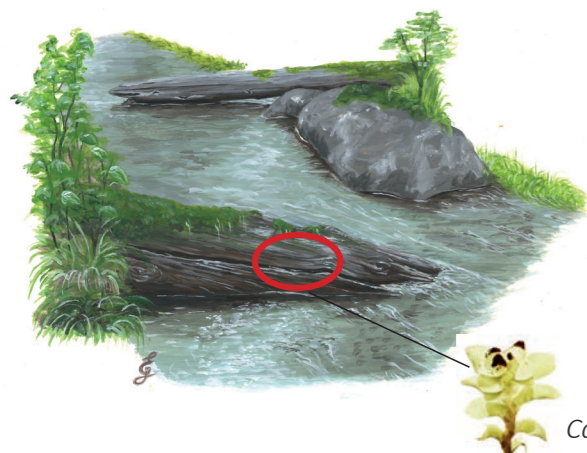


## TARGETED SPECIES

The project Rivers of LIFE specifically targets three species, the freshwater pearl mussel, the otter and the moss carinthian liverwort. All three species are included in the EU Habitats Directive. Planned project actions will restore lost habitats and strengthen populations of all three species. Although Rivers of LIFE specifically targets these three species, planned actions will benefit many more animal and plant species, including fish species such as trout and grayling.



Carinthian liverwort  
(*Scapania carinthiaca*)

**CARINTHIAN LIVERWORT** is a moss species growing on dead wood found in the riparian zone in areas that are periodically flooded. Decreasing amounts of dead wood in coniferous forest, especially along watercourses, is a threat to the species. Forestry management activities nearby or at the sites where carinthian liverwort is found are also a threat.



Left. Angler catching grayling in The River Voxnan. Photo: Bengt Olsson.



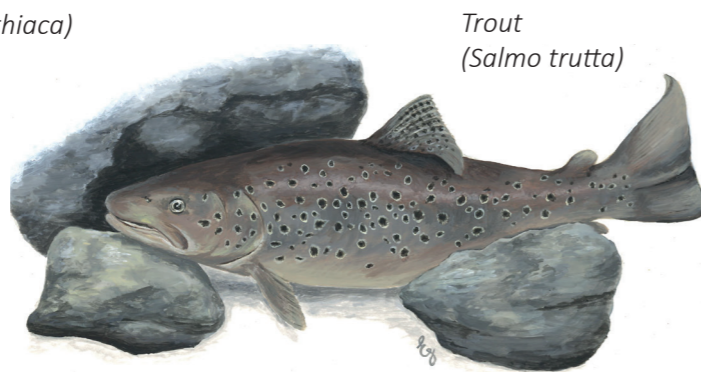
Fresh water pearl mussel  
(*Margaritifera margaritifera*)

**FRESH WATER PEARL MUSSEL** lives in running water on a riverbed of stone and gravel. The freshwater pearl mussel lives to several hundred years old! To complete its lifecycle, the species depends on viable and reproducing populations of trout and salmon. During development, the freshwater pearl mussel undergoes a parasitic larval stage attached to the gills of either trout or salmon. Reproducing populations of freshwater pearl mussel in a stream is a good indicator of a healthy freshwater ecosystem.

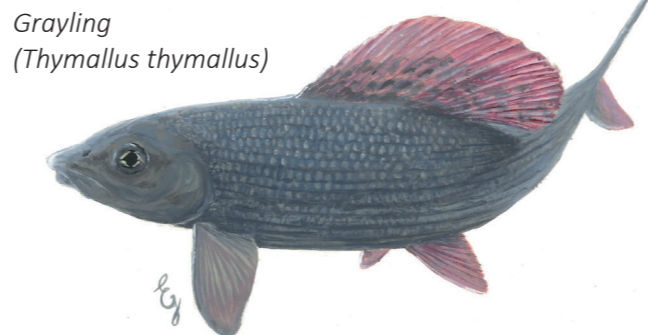


Otter  
(*Lutra lutra*)

**OTTER** favours river environments that offer abundant supplies of easily caught food throughout the year. The main food source for otters are river living fish. However, many river living fish are negatively affected by changes to the river ecosystem that occurred during the log-driving epoch or the establishment of hydro power plants, which also influence the otters' food supply. Otters also rely on suitable riparian zones for rest and protection.



Trout  
(*Salmo trutta*)



Grayling  
(*Thymallus thymallus*)

## PROJECT PARTNERS



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Restoring lost habitats in the rivers Ljusnan, Voxnan and Gimån



## RIVERS OF LIFE

The project Rivers of LIFE will recreate natural water environments in parts of the River Ljusnan, the River Voxnan and the River Gimån. Actions taken within the project will benefit biodiversity overall and fish populations in stream water habitats. Rivers of LIFE is a shared project between the County Administrative Boards of Gävleborg and Jämtland, and the project will run from fall 2019 to December 2025. The project is funded by a grant from the EU LIFE-programme (60 %) and the Swedish Agency for Marine and Water Management (30%), with support from the other project partners.

## NATURA 2000 NETWORK

Parts of The River Ljusnan, the River Voxnan and the River Gimån belong to the EU Natura 2000 network. Natura 2000 is a network of core sites for rare and threatened species or rare natural habitats, particularly valuable in a European perspective. The goal is to protect biodiversity. Through funding from the EU LIFE-programme, actions improving nature conservation in Natura 2000 sites are made possible.



*A watercourse cleared from large stones, boulders and other protruding obstacles during the log-driving epoch.*

*Photos: County Administrative Board Jämtland*

## HISTORICAL USE OF THE RIVERS

In the 1900th century, transporting timber by floating it in waterways, log driving, developed into an important business in the region. The log-driving epoch ended in the region in the 1960's once the labour-intensive log driving became unprofitable. Log driving was facilitated by removing large stones and other natural obstacles from the waterways, straightening streams and making them narrower. Extensive stone-banks were also built to block side-streams and steer the timber downriver. These measures have had an immense impact on the riverine morphology, hydrology and ecology. The natural stream environment once supported a rich diversity of plants, insects and animals, but when the stream environment was altered into straightened channels, the mosaic of natural habitats both in the river and in the riparian zone, disappeared.

When the transportation of timber became land-based, a large road network evolved in the Swedish forests. This caused further problems in many of the smaller stream environments. For example, older techniques to construct road-culverts often blocked the routes of migratory fish.

*Left. Blasting to facilitate log-driving in the waterways, beginning of the 1900th century. Picture by permission from Ateljé Rehnströms, Ljusdal.*



*After actions to restore the same watercourse, large stones, boulders and dead wood have been returned. This creates a mosaic of habitats supporting a rich biodiversity.*

## RESTORING LOST HABITATS

The planned actions within Rivers of LIFE will be done to restore the natural habitats of waterways altered by man during the timber-floating epoch. The actions will benefit species living in the stream environments or in the riparian zone.

- Restore lost stream habitats by returning stones and boulders to the waterways. Natural riverbeds essential for spawning of trout will be restored by placing out new gravel.
- Restore deadwood habitats to benefit the moss carinthian liverwort.
- Remove obstacles that block the routes of migratory fish and other water-living species.
- Re-introduce the freshwater pearl mussel to appropriate stream sites.
- Restore the hydrological conditions in a forested wetland area by closing man-made ditches draining the wetland. This action will hamper unwanted transportation of sediments into nearby waterways, which has several undesirable effects, such as reduced light availability, increased nutrient concentrations and silt build up.
- Increase knowledge among landowners and other stakeholders on proper safety measures to protect riverine environments from forestry management activities.

- Produce management plans for fish populations and the fishery, together with local fishery conservation area associations.

## LONG TERM EFFECTS

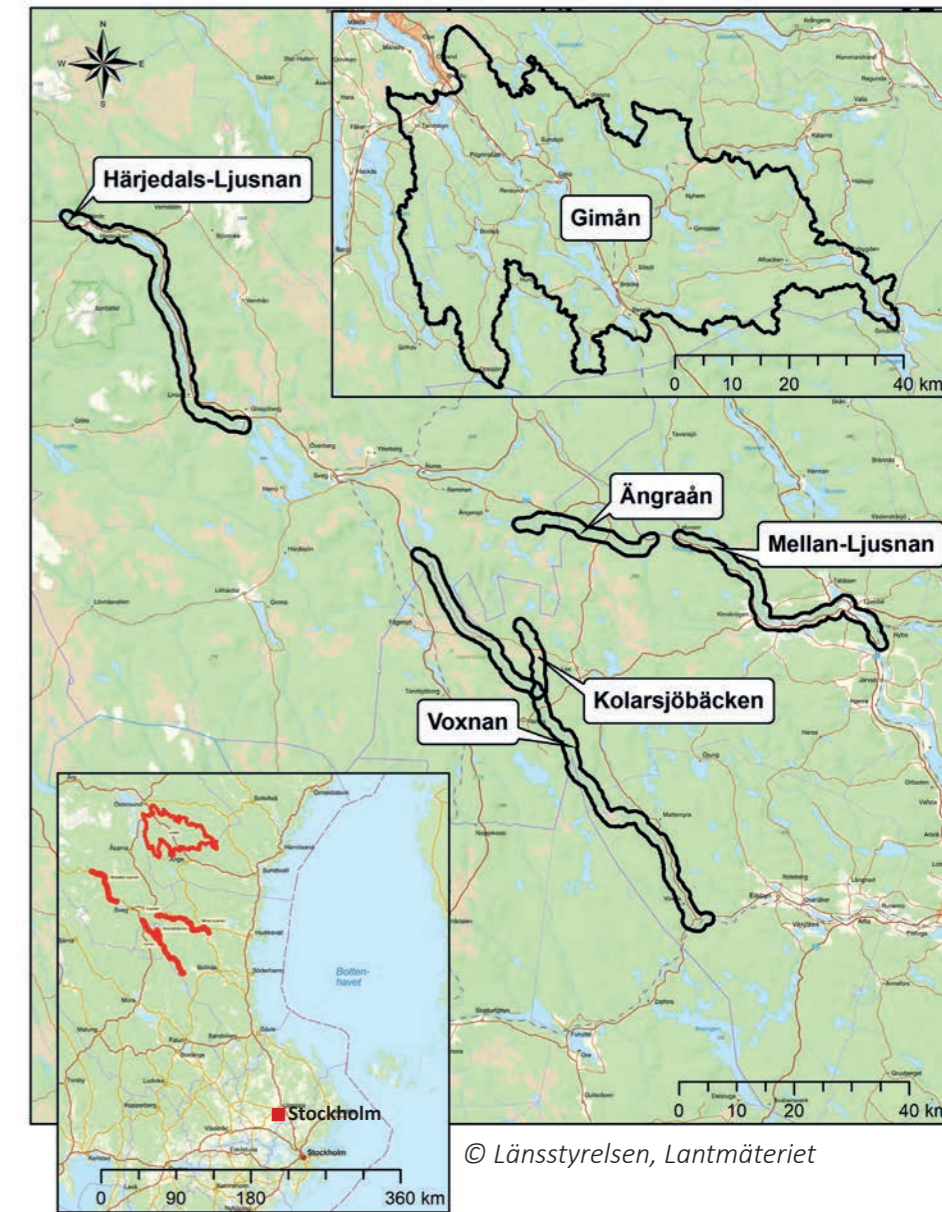
Restoring stream habitats will contribute to healthier and well-functioning ecosystems, hindering the loss of biodiversity and supporting more fish in the rivers. In this way, future generations can also enjoy all of the ecosystem services that the rivers provide us.

Our human and societal well-being is dependent on healthy ecosystems and the ecosystem services they provide us. From fresh water ecosystems, we get drinking water and fish for food, but they also provide water purification, water storage and flow equalization. Nature based experiences are also something the ecosystem provides.

Healthy freshwater ecosystems support larger fish stocks, which create better conditions to develop local ecotourism based on nature experiences and sport fishing. In the long run, this can create more job opportunities and strengthen local development.

Restoring stream habitats will also lower the stream water flux and create a better connection between the river and the riparian zone. The surrounding landscape ability to store water is important from several points of view, in time of drought to retain water

in the landscape, or to equalize flow during heavy rainfalls.



*Rivers of LIFE project area. The River Gimån consists of several linked watercourses within the marked area.*