

AFTER LIFE ACTION PLAN

LIFE13NAT/PL/000009

*Active protection of water-crowfoots habitats
and restoration of wildlife corridor in the River Drawa basin in Poland*

LIFEDrawaPL



REGIONAL DIRECTORATE FOR ENVIRONMENTAL PROTECTION IN SZCZECIN

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Project co-financed by the European Union under the LIFE+ Financial Instrument
and the National Fund for Environmental Protection and Water Management in Warsaw

I. Project characteristics

I.1 Information about the project

Project location: West Pomeranian Province, Poland

Project acronym: LIFEDrawaPL

Project number: LIFE13NAT/EN/000009

Project duration: 2014-2022

Project budget: 6 730 292 €

Beneficiary: Regional Directorate for Environmental Protection in Szczecin

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Map of the project area

I.2. Project objectives

The LIFE Drawa PL project was implemented in several areas belonging to the European Natura 2000 network of protected areas, where the main objective is to protect the habitat *Ranunculus fluitans* 3260. These areas were PLH320046 Drawa River catchment area with the adjacent "Uroczyska Puszczy Drawskiej" area (part of Drawa National Park); PLH320023 "Jezioro Lubie I dolina Drawy"; PLH320039 "Jeziora Czaplinskie" and adjacent catchments of the Radew and Grabowa rivers (included in the protection area, as part of PLH320022 "Dolina Radwi, Chocieli I Chotli" and PLH320003 "Dolina Grabowej"). The main objective of the project was to improve the ecological conditions of habitat 3260 occurring in watercourses of plain to mountain levels with *Ranunculus fluitans* vegetation," by removing adverse anthropogenic changes in the river systems of Drawa, Radew and Grabowa.

The following priority tasks were designated and implemented:

- restoration of natural morphological elements of the riverbed topography - 70 prisms
- construction of spawning grounds (stone and gravel prisms) for fish and lamprey - 8 objects
- restoration of the connectivity of river channels through reconstruction of part of the hydrotechnical infrastructure in the Drawa catchment area - 5 fish ladders
- a special device was made - a barrier guiding fish migrating downstream the Drawa River (mainly salmonid smolts) to the fish ladder at HPP Kamienna
- construction of 4 camsites along the Drawa and Korytnica rivers, including 3 outside the Drawa National Park to channel tourist traffic
- the reintroduction of the opposite leaf pondweed *Groenlandia densa*, which has reappeared in friendly places after 4 decades - the potential area of tributary river habitat at the monitored 13 sites in 2021 was 338 m²
- activities to protect river ecosystems, by actively counteracting poaching, especially during the spawning season of bi-environmental fish species and lampreys - patrol actions in the field, the formation of the Anti-Poaching Coalition
- elimination and reduction of threats (and their negative effects) affecting the already achieved project goals - treatment of the removal of the invasive species (yellow dotterel *Mimulus guttatus*)
- conducting a broad educational and promotional campaign
- conducting monitoring studies, the main purpose of which was to indicate the effectiveness of planned restoration activities.

I.3. Main activities implemented in the project

The technical barrages inventoried in the Drawa River basin were of various types, and hence the methods of making them passable varied. The project team, with the expert support of the Steering Group Experts, selected the most effective types of opening obstruction under the circumstances. A total of eight improvements were made for fish and other aquatic organisms migrating through the river. At the Kamienna hydroelectric power plants in Głusko, Drawsko Pomorskie and on the Korytnica in Jażwiny, at the weirs on the Korytnica in Sówka, the ruins of the weir in Głębozec on the Drawa, and the remains of the water junction in Złocieniec. The remnants of the sill on the Korytnica River

between Sówka and Jaźwiny were also cleared by making a gravel prism, raising the water level below the sill. In places where terrain conditions did not allow solutions close to nature, technical slotted passages with rough bottoms were made. When conditions were favorable, close-to-nature bypass channels were made, including one using the principles of riverbed equilibrium, and another using rock blocks as energy dissipators and flow stabilizers. In one case, in Złoceniec, a bottom ramp was made using grouted rock technology, i.e. boulders embedded in concrete. For most of the embankments, a sequence of gravel and stone prisms was made as an addition to the stream channel, as an additional stabilization of the bottom and an increase in morphological diversity

As already mentioned above, as part of the restoration of morphological connectivity, the project has built fish ladders that allow two-way migration of fauna. Some of them are solutions close to nature, i.e. :

The close-to-nature bypass channel in Głębczek was made as an imitation of a natural stony river without the use of concrete. Durability was ensured by selecting appropriate gradients in the rapids-ploso sequence and graining the gravel-stone mixture, on which a layer of large stones was laid. Their size is based on hydrodynamic equilibrium calculations according to Hey Thorne's equation.



A half technical bypass channel made of large boulders on the Korytnica River in Jaźwiny.



A bottom ramp in the lower section of the Sucha stream built as a protection of the intensely eroding slope of the road embankment for the protection of the only water crowfoot site of proper conservation status in the Drawa National Park.



The others are **technical solutions** whose efficiency was increased by introducing a rough bottom, the purpose of which is to slow down the speed of water in the bottom zone. Slotted fish ladders resistant to fluctuating water levels have been made to ensure continuous operation of the facilities



The largest of the fish ladders completed under the project is a slotted fish ladder at the Kamienna hydroelectric power plant in Głusko. It is a structure almost 250 meters long, consisting of 45 chambers with a volume of 30 m³ each. A layer of stones and gravel has been laid in the bottom of the fish ladder so that all groups of organisms can easily overcome the several-meter dam at the power plant, blocking the way up the watercourse.



Another is a **fish ladder with a gravel bottom** in Drawsko Pomorskie, Koleśno Street.



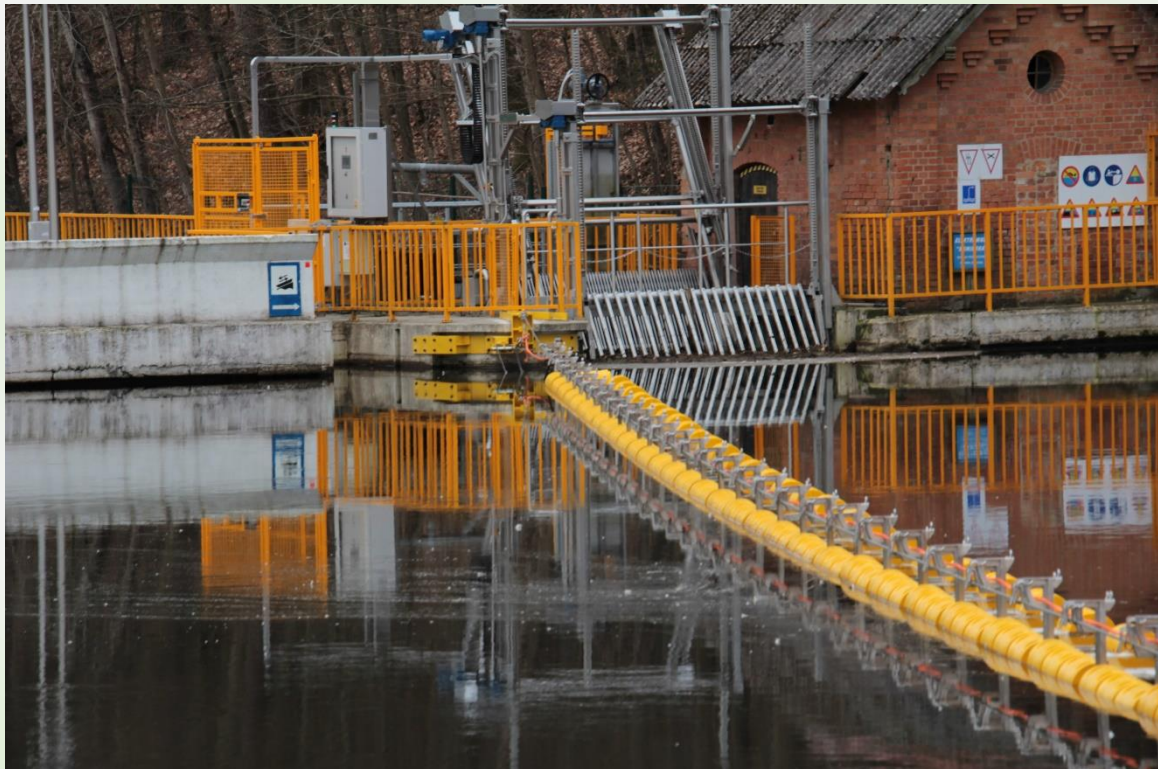
Another, much smaller **slotted weir with a rough bottom** was built as part of the project at the **Sówka weir on the Korytnica River**.



In order to level the threshold left by the weir in **Złocieniec**, a solution combining typical technical applications with nature-friendly methods was used. A **bottom ramp** was built there using **grouted rock** technology.

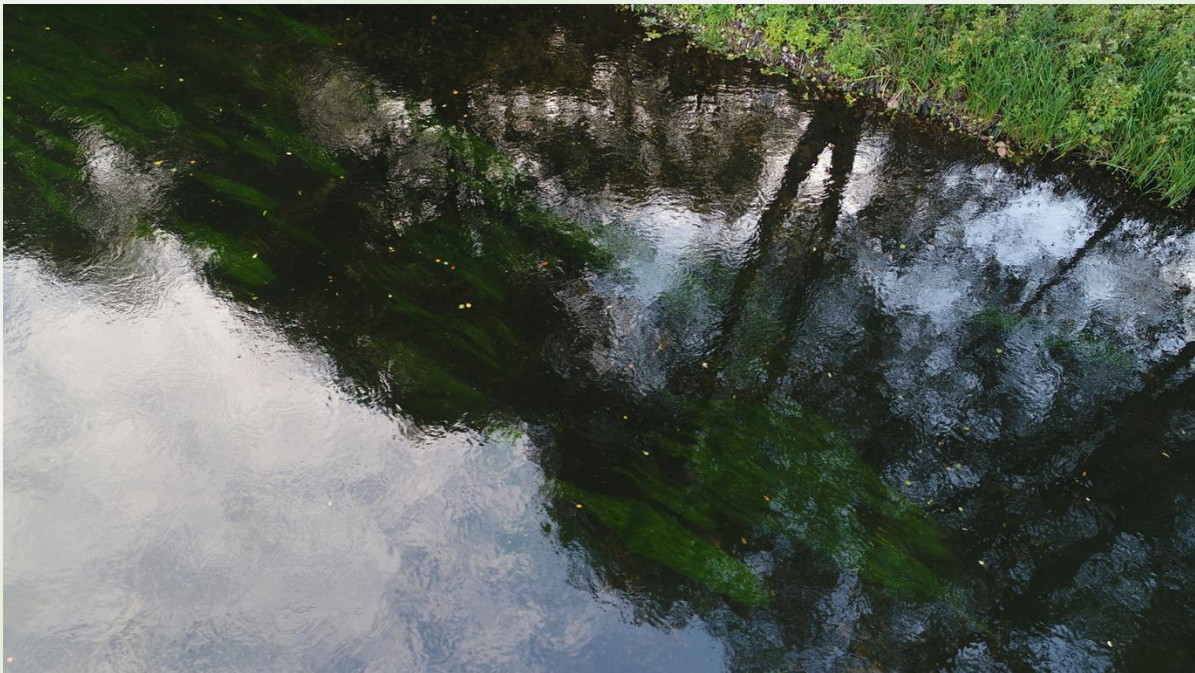


In addition, in view of the problem (characteristic of most technical fish ladders) of the downstream migrating salmonids smolts finding the entrance to the fish ladder at HPP Kamienna, a special device was built to direct fish coming down the river to the fish ladder (a new solution on a national scale).



In addition to barriers in the form of dams of various sizes or their remnants, inventoried at the project submission stage, heavily altered sections of the Drawa River and its tributaries were found during monitoring studies at the start of the project. Some of them turned out to be so divergent from the overall ecological condition of the Drawa that they required urgent restoration activities. These activities were carried out mainly by restoring the morphological diversity of the riverbed. To this end, sequences of rapids and pools were designed and introduced in accordance with the principles of gravel riverbed balance. A total of 70 such activities were carried out in the project area, most of them directly in the form of restoring sequences, and 8 in the form of restoring spawning areas. As far as the principle of construction is concerned, these are the same activities, based on calculating the strength of the watercourse stream at a given location and selecting the shape of the prism and the grain size of the gravel-stone mixture. Among the many ecological functions performed by diversified watercourse bottoms is the function of providing favorable conditions for aquatic plant species of the *Ranunculion fluitantis* association, which is directly related to the main goal of the project, i.e. improving the habitat conditions of 3260.

The ecosystem's response to the project can be seen in the photo below in the form of new patches of *Batrachium sp.* on the prisms made by the project.



Another noteworthy effect of the project's activities is the return of Atlantic salmon, whose wild fry have not been recorded in the Drawa River for 25 years. During the course of natural monitoring, several smolts were found in the renaturated sections of the Drawa and Korytnica rivers. Surveys and results from the fish scanner placed in the fish ladder at HPP Kamienna, showed the presence of a migratory population of cherts, as well as individual eels, which continue to run off the Drawa. Compared to the previous situation, the number of fish crossing the Kamienna hydroelectric dam increased by several hundred percent after the implementation of project activities.



A magnificent male salmon recorded in the scanner and one of the salmon smolts caught as part of the monitoring.

Throughout the project period, a number of field patrols were conducted with the main goal of protecting spawning bi-environmental fish and lamprey species (especially the aforementioned salmon). By the end of December 2021, a total of 193 anti-poaching patrols were conducted. Some of these were carried out in cooperation with the State and Community Fishery Guards. In addition, a video surveillance system was installed on the island near the "Kamienna" fish ladder to eliminate poaching in the area.

One of the species associated with tributary river habitat that disappeared in Western Pomerania in the late 1980s as a result of complex anthropopressure was the opposite leaf pondweed *Groenlandia densa*, an evergreen, riverine hydromacrophyte in the Potamogetonaceae family of pondweeds. In Poland, opposite leaf pondweed is a critically endangered species under strict legal protection and requires active protection, so attempts have also been made to reintroduce the species in the project areas. Attempts to reintroduce this extinct plant have been successful. However, this plant requires constant supervision due to its high sensitivity to anthropogenic factors. To ensure this in the most promising area, the beneficiary, in cooperation with the water and forestry administrations, has undertaken knitting to establish a nature reserve.



Extensive monitoring studies, both of the habitat and priority species, have confirmed the suitability of the selected solutions after less than a season. It remains to consistently monitor the development of the natural effects of project activities. The full picture of the effects of the project should emerge after several years of implementation, assuming the removal of additional anthropopressure factors unknown to the project's authors at the time of its preparation. These factors should be mitigated by additional conservation measures in the sections where they occur, outside the project area.

I.4 Ensure sustainability of project results

To ensure the sustainability of the activities carried out and their impact on the environment, it is necessary to include them in local laws. Most of the project activities were carried out in N2000 conservation areas and protected areas. This circumstance is conducive to the effective continuation of conservation activities, as each of these areas has planning documents to protect natural resources. During the course of the project, updates were made to the conservation task plans, to which the beneficiary submitted comments strengthening the legal protection of the resources. Thanks to the conducted field studies and the possibility of adaptive management of the project, an added effect has been obtained, which is the agreement with the forest and water administration on the establishment of the "Źródlińska Biegały" reserve. The beneficiary is in a rather privileged position when it comes to environmental protection, as it is itself a regional authority appointed for such protection. This gives confidence that, with regard to both the area and the general state of the environment, it will make every effort to at least maintain the current state of protection. Part of the project area also lies within a national park, established to protect resources, including habitats and species covered by the project. In order to ensure the sustainability of the effects of the tasks performed, for which the maintenance of the built infrastructure will be crucial, the beneficiary already at the initial stage of the project concluded agreements with "users of the environment", in which the parties undertook to cooperate in the implementation of the project, including the subsequent takeover of the infrastructure in question for use and maintenance. In this context, the sustainability of the tasks performed seems assured. In addition, it is planned to continue natural monitoring: ichthyological and habitat monitoring, to the same extent as in the project, which will allow the determination of further directions of activities to ensure the maintenance of the achieved ecological effect and perhaps its further improvement. At the same time, in order to continue research on the effectiveness of the device guiding smolts flowing into the inlet of the fish ladder near HPP Kamienna, a cooperation agreement was signed with the Inland Fisheries Institute in Olsztyn.

I.5. Situation analysis (SWOT analysis)

The nature of the project area is subject to many internal and external threats. They affect natural processes and the diversity of plant and animal populations and their habitats. The beneficiary of the project is the RDOŚ in Szczecin, a government administration body established to carry out tasks arising, inter alia, from the Law on Nature Protection, which guarantees formal-legal influence on the management of the state of the quality of the natural environment in the project area, among other things, by influencing environmental decisions issued and local laws enacted. Some of the tasks carried out were performed in a legally protected area, i.e. the Drawa National Park and its buffer zone, which, among other things, through statutory activities undertaken by the Directorate of the National Park, guarantees the maintenance of the ecological effect in this area.

| Strengths | Weaknesses |
|---|---|
| <ul style="list-style-type: none"> - Strong and stable state authorities responsible for the protection and management of Natura 2000 areas; - The area of operation is of natural value and is important in the network of Protected Areas; - Drawa National Park belongs to the group of parks that are very successful in raising funds for active conservation, and the Park's activities ensure the continuation of some active conservation measures for selected species and habitats; the Park also cooperates with natural non- governmental organizations that can effectively support the Park's activities by raising additional funds for conservation and education; - The institution overseeing the project area - the RDEP in Szczecin has experience in conducting active protection activities; - The infrastructure produced makes it possible to maintain the good condition of the objects of protection of the Natura 2000 area without incurring additional costs; - Experienced administrative and research staff; - Development of public awareness, especially in the area of project activities; - Strengthening cooperation to reduce poaching in the region; - Understanding and commitment on the part of hydropower facility operators to solve environmental problems generated by hydroelectric dams; - Understanding of the importance of and commitment on the part of canoe tourism operators to maintain high quality natural environments as one of the determinants of tourism demand | <ul style="list-style-type: none"> - Progressive climate change and its consequences, including increased groundwater withdrawals in the basin; - No impact on human activities throughout the catchment; - The long distance to be covered by diadromous species - about 500 km from the Baltic Sea to the Drava River; - Lack of a unified strategy and plan to protect species and their habitats from invasion by alien species. Lack of detailed identification of pathways for invasive alien species to enter environments; - Lack of full understanding of the need for active protection of the natural environment among those involved in environmental protection at various levels of government; - Lack of adequate knowledge about the biology and ecology, as well as methods of active protection of species and habitats covered by the project among local communities, which implies a low level of ecological awareness and often unfriendly attitudes towards nature and the conservation measures taken; - The limited nature conservation funds and the lengthy procedures for obtaining them from external sources, which limits the possibility of taking urgent conservation measures and forces the planning of activities well in advance, which, given the dynamics of nature, is an additional problem- there is likely to be a conflict between tourism and the conservation needs of the habitat in question. |
| Opportunities | Threats |
| <ul style="list-style-type: none"> - Increased environmental awareness of small/local communities, especially in the area of project activities; - Trend in society to "be eco," and live in a healthy environment; - Strengthening, thanks to the project, cooperation with various public bodies, universities, NGOs, and entities and individuals in the field of aquatic ecosystem protection, which increases the chances of future, efficient undertaking of further conservation measures for these ecosystems and joint acquisition of funds for their implementation, as well as provides better supervision of the performed activities; - Promoting the results of the project to encourage other entities and local communities in continuing aquatic habitat activities; - The emergence of new players, such as the Drawa enthusiasts' association, and greater involvement of the tourism and angling communities focused on sustainable use of resources to ensure the sustainability of the activities undertaken; - Strengthening cooperation to reduce poaching in the region; - Drawa National Park, by virtue of the Law on Nature Protection, must protect the natural environment from | <ul style="list-style-type: none"> - Increasing pressure on water resources, both directly in the form of water abstraction and indirectly through increasing nutrient emissions; - Poorly conducted maintenance work in rivers; - Increased interest in hydropower; - Intensive management on land in the Drawa catchment area; - Global climate change and long periods of drought, which drastically destroy riparian habitats; - High unit costs of conducting conservation activities; - High mortality of juveniles and spawners of bi-environmental fish and lamprey species; - Progressive lowering of groundwater and disappearance of 3260 habitat conditions; - The very high cost of carrying out some conservation activities (e.g., construction of fish ladders) can pose a serious threat in raising funds for habitat improvement, -The appearance of new invasive species of geographically alien plants can threaten the sites of valuable native species and overall biodiversity. - Difficulties in maintaining the project's environmental effect may change local communities' perceptions of conservation efforts and reduce their support for similar activities. |

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| <p>the negative impact of tourism;</p> <ul style="list-style-type: none"> - The development of strategic actions by the General Directorate for Environmental Protection on the possibility of combating alien species that significantly threaten native wildlife, as well as the analysis of pathways for the unintentional introduction or spread of these species, will allow more effective control of dangerous species; | <ul style="list-style-type: none"> - A malfunctioning system for prosecuting and punishing fishing poachers. |
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In the planned activities, both during the life of the project and thereafter, it is a matter of priority to reduce or eliminate the weaknesses and threats that result from the above analysis. The lack of adequate knowledge in society about nature conservation, its importance for various spheres of life, threats and methods of implementation should be leveled by increased educational activities. These activities will be addressed to a wide audience, including professionals in the field of nature protection, such as employees of municipal, county and city offices. On the other hand, the Drawa National Park should strive to reduce threats to native wildlife using its strengths, which undoubtedly include its broad staff, consisting of experienced scientific and research workers, specialists in the protection of forest and aquatic ecosystems, and educators.

II. Plan objectives and methodology

II.1. Conservation needs

The conservation measures included in the completed project reflect well the needs of individual species or natural habitats. However, in addition, the main ways of eliminating or reducing threats and their effects include the removal of alien species, in the case of LIFEDrawaPL especially the yellow dotterel, through its manual removal along with the disposal of the harvested biomass, as well as the removal of sources of expansion of invasive species, including plantings near forest lodges, villages, etc.

A separate problem is poaching activity directed especially at the catch of migratory salmonids during spawning, which effectively limits the size of the reproductive population. In order to reduce this harmful and illegal practice, as a result of the beneficiary's actions, an Anti-Poaching Coalition was established, whose main goal is to jointly take measures to eliminate this threat.

In addition, it should be emphasized that in the sections of rivers on which restoration has been carried out, the key to maintaining the achieved ecological effect will be the proper conduct of maintenance work by State Water Farm Wody Polskie (PGW WP).

II.2. Long-term goals

- a. Ensure that the natural habitats and species for the protection of which each N2000 area was designated are not lost.
- b. Ensure the continued existence of species and natural habitats in the area and identify necessary conservation measures.
- c. Establish conservation measures of a "purposeful" nature, i.e., focused on achieving specific outcomes.
- d. Conduct regular monitoring of the achieved environmental effects.
- e. Continuation of educational activities and promotion of the results obtained as a result of the project.

II.3. Activities that maintain the results of the project after its completion

Some activities, carried out within the framework of the project, will need to be continued after its completion. These are activities necessary to maintain the results of the project.

Table 1 summarizes all the activities carried out under the project, indicating which ones will need to be continued and specifying which institutions/organizations will be necessary to involve in their implementation.

Table 1. Summary of project activities with identification of the extent of necessary follow-up

| <u>Action</u> | <u>The need for continuity</u> | <u>Responsible party</u> | <u>Possible sources of funding</u> | <u>Estimated cost of the measure</u> |
|--|--|--|--|--------------------------------------|
| A.1 Preparatory activities for project implementation including organization of the project office | No. Preparatory activity in the project. It was directly related to its implementation. | - | - | - |
| A.2 Obtain the technical documentation necessary to commence the planned construction work and obtain the required permits and agreements | No. Preparatory activity in the project. It was directly related to its implementation. | - | - | - |
| A.3. Consultation trips to Germany to prepare the reintroduction of duckweed in Poland | No. Preparatory activity in the project. It was directly related to its implementation. | - | - | - |
| A.4 . Public procurement | No. Preparatory activity in the project. It was directly related to its implementation. | - | - | - |
| C.1.* Preparation of material and reintroduction of <i>Groenlandia densa</i> | Yes. There is a need to continue research on the reproduction and adaptation to natural conditions of the opposite leaf pondweed <i>Groenlandia densa</i> | RDOŚ in Szczecin ¹ in cooperation with the West Pomeranian University of Technology in Szczecin and Adam Mickiewicz University in Poznań. | Own funds of: RDOŚ in Szczecin, West Pomeranian University of Technology in Szczecin, Adam Mickiewicz University in Poznań , NFOŚiGW ² , WFOŚiGW ³ | About 10 thousand PLN/year |

¹ Regional Directorate for Environmental Protection in Szczecin

² National Fund for Environmental Protection

³ Regional Fund for Environmental Protection

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| C.2.** Preparation of gravel and stone bed for reintroduction of <i>Groenlandia densa</i> | YES. Approximately 625 m ² of gravel sites were created for the development of water crowfoot habitat. In addition, a procedure was carried out to remove an invasive species - yellow dotterel <i>Mimulus guttatus</i> , which absolutely must be continued , as it threatens at some sites the effects of the reintroduction carried out. | RDOŚ in Szczecin in cooperation with Polanów Forestry Commission | NFOŚiGW, WFOŚiGW | About 100 thousand PLN /year |
| C.3. Construction of an erosion control solution for the protection of water-crowfoot | No. Infrastructure task, does not need to be continued after the completion of the project, but only to ensure that the infrastructure is maintained in good working order. | RDOŚ in Szczecin in cooperation with Strzelce Krajeńskie District Office and Drawa National Park | - | - |
| C.4.1. Bystrotok in Złocieniec | No. Infrastructure task. Does not require continuation after the project is completed, but only to ensure that the infrastructure is maintained in a good state of repair | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Bydgoszcz and the Municipality of Złocieniec | - | - |
| C.4.2. Bystrotok in Głębozec on the Drawa River - at the Old Mill (km 162+250) | No. Infrastructure task. Does not require continuation after project completion, only ensuring that infrastructure is maintained in good working order | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Bydgoszcz and the Municipality of Czaplonek | - | - |
| C.4.3. Shaping the cross profile of the watercourse bed | Yes. The task does not need to be continued in terms of implementation of gravel and stone prisms after the project is completed. Key to maintaining the ecological effect of the task will be the proper conduct of maintenance work by PGW WP on the sections of rivers where restoration has been carried out. Regardless of the completed project, it is important to continue to replicate the measure in other sections as water maintenance in accordance with the NAPP ⁴ project period developed ³ , including the inclusion of a section in the Drawa basin pilot. | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Szczecin and Bydgoszcz together with water supervisors | The action of properly conducting maintenance work does not generate additional costs. | |
| C.4.4. Passes and bypasses on the Korytnica River (3 hydrotechnical facilities). | No. Infrastructure task. Does not require continuation after the project is completed, but only to ensure that the infrastructure is maintained in a good state of repair. | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Bydgoszcz | - | - |

⁴ National Surface Water Restoration Program

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| C.4.5.*** Purchase and installation of electrical and electronic barriers | <p>Yes. As part of the task, a special device was made - a barrier to guide fish coming down the river (mainly smolts) to the fish ladder at HPP Kamienna.</p> <p>The task of operating the device (unfolding and folding the barrier once a year) and ongoing maintenance and upkeep needs to continue after the project is completed.</p> <p>For a period of 8 years after the completion of the project, the device will be operated directly by the Contractor on the basis of the settlement agreement, at no additional cost. After this period, the task will be carried out by Drawa National Park staff in cooperation with the beneficiary.</p> | RDOŚ in Szczecin in cooperation with Drawa National Park | Own funds: RDOŚ in Szczecin, Drawa National Park, WFOŚiGW, NFOŚiGW | About 4 thousand PLN/year |
| C.5.1. The fish ladder (reconstruction) on EW Kamienna at km 31 + 075 | <p>Yes. The task in terms of the constructed fish ladder does not need to be continued after the completion of the project, but only to ensure that the infrastructure is maintained in a good state of repair.</p> <p>In connection with the retrofitting of the fish ladder with a mechanical cleaning grating, it is necessary to continue the task of operating and maintaining the grating on an ongoing basis. The task will be carried out by Drawa National Park staff in cooperation with the beneficiary.</p> | RDOŚ in Szczecin in cooperation with Enea Nowa Energia Sp. z o. o. and Drawa National Park | Own funds: RDOŚ in Szczecin, Drawa National Park, WFOŚiGW, NFOŚiGW, FEnIKS ⁵ , FEPZ ⁶ | About 45 thousand PLN per year (cost of service with travel) |
| C.5.2. Drawsko Pomorskie fish ladder at km 130+500 at Koleśno SHPP | <p>No. Infrastructure task. Does not require continuation after the project is completed, only ensuring that the infrastructure is maintained in a good state of repair.</p> | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Bydgoszcz | - | - |

⁵ European Funds Program for Infrastructure, Climate, Environment 2021-2027

⁶ European Funds for Western Pomerania 2021-2027

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| C.6. Construction of spawning grounds in the rivers Korytnica, Radew and Grabowa | Yes. The task does not need to be continued in terms of the implementation of gravel and stone prisms after the completion of the project. Key to maintaining the ecological effect of the task will be the proper conduct of maintenance work by PGW WP on the sections of rivers where the measure was carried out. Regardless of the completed project, it is important to continue to replicate the measure in other sections as water maintenance in accordance with the NAP developed during the project period. | RDOŚ in Szczecin in cooperation with Regional Water Management Board in Szczecin and Bydgoszcz together with water supervisors | The action of properly conducting maintenance work does not generate additional costs. | |
| C.7.**** Measures to protect river ecosystems | Yes. Further cooperation is needed to protect anadromous salmonid populations from poaching during spawning. | RDOŚ in Szczecin in cooperation with Drawa National Park, Regional Directorate of State Forests in Szczecin, Provincial Police Headquarters in Szczecin, the District of the Polish Angling Association in Gorzow Wielkopolski, and the Drawsko District Social Fishing Guard. | Own funds: RDEP, Drawa National Park, WFOŚiG, NFOŚiGW, FENIKS, FEPZ, LIFE. | Full cost of further activities impossible to estimate at this stage - dependent on the scope of jointly developed tasks About 100 Thousand PLN/year for the implementation of ongoing cooperation. |
| C.8. Channelization of tourist traffic in the Drawa basin | Yes. Tourist infrastructure was carried out in the form of 4 camping sites, including 3 outside the DPN area to reduce tourist pressure on the most naturally valuable section of the Drava River. In addition, canoe trail signage was carried out. The task requires ensuring that the infrastructure is maintained in a good state of repair. The activity should continue outside the DPN area to a similar extent, but at the local government level. | RDOŚ in Szczecin in cooperation with Drawa National Park, Drawno forestry, Złocieniec Municipality and Local and regional governments in cooperation with local stakeholders | Local governments' own funds WFOŚiG, NFOŚiGW, FENIKS, FEPZ, Interreg. | Cost of further activities impossible to estimate at this stage - dependent on the scope of the tasks undertaken |
| C.9. Construction of a viewing tower in DPN | No. Infrastructure task. Does not require continuation after the project is completed, but only to ensure that the infrastructure is maintained in a good state of repair. | RDOŚ in Szczecin in cooperation with Drawa National Park | - | - |

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| D.1 Initial condition monitoring - "0" | No. Preparatory activity in the project. It was directly related to its implementation. | - | - | - |
| D.2.***** Monitoring of the condition of natural conditions on natural habitat 3260 Lowland and submontane rivers with Trichinella communities of <i>Ranunculion fluitantis</i> | Yes. It is necessary to continue monitoring of the ecological effects of the implemented impoundments and restoration activities on the status of the 3260 tributary river habitat. | RDOŚ in Szczecin in cooperation with the West Pomeranian University of Technology in Szczecin and Adam Mickiewicz University in Poznan. | NFOŚiGW, WFOŚiGW, EnIKS, FEPZ, LIFE. | About 140 thousand PLN/year monitoring covering a full research season |
| D. 3.***** Monitoring of fish and lampreys of Annexes II, IV and V of the Habitats Directive (92/43/EEC), including: 1106 <i>Salmo salar</i>, 1163 <i>Cottus gobio</i>, 1149 <i>Cobitis taenia</i>, 1099 <i>Lampetra fluviatilis</i> | Yes. It is necessary to continue monitoring the ecological effects of the project in terms of improving the quality and availability of new habitats, especially for migratory species, and to assess the impact of the performed activities on the population status of individual protected species. In addition, it is necessary to continue the task of maintaining and operating and reading the fish monitoring scanner mounted on the fish ladder at HPP Kamienna, as well as conducting surveys using PIT tags to determine the effectiveness of guiding smolts flowing into the fish ladder. | RDOŚ in Szczecin in cooperation with Drawa National Park. | NFOŚiGW, WFOŚiGW, EnIKS, FEPZ, LIFE. | About 325 thousand PLN/year monitoring covering two research seasons of spring and autumn/winter. About 15 thousand PLN /year cost of operating the scanner |
| D.4 Evaluate the impact of the project activities on the socio-economic aspect | No. A report assessing the project's impact on the socio-economic aspect was developed as part of the project. | - | - | - |
| E.1 Information and educational materials | YES. The task after the completion of the project, will require ensuring that the made information and educational boards are maintained in good technical condition | RDOŚ in Szczecin | NFOŚiGW, WFOŚiGW, | About 70 thousand PLN /for 5 years |
| E.2. MASS MEDIA | Yes. The project's bilingual website will be maintained for at least 5 years after project completion www. drawalifeplus.rdoszczecin.pl . | RDOŚ in Szczecin | Own funds | About 1 thousand PLN/year |
| E.3 Conferences | No. The opening and closing activity of the project. | - | - | - |
| E.4 Workshops | No. Educational activities carried out under the project. Further educational activities will be carried out under own tasks. | - | - | - |
| E.5 Active education | No. Educational activities implemented under the project. | - | - | - |
| E.6.Layman's report and scientific report | No. The activity implemented under the project | - | - | - |

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|---|---|------------------|--|--|
| E.7. Permanent exhibition in Ostrowite on the territory of the Drawa National Park promoting the project | No. Activities implemented under the project. It does not require continuation after the completion of the project, but only to ensure the maintenance of the exhibition | - | - | - |
| F.1 Project management | No. A task directly related to the implementation of the project. | - | - | - |
| F.2 Establishment and operation of the Contract Office | No. A task directly related to the implementation of the project. | - | - | - |
| F.3 Steering Group Activities | No. A task directly related to the implementation of the project. | - | - | - |
| F.4 Monitoring the progress of the project | No. A task directly related to the implementation of the project. | - | - | - |
| F.5.***** Networking with other projects | YES. It is planned to maintain cooperation with beneficiaries of other projects, including those financed by the LIFE program, to take part in conferences, symposia and seminars where the results of the project will be presented | RDOŚ in Szczecin | Own funds of RDOŚ in Szczecin, WFOŚiGW | Cost of further activities impossible to estimate at this stage - dependent on the scope of the tasks undertaken |
| F.6 External financial audit | No. A task directly related to the implementation of the project. | - | - | - |
| F.7 Preparation of After-Life Action plan | No. A task directly related to the implementation of the project. | - | - | - |

* Task C. 1 In 2018, 13 monitoring sites were established at reintroduction sites of opposite leaf pondweed *G.densa*. These sites were included in the permanent monitoring of the conservation status of the reintroduced population of opposite leaf pondweed, as well as the status of the tributary river habitat (3260) into which it was introduced. The results were summarized annually, with the end of the growing season in site monitoring cards, which provided an opportunity to compare results in subsequent years and determine trends of change. Finally, in 2021 when the measure was completed, opposite leaf pondweed persisted at 5 of the 13 sites and a patch with a total area of 16.6 m² was obtained. The potential area of tributary river habitat at the monitored 13 sites in 2021 was 338 m². The variability of results in subsequent years of monitoring (2018-2021) is a result of changing habitat conditions, weakening groundwater recharge of surface watercourses and overgrowth of sites with competing vegetation.

** Task C.2. In the course of trenching work, a serious problem was observed - the occurrence of an alien species, the yellow dropwort *Mimulus guttatus*, which has a category III invasiveness rating and poses a threat to native flora and natural plant communities. At the sites where dense pondweed was reincorporated, the yellow dropwort *Mimulus guttatus* has taken over the area of the headwaters and the bank zone of the headwaters of the valley of the Biela River watercourse, a tributary of the Białka River (Zielenica) - site located in Polanów Forest District Forestry Żytnik Branch 19d. The grantee decided on the need to remove the dotterel in order to eliminate the risk of its expansion to the inbreeding sites. The removal of the species should be carried out manually, along with the removal of the underground decomposers before the phase of its flowering and seed release.

*** Task C.4.5 The project has also addressed the problem of flowing smolts finding the entrance to the fish ladder at HPP Kamienna. For this purpose, the fish ladder has been retrofitted with a device that is innovative in the country, the so-called directing barrier, whose task is to direct fish coming down to the entrance of the fish ladder from the upper water side. The solution was developed with the participation of members of the project team and GS representatives, based on solutions used in America and Sweden. The barrier is an installation about 96m long, consisting of 60 interconnected segments, equipped with a set of round floats. The height of the barrier segment (the part submerged in water) is 1.0m, with the possibility of dividing it into two elements of 0.5m each. The upper part is made of solid sheet metal, the lower part is made of mesh with a mesh of less than 15 mm. The height of the barrier (0.5m or 1m) can be freely adjusted before installation, depending on the shape of the bottom found before installation. The route of the barrier was determined on the basis of bathymetric surveys and studies of water flow velocities in selected sections of the dam reservoir of the Hydroelectric Power Plant. Post-project activities assume the need to further test the effectiveness of the device using the method of marking fish with tags encoded using RFID technology. The applied innovative technical solution, may bring an added effect of the project in the form of further replication of the solution to other fish ladders or hydroelectric devices aimed at improving fish migration conditions.

**** Task C. 7 A number of field patrol actions were carried out throughout the project period, with the main goal of protecting spawning bi-environmental fish and lamprey species (especially salmon). Key to improving the conservation status is the strengthening of cooperation between departments, NGOs and fishing users in the project areas. To this end, the beneficiary has sought the formation of an anti-poaching coalition. In addition to patrolling activities, the beneficiary has tried to draw attention to the need to strengthen protection, both of ichthyofauna itself and of river and water-

dependent habitats. The project team actively participates in the development of Conservation Task Plans, and works with water and forestry administrations, and the National Park to improve conservation.

***** Task D. 2. monitoring of the state of natural conditions relevant to the functioning of natural habitat 3260 "Lowland and submontane rivers with water crowfoot (*Ranunculion fluitantis*) communities" consisted of: hydrological mapping, geomorphological mapping, assessment of sediment lithology, physicochemical studies of waters, hydrobiological monitoring. Each designated site was analyzed for current conditions and potential threats to the vegetation characteristic of this habitat. Monitoring carried out in 2020 did not show that the condition of habitat 3260 in the study catchments was deteriorating. Compared to the state found in the "0" monitoring in 2015, there were no negative trends manifested in the disappearance of indicator plants or reduction of their range. It was concluded that some recognized spatial changes are the result of adaptation of plants to the natural dynamics of the river environment than a reaction to adverse conditions

***** Task D. 3 Surveys for monitoring fish and lampreys from Annexes II, IV and V of the Habitats Directive (92/43/EEC), including: 1106 *Salmo salar*, 1163 *Cottus gobio*, 1149 *Cobitis taenia*, 1099 *Lampetra fluviatilis* were separated into 2 parts: strictly natural and "technical". Part I - natural monitoring is a total of 3 tasks, which included the study of macrozoobenthos, among others. as a food base for fish (especially for juvenile salmonids); monitoring of ichthyofauna (using the electrofishing method) to assess the population status and habitat quality of the project's guide species and their activity in terms of upstream migration; counting spawning nests of bi-environmental salmonids and river lamprey, as an indicator of obtaining permeability. All of the above-mentioned surveys were carried out twice, in the cycle of the autumn season of 2019 and the spring season of 2020. Meanwhile, Part II - technical monitoring consisted of 2 tasks, i.e., testing with the help of the RFID system the functionality of 4 fish ladders on the Drawa and Korytnica with the use of previously tagged fish with PIT tags (smolts and fish caught directly under the fish ladder) and analysis of data (monitoring) from the fish scanner placed in the fish ladder at HPP Kamienna.

***** Task F. 5. activities to promote the project and its results. These activities will consist of both presenting the results of the project at various types of meetings (conferences, symposiums, seminars, workshops) and including information about the project in materials for the continuation of certain activities.

Post-project action plan

Sustainability of activities

With regard to ensuring sustainability, the beneficiary, by virtue of its charter, is partly able to carry out ongoing supervision and management of the project area on its own by carrying out its tasks in N2000 areas or for projects that may affect these areas. Most of the N2000 areas covered by the project have updated ten-year conservation task plans that specify the areas' conservation objectives, which is an important tool for securing the proper management of the areas and guaranteeing the security of the activities carried out by the beneficiary.

The section on the Drawa River, which is key to the sustainability of project activities, is located within the National Park, where statutory objectives along with the Nature Conservation Act provide institutional oversight and management consistent with project objectives. In some areas, the

beneficiary, as a participant in the Council of the Drawa National Park, has influence over the activities of the National Park, coinciding with the objectives of the project, so it follows that there is a mutual desire to ensure sustainability. A separate problem, but one that is very important in the process of maintaining the results obtained, is also the inclusion of additional, active protection of the lower (located outside the borders of the DPN at the junction of two provinces) section of the Drawa River, which is extremely important in the context of improving the condition of the entire catchment area of this river, which has been very heavily altered by man. Therefore, the beneficiary assumes permanent cooperation in this regard with the RDOŚ in Gorzow and Poznan.

Also in other cases, beyond the powers of ownership or acting directly as management, the beneficiary has entered into the necessary agreements with institutions and entities on whose lands the activities were carried out. The agreements entered into are intended to guarantee the maintenance of the constructed facilities for a period of at least 5 years after the completion of the project, however, ultimately these agreements are envisaged for a multi-year period in order to maintain the environmental effect produced by the project activities. On the basis of the agreements, the constructed infrastructural facilities serving directly to improve the conditions of ichthyofauna migration and to direct tourist traffic in the Drawa basin are systematically transferred to future users, including representatives of: State Forestry Company (Państwowe Gospodarstwo Leśne Lasy Państwowe), State Water Company (Państwowe Gospodarstwo Wodne Wody Polskie), Drawa National Park, Municipalities and Enea Nowa Energia Sp. z o. o.

Follow-up

The continuation of habitat improvement activities carried out under the project mainly concerns the management of restored sections and the monitoring and maintenance of some facilities. However, during the course of the project, part of the team also participated in the development of the National Surface Water Restoration Program. Within the framework of this study, pilot sections were selected, including on a tributary of the Drawa River - the Płociczna River, for which a methodology for restorative measures developed, among other things, on the basis of the effects obtained as a result of project tasks was presented. The beneficiary, within the framework of its competence, will undertake activities aimed at supporting the implementation of the restoration plan, as activities supporting the status of habitat 3260.

In view of the great importance of public support in the case of large-scale efforts to protect endangered habitats, the project team has implemented a series of information and education campaigns in the form of workshops and regional conferences, as well as a series of educational meetings. Their result (demonstrated by relevant surveys) is a general increase in the community's knowledge and awareness of the need and rationale for protecting the Tributary Rivers. Educational activities will continue also after the end of the project, among other things, through educational and information boards installed in the field, and thanks to the built viewing and educational tower at the fish ladder at HPP "Kamienna" in the Drawa National Park. Further promotion of the project results, which will be carried out within the framework of the RDEP's own tasks in Szczecin, should also be considered as a form of education.

Expanding the effects of the project

Monitoring activities (carried out in 2019 -2021) identified significant deterioration in the ecological status of the upper section of the Drava River. Aware of the risks to the project in the entire area without solving the problems of the upper section, the beneficiary has taken steps to co-create a project for the continuation of activities, mainly renaturalization and improvement of natural retention, as a way to permanently improve the ecological status of the entire Drawa basin.

Currently, the aforementioned project is planning:

- Restoration of the section of the Drawa River between Zlocieniec and Drawsko Pomorskie along with the lower section of the Kokna River;
- Renaturation of outflows from Rakowo and Maleszewo lakes in Zlocieniec;
- Restoration of the Drava River from its sources to Prosinko and from Kuźnica Drawska to Żerdno;
- Raising the ordinates of the bottom of the Drawa River in the Drawsko lake system, together with the restoration of connectivity with Lake Czaplino;
- The renaturalization of the upper reaches of the Plocotia River;
- Restoration of the Korytnica River in the Mirosławiec area.

Due to the current economic situation, it is difficult to estimate the exact costs of this project. It is assumed that they will be similar to the costs incurred in the implementation of the LIFEDrawaPL project.

Many parties, including NGOs, are interested in such a project, but at this stage the source of funding has not yet been determined.

As part of the continuation of the LIFEDrawaPL project, in-depth research is also being conducted on the bioaccumulation of heavy metals and other compounds present in flowing waters by the stems and roots of *Groenlandia densa*. Based on the approval of the GDOŚ (DZP-WG.6400.3.2020.EP), biological material in the form of a number of *G. densa stems* was obtained from the richest reintroduction site of this species located in the Manowo Forest District, Rosnowo Forestry - on the section of the Stara Radew River near Zegrze Pomorskie - Rosnowo, as well as from a site on Chwalimski Potok at the Geological Station in Storkowo, which is a co-partner in the project. The contract for conducting and studying the plant's bioaccumulation potential and the possibility of preserving them in in vitro tissue cultures was awarded to the West Pomeranian University of Technology in Szczecin. Research and breeding of opposite leaf pondweed *G. densa* is carried out by the Department of Plant Genetics, Breeding and Biotechnology at the Faculty of Environmental Formation and Agriculture at ZUT in Szczecin, and the activities are aimed at, among other things, securing the gene pool of the endangered species, as one of the modern methods of active protection of endangered species listed in the Regulation of the Minister of Environment of October 9, 2014 on the protection of plant species (Journal of Laws of 2014, item 1409). Material propagated in vitro in 3-month cycles in the form of rooted specimens of *G.densa* opposite leaf pondweed has so far undergone only one attempt at adaptation to natural conditions. The attempt to reintroduce the first specimens was too few and only a few specimens were able to be maintained, which did not survive the winter of 2021/2022.

Currently, the unit at ZUT in Szczecin has a large amount of propagation material (about 250-300

specimens) in good condition, and further research will be carried out to increase the chances of adaptation of opposite leaf dense pondweed seedlings obtained in this way to natural conditions. This is also an important method of preserving the gene pool of a critically endangered species, so research should continue on optimizing the propagation, storage and adaptation to natural conditions of opposite leaf pondweed propagated in this way. It can also be a model example of the application of modern methods of active conservation of endangered species.



Opposite leaf pondweed *Groenladia densa* - specimens propagated in vitro under laboratory conditions at the Department of Plant Genetics, Breeding and Biotechnology, ZUT, Szczecin



Specimens of *G. densa* prepared for reintroduction at the Chwalimski Potok site (11.08.2021)



On 11.08.2021, a field trip was held, during which about 30 specimens of *G.densa* propagated *in vitro* under laboratory conditions at the Department of Plant Genetics, Breeding and Biotechnology of the Adam Mickiewicz University in Szczecin were reintroduced in Chwalimski Potok at the Geoecological Station of the Adam Mickiewicz University in Storkowo.

A prerequisite for taking the above-mentioned actions is detailed recognition of the needs of individual species or groups of species and natural habitats. Therefore, it is necessary to carry out continuous natural monitoring, providing information necessary to plan protective actions. Particularly important is the identification and determination of ways to eliminate or reduce existing and potential internal and external threats and their consequences for the preservation of the proper state of protection of species and their habitats, which are the objects of protection.

III. Summary

The implementation of the LIFE13NAT/PL/000009 project, titled “*Active protection of water-crowfoots habitats and restoration of wildlife corridor in the River Drawa basin in Poland*” has contributed to the preservation and maintenance of the in good condition the habitat and population of species covered by the project in several Natura 2000 areas and in the Drawa National Park. Some activities were a continuation of conservation activities carried out by the Park for many years, and some were carried out for the first time. Some of these activities will be carried out in subsequent years, ensuring that the ecological effect achieved by the project is maintained.

The results obtained largely confirmed the effectiveness of the protective measures taken, allowed for their detailed analysis and the development of the most effective methods of operation. For example, the results obtained during the monitoring of the fish ladders using a scanner and RFID technology unequivocally confirmed the validity of their construction and effectiveness of their operation. The study shows that the fish ladders are used by fish of various species throughout the year (as many as 20 species in total) with a marked intensity of migration in spring and autumn. The majority of species easily cross the fish ladders both migrating upstream and flowing downstream. Importantly, the fish ladder at HPP Kamienna was also used by salmon and sea trout to migrate upstream in the catchment (as well as another bi-environmental species, i.e., the Vimba carp, which was also the most numerous species recorded at the fish ladder), which then usually spawned in the Drawa tributaries, also confirmed during ichthyofauna monitoring as part of the spawning nest counting task. The project also addressed the problem of flowing smolts finding the entrance to the fish ladder at HPP Kamienna. For this purpose, the fish ladder has been retrofitted with a nationally innovative device, the so-called directing barrier, whose task is to direct fish coming down to the entrance of the fish ladder from the upper water side. On the other hand, strictly wildlife monitoring shows that there is suitable habitat for the project's leading fish and lamprey species in the impounded parts of the Drava River basin, while confirming their presence (usually in the form of strong populations) in the sections below the now-improved baffles, which will allow them to colonize new areas. Interesting results were also obtained when surveying sections of watercourses that had undergone restoration through the construction of gravel rapids and spawning grounds for lithophilic species. The new, better quality habitats were willingly and massively populated by fish and lampreys with higher environmental requirements than eurytopic species, which indirectly confirmed that such habitats (especially in the upper Drawa) are always in short supply and their restoration is not only justified, but also most necessary. However, at the same time, the results obtained indicate that the very process of settling in and creating a suitable food base for fish takes much longer than previously assumed, and the habitat itself in the first period of operation is very vulnerable to changing environmental conditions.

The results of the project form the basis for a broad discussion of the most effective ways to protect the natural environment. They also prompt further projects in which these measures will be applied, expanded and subjected to detailed analysis of their effectiveness.

The effectiveness of all conservation activities depends to a large extent on the environmental awareness of local communities. The formation of appropriate attitudes towards nature in society is an extremely important task. Educational activities should therefore be continued and directed to very different groups of recipients (tourists, local entrepreneurs, farmers, foresters, conservation

services, teachers, etc.). The results obtained in the project and further activities planned after the project's completion will significantly contribute to the protection of the natural environment of the area in question, including the species and habitats covered by the project. An important element of the activities undertaken will be further promotion of the project results and making them available to all interested persons and institutions.