Annex: **"Listing the European eel in CITES Appendix II- The Swedish case".**

*By*
*Håkan Wickström, PhD*
*Swedish Board of Fisheries*
*Institute of Freshwater Research*
*SE-178 93 Drottningholm*
*Sweden*

*hakan.wickstrom@fiskeriverket.se*

## Introduction

Already in the 1970' a decline in the European eel (*Anguilla anguilla* (L.)) was described by Svärdson (1976). This decline was observed in the Baltic Sea. Not until later, during the 1980' when a more general and drastic decline in recruitment of glass eels to continental Europe became obvious, the eel issues were paid more attention to.

The international eel working group(s) is a joint initiative of EIFAC (European Inland Fisheries Advisory Commission) and ICES (International Council for the Exploration of the Sea). This group has analysed and reported on the decline of the eel stock since the early 1970' and the continuously decreasing recruitment since 1985. Not until 1999 and onwards ICES has advised that the "anthropogenic induced mortalities in eel" (as from fisheries, habitat loss due to e.g. migration obstacles, turbine mortalities etc.) "should be reduced to as close to zero as possible".

In 2003 the European Commission (COM) issued a first action plan how to manage the European eel on a Community basis (COM 2003, 573). After revised versions of the proposal the Council of the European Union finally adopted the Council Regulation (EC) No 1100/2007, "Establishing measures for the recovery of the stock of European eel". This regulation's main target is to restore the spawning stock and the subsequent recruitment and therefore demands EMPs (Eel Management Plans) from the respective member states. The aim of EMPs are to release 40 % in biomass of spawners (migrating silver eels) from what a pristine population would have produced without human impacts. Convincing EMPs should be produced before 2009 and the plans should after adoption by COM be implemented from July, 2009. Plans and a resulting increase in spawners are to be evaluated after three years, i.e. in 2012 for the first time. One measure among several in the Regulation from COM is to allocate a considerable proportion (60 %) of glass eels caught within a managed fishery for restocking purposes.

Since 2005 the eel is "red listed" as "critically endangered" in Sweden. Norway and Germany have then followed this approach. Since 2008 the European eel is listed as CR (Critically Endangered) on the IUCN (International Union for Conservation of Nature and Natural Resources) list (IUCN 2008).

In parallel with the work within EIFAC, ICES and the European Commission a process was initiated in 2006 aiming at listing the European Eel on CITES Appendix II. At the CoP14 in The Haag, the proposal to list *Anguilla anguilla* was adopted and will come into force in 13th March 2009. As a result, trade in Euroepan eel has not yet been regulated by CITES.

Trade with the European eel will only be permitted if a Non Detriment Finding/NDF statement can be made.

**The historical background**

More than 30 years ago, in June 1976 there was a joint ICES/EIFAC symposium on "Eel Research and Management" held in Helsinki, Finland. At that meeting the former director of the Institute of Freshwater Research in Drottningholm (an institute placed under the Swedish Board of Fisheries), Gunnar Svärdson presented his paper, "The Decline of the Baltic Eel Population" (Svärdson 1976). However, there had been even earlier papers on the decline indicating something had already happened to the stock of the European Eel (*Anguilla anguilla* (L.)) in the late 19th century (e.g. Olofsson 1934, Puke 1969) Svärdson's paper was the first given a wider audience. He described how the commercial catches were declining due to decreasing recruitment measured as the amount of ascending young eels in a number of Swedish rivers. This gave occasion to study the decline more in detail and the reasons behind, both from a national Swedish perspective as on the international scale. At this time, the late 1970' and early 1980', main concerns were not the species but the fishery. In e.g. Sweden there was a growing interest at that time in stocking activities as measures to enhance local stocks of eel in order to give basis for a profitable eel fishery in lakes and along the Baltic coast.

Simultaneously, international organisations as EIFAC (European Inland Fisheries Advisory Commission, a body within FAO) and ICES (International Council for the Exploration of the Sea) observed and reported on the decline, at least since the early 1980', to their respective headquarters and member countries. However, there was not until the very drastic decline in glass eel recruitment in the early 1980' was clearly seen, that more importance was given to the "eel issue". The International Eel Working Group(s) (within ICES, EIFAC and periodically joint) has reported on the bad and continuously deteriorating status of the stock since those early days but not until 1999 and onwards ICES advised that the "anthropogenic induced mortalities in eel" (as from fisheries, habitat loss due to e.g. migration obstacles, turbine mortalities etc.) "should be reduced to as close to zero as possible" (ICES 1999).

One reason behind this rather slow progress since the decline in the European eel was first reported, until today's situation, was that no single country or body took or could take the responsibility for a widely distributed species shared between many countries.

As the European eel is a panmictic species (Dannewitz *et al* 2005, Maes *et al* 2006) and is exploited and managed at local levels scattered over many small units within the area of distribution (Dekker 2000) it was realised that an international approach to improve the situation was required as the only realistic solution. In lack of a full understanding of causes behind the decline a precautionary approach was required. In 2003 then the European Commission (COM) took the initiative and issued a first action plan how to manage the European eel on a Community basis (COM 2003, 573). This proposal gave rise to extensive discussions in most member states and several revised versions of the proposal from COM (COM 2005, 472). Finally, in September 2007 the Council of the European Union adopted the Council Regulation (EC) No 1100/2007, "Establishing measures for the recovery of the stock of European eel" (EC 2007).

This regulation's main target is to restore the spawning stock and the subsequent recruitment and therefore demands EMPs (Eel Management Plans) from the respective member states before 2009. After adoption by COM (European Commission) the plans should be implemented from July, 2009. The ultimate aim of EMP:s are to release 40 % in biomass of spawners (migrating silver eels) from what a pristine population would have produced without human impacts. Plans and the resulting increase in spawners are to be evaluated after three years, i.e. in 2012 for the first time. One measure among several in the Regulation from COM is to allocate a considerable proportion (60 %) of glass eels caught within a managed fishery for restocking purposes.

Stocking has been an important measure in many countries in order to enhance local stocks, mainly to support the fishery. Starting in the 1950' stocking increased from about 50-100 million to more than 150 million glass eels and young eels per year in 1980. Those amounts have now decreased to modest 5-10 millions per year in Europe (EIFAC/ICES WGEEL 2008). One major reason behind this decrease is high prices and this in turn is due to a competition for the dwindling supply of glass eels with the aquaculture industry. As eel aquaculture and eel consumption is concentrated to East Asian countries as Japan, Taiwan, South Korea and China, there is a huge demand for seed material (glass eels) for aquaculture in e.g. China. To support the Chinese eel aquaculture large amounts of our eel species (*A.anguilla*) have been exported from Europe, even though the Japanese eel (*A.japonica*) performs better in Asian aquaculture (Briand *et al* 2007). Also other *Anguilla* species as e.g. *A. australis* and *A. rostrata* have been used for aquaculture.

When there were large exports of glass eels out of the European eel's distribution area and at the same time a strong demand for glass eels for restocking purposes within Europe, strongly endorsed by the EC Eel regulation, a request for protection and trade restrictions came up.

It might very well be that also the eel industry in Europe (both aquaculture and capture fisheries) has acted towards some control of exports as there is a competition for seed and stocking material and that European eels cultured in Asia are sold also on the European market at lower prices than normal for eels in Europe.

The concerns about exporting glass eels out of Europe were strengthened by the fact that *A. anguilla* was red listed nationally according to the IUCN:s criteria, first in Sweden in 2005 followed by Norway and Germany. Since 2008 the European eel is listed as CR (Critically Endangered) on the IUCN (International Union for Conservation of Nature and Natural Resources) list (IUCN 2008).

**The process towards a possible Non Detriment Finding/NDF for *Anguilla anguilla.***

From March 13 2009 onwards all Parties to the Convention will be required to issue permits for all exports of the species. Such export permit may be issued only if the specimen was legally obtained and if the export will not be detrimental to the survival of the species.

In the European Union, which includes at least 25 eel range states, CITES is implemented through Council Regulation 338/97 and Commission Regulation 865/2006 which require both import and export permits to be issued for species listed in Annex A and B of the Regulation.

The crucial question to answer is then if it is detrimental or not to the European eel if trade between third countries or between EU and third countries is allowed to continue.

Today there is a considerable export of glass eels, mainly from France but also from Spain and probably from Portugal for aquaculture in China (CITES 2007). European eels sent out from its natural range of distribution are lost for the spawning stock irrespective if they are stocked in natural waters or consumed either directly as glass eels or as cultured products. The question is whether the stock can stand such a loss, i.e. is there a surplus of glass eels somewhere within the natural range of *A. anguilla*?

As stated earlier *A. anguilla* is regarded a panmictic species (Dannewitz *et al* 2005, Maes *et al* 2006) even though there were some deviating results and views presented by e.g. Wirth & Bernatchez (2001). Their interpretation was probably due to the fact there is a small variation in the genetic structure in temporal terms but not in spatial terms (Maes *et al* 2006). This might be due to a very small effective population size ($N_e$) where small groups of eels or single individuals give rise to closely related cohorts of larvae arriving in waves to continental Europe.

Ongoing discussions within SRG (Scientific Review Group, established in accordance to EC Regulation 338/97 and consisting of representatives from the Member States' Scientific Authorities) and its ad hoc Eel Working Group deals with this crucial question, i.e. whether there is a surplus of *A. anguilla*.

Some fundamental facts:

- *A. anguilla* is still considered as a panmictic species, and the weak genetic structure found is due to temporal variation that do not jeopardize the theory of panmixia. This means glass eels can be translocated within the distribution area without risks, at least from a genetics point of view (Dannewitz *et al* 2005, Maes *et al* 2006).

- ICES has since 1999 advised that the "anthropogenic induced mortalities in eel" (as from fisheries, habitat loss due to e.g. migration obstacles, turbine mortalities etc.) "should be reduced to as close to zero as possible". There were no improvements in recruitment reported at the EIFAC/ICES WGEEL meeting in Leuven in September 2008. The last recruitment season seems to be one of the worst if not the worst in documented history (EIFAC/ICES WGEEL 2008).

- Glass eels still seem to occur locally in surplus, though this has been questioned in recent years. In UK standing stocks of young eels seems unaffected despite a continuous exploitation of glass eels in the estuaries for many years (Bark *et al* 2008). However, in France where unbelievable amounts of glass eels were caught in the 1970' scientists are now questioning if today's recruits are sufficient to fill all available habitats (e.g. Beaulaton & Briand 2007).

- There are probably density dependent processes involved as both survival and growth increase inversely with density (Lobón-Cervia & Iglesias 2008).

- Many countries are now depending on restocking their waters with glass eels to be able to fulfil the demands from EC and to reach the goal of releasing 40 % of what was produced as spawners under pristine conditions. Without restocking they cannot reach the target. Today this market deals with about 5-10 million individuals only, mainly due to high prices (EIFAC/ICES WGEEL 2008).

- Stocked eels are assumed to support to the spawning stock in the Sargasso Sea (Wickström 2001, Limburg *et al* 2003), but final proof is for obvious reasons still missing. However, some doubts have been presented, mainly by Westin (2003) but this question is now addressed in several ongoing studies (e.g. the EELIAD-project (http://www.eeliad.com).

- EC is in the Eel Regulation (EC 1100/2007) advocating restocking as one measure (among others) to achieve a higher production of spawners.

- There is a demand for glass eels as seed from the aquaculture industry, both in Europe as from East Asia. Some of these eels are intended for restocking purposes (in open natural waters) after a period of on-growing and/or quarantine purposes. When on-grown eels are used for restocking the risk of changed sex-ratios in favour of males has to be considered.

- Juveniles and even silver *A. anguilla* eels have been reported as common from Japanese waters (Tabeta *et al* 1979, Okamura *et al* 2002, Miyai 2004, Okamura *et al* 2008), originating from intentional or accidental releases of the wrong species in natural waters. They pose a hazard to wild *A. japonica*, obviously with respect to parasites and diseases being introduced but in the long run they may also interfere genetically as artificial hybrids between the two species are possible to obtain (Okamura *et al* 2004).

The discussions and opinions about a NDF among different scientists within the ad hoc Eel Working Group of the SRG can be simplified or condensed into two different standpoints.

- *A. anguilla* is a widespread panmictic species that cannot be managed at local or national levels. It has to be looked upon and managed as a whole, as one stock in common, irrespective if there exist local surpluses in some countries or not. The EC Eel regulation manifests this kind of view on the stock of European eel. This view implies a NDF cannot be formulated.

- The second standpoint is that eel stocks very well can be managed at a local or national level. If there is a local surplus of glass eels in a river or estuary, that surplus can be used for any purpose, i.e. they can be sold for direct consumption, for aquaculture in Europe as well as in East Asia or used for restocking purposes within the same or in other countries. This standpoint implies a NDF can be formulated on a local scale (for a drainage basin, a country or a region).

**Discussion**

There is a debate among eel scientists if there still are some local surpluses of glass eels that without influencing the donor stock could be caught and used for other purposes. However, it seems that the eel stock in e.g. River Severn in the UK is still at carrying capacity. Probably that is the case also in a few other countries traditionally known for good recruitment of glass eels as France, Spain, Portugal and maybe in some of the North African countries too.

If we then conclude there is a surplus on a local scale, what would happen if those eels were not caught by humans? They would then probably starve to death or more likely be eaten by

other fish or birds. It is unlikely they would leave e.g. a crowded estuary and continue for any significant distance to explore another river. Thus, a surplus could be removed and used for other purposes. If used for aquaculture in Europe they are lost for the spawning stock, i.e. if they are not used for restocking after some on-growing. If consumed directly or after a period in aquaculture outside its natural range they are also totally lost for the spawning stock.

The only case when surplus glass eels in practice could support to the spawning stock in the Sargasso Sea is when they are used for restocking in areas below carrying capacity for eel, irrespective if that is in a neighbouring drainage basin or even in another country. The important prerequisite is that their survival is higher in the new environment (recipient) compared with the donor site. Even though there are no final proofs yet showing stocked eels do contribute to the spawning stock, a precautionary approach would be to use surplus glass eels where their survival is the best.

This kind of reasoning was the basis behind the Article 7 in the EC Eel regulation, stating 60 % of all glass eels fished in accordance with an approved eel management plan have to be used for or offered for restocking purposes. As the available amounts of glass eels on the market (<100 tons) (Briand *et al* 2007, Briand *et al* 2008) are far from enough to restock all those waters in urgent need of recruits, it is obvious that also the remaining 40 % is required for restocking in order to increase the run of spawners from all over Europe.

**Conclusions**

It is obvious that if there still exist some local surpluses of glass eels, those eels are urgently needed for restocking within the natural distribution area in order to produce more silver eels leaving to spawn in the Sargasso Sea. The only conclusion to be drawn from this is that you cannot produce a Non Detriment Finding for *Anguilla anguilla*.

The European Commission will in 2012 evaluate the effects of all measures implemented as results of the different EMPs. Probably the effects will not be that clear after only three year but if recruitment responds satisfactorily this conclusion may be reconsidered. If not the Commission will perform the next evaluation in 2015 and the following in 2018.

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