

## Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260) – Estonia

*Ranunculus fluitans*

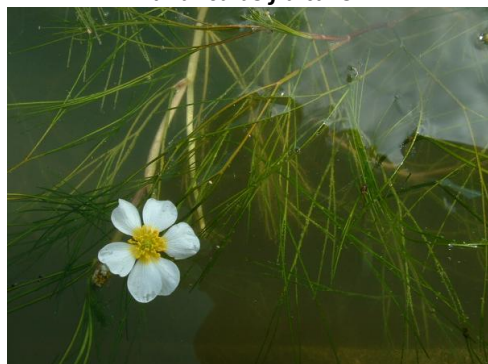


Photo: J F Gaffard (Wikimedia Commons)

Conservation status	EU28: Vulnerable (EUNIS C2.2b) Boreal: U2 (-) EE: U1 (+)
Protection status	HD: Annex I
Area	EU: 12,800 km <sup>2</sup> EE: 60 km <sup>2</sup>
MS with genuine improvement	DE (ATL), EE, UK
Other MS	AT, BE, BG, CZ, DE (ALP), DE (CON), DK, ES, FI, FR, GR, HU, IE, IT, LT, LU, LV, NL, PL, PT, RO, SE, SI, SK

**Summary:** Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the boreal regions of the EU are widespread in the EU. They have been widely assessed as in unfavourable-bad condition, with a favourable range and area, but unfavourable structure and function of habitats as well as unfavourable future prospects (EEA, 2013; EIONET, 2014). Pressures mainly stem from human-related impacts such as modification of water courses through canalisation and pollution through urbanisation and transport (EEA 2013; EIONET, 2014). In Estonia the main pressures have been mostly related to the changes in water bodies' conditions and pollution to surface waters. Conservation measures for the habitat have largely focussed on the restoration or improvement of the river's hydrological regime. This included measures to excavate silted connecting points between oxbow lakes and the main rivers, as well as restoring natural river flows and meanders to pre-canalisation conditions.

### Background

#### Status and EU occurrence

Water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation are widespread in Europe throughout all biogeographical regions, although rare to the south (EEA 2013). The habitat type has an unfavourable conservation status in Alpine, Black Sea, Continental and Pannonic biogeographical regions, and only has a favourable status in the Steppic region (EEA, 2013).

Within the Boreal biogeographic region, the habitat is widely distributed with most of the habitat area located in Sweden (37.5%, 91 km<sup>2</sup>), but about 13.6% (33 km<sup>2</sup>) occurs in Estonia (EU, 2016). The habitat conservation status in the Boreal region is determined as unfavourable-bad, mainly due to its bad structure and function in Finland. In Estonia, although its status remains unfavourable-inadequate, its trend has changed from stable to positive and this is considered to be a genuine improvement. The trend in Finland is also positive but it is not known if this is a genuine change.

#### Ecological requirements

The habitat includes sections of watercourses of lowland plains to montane zones characterised by the presence of floating or submerged vegetation. Floating mats of white-flowered (*Ranunculus*) species can be seen in river channels during early to mid-summer. These river plants may modify water flow, promote fine sediment deposition, and provide shelter and food for fish and invertebrate animals (JRCC, 2018). The habitat can be present in natural watercourses such as streams and rivers, backwaters with water throughflow, as well as near-natural drains. The structure of this habitat can be described as layered communities of mostly rooted plants (BfN, 2011). Importantly, these water courses require mostly fast flowing, turbulent rivers with a stable substrate of coarse sand or grit on which plants can take root. Distribution of this habitat is restricted to locations with shallow water during

the summer period, without sudden water level fluctuations and with low nutrient levels or enough current to restrict the growth of algae and sludge (Deltares, 2018).

### **Pressures and threats**

Overall, the main pressures and threats to this habitat in Europe are changes in water bodies' conditions and pollution to surface waters. Less frequently claimed pressures and threats include pollution to groundwater, agriculture practices (fertilisation and pesticide use, modification of cultivation practices, irrigation), invasive alien species, forest and plantation management and use, production of renewable energy, shipping lanes and ports, as well as mining and quarrying (EEA/ETC, undated).

According to the national Article 17 report for Estonia and published research, the main pressures and threats on water courses of plain to montane levels with *Ranunculon fluitantis* and *Callitricho-Batrachion* vegetation are related to human-related changes that affect the hydrological regime and its hydrographic functioning, such as canalisation and water deviation, modification of hydrographic functioning, modification of structures, and other human-induced changes in hydraulic conditions (EEA, 2013). Further pressures include the effects of mining, fertilisation, landfill, forestry activities, urbanisation, and pollution to surface waters from chemistry industry as well as households.

## **Drivers of improvements: actors, actions and their implementation approaches**

### **Organisers, partners, supporters and other stakeholders**

A variety of stakeholders were engaged in the restoration of watercourses in Estonia. In the case of LIFE project Happyfish, the main stakeholders were Wildlife Estonia, a national NGO, as well as the Nature Conservation Association Kotkas and the Estonian Environment Information Centre (LIFE, 2012a). A steering committee was established to monitor the overall development of the project and to assimilate all interested parties and agencies at the highest possible level. The steering committee included the project manager, project partners, the local municipality, Estonian Environmental Investments Centre, the Environment Board, the Ministry of the Environment and the Ministry of Agriculture representatives (LIFE, 2012a). During the project's lifespan, local volunteers were employed to support restoration activities around the village of Palupõhja in cooperation with the Nature Conservation Association Kotkas during four education camps. These four youth and children camps had over 120 participants with activities focusing on nature conservation education and awareness (AKA, 2011; LIFE, 2012a). Lastly, efforts were made to ensure good communication and cooperation with professional fishermen and hobby anglers, as well as experts, officials and decision-makers (AKA, 2011).

Within the project Happydrivers, a similar set up was taken to Happyfish, with the main stakeholder represented by Wildlife Estonia. Outreach to local governments and other stakeholder groups has been undertaken in this project as well. Local authorities and the Environmental Board were consulted and included mainly to provide permitting and licencing support; for example, to issue permits for visiting the area and for riverbed restoration activities during the project duration, a special licence to undertake the annual fish surveys, an annual permit for forestry work, and lastly a permit for restocking fish (asp) in 2016 (LIFE, 2013).

### **Contributions / relevance of strategic plans (e.g. species/habitat action plans)**

The project Happyfish contributed to the restoration of prioritised habitats and species designated under the EU Nature Directives, and the monitoring plans within the project are in line with the EU Water Framework Directive's implementation within Estonia's River Basin Management Plans (LIFE, 2012a). No other information was found regarding how the project's activities linked to or supported local action plans or strategies.

### **Measures taken and their effectiveness**

Frequently reported measures to improve the conservation status of this habitat across Europe have been to restore and improve the water quality as well as the hydrological regime, and establish protected areas. Between 24% and 29% of the EU Boreal habitat is encompassed by Natura 2000 sites (over 1,000 km<sup>2</sup>). In Estonia, Natura 2000 sites cover 55% of the habitat (Boreal) within the country. The measures taken by Estonia over the 2007-2012 period for the conservation of water courses of plain to montane levels with the *Ranunculon fluitantis* and *Callitricho-Batrachion* vegetation are set out in the table below.

**Application of conservation measures for the conservation of water courses of plain to montane levels with the *Ranuncion fluitantis* and *Callitricho-Batrachion* vegetation in Estonia over 2007-12**

Habitat	Code	Measure	Type	Ranking	Inside / outside N2k	Broad Evaluation
Water courses 3260	6.1	Establish protected areas/sites	Legal	Medium	Inside	Maintain
	4.2	Restoring/improving the hydrological regime	Legal	Medium	Both	Enhance

Source: EEA Article 17 report 2013 at <https://bd.eionet.europa.eu/article17/reports2012/>

Two LIFE projects in Estonia implemented measures to support and improve this habitat. The first LIFE project called “Happyfish” (February 2009–November 2012) aimed to restore and preserve the unique ecosystems of the river Emajõgi with its oxbow lakes and meadows, and also to maintain the habitat and preserve the stability of European conservation priority fish populations, i.e. Asp (*Aspius aspius*), Spined Loach (*Gobitis taenia*), European Weatherfish (*Misgurnus fossilis*) and European Bullhead (*Cottus gobio*) (Wildlife Estonia, 2018a). The project area was located within the Alam-Pedja Nature Reserve in Estonia, a Natura 2000 site, as well as a Ramsar wetland of international importance and a bird area of international importance. The site contains 12 watercourses with a total length of 114.5 km and 55 oxbow lakes with total length of 50.6 km (AKA, 2011). Measures taken in the project aimed to improve the flow between the oxbow lakes and the main river, which would benefit fish populations through increased access to spawning grounds. As such, the project removed sediment barriers from 10 connecting points between the lakes and the river Emajõgi, using machines to carefully dig an estimated 720 m to improve habitats and migrating conditions in the oxbow lakes with total length of 15 km (AKA, 2011). In addition, efforts focused on restoring and maintaining 56.58 ha of spawning grounds on the flooded meadows through cutting obstructing grass and shrubs. Lastly, around 53,000 young Asps were released to strengthen the Asp population in the River Emajõgi network of waterbodies (AKA, 2011). Asp monitoring was conducted using telemetry, which helped conservationists determine habitat areas these fish prefer and its migration behaviours; consequently, some fish were equipped with tracers sending signals, and their movements were monitored using special equipment (AKA, 2011).

Within the Alam-Pedja Nature Reserve, the habitat 3260 covers around 485 ha (1.4%) of the total area. In general, watercourses are in good condition, though the situation is bad in the lower course of River Laeva, where the water is guided out of its natural riverbed and flows into River Emajõgi through a man-made canal. A 5.2 km long stretch of this natural riverbed of this river (called Brook Karisto) is partially preserved. To restore the natural state of the river and secure the integrity of the network of rivers, it is necessary to channel the waters back into their natural riverbed and restore the connection with River Emajõgi (LIFE, 2012b). With this information, the second LIFE project called “Happyriver” (July 2013–December 2018) is a follow-up project to Happyfish. This new project aims to restore the integrity of freshwater habitats in the sections of the lower course of the Laeva River in Alam-Pedja Natura 2000 area. In addition, Happyriver also includes cutting down shrubs at the spawning grounds on the flooded meadows (over 10 ha), building spawning grounds for Asp (300 m<sup>2</sup>), and artificial propagation and restocking (10,000 young individuals) (EC, 2018b; Wildlife Estonia, 2018b). To date, project activities have restored a total of 8 km of the river channel, roughly 5.6 ha of river habitat. In addition, suitable spawning sites were restored for breeding fish and 13 ha of flood plain meadows were restored (Wildlife Estonia, 2018c).

**Funding sources (current and long-term) and costs (one-off and ongoing)**

Key funding sources are not fully documented, but the LIFE Nature Programme has played an important role in habitat recovery, in particular through the number of projects listed in Annex I. For the project Happyfish, the total budget initially allotted for restoration works and activities amounted to €1,157,546. Support from the LIFE programme amounted to €573,615 (EC, 2018a). Funding for Happyfish was supplemented to some extent by the Estonian Environmental Investments Centre, though the specific amount of support for this project was not stated (LIFE, 2012a). In practice, the project went a little over budget, with costs amounting to €1,165,907 (LIFE, 2012a). The project budget for Happyriver is smaller, amounting to €911,529, with a contribution from the EU of €455,764 and from the Estonian Environmental Investments Centre of €446,449 (EC, 2018b; KIK, 2018).

**Future actions:** The Prioritised Action Framework (PAF) for Natura 2000 in Estonia for the financing period 2014–2020, includes the following measures for habitat 3260: Investment support for construction or reconstruction of

manure storages, regional support for nitrate vulnerable areas, restoration of spawning areas, migratory routes. Potential funding sources listed for these measures included European Regional Development Fund/Cohesion Fund, Life, national public funding and European Agricultural Fund for Rural Development (Estonian Ministry for Environment). For example, the Interreg Estonia-Latvia programme 2014-2020, funded through the European Regional Development Fund, supports cross border cooperation of institutions responsible for Gauja/Koiva and Salaca/Salatsi river basins through financing of projects such as GroundEco (Interreg, 2018a, 2018b). Though not directly aimed to improve habitat 3260, actions implemented through this programme could address pressures and threats that indirectly lead to this habitat's improvement. In addition, future actions include the implementation of Estonia's RBMPs (river basin management plan) through EU financial instrument LIFE (Integrated projects). Consequently, Estonia has submitted an Integrated Project in the area of Water, which will also cover 3260 habitats in the East-Estonia RBMP. As this proposed project has recently been submitted, no additional information regarding its planned activities or how these activities build on previous LIFE projects could be found. Lastly, outputs of the project Happyfish included an after-LIFE conservation plan, which supported actions to establish its follow-up project Happyriver (LIFE, 2012b). As Happyriver is still ongoing, no after-LIFE conservation plan has been developed yet.

## Achievements

### Impacts on the target habitat

The implementation of targeted measures (as described above) has had a key role in maintaining or enhancing habitat 3260. Though most of the documentation does not explicitly state how project restoration works improved the quality or dispersal of the habitat, much of the restoration works indirectly benefited this habitat type through improved water quality and water flow. This includes the reconnection of 10 oxbow lakes to the river Emajõgi and the restoration of 8 km of the Brook Karisto river channel (AKA, 2011; Wildlife Estonia, 2018c). Two of the main pressures for this habitat type are changes in water bodies conditions and pollution to surface waters. LIFE project activities for both Happyfish and Happyriver addressed both pressures through the reconnection of water courses and restoration of river meanders.

### Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

The conservation measures for habitat 3260 had a plethora of benefits for surrounding species, adjacent habitats, as well as socio-economic benefits for humans living in or visiting the region. The post-restoration monitoring results of Happyfish showed clearly that fish life quickly improved in the restored oxbow lakes. Already within the first year the number of fish species and the abundance of fish had increased (AKA, 2011; LIFE, 2012a). Re-opening of the meanders and management of the floodplains also allowed fish access to 24 sites as spawning grounds (LIFE, 2012a). Improvements in fish populations provided a significant advantage for recreational and professional fishermen in the area, as the catch of 15 tonnes in 2011 increased to over 30 tonnes in 2016 (Eschbaum et al., 2017). Other non-fish species were also seen to benefit from the project's activities, particularly birds such as the White-tailed Eagle (*Haliaeetus albicilla*), Grey Heron (*Ardea cinerea*), and Great Egret (*Ardea alba*), as well as mammals like the Eurasian Otter (*Lutra lutra*) and Pond Bat (*Myotis dasycneme*). In addition, flora increased dramatically in the first year, with the average number of species 3.5 times higher than before the excavation works (LIFE, 2012a). The success of the project garnered attention at the national level, where it was recognised and awarded the Pro Environment Feat 2011, which is the highest acclaim in the field of nature conservation and environment protection in Estonia (AKA, 2011).

Similar results as Happyfish were seen in Happyriver, with benefits of restoration works seen in other fish species and fauna due to improved water flow and water quality (Wildlife Estonia, 2017). The effect of the restoration activities on protected fish species has been positive. During the course of monitoring activities several protected fish species which were previously absent due to the destroyed habitat have now been recorded for the first, including Spined Loach, Bullhead, Asp and Weatherfish (Wildlife Estonia, 2018c).

## Conclusions and lessons learnt<sup>1</sup>

### The key targeted conservation measures that led to the improvements

- Sediment removal at the mouths of oxbow lakes (Happyfish).
- Sediment removal and re-opening of the natural river bed (Happyriver).
- Re-opening of the migratory routes.
- Restoration of the spawning grounds.

### Conservation measures that have not been sufficiently effective

- None.

### Factors that supported the conservation measures

- Regular communication with stakeholders and general public.
- Participation at the dissemination events.
- Thorough planning and sufficient time for implementation.

### Factors that constrained conservation measures

- The time when the work can be done is very short (in case of Estonia only two months in a year).

### Quick wins that could be applied elsewhere

- The project showed that the use of machinery can be very effective and not harm the natural environment when the work is done in the right time of the year.

### Examples of good practice, which could be applied to other habitats and species

- The opening of the longitudinal and lateral connectivity of rivers and restoration of diverse habitats and river sections, which improves water flow and water quality while also benefitting species through extension and better access to new habitats and spawning grounds
- The involvement of volunteers in dissemination, communication and conservation education activities, as well the added value of support for on-the-ground restoration activities.
- The use of different monitoring methods (telemetry) to identify important habitat areas for protection and conservation.

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<sup>1</sup> Based on input from Kaia Treier, 2018

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## Authorship

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The information and views set out in this case study are those of the authors and do not necessarily represent the official views of the Commission.

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## Annex 1 Trends at EU and Member States Levels

### Habitat – Boreal region

Favourable	<b>FV</b>	Unknown	<b>XX</b>	Unfavourable - inadequate	<b>U1</b>	Unfavourable - bad	<b>U2</b>
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3260	2001-06	2007-12				
	Overall	Range	Area	Structure	Future	Overall
EE	U1	49600	60	U1	U1	U1
FI	U2+	353700	N/A	U2	U1	U2
LT	U1	64700	70	U1	U1	U1
LV	U1	64589	176.20	U1	U1	U1
SE	U1	378500	700	U1	U1	U1
<b>EU 27 Boreal</b>	<b>MTX</b>	<b>911089</b>	<b>1006</b>	<b>2GD</b>	<b>0</b>	<b>MTX</b>

Source: Member State Article 17 reports as compiled by ETC-BD on EIONET

<https://bd.eionet.europa.eu/article17/reports2012/species/summary/>

## Annex 2. LIFE Nature Projects

Project Title	Project N°	MS	Type Of Beneficiary
LIFE HAPPYRIVER - Restoring the integrity of freshwater habitats in Alam-Pedja Natura 2000 area- bringing the River Laeva back to life	LIFE12 NAT/EE/000871	EE	NGO- Foundation
LIFE HAPPYFISH - Saving life in meanders and oxbow lakes of Emajõgi River on Alam-Pedja NATURA 2000 area	LIFE+07 NAT/EE/000120	EE	NGO- Foundation

Source: Life Programme database, projects with Habitat 3260 in Estonia