

Role of the Republic of Belarus in conservation of the European eel world population

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1. Distribution of the European eel in Belarus

The European eel is one of the most interesting in its biology representative of native fish fauna of Belarus. Inland water reservoirs of Belarus are part of trophic eel areal where it came in a natural way up to 50s of the XX century from the Baltic Sea upward the Western Dvina (Daugava) and Neman (Nemunas) Rivers and its feeders up to its damming.

At present the main eel capture fisheries are concentrated in Naroch (Neman river basin) and Braslav (Western Dvina river basin) lake groups, i.e. water basins, into which the juvenile eel was quite regularly and intensively released. The eel fattens here in natural environment and migrates from these basins when reaches life stage which corresponds to downstream-migrant stage (silver eel).

From the water basins of Naroch lakes group the eel migrates down the rivers Narochanka and Stracha flowing into the river Vilija (Neris) and into Neman then lower the dam of Kaunas hydro power plant. Its natural return is possible by Vilija river.

The eel migration from the water basins of Braslav lakes group takes place down the rivers Druyka and Drisvyatka, flowing into the river Western Dvina (Daugava). Unfortunately, at the moment the downstream eel migration down the river Western Dvina is limited, as the river is regulated by three large hydroelectric dams on the territory of Latvia - Riga, Ķegums and Pļaviņas hydro power plants. For that very reason full-scale migration to Sargasso Sea for spawning and return of eel juveniles into its natural habitats in Belarus is not possible by this river.

2. Scientific investigation of eel in Belarus, achievements

The study of the European eel biology in Belarus has deep roots. The works were started in the early 50s of the XX century by the leading specialist in eel-breeding Dr. S.V. Kokhnenko. A team of researchers, engaged in the research of various aspects of this fish species biology was formed. In 1975 eel reproductive products were obtained for the first time in the USSR. In 1982 fertilization of eggs was made and viable larvae were received for the first time in the world experimental practice. Embryogenesis and eel larvae early life stages have been described.

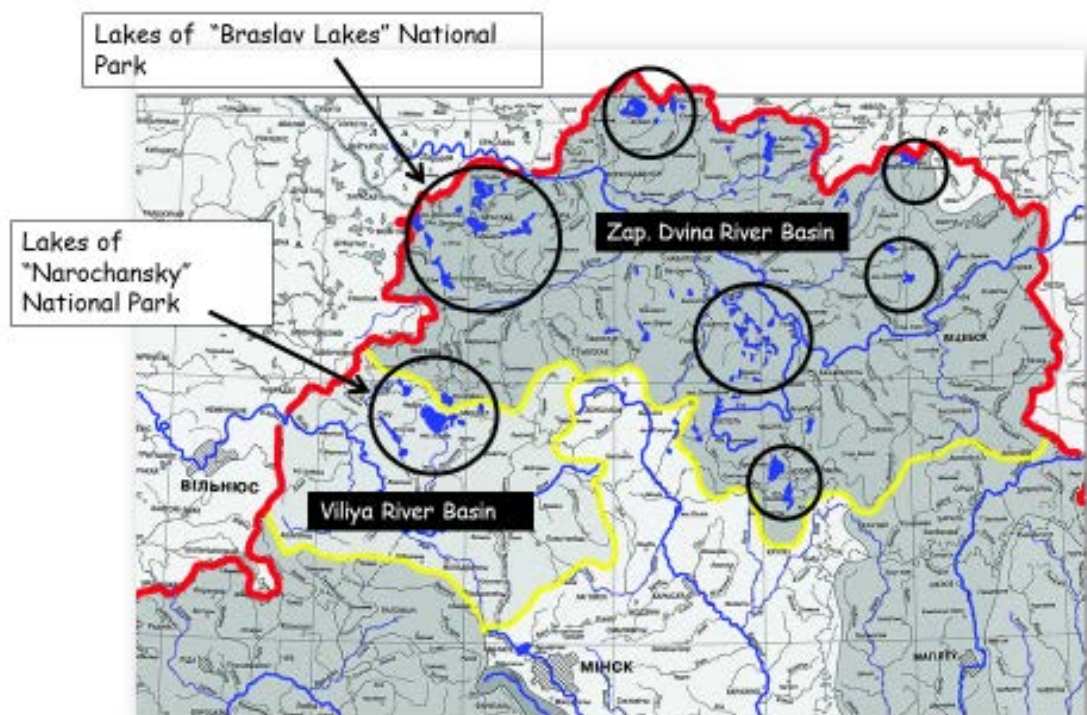
Up to the present time, the number of migrating silver eel from Belarus main eel lakes to transboundary river basins for the purpose of migration to spawning grounds, as well as the mechanism for the pass have not been known. In 2014-2015 at the initiative of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus the research project "Estimate the amount of annual European eel

downstream migration from Belarus water basins to transboundary river basins with a view to sustainable use of eel resources" was carried out by the State Scientific and Production Amalgamation "The Scientific and Practical Center of the National Academy of Sciences of Belarus for Bioresources".

This has been determined that escapement index of migrating eel from water basins of Belarus in spring period of the years 2014-2015 amounts to 61,21% on the average from total migrating eel quantity which is higher than that one established by the Resolution of the EU Council dated 18.09.2007 № 1100/2007. It should be noted that the calculations provide data only on the European eel females, as the fish males are not normally captured by the applicable fishing gear (they are smaller than the commercial measure) and they easily migrate down to transboundary watercourses.

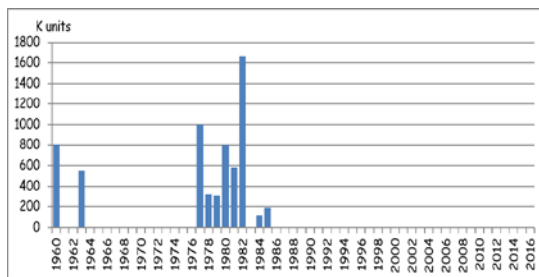
3. Seeding and fishing

Due to the damming, the migration of the juvenile eel in the boundaries of Belarus has significantly decreased and now is only possible down the River Viliya from the Naroch lake group. In this regard, the eel farming in inland water basins of Belarus is based mainly on the stocking of water basins with the eel breeding material and the population status (commercial stocks) and eel resources are determined mainly by the frequency and volumes of water basins' stocking.

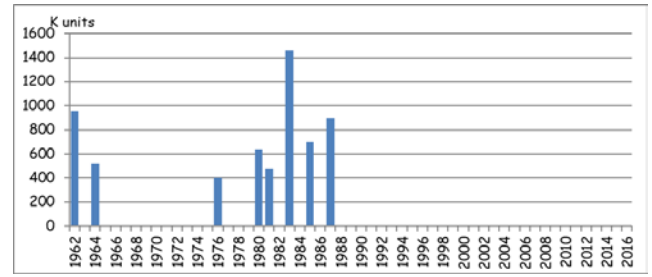


Picture 1. Basic lake systems of Belarus stocked with eel

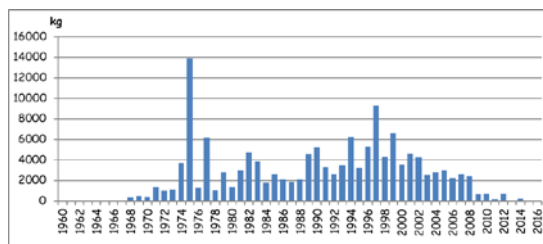
Currently, in Belarus water basins there are commercial fish populations, consisting mainly of the fish released into them as breeding material over the period of 2003-2008.



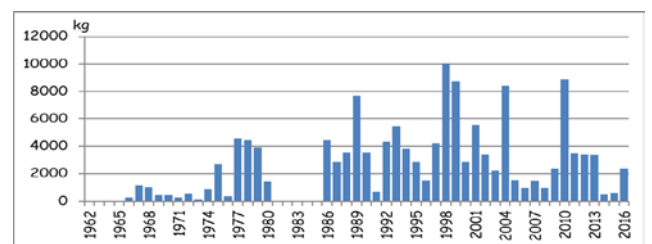
Stocked



Stocked



Captured



Captured

Nescherdo lake
(Western Dvina (Daugava) river basin)

Svir' and Vishnevo lakes
(Neman (Nemunas) River basin)

Picture 2. At present inland water reservoirs of Belarus are inhabited by eel stocked after 1985 (24 lakes were stocked in total, including 5 in Neman River basin and 19 in Western Dvina River basin).

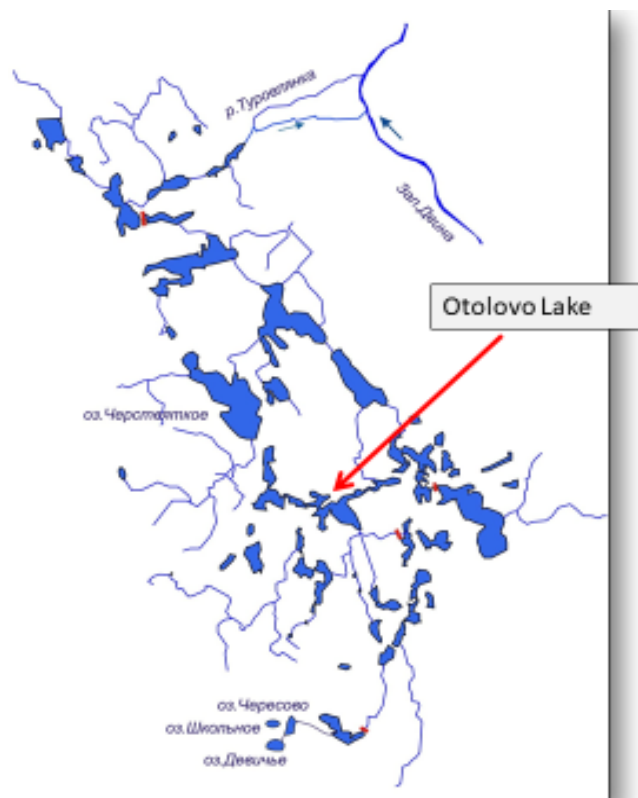
The commercial fishing of eel is currently performed only by tenants (users) of fishing areas (economic entities with a separate legal identity). In accordance with the legislation of the Republic of Belarus the commercial fishing of migratory eel is carried out only in spring time (from 1 April to 8 June) in places strictly defined in the annual Decree of the Ministry of Natural Resources and Environmental Protection. In autumn target migratory eel fishing is not carried out. In accordance with the existing rules, the amateur fishing of eel is not allowed.

The planned stocking of Belarus water basins with the juvenile eel, imported from France and England was launched in 1956. This significantly improved the eel population and allowed to form commercial populations in the Western Dvina and Neman River water basins.

River basin	Stocked water reservoirs		Number of juvenile eel stocked	
	units	%	Thousand of units	%
Neman	11	22,00	18 527,3	25,83
Western Dvina	39	78,00	53 194,2	74,17
IN TOTAL	50	100	71 721,5	100

Table 1. Restocking indicators of inland water basins by European eel in Belarus (1956 - 2008)

Over the period of 1956-2008, 50 water reservoirs were stocked in the territory of Belarus with the total area of 49.64 thousand hectares. The total volume of stocking was 58.9 million units, including 685 thousand units of grown-up fingerling with the average weight of 0,5-5g per unit. In practice the number of water bodies in Belarus inhabited by eel is much greater. For example, stocking of Otolovo Lake was made in 2007 which falls under Ushachi Lakes group. There are more than 60 lakes in this group with total territory of 7 500 ha linked with each other and it is naturally that eel will fatten in majority of them eventually.



Picture 3. Otolovo Lake (Ushachi Lakes group)

Since 2008 the deliveries of eel (the breeding material) to Belarus have been discontinued in connection with the Resolution of the EU Council of 18.09.2007 № 1100/2007. Real threat of extinction emerged both as native species of fish fauna of Belarus and significant part of its trophic areal.

4. Protective measures and potential

At present complex of measures on protection and sustainable use of the European eel developed and under implementation in Belarus:

- normative legal provision for protection and use of eel resources. The eel inhabits mainly in the lakes on the territory of National Parks what guarantees additional protection;
- strict state and departmental protection of eel resources in the management of commercial and recreational fisheries, including prohibiting of eel fishing by amateurs;
- introduction of licensing for the management and conduct of target eel fishery for fishing enterprises (tenants of fishing grounds);
- setting quotas for the eel capture and the rules governing the management of its fishery;
- taking actions on reduction of eel mortality in the areas of the hydrotechnical facilities' location on the fishery water basins and watercourses;
- improving environmental conditions (water quality) in fish ponds;
- updating the system of ichthyopathologic control measures;
- facilitating support European eel world population by means of passing not less than 50% of migrating eel to its spawning grounds (monitoring of compliance with a 40% downstream migration value of migrating eel to its spawning grounds).

In addition, in the near future the development of eel resources monitoring program and its inclusion in the National Environmental Monitoring System have been planned to be implemented.

There are technical capacities enabling to increase the survival of the breeding material by keeping it for a longer period and rearing of glass eel fish on specialized fish-breeding farms (there are 5 such fish-breeding farms in Belarus).

Currently, a calendar plan for the implementation of Eel Recourse Management Plan for the period up to 2020 has been developed in the Republic of Belarus and, in case of lifting a ban on the supply of glass eel larvae, Belarus is ready to start its implementation.

It should be noted that Belarus has an additional resource of natural eel water basins, which are not currently used as feeding water basins due to the shortage of breeding material. Potentially there are 318 lakes with total territory of more than 91 thousand ha which can be used as eel nursery grounds. Taking into account that Western Dvina (Daugava) river is strictly dammed by Riga, Ķegums and Pļaviņas hydro power plants on the territory of Latvia what completely prevents eel migration from the water basins of Braslav lakes group, Belarus could make accent on stocking

Viliya (Neris) river basin. Besides abovementioned lakes of “Narochansky” National Park there is great potential in this river basin for eel including Republican Landscape Reserve “Sorochanskies Lakes” with its 14 lakes which are going one by one as integrated water chain of 18 km.

Lifting a ban on the supply and the increase in the glass eel stocking of Belarus natural water basins would allow to ensure the recruitment (replenishment) of the European eel world population due to brood-fishes migrating for spawning from Belarus water basins.

Considering the above, the Republic of Belarus fully complies with the EU Council Regulation dated 18.09.2007 № 1100/2007 for the recovery of the stock of European eel, including compliance with measure on the pass to the routes of the spawning migration of at least 40% of the fish, which in size and physiological condition of the gonads corresponds to the downstream migration state.

CONCLUSIONS:

1. European eel is native representative of ichthyofauna of Belarus.
2. Inland water reservoirs of Belarus are part of natural trophic eel areal where it came in a natural way from the Baltic Sea upward the Western Dvina (Daugava) and Neman (Nemunas) Rivers and its feeders up to its damming
3. As the result of damming (beyond the territory of Belarus) mass natural migration of eel to inland waters was practically stopped
4. Eel fishery in Belarus is based exclusively on stocking of inland water reservoirs with elvers
5. Regular stocking of Belarussian water reservoirs with elvers made this possible to form numerous local populations achieving migrating stage
6. Belarus has big potential with water reservoirs which can be used as eel nursery grounds
7. Complex system of measures was developed and under implementation in Belarus on protection and recovery of the stock of European eel, including measures on implementation of EU Council Regulation dated 18.09.2007 № 1100/2007 :
 - Fishing of eel is strictly licensed
 - Amateur (recreational) fishing of eel forbidden
 - Eel inhabits mainly in the lakes on the territory of National Parks what guarantees additional protection
 - Eel Recourse Management Plan for the period up to 2020 has been developed
 - Escapement index of migrating eel from water basins of Belarus in spring period amounts to 60%
8. Belarus has school of thought on eel investigation with depth of practical experience
9. There are technical possibilities in Belarus to increase the survival of the stocking material by keeping it for a longer period and rearing of glass eel on specialized fish-breeding farms

10. Removal of a ban on supply of the stocking material to the Republic of Belarus will give possibility
 - a) to maintain substantial part of natural trophic eel areal and
 - b) to provide recruitment of its world population by means of brood fishes migrating to spawning places from Belarussian water reservoirs