November 2020

Policy Brief

Baltic Sea Centre | Stockholm University

Fishing ban and more knowledge required to save the European eel

If the endangered European eel population is to recover there is an urgent need for a fishing ban, increased environmental monitoring and fewer obstacles to migration. Furthermore, the estimates of spawning biomass and of the impact of coastal fishing used in eel management today should be independently reviewed and revised.

The number of eel fry (glass eel) reaching Europe has fallen by more than 90% since the 1970s. The decrease in the North Sea region is around 98 per cent. Therefore, the European eel is red-listed as critically endangered by the International Union for Conservation of Nature (IUCN). According to the International Council for the Exploration of the Sea (ICES), all human impact on the European eel should be "*reduced to, or kept as close as possible to, zero*".

Despite this, there is extensive commercial eel fishing conducted throughout the full life cycle of the eel. Fishing still kills hundreds of tonnes of eel in Sweden every year. Nonetheless, the fisheries management considers that Swedish fishing for emigrating silver eels has a negligible impact on the population. However, this assumption is based on uncertain estimations.

Imposing a ban on all fishing targeting at eels in the Baltic Sea and other European waters is the single fastest, cheapest and most feasible measure to increase the chances of population recovery. It is also completely in line with the EU Common Fisheries Policy, the precautionary principle and the scientific recommendations.

Fishing catches

European eel catches have declined steadily over the last 60 years. In 2017, fishing in the EU (including Norway, Turkey and Tunisia) landed a total of 2,224 tonnes of yellow and silver eels . In the 1950s, the total catch of yellow and silver eels was 18,000 – 20,000 tonnes. The same negative trend is seen in the Baltic Sea.

In 2007, eel fishing was banned in Sweden with the exception of commercial fishers with permits. Since 2012, eel fishing has been completely closed on the west coast. There are currently 189 commercial fishers in Sweden with permits to fish eel. Of these, 132 fish in saltwater and the remainder (57) fish in inland waters. Each fishing permit allows a maximum annual catch of eight tonnes. In 2018, Swedish eel fisheries reported landings totalling 244 tonnes of eel. Of these, 142 tonnes were taken from coastal fishing and the rest from inland fishing (102 tonnes). There is also extensive illegal eel fishing that occurs in the Baltic Sea. There were more than 360 pieces of illegal eel fishing gear seized in Swedish waters in 2017.

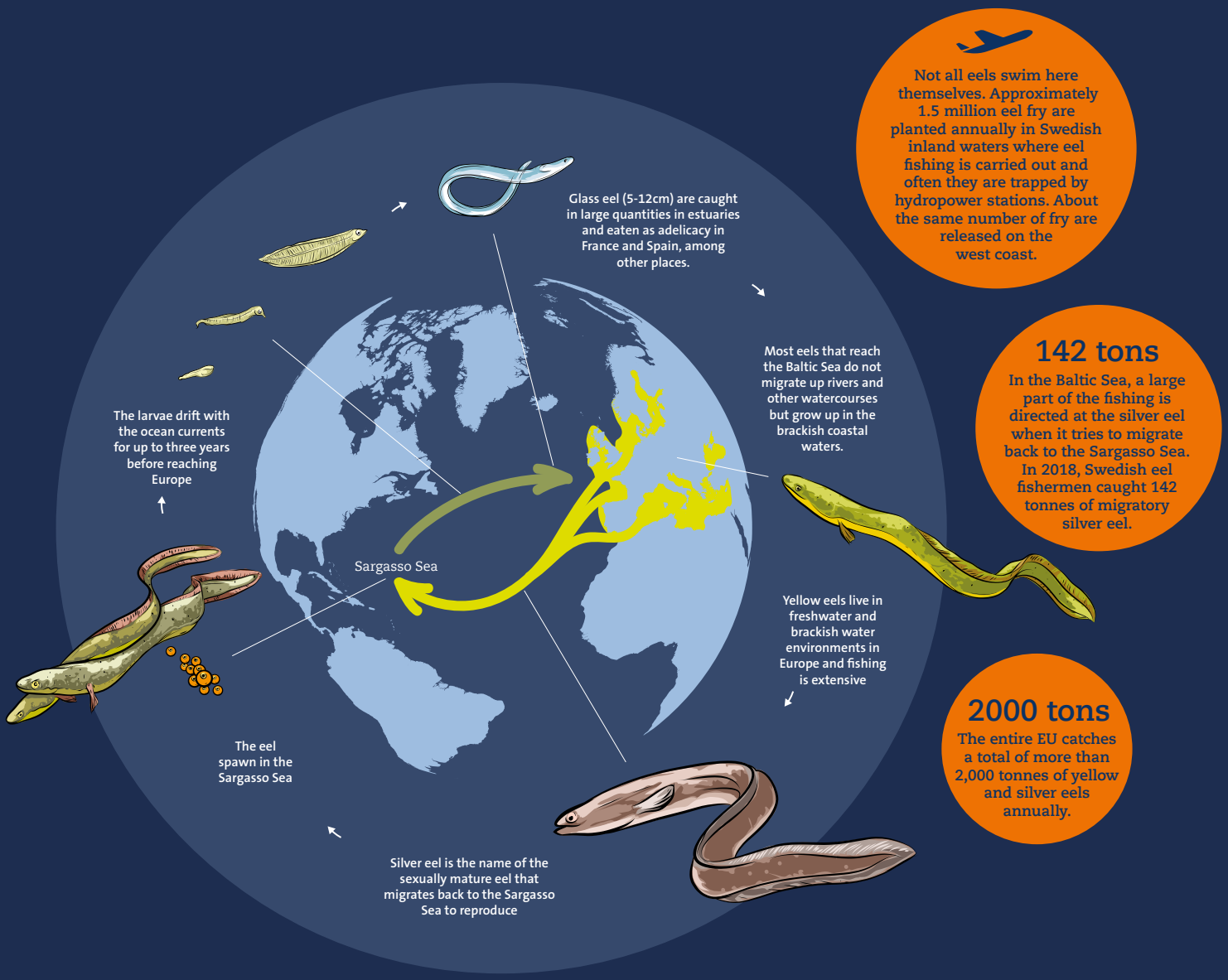
Silver eel fishing does the most damage

Most of eel fishing in Sweden target migratory silver eels – which is the fishing that has the biggest impact on the population. According to ICES, reduced silver eel fishing is likely to be the measure that would have the fastest positive effect on the spawning biomass.

Naturally, the older the eel gets, the higher its reproductive value, that is, the chance of the individual multiplying. The reproductive value of the glass eel is quite low because eel fry also have a high natural mortality rate. Eels in the Baltic Sea normally wait for 10– 20 years before transforming into silvers eels and beginning the journey back to Sargasso. Thus, a fully grown spawning silver eel has a significantly higher reproductive value than a glass eel or yellow eel, and the survival of the silver eel should therefore be

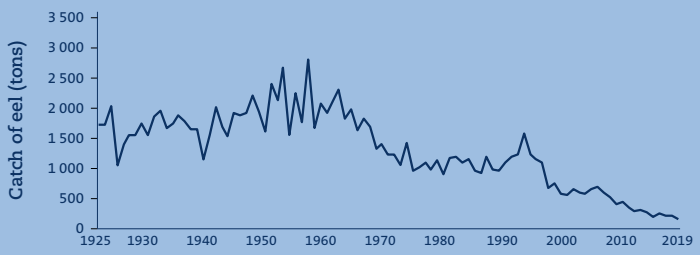
Photo:Gunnar Aneer/Azote

The eel's life cycle: a journey with great risks

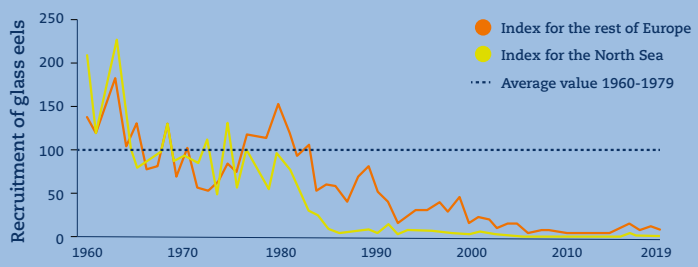


The eel spawn in the Sargasso Sea where the eggs hatch. From there, leptocephalus larvae drift towards Europe. When the larvae have almost reached the coast of Europe, they are transformed into glass eels, and then into pigmented eel fry that migrate up into fresh and brackish waters. The growing eel is called yellow eel. When the eel becomes sexually mature, it gets silver-colored scales and is called silver eel during its migration back to the Sargasso Sea.

Illustrations: Robert Kautsky/Azote



Catch statistics for eels in Swedish commercial fishing during the period 1925 - 2019 along the south coast, east coast, west coast and in lakes (catch data for lakes are missing until 1986). Source: SLU, Department of Aquatic Resources.



The amount of glass eels that reach Europe and the North Sea. Mean value for the years 1960-1979 is used as index (= 100). Source: ICES, *Advice on fishing opportunities, catch, and effort Ecoregions in the Northeast Atlantic*. Published 8 November 2019.

EEL MANAGEMENT PLANS NOT FULFILLED

In 2007, the EU adopted a European Eel Recovery Plan (European Council Regulation (EC) No 1100/2007). It means that all eel fishing Member States that have significant natural habitats for European eels must have national eel management plans. These must ensure that at least 40 per cent of the quantity of eel that would have been spawning if there was no human impact, can enter the sea and swim towards Sargasso to spawn. So far neither Sweden nor any of the other Baltic Sea countries are even close to achieve all the objectives of their management plans.

THREATS TO EELS

The biggest human threats to eels are fishing, the expansion of hydropower and other land use that prevent eels from migrating up rivers and other waterways. As the eel is a fatty fish that will grow quite old before it returns back to the Sargasso Sea, it is also sensitive to harmful environmental toxins that accumulate in its adipose tissue. Over the last 30 years, many eels in Swedish waters have been infested by swimbladder worms - a parasite that probably derives from the Japanese eel imported into southern Europe for cultivation. Furthermore, the eel is also a natural prey fish for cormorants and other predators.

prioritised. According to the figures from 2016, if the Baltic Sea countries (primarily Sweden, Denmark, Poland and Germany) stopped all fishing targeted at silver eels, an additional 900 tonnes of eel would have the chance to swim out of the Baltic Sea and onwards to Sargasso each year.

Uncertain calculations

Fishing mortality – the proportion of the population killed by fishing – is a key factor in the management of eel in Sweden. According to the estimates of the administration, Swedish coastal fishing kills approximately just two per cent of the spawning silver eel that swims along the eastern and southern coasts of Sweden. As a result, coastal fishing is considered to be of little importance and is within the limits of the targets for the Swedish eel management plan. At the same time, the contribution of spawning silver eels from the Baltic Sea is specified at 3,627 tonnes . These assumptions are based on calculations that are extremely uncertain – and in some cases unreasonable. (See *Uncertain estimates*.)

The greatest uncertainty is due to the fact that the eel population in the Baltic Sea is a migrating and naturally diverse population, which makes it very difficult to measure. There is also a significant lack of regional catch and measurement data. Currently, scientists can only make very rough estimations of how large biomass of silver eel migrates out of the Baltic Sea each year, with a margin of error of several thousand tonnes. Without a more precise estimate of the amount of spawning silver eels, it is difficult to give an exact figure of the proportion of the stock that is killed by fishing.

Uncertain measurement methods

The difficulties in estimating spawning eel biomass in the Baltic Sea have led to research on seeking other methods to try to measure the impact of fishing. The calculations currently used by Swedish eel management are based on historical data from tagging experiments since the 1940s, where the fishing mortality is determined on the basis of how many tagged eels are reported by fisheries. Tagging experiments are associated with a great many uncertainties. Firstly, the tagged eels can die naturally before they are caught and secondly, the marker tag can come off before the eels are caught.

Furthermore, as the controls are non-existent, commercial fishers can forget – or fail to – report the catch of marked eels. Incentives for eel fishers to contribute catch data may vary. In 2005, an independent tagging trial was conducted in which the reporting rate was as high as 50 per cent. However, in these trials the eel fishers received SEK 400 for each marker tag and SEK 400 for each eel reported.

Inland fishing of imported eels

According to Swedish eel management, inland fishing in Swedish lakes and streams is estimated to harvest approximately 40 per cent of eels while the surviving part will eventually begins the migration downstream towards the coast. Almost all eels caught in the inland fishery are translocated eels, that were caught as fry on the coasts of Europe and transported to Swedish waters for release. Today, the supply of eel to Swedish inland waters relies almost exclusively on stockings. Without the stocking of eels, the amount of eel in Swedish inland waters would decrease sharply and disappear entirely in many places.

Sweden has been stocking glass eel since the 1970s. Today, there is approximately 1.5 million eel fry released into Swedish inland waters on an annual basis, as well as an equal amount on the west coast. However, many such releases are conducted above hydroelectric plants , such as in Lake Vänern and Ringsjön. Most eel fry are also released into waters in which there is active fishing. So-called trap-and-transport operations of silver eels past hydroelectric plants down to the estuary area are estimated to add 1–5 per cent to the spawn migration.

UNCERTAIN ESTIMATES

According to the eel management in Sweden, Swedish coastal fishing takes only two per cent of the migrating silver eel that pass the east and south coasts of Sweden. In 2018, coastal fishers reported a total catch of 142 tonnes. With an estimated take of around two per cent, it was estimated that 3,627 tonnes of silver eels swam past the Swedish east and south coast. Based on the highly reasonable assumption that approximately just half of all spawning silver eels in the Baltic Sea pass the coastline of Sweden, more than 7,200 tonnes of silver eels would have tried to migrate out of the Baltic Sea this year.

In order to sustainably produce approximately 7,000 tonnes of spawning silver eels per year, the total eel biomass (silver eel and yellow eel) would need to be around 18,000 tonnes in the Baltic Sea, according to the Beverton and Holt population model. Thus, the eel would be one of the most common species of fish in shallow coastal waters – which it is not. If there was just one (1) per cent deviation from the estimated fishing mortality rate of two per cent it would have caused deviations of several thousands of tonnes. As there is a lack of other indications that the Baltic Sea would contribute such large quantities of spawning silver eels, estimates that show only negligible fishing mortality may be considered arbitrary.

Releasing large quantities of imported glass eel into environments in which a relatively large proportion will be killed by either fishing or hydropower is a counterproductive conservation measure. If Swedish eel management is serious about using eel stocking as a measure to strengthen the spawning population and the recovery of the endangered eel, these stockings should be done in a way that avoids risk , i.e. in aquatic environments in which:

- there is no hydropower or other obstacles to migration
- no fishing is conducted.

In addition, an independent and thorough analysis of the actual benefits of stocking practices/translocations should be conducted. Releases should only be done if it can be effectively demonstrated that they; (a) increase the migration of the silver eel and, (b) benefit the recovery of the eel population more than if the glass eels had never been fished on the European coasts.

Fishing ban resistance

Catches of silvers eels have been significantly reduced in the Swedish coastal areas from an average of 785 tonnes per year in 2004 – 2006 to an average of 160 tonnes per year in 2015 –2017. At the same time, the number of active eel fishers has decreased. This reduction in catches is often used as an argument for the fact that fishing is having less and less impact on the eel population. Furthermore, it is often said that eel fishing will gradually cease as eel fishers retire and no new permits are issued for new establishment.

However given the scientific recommendations, the precautionary principle and the overall fisheries policy objectives for sustainable fisheries of the EU, these arguments are not sufficient to justify the continuation of fishing of an endangered species. Reduced catches may not only be the result of fewer eel fishers but also of a significant reduction in the number of eels. As a large part of the migrating silver eels from the Baltic Sea region pass Sweden's coastline, Swedish eel fishing has a significant impact on the chances of the silver eel to eventually reproduce and contribute to the stock. And even if there are no new permits issued, eel fishing in Sweden will continue for decades to come.

A fishing ban will give quick effect

The eel issue ultimately addresses the survival of a species. The European eel is a biologically unique species that evolved about 40 million years ago. If it disappears, it will be gone forever. There are several measures to prevent this from happening; for example, opening up free migration routes in rivers and streams, reducing the impact of hydropower and reducing emissions of harmful chemicals. However, these measures are complex, time-consuming and costly.

POLICY RECOMMENDATIONS

- Ban on all fishing targeting eels in Swedish waters. Prioritise winding up fishing for spawning silver eels.
- Work towards a ban on all fishing targeting eel in the Baltic Sea and in other European waters.
- Cease all stocking of eels above hydroelectric power plants and other obstacles to migration.
- Remove as many obstacles as possible in accordance with the EU Water Framework Directive. Prioritise small waterways in the western and southern Sweden
- Initiate an independent scientific review of current estimates of fishing mortality, turbine mortality and biomass of spawning silver eels, which are currently used as a basis for decision-making in the eel management in Sweden.
- Expand environmental monitoring for the purpose of (a) filling gaps in important scientific knowledge on the state of the eel population in terms of biomass, density and mortality, and (b) analysing and evaluating the impact of the measures taken for the purpose of population recovery.

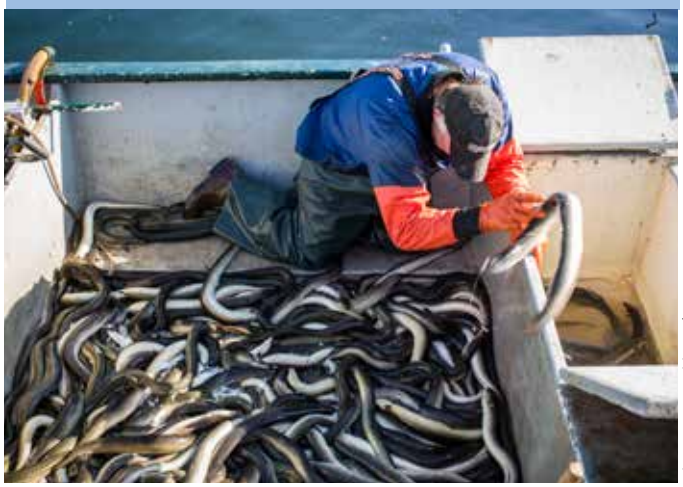


Photo:Hasse Dahlgren/Azote

Stopping fishing is a relatively simple measure that can be implemented quickly. In one stroke, a ban on eel fishing in all EU waters would significantly increase the chances of the population reaching sustainable levels again. To be sure, this would have economic consequences for inter alia, the processing industry and a limited number of commercial fishers. However, the costs should be weighed against today's obvious risk of the extinction of a species and thus losing the opportunity having a viable and fishable European eel stock in the future.

TO BRIDGE THE GAP BETWEEN SCIENCE AND POLICY

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