

## Restocking eels? – In Sweden a success!

- Evidence suggests that glass eel fisheries have little effect on the local eel population.
- High survival in farms preparing eels for restocking.
- Good survival of restocked eels.
- The ability to navigate is undiminished by restocking.
- Restocked eels are represented in significant numbers at the outlet of the Baltic.
- Good growth rates.
- The ratio of male to female is the same in restocked eels as the wild ratio.

The examples below come from the Baltic Region and illustrate how glass eels transferred from areas of local abundance have contributed to a significant number of silver eels leaving the Baltic Sea headed for the Sargasso Sea. Whether they complete the journey is unknown, but it is also unknown if wild silver eels are able to complete the same journey.

The source material for restocking eels is glass eels caught mostly in France and England. Once the glass eels are caught they may be restocked directly, or several countries now restock glass eels after a short period of growth and assessment in an eel farm (see farming poster). The Eel Standard will encourage more sensitive fishing methods for glass eels and inevitably decrease the capture and transport mortalities. Despite the reduction in glass eel recruitment to Europe there are still locations with a surplus of glass eels caused by geography and by anthropogenic barriers. One such location is in the River Severn in England where a glass eel fishery has been established because of a natural concentration of glass eels. Here, the local stocks of eels have been little affected by the glass eel fishery (Bark et al., 2007). It seems also reasonable to include glass eels which become concentrated due to anthropogenic barriers and are unable to reach suitable areas to mature. Therefore, capture of the glass eels and transport for restocking is an advantage for the eel as a species because if the excess glass eels are left they become food for birds and other fish or simply starve to death.

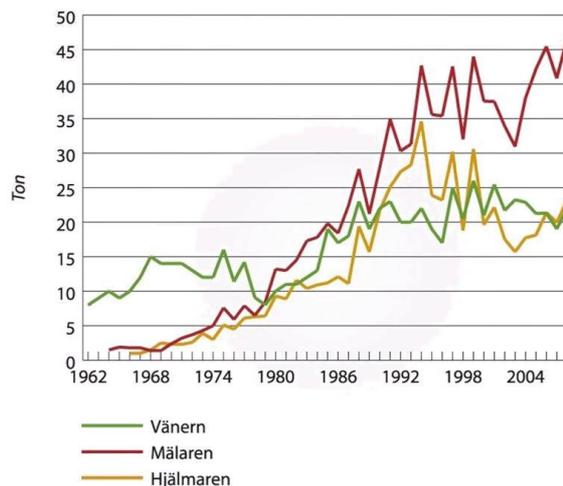


Figure 1. Shows the catches in metric tons for three of the largest freshwater lakes in Sweden. The increased catches is due only to increased restocking (Fiskeriverket, 2009)

Since the 1920's and up to the present day eels have been restocked by many countries bordering the Baltic Sea including: Germany, Poland, Sweden, Denmark, Finland and

Estonia. In the past this practice was intended for the benefit of fishermen but now emphasis is more towards restocking to help the eel survive as a species.

In Sweden all imported glass eels must pass through a quarantine before being restocked at about 1 gram. It has been known for some time that restocking of quarantined eels works as they grow to maturity in the numbers expected and with the growth rate expected. We even know that they will be silver and begin to migrate (Sjöberg et al. 2008). The effect of restocking is illustrated in figure 1 which shows, that while in many countries the catches of eels were dwindling the catches in three Swedish lakes were increasing simply due to restocking. There are reports 9%,13%, 17% och 18% of restocked eels surviving (Swedish Eel Management Plan 2008, Kundskapsgenomgång 2010, Pedersen 2009), and finally in 1966 Finland restocked 1 762 glass eels in 5 lakes and by 1992 had recaptured 56,1% of them and of which 63% were silver eels (Tulonen et al. 1992). The figures for Sweden of 13% and 17% are a minimum because recaptures are still being made.

Some question marks exist about the ability of the restocked eels to negotiate their way back to the Sargasso Sea. That eels find the outlets from the Baltic Sea was illustrated in 2006 when a tagging experiment, with both restocked and wild eels, showed that nearly all 252 recaptures had migrated towards one of the outlets from the Baltic already in the same autumn as the year in which they were tagged (Sjöberg et al. 2008). It is also stated in EIFAC / ICES in their 2009 report (page 44) stated that “considerable numbers of Swedish stocked eels reach at least as far as the outlet from the Baltic Sea”. One report quoted estimates that 26.7% (Limburg et al, 2003) and another that 21.3% (Clevestam et al. 2008) of all coastal eels at the outlet of the Baltic come from restocking. The same researchers also discovered that only 8.4% were naturally recruited. The remaining percentage (70.3%) is not categorized but is likely to include considerably more eels with a restocking background (pers. comm.). Indeed, why if their navigation ability is impaired by being restocked are there so many restocked eels at the outlets of the Baltic Sea.

In Sweden people often ask if the ratio of males to females is affected by using material from the quarantine. In Sweden the wild eel population is nearly all female in the lakes and the restocked eels reflect the same ratio. A study in Sweden found no males in a sample of 435 eels from 7 lakes with 38.9% of the eels being restocked from the quarantine. The same study also found that quarantined eels had an average growth rate of 47 mm/year (Fiskeriverket 2004).

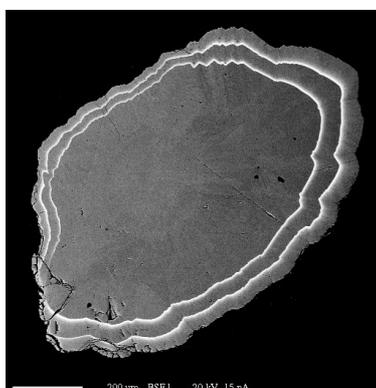


Figure 2. Otolith marked with two strontium rings and to the right restocking in fresh water.

2011 is the second year that all eels in the Swedish quarantine have been marked with strontium before restocking. This marks the otoliths with a distinctive ring which is visible under a microscope and the example shown in figure 2 has two rings that indicate that it was restocked in Finland.

The goal is to find strontium marked eels in the Sargasso Sea and with the help of The Sustainable Eel Standard it might be possible.

### References:

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