

The eel **fishery** in Denmark

# Commercial eel fishers decline in number

The Danish eel fishery is struggling to cope with the challenges it is facing. Some of these are specific, such as the short validity of the eel fishing license, while others, such as predation by seals and cormorants, affect the coastal fishery at large.



The harbour office at Mosede Havn, a small fishing port south of Copenhagen, where a few fishers still target eel.

Recruitment of glass eels has been declining in Europe since the 80s and since around 2000 has fallen to as low as 1-5% of the pre-1980 levels. Eel stock abundance has been falling since the 60s and poor recruitment means the stock will continue to decline. As a result, European eel (*Anguilla anguilla*) has been listed as critically

endangered by the International Union for the Conservation of Nature and Natural Resources (IUCN) and is listed by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in its Appendix II, following which the species though not threatened with immediate extinction, may become so unless international

trade in the species is closely controlled. Accordingly, a special permit is required for the export of European eel.

## National management plans developed

The critical state of the eel stock within Europe together with warnings from ICES prompted adoption

of the European eel regulation of 2007 ("establishing measures for the recovery of the stock of European eel"), which enjoins Member States with eel habitats on their territories to develop and implement national eel management plans. According to the legislation, EU countries must take measures that, among others, allow 40% of adult eels to escape from



**Claus Erik Olsen, an eel fisherman, and his wife Christine also run a café in the harbour.**

inland waters to the sea, where they can spawn. This proportion is with reference to “the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock.”

Denmark was actively involved in the drafting of the European eel regulation participating in the various bodies that were part of the process including the International Council for the Exploration of the Sea (ICES), European Inland Fisheries Advisory Commission (EIFAC), and various working groups on eel. Following the adoption of the EU legislation in 2007 a national eel management plan was implemented by the Danish authorities. The

national plan had two basic elements. The first covered marine waters and sought to reduce the fishing effort on eel to 50% of the average effort deployed between 2004 and 2006. The second related to freshwater and aimed to reduce mortality to the point where the 40% condition mentioned earlier could be satisfied.

### **Danish catches come primarily from the sea**

According to the national eel management plan, the Danish eel fishery takes place all around the country in bays, lagoons, fjords as well as inland waters. About 95% of the catch is from marine waters. Fishers, who may be commercial

or recreational, use a variety of gears including fyke nets, pound nets, trawls, seines, traps, pots and spears. One of the eel fishing harbours is Mosede Havn a little south of Copenhagen. Here, Claus Erik Olsen has a license to fish for eel which he does with a pound net. The eels from the Baltic are on their way to the Sargasso Sea to spawn, when some of them are intercepted by Mr Olsen’s nets. However, he says, only a tiny fraction, 1%, is caught, the rest continue on their way through the straits and to the North Sea. The European eel is catadromous (migrates from freshwater to the sea to spawn) and semelparous (spawns only once in its lifetime). It has a complex life history, parts

of which are still shrouded in mystery, but it is fairly well established that eels spawn in the southwestern part of the Sargasso Sea. This is body of water within the Atlantic Ocean and the only sea in the world without a land boundary. Instead its borders are defined by currents, the Gulf Stream to the west, the North Atlantic Current to the north, the Canary Current to the east, and the North Atlantic Equatorial Current to the south.

A report from the ICES working group on eel (ICES WGEEL 2015) describes how the larvae float with the currents to the continental shelf of Europe and North Africa before metamorphosing into glass eels. In fact, the presence of these currents may be one of the reasons eels migrate to the Sargasso Sea in the first place. Peter Rask Moeller, an associate professor at the Danish Natural History Museum, who actually trawled for eel larvae in the Sargasso Sea in 2014, says that most larvae can be found at the subtropical fronts between warm and cold zones in the sea at around latitude 26N, a discovery made almost 100 years ago by another Danish biologist, Ernst Johannes Schmidt. The growth phase of their lives, when they are called yellow eels, extends from two and up to 25 years (sometimes even more than 50), after which they metamorphose again, this time into silver eels, signalling maturity. At this stage they begin their long migration back to the Sargasso Sea, whence they came as larvae, to spawn and then die, an act that has so far not been witnessed.

### **Eel widely distributed in Denmark**

The eel is essentially a deep sea fish, says Henrik Carl, a scientist at the Danish Natural History



Niels Stalkam

**Seals are an unalloyed menace, killing vast quantities of fish, destroying nets, and occasionally topping themselves in the bargain.**

Museum, typically living for 10-12 years in European waters and then migrating back to the deep sea to spawn. Questions abound as to the purpose of this migration over thousands of kilometres, but the Sargasso Sea is in fact a favourable place for breeding as it is something of a desert with few predators that feed on the eel larvae. This changes as the larvae drift towards Europe, where cod, herring, mackerel and other species all prey on the larvae. Furthermore, as glass eel, they are targeted by fishermen in Portugal, Spain, France, and the UK, making the journey into freshwater a hazardous enterprise. In Denmark (as in other countries) most eel leave the sea and move upstream. Henrik Carl points to a mapping exercise for eel in freshwater that shows that eel is the most widely distributed fish

in Denmark, thanks to its capacity to live in all kinds of water bodies, from small streams to big lakes. He and Peter Rask Moeller are now working on an atlas of Danish saltwater fish for which they have had to study coastal waters and during their sampling trips inevitably they have found eel. The point they make is that despite the drastic decline in the eel population in Europe, the species is not threatened to the point of extinction.

Genetics has now fairly clearly established that there is only one population of European eel in Europe and North Africa with eel from both regions travelling to the Sargasso Sea to spawn, says Peter Rask Moeller. This leads to a comprehensive pooling of genetic material resulting in larvae that may have forebears

from anywhere in a region that stretches from Norway to Egypt. It is in fact the Nile in Egypt that hosts the largest numbers of European eel. Although dismissive of the possibility of extinction the researchers agree that fishing is just one of the factors that can impact the European eel population. In Denmark most lakes suffer from eutrophication, fish farms and hydropower stations block rivers, many water courses suffer from acidity and elevated levels of iron, and, perhaps most damaging of all, land reclamation has seen the draining of small ponds, shallow fjords, wetlands, and lakes to create agricultural land, depriving the eel of thousands of hectares of habitat. The Danish eel management plan goes some way towards reversing these developments by implementing several measures

to meet the requirements of the EU eel regulation and to rehabilitate the stock in the country. These include reducing the fishing effort, improving habitat conditions, restocking, and mitigating structural factors that contribute to eel mortality.

### Three-month eel fishing season

While the number of eel fishing licenses has been reduced, they are still issued. For Claus Erik Olsen, the Danish fisherman, eel is the main species he targets. Catches over the last years have tended to fluctuate, he says. Over the last 10-year-period there have been perhaps seven good years versus three bad ones, but in general his catches have increased over time. This is at odds with official data on commercial



**For Joern Larsen, who has been a fisherman for almost forty years, fishing is not an occupation, but a lifestyle.**

marine catches of eel, which show a decline over the 10 years to 2014 from 517 to 317 tonnes. Mr Olsen puts his nets in the sea at the beginning of September and they remain in the water for two months. It takes several days to install all the nets and then to take them down at the end of the season, so Mr Olsen stops fishing by the third week of November, so that the nets can be dismantled before Christmas. If it gets very cold in the winter and the water freezes the ice would destroy the nets. This would be a significant loss as the nets are worth between DKK500,000 and DKK1m (EUR67,000 to EUR134,000). The first net starts close to the shore on the seabed at a depth of about 2 m

and extend out for 700-800 m. The next net will be further out and so on, but there is a limit on how far out in to the sea they may extend. In a good year some 25-30 tonnes of eel as well as a number of other less commercially valuable species will be trapped in the nets.

The eel fishery like the rest of the Danish fishery is seeing a gradual reduction in the number of fishers. Several factors are behind this development. An earlier reform of the fishing sector saw a consolidation of quotas and a reduction in the number of vessels. Reporting requirements have become increasingly onerous prompting many fishers to throw in the towel; older fishers

are not being replaced by a younger generation as youngsters are not attracted to the physically demanding (and dangerous) occupation since alternative employment opportunities exist. And for eel fishermen in particular, the Danish eel management plan has resulted in a fall by almost a third in the number of commercial eel fishing licences between 2009 and 2014. On top of these issues that have contributed to the decline in the number of fishermen, many commercial fishers also feel threatened by recreational fishermen. While the number of recreational fishers officially registered is some 34,000, Mr Olsen for example suspects the figure is significantly higher.

Niels Skalkam, another eel fisher from the area, says that construction in the water, such as pillars for bridges, wind mills, or artificial reefs can have an impact on the currents and thereby an impact on the fishery. While opinions among fishers may differ on some of the factors that influence the fishery, unanimity is absolute on two issues - predation by seals and cormorants, and the one-year-validity of the eel fishing license.

### **Preserving the fishery calls for changes in regulations**

Seals not only kill fish but also damage valuable fishing gear. They also get caught in the nets and drown and then have to be freed. Cormorants can also injure fish leaving them impossible to sell. Joern Larsen, another eel fisher in Mosede Haven, is convinced that if something is not done about the menace there will soon be no coastal fishery left in Denmark. According to Mr Skalkam killing the seals should be permitted if they enter the nets. The short term of the license is in its own way as detrimental to the future of the fishery as are the predators. With a license that is valid for only a year we cannot plan nor risk investing, says Mr Olsen, as we never know whether we will be allowed to continue fishing. Vessels, nets, and other gear are therefore maintained at the bare minimum level needed to be able to fish. While this uncertainty is bad for the fishermen, perhaps it is good for the eel. A 2015 report shows that the reductions in eel fishing effort and catches over the seven years to 2014 conform to what was envisaged in the European eel regulation and the Danish eel management plan.