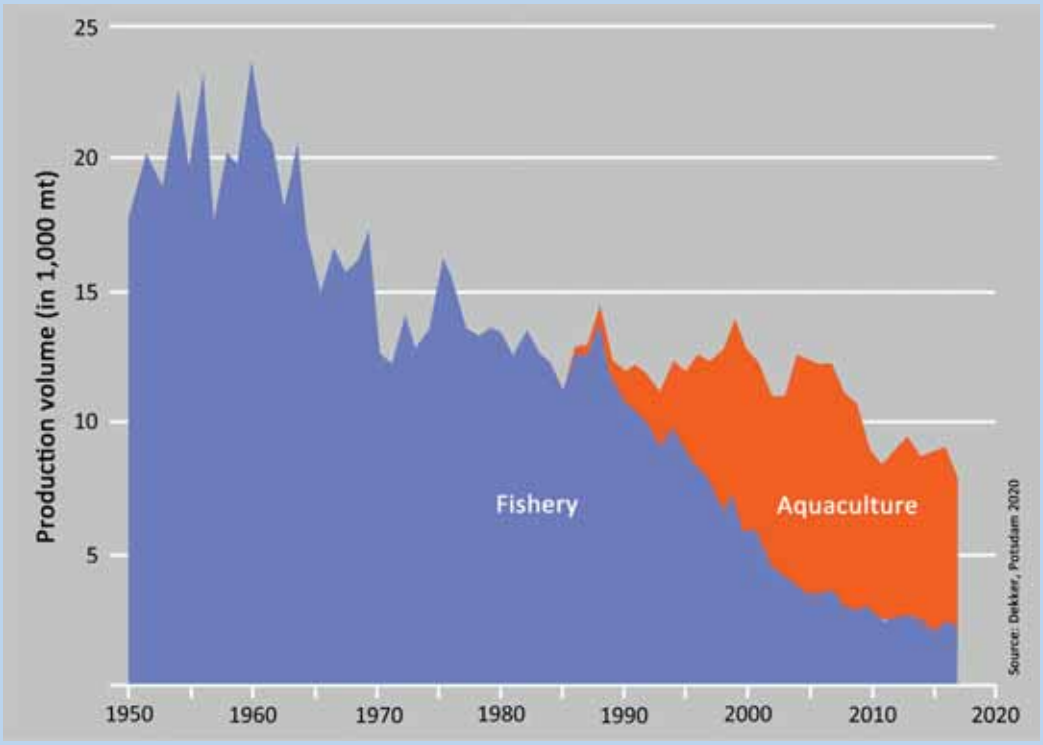
Protective measures for the European eel are beginning to pay off

Eel stocking must be further intensified

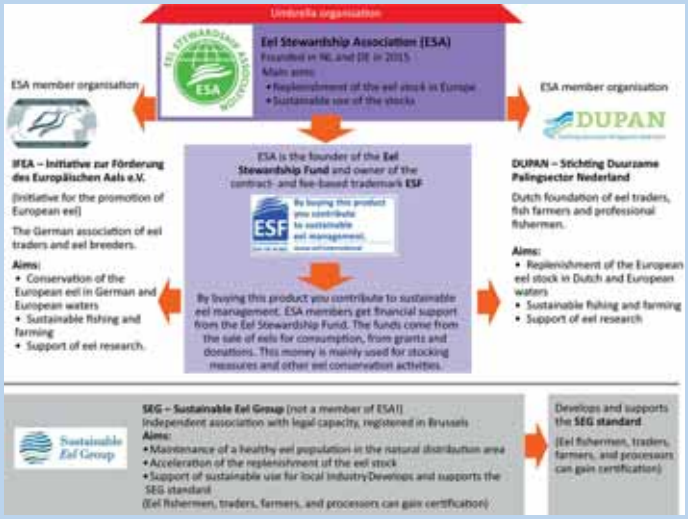
Four years after the first workshop on the state of the European eel stock some 70 eel conservationists, fishermen and anglers, eel farmers, representatives of authorities and scientists met for the second time in Potsdam near Berlin in mid-March to discuss progress so far and further measures. Although there are first signs that the eel stock is recovering conservation efforts need to be intensified as there is still a long way to go before the goal is reached.

The decline of the eel stock was initially almost completely ignored by the general public. With its snake-like, slimy body, it is a species of fish that arouses little interest – let alone sympathy – apart from among eel fishermen and eel smokers, and so the sad state of its population went largely unnoticed. Andrew Kerr, Chairman of the Sustainable Eel Group, suspects that, when confronted with the species' impending disappearance, some people perhaps thought "Well, it's only eel". Although our ability to support eel stocks is limited because eels cannot yet be hatched artificially, the alarming development requires decisive action. Whereas almost everyone knows and is concerned about conservation efforts to reintroduce salmon to aquatic environments it is often overlooked that the eel, too, is not only an important part of these communities but also the basis of economically viable fisheries. The healthier the eel stock, the more sustainable its exploitation. It was only after the turn of the millennium that responsible politicians under the pressure of developments realized that countermeasures had to be taken. With the Eel Regulation 1100/2007 the EU Commission finally created a solid basis for the protection and sustainable use of eels.



Development of fisheries catches and aquaculture production of eels since 1950.

In March 2009, the European eel was included in Appendix List II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Annex B of the European Species Protection Regulation 338/97 in order to stop the export of glass eels to Asia. This was well-intentioned but insufficiently controlled since the ban on exports led to an increase in glass eel smuggling and drove up glass eel prices, thereby compromising the urgently needed stocking measures in Europe. And it also affected the work of eel conservation initiatives and associations which involved many companies, organisations and individuals who were not indifferent to the species' fate and who supported conservation efforts through regular stocking and other measures. In March 2009 the "Initiative zur Förderung des Europäischen Aals e.V." (IFEA) – the Initiative for the Promotion of European Eel, a German association of eel traders and eel farmers – was established in Germany and in June of the same year two predecessor organisations in the Netherlands merged to form DUPAN, the Dutch foundation for the recovery of the European eel. In December 2015 the two industry associations founded the Eel Stewardship Association which



Grouping and structure of the organisations and associations involved in the protection, conservation and exploitation of European eel. (Based on a system developed by Ronald Menzel)

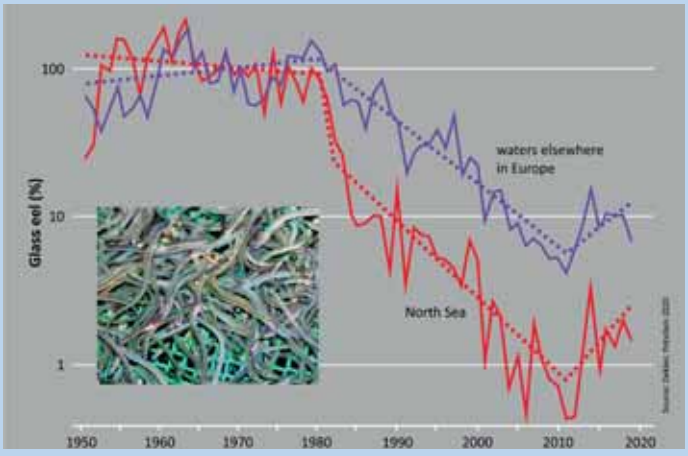
with its contract- and fee-based ESF trademark contributes to the financial support of eel protection measures.

Eleven years to the day after the founding of the IFEA eel initiative a large number of the players involved in the promotion and exploitation of eel met for the second time in Potsdam for a workshop to discuss the latest scientific findings, take stock and coordinate the next steps. The current situation of the eel stock was naturally of particular interest. Willem Dekker, the well-known eel specialist from the Swedish University of Agricultural Sciences, pointed out how differently the current state of the eel stock was described by different groups. While one group paints a disaster scenario and conjures up the fish species' extinction the other group sees no threat at all and even pleads for a fishery without quotas. For Dekker, the truth lies somewhere in between. Although glass eel migration has been declining for decades the species was still far from extinction – despite its classification as „critically endangered" by the World Conservation Union IUCN! Only one of the five criteria defined by the IUCN for inclusion in the Red List (stock decline of 80 to 90 per cent over three generations) actually applies to eel. If we succeed in limiting mortality, stabilising the level of protection achieved so far, and increasing the migration of silver eels we stand a realistic chance of preventing the fish's disappearance. The trend in glass eel migration had been increasing again since 2011. After decades of decline this was a sign that the stock's recovery had begun. However, it would be wrong to expect miracles since it would take a long time for the eel stock to fully recover. It is possible that our children or grandchildren will be the first to benefit from today's efforts. However, current developments show that the EU eel regulation provides a good basis for the eel's recovery and that its implementation is worthwhile.

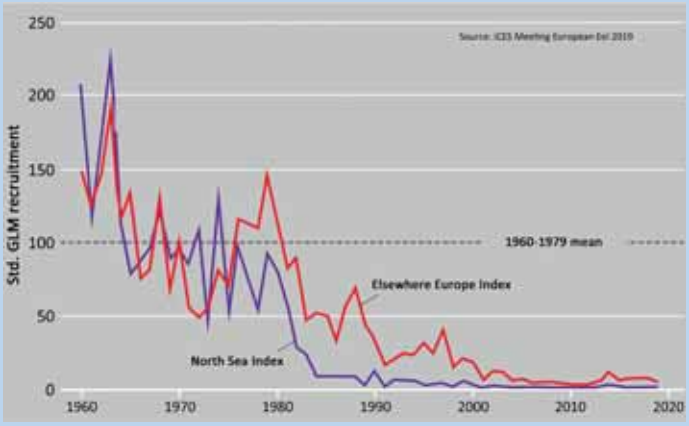
Both the eel stock and fishermen benefit from restocking

Regular stocking measures, in particular in „classic" eel waters where the natural glass eel migration is below the theoretically possible fish intake capacity, make an important contribution to the desired recovery of the eel stock. Eel stocking has a long tradition in Germany and is of great importance for the conservation of the eel stock and for eel fisheries. It is therefore not surprising that in 2005, some time before the adoption of the EU Eel Regulation, the Brandenburg Fisheries Conservation Association „Havel" (Fischereischutzgenossenschaft – FSG) applied for financial support in Brussels for its pilot project to „increase the spawning stock in the Elbe river basin". Following the unavoidable bureaucratic procedure, which was described in broad outlines by FSG and IFEA Chairman Ronald Menzel, a funding decision for 695,000 euros was taken the following year and the first stocking measures were carried out in open waters from which silver eels can later migrate to their spawning grounds. In the following years this initiative developed into probably the largest eel stocking project in Northern Europe, involving 169 fishing companies and several thousandanglersaswellasscientific institutions.

Within the framework of this pilot project a total of 66 million young eels (44 million glass eels A_0 and 22 million farmed eels A_v) were released into Brandenburg waters between 2006 and 2020. The project participants contributed 2.3 million euros themselves to the total stocking costs which amounted to 11.5 million euros. The remaining 9.2 million euros came from the EU Fisheries Fund EMFF and other sources. This achievement of the stocking programme is only clouded by the fact that only just under half of the stocking targets of the EU Eel Regulation and the numerous national Eel Management Plans are achieved throughout Europe. That is why stocking remains a central concern of the Eel Initiative and the Eel Stewardship Fund which since its establishment in 2009 has provided a total of 553,000 euros to promote eel stocking in the Lune, Schlei, Elbe, and Weser rivers and other waters. In order to achieve the stocking targets as laid down in the EU Eel Regulation Ronald Menzel submitted several proposals for improvement on behalf of the Eel Initiative. For example, that financial support of 80% and more for eel stocking



Statistical analyses show that the trend in recruitment indices for glass eels has reversed since 2011. The average increase over the last five years was 8.7%.



ICES analysed the recruitment data of European eels from 46 stations in Western Europe and presented the trend as an index (GLM, Generalized Linear Model).

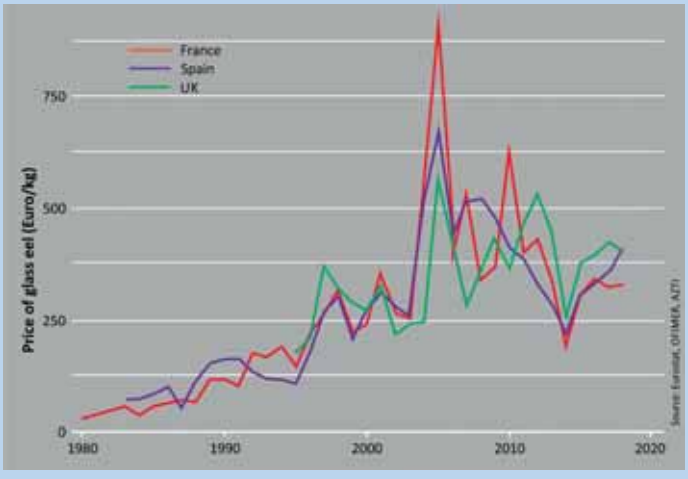
should already be laid down in the EU funding directive, that a fund for eel research should be created in addition to the stocking fund for glass eels, and that the declared target of 60% of glass eel catches for stocking purposes should be financed and enforced. Illegal trade in glass eel must be effectively prevented and the application of the precautionary principle ("no exploitation of eel stocks") for eel management must be reviewed since it makes stocking for restocking purposes more difficult, if not impossible. By combining the protection and simultaneous use of eel it would be possible to achieve much more for the recovery and conservation of the European eel stock than by prohibitions that couldn't be implemented.

Without stocking, the chances of preserving the eel population in the Elbe region would be very slim, explained Erik Fladung (IfB Potsdam Sacrow) because the proportion of eels swimming up the rivers naturally had declined significantly in recent years. This would also endanger the goals of the eel management plan, especially the silver eel migration target of 40 per cent. In order to achieve the highest possible survival rates of the valuable stocking material scientists from his institute have been monitoring stocking measures since 2006, advising on the selection of suitable waters, examining transport conditions and evaluating the quality of both glass and farmed eels. The evaluation of the extensive data of 126 deliveries of eels for stocking purposes showed that transports are mostly carried out professionally and that the quality of the eels can be rated good to very good. Fladung attested that the health status of the young eels was without pathological findings or accumulations of parasites or deformations. It was particularly pleasing that the swim bladder infestation with the parasite Anguillicola crassus in farmed eels A_v had decreased from a maximum of 16% to less than 1% since 2011.

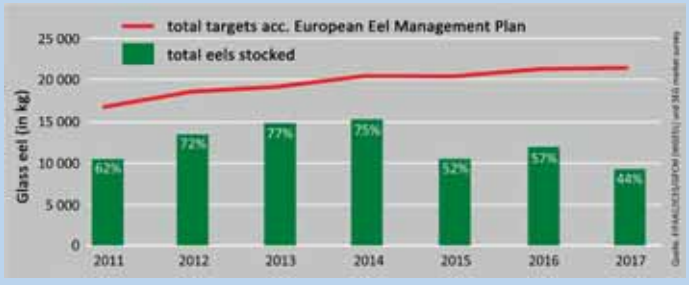
Positive news also came from his IfB colleague Janek Simon, who together with Fabien Charrier (FishPass) had conducted an extensive study on the mortality of glass eels from capture on the French coast to release in German waters. This is the first time that reliable data have been available for the entire stocking supply chain, which in terms of complexity, breadth and depth go far beyond the earlier study by Briand et al (2012) which specified an average mortality rate of 42% for the glass eel catch alone. Although Briand only accompanied one single fisherman on a few fishing trips for his studies, so that the conclusions drawn cannot be seen as representative, this extremely high loss rate was often used by critics as an argument against stocking. Simon's statements, on the other hand, are based on 41 fishing trips in several locations with different fishermen, an average of 11 fishing activities per trip and the use of various fishing gear, net shapes and fishing methods. If all losses on the long journey from catch to release are added together, more than 85 out of 100 glass eels survive.

SEG standard enables transparency and ensures sustainability

Efforts to conserve eel are showing the first signs of success was the key message from Andrew Kerr, Chairman of the Sustainable Eel Group (SEG). After years of decline in the eel stock a reversal of the negative trend in glass eel numbers was now becoming apparent. Although there was still a long way to go until a state of abundance was reached everyone could now see that consistent implementation of the EU Eel Regulation was worthwhile. Kerr based his assessment on a statement by Willem Dekker ("The recruitment has stopped decreasing and has been increasing in the period 2011-2019 with a rate statistically significantly different from zero"). The SEG had contributed significantly to this success



The rise in glass eel prices makes many restocking measures in Europe more difficult and renders financial support programmes almost indispensable for the conservation of the fish species.



The actual stock level is well below the targets set in the management plans as required by EU Eel Regulation 1100/2007.

Ronald Menzel (Chairman of the Eel Initiative). From 2006 to 2020 a total of 66 million juvenile eels (22 million farmed eels, 15-20 cm long, and 44 million glass eels) were released in Brandenburg waters.

Dr Willem Dekker (Swedish University of Agricultural Sciences). Despite its declining population the European eel is still far from extinction.

through dialogue with influential policy makers in the UK and Europe and authorities such as Interpol. The growing acceptance of SEG's standards in the eel trade throughout the entire chain from the catching of glass eels to the sale of ready-to-eat eel products was also very encouraging. In order to ensure acceptance of the SEG standard SEG is aiming for ISEAL membership (International Social and Environmental Accreditation and Labelling Alliance). SEG is at present already an Associate Member of ISEAL and has been evaluated against the basic criteria of the ISEAL Code of Conduct. SEG-certified eel suppliers and businesses offer full transparency and complete traceability for their products. In France, 130 glass eel fishermen and in the UK 300 part-time fishermen, who together caught 12.7 t of glass eels in 2019, have already been certified according to the SEG standard. In addition, there are eleven eel farms in the Netherlands and Scandinavia and 16 eel smoking plants in the Netherlands. The Eel Initiative reckons that in Germany, too, by Christmas 2020 there will be eel farms, eel traders and eel smokehouses certified according to the SEG standard. Andrew Kerr hopes for even broader acceptance, especially since Chain of Custody certification will soon be possible. With the money raised through the ESF, SEG also supports numerous projects for the replenishment of the eel stock.

Eleven years to the day after the founding of the initiative for the support of European eel (IFEA) or Eel Initiative for short, the second eel workshop was held in Potsdam.

The SEG standard was so important precisely because due to its unique life cycle eel could not be certified on the basis of the existing sustainability standards for fish, emphasised Dutch eel farmer Alexander Koelewijn, who is engaged in the conservation of this fish species in DUPAN and ESA. He calls for the value chains to be geared even more specifically to the SEG standard and for pressure to be stepped up on all parties involved from fishermen and farmers to traders to use only certified eel. Eel stewardship, which can be understood as custody of or taking responsibility for eel, is much more than just management. Without stocking and intensive research, as supported by the ESF, it would be much more difficult to help the eel effectively. Of course, fishermen and eel farmers like himself also had an economic interest in preserving the resource. But that was not a contradiction in terms of conservation since the glass eels are procured sustainably and strictly within the legal fishing quota. Overall, eel farms in Europe use only 4 per cent of the estimated annual glass eel migration! Although the situation of the eel stock was still difficult, some scientific assumptions and statements on which ICES reports are based had to be looked at again. Is it justified, for example, to take the high glass eel figures registered between 1960 and 1976 as a reference period for recruitment calculations, especially since, when compared with today's glass eel recruitment, illegal withdrawals and existing fishing quotas are usually overlooked? Many fishermen only go out when they have concrete orders for glass eel and do not catch more than they can actually sell. If one failed to take these factors into account, too, it inevitably led to an underestimation of the potential yield of glass eels. At the very least, recruitment graphs should include illegal trade, which is estimated at a remarkable 100 t per year (which would correspond to about 330 million eels), even if only in a dotted line.

Erik Fladung (IfB Potsdam-Sacrow). In general, it can be attested that the health status of the young eels was without pathological findings or accumulations of parasites or deformations.

Dr. Janek Simon (IfB Potsdam-Sacrow). Losses of 15% from capture to release are far below the previously claimed mortality of 40% for glass eel capture alone.

Black market trade in glass eels not yet under control

The extent of illegal glass eel fishing and trade, despite the export ban, was made clear by Florian Stein in his presentation. At the hub of black market business is China, whose aquaculture – with 100 t of illegally acquired European glass eels (figure estimated by Europol) – can cover about one third of its needs for an annual eel production of approximately 218,000 t. Europol's estimate sooner seems to be understated, since back-calculations of actual production figures still show a gap in the stocking of farms which is otherwise difficult to explain. Every eel that does not grow in European waters but in Asian eel farms further weakens the stock because these animals have no chance of ever reaching their original spawning grounds again. Glass eel smuggling is a lucrative business that is particularly profitable for traders. Florian Stein calculated that a kilogram of glass eels, which might be worth about 300 euros paid to the illegal fisherman in Europe could be worth around 6,000 euros in Asia. The produced eels, from which an average of 727 kg of kabayaki fillets can be made, then have a market value of almost 26,000 euros.

The biological damage to the eel stock is compounded by economic losses, as some of the eels grown in China are likely to return to Europe later and compete here with legally produced goods from local suppliers. In this case, CITES turns out to be a toothless paper tiger, because many eel products that are traded internationally are completely lacking in the necessary permits – not on the black market, but in quite normal shops. A recent study carried out in Hong Kong supermarkets in 2020 found that almost half of the 49 eel products traded there contained European eel. Although authorities, police and customs in Europe are now taking more vigorous action to curb the illegal trade (48 smugglers were arrested in the 2016/17 glass eel fishing season, 98 in 2017/18 and 153 in 2018/19), this is probably only the tip of the iceberg. The actual masterminds behind the machinations are rarely brought to justice and it

Andrew Kerr (Chairman of SEG). The SEG standard, which focuses on traceability and transparency, is increasingly accepted by fishermen, eel farmers and processors.

Alexander Koelewijn (Chairman DUPAN). The Eel Stewardship Fund (ESF) provides financial support for restocking and scientific research on eels.

Florian Stein (SEG). Despite the 2010 trade ban on European eel outside of EU borders about 100 tonnes of glass eels are illegally exported to Asia every year.

is also questionable whether the comparatively mild sentences in court really have a deterrent effect on criminals. An example of this is the case of "Mr. Khoo", who in 2020 was sentenced by a British court for illegal trade with 5.3 million glass eels to a ridiculous two years' probation and 240 hours of community service. Because the black market can hardly be dried up in this way some eel conservationists in Europe are even seriously considering whether it would not be more sensible to sell some of the glass eels caught here quite legally for high prices to Chinese eel farmers and use the proceeds for stocking programmes in our waters. So far, however, neither SEG nor ESA have officially taken a position on this. Rightly so, because it is more than questionable whether this practice would actually put a stop to the black market.

The current achievements of the conservation efforts show that progress in rebuilding healthy eel populations in their natural range is possible without such questionable sales. Based on Eel Regulation 1100/2007, 19 EU Member States have developed sound eel management plans, defined almost 90 management units and initiated or implemented 1,880 measures. Public awareness for the conservation of this economically important fish species has been raised. However, the recovery of the eel stock will still take decades. The most important thing now is to achieve the required stocking and migration targets. *mk*

Stock in Elbe catchment area to increase by 10m in 2020

Eel stocking in the Havel and neighbouring waters

Workshop participants did not only discuss the conservation of eel theoretically but also undertook practical steps: During a break in the event several thousand farmed eels were released into the Havel river directly in front of the hotel. This was only the symbolic prelude to a much larger stocking campaign which included 300,000 young eels with a total weight of 2,100 kg. Fishermen from Potsdam and Werder loaded the valuable cargo into their boats directly on site in order to take the young eels to the waters of destination for release. In total, the eel stock in the Elbe catchment area is to be increased this year with the addition of 8 million glass eels and 2 million farm eels.

During the workshop, about 300,000 farm eels weighing about 7 grams from Albefarm were released into the Havel and suitable lakes around Potsdam and Werder.

Researchers to study larvae caught in the Sargasso Sea

Deeper understanding of the larval ecology of the European eel

Prof. Reinhold Hanel from the Thünen Institute in Bremerhaven presented some of the objectives of the upcoming research project in the Sargasso Sea. Among other things, the participating researchers want to fish for eel larvae with close-meshed nets in water layers between 22 and 24°C. It is known from previous expeditions that the larvae like to stay in these areas. However, the search for eel larvae remains difficult because the area is very large and the course of the temperature fronts varies from year to year. In order to solve the as yet unsolved problem of larval nutrition the researchers also want to carry out intestinal examinations on eel larvae. This would enable them to make an important contribution to the artificial reproduction and rearing of leptocephali.

Prof. Reinhold Hanel (Thünen Institute). Tracking down eel larvae in the Sargasso Sea can be compared to searching for a needle in a haystack.