to remove/mitigate barriers

1. Positive interest to remove the barrier from regional government (if the hydrological construction is dangerous for people or can cause flooding)

2. Occurrence of Atlantic salmon downstream the barrier

3. Occurrence of Sea trout downstream the barrier

4. Availability of appropriate spawning sites for salmonid fish upstream the barrier

5. Availability of permissions or possibility to get permissions for barrier removal from Russian federal and regional authorities

6. Absence of strong interest of local residents for saving the dam for such purposes, as passage, recreation, tourism, cultural/historical object

Process of dam removal in Russia (Leningrad region):

Leningrad region has no experience in removal of dams and building fish ladders to provide migration ways for salmonid fish. Old dams in Leningrad region are removed by the regional government in frame of programme "Development of the Water Management Complex", the main activity "Ensuring the safety of hydraulic structures". Removal of dams occurs when a dam is considered dangerous for people and can cause flooding.

Firstly, the owner of the dam should be recognized and agreed to remove the dam. Then few documents should be prepared: Agreement for water usage, Expertise of necessity of removal, Technical Permit (Project of removal by certified hydrological organisation), Environmental impact assessment (EIA), and negotiated with authorities: Fishery Agency, local and regional administration, Neva-Lagoda water basin management, Committee of Natural Resources of Leningrad region. Removal project should be included to the Regional Programme of ameliorative works before the year of removal works. When the dam is managed by authorities, then tender procedure should be implemented for each step of works that elongate process of removal for many years.

The administrative process to get permits for dam removals is quite complicated and demanding. There is examples, where funding is available for the decommisioning of dam barriers, that prevent migration of salmonids, but no funding is available for the permit administrative process.

It would be very helpful if Russian administration could find a more simple process to get permits for dam removal in cases where stakeholders involved support a removal and no strong conflicting interests exist.

Proposals for top priorities barriers removal in Russia (Leningrad region):

Name of barrier/dam object: Obsolete dam of small hydropower plant of paper mill on the river Seleznevka in settlement Kravtsovo.

Localisation/place: settlement Kravtsovo, Vyborg district of Leningrad region (Northern coast of the Gulf of Finland). Coordinates: 60.775186783077, 28.5533614345901

Satellite image of the dam (Image © 2012 DigitalGlobe, Inc. © ООО ИТЦ «СКАНЭКС» © GeoEye, Inc)

Hydraulic head/height of dam: Height of dam – 2m, length – 35 m, width – 6 m.

Suitable spawning conditions down and upstream the the dam: Spawning areas upstream – 4 rapids in Russia and 5 rapids in Finland.1 rapid right downstream the dam with length 70 m and area 1200 m2.

*Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea):*there is no upstream barrier in the river, 46 km to the river's source; length to the Baltic Sea (Vyborg bay) – 7 km.

Observation of Salmonids down- and upstreams barrier today: Atlantic salmon was met in the river Seleznevka in the in 2004-2006 with mean densities from 0.4 till 1.3 ind/100m2. Later individuals of Atlantic salmon were not observed in the river.

Mean density of sea trout 5 ind/100m2. Population size of sea trout in the river less than 1000 ind. Salmonids were caught below the upper dam in settlement Kravtsovo in the river. In 2013

water flood destroyed flow regulating valve in Kravtsovo dam, but salmonids were not observed upstream the dams afterwards.

Other info: The dam is not a serious obstacle for salmonid fish migration nowadays, but there is necessary to remove all constructions for safety reasons (it's dangerous for people and can cause flooding) and for improving water quality. The valves in the dam can be blocked with river litter and logs. Regional authority included the dam into the Plan of removal, and is planning to prepare project of removal and get the permission. But necessity to remove living building make the process expensive and long-termed.

Name of barrier/dam object: Dam of former small hydropower plant (Kalininskaya HPP) on the river Seleznevka

Localisation/place: settlement Seleznevo, Vyborg district of Leningrad region (Northern coast of the Gulf of Finland). Coordinates: 60.75856974, 28.62043662

Hydraulic head/height of dam: Height of the dam – 1.5 m, length – 33 m, width – 5,5 m. 1.5 m difference between upper and lower points.

Suitable spawning conditions down and upstream the the dam: Total area of suitable spawning habitats (m2 or ha) up to next migration barrier - there are 3 rapids upstream up to the next migration barrier and total area of suitable spawning areas about 1 ha. Spawning areas downstream the barrier (m2 or ha) – 1 rapid right before the dam with length 70 m and area 1200 m2.

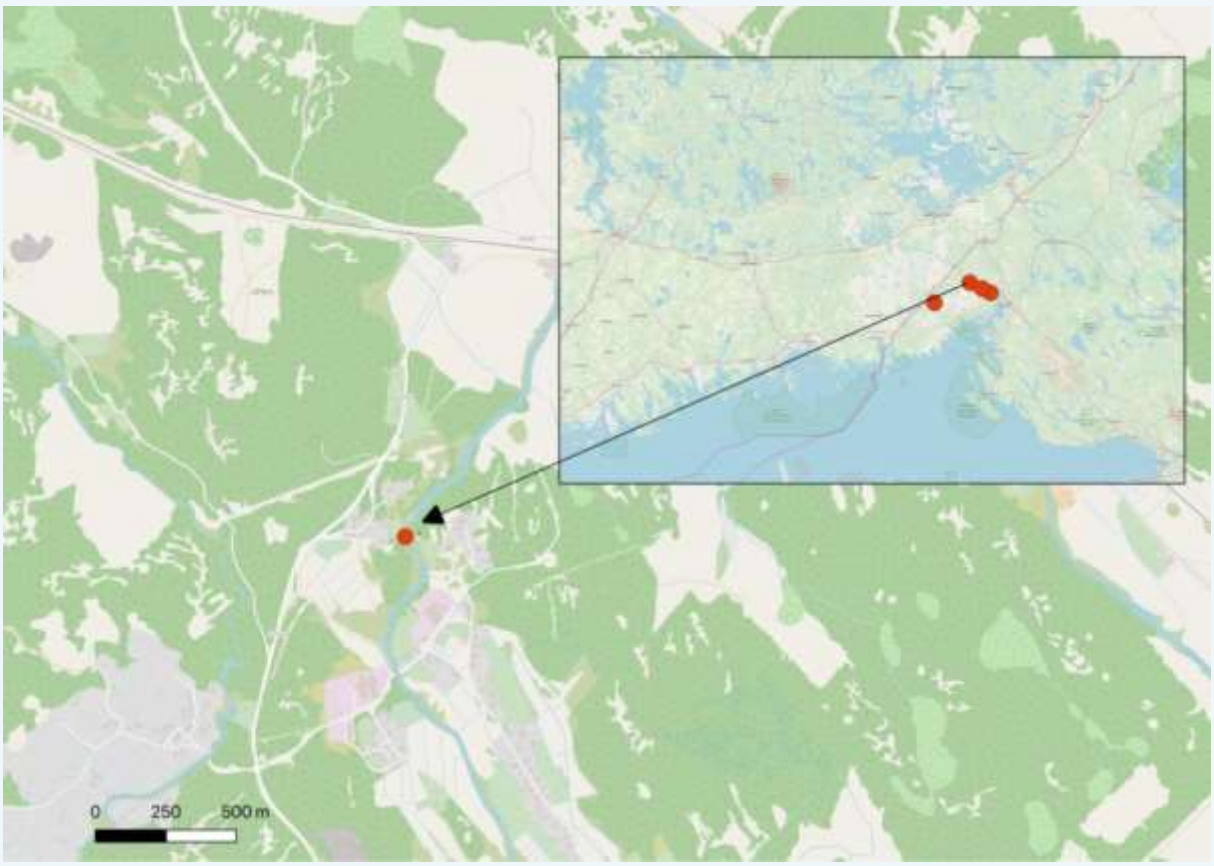
Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): Upstream there is a dam of former paper mill in 4 km in settlement Kravtsovo, and obstacle for fish migration and it can be also border protection construction on Russian-Finnish border, that serve to prevent illegal border crossing by people. It is 50 km distance from the dam to the source of river and 3 km to the Baltic Sea.

Observation of Salmonids down- and upstreams barrier today: Atlantic salmon was met in the river Seleznevka in the in 2004-2006 with mean densities from 0.4 till 1.3 ind/100m2. Later individuals of Atlantic salmon were not observed in the river. Mean density of sea trout 5 ind/100m2. Population size of sea trout in the river less than 1000 ind. Salmonids were caught down- and upstreams barrier.

Other info: The dam is the first obstacle for salmonid fish migration upstream to the spawning areas in the river Seleznevka. The dam is barrier for fish upstream migration when the water level is low. Regional government nowadays do not have plan and resources for dam removal in the settlement Seleznevo. The most suitable option for this dam is creating of submerged dam to increase and support the water level after the dam. In this case salmonid fish will have the possibility to migrate upstream during all time. Construction of submerged dam requires permission of regional and federal authorities and environmental impact assessment.

Name of barrier/dam object: Dam on the river Buslovka (Kintereenkoski, former Yashinskaya HPP)

Localisation/place: rapid Kintereenkoski near settlement Usadische, Vyborg district of Leningrad region (Northern coast of the Gulf of Finland). Coordinates: 60.7976894651269, 28.4581294011496



Hydraulic head/height of dam: Height of dam – 4,3m, length – 35 m, width – 12 m, height of barrier - 2 m.

Suitable spawning conditions down and upstream the the dam: Upstream the dam there are potential spawning areas for Sea trout (Salmo trutta) and Atlantic salmon (Salmo salar). But upstream and downstream the dam neither salmon, nor trout were observed. There are rapids-spawning areas downstream in the river Buslovka and river Seleznevka, with approximate total area 2 ha.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): There are 14 km to the Russian-Finnish border upstream from the dam that is headwater of the river (lake Telkjarvi). Distance to the next downstream barrier is 2.5 km (obsolete dam construction in the river Buslovka). Length of river downstream to the connection with the river Seleznevka is 3 km from the dam. Lenght to the Baltic Sea from the dam is 15 km.

Observation of Salmonids down- and upstreams barrier today: But upstream and downstream the dam neither salmon, nor trout were observed.

Other info: The dam is planned to be removed by regional authority – Committee on Natural Resources of Leningrad region. Nowadays planning documents for dam removal should be ready, permission documentation is under negotiation in regional and federal authorities. The plans of removal were initiated to reach safe state of the dam and river banks for people.

Name of barrier/dam object: Dam on the river Tarhanovka

Localisation/place: Dam is located in the upstream of the river Tarhanovka (Vilajoki) (left stream). It is obsolet dam of former Andreevskaya HPP, Vyborg district of Leningrad region

(Northern coast of the Gulf of Finland). Coordinates: 60.719481, 28.177468

Hydraulic head/height of dam: height of dam – ruins of the dam are 4 m, there is round waterway diameter 1,5 m, the height of water fall is 2 m. There is also bypass channel parallel to water way to HPP. This bypass channel does not have gates nowadays, but it can be obstacle for fish upstream migration during low water level in the river

Suitable spawning conditions down and upstream the the dam: The river on Russian side has favorable condition for sea trout spawning down and upstream the the dam. River Tarhanovka (Vilajoki) on the Finnish side has reproducing trout population. There are rapid area downstream the dam (under the dam) and rapid closer to Gulf of Finland (1,5 km long rapid).

*Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea):*there is no barriers upstream and downstream the dam. Lenght of the river to the Baltic Sea is 16 km.

Observation of Salmonids down- and upstreams barrier today: Salmonids (sea trout (Salmo trutta)) are observed down- and upstreams barrier: upstream the dam there is reproducing trout population (in Finland) and downstraem the dam sea trout was caught electrofishing work in 2004-2006.

Other info: There are no interest and plans to remove dam on the river Tarhanovka by regional government or local administration. Removal of the dams of Andreevskaya HPP is realistic if funding will be found form non-governmental sources. The dam is located in the border zone with limited access of people to it because of bad roads. The dam is not popular among tourists, only few publications were found about the site with dam.

Estonian National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Summary of proposed Dam-barrier objects for removal/mitigation to support wild salmonid populations in Estonian rivers

Introduction

Estonia has totally about 1000 dams and barriers in Estonian river systems and 75 % of those are unpassable to fish. Furthermore 40 % of those dams pose a major threat to riverine fish fauna. Many of these are historical and are today without purpose or usage. Many are obsolete weirs and partly broken/demolished barriers, which should be removed with priority when it is barriers that prevent migrating fish and aquatic fauna.

Estonia has so far a few examples where you have removed or taking mitigation measures to support salmonid migration in rivers with dams/barriers that prevent migration. Seventeen dams have been demolished and, ninety fish-passes have been constructed so far in Estonian rivers.

Estonia has so far been able to use EU cohesion fund to finance dam removal and fish pass construction. Estonia's River Basin Management Plans for 2016-2021 do specify the work to be done to promote the migration and spawning of salmonids, in general during the 2016-2021 period the planned measures were carried out to a limited degree. The future tasks are aimed for evaluation of the feasibility of such work and direct effort to open fish passage at key dams.

The Fisheries administration in Estonia have unfortunately not initiated any serious work or activities to strengthen and support migration of salmonids to important upstream salmonid spawning areas in past years. Only some examples exist.

Estonia has developed policy ambitions to promote the three remaining native wild salmon populations in Estonian rivers, but more concrete plans to buy out dams and land in wild salmon rivers are necessary, including dam removals for free salmon migration. For wild sea-trout river populations is needed an evaluation of various populations and an action programme for protection, including removal of barriers, where needed, and habitat restoration measures.

Beaver dams

In Estonia the total number of beaver dams is estimated to be about 13 000. A typical small trout stream holds 4-5 beaver dams, of which on average 1-2 dams are impassable and depending on the location can pose a threat for important salmonid populations. Beaver is less of a problem in larger rivers.

Estonia has listed river sections of special importance for salmon, sea-trout and grayling where beaver dams can be a threat to endangered/threatened/native salmonid stocks of high value. Beaver population removal or temporary beaver dam opening during Sea trout migration period are irregularly organized by recreational anglers. This activity is also favoured by fisheries officials.

River stretches, where beaver dams are recommended to be removed, should be documented and marked on maps. Administrations implementing current WFD River District Management Plans should also allocate resources for actions/programmes to remove beaver dams, with start in river basins with salmonid populations of high value.

Financing of dam/barrier removals

The best example in BSR where EU Cohesion Funds have been used for dam removal can be found in Estonia. In lower part of Pärnu river a 150 m wide and 4,5 m high dam was constructed in 1977, which prevented upstream migration of salmon, seatrout, vimba etc. In 2019 the dam was removed in a big project with a total budget of 15 million Euro, where 85% was paid via EU Cohesion Funds and the rest via Estonian state budget. Pärnu river, that drains 20% of the Estonian territory, opened the main stream with another 100 km, and reached 144 km length. When Sindi dam was removed, another 2 small dams in the river basin were also removed. Future studies of salmonid migration in Pärnu river basin will consider the need for more dam removals.

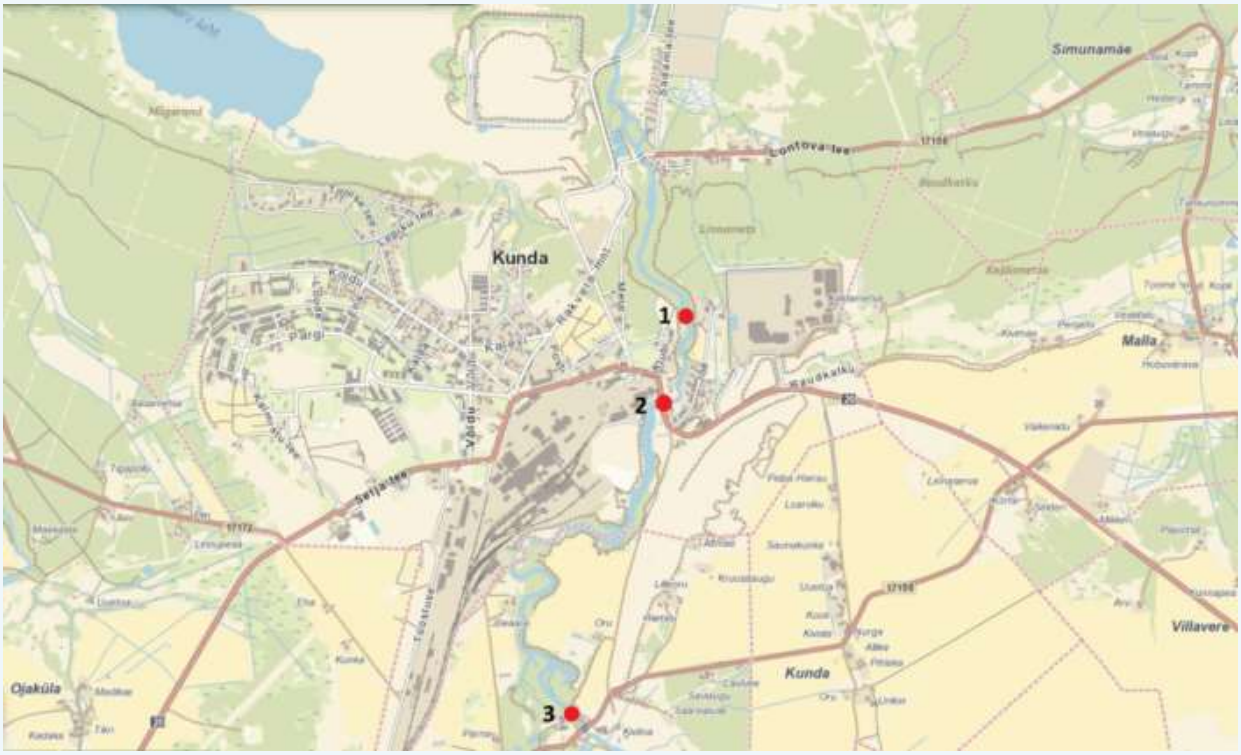
Estonia has had a very cleaver policy how to use EU Cohesion Funds for infrastructure projects. A dam removal in the size of Sindi dam with a total budget of 15 mill Euro, would probably never happened, if only national budget resources would be used.

To support native salmonid populations in Estonian rivers, there is a need for financial mechanisms to provide financing for dam removal and construction of fauna-passages that could be used by different public organizations and NGO's, e.g. anglers' clubs, and municipalities etc.

Potential dam/barrier objects in Estonia for removal/mitigation to support wild salmonids.

Name of barrier/dam object: Kunda river cascade of dams

Localisation/place: three dams in the lower Kunda river



Map 1. Three dams on the lower river Kunda. Nr. 1. Lower Kunda hydroelectric power station, nr. 2. Kunda second Hydro hydroelectric power station and nr. 3. Old Kunda manor mill.

Dam situation and height of dam:

Dam 1: Lower Kunda hydroelectric power station (priority 1 dam).

The hydroelectric power station was built in 1893 and it is cultural heritage site. Presently the power station is not operational and it has no water permit. Designed height of the dam is 9.3 m, however the wooden parts are gone and the height as it presently stands is approximately 6.5 m (Photo 1 and 2). The dam is located 2.3 km from the river mouth and it is migration obstacle for all fish. The private company owns the dam and wishes to restore the power station and produce electricity. Local county also supports the plan. However, it is unlikely that the dam gets a water permit as it is not able to meet many environmental requirements. The environmental inspectorate issued a decree to fully open the spill gate and to remove the impounded lake. This would restore the spawning areas that are presently flooded, however fish can pass the spill gate only in low numbers and only during in optimal conditions. Long term solution is to remove part of the dam to provide satisfactory fish passage and to retain culturally valuable features of the dam as much as possible. The dam is included in INTERREG RETROUT project, and three alternatives to provide free passage were devised. The construction of a new river channel around the left side of the dam, while retaining all of the cultural values was estimated to cost 2 666 862 euros. The demolition of the concrete body of the dam was estimated to cost 1 038 147 euros. In this alternative cultural values are only partially kept. Third alternative was demolition of all parts of the dam and the estimated cost was 1 125 234 euros. None of the cultural values would be kept in this alternative.

Photo 1. Lower Kunda hydroelectric power station. Note that the upper wooden parts of the dam are missing and all water is (M. Kesler 29.09.2016).

Dam 2: Kunda second Hydro hydroelectric power station

The hydroelectric plant was built in 1870 and rebuilt in 2003. The height is 6.4 m and it is located 2.8 km from the river mouth. The dam has no water permit and therefore not operational. A Fish elevator was built in 2013 to provide passage to fish, however it is considered not adequate (Photo 2). The private company owns the dam and wishes to restore the power station and produce electricity again. Local county also supports the plan. Long term objective is to remove at least part of the dam to guarantee good passage (both upstream and downstream) to fish and at least partially restore the salmon spawning areas at the impounded part of the river. Presently there are no cost estimates of such work.

Photo 2. Kunda second Hydro hydroelectric power station has a fish lift that is considered not to provide sufficient passage.

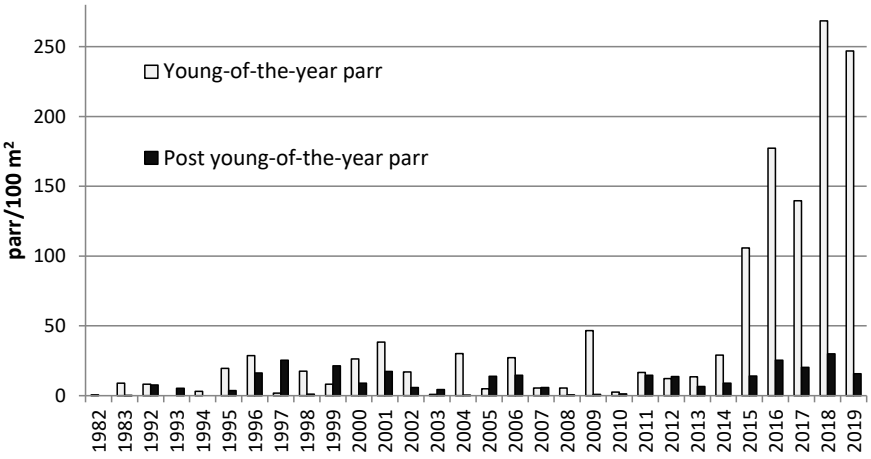
Dam 3: Old Kunda manor mill

The mill was built in 1870 and the original height was 2.7 m. Only the concrete lower part of the dam remains and the bottom spill gate is open (Photo 3). All water flows through the spill gate during low flow periods, however it is still a migration obstacle. The dam has no water permit and negotiations over the solution with the dam owner (private company) and the Ministry of the Environment are ongoing. Environmental agencies long term coal is to remove the dam. Estimated cost of the dam removal is 104 148 euros.

Photo 3. Old Kunda manor mill has no function, is very bad technical condition and is a migration obstacle for fish. The best option is to demolish it (26.07.2019 M. Kesler).

Observation of Salmonids down- and upstreams barrier today: The lowermost accessible part of the river holds wild native salmon and sea trout populations. Resident trout is widespread throughout the watershed. River also has a river lamprey, grayling and noble crayfish populations. Lower 14.5 km long part of the river is Natura 2000 area.

Suitable spawning conditions down and upstream the dam. Connectivity (lenght to upstream barrier; downstream connectivity, length to Baltic Sea): Salmon in River Kunda is one of only 3 remaining native populations in Gulf of Finland and thus particularly valuable. Salmon parr density at the lower part of the river is monitored since 1982 (Figure 2). Parr density has been on a precarious level up to a year 2015, since then the density has increased many folds and is now considered at or near the carrying capacity. Thus the size of the accessible spawning and rearing areas is most limiting factor for the size of the salmon population.



River Kunda is 82.2 km long and has a 535.9 km^2 catchment area. Average discharge is 4.26 m^3/s, maximum is 50 m^3/s and absolute minimum is 1.1 m^3/s. Source elevation the river is 90 m According to the present best available knowledge, available reproduction area suitable for salmon and sea trout below the lowermost hydroelectric power station is 2.1 ha. Reproduction area between the first and second hydroelectric power stations is 0.3 ha, if the lowermost dam is removed, the reproduction area would increase to about 0.5 ha. There is about 0.5 ha of reproduction areas between the second hydroelectric power station and old Kunda manor mill. Main river upstream from the old Kunda manor mill has about 16 ha of reproduction areas suitable for salmon and sea trout. There is no information about the reproduction areas suitable for sea trout in tributaries and uppermost part of the main river. More detailed habitat inventory of the entire river basin is recommended. It is evident that the restoration of salmon population (and all other anadromous species) necessitates a free passage in all 3 dams on the lower river Kunda.

Name of barrier/dam object: Udria brook barrier

Localisation/place: Udria brook is located at north eastern Estonia and it flows to the Gulf of Finland 10 km to the west from the river Narva.

Map 3. Lower part of the Udria brook. Red dot indicates the location of the dam.

Photo: The 1.9 m high dam on Udria brook prevents access to about 75% of the potential sea trout spawning areas.

Photo: Typical habitat of the Udria brook. Bottom is naturally dominated by gravel that is suitable for sea trout spawning.

Photo: Outlet of the Udria book.

Hydraulic head/height of dam: The brook has a dam 320 m from the sea, it is 1.9 m high and unpassable for all fish

Suitable spawning conditions down and upstream the dam: The brook is just 5 km long. This lower part, 1,4 km long, is also the only part that has natural riverbed, rest of the brook is dredged. The brook has relatively high summer base flow due to many springs. The lower 1.4 km long part of the brook is very suitable for sea trout spawning and parr rearing.

Observation of Salmonids down- and upstreams barrier and Connectivity: Sea trout parr density below the dam was 59 parr/100 m^2 and no trout was found upstream from the dam. Based on the size of the habitat in the brook, it was estimated that the part downstream from the dam could potentially produce 150 sea trout smolts annually and the upstream part could produce about 500 smolts annually. The dam has no water permit or any use, therefore removing it is best option and easy to do. The 1.9 m high dam on Udria brook prevents access to about 75% of the potential sea trout spawning areas.

Name of barrier/dam object: Kopli dam on Häädemeeste river

Localisation/place: close to Häädameeste settlement at Gulf of Riga

Map: Location of the Kopli dam on Häädemeeste river is marked with a red circle.

Photo: The Kopli dam as a simple metal frame that holds wooden blanks. Removing this structure is very easy.

Dam situation and height of dam

The construction year of the Kopli dam is not known. The dam was part of irrigation system; however it is no longer in use. Presently the dam less than 1 m high and does not need a water permit because the river is not designated as salmonid bearing river. Nevertheless it is still impassable to fish. The dam is in front of a culvert and is owned by the local municipality. It is has no cultural or recreational value. The dam is maintained by nearby household. The household fears that the further lowering of the water level at the dam will affect the water level in their well. Most sensible solution is to completely remove the dam and assisting the nearby household with their water supply issues.

Suitable spawning conditions down and upstream the the dam. Connectivity (lenght to upstream barrier; downstream connectivity, length to Baltic Sea): Häädemeeste river is 15.1 km long and its catchment area is 67.7 km^2. Its elevation at the source is 48 m. Sea trout regularly spawns on the lower 4.4 km long part. Small resident trout population also exists upstream of the Kopli dam. The river has about 2.5 hectares of sea trout spawning areas and conservative potential smolt production estimate is 1400. About 55% of those areas are located upstream of the Kopli dam.

Name of barrier/dam object: Linnamäe dam, Jägala river

Localisation/place: Linnamäe

Map: Indicates the location of the Linnamäe hydroelectric power station and 2 indicates the location of the Jägala-Joa waterfall.

Photo: Linnamäe dam on river Jägala is the principal cause for the lack of migratory fish in the river.

Dam situation and height of dam

Linnamäe hydroelectric power station was built in 1924 and classified as a cultural heritage site. The dam was deliberately partially destroyed in 1941 and was restored in 2002. Since then it is operational hydroelectric power station with a capacity of 1.1 MW. The height is 11.8 m and (see Photo) and it is located 1.5 km from the river mouth. The private company owns the dam and wishes to continue to produce electricity. Local county also supports this plan. However the dam has a temporary water permit and an obligation to ensure the good status of Jägala Natura 2000 areas conservation values. The main values are river habitat and salmon. The Linnamäe dam was declared to be culturally valuable site in 2016. The future of the Linnamäe dam is a source of heated debate between the dam owners, county, cultural heritage experts and environmental agencies. Long term solution is to remove part of the dam to provide satisfactory fish passage and to retain culturally valuable features of the dam as much as possible. The construction of a new river channel around the left side of the dam, while retaining all of the cultural values was estimated to cost 6 777 045 euros. The demolition of the concrete body of the dam was estimated to cost 2 169 750 euros. In this alternative cultural values are only partially kept. Third alternative is demolition of all parts of the dam and the estimated cost is 2 391 246 euros. None of the cultural values would be kept in this alternative.

Suitable spawning conditions down and upstream the the dam. Observation of Salmonids down- and upstreams barrier today: According to the present best available knowledge, historical reproduction area suitable for salmon and sea trout existed from the present location of the Linnamäe dam up to the Jägala-Joa waterfall and in the tributary river Jõelähtme. It is estimated that historically there has been about 7.6 ha of spawning areas available for salmon and sea trout. Before the construction of the Linnamäe dam the river Jägala was well known salmon river. The Jägala-Joa waterfall is 7 m high and a natural migration obstacle for all migratory fish.

Connectivity (lenght to upstream barrier; downstream connectivity, length to Baltic Sea): River Jägala is 119 km long and has a 1481.3 km^2 catchment area. Average discharge is 7.24 m^3/s, maximum is 111 m^3/s and absolute minimum is 0.67 m^3/s. Source elevation is 82 m.

The lowermost accessible 1.5 km long part of the river has only marginal spawning areas for salmon and seatrout (see Map). Therefore, the wild recruitment of salmon is marginal. Resident brown trout is widespread throughout the watershed. Weak population of grayling inhabits mid-section of the river. Lower 4.7 km long part up to the Jägala-Joa waterfall of the river is Natura 2000 area.

Other interesting information: There has been a decade's long period when the water quality in river Jägala was poor and therefore possibility to restore a salmon population (and other anadromous fish populations) was unrealistic. Presently however the water quality has improved substantially and lack of habitat because of the Linnamäe dam is the principle factor.

Latvian National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Summary of proposed Dam-barrier objects for removal/mitigation to support wild salmonid populations in Latvian rivers

Historical overview

Latvia has always been an arena for the actions and clashes of various political and economic forces, therefore there have always been some contradictions in the use of rivers and other reservoirs. The aim of this project is to give a priority list of river dams to be demolished or mitigated, but in order to perform this task, one must first understand the social, political and economic situation in Latvia and how it refers to river management. Further consideration can be given to how to improve the ecological situation of rivers, including by restoring salmonid migration routes.

"The beginning of the transformation of rivers and lakes in the territory of Latvia can be traced back to the end of the 17th century - the beginning of the 18th century. However, it must be thought that the transformation of rivers began much earlier. In the 18th century, there were 192 watermills in Kurzeme (Teivens, A., 1985). According to various data, there were 192 watermills in Latvia by 1920, but 666 watermills were in operation at the end of the 1930s (Teivens, A., 1985). Other sources indicate that their number has been about the same as that mentioned by A. Teevens, or even higher - in the range of 600-800. Unfortunately, some accurate and comprehensive information has not been preserved as it was after the Second World War. Namely, how many of the dams were managed in different time periods, how many collapsed and how many were rebuilt, as well as how many dams were rebuilt, mainly for the needs of collective farms and sovkhozes for watering, irrigation and recreation of cattle. " (From the report to the project of LVAF and Latvian Angler's Association "BARRIERS IN RIVERS OF LATVIA. Study of the situation, assessment and measures to be taken in the restoration of rivers in connection with the implementation and enforcement of the EC Water Framework Directive (2000/60 / EC)", 2005 - (hereinafter "LAA report".)

According to the data of the Latvian Center for Environment, Geology and Meteorology (hereinafter "LVĢMC"), there are currently 1137 different types of man-made dams on Latvian rivers. After World War II, Latvia was included in the USSR, reoriented to the socialist economic system, as a result of which many small mill dams lost their significance, because due to the deprivation of property rights, there was no one to take care of them.

Beginning in 1991, when Latvia was internationally recognized as an independent state, denationalization of property began, as a result of which many regained the dams and mill ponds belonging to their families. Now almost every water body has an owner, and there are often situations when, for example, a dam has one owner, the adjacent buildings have another owner, and the land has another owner.

The situation was further complicated at the end of the 1990s, when the mass construction of small HPPs on Latvia's small rivers began. One of the positive goals was to find good use for neglected ancient mill dams, but the result was tragic for small river ecosystems.

The fight of nature defenders for restricting the construction of small HPPs begins, but it was quite a chaotic fight. For example, the plan to build the Staicele HPP in Salaca was stopped

with great effort, but the dilapidated dam is still there, and negotiations with local forces (owners, municipalities, residents) have been at a standstill for the last 20 years. The regulation of the Cabinet Nr. 27 from 01/15/2002 on the list of rivers on which the construction of dams is prohibited is a temporary step towards resolving the issue. There have been several studies on dams. One of them is the already mentioned LAA report. Another study was conducted by the State Ltd. "Vides projekti" - "Evaluation of Small Hydroelectric Power Plant Performance", which was performed in 2005 (hereinafter - "Environmental Project Study"). In 2019, the LVĢMC organized a cross-border cooperation study ECOFLOW on the impact of small-scale HPP activities on aquatic ecosystems. There may have been other specific studies on the dams that have not caught our attention. There have been individual activists in demolishing beaver dams. In 2015, the remains of the Noriņi dam were removed from man-made obstacles under the auspices of the Latvian Fund for Nature. Around 2010, a dam in Ķīšupe was blown up, as well as at least 1 more dam was demolished in an individual round (K. Abersons, Latvian Fisheries Yearbook, 2019). There are fish passes in rivers Aiviekste, Amata, Vaidava near Karva HPP, Lake Pape, rivers Līgatne and Rīva. The last one was opened in 2020. Unfortunately, you can only hear good reviews about the Līgatne fish route.

We reviewed Latvia's river basin management plans for 2016-2021. They do not specify the work to be done to promote the migration and spawning of salmonids, but set out future tasks for the feasibility study of such work. For example - "to develop a methodology for e-flow measurements", "To review the management regulations of small HPPs and the conditions of water resource use permits", "To assess the significance of loads caused by hydromorphological transformations". It is acknowledged that "no study has been carried out on the impact of each HPP on the ecological status" and the task has been set to "assess at which dams or other barriers it is necessary to ensure fish migration".

This year, the BIOR Institute in cooperation with the LVĢMC has started work on prioritizing Latvian rivers according to its current and potential role in the conservation of fish fauna. The work should be completed this summer. The results will be publicly available.

Our study is therefore a small, alternative "pilot project" for this inventory.

Working methods

Compiling a list of priority barriers to be demolished/mitigated on Latvian rivers is a difficult task, because little is known about these barriers and in nature we were able to visit only a few. The information is not gathered in one place, and a small part of it is publicly available. (In order to correct this situation, the website aizprosti.pie.daugavas.lv was created, which is in the early stages of its development. There is also a special website dedicated to Latvian rivers, upes.lv, where, however, there is a7 lack of scientific information).

In order to obtain information and to promote cooperation between the parties working with rivers, on February 21, 2020 we organized an expert seminar "Elimination of Salmon and Sea trout migration barriers in Latvian rivers", which was attended by representatives from environment and agriculture ministries, public organizations, municipalities, fishermen, companies as well as individual experts. We also communicate with these and other specialists electronically. We communicated by phone and electronically with the owners of Cimza and Dobelnieki dams, with the manager of Staicele dam, with environmental activists and anglers as well as representatives of local governments from Ropaži, Vaive, Staicele. We had 2 study tours on October 26, 2019 (to Ropaži, Staicele, Aģi) and March 16, 2121 (to Dobelnieki).

We prepared and distributed a survey to the owners of small HPPs, under what conditions they would be willing to demolish dams or install fish passes next to them.

In order to select suitable rivers for salmonids, we needed information on spawning grounds, which the BIOR institute has identified for us as a paid service. Therefore, we could only use publicly available scientific data and data provided by anglers.

However, at the level of individual specialists, we also had good cooperation with the BIOR institute. We saw a response and interest from all parties involved, which, however, did not take the form of an initiative.

Analysis

Thus, according to the LVĢMC data (in fact, these data have been collected by various specialists, both from the LEGMC and the BIOR Institute), there are 1137 river dams in Latvia. It can be seen on the map created within this project: http://www.vak.lv/upes/aizsprosti80.pdf

Of these, 149 are small HPPs. Not all dams are on rivers suitable for salmon and sea trout spawning. Currently, there are 10 salmon Rivers officially in Latvia (HELCOM, 2011): Bārta, Saka, Užava, Venta, Irbe, Daugava, Gauja, Pēterupe, Vitrupe, Salaca. To these can be added the sea trout Rivers mentioned in the HELCOM, 2011 publication - Rīva, Roja, Aģe, Svētupe. However, there are many more rivers flowing into the Gulf of Riga and the Baltic Sea where salmon and sea trout can spawn.

In addition to Staicele, the expert seminar advised us to pay attention to the following rivers and dams: Ropaži HPP on Lielā Jugla (also recommended by expert Jānis Birzaks), Dobelnieki HPP on Mazā Jugla (also in LAA report), Vaive's mill dam (LAA report and expert Matīss Žagars from Institute for Environmental Solutions), Salaca's tributary Glāžupe (LAA report), Saka's tributary Alokste (there are 3 HPPs on this river), Roja, Riežupe, Rīva, Gauja's tributaries Amata, Abuls, Rauna with tributaries Vaive and Cimza (LAA report), as well as many other Gauja's tributaries. Regarding the Gauja, we discussed that the whole Upper Gauja for fish migration is closed. 9 HPPs have been built there between year 1998 and 2002. HPP also has almost every tributary of the Gauja. These river areas has spawning grounds for trout, sea trout and salmon, as well as grayling. There are also the last pearl mussels (Margaritifera margaritifera) deposits disappearing in Europe. HPPs do not respect the flow water regime and endanger these rare fauna, which is an indicator of clean water and a whole rapid river ecosystem.

According to the LAA report, it is necessary to free from dams the following rivers as well: Rūja, Vaidava, Līgatne, Ogre, Lobe, Pededze, Ārona. A separate discussion at the expert workshop was about the Daugava, which is not a small river, but once, before the construction of the HPP cascade, it was the main Latvian Salmon River. Dainis Kanders, Head of the Environmental Department of AS Latvenergo, presented observations on the construction of a fish passage at the Riga HPP, which is an expensive and complicated project.

The expert seminar also expressed the ideas that:

- In the economic and legal situation of Latvia, it would be more realistic to focus on the construction of fish passes rather than the demolition of dams. Owners are not persuaded to break down dams without very much compensation.

- On the rivers of Latvia in the last 2-3 centuries there have always been dams.

- Priority should be given to dams where this is easier to demolish them, regardless of the size of the fish stock. This would create "success stories" that would make it easier to break down other, more important dams.

- Anglers want relief for sea trout and salmon fishing if they help with information to restore spawning grounds and remove obstacles (Kārlis Goldmans, a representative of the Sudrablasis Fishing Association).

Conditionally, dams in Latvian rivers can be divided into the following categories: A. Operating HPP dams; B. Dams relevant to fishing, recreation or other constructive intentions of their owners; C. Various "errors". Remains of dams, failed culverts, slopes and other obstacles without special use; D. Beaver dams.

A. The owners of small HPPs did not consider it an obligation to answer the questionnaire questions regarding the demolition of HPP dams and fish routes, but shared their observations both during telephone conversations and during meetings.

In our opinion, the demolition of HPP dams should not be rushed. Their contribution to Latvia's energy is insignificant, but they provide jobs and are a source of income for families. Usually small HPPs, such as Aģe HPP, Dobelnieki HPP, are family businesses. The demolition of the dams would require large compensations that are only available to the government.

Regarding the construction of fish passages, the owners of HPPs are not against. They are ready to improve their reputation with a good fish pass. The only question is where to find the funds. A detailed economic analysis is needed. Talks with HPP owners showed that their economic and legal situation is not stable.

According to Latvian legislation, the HPP water use permit is granted without a time limit, but it can be revoked for various violations of regulations, including the reporting regime - this was explained to us by an owner of the Upper Gauja Cascade HPP. Small HPPs sell electricity at a "double tariff", so about 2 times more expensive than it can be bought on the electricity market, because it is a renewable energy resource. Otherwise, the operation of the HPP would not be profitable. However, in the general electricity balance in Latvia, small HPPs make up only about 1%. Permits to sell electricity at double tariff will expire in 3-10 years. Whether these permits for HPPs will be extended will depend on national policy.

By their nature, small HPPs are only an unstable transition solution in the use of rivers. More complete solutions need to be found.

HPP dams can cause the greatest damage to river fauna and flora if they do not provide sufficient flow during the low water period. The water use permit specifies the minimum flow during the summer low water period and the ecological flow. The size of these indicators can be changed by Cabinet Regulation Nr. 736.

The correct calculation of the ecological flow is currently under discussion. This may not have been determined correctly, as fishermen and environmental friends have been complaining about the catastrophically small water downstream of the locks in the small HPPs for years. The Environmental Project Study (2005) notes: “For example, Mazā Jugla is practically dry in the most of their water course due to the operation of Dobelnieki HPP in a section of about 3 km with an average width of 15-20 m and a continuous flow of 0.13 m3 / sec throughout the low water period.” The LAA report (2005) states: "In general, it is concluded that the current

minimal guaranteed flow (also referred to in some permits as ecological flow) are significantly lower than necessary for the conservation of habitats and, in essence, mean "guaranteed death" for many fish species living in the river. The current regulatory enactments were developed, the minimum guaranteed flow was based only on hydrological calculations, without taking into account the requirements of biota or historically established territory of plants, animals and microorganisms." These practices are not in line with the WFD requirements.

If HPPs do not comply with the rules, they can be sued, only then should the breach be recorded by an environmental inspector who may be afraid to do so. It is possible that small HPPs are being lobbied in the government.

B, C. With regard to other dams, both with and without use, also here the question of the owners is most important. Their interests in the use of dams must be taken into account. But there is also good news. Our observation is that positive change can be seen where there is an active local community. A lot depends on active people. We have heard good reviews about the fishing route in Līgatne (which has already been renovated once) thanks to the efforts of the municipality and local enthusiasts, establishing the association "Līgatne river owners", attracting European funds. The locals themselves renovate and improve this fish route, if necessary. Similar support groups are beginning to form in Ropaži and Vaive. Dam owners are also involved.

The head of the Staicele fishing association "Ūdensroze" said in a telephone conversation that the locals did not want to settle the situation if they could not even get fishing licenses, because they were all bought by rich people from the capital.

So a lot depends on sound management, while allowing for human initiative and, at the same time, controlling compliance with the law, which must also be balanced.

D. Beaver dams are perhaps even the biggest problem for Latvia's rivers, but here too everything stems from the human factor. The issue of hunting these animals is not properly settled.

The analysis of earlier studies allowed to state that in Europe from 2002 to 2012, the Eurasian beaver population increased by more than 75%, from 593,000 to 1,044,000 specimens.

General Survey on beaver dam number in Latvia is not done yet, but side information can be acquired from “Nature count” Project in Latvia, which in 2019 stated that from observed 500 m long river sections in 976 rivers corresponding to a habitat of EU importance, 472 river sections or 48% have beaver activity including:

- The number of beaver settlements varied from 1 to 8 in one section of the river 500 m in length (Rauna and Arona (both 3260_1 –rithral-fast flowing type) river sections are "record holders").
- The number of beaver dams varies from 1 to 5 in one section of the river 500 m in length. There are 27 rivers with more than 3 beaver dams per 500 m section. "Record holders" are Vilce and Melnupe with 5 dams per river section.

Above stated numbers covers 67% of Latvia (as per 2019.). It is assumed that the trend will be the same as well for the rest of surveyed area.

And it means that there are at least several thousands of beaver dams blocking fish migrations in small streams even in absence of hydroelectric power plants as the Target of our Project.

Our priority list of objects for demolition/mitigation includes various categories of dams. It is recommended to completely demolish the two (Staicele, Cimza). It is recommended to install fish passes at 3 HPP dams (Ropaži, Aģe, Dobelnieki). We also support the fish pass on one dam of the old mill pond (Vaive). One dam (Glāžupe) was removed from the list due to the claim of local fishermen that there are no suitable spawning grounds for salmon upstream, although the LAA report states otherwise. One fish path in our chosen object (Rīva) has already been built. It is now important to make sure that it works and to correct any mistakes. One object (Upper Gauja HPP cascade) can be considered as an object to be arranged in the future, because at the moment we could not give real proposals, but it is very important due to natural values.

Conclusions

The use of rivers, including the removal or modifying of barriers on rivers, must be based on the needs, will and commitment of local communities and must be scientifically justified.

Studies should be made at barriers/dams having valuable salmonid populations and suitable spawning areas upstream, to evaluate and compare costs for functional fish pass/fauna-passage, removal of barrier, and for By-out of HPP and dam rights (incl. e.g. annual electricity production and income). However, in the discussions that took place within the project, it was argued that in the current economic and legal situation of Latvia, it would be more realistic to focus on the construction of fish passes rather than the demolition of dams. Owners are not persuaded to break down dams without very much compensation.

Stakeholders - river users - anglers, HPP owners, local people, municipalities, activists, scientists, and the government must work together for the balanced use of rivers.

The government needs to manage this work more effectively with sound legislation and financial mechanisms.

Scientists need to provide an objective and easy-to-understand explanation of how a river ecosystem works.

The correct value of ecological flow must be determined and incorporated into legislation as a matter of urgency.

As discussed in the project, first and foremost, obsolete barriers must be removed in rivers, (ideally - with priority for rivers with valuable salmonid populations). It is necessary to start with easier-to-implement, "possible" projects, which must be made in order to have "success stories", so that more difficult projects can then be implemented in the most important salmon rivers.

More attention needs to be paid to beaver dams, which are likely to hinder the migration of salmonids more than man-made barriers. A watercourse must be considered hydromorphologically heavily affected, if there is on average one beaver dam per a 2 km long reach in fast flowing rivers, and very heavily affected, if the density of beaver dams is one dam per kilometer. Slow rivers are heavily affected, if there are one or more beaver dams per 1 km long river reach.

Lithuanian National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Summary of proposed Dam-barrier objects for removal/mitigation to support wild salmonid populations in Lithuanian rivers

Introduction

Lithuania has totally about 1500 dams and barriers in Lithuanian river systems. Many of these are historical and are today without purpose or use. Many are obsolete weirs and partly broken/demolished barriers, that should be removed with priority when it is barriers for migrating fish and aquatic fauna.

Lithuania has so far very few examples where you have removed or taking mitigation measures to support salmonid migration in rivers with dams/barriers that prevent migration. Only 1 dam have been demolished and 25 fish-passes have been constructed so far in Lithuanian rivers.

Lithuania has so far not used the possibilities within WFD to reach a better management for "river connectivity" and fauna-passage in river basins. Despite, Lithuania's River Basin Management Plans for 2016-2021 do specify the work to be done to promote the migration and spawning of salmonids, in general during the 2016-2021 period the planed measures were not carried out. The future tasks are aimed for evaluation of the feasibility of such work.

The Fisheries Service in Lithuania have unfortunately not initiated any serious work or activities to strengthen and support migration of salmonids to important upstreams salmonid spawning areas. Only some examples exist.

Beaver dams

In Lithuania the total number of beaver dams is not known, however on average a salmonid stream hold 4-5 beaver dams, of which on average 1-2 dams are impassable and depending on the location can pose a threat for important salmonid populations.

Lithuania should identify and list river basins/tributaries of special importance for salmon, sea-trout and grayling where beaver dams can be a threat to endangered/threatened/native salmonid stocks of high value, where regulation of beaver population or temporary beaver dam opening at least during Sea trout migration period can be established.

River stretches, where beaver dams are recommended to be removed, should be documented and marked on maps. Administrations implementing current WFD River District Management Plans should also allocate resources for actions/programmes to remove beaver dams, with start in river basins with salmonid populations of high value.

Financing of dam/barrier removals

To support native salmonid populations in Lithuanian rivers, there is a need for financial mechanisms to provide financing for dam removal and construction of fauna-passages that could be used by different public organizations and NGO's, e.g. anglers clubs, and municipalities etc.

Latest information on Hydropower management and plans for dam/barriers removal/mitigation

In 2020, the subsidies for hydropower have ended for most on hydro energy producers with the last producers to receive in 2021. It is expected the profit margin for hydropower generation to drop sharply or to be no longer profitable.

The hydropower sector lobby politician to introduce new type of public subsidies for public services performed by sector, mainly for flood prevention and dam running costs.

Despite of this, in 2021 it is planned to remove 3 migration obstacles in Lithuanian: Salantai dam, Anykšta dam and former railway bridge dam in the Dubysa river. It is carried out either by administrations of protected areas or municipalities. The funding for the removal of these dams are provided from the EU Cohesion Fund.

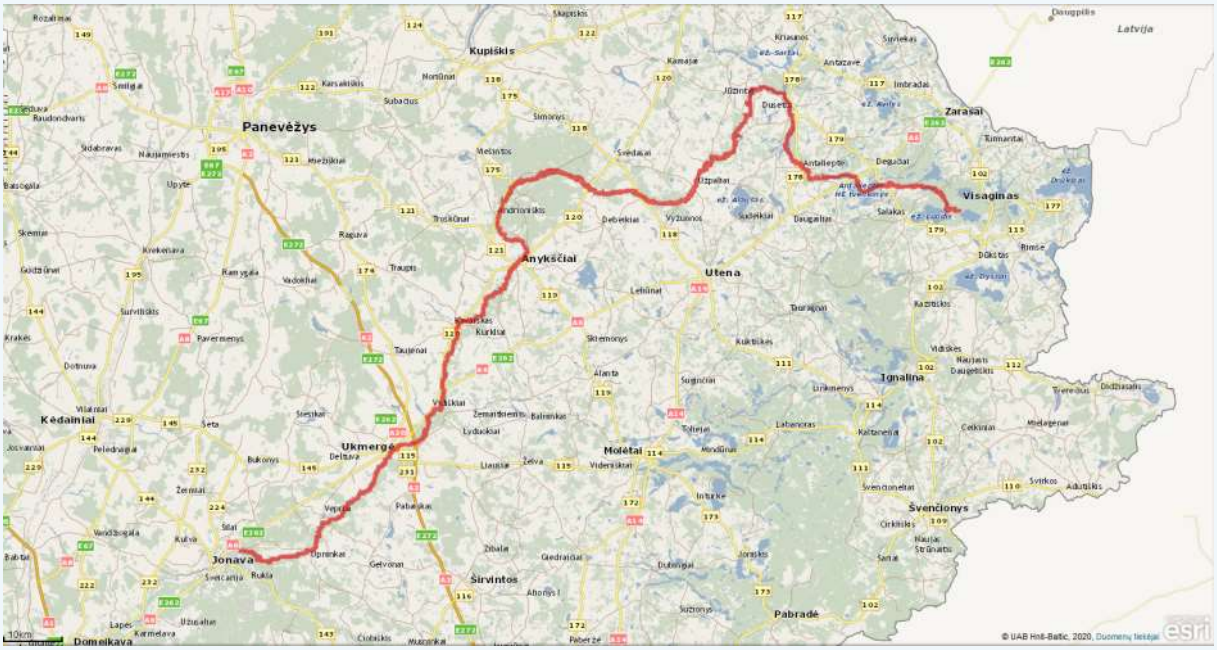
Currently, the public consultations have started on River Basin Management Plans and measure programmes for the period 2022-2027.

Summary of proposed dams/barriers for removal/mitigation in Lithuania

Proposed dams/barriers for removal/mitigation to support salmonid populations in Lithuanian rivers have been selected according to importance of the local salmonid populations, interest of various stakeholders, foreseen practical possibilities. Many other views can also be considered. A balance between these aspects/parameters is not always easy to make, but actions to mitigate salmonids in the following rivers would give a good contribution for fish biodiversity in Lithuanian river basins.

Name of barrier/dam object: Anykščiai dam, Sventoji river

Localisation/place: Anykščiai district manucipality, Šventoji river sub-basin, Nemunas basin



Hydraulic head/height of dam: 1,6 m, old watermill from 1902

Suitable spawning conditions down and upstream the the dam: The removal or modification on the dam would open 67 km migration route for salmon in the Šventoji river and additional 50 km in its tributaries (Anykšta, Jara ir Vyžuona). Additional 24 km could be open for sea trout migration in upstream sections of smaller tributaries (Pelyša, Taurožė, Nasvė). This would increase the accesible for salmonids waterflows by 57%, and the potential increase of spawning grounds in the Šventoji river sub-basin could increase by *30%.*

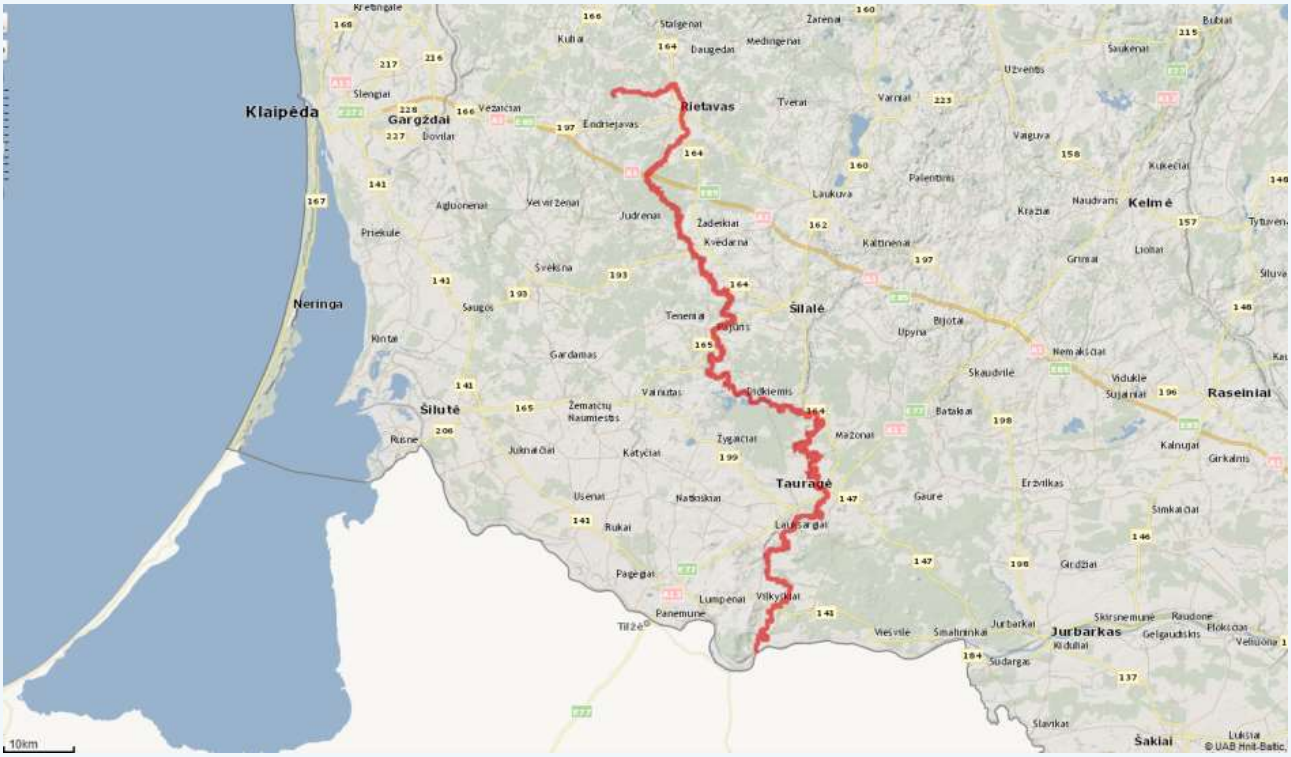
Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): The dam in Šventoji river is situated 87 km from confluence with the Neris/Nemunas river

Observation of Salmonids down- and upstreams barrier today: Salmon spawing takes place just below the dam today.

Other info: The recent Ecological water quality assessment according to River Basin Management Plans identified high water good status in The Šventoji river and tributaries above it either good or high quality.

Name of barrier/dam object: Balskai dam , Jura river basin

Localisation/place: Nemunas basin, Jūra sub-basin. Tauragė and Šilalė district manucipality



Hydraulic head/height of dam: Dam head 14,1 m. State owned, handed over to Tauragė district municipality**.** Water reservoire from 1984 for the Vizbarai pond aquaculture facilities. The dam also has the 2nd biggest hydropowerplant in Lithuania, 2,9 MW, constructed in 2005.

Suitable spawning conditions down and upstream the the dam: The rapids suitable for salmonid spawning is located in Jūra river between Žadvainiai and Balskai reservoir (65 km river section), Aitra river upstream after Labardžai village (15 km river section), Lokysta upstream from Nevočiai dam (17 km) and some small tributaries (around 16 km).

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): The removing of dam and especially HPP will support restoration of salmon, sea trout, grayling and common nase populations in Jūra river catchment area. The dam in Jūra river is 80,7 km from confluence with the Nemunas river

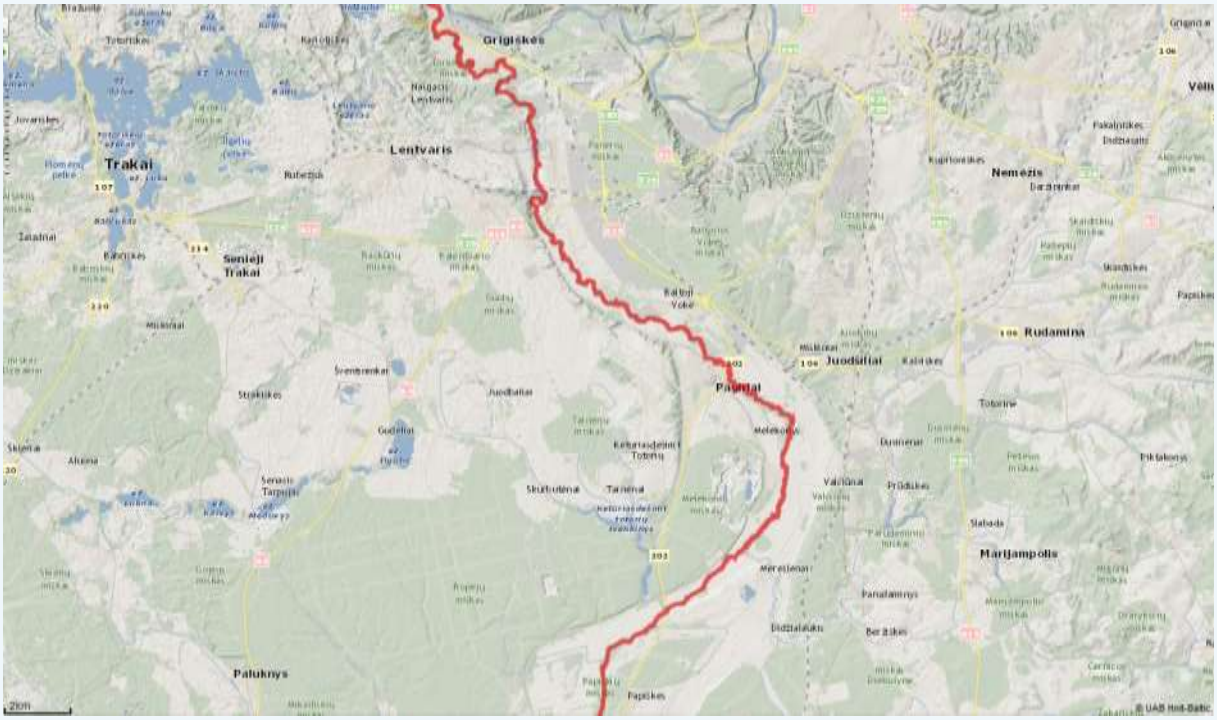
Observation of Salmonids down- and upstreams barrier today: The brown trout population above Balskai dam is quite poor. The population above the Taurege dam greatly depend on the effectivess of fish lift on Tauregė dam. In 2019 this pass has been reconstructed, howerer, the current design of the fish pass can still have some flaws. Other fish species of community importance inhabiting the river system are river lamprey, european bulhead, spined loach and european bitterling.

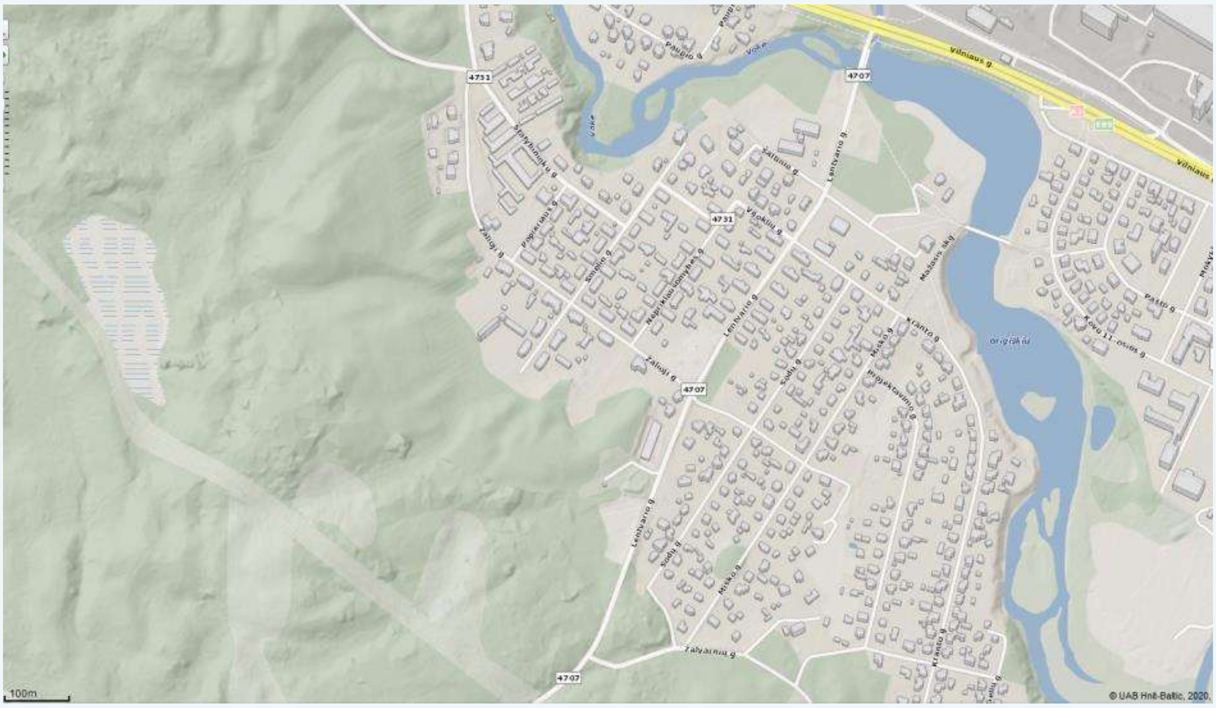
The electrofishing inventories are carried in majority of the tributaries. Sea trout and salmon migrate to spawn to some tributaries with suitable habitats below the Balskai dam only. In our days sea trout parr are absent in the Jura rapids below the dam till Tauragė dam, they are found only in tributaries. The reason for this is high temperature in summer time below Balskai dam and water level fluctuations by the HPP activities in the dam. The status of salmon in the cathment is still unclear.

Other info: The recent Ecological water quality assessment according to River Basin Management Plans identified moderate in the Balskai reservoir and good above the reservior and halfway to confluence with the Aitra river decreases to moderate again. In the Aitra river enviromnetal status is identified as good.

Name of barrier/dam object: Vokė cascade of dams, Voke river

Localisation/place: Nemunas basin, Neris river sub-basin. From adminstration perspective: Vilnius district and city municipalities. Grigiškės dam is owned by Vilnius municipality. In 1999 JSC Hidromodulis purchased the dam and built HPP (340 kW).




Vilniaus g
4731
4707
Lentvario g
Zalioji g
100m
© UAB Hnit-Baltic, 2020.


Liudvinavas
Gureliai
100m

Hydraulic head/height of dam: Grigiškių (1), Mūrinė Vokės (2), Vaidotų (3). Grigiškės dam(1st dam) 5 m , Mūro vokė dam (2nd dam) 6 m and Vaidotai dam 1,5 m

Purpose of the dam: Grigiškės dam (XX century) was built to supply power and water to nearby cardboard factory, Mūro Vokė dam (XIX century) initially built for a mill, which later was reconstructed to a paper factory, Vaidotai dam was built to supply former watermill with power.

Suitable spawning conditions down and upstream the the dam: Removal of the first Grigiškė dam would open 9 km of spawning section for both salmon and sea trout. The specific section stretch almost all the way to the Mūro Vokė dam and holds the biggest potential in all of the river. The average slope there 3,4 m/km with many suitable spawning areas.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): The dams in Vokė river are 2,6 km, 9,5 km and 19,1 km from the river mouth.

After the Balskai dam, the Grigiškės dam would have the biggest positive impact on national salmon population as there quite few rivers in Lithuania of this size and comparatively large riverbed slope. In the 2020 the subsidies for the hydropower have to end and it expected the dam to be no longer profitable. This window of uncertainty could give a great opportunity for removal of this specific dam.

Observation of Salmonids down- and upstreams barrier today: Neris river system is the only sub-basin where native salmon population survived after the collapse. Currently it serves as a source for restoking of Lithuanian rivers and in general is the backbone of the national populati on.

At the moment only the lowest section of Vokė river is accesible to salmon and sea trout. The abundance of salmon parr in this section meet with the best salmonid rivers i.e. Vilnia and Kena. The assessment of the population there is problematic as this section every year is stocked with 3 000 – 10 000 salmon and up to 4 000 sea trout, every fourth years. However, the survival rates of stoked salmonids estimated to be low in Vokė and every year spawners are observed accumulated below Grigiškė dam.

Other info: The recent Ecological water quality assessment according to River Basin Management Plans identified good environmental status in Vokė river.

Name of barrier/dam object: Tuzai dam, Minija basin, Salantas river

Localisation/place: Kretinga municipality, Imbarė eldership

Hydraulic head/height of dam: 6,4 m. Dam from 1982. Made for crop irrigation (although unlikely to be ever used for this purpose) as well landscape element for recreation.

Suitable spawning conditions down and upstream the the dam: The suitable spawning conditions are observed 3-4 km below the Tuzai, and the rest for good spawning is found in the river upstream (around 10 km) section flowing though the Samogitian Highland which is suitable for spawning. Sea trout, brouwn trout, river lamprey and vimba bream migrate to spawn to this river.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea)

The Tuzai dam in Salantas river is 30,3 km from confluence with the Minija river.

Observation of Salmonids down- and upstreams barrier today: The salmonid population in the Salantas river system is quite good. Its tributary Blendžiava has hold one of the best sea trout populations in Lithuania. It is unlikely for salmons to migrate to the river, except for a few rapids located in the most downstream section of river. Above the Salantai dam there is located Tuzai dam. Brown trout populations are present in the sections below and above Tuzai dam. Other national or community important species present in the river system include river lamprey, brook lamprey, ukrainian lamprey, european bullhead, spiny loach, vimba bream, thickshelled mussel, noble crayfish.

The coverage of Salantas rivers by electofishing inventories is poor ,therfore, there is no data for the river section between Salantai and Tuzai dams as well as upstream section from the Tuzai dam.

Other info: The removal of the dam would open the way for sea trout migration to the habitats with the highest potential for sea trout in Minija sub-basin, if not the whole Nemunas basin.

Latest information on Hydropower management and plans for dam/barriers removal/mitigation

Here listed dams are included in Lithuanian measure programme:

It is foreseen to remove Anykščiai dam and the foreseen measure is set of highest priority (1 out of 5).

In the Balskai dam it is intended to construct fish ways and fish screens that would divert the downstream migrating fish; initiate changes of water usage and recalculate minimum dam discharge or halt operation of hydropowerplant. The developed measure is listed as low priority (4 out of 5)

In the Grigiškės dam it is foreseen to install new hydroturbines that will consider water discharge and environmental impact; initiate changes of water usage and recalculate minimum dam discharge; install fish way and fish screens that would divert the downstream migrating fish or halt operation of hydropowerplant and remove the dam. The developed measure currently is listed as medium priority (3 out of 5).

It is planned to remove the Tūzai dam or construct fish way and fish screens that would divert the downstream migrating fish. It is not specified the priority of this dam.

Belarus National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Potential dam/barrier objects in Belarus for removal/mitigation to support wild salmonids

Introduction

Belarus has 26 Hydro Power Plant (HPP) dams. The total number of dams and barriers in Belarus river systems is unknown. Many of these were built to create reservoirs, or to regulate water levels in reclamation channels. In Vilia river system is verified 7 dams. Some dams are historical and are today without purpose or use. Many are obsolete weirs and partly broken barriers, which should be removed with priority when such barriers stop migrating fish and aquatic fauna.

Belarus has so far no examples where you have removed or taking mitigation measures to support salmonid and other fish migration in rivers with dams/barriers that prevent migration. Fish-passes have never been constructed so far in Belarus rivers.

The last decade Belarus has constructed three new big dams, for Hydropower Plants (HPP), in the rivers Neman and West Dvina/Daugava. The first one was constructed 2012 in Neman, upstreams the city Hrodna (h 7 m; 1 MW). In 2017, two dams of Vitebskaya (h 9m; 40 MW) and Polotskaya (h 7,8m; 21,66 MW) were built on the West Dvina River/Daugava. None of the three dams have a fish-ways.

During the design period of the Hrodna HPP, environmental NGO informed the public about the problems concerning this HPP dam. NGOs insisted on the need for a fish ladder. In 2001, was organized the first public hearings in Hrodna on the issue of the future HPP. At that time, the HPP project had not yet been approved. Later in 2005, in Minsk, NGOs held a Round Table on the problems of the Hrodna HPP. When it became clear that the Hrodna HPP could not be avoided, NGOs appealed to the Ministry of Natural Resources with a request to include a fish-way in the project, but such proposals were ignored because this was not in line with the policy for environmental requirements. Belarus make compensation for reduced fisheries in the river by land-based fish farming in the neighbourhood, a policy that have been used in Soviet union for decades.

The dam of the Hrodna HPP is very bad to Neman's biodiversity. Many fish in Neman make internal migrations to feeding areas or spawning places. Every spring, a lot of fish gathers down the dam of the Hrodna HPP. Poachers come here to catch fish with nets. The only measure state agencies have applied is to declare a ban on fishing in a one kilometer zone downstream the dam.

Beaver dams

Practically all salmonid spawning tributaries of the Vilia River are exposed to beavers. For example, on the Senkanka river is counted up to 14 beaver dams per 7 km of riverbed. Every year in the autumn before the spawning of Baltic salmonid, NGOs organize volunteers for an

action to destroy beaver dams. In Belarus, it is possible to hunt beavers with a license from September to December. But there are still a lot of beavers.

Dam/barrier mitigation in Belarus

Sea-trout and salmon migrate from the Baltic Sea and return into Belarus via Neman and Vilia river. The natural spawning areas for salmonids have been closed by dams in many tributaries to Vilia river. The most important salmon spawning historically took place in Stracha river. In the 1950-ies a dam for a cardboard factory, incl. turbines, was built in Olkhovka in Stracha river, which stopped fish migration. Initiatives for construction of a fishway at this dam was taken a decade ago by Belarus environmental NGOs (Friends of Neman). A project for a fauna-passage started in 2019, and a design study will be presented in 2021.

Summary of proposed dams/barriers for removal/mitigation in Belarus

In Belarus, the Vilia River (Neman's tributary) is the habitat for the Baltic salmonids. At least 12 tributaries of the Vilia River are real or potential spawning places for migratory fish from the Baltic Sea. Many rivers have dams built in the 50s and 70s or later. None of them have fishways.

Map of salmonid rivers Belarus

Name of barrier/dam object: Olkhovka dam, Stracha river, tributary to Vilia river

Localisation/place: Olkhovka village

Hydraulic head/height of dam: 5,5 m high concrete dam constructed in 1950s. The purpose of the dam is a reservoir for the Cardboard Factory in Olkhovka village. Water is used for processwater and for a small hydropower turbine.

Suitable spawning conditions down and upstream the dam: Stracha river is the most important salmonid river in Vilia basin, with historical records of both salmon and sea trout. Stracha River is a very nice river for the Baltic salmonids to spawn and breed.

This will open Stracha including its tributaries Pelyaka and Struna for spawning of Baltic salmonids. Upstream the dam there are more than 140,000 m2 of suitable spawning bottoms.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea). Observation of Salmonids down- and upstreams barrier today: Stracha dam is 3 km upstreams the confluence with Vilia river. A fishway/removal would open big production areas for salmonids (57 km in the main stream and 50 km in functional tributaries upstreams. Downstream, close to the dam, is 300 m2 of spawning areas for sea trout. Stracha river holds sea trout, trout, grayling, perch, pike, bulhead, gudgeon, stone loach, barbel, asp, ide, bleak, dace, carp.

No barriers downstreams the dam, about 550 km, to the Baltic Sea.

Other information: Mitigation of Stracha dam for fish migration should be a top priority for fisheries management in Belarus.

Name of barrier/dam object: Biala river dam

Localisation/place: The dam is situated 1 km upstreams from the Biala river inflow to Vilia river. Biala river runs to Vilia river not far from Smorgen city.

Hydraulic head/height of dam: Dam head is 2,5 m. Concrete dam. The dam was built to create a small reservoir of 0.6 hectares. The dam is under the jurisdiction of the local administration**.** Owner of is Smorgon regional administration of Hrodna oblast

Suitable spawning conditions down and upstream the dam: This dam can be really considered as an object to remove. Upstream the dam there are about 4000 m2 spawning areas for Baltic salmonids. Downstream the dam the river has about 700 m2 of spawning areas.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): Biala dam, 1 km from the confluence with Vilia river, has good potential for salmonid production 10 km upstreams to the next barrier. There is no barrier downstream, about 580 km, to the Baltic Sea.

Observation of Salmonids down- and upstreams barrier today: Biala river is small, about 25 km long. The river holds not only Sea trout that spawn in the river, but also Baltic salmon (there are cases of such catch by anglers). The river also has trout, perch and pike.

Other info: Biala dam is suitable for dam removal. The dam has been out of operation for the last 30 years. The original purpose was to create a small reservoir for the visitors of the private bathhouse nearby. This dam is under the controle of the Smorgon Regional Executive

Committee (local authorities) who is generally positive about the dam removal and Biala river restoration.

Name of barrier/dam object: Varona dam, Senkanka river

Localisation/place: Varona village

Hydraulic head/height of dam: Concrete dam 5 m high. Its purpose is a 1.8-hectare reservoir. The reservoir is located between the road P-45 (Vilnius-Polotsk) and a livestock farm. Therefore, it is practically not even a place of recreation. The only value of the dam is the road - the passage to residential buildings from the farm. And only for light transport.

The owner is Verona village administration.

Suitable spawning conditions down and upstream the dam: If the dam will be removed, the total area of spawning grounds for the Sea trout increase from 9000 to 12,000 m2.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): About 5 km from the dam Senkanka river flows into the river Vilia. The total distance to the Baltic Sea is about 560 km. The river reach 7 km upstreams, with 2-3 km of functional tributaries.

Observation of Salmonids down- and upstreams barrier today: Sea trout spawns downstreams the dam in the river every year. The river Senkanka also holds trout, pike, perch, bullhead and chub.

Other info: The owner of the dam is the local administration of Varona. It is not yet known whether they are ready to support the removing of the dam. It makes sense to discuss the possibility of removing this dam and restoring the Senkanka river with local authorities and the local citizens.

Name of barrier/dam object: Gerviaty dam, Losha river

Localisation/place: close to Gerviaty village, Astravets district

Hydraulic head/height of dam: The dam is 3 m high, and it supports a reservoir of 9 hectares.

Suitable spawning conditions down and upstream the dam: Losha river is very suitable to the salmonids. Downstream the dam is about 6000 m2 of trout spawning areas. The total area of suitable spawning areas upstream the dam is about 40 000 m2.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): Losha river is a tributary of Oshmianka. First dam in the river has been built near Gerviaty village. It is about 18 km with good riverbedup to the next barrier Janovsky reservoir, incl. the Janovskyi hydropower plant. Downstream of the dam there is no barriers. From here to the Baltic Sea about 570 km.

Observation of Salmonids down- and upstreams barrier today: There is brook trout in the river, but it also holds pike, perch, bullhead, chub, dace and Schneider.

Other info: It is most possible to have a fishway at this dam.

Name of barrier/dam object: Rachunskaya dam, Oshmianka river

Localisation/place: Rachunskaya

*Hydraulic head/height of dam:*The dam is 5 m high.

Suitable spawning conditions down and upstream the dam: Oshmianka River, a tributary of Vilia river, has good conditions for salmonids. Below the dam there is approximately 37 000 m2 of suitable spawning areas. And above the dam is still about 33 000 m2 spawning areas along with two tributaries of Panarka (10 km) and Kernova (7 km).

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): Total length of the river is 92 km. This dam is the first and is 55 km from the flow into the river Vilia. It is about 54 km up to the next barrier. The dam belongs to the state energy Concern "Belenergo". There is a hydroelectric power plant, built in 1958 Rachunska HPP, and reservoir of 150 hectares.

Observation of Salmonids down- and upstreams barrier today: Oshmianka River holds sea trout, trout, pike, perch, bullhead, chub, dace, Schneider, bleak, burbot and roach.

Other info: It is very likely that the local authorities and Concern will support the idea of building a fish way.

Poland National report on Potential Dam-barrier objects for removal to support wild salmonid populations

Summary of proposed Dam removals/mitigation in Polish river system

Introduction

It is impossible to determine unequivocally the number of dam/barriers on Polish rivers. The HYMO database gives 16,000, but the official website of the water administration states the number as 32,000. The situation looks even worse if we apply the methodology of estimating the number of barriers in Europe as 1.2 million. According to this methodology there are about 77 000 in Poland. About 4000 Dams/barriers in Pomerania. Many of these are historical and are today without purpose or use. Many are obsolete weirs and partly broken/demolished barriers, that should be removed with priority when it is barriers that prevent migrating fish and aquatic fauna.

Poland has so far very few examples where you have removed or taking mitigation measures to support salmonid migration in rivers with dams/barriers that prevent migration 2-3 dams have been demolished and at limited part of the rest fish-passes have been constructed so far in Polish Pomeranian rivers.

The most important measure to support Polish salmonid stocks would be remove Włocławek Dam, which close 2/3 of Vistula river basin from fish migration, one of the biggest river flowing natural river in the Baltic Sea. This barrier have a fish passage partially working after modification, but it is still a huge dam reservoir upstreams turning the riverine habitat into a lake. Such change reduce possibilities of downstream migration of salmonid smolts to near zero. Włocławek dam removal should be first priority to promote river fish migration in Poland.

Poland has so far not used the possibilities within WFD to reach a better management for “river connectivity” and fauna-passage in river basins. Poland's River Basin Management Plans for 2016-2021 do not specify the work to be done to promote the migration and spawning of salmonids, but set out some future tasks for the feasibility study of such work.The administrations on fisheries and river management in Poland have unfortunately not initiated any serious work or activities to strengthen and support migration of salmonids to important upstreams salmonid spawning areas. Only few examples exist, many as initiatives from NGO-stakeholders .

Apart from opening the barriers for fish migration , a serious problem is the ecological condition of the vast majority of rivers, which urgently needs renaturalisation and restoration of the diversity of the riverbed morphology.

Beaver dams

Poland has about 100 000 beavers / nfosigw.gov.pl › gfx › nfosigw › nfoekspertyzy/, in Pomerania over 2200 beaver dams , which in many cases can pose a threat for important salmonid populations.

Poland should identify and list river basins/tributaries of special importance for salmon, sea-trout and grayling where beaver dams can be a threat to endangered/threatened/native salmonid stocks of high value, where temporary beaver dam opening, at least during Sea trout migration period, can be established.

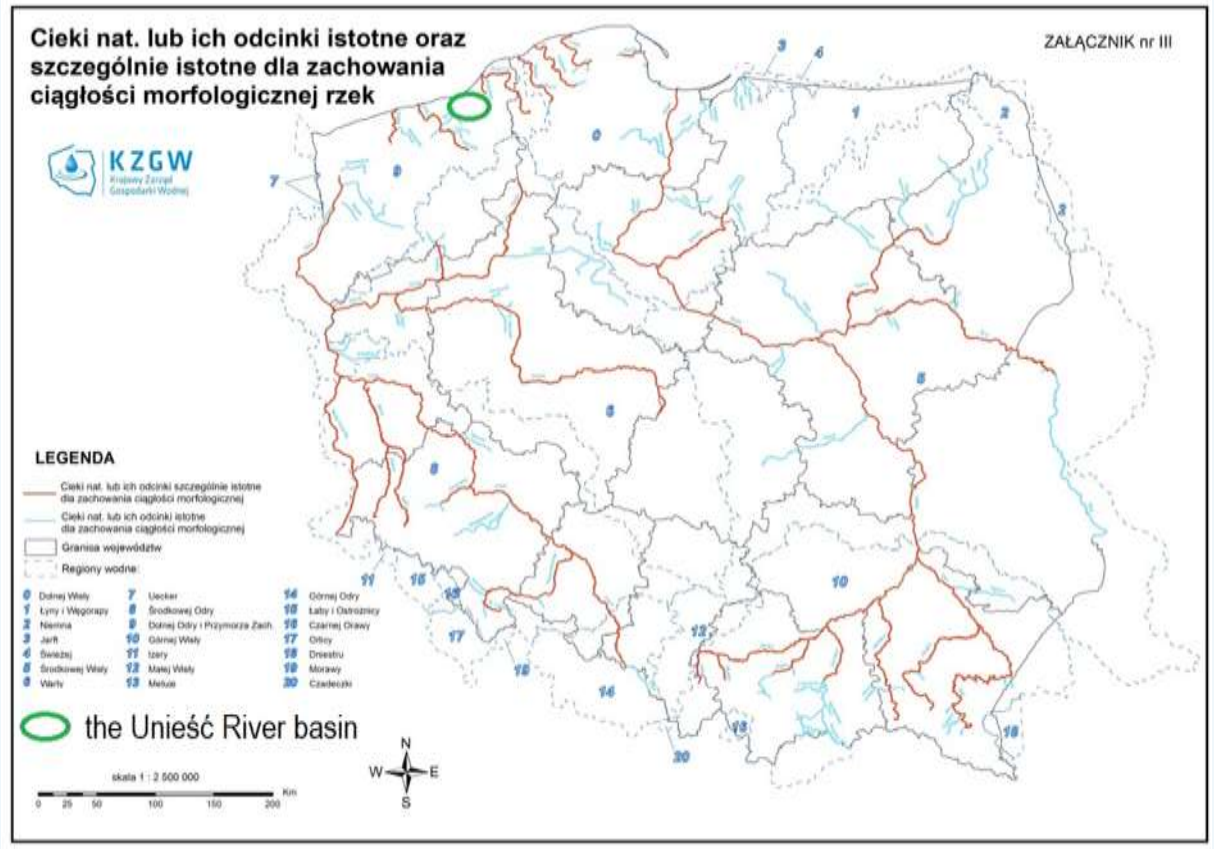
River stretches, where beaver dams are recommended to be removed, should be documented and marked on maps. Administrations implementing current WFD River District Management Plans should also allocate resources for actions/programmes to remove beaver dams, with start in river basins with salmonid populations of high value.

Financing of dam removal/mitigation

To support native salmonid populations in Polish rivers, there is a need for financial mechanisms to provide financing for dam removal and construction of fauna-passages. The main sources of funding for the fish passages are state budgetary resources and EU programmes, primarily LIFE, but also OP FISH and others. A small part is built from private funds.

Summary of proposed dams/barriers for removal/mitigation in Poland

Proposed dams/barriers for removal/mitigation to support salmonid populations in Polish rivers have been selected according to importance of the local salmonid populations, interest of various stakeholders, foreseen practical possibilities. Many other views can also be considered. A balance between these aspects/parameters is not always easy to make, but actions to mitigate salmonids in the following rivers would give a good contribution for fish biodiversity in Polish river basins.



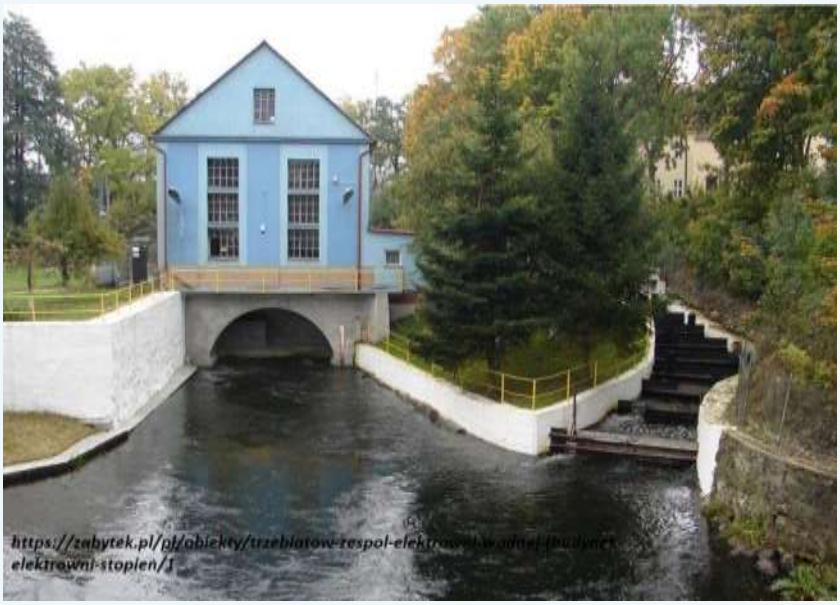
Map of rivers with First priority for salmonids in Poland marked red, and for Second priority marked blue.

Proposals for dam/barriers removal in Poland:

Name of barrier/dam object: HPP Trzebiatów, Rega river

Localisation/place: Trzebiatów manucipality, Rega basin – 3rd straight flowing to Baltic river in Poland, West Pomerania. Water Region – Odra and straight Baltic Sea tributaries

Hydraulic head/height of dam: 1,6 m, old HPP from 1926-1927 placed at 16th km of river from its mouth to Baltic Sea



Fish passage presented at the picture is very old and works very bad. It needs to be changed into a better working fauna-passage, as a minumum action.

Schematic map of the water system in Trzebiatow

Next HPP dam that has closed the access for migration is HPP weir at tha bypass channel. Fish passage work good, but it is a place where fishing for spawners takes place and only small part of them could pass the barrier. This use of the fish ladder to capture the majority of migrating spawners significantly reduces the potential for a sufficient number of spawners to reach the natural spawning grounds upstream of the river basin for a stable population.

Suitable spawning conditions down and upstream the the dam: The removal/ restoration of good connectivity or modification on the lower dam would open 180 km migration route for salmon in the Rega river and additional 70 km in its main tributory (Mołstowa). Additional 60 km km could be open for sea trout migration in upstream sections of smaller tributaries (Stara Rega, Brzeźniacka Węgorza). There are more dams at Rega, but all of them was reconnected thanks to LIFE project support. The main barrier is the first dam, and its removal would increase the accessibility for salmonids waterflows by few hundreds per cent.

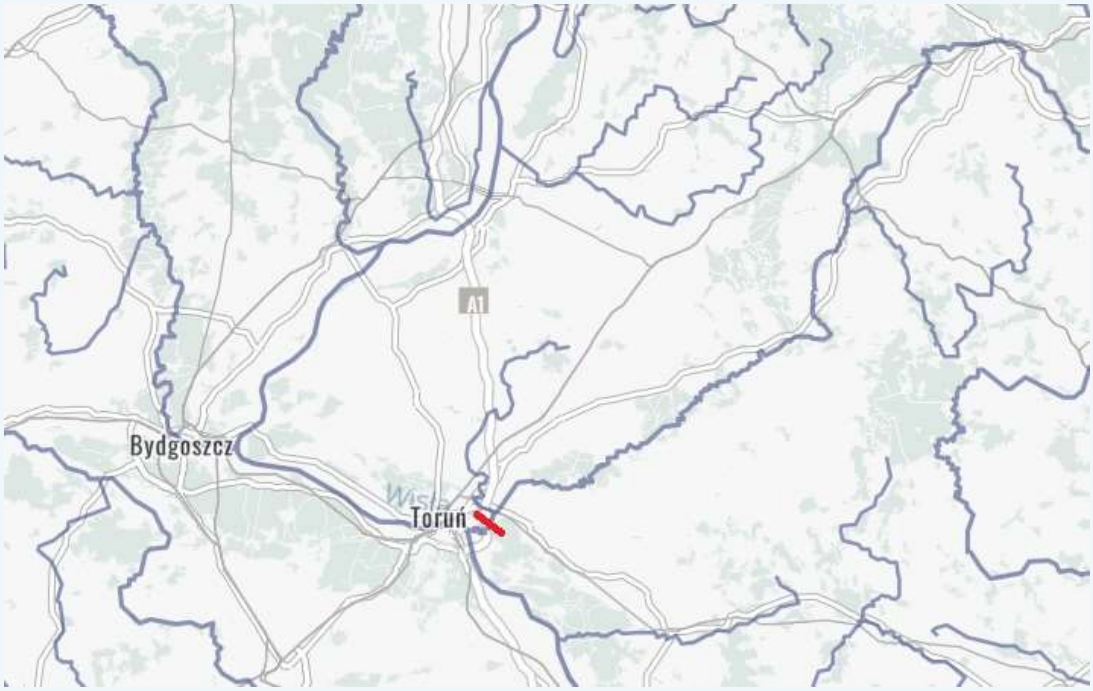
C*onnectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea):* The dam Trzebiatów HPP Dam in Rega river is situated 15,2 km from mouth to the Baltic Sea.

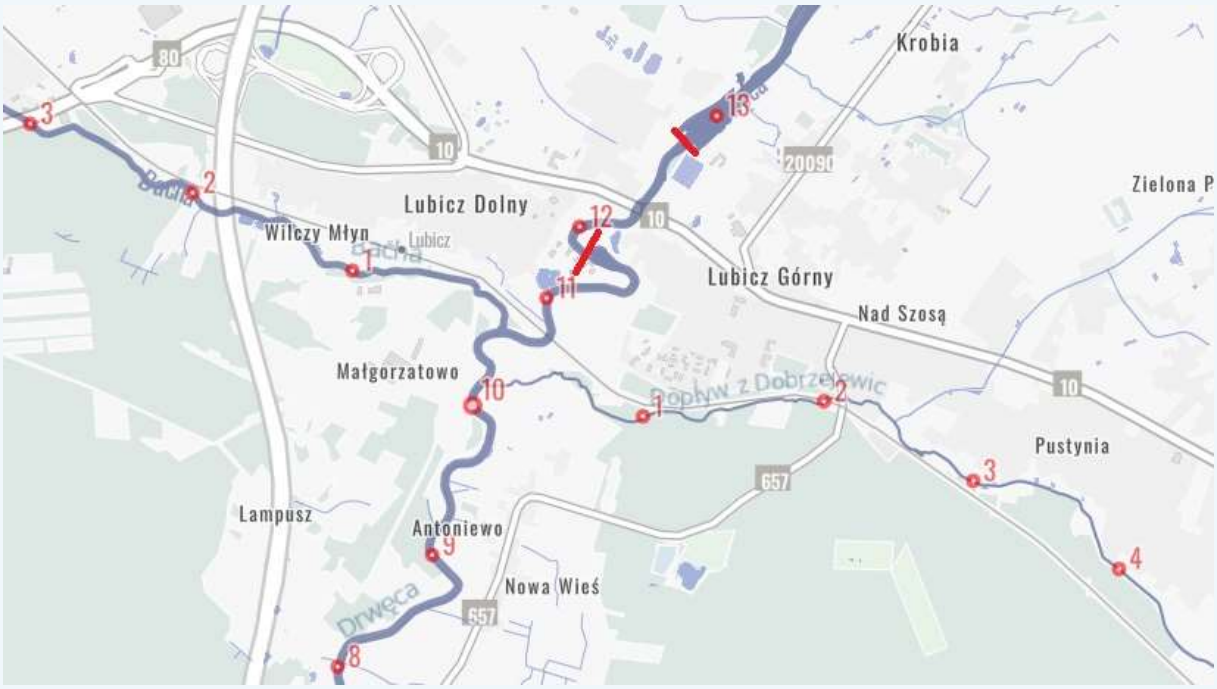
Observation of Salmonids down- and upstreams barrier today: Salmon spawing was observed but some individuals, mainly at spawning ground downstreams from the dam.

Other info: The recent Ecological water quality assessment, according to River Basin Management Plans, identified high water quality good status in The Rega river and tributaries above it either good or high quality. All basin with part of Rega's Valley in Nature 2000 area and water crowfoot river site- N2000 code 3260. This river habitat type is considered by experts to be suitable for salmonids due to the convergent requirements of the plants of this habitat with those of the most environmentally sensitive ichthyofauna species.

Name of barrier/dam object: Lubicz dams, Drwęca river basin

Localisation/place: Vistula basin, Drwęca sub-basin. Lubicz manucipality





Hydraulic head/height of dam: Each weir head is near 3,2 m. State owned, handed over to Lubicz municipality**.** There are 3 HPP and 2 weirs, for fish farm.

Suitable spawning conditions down and upstream the the dam: At big part of Drwęca river catchment was established as an ichtiophauna reserve. Last years there was a plan to modify existing fish passages but it looks, it is not done good enough. Spawning grounds up from the Lubicz are placed at near 200 km of main river and next 200 km at a lot of tributaries. Potential for natural spawn in this basis iv very big. Second, Drwęca river mouth is down from Włocławek dam, the biggest barrier for migration at Vistula river.

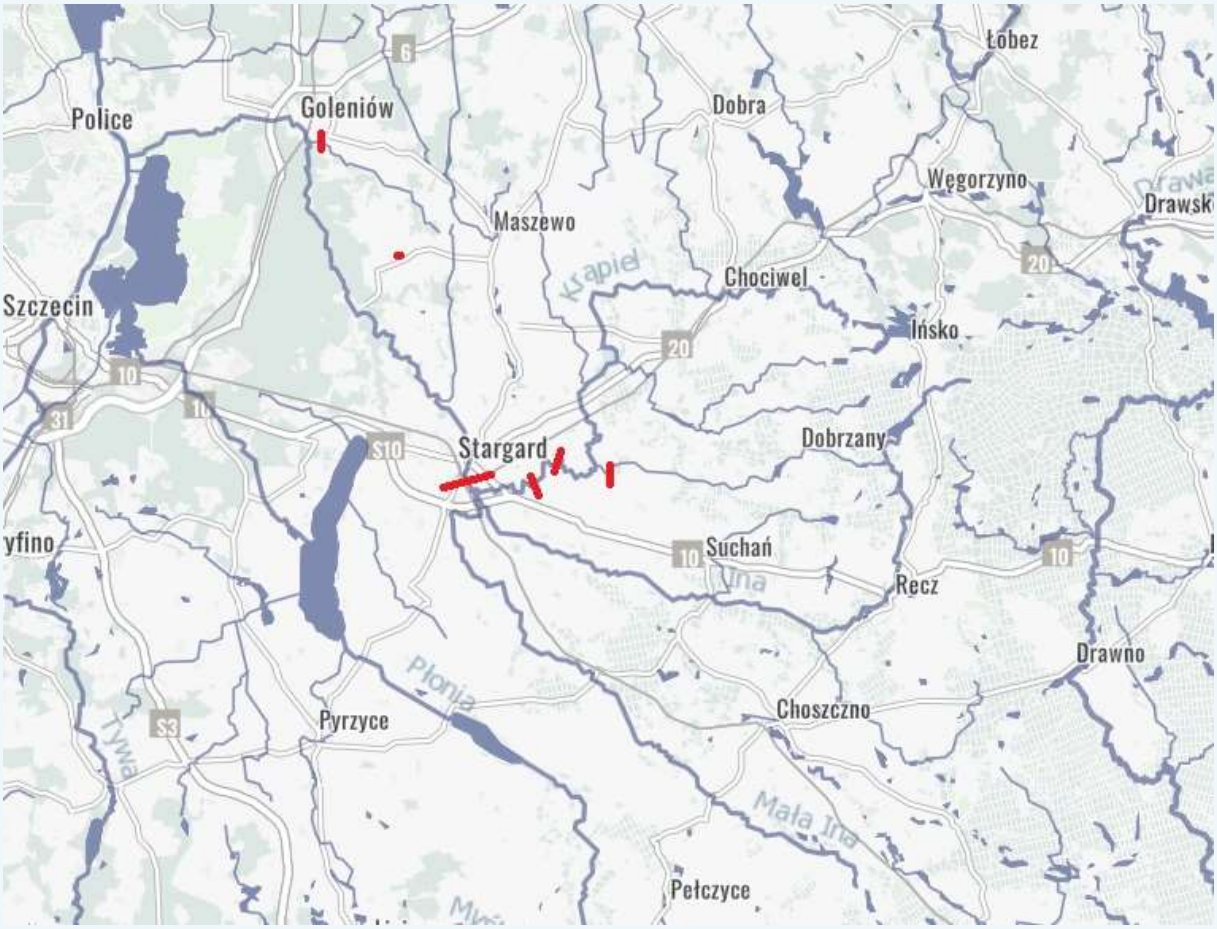
Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): Weirs are placed closely to the mouth, 226 km from the Baltic Sea. The removing/ connectivity restoration/ of dam will support restoration of salmon, sea trout, and many others migratory species in both, Vistula and Drwęca rivers.

Observation of Salmonids down- and upstreams barrier today: The salmonids populations above Lubicz is poor, but both Atlantic salmon and sea trout every aprear in the river stretch down of Drwęca river.

Other info: The recent Ecological water quality assessment according to River Basin Management Plans identified moderate status in all of the basin, but one of negative indicators is ”poor connectivity”. Upper stretches of tributaries are very good for salmonids.

Name of barrier/dam object: Weir in Stargard, and smaller weir ruin in tributaries of the Ina river

Localisation/place: Odra basin, Szczecin Lagoon sub-basin. From administration perspective: Stargard municipality. Weir is owned by state. Weir supply small HPP at a bypass channel. It is near 100 years old construction which could be difficult to remove, but it is possible to remove underwater part, leaving bridge. The bridge is an important thoroughfare for the public and also forms a visible part of the monument.



Ina river with barriers to remove.

Hydraulic head/height of dam: 1,5 m

Purpose of the dam: built to supply a former watermill, currently a HPP. Ruins were supplying watermills. Not used currently.

Suitable spawning conditions down and upstream the the dam

Removal of the weir in Stargard will open 70 km of upper Ina, which is very important for spawning in the tributaries. Weirs cut access to good status gravel bottom streams.

Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea): The weir in Stargard is placed at main river Ina. Smaller weir were placed closely to main river, and cut off all tributaries upstreams.

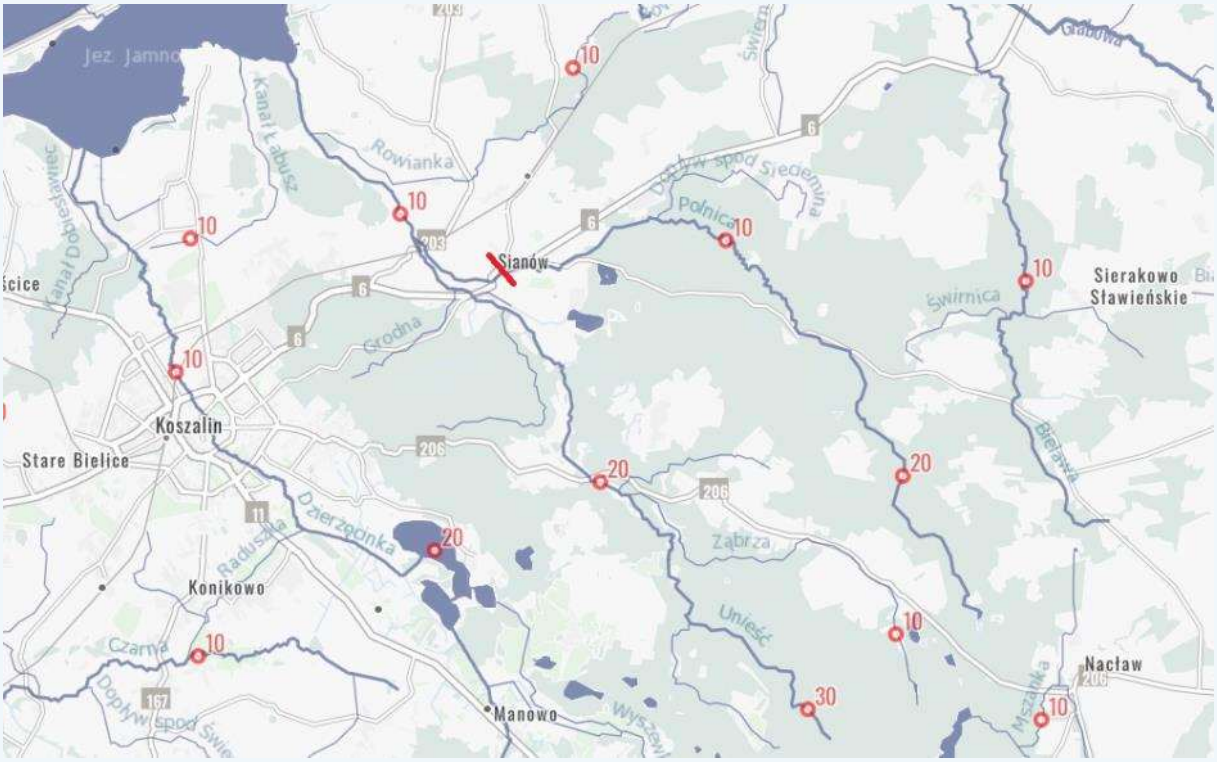
Observation of Salmonids down- and upstreams barrier today: Ina is one of the best sea trout river in Poland for 30 years. Main problem is weak quality of water after heavy rains – which create pollution from intensive agriculture and bad working sewage plants, especially in Stargard. At the same time it is still water crowfoots river with huge potential. Every season some Atlantic salmon are observed.

Other info: next year Ina will become Nature 2000 area. The natural data in this valley are currently being supplemented.

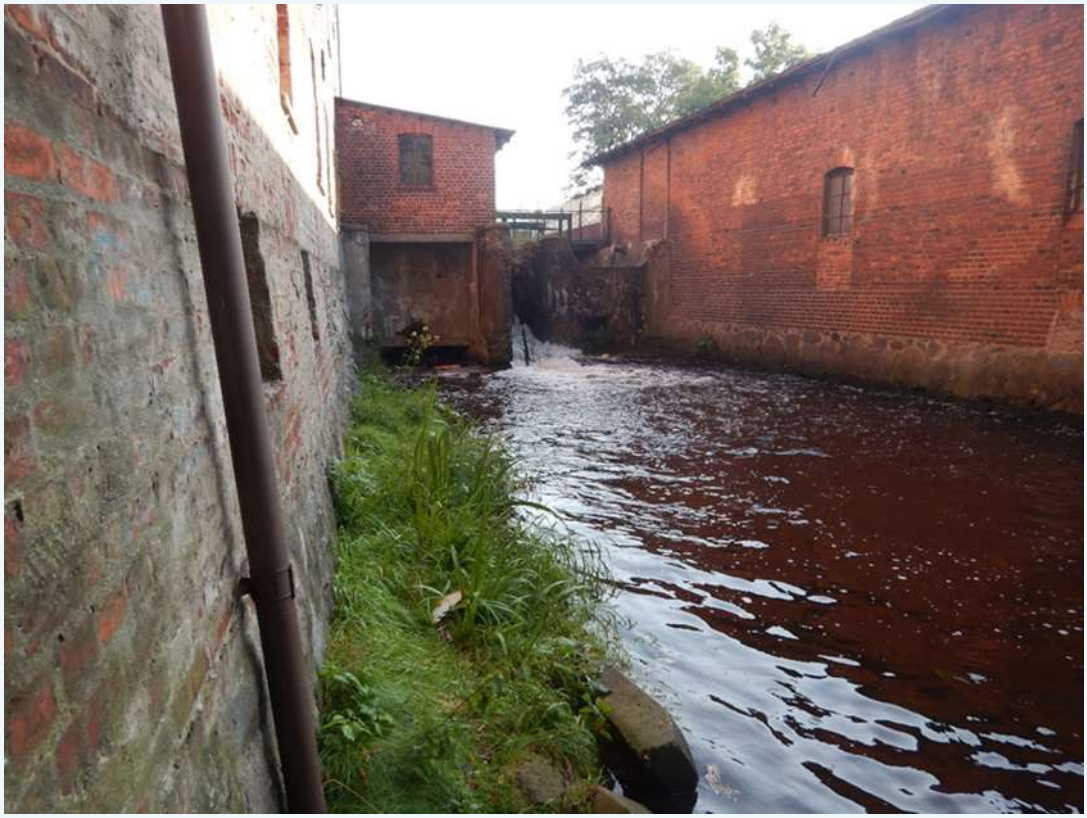
Name of barrier/dam object: Sianów weir ruins , Unieść basin, Polnica river

Localisation/place: Sianów municipality, West Pomerania

Hydraulic head/height of dam: 2 m. Not used



Suitable spawning conditions down and upstream the the dam: The suitable spawning conditions are observed at upper 15 km of the river.



Connectivity (length to upstream barrier; downstream connectivity, length to Baltic Sea)

The Polnica is second priority Baltic Sea tributary, accessible for all migratoiry species..

Observation of Salmonids down- and upstreams barrier today

Downstreams from the weir every year some sea trout are observed.

Other info: The removal of the dam would open the river for sea trout migration to the habitats with the high potential for sea trout.

Coalition Clean Baltic

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Published in 2021

With the contribution of the LIFE financial instrument of the European Community.
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