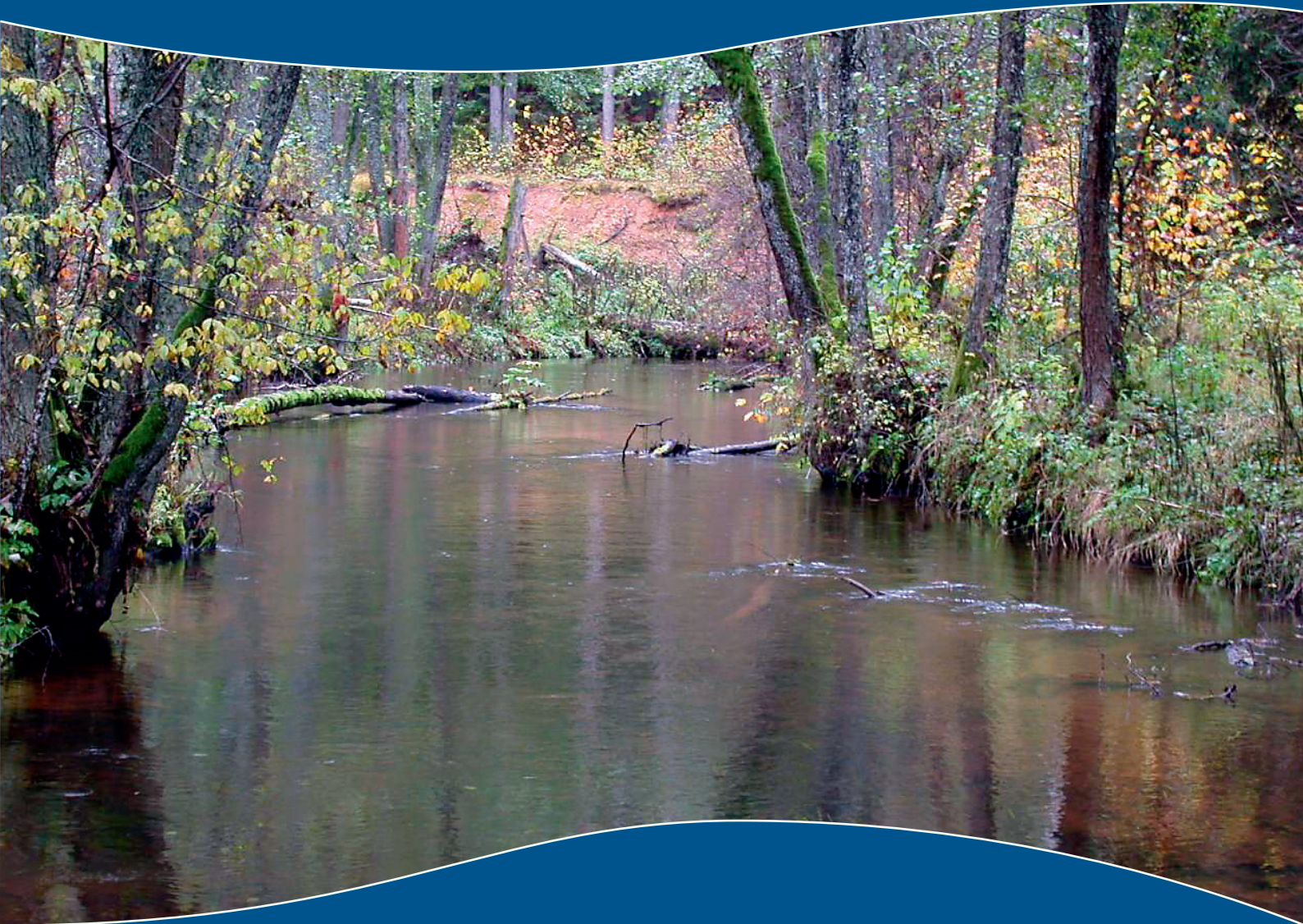


Baltic Sea Environment Proceedings No. 126B

Salmon and Sea Trout Populations and Rivers in Lithuania

HELCOM assessment of salmon (*Salmo salar*) and sea trout (*Salmo trutta*) populations and habitats in rivers flowing to the Baltic Sea.



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1. Introduction

This Report gives a description of Lithuanian salmon and sea trout populations and rivers that empty into the Baltic Sea. The Report is based on the HELCOM SALAR Project that focused on the state of salmon (*Salmo salar*) and sea trout (*Salmo trutta*) populations in rivers flowing to the Baltic Sea.

The deliveries of the HELCOM SALAR Project include a General Report on Baltic salmon and sea trout populations and rivers (BSEP 126A) as well as reports with individual descriptions of populations and rivers separately for Denmark, Estonia, Finland, Latvia, Lithuania, Poland, Russia and Sweden (BSEP 126B). The project also prepared a GIS map of salmon rivers as well as a database compiling information on salmon and sea trout populations and rivers.

The overall ecological state of the Baltic rivers and their fish populations has deteriorated from their pristine state. This is a consequence of direct anthropogenic impacts caused by many activities in the drainage area, in the rivers and in the Baltic Sea. In the rivers, the most detrimental activities have been damming, dredging and channelizing rivers to serve for hydropower production, log driving and agricultural purposes. Also indirect impacts of human activities such as nutrient and sediment loads from agriculture, forestry and sewage sources have had negative consequences on the ecological state of the Baltic rivers.

The General Report of the HELCOM SALAR Project presents an overview, inventory and classification of Baltic rivers with salmon and/or sea trout populations. In order to improve the status of these populations, the Report recommends measures for the restoration of river habitats and waters, for the opening of passage as well as for fisheries management in rivers. Furthermore, a prioritization of Baltic salmon and sea trout populations in need of urgent actions for their recovery is included. The recommendations and prioritizations form a basis for the development of international and national programs for the planning, funding and systematic realization of these actions.

The HELCOM SALAR Project was funded through a co-financing agreement between the European Commission (DG MARE) and HELCOM. It implements fisheries actions in the strategic HELCOM Baltic Sea Action Plan to radically reduce pollution to the sea and to restore the good ecological status of the marine environment by 2021.

The Reports have been prepared in co-operation with nominated salmonid and river habitat experts of the Baltic Sea countries as mentioned on the second page. The texts concerning salmonid populations and rivers in each country have been produced by the nominated experts and edited by the project staff in the HELCOM secretariat.

The General Report, the Reports with river descriptions and the GIS map are available at www.helcom.fi and the databank as an excel file at the institutions of the nominated experts.

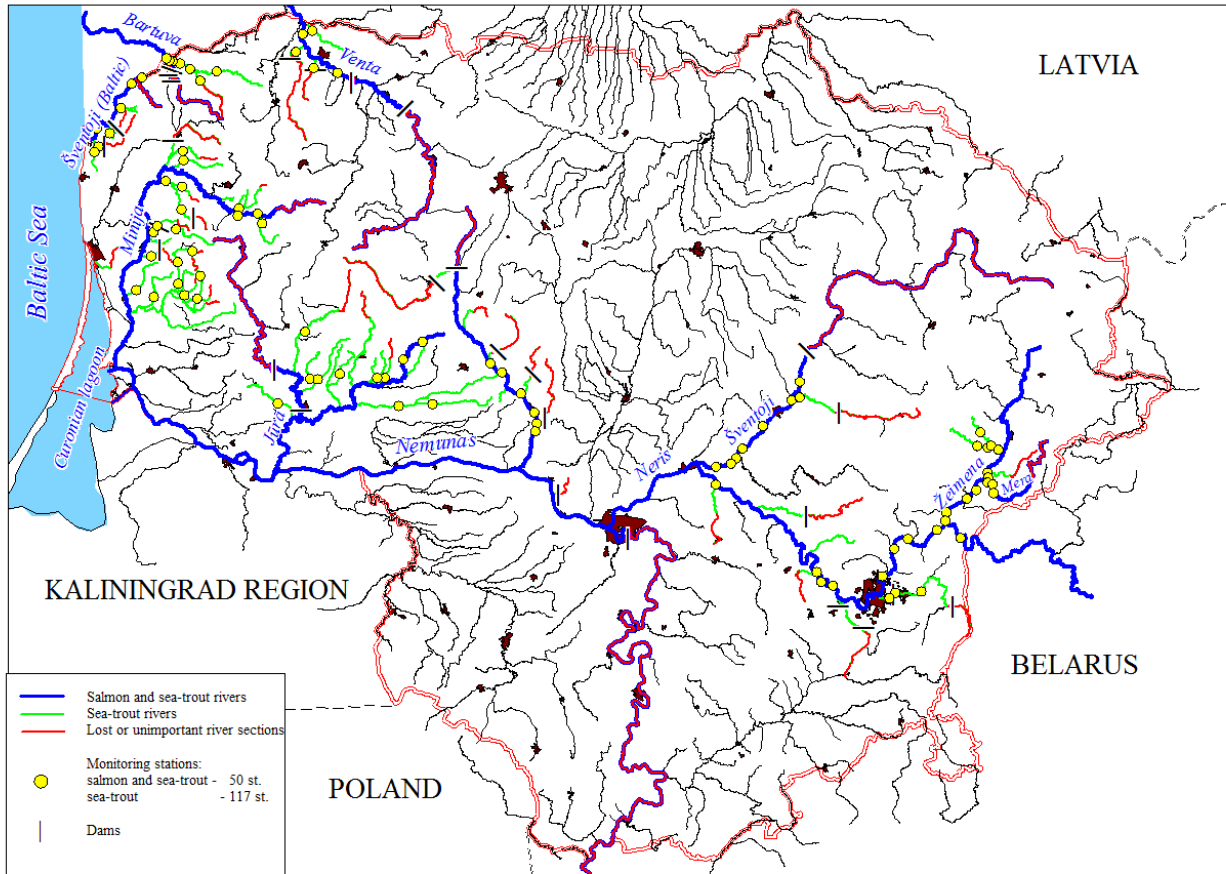


Figure 1. Map of the salmon and sea trout rivers of Lithuania.

2. Salmon and sea trout populations and rivers in Lithuania

The River Dubysa

The River Dubysa is a salmon river flowing to the River Nemunas.

Basic hydrological facts

River length: 130.9 km of which 75.5 km accessible for salmonids

Size of catchment area: 1,972.6 km²

Average flow: 13.4 m³/s

Daily lowest flow: 4.9 m³/s

Number of migration hindrances: 2

Habitat and water quality in River Dubysa

The River Dubysa is one of the most beautiful Lithuanian rivers. It is a right tributary of the River Nemunas. The river springs from the Bubiai pond and flows into the Nemunas at 167.5 km from the mouth. River Dubysa flows mainly through cultivated fields and meadows. Forestry in the catchment area has remained very low (13 % of the area is forest). There are only 17 tributaries in the area that are more than 10 km long. Lakes cover 0.27 % of the catchment area. The largest tributaries of the River Dubysa are rivers Kražantė (87.4 km), Luknė (25.8 km), Lapišė (21.1 km), Kirkšnovė (24.7 km) and Mūkė (15.8 km).

Previously, there were 11 dams on the River Dubysa but the majority of them have been torn down. There are no major cities or industries in the River Dubysa catchment area. Pollution from households and industrial wastewater is minimal. Water quality studies in the lowlands show that nutrients and organic matter enter the river mostly as non-point pollution from agriculture. Due to the pollution and bacterial contamination the Dubysa water is somewhat polluted.

There is a 29.4 km long ichthyologic Reserve between the Ariogala mill and the river mouth. The dominating substrates in this segment are gravel and stones, and there are numerous rapids, riffles and pits in this area of the river. Throughout the section there are dense growths of macrophytes.

River Dubysa according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river.

Ecological status: Fair

Biological status: Fair

Physical & chemical status: Good

Hydrologic & morphological status: Good

The main measures in the water management plan are to reduce the scattered water pollution of small towns and agriculture lands, and to build a fish ladder in the tributary Kražantė.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Dubysa salmon stock

The River Dubysa has been nominated as a potential salmon river. Recently salmon in the Dubysa River have been found at the bridge of Lyduvėnai, about 75 km upstream from the river mouth. The distribution of salmon in the River Dubysa is sparse and the species is found mostly in places where there are rapids and riffles.

Historical data show that salmon existed in the River Dubysa in the 20th century, but disappeared later, when the number of salmon in the whole Nemunas basin diminished. Salmon started to breed again in the River Dubysa in 2002, and since 2003 young salmon have been caught in the electrofishing surveys. Recently salmon has been observed to spawn in the river, but the spawners are sparse. Also the average density of juveniles in the River Dubysa is low.

Salmon population facts

Population category: 4

Reproduction area: 7 ha

Production capacity: 5,000 smolts

Recent wild smolt production estimate: 200

Fishing regulations in the River Dubysa

In the lowlands of the River Dubysa salmon and sea trout fishing is allowed with a licence within an area that stretches from the river mouth to the bridge of Lyduvėnai. The salmon and sea trout fishing season is from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in this part of the river is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be improved by reducing pollution throughout the river basin. To reduce nutrient and sediment loads from agriculture effective protection zones should be established along agricultural lands by the river. The river flows through a quarry where predatory fish (pike and perch) pose a risk to migrating salmon and sea trout smolts. Water temperatures during hot summer periods are very high which in turn may affect salmonid welfare.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Mera

The River Mera is a salmon river flowing to the river Žeimena.

Basic hydrological facts

River length: 60.2 km of which 12.5 km accessible for salmonids

Size of catchment area: 204.4 km²

Average flow: 1.8 m³/s

Daily lowest flow: 0.9 m³/s

Number of migration hindrances: 0

Habitat and water quality in River Mera

The River Mera is the left tributary of River Žeimena. The river springs from the highlands near the city of Švenčioniai. From its source until the River Strūnaičiai, the river is known as Kūna and later becomes Mera. The upper and middle reaches of the river bed are in several places channelized, while the lower part is in a natural condition. The natural part of the river Mera is abundant in rocky rapids, basins and overturned trees. The bottom is covered by gravel and sand and is scarce in water vegetation, and the river is particularly fast flowing and rocky from Gužai village to the lower reaches.

The river Mera is regulated in its upstream and middle sections that are dominated by peat and silt grounds. Consequently, there are no suitable habitats for salmonids in these areas. In the lower reaches, the ecological conditions and habitats are more suitable for salmonids. Also, in these areas there are segments with high current and deeper pools. However, some places in the lower reaches are dominated by sandy substrates which are not the best substrates for salmonids. The temperature regime and water quality is good, and habitat structure on the average is suitable for salmonids.

River Mera according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a –medium-sized lowland river

Ecological status: Fair

Biological status: Fair

Physical & chemical status: Good

Hydrologic & morphological status: Fair

The main measure in the water management plan is to reduce the scattered water pollution of Švenčioniai town.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Mera salmon stock

As shown by monitoring data, the River Mera is not an important salmon river. Some salmon are found in the river almost each year, but in low densities. However, sea trout is more abundant in the river.

The productive segment of the river is about 12.5 km reaching from the downstream areas until the Baliuliai village. The main salmon spawning areas are located in the villages of Baliuliai and Gūžiai. No introductions of reared salmon have been made in the rivers Mera and Žeimena, so the production of salmon relies entirely on the naturally spawning fish. Smolt production in the river is low.

Salmon population facts

Population category: 1
Reproduction area: 3 ha
Production capacity: 3,000 smolts
Recent wild smolt production estimate: 60

Fishing regulations in the River Mera

Fishing of salmon and sea trout in the river is prohibited at all times.

Specific actions for the development of the salmonid populations

The water quality should be improved by reducing pollution throughout the river basin. To reduce nutrient and sediment loads from agriculture an effective protection zone should be established along agricultural lands by the river. Efficient sewage treatment should be ensured at the Švenčioniai city.

The recommendations in the general report of the HELCOM SALAR project concerning river fisheries management are applicable for this river.

The River Neris

The River Neris is a salmon and sea trout river flowing to the River Nemunas.

Basic hydrological facts

River length: 509.5 km of which 275 km accessible for salmonids
Size of catchment area: 2,494.2 km²
Average flow: 189.5 m³/s
Daily lowest flow: 99.3 m³/s
Number of migration hindrances: 0

Habitat and water quality in River Neris

The River Neris is the second largest river in Lithuania and it is the main tributary of the river Nemunas. The springs of the river are in the northern part of the Minsk highlands in Belarus. The first 234.5 km the river flows in the territory of Belarus and from 234.5 to 228 km it passes the Lithuanian border. The remaining 228 km flows in Lithuania. The largest tributaries of the the River Neris in the Lithuanian territory are Šventoji (246 km), Žeimena (114 km), Vilnia (82 km), Musė (72

km), Vokė (42), and other 19 rivers that are smaller. Before the town of Vileika the river Neris flows slowly through a wetland habitat. At the village of Žodiškis, the river becomes a faster flowing river, and has very large and impressive riffles.

There are no dams in the Lithuanian part on the River Neris. However, its upper reaches in the territory of Belarus are dammed by a 12 m high Vileika Dam (located 406 km from the river mouth). The area of the water reservoir above the dam is 7,300 ha. There are more than 40 large riffles in the River Neris. The water temperature regime is favourable to salmonids.

The water quality in the Lithuanian part of Neris has been investigated in six areas: at the Lithuanian border at Buivydžiai, above and below Vilnius, above and below Jonava and above Kaunas. The cleanest stretch of the river is located between the border of Belarus and Vilnius. The river passes the major industrial centres of Vilnius and Jonava, after which the water quality deteriorates. The water quality varies also seasonally. Throughout its length Neris is moderately polluted with organic materials. Nitrogen and phosphate concentrations during the warm period were low and did not exceed the permitted levels.

A nuclear power plant has been planned in the Belarus territory and the river Neris water will be used to cool the nuclear reactors. This may alter the river hydrologic regime and affect the fish community structure as well as the overall ecological status of the river.

River Neris according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a large lowland river.

Ecological status: Fair

Biological status: Good

Physical & chemical status: Fair

Hydrologic & morphological status: Excellent

The main measures in the water management plan are to reduce the water pollution of the major cities in the Neris River Basin and to monitor this in cooperation with Belarus.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Neris salmon stock

The species diversity in river Neris is very high. Varying ecological conditions in the river leads to a wide variety of flora and a complex community structure, which varies depending on the river gradient. River Neris is composed of a wide variety of rivers and streams. Most of them are suitable for salmonids. Hence the river is one of the most important salmon rivers in Lithuania. Also its role is very important as a salmon gene pool, and as a provider of migration routes and spawning sites. Salmonid species diversity and distribution varies according to the size and type of the tributaries and is influenced by anthropogenic activities and climatic factors.

Historical data indicate that the salmon population has changed significantly in several ways. During the 20th century the state of the Neris salmon population was critical due to high pollution and other anthropogenic activities. Thanks to the reduction in the amount of pollution and the introduction of salmon from hatcheries the state of the stock gradually improved.

Nowadays, salmon spawn in the river each year. The population genetic structure is a mix of a historical natural and artificially bred salmon. Fish are stocked to the river annually. Recently, juvenile Neris salmon have been found in many places, but mostly in riffles and in other places where the ecological conditions are appropriate. The best place for juvenile salmon is located in the middle course between the mouths of rivers Žeimena and Žiežmara. Smolt production of the River Neris is increasing.

Sea trout are found within the river Neris and in 13 of its tributaries (there are four larger tributaries and nine smaller tributaries). The suitable reproduction area for sea trout in the Neris river basin is about 73 ha (48 ha in the main river). According to aggregated data for the last 10 years the juvenile density of sea trout in the river Neris is low (about 0.7 individuals/100 m²). The small and medium-sized tributaries of the river basin have a higher density. The average density in the medium-sized tributaries (Vilnius, Voke, Musė, Kena) is 5.5 individuals/100 m², and in small tributaries the density of juveniles varies a lot with an average of 5.8 individuals/100 m². The estimated average of sea trout smolt production in the Neris river basin is 4,300 individuals per year (according to electrofishing surveys).

Salmon and sea trout population facts

Population category: 4 (salmon)

Reproduction area: 48 ha (salmon); 73 ha (sea trout)

Production capacity: 50,000 smolts (salmon)

Recent wild smolt production estimate: 14,813 (salmon); 4,300 (sea trout)

Fishing regulations in the River Neris

Fishing of salmon and sea trout is allowed with a licence in 7 stretches of the river from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in the river is prohibited.

Specific actions for the development of the salmonid populations

Salmonid juveniles in the Neris River are distributed only in the rapids or limited habitats characterized by stretches with adequate water flow. The water quality should be improved by reducing pollution throughout the river basin in both Lithuania and Belarus. Sewage treatment should be efficient at cities and towns and industrial plants along the river. To reduce nutrient and sediment loads from agriculture effective protection zones should be established along agricultural lands by the river.

Measures taken to implement the Water Framework Directive will reduce water pollution and improve ecological conditions. Water temperatures during hot summer periods are very high which in turn may affect salmonid welfare. Algal blooms and excessive vegetation is to be expected during the second half of summer downstream Vilnius City.

The recommendations in the general report of the HELCOM SALAR project concerning river fisheries management are applicable for this river.

The River Siesartis

The River Siesartis is a salmon river flowing to the River Šventoji.

Basic hydrological facts

River length: 64.1 km of which 15 km accessible for salmonids

Size of catchment area: 615.7 km²

Average flow: 4.4 m³/s

Daily lowest flow: 1.5 m³/s

Number of migration hindrances: 3 (1 contains a fish way)

Habitat and water quality in River Siesartis

The River Siesartis is one of the major tributaries of the River Šventoji. The spring of the river is the Siesartis Lake, 3 km to the east of the city of Molėtai. There are 55 lakes in the Siesartis catchment area covering a total area of 2,196 hectares. The river bottom is predominantly sand and gravel and there are plenty of boulders of varying size. There are numerous rapids in the river. The main tributaries of the River Siesartis are Grabuosta (9 km), Mokia (8 km), Plaštaka (16 km), Želva (10 km) and Šašuola (13.6 km).

The section between 47.2 km and 55 km of the River Siesartis has been straightened. The mill dams of Molėtinai, Rudokai, Cesarka, Kazliškiai, Siesartis and Vaisgeliškiai remain in the river, but they are passable for the migrating fish. At 14 km from the river mouth there is the Valtūnai hydroelectric power plant dam. The effect of this dam is far reaching in the downstream direction. The dam is equipped with a fish-ladder.

The overall water quality is quite good. Possibly small quantities of nitrogen and nitrogen compounds reach the river as pollution from the surrounding cultivated areas. As the river flows out of the lake, the water level during the hot summer remains sufficiently high for adverse conditions not to develop in the salmonid habitats. The overgrowth of macrophytes in the habitats during the summer is negligible except for the eutrophic parts of the river.

River Siesartis according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river.

Ecological status: Good

Biological status: Excellent

Physical & chemical status: Good

Hydrologic & morphological status: Good

The main measures in the water management plan are to improve fish migration by removing barriers and to take measures to reduce pollution of wastewater from agriculture lands.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Siesartis salmon stock

The River Siesartis has been nominated as a potential salmon river. Recently salmon in the River Siesartis have been found near the Ciesarka mill dam (through the length of a 43.8 km section from the river mouth). There are many places in this river section where ecological conditions are suitable for salmon, with the exception of the 2.5 km stretch of the river above the dam of Valtūnai. The Valtūnai dam is equipped with a furrow type fish passage that salmon and sea trout can easily pass and reach the habitats above the Ciesarka milldam.

There is also historical data of salmon existing in the River Siesartis. The main reason for the decreasing salmon population was the construction of the mill dams. 6–7 dams were built in the 19th and in the early 20th century.

Juvenile salmon in the River Siesartis have been constantly caught from 2000 onwards. In 2001 salmon stocking was started in the lowlands of River Siesartis, and several thousands of juvenile salmon were released to the river during the first years. Due to the re-established naturally spawning salmon population and thanks to the significant increase of the salmon smolts, the releasing of hatchery-reared juveniles was stopped in 2008. Currently, River Siesartis salmon production is increasing, and it is one of the leading salmon rivers in the whole Šventoji basin.

Salmon population facts

Population category: 4

Reproduction area: 6 ha

Production capacity: 13,000 smolts

Recent wild smolt production estimate: 12,036

Fishing regulations in the River Siesartis

Fishing with a licence is allowed from the river mouth until the village of Želva from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in the river is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be further improved throughout the river basin. To reduce nutrient and sediment loads from agriculture effective protection zones should be established along agricultural lands by the river.

Old watermill dams are present in some parts of the river. One of the dams in the upper part is hardly passable by salmon and sea trout. Valtūnai fish ladder is constructed in the middle part of the river and is functioning properly.

The recommendations in the general report of the HELCOM SALAR project concerning river fisheries management are applicable for this river.

The River Širvinta

The River Širvinta is a salmon river flowing to the River Šventoji.

Basic hydrological facts

River length: 128 km of which 23 km accessible for salmonids

Size of catchment area: 918.1 km²

Average flow: 6.43 m³/s

Daily lowest flow: 2.5 m³/s

Number of migration hindrances: 2

Habitat and water quality in River Širvinta

The River Širvinta is a medium-sized Lithuanian highland river and it is the main tributary of River Šventoji. On its course the river passes through several small towns such as Šešuolėliai, Širvintos and Liukoniai. The river is channelized in the upstream areas (about 12% of the total river length). The upper and middle reaches of the river have dams and altered habitat, and hence the ecological conditions are poor. Below the Liukoniai milldam the situation is better. There are numerous riffles in this 23 km river section and also the largest water fall of the river is located there.

The river is characterized by a medium scale water thermal regime, and the water is slightly eutrophied. Water vegetation covers approximately 26.3 % of the riverbed. The amount of dissolved oxygen is sufficient. The water quality is good in the downstream areas. The major polluters are Širvinta city and effluents from households, and most of this pollution influences the middle part of the river. Some nitrogen pollution from the surrounding cultivated fields also enters the system. All of the mentioned factors have significant effects on salmonid distribution, productivity and migration.

River Širvinta according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river.

Ecological status: Good

Biological status: Good

Physical & chemical status: Good

Hydrologic & morphological status: Good

The main measures in the water management plan are to take measures to reduce the wastewater pollution from agriculture and the water pollution of the town of Širvintai.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Širvinta salmon stock

The River Širvinta has been nominated as a potential salmon river. The habitats suitable for salmon remain only in the lowlands of the River Širvinta, where the ecological conditions are satisfactory. Only about 23 km of these lowland reaches (until the Liukoniai milldam), are suitable for salmon. The most suitable habitats, with numerous riffles and pools, are found 5 km above the mouth.

There is no record of a former salmon population in the river Širvinta. Moreover, the ichthyologic studies using electro-fishing methods for the last 30 years show the absence of salmon smolts in the river. In 2004, salmon juveniles were captured in the river for the first time. It seems that these were juveniles migrating from the River Šventoji where stocking was started in 2000. In 2005 salmon stockings were started also in the River Širvinta, and almost each year several thousand juvenile salmon have been released.

Salmon population facts

Population category: 4
Reproduction area: 1.5 ha
Production capacity: 5,000 smolts
Recent wild smolt production estimate: 238

Fishing regulations in the River Širvinta

Salmon and sea trout fishing is allowed with a licence from the river mouth until the Lukoniai mill, from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in this part of the river is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be further improved throughout the river basin. Sewage treatment should be efficient at towns along the river. To reduce nutrient and sediment loads from agriculture effective protection zones should be established along agricultural lands by the river. The ecological conditions from midstream to the upper stream of the river need to be improved.

Middle and upper parts of the river are dammed and impassable for salmonids. Algal blooms and excessive vegetation occurs during the second half of summer.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Šventoji

The River Šventoji is a salmon and sea trout river flowing to the River Neris.

Basic hydrological facts

River length: 246 km of which 75 km accessible for salmonids

Size of catchment area: 6,888.8 km²

Average flow: 56.5 m³/s

Daily lowest flow: 25.8 m³/s

Number of migration hindrances: 3 (1 contains a fish way)

Habitat and water quality in River Šventoji

The River Šventoji is one of the largest Lithuanian rivers, and it is a right tributary of the River Neris. The spring of the river is lake Samanys that is situated approximately 2.5 km north from Dūkštas and combines a number of upstream lakes. The Šventoji catchment area occupies approximately 11 % of the Lithuanian surface area extending from the northeast to the southwest and covering the laky hills of Zarasai, Utena and Moletai and a part of the middle Lithuanian lowlands. The proportion of forests, wetlands and lakes of the basin are 10 %, 16 % and 3 %, respectively.

There are two dams in the midstream of the River Šventoji: one at Anykščiai and the other at Kavarskas. The Lower Šventoji begins from Siesartis river mouth. It is a short (49 km) but variable section of the river. Towards to the mouth the river bed straightens and the slope is grows. The highest slope and maximum riffle zones are in the last 10 km of the river. Šventoji flows to the Neris River above Jonava, at Skaruliai village. Due to the very laky basin (even in the upper stream 16%) the discharge per year varies less than in the other middle Lithuanian rivers. The water in Šventoji is rather clean. It is low in organic matter, nitrogen and phosphate, and it has most of the time allowable levels of BOD₇.

The prevailing substrates of the riverbed are sand and gravel, and in rapids pebbles and stones. There are numerous rapids, riffles, and quite a number of islands in the river. The riparian zone is overgrown by abundant vegetation. The rate of riverbed overgrowing is 0–5 % and it is slightly higher downstream.

River Šventoji according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a large lowland river.

Ecological status: Good

Biological status: Good

Physical & chemical status: Good

Hydrologic & morphological status: Good

The main measures in the water management plan are to improve the conditions for fish migration and to reconstruct Anykščiai town fish ladder.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Šventoji salmon stock

The River Šventoji has been nominated as a potential salmon river. Recently, Šventoji salmon have been found near the Anykščiai dam (87 km upstream from the river mouth). Despite the fact that there is a fish-ladder constructed over this dam, juveniles have not been observed upstream of the dam. Downstream of the dam salmon are found in places where there are rapids and riffles. As the riverbed is dominated by sandy substrates, there are relatively few suitable habitats for salmonids.

Historical data shows that the Šventoji salmon spawned in the river and lived there for many years. The local population was virtually extinct in the second half of the 20th century when the number of salmon in the whole Nemunas basin decreased to a minimum. The salmon distribution is greatly affected by the dams, water pollution, and illegal fishing. Šventoji River smolts have been constantly caught from 2000 onwards. Stockings have also been made since 2000. In recent years salmon has regularly spawned in the river.

Sea trout are found in the river Šventoji and in eight of its tributaries, three of which are larger and five small. The average density of sea trout juveniles in the river Šventoji is low: about 0.67 individuals/ 100 m² (2.3 individuals/ 100 m² in the mid-sized tributaries and 11 individuals/ 100 m² in the small tributaries). The suitable reproduction area for sea trout in the Šventoji river basin is about 20.5 ha in size (7 ha in the main river). The average sea trout smolt production in the Šventoji river basin is 5,100 individuals.

Salmonid juveniles in the Šventoji River are distributed only in the rapids or limited habitats characterized by stretches with adequate water flow.

Salmon and sea trout population facts

Population category: 4 (salmon)

Reproduction area: 7 ha (salmon); 20.5 ha (sea trout)

Production capacity: 15,000 smolts

Recent wild smolt production estimate: 2,272 (salmon); 5,100 (sea trout)

Fishing regulations in the River Šventoji

Salmon and sea trout fishing is allowed with a license in three sections of the Šventoji River from September 16 – October 15. These areas are: upstream to the mouth Armona, from Zujai Alka to the Kavarskas dam and 500 m above and below Virinta mouth. During the salmon spawning season, from October 16 – December 31 all fishing in these parts of the river is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be further improved throughout the river basin. Sewage treatment should be efficient along the river. To reduce nutrient and sediment loads from agriculture a protection zone should be established along agricultural lands by the river. The ecological conditions from midstream to the upper reaches of the river need to be improved.

Two dams are constructed in the middle part of the river. They are functioning with some issues for salmon and sea trout migration. Water temperatures during hot summer periods are very high

which in turn may affect salmonid welfare. Excessive vegetation is to be expected during the second half of summer in some habitats. Measures taken to implement the Water Framework Directive will improve the situation in the whole basin.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Šventoji (Baltic Sea)

The River Šventoji is a salmon river flowing to the Baltic Sea.

Basic hydrological facts

River length: 68.4 km of which 56.3 km accessible for salmonids
Size of catchment area: 471.9 km²
Average flow: 5.3 m³/s
Daily lowest flow: No information
Number of migration hindrances: 1

Habitat and water quality in River Šventoji

The River Šventoji is a river flowing in the northwest of Lithuania and southwest of Latvia. It begins in Skuodas district and for 31.8 km flows on the international border between Latvia and Lithuania. River Šventoji flows into the Baltic Sea near Šventoji settlement north of Palanga. River Šventoji flows mainly through cultivated fields and meadows. Forests cover 30.7% of the total catchment area. There are 34 streams more than 3 km in length and the total length of flowing waters is 384 km only in catchment. Lakes cover 0.3 % of the catchment area. The largest tributaries of the River Šventoji are rivers Darba (7.2 km), Įpiltis (29.8 km) and ir Kulšė (23.0 km).

There is only one dam on the River Šventoji, and a fish leader was constructed there in 2009. There are no major cities or industries in the River Šventoji catchment area. Pollution from households and industrial wastewater is minimal. Water quality studies in the lowlands show that nutrients and organic matter enter the river mostly as non-point pollution from agriculture.

There is a 9.3 km long part of river valley, Margininkai botanical preserve, which is protected within the Natura 2000 network. The dominating substrates in the part accessible for salmonids are gravel and stones. There are also rapids where the dominating bottom substrate is sand. Throughout the section the growth of macrophytes is quite dense.

River Šventoji according to the Water Framework Directive

The name of the water management district is Venta River Basin District and the river type is a medium-sized lowland river.

Ecological status: Good

Biological status: Good

Physical & chemical status: Fair

Hydrologic & morphological status: Good

Natura 2000

A part of the river (9.3 km) belongs to the Natura 2000 network.

The River Šventoji salmon and sea trout stocks

The River Šventoji has been nominated as a potential salmon river. Recently salmon in the Šventoji River have been found downstream of the Laukžemė dam. The distribution of salmon in the River Šventoji is sparse and the species is found mostly in places where there are rapids and riffles.

Historical data show that salmon existed in the River Šventoji all times but the number of spawners was low. Salmon releases were carried out in the end of last century using the Daugava strain from Poland. Young salmon have been caught in the electro fishing surveys from 1998, but not each year. Recently salmon has been observed to spawn in the river, but the number of spawning salmon is low. Also the average density of juveniles in the River Šventoji has been low, except in 2009.

Salmonid juveniles in the Šventoji River are distributed only in the rapids or limited habitats characterized by stretches with adequate water flow.

Salmon population facts

Population category: 4
Reproduction area: 3 ha
Production capacity: 3,000 smolts
Recent wild smolt production estimate: 100

Fishing regulations in the River Šventoji

The general recreational fishing regulations and license fishing regulations are valid in the River Šventoji. In the lowlands of the River Šventoji salmon and sea trout fishing is allowed with a licence within an area that stretches from the river mouth to the Laukžeme dam. The salmon and sea trout fishing season is from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be improved by reducing pollution throughout the river basin. To reduce nutrient and sediment loads from agriculture an effective protection zone should be established along agricultural lands by the river.

High water temperatures expected during summer and excessive vegetation found in the middle stretches with high densities of predatory fish.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Venta

The river Venta is a sea trout river flowing to the Baltic Proper.

Basic hydrological facts

River length: 343 km (in Lithuania 161 km)
Size of catchment area: 11800 km² (in Lithuania 5 140 km²)
Average flow: 44.2 m³/s (in Lithuania)
Daily lowest flow: 0.54 m³/s (in Lithuania)
Number of migration hindrances: 5 (in Lithuania) (4 contain fish ways)

Habitat and water quality in River Venta

The upper part of River Venta is situated in Lithuania and the lower part in Latvia. The total length of the river is 343 km (161 km in Lithuania and 182 km in Latvia). Many tributaries flow to the river Venta. In the Lithuanian part important tributaries are: Virvyčia (99,7 km), Varduva (90,3 km), Vadakstis (82,2 km) and Dabikinė (37,2 km). Many of the tributaries and parts of the main river in Lithuania are canalized and heavily eutrophicated. Most of the rivers in the Venta river basin are moderate or warm water rivers – during the summer water temperatures are 18-21 C°. Some small tributaries - Lūšys (31,5 km), Saldupis (17,2 km), Viešetė (23,6 km) and Šerkšnė – Markija (38,1km) are cold water rivers and are populated by sea trout and trout.

In the River Venta currently five dams remain at the constructed hydropower plants: Kuodžių, Jautakių, Vieکشnių, Rudikių and Užvenčio. Four of them have been equipped with fish ways that have worked satisfactorily.

The ecological status of the river is good. The water quality has been affected by eutrophication, sedimentation and vegetation. The nutrient and sediment load stems from agricultural lands and settlements by the river. Waste water without effective treatment flow into the main river and tributaries from small towns and villages (Kuršėnu, Papilės, Ventos, Vieکشnių, Mažeikų).

The River Venta sea trout stock

The total salmonid productive area averages about 6 000 m² with a potential production of 5 000 smolts. The river is open for the migrating of sea trout and vimba in Lithuania after the construction of fish leaders, but the natural natural waterfall Kuldingas Rumba in Latvia is still an important barrier for spawning, especially during dry autumns.

Salmon population facts

Population category: 4
Reproduction area: 6 ha
Production capacity: 5,000 smolts
Recent wild smolt production estimate: 1,000

Specific actions for the development of the salmonid populations

The nutrient and sediment load from agriculture should be decreased by establishing effective protection zones along agricultural lands by the river. Four fish ladders were constructed on existing dams in the middle part of the Venta River. These

measures improved the status of local populations of salmonids. High temperatures, algal blooms and excessive vegetation takes place during summer time. Measures taken to implement the Water Framework Directive will reduce water pollution and improve ecological conditions.

The recommendations in the general report of the HELCOM SALAR project concerning river fisheries management are applicable for this river.

The River Vilnia

The River Vilnia is a salmon river flowing to River Neris.

Basic hydrological facts

River length: 79.6 km of which 11 km accessible for salmonids
Size of catchment area: 623.5 km²
Average flow: 5.4 m³/s
Daily lowest flow: 3 m³/s
Number of migration hindrances: 1 (it has a partly working fish way)

Habitat and water quality in River Vilnia

River Vilnia is a cold-water salmonid river flowing in southeastern Lithuania and entering Neris in the city of Vilnius. The river bottom is sandy, gravelly and rocky at the rapids. The flow in downstream rapids is high.

The River Vilnia is straightened in its upper part between 76 km and 74 km from the river mouth. There are a number of dams in the upstream part: Margiai dam at 70 km from the mouth, Naujoji Vilnia near Rokantiškės village in the lowlands at 11.6 km from the mouth, and Pavilnys (Belmontas) at 7.4 km. The Pavilnys dam has a cascade- furrow type fish ladder and Naujoji Vilnia dam has a "Denil" type fish ladder.

The water temperature and oxygen concentration in the river is sufficient for salmonids and negative hydro-chemical or hydrological factors have not been observed. The overgrowth of habitats during the summer by the macrophytes is negligible except at the eutrophic area of New Vilnia. Most tributaries are small and without salmonids. Only Kena, the largest tributary of the Vilnia River, has brown trout.

Recently, when Vilnius wastewater treatment plants started to operate, the water quality in River Vilnia has improved and is now classified as good. Despite the fact that the river passes through many small towns (Kena, Lavoriškės, Mickūnai, N. Vilnia) and Vilnius city, it is relatively little polluted. However, the anthropogenic impact in the river is high, especially for separate river sections. In the most polluted lowlands the main polluters are the wastewaters of the cities of N. Vilnia and Vilnius. In these areas there has been a significant deterioration of water quality. Vilnia lowlands are somewhat contaminated with organic materials. Nitrogen and phosphate concentrations in the warm season were low and did not exceed the permitted levels. The upper stream reaches are polluted by fishery farm ponds when they are launched in the autumn. At this time a lot of sludge is released to the river.

River Vilnia according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river.

Ecological status: Good

Biological status: Good

Physical & chemical status: Fair

Hydrologic & morphological status: Fair

The main measures in the water management plan are to take measures to reduce pollution of wastewater from agriculture lands and fishery ponds and to improve wastewater treatment in the cities of N. Vilnia and Vilnius.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Vilnia salmon stock

Nowadays salmon are common in the river downstream of the dam of Rokantiškės. There is historical evidence that salmon previously existed in Vilnius, but later disappeared due to high water pollution and damming. In the Vilnia lowlands two fish-ladders have been built. Salmon and sea trout can pass the Belmontas fish-ladder easily, but only a small number of fish can cross the fish-ladder near Rokantiškės.

Since 2000, salmon stocking was started in the lowlands. Every spring 10,000 fish have been introduced. Since 2001 salmon juveniles have been regularly caught in the river. Salmon and sea trout have been observed to spawn regularly in the Vilnia lowlands. The studies show that in the first stretch of 12 km of the river there are up to 125 spawning places.

Salmon population facts

Population category: 4

Reproduction area: 7 ha

Production capacity: 5,000 smolts

Recent wild smolt production estimate: 2,184

Fishing regulations in the River Vilnia

The general recreational fishing and license fishing regulations are valid in the River Vilnia. In the lowlands salmon and sea trout fishing is allowed with a licence from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in this part of the river is prohibited.

Specific actions for the development of the salmonid populations

Limited amount of habitats suitable for salmonids are present in the upper part of the river. The water quality should be improved by reducing pollution throughout the river basin. To reduce nutrient and sediment loads from agriculture a protection zone should be established along agricultural lands by the river. Nutrient loads from fish farms should be controlled.

Measures taken to implement the Water Framework Directive will reduce water pollution and improve ecological conditions. Two fish ladders are constructed in the lower part of the river. Belmontas fish ladder is functioning properly while Rokantiškės ladder does not work and needs reconstruction.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Virinta

The River Virinta is a salmon river flowing to the River Šventoji.

Basic hydrological facts

River length: 59.1 km of which 27 km accessible for salmonids

Size of catchment area: 566.3 km²

Average flow: 4.68 m³/s

Daily lowest flow: 2.46 m³/s

Number of migration hindrances: 1

Habitat and water quality in River Virinta

The River Virinta is the left tributary of the River Šventoji. It springs from the Gudeliai surroundings, to the east of Suginčiai, in the Molėtai district. In the upstream areas the river flows through the lakes Želva, Gavėnas, Ilgynas, Grauželis and Virinta. Further it flows northwest through the small towns of Alanta, Laičius, Klabinius, Kurklius and enters the River Šventoji 75 km from its mouth.

Previously there were at least 6 milldams in the river. They have all been destroyed, but two of them (Mendučiai in the upper section and Klabinai in the middle section) are still serious obstacles for fish migration. There is a 15 km long section of the River Virinta in its lower reaches (from Kaunas, Zarasai road, to the mouth) that forms an ichthyological reserve.

The dominant soils of the riverbed are sand and gravel. Water vegetation in the riparian zone is sparse, but in slow flowing stretches both coastal and underwater vegetation is rich (the overgrowing level in these areas is commonly about 90 %). Elsewhere the vegetation grows mostly fragmentary and overgrowing ranges from 10 % to 25 %.

River Virinta according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river

Ecological status: Good

Biological status: Fair

Physical & chemical status: Good

Hydrologic & morphological status: Good

The main measures in the water management plan are to take measures to reduce pollution of wastewater from agriculture and to improve fish migration by installing a fish ladder over the Klabiniai dam.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Virinta salmon stock

There is an important salmonid river section from the mouth to the Klabiniai milldam (27 km). In many areas of this river section, except the stretches with sandy bottom and low flow, the ecological conditions are suitable for salmon. Hatchery-reared salmon juvenile releases in the river Virinta started 2003, and during the same year's autumn salmon juveniles were observed in two monitoring stations. Salmon juveniles have not been released into the river Virinta on a yearly basis and hence their overall abundance has remained low.

So far in the river Virinta only artificially reared salmon juveniles have been observed. The natural migration of salmon is affected by the fact that the estuary of the Virinta is above the Kavarskas dam. Affluent water raises the water level in downstream areas of the Virinta. For this reason, it can be difficult for the salmonids that pass the Kavarskas fish-ladder to find the mouth of Virinta.

Salmon population facts

Population category: 4

Reproduction area: 3 ha

Production capacity: 3,000 smolts

Recent wild smolt production estimate: 68

Fishing regulations in the River Virinta

Fishing of salmon and sea trout is prohibited in the river at all times.

Specific actions for the development of the salmonid populations

The water quality should be improved by reducing pollution throughout the river basin. To reduce nutrient and sediment loads from agriculture a protection zone should be established along agricultural lands by the river.

One dam is constructed in the middle part. The dam is difficult to pass for salmonids and should be improved.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Voké

The River Voké is a salmon river flowing to the River Neris.

Basic hydrological facts

River length: 35.8 km of which 2 km accessible for salmonids

Size of catchment area: 527.7 km²

Average flow: 5.2 m³/s

Daily lowest flow: 1.7 m³/s

Number of migration hindrances: 2

Habitat and water quality in River Voké

River Voké is a small cold-water salmonid tributary of the River Neris. The River Voké connects the basins of Merkys and Neris. The surroundings of the River Voké upper reaches are very marshy. The southern part of the upper river basin includes the Papės Lake (1.90 km²), where the headwaters of Voké are located. In addition to the Papės Lake, several other smaller lakes are found in the river basin. The tributaries of Voké are Krempė, Asdrė and Rudamina. All rivers flow out of the swamps. 35 % of the Voké basin is channelized including the Voké and Nemėža and its tributary Galinė. In the upper and middle courses of the river the bottom is peaty. However, downstream the slope and sinuosity increases and soil becomes sandy and gravelly. Under the rapids the bottoms are rocky.

In the 1930s, a channel near the Žagarinė was excavated between Merkys and Voké and the upper Merkys outflow was directed through the Papės Lake to the River Voké. At the same time the Grigiškės paper mill was constructed. The amount of water was regulated by two shield-shaped dams, one on the Merkys River and the other 30 m below, at the beginning of the channel. During the war the dams were destroyed. Now there are two dampers, one on Merkys River and other on the channel at the Baltoji Voké town. The Merkys-Voké channel was dug through the swamp of Baltoji Voké.

There are a number of dams in the River Voké: the Baltoji Voké dam in the upstream areas, the Vaidotai spillway dam in the middle part of the watercourse, and the Mūro Voké dam in the downstream area (9 km to the mouth). The highest dam (4–5 m) is Grigiškės hydropower plant that is located 2.6 km from the mouth. The downstream dams that are not equipped with ladders are an impassable barrier to fish.

The water temperature and oxygen concentration in the water are sufficient for salmonids, except during the hottest summer period. The overgrowing level of habitats with macrophytes during the summer months in the upper and middle courses is high, except in the affluent zone at Grigiškės. The anthropogenic impact in the Voké River basin is not very high for the separate river sections.

The most polluted areas are located downstream, where the main polluters are the towns of Vilnius, Vaidotai and Grigiškės and their wastewaters. A significant deterioration of water quality has been observed in these areas. The water quality has deteriorated significantly below Mūro Vokė affluent, where the transparency has decreased and changes in color and odor have occurred. River Vokė lowlands are contaminated with organic materials.

River Vokė according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a small lowland river.

Ecological status: Fair

Biological status: Fair

Physical & chemical status: Fair

Hydrologic & morphological status: Fair

The main measures in the water management plan are to improve fish migration conditions by the installation of fish ladders and to take measures to reduce pollution of wastewater from agriculture lands and towns.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Vokė salmon stock

Nowadays salmon are prevalent in a small part of the river before the dam Grigiškės (2.6 km section). The lower reaches of the river are suitable for salmon. There are historical records that salmon also previously existed in the River Vokė, but the stock became extinct by the pressure of water pollution and dams.

Since 2000, salmon stocking began in the lower sections, and every spring about 5–10,000 fish have been released into the river. Since 2001 salmon juveniles have been caught in the river, except in the years 2003 and 2006. Recently, salmon and sea trout have been found to spawn in the lowlands of Vokė.

Salmon population facts

Population category: 4

Reproduction area: 2 ha

Production capacity: 2,000 smolts

Recent wild smolt production estimate: 945

Fishing regulations in the River Vokė

Fishing of salmon and sea trout in the river is prohibited at all times.

Specific actions for the development of the salmonid populations

The water quality and habitat should be improved by reducing pollution throughout the river basin. Sewage treatment should be efficient at cities, towns and industrial plants along the river. To reduce nutrient and sediment loads from agriculture a protection zone should be established along agricultural lands by the river.

Algal blooms and excessive vegetation takes place during summer in many stretches of the river. Two dams are constructed in the lower reaches of the river. Fish ladders are planned to install on both of the dams. Measures taken to implement the Water Framework Directive will reduce water pollution and improve ecological conditions.

The recommendations in the general report of the HELCOM SALAR project concerning accessibility and river fisheries management are applicable for this river.

The River Žeimena

The River Žeimena is a salmon and sea trout river flowing to the River Neris.

Basic hydrological facts

River length: 79.6 km of which 48 km accessible for salmonids

Size of catchment area: 2,793 km²

Average flow: 27 m³/s

Daily lowest flow: 15.2 m³/s

Number of migration hindrances: 0

Habitat and water quality in River Žeimena

River Žeimena is the right tributary of River Neris, bringing water from the northern part of the south-eastern plains. It springs from the Žeimenis Lake. There are a total of 22 streams in the Žeimena catchment area that are more than 10 km in length, but the main tributaries are rivers Mera (60 km), Lakaja (29 km), Saria (28 km) and Peršokšna (26 km).

The dominant substrate of the riverbed is sand. Gravel and pebble occurs at rapids sites, but they are not abundant. The overgrowth of macrophytes during the summer is relatively high. Vegetation can cover between 50–80% of the water surface. The share of forested area in the Žeimena river basin is 31%, and the forest is dominated by conifers (85–90%). The Žeimena basin has the largest proportion of lakes of all the river basins in Lithuania. There are 479 lakes larger than 0.5 ha in the basin. Altogether lakes cover 180 km² (6.4%) of the catchment area.

There are no natural or man-made migration obstacles in the river. The Žeimena River is one of the cleanest rivers of Lithuania. This is due to the affluent formation of groundwater and a relatively small anthropogenic impact. According to all the main water-quality criteria the water in Žeimena is very clean.

River Žeimena according to the Water Framework Directive

The name of the water management district is Nemunas River Basin District and the river type is a medium-sized lowland river.

Ecological status: Excellent

Biological status: Excellent

Physical & chemical status: Good

Hydrologic & morphological status: Excellent

The main measures in the water management plan are to take measures to reduce waste water pollution and to improve the wastewater treatment in the cities of Švenčionėliai and Pabradė.

Natura 2000

The main river belongs to the Natura 2000 network.

The River Žeimena salmon stock

The River Žeimena is one of Lithuania's main rivers in which natural salmon populations live and spawn. When salmon populations in most other Lithuanian rivers decreased, the River Žeimena has sustained a stable local salmon population. The salmon stock of the river Žeimena is of the original strain since there has been no stocking in the river.

It is argued that the Žeimena river salmon spread across the entire river system, but survey data show that the fish are not present in the upstream areas from Kaltinėnai to Švenčionėliai. However, there are some cases during the migration period that salmon have been caught in the lake Žeimenis. The monitoring data shows that salmon has most recently been found at the Lakaja mouth, which is located at 48.8 km from the mouth of Žeimena.

Two areas of the river have been identified as the most important areas for salmon reproduction. These areas are the rapids in the Žeimena midstream (extending from the mouth of river Mera to the town of Pabradė) and the rapids below Pabradė (extending until the mouth of Žeimena). The rapid areas with gravel and pebble substrates are ideal for salmon reproduction. Salmon juveniles are usually found in the rapids or in the littoral zone, and sometimes they occupy shallow and relatively large vegetated areas.

Sea trout are found in the river Žeimena and in five of its tributaries. The suitable reproduction area for sea trout in the Žeimena river basin is about 29 ha (20 ha in the main river). The density of sea trout juveniles in the Žeimena river is low: about 0.3 individuals/100 m² (2.1 individuals/100 m² in the tributary Mera and 2.8 individuals/100 m² in the small tributaries). The average sea trout smolt production in the Žeimena river basin is 2,000 individuals per year.

Salmon and sea trout population facts

Population category: 1 (salmon)

Reproduction area: 15 ha (salmon); 29 ha (sea trout)

Production capacity: 20,000 smolts (salmon)

Recent wild smolt production estimate: 3,280 (salmon); 2,000 (sea trout)

Fishing regulations in the River Žeimena

Salmon and sea trout fishing is allowed with a licence from September 16 – October 15. During the salmon spawning period, from October 16 – December 31, all fishing in this river is prohibited.

Specific actions for the development of the salmonid populations

The water quality should be further improved by efficient sewage treatment at the towns of Švenčionėliai and Pabradė.

Measures taken to implement the Water Framework Directive will reduce water pollution and improve ecological conditions.

The recommendations in the general report of the HELCOM SALAR project concerning river fisheries management are applicable for this river.

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