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

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Inland water reservoirs of Belarus are part of natural trophic eel areal
Historically eel 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.
Restocking indicators of inland water basins by European eel in Belarus (1956 - 2008)

<table>
<thead>
<tr>
<th>River basin</th>
<th>Stocked water reservoirs</th>
<th>Number of juvenile eel stocked</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>units</td>
<td>%</td>
</tr>
<tr>
<td>Neman</td>
<td>11</td>
<td>22,00</td>
</tr>
<tr>
<td>Western Dvina</td>
<td>39</td>
<td>78,00</td>
</tr>
<tr>
<td><strong>IN TOTAL</strong></td>
<td><strong>50</strong></td>
<td><strong>100</strong></td>
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Stocking has been made into water basins of the rivers which were used for migration traditionally (Neman and Western Dvina)

Stocking material - from Great Britain and France
Basic lake systems of Belarus stocked with eel
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).
Ushachi Lakes group

Otolovo Lake was stocked with eel in 2007 (96.6 thousand of units)

More than 60 lakes with total territory of 7 500 ha
Since 2008 the deliveries of eel (stocking material) to Belarus have been discontinued in connection with the Resolution of the EU Council dated 18.09.2007 № 1100/2007.
There are two main issues which have significant importance for natural eel reproduction:
- conditions to reach downstream migrant stage in the nursery grounds and
- possibility for unhampered downstream migration

Commercial return of eel in water reservoirs of Belarus is indirect indicator of escapement index

Pre-war stocking - 5.7 %

Stocking in 50th-60th - 10 %

At the beginning of XXI century - 4 %
2 peaks of mass migration of silver eel from Belarus: spring (maximum in May) and autumn (maximum in September)

Specialized fishing of migrating eel in Belarus is permitted during 2 spring months only in places specified by appropriate Resolution of the MNREP. Fishing is implemented by special stationary and portable traps
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 Center for Bioresources of the National Academy of Sciences of Belarus.

This has been determined that escapement index of migrating eel from water basins of Belarus in spring period of the years 2014-2016 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.
More than 10 thousand lakes in Belarus

Potentially there are 318 lakes with total territory of more than 91 thousand ha which can be used as eel nursery grounds.
Free-flowing way of the European eel migration from Belarussian water reservoirs to the Baltic sea
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.

14 lakes which are going one by one as integrated water chain of 18 km.
There are technical capacities enabling 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 (there are 5 such fish-breeding farms in Belarus).
The works were started in the early 50s of the XX century

Main publications

Dr. Serafim V. Kohnenko

Biology and distribution of eel, 1958

European eel, 1969

Ecological and physiological plasticity of the European eel *Anguilla anguilla* L., 1977

Issues of eel reproduction, 1983
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.

1 day after hatching

2 days after hatching

4 days after hatching

Prolarvae of the European eel

Hormonal regulation of eel maturation, 1990
European eel is native representative of ichthyofauna of Belarus.

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.

As the result of damming mass natural migration of eel to inland waters was practically stopped.

Eel fishery in Belarus is based exclusively on stocking of inland water reservoirs with elvers.

Regular stocking of Belarussian water reservoirs with elvers made this possible to form numerous local populations achieving migrating stage.

Belarus has big potential with water reservoirs which can be used as eel nursery grounds.
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%

Belarus has school of thought on eel investigation with depth of practical experience

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
Removal of a ban on supply of the stocking material to the Republic of Belarus will give possibility
(1) to maintain substantial part of natural trophic eel areal  
and
(2) to provide recruitment of its world population by means of brood fishes migrating to spawning places from Belarussian water reservoirs
Годы перекрытия плотинами ГЭС путей миграции угря в водоемы (из водоемов) Беларуси

<table>
<thead>
<tr>
<th>ГЭС</th>
<th>Река</th>
<th>Год ввода</th>
</tr>
</thead>
<tbody>
<tr>
<td>Кегумская (Латвия)</td>
<td>Zap. Dvina (Daugava)</td>
<td>1940</td>
</tr>
<tr>
<td>Плявинская (Латвия)</td>
<td>Zap. Dvina (Daugava)</td>
<td>1966</td>
</tr>
<tr>
<td>Рижская (Латвия)</td>
<td>Zap. Dvina (Daugava)</td>
<td>1974</td>
</tr>
<tr>
<td>Каунассская (Литва)</td>
<td>Neman (Neris)</td>
<td>1960</td>
</tr>
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</table>
В 2005 г. в НП «Нарочанский» европейским угрём было зарыблено озеро Большие Швакшты. Всего в водоем было выпущено 444,5 тыс. шт. стекловидной личинки угря. Впервые нагуливающийся угорь был отмечен в промысловых уловах в озере в 2009 г., в последующие годы вылов нагуливающегося угря отмечается уже регулярно. Специализированный весенний (как и осенний) лов мигрирующего угря из данного водоема не ведется, и весь (100 %) покатный угорь из озера уходит по р. Страна в р. Вилия.

Схема расположения ловушек для лова мигрирующего угря в весенний период из водоемов НП «Нарочанский»