EXECUTIVE SUMMARY EEL MANAGEMENT PLAN THE NETHERLANDS

Introduction

The Netherlands is located in the estuaries of a mix of rivers ending in the North Sea. The country recognises four river basins, all extending beyond the national boundaries. The river Ems basin in the North-East is shared with Germany, the river Rhine basin is shared with Germany, Luxemburg, Switzerland, France, Austria and Liechtenstein, the river Meuse basin covers Belgium, Luxemburg, France and Germany, and the river Scheldt basin in the Southwest shared with Belgium and France. Since all rivers are intertwined and confluent, sharp boundaries between river basins in the Netherlands for managing eel impacts appear neither practical nor appropriate. Therefore, the Netherlands has prepared one single Eel Management Plan. Eel can be found in all Dutch inland waters, coastal and marine waters.

Eel stocks and fishery

The available information does not allow a reliable estimate of the eel population status. However, the CPUE-indices and glass eel surveys confirm the existing circumstantial evidence that the current level of eel stock is extremely low.
The yellow eel catch from professional fisheries is approximately 640 tonnes, the silver eel catch 280 tonnes, in total 920 tonnes. The fishery is operated by approximately 237 professional companies. Only for Lake IJssel the number of gear is known, other inland fisheries are based on territorial fishing rights, and no information is available on the fishing effort. Anglers and recreational fisherman catch approximately 200 tonnes of yellow eel. There is no glass eel fishery in the Netherlands.

Other mortality factors

The mortality factors (other than fisheries) that can be quantified are hydropower stations (mortality of silver eel and yellow eel respectively 15.5 and 3.5 tonnes), water pumping stations (15-65 and 27-83 tonnes respectively), and cormorants (mortality of yellow eels 50 tonnes). Besides a number of other factors such as migration barriers, pollution, parasites, propellers of vessels etc. will induce mortality on eels, but lack of data makes it impossible to quantify these.

Silver eel escapement

Several studies have been conducted in order to estimate the potential escapement level using historic catch data and the potential productivity of different water bodies. It was concluded that the total escapement without human impact is 10,000-15,000 tonnes of silver eels. The aspired escapement of silver eel would then become 40% of this, i.e. 4000-6,000 tonnes. Preceding the decision of the European Commission to approve or disapprove of the Dutch eel management plan, ICES evaluated the scientific assumptions on which the measures described in the plan are based. ICES is of the opinion that the density dependent factors are weaker than indicated and that the carrying capacity is higher than suggested. According to the ICES advice, the estimate for the total escapement without human impact is set at 13,000 tonnes of silver eels. The aspired escapement of silver eel would then become 40% of this, i.e. 5200 tonnes.
The current escapement level for the Netherlands was estimated at 400 tonnes of silver eel. Of this, about 200 tonnes originates from neighbouring countries, mostly from the Rhine basin. The current potential escapement given a total fishing ban is 1381-1487 tonnes (plus an unknown fraction due to barriers).

Restocking

The Netherlands will use restocking as a management measure. To minimize the ecological risks associated with restocking, a protocol has been developed. This protocol will be the basis of all restocking programmes. One of the conditions in the protocol is

that the eels are to be stocked only in water bodies from where free and safe migration to sea is possible or where provisions have been made at migration obstacles in the migration routes to the sea. Restocking will not be done in closed water bodies from which eels can not migrate to the sea. The ministry of LNV intends to co-fund the restocking programmes through a yearly subsidiary of €300,000 from the European Fisheries Fund (EFF). Also private funds will become available for restocking. It is estimated that 1000-1600 kg glass eels will be purchased annually. With this amount an area of 10,000-16,000 ha can be restocked with glass eels.

Measures

The Netherlands will implement the following measures:

- Reduction of eel mortality at pumping stations and other water works;
- Reduction of eel mortality at hydro-electric stations;
- The establishment of fishery-free zones in areas that are important for eel migration;
- Release of eel caught at sea and at inland waters by anglers;
- Ban on recreational fishery in coastal areas using professional gear;
- Closed season for all eel fishery from 1 September to 1 December (3 months);
- Stop the issue of licences for eel snigglers;
- Restocking of glass eel and pre-grown eel from aquaculture;
- Research into the artificial propagation of eel.

All measures will be implemented in 2009, except the fishery-free zones in area's important for eel migration (2010) and the ban on recreational eel fishery (in 2011). The closed season for all eel fishery in 2009 will be for 2 months (October and November), and from 2010 onwards for three months (September-November).
Where relevant these measures will be applicable in coastal and transitional waters as well. This concerns the fishery-free zones, sea angling , recreational fishery and the 3 month closure.
Besides these measures it is expected that other policies related to the improvement of the environment will have a beneficial impact on the water quality, and thus on the eel population. Furthermore, measures that have been taken in the recent past will also contribute to an increased escapement of silver eels. Most important in this respect are the reduction of the total fishery effort in lake IJsselmeer in 2006, resulting in a decrease of eel fishing gear with 55%, and the year round opening of the sluice gate at the Brouwersdam in 2005, resulting in an 80% increase of silver eel escapement. Although the exact effect of these measures can not be quantified, overall there will be a positive effect on the number of silver eel that can escape.

Effect of measures

In order to satisfy the requirements of the Eel Regulation, an indication of the time needed to attain the 40% escapement objective can be obtained by adding the effect of the individual measures. This results in an escapement of 4779 tonnes in 2090. With the aspired escapement objective of 5200 tonnes silver eel, than the time schedule for attainment of the 40% objective is approximately 6-7 eel generations. This estimation is based on the assumptions that the effect of the measures are independent, that increasing numbers of silver eel become available because of the implementation of eel measures in those countries that share river basins with the Netherlands, and that increasing numbers of glass eels become available because of the overall improvement of the stock.

REGERINGSKANSLIET

Jo2008/3901

15 September 2009

Ministry of Agriculture Sweden

Game Management, Fisheries and Sami Affairs Division
Agnetha Alriksson, PhD, Senior Administrative Officer
Telephone + 46 (0)8 759 59 00
Mobile +46 (0)70 54 74 626
Fax + 46 (0)8 10 50 61
E-mail
agnetha.alriksson@agriculture.ministry.se

Swedish Eel Management Plan – Executive summary

Based on the Regulation EC No 1100/2007 establishing measures for the recovery of the European eel, Sweden has developed an eel management plan, which has an initial emphasis on achieving a rapid increase of escapement of adult eels to the breeding place. In parallel, long-term measures are initiated to improve the conditions for eels e.g. by habitat improvements.

The entire Sweden is considered one single eel management unit, which allows a maximum cost-efficiency for the measures. Moreover, the Swedish plan uses data for the present situation. Calculations show that to stop the decline at least 80 % of the potential present escapement is reached where yellow eel fishery dominates and 90 % if the fishery is for silver eels. This assumes that measures of this magnitude are made in the whole distribution area of the European eel. Using this approach the operational, short term, target of the Swedish plan is that 90 % of the potential production of silver eels in Swedish waters shall survive and be allowed to migrate to the sea. In numbers this means about 2.6 million silver eels.

The implementation will be in an adaptive process in line with the regulation, where the measures will be adjusted as data become available to calculate the 40 % overall target of pristine escapement in the EU regulation.

Measures planned within the EMP

Measures
The plan involves measures in four principal areas:

- Reduction of the fishery
- Improved possibilities for downstream migration (reduced turbine mortality)
- Stocking of glass eel
- Control

Reduction of the fishery
The first step to regulate the eel fishery was made in 2007, when fishing for eel was prohibited without holding a special permit. The effect of this was approximately a 30 % reduction compared to the exploitation in 2006, i.e. the reference year for the regulation. The national plan has as a target to reduce the 2007 level by a further 50 % until 2013. The already implemented regulation for 2009 is dimensioned to give a reduction of 20 %. This will be followed up with successive reductions depending on a continuous evaluation of the results of the management measures.

For the silver eel fishery an effort regulation will be introduced, where a fisherman with an eel fishing permit is allowed to fish during a specific number of consecutive days, but with the freedom to choose when this period is to be started. The permit will also specify the place and number of gear allowed.

The yellow eel fishery will be regulated by an increase of the period when the fishing is forbidden. In the Öresund strait the minimum landing size will be increased to 40 cm. Future increases of minimum landing size is an option for the future regulations.

Improved possibilities for downstream migration
The management plan includes measures to reduce the mortality of silver eels in hydropower turbines as soon as possible. A voluntary agreement has been reached between the major hydropower companies and the Swedish Board of Fisheries that states that within the coming five years the total survival will be increased to 40 % of all silver eels leaving freshwater areas where at least one hydropower station has to be passed. This will be achieved by concentrating the work to river basins where the most cost-efficient measures can be made.

Stocking of glass eel
The number of glass eels stocked as part of the management plan will be twice the present stocking. This should be possible by using the

European Fisheries Fund when the national management plan has been approved by the Commission. If the prices become lower due to the provision about restocking in the EU regulation the volume stocked can increase further. All stocking will be made in river basins with free migration conditions to the sea. Areas with a high production potential and no or negligible fishery will be prioritised.

Increased control measures
The follow up of compliance with effort limitations in the silver eel fishery will be made by control of documents in the regular monitoring of quotas and effort. To make control of gear use possible for vessels without a mandatory logbook, the present catch journals for coastal waters and inland waters will be changed so that the number of gear used each day will be registered. The evaluation of the management plan requires a separation of silver eel and yellow eel catches. The present possibility to register the catch of unspecified eel will cease. Sales notes concerning eel should hold information on geographic origin of the catch and information of the minimum landing size for this area shall be registered. There is no community provision for those provisions and therefore a national regulation is planned in order to facilitate verification of catches of eel.

Quantification of the measures

The overall target for the national management plan is that 90 % of all silver eel that at present would have been produced in Swedish water without anthropogenic mortality shall survive and escape to contribute to reproduction. This shall be achieved by regulation of the fishery, reduction of turbine mortality and increased stocking of imported glass eel. All the measures planned are evaluated within a balance model providing opportunities to tune the measures to receive the overall short term target of 90 % silver eel escapement from the Swedish eel management unit.

Ministry of Food, Agriculture and Fisheries

Directorate of Fisheries

Date: 30.09.09
Ref.: Esben Sverdrup–Jensen
Email: esje@fvm.dk
File no.: 2008-10108

Danish Eel Management Plan - Executive summary

In order to secure the protection and recovery of the European eel in accordance with EU Council Regulation (EC) No. 1100/2007 Denmark has developed an eel management plan.

In accordance with the Council Regulation the Danish Eel Management Plan incorporates the introduction of a framework for effectively managing an extensive reduction in fishing effort, management measures for mitigating structural eel mortality, improving habitat conditions and re-establishing eel stocks. The Plan also includes a number of initiatives, management tools and development projects aimed at strengthening the quality and quantity of eel data.

The Danish Eel Management Plan – two main elements:

- an eel management plan (EMP) for inland fresh water in alignment with the objective, in the long term, of reducing anthropogenic mortalities so as to permit with high probability the escapement to the sea of at least 40 % of the silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock, as described in Article 2 of Council Regulation (EC) No. 1100/2007

- a management plan for marine water, introducing reductions in fishing effort by at least 50% relative to the average effort deployed from 2004 to 2006 in conformity with Article 8 of Council Regulation (EC) No. 1100/2007

Given the diverse conditions and traditions characterising the Danish eel fishery, it has been a top priority throughout the course of drafting the Danish Eel Management Plan that the development of management measures has been conducted in an open and transparent process involving and engaging stakeholders at all levels.

Following a series of public meetings, consultations and a five week idea phase, in September 2008, the Danish Directorate of Fisheries opened a public consultation on drafts of proposed regulation to be adopted in conjunction with the Council Regulation and the effort reductive measures described in this Plan. The consultation produced a plethora of comments, suggestions and objections from stakeholders in all segments of the fishing community. These were considered in as far as they were compatible with requirements in the Council Regulation and the protection of European eel.

Measures in inland freshwater - attaining the 40 % escapement target

In accordance with the Council Regulation, the pre 1980s escapement target for Danish inland waters is estimated at 444t. of silver eel. The current production of silver eels is estimated at approx. 100t.; this leaves a difference of 340t. between the target and the current silver eel production.

Mortality due to fisheries is estimated at 31 t., commercial fishermen account for more than 15t. of total catches. Other mortality factors are unknown and have not been quantified. Cormorants do feed in fresh water, but most colonies are close to the coast. Actual predation in fresh water is unknown. Eel mortalities due to hydropower exist, but it is not known to what extent

Models indicate that the 40% target will be reached by 2080 and attainment of pristine production is possible by 2095.

In order to achieve the 40% target a series of measures are introduced:

- Reduction in fishing effort by min. 50%, aiming at out phasing.
- Improvements to eel habitats
- Extensive stocking of eel
- Intensified and strengthened control measures
- Intensified monitoring of eel migration and mortality
- Improved possibilities for eel migration (Hydropower / aquaculture)
- Integrated management of predators
- Monitoring and research on parasites and contaminants

Measures in marine waters – attainment of 50% fisheries effort reduction
Danish eel catches in marine waters are estimated at 669t. annually in the period 2004-2006. Commercial catches account for approximately 80% of the total catches. More than 750 commercial fishermen have reported landings of eel in the reference period. An estimated 15,000 recreational fishermen are engaged in eel fishing activities.

A diversity of gear types are traditionally used in eel fishing depending on local conditions and artisanal heritage. Commercially most significant are small / and large pound nets, fyke nets and hook lines.

The Danish plan for reduction of fishing effort in marine waters combines a variety of management tools establishing a comprehensive, tangible and effective framework for eel fisheries regulation. The framework enables managers, scientists, control officers and fishermen to adequately address issues of effort reduction, eel recovery, fisheries feasibility and rule compliance.
The regulation includes a license system which limits each fisherman or entity to a fixed limited number of gears and / or fishing seasons and thus a limited effort. The system includes a variety of elements, routine compulsory registration and reporting and tangible measures for strengthened control efficiency, providing managers and researchers with comprehensive and reliable data for monitoring, analysis and adequate management of both commercial and recreational eel fishing activities.

In order to achieve the 50% target a series of measures are introduced:

- At least 50% reduction in commercial fishing effort
- 50% reduction in recreational fishing effort
- Increase in minimum legal size of eel
- Out phasing of hook-line fisheries
- Ban on trawls, seine nets, spears and a number of other gear types.
- Intensified and strengthened control measures
- Intensified monitoring of eel migration and mortality

Within the plan and concurrent national legislation, the means to take additional measures in order to further reduce effort and fishing activity have been reserved, should the expected output not materialize.

Baltic eel

Due to the geographic position of Denmark, the nature of Danish marine waters and the structure of the Danish eel fishing fleet, Danish eel management plays a role in securing Silver Eel escapement from the Baltic Sea. Danish authorities recognise this responsibility. In line with the recommendations in Preamble 11 of Council Regulation 1100/2007, efforts have been made to engage in the establishing of a forum for the transboundary coordination necessary in securing that appropriate management measures are developed and solid data on eel stocks and fishing effort is generated and assessed throughout the Baltic Sea.

Modification of the Eel Management Plan

The first phase of the Danish Eel Management Plan incorporates a number of initiatives, management tools and development projects aimed at strengthening the quality and quantity of data relevant to eel. Comprehensive data and data analysis are fundamental in assessing the status of the eel stock, estimating production and escapement and managing fishing effort. Denmark considers the management plan to be a living document and the management of European eel an adaptive process which can be enhanced as information and knowledge strengthens over time.
Once a number of the measures described for both freshwater and marine fisheries have been implemented, a large set of quantitative and qualitative data on fishing effort will be available. Denmark expects this data to provide more detailed information on fishing activities and eel mortality, providing a solid foundation for future management measures and subsequent modifications to the Danish Eel Management Plan.

Estonian Eel Management Plan – Executive summary

Estonian Eel Management Plan based on the Regulation EC No 1100/2007.

In connection with Eel Management Plan (EMP) Estonian water bodies were divided into two management units on the basis of the formation of eel stock.

1) Narva River Basin District – population of eel based entirely on stocking
2) West-Estonian Basin District (coastal waters and West-Estonian inland water bodies) – natural population of eel

Measures planned within the EMP

Narva River Basin District

The natural status of eel stock in Narva River Basin before the construction of hydropower station was not very abundant (annual catch 1,8 tons L. Võrtsjärv and 3-6 tons L. Peipsi), therefore the contribution into recruitment was ten times lower than at present. Due to permanent stocking and rather fetterless downstream migration, the 40% escapement objective of silver eel in Narva River Basin is achieved. On the basis of financing of local fishermen the present escapement capacity exceed the pristine escapement several times and there is no need of reduction in fishing effort.
The hydroelectric power station lying on Russian side totally hindered the natural pass of eel into Narva River Basin, but according to tagging and recapture results it is not obstacle for downstream migration (2% of tagged silver eel escaped from Narva River Basin were caught in the Danish Straits).
Without stocking a huge area with a high production potential will be cut off for recruitment.

The main proposal is to increase annual stocking amount of eel in the water bodies of Narva River Basin and to enhance the stocking with additional financing using the European Fisheries Fund.

West-Estonian Basin District

The main aim in this district is reduction in fishery.

As in most of fyke nets, used in coastal waters, eel is caught as a by-catch consisting less than 1% of total, there is no need to decrease the number of licences for this gear, except small fyke nets in line specialized on catch of eel.

In 2009 the number of licences for small fyke nets in line was reduced approximately 15% already. For 2013 this number will be cut down up to 50% of the present number.

Catch of eel in West-Estonia, mostly in coastal waters, should to be less than 6 tons per year, set in relation to the catches in 2004-2006 (12 tons). Actually, the requirement of 50% reduction in eel catch in maritime areas is followed up to now already as in 2008 in coastal waters 4.8 tons of eel were harvested. In spite of this licences of small fyke nets will be reduced 50%. In case of the increase of eel catches in coastal waters of Estonia, the number of licences for small fyke nets will be cut down up to zero or additionally other types of fyke nets with mouth height up to 1 m will be reduced.

Due to the above mentioned measures, 40% escapement of silver eel from the waters of the West Estonian Basin District is guaranteed.

Control measures and monitoring

Management of eel stock in Estonia is under the control of the Government. Fisheries are managed by the Fishery Department of the Ministry of the Environment dealing with restocking and management measures for fish stocks conservation, the Fishery Economics Department of the Ministry of Agriculture is responsible for issuing fishing permits and collecting catch data on commercial fishing activities.

The number of fishing gear allowed to use for eel fishery is divided between fishermen and issued by special fishing permit. The Estonian Environmental Inspectorate is responsible for control of fishing activities which allows to ensure that number of fishing gear issued by fishing permits will be not exceeded.

Monitoring of the implementation measures will be continued – monitoring of fishing effort, yellow and silver eel landings and stocks are estimated separately.

Executive summary of the Eel management plan of Latvia

Introduction

Latvia defines only one eel management unit or a single “eel river basin” which includes part of four river basin districts where the natural distribution range of eel is. The natural eel habitat in Latvia covers total area of 113.3 ha – 7.5 ha in rivers, 16.1 ha in lakes and about 89.8ha along coastline of the Gulf of Riga and the Baltic Sea. Approximately 60% of the territory and majority of lakes and rivers have not been accessible for natural migration of eels for years.

Eel stocks and fishery

Targeted eel fishery in Latvia is conducted only in inland waters – in the lakes and in the river outlets at eel stocked production lakes. In marine coastal fisheries eels are caught only as a by-catch, mainly during herring and perch fishing. Latvian eel catches from 2001-2007 were very small and 90% of amount was provided by eel fisheries in their stocked production lakes. Catches of artificially restocked production eels in lakes reach 8 tons, but eel catches in their natural distribution area makes only 2-3 tons a year since 1980ies. In Latvia it is legally binding to register in the logbooks all fish catches including inland waters and coastal waters independently of the fishing purpose - commercial or self-consumption fishery, showing that the catch data is precise. The eel fishing effort with eel-weirs in Latvia is fixed by strongly limited quantity of fishing gears and in general is set for water bodies outside natural eel habitats. There is no direct eel fishery in inland and coastal waters with other small mesh size mixed fishery gears indicating that no specific eel fishing effort can be separately calculated. The impact of fishing on the condition of eel stocks in the waters of their natural distribution is insignificant. The present eel fishing capacity in the waters of their natural distribution may not be considered a factor that balks escapement of 40% of the natural silver eels to the sea. There is no additional fishery restriction foreseen in the Latvian eel management plan. Eel angling tends to be occasional, only 4% of anglers specify the eel as a target species. Therefore no technical measures to limit eels’ angling are foreseen.

Eel restocking

Latvia will use restocking as a management measure. The priority for the glass eel restocking will be given to the lakes that historically are the waters of eels natural distribution, which manly are lakes connected to the Gulf of Riga. Latvian considers that eel restocking could take place only in those eel natural habitat waters where are no obstacles for their free migration downstream and where is not developed intensive eel fishing to ensure the possibility for eel free migration throughout the streams when accessing the sea. The calculations in plan shows the list of perspective water bodies for restocking glass eel and that for restocking totally it is necessary 2.7 millions of glass eel. At the same time Latvia foresees that there should be a special restocking program elaborated to describe exactly what quantity of glass eel and in which water bodies should be restocked and the timeframe. At this moment no studies have been conducted in Latvia on the restocking efficiency of glass eel.

Other measures

- Structural measures to make rivers passable and improve river habitats, together with other environmental measures. In Latvia the main factor that nowadays limit the distribution of eel are obstacles built by humans. It is necessary to collect data on other anthropogenic obstacles in rives except HPS location of which are well known. A perspective site, where it is possible to considerably increase the area of water accessible to migratory fish, is the basement of the dam of the old Staicele Paper Factory on the Salaca River. The implementation timeframe of this project is not clear yet. At present, experts are working on a technical solution, which would enable dismantling this barrier or creating a passage for fish.
- Transportation of silver eels to waters, which enable their migration to the sea. It is almost impossible to ensure the downstream migration of Latvia's silver eel from eel stocked production lakes as their mortality in HPS turbines could reach as much as 100%. Therefore a prospective technical solution could be transportation of silver eel downstream to lakes or rivers, which are free from obstacles.
- Combating predators. No studies about predators' impact on eel populations have been conducted in Latvia. Studies conducted in other countries indicate that this impact is proportionate to the density of the eel population. As in Latvia the density of the eel population in the waters of their natural distribution is low, it does not have a considerable impact on the eels' condition. It is important to envisage monitoring of predators' impact for the foreseeable future.
- Temporary switching-off the hydro-electric power turbines. The majority of Latvia's small HPSs work in the water accumulating regime, and turbines are stopped regularly. Therefore it is foreseen to conduct studies on the possibilities of silver eel downstream migration through turbines at night or through other devices that ensures the ecological flow in dams.
- Measures related to aquaculture. Aquaculture could be used in the implementation of Eel management plan in two fields. Firstly, in the process of planning of the restocking of the glass eel, one has to consider the specific situation in Latvia's water bodies – seasons, habitats, food base and other factors that may influence the restocking presumably efficiency of glass eel. As this restocking could also be conducted by fishing operators, local municipalities and individual persons, relevant legislative acts have to be drawn up for setting out the provisions for eel restocking.

The introduction and enforcement control

The introduction and enforcement control of the Eel management plan is coordinated by the Ministry of Agriculture of the Republic of Latvia. The Ministry of Environment is also involved in the implementation of the plan regarding the issues under each competence. It is rational to start the financially most demanding measures, like procurement and restocking of glass eels and transportation of silver eels, only in 2010.

Summary of Lithuanian eel management plan

European Commission regulation No. 1100/2007, approved on September 18, 2007 obligates Member States to define unit for stock management, to describe the current stock status, to identify and implement measures for stock recovery and evaluate efficiency of these measures. Eel stock in Lithuania is not abundant, national fishery catch only 0,1-0,2% of total European eel fishery catch. However country, taking principle of solidarity, has implemented the first measures to reduce stock decline due to fishery even before the regulation has been approved. Two institutions: Ministry of Environment and Agriculture are responsible for the national eel management plan implementation in Lithuania. Lithuania is lacking detail information about the current as well as the past status of the eel stock, however preparing national eel management plan, has tried to collect all available information about the current and historical stock status and according to collected information to plan the adequate measures to stop stock decline, achieve stock recovery in the future and build an effective system of stock monitoring. Eel stock management unit was defined according to the EC regulation‘s 1100/2007 article 2, which provides this pragmatic possibility, Lithuania had declared its national territory as one unit for European eel stock management, since Nemunas RBD includes almost all Lithuania territory and the most important eel habitats within the country. Lithuania expects the possibility to coordinate measures for eel stock recovery in the future with neighbouring countries Member States, Latvia and Poland, as well as the third countries, Russia and Byelorussia, if the last two countries will plan measures in accordance with the EC regulation for stock protection or recovery.

In Lithuania main habitats for eels are lakes, ponds, Curonian Lagoon and coastal waters of the Baltic Sea. Eels were known in Lithuania lakes 100 years ago, but this stock seems to be very scarce and had no importance for commercial fishery. Eel stock in the Curonian Lagoon was much more abundant. Lakes and ponds in Lithuania are slightly eutrophic, little polluted, 39% are without obstacles for silver eel escapement, i.e. belong to basins which are not affected by HP turbines and are safe for silver eel escapement. Fishery is extensive in the Curonian Lagoon catching only big eels, the lagoon itself has open access to the sea through Klaipėda port therefore, eels can migrate in and out the lagoon. 22% of country‘s water bodies (lakes and ponds) are open for migrating yellow eels from the sea, if that migration would exist. Therefore Lithuania water reservoirs can be a good polygon for silver eels of good quality production.

There is one large cormorant colony in the coastal region of Lithuania and some small in central and east parts of the country. An impact of other predators is not known. Infection by *Aguilicolla crasus* has been observed everywhere: in the Baltic Sea, Curonian lagoon and lakes, but detail study hasn‘t been done. First eel stocking was done in 1928-1939 in eastern part of country, later more intensive stocking programmes were implemented since 1956 and as the result during fifty years about 50 mln. eels were stocked. Consequently, eel populations in countries inland water bodies were artificially created. Landings of commercial fishery in the inland water bodies and Curonian Lagoon are about 15 tones annually currently. An impact of recreational fishing is not known. Recent study of eel otolith microchemistry demonstrates that all eels from inland water bodies are of stocked origin. In the Curonian Lagoon and Baltic Sea 80% and 98% are natural recruits accordingly, while 20% and 2% of stocked origin. It is discovered, that eels into Lithuania fresh water invade at yellow eel stage, at an average 5,2 years age.

The first practical measures to stop stock decline, following measures to prevent anthropogenic mortality and to recover stock are included in the national management

plan: (1) to limit fishery in northern part of the Curonian Lagoon to increase possibilities for silver eels escapement to the sea, (2) to decrease fishery efforts for about one third until 2012, (3) in the inland water bodies the number of fishing licenses is reduced by 43% recently, further measures are aimed to decrease efforts by shortening fishing season, allowing to fish silver eels during spring only, (4) to shorten the fishing season for yellow eels to 3 months, (5) to introduce limitation for bait use in long lining, (6) for recreational fishing to reduce the day catch limit from five to three eels (40%), (7) the HP impact will be evaluated in the most essential sites and according to obtained data measures to decrease the mortality will be discussed and implemented. Starting from March 13, 2009 Lithuania is ready to implement CITES requirements, starting control import and export, accordingly regulate trade on national market.
The stocking will be one of the measures for stock recovery .In the inland water bodies eel populations are more abundant than were before the programme of stocking had started in 60s, though Lithuania at the inland water bodies meet EC regulations criteria.

Lithuania is lacking knowledge about stock in the past and now; however, all necessary studies are planed and most data about the stock status should be obtained until 2012, while stock monitoring system will be built as well: (1) samples will be collected from fishery to evaluate mortality, (2) natural recruitment and stock status will be monitored by installing the fish-pass on the dam in the sea-cost region and bottom trawling in Curonian Lagoon, (3) marking and telemetry study in combination with traditional fishing methods will be implemented and this should allow to evaluate mortality due to HP turbines and fishery, (4) silver eels (caught leaving Lithuania territory) otoliths microchemical analysis ,will allow to evaluate efficiency of stocking programmes, (5) analysis of hazardous elements and energetic resources in silver eels will allow to evaluate migrating to spawn eels quality, (6) post-stocking evaluation should estimate stocking efficiency, evaluating survival rate, contamination by parasites, growth rates, sex proportion (7) using inquiries recreational fishing impact will be evaluated. The obtained information about eel stock in Lithuania will support revision and optimization of the national eel management plan in 2012.

Executive Summary

Eel Stock Recovery Plans Ireland

National Plan on Eel Stock Recovery, five River Basins and one transboundary (Eastern, South Eastern, South Western, Shannon International, Western and North Western International)

Preparation of the Eel Management Plan

Ireland established a National Working Group on eel management in 2006, in advance of the agreement of Council Regulation No 1100/2007[1] establishing measures for the recovery of the stock of European eel, in order to begin the preparatory work required and Irish scientists participated in Working Groups and EU projects (i.e.EU SLIME) in developing methodologies and data collection and modelling for eel stock assessment.

Organisation of the Eel Management Units

The Eel Management Plans established and implemented are for River Basin Districts (RBDs) as defined in Directive 2000/60/EC and in accordance with Article 2 of Council Regulation No 1100/2007. These plans include: the National Plan on Eel Stock Recovery, five River Basins and one transboundary (Eastern, South Eastern, South Western, Shannon International, Western and North Western International).

The closure of the eel fishery on the 1 June 2009 as provided for in the Eel Management Plan is provided for in National Legislation: prohibiting the fishing for eel (Conservation of Eel Fishing Bye-law No CS303 2009) and prohibiting the issue of eel fishing licences in any fishery district (Conservation of Eel Fishing Bye-law No 858, 2009).

Inland and estuarine eel fisheries in Ireland are managed by seven Regional Fisheries Boards, divided into Fisheries Districts, and the Loughs Agency. Fisheries District boundaries largely conform to the arrangement of river catchments. In general, eel fisheries managed on a Fisheries District basis fall naturally within the boundaries of the RBDs.

Description of the Eel Management Units

Current management of migratory species in Ireland, salmon and sea trout, has been at the catchment level and expand to encompass the management of eel. A G1S based data model was established for the quantification of the freshwater salmon habitat asset and for the determination of the quantity of habitat available to migratory salmonids.

The estimated total wetted area of the 265 lake; river and stream habitat accessible to migratory fish (including 1st order streams) in Ireland (including the Northern Ireland part of the Erne and the Loughs Agency Rivers in the Foyle and Carlingford areas) is 153,881ha.

The catchments have been characterised on the basis of their underlying geology, specifically in terms of the proportion of the surface area comprising calcareous and non-calcareous types. This catchment characterisation led to a continuous summary variable for catchment freshwaters, i.e. the proportion of wetted area comprising non-calcareous geology.

---

[1] OJ L 248, 22.9.2007, p.17-23

Water quality in Ireland is generally good and compares favourably with other Member States. The main challenge for water quality is to deal with eutrophication arising from excess inputs of nutrients from all sources.

Preliminary analysis of information available on the presence of *Anguillicola* in different catchments indicates that approximately 50% of the wetted area is now potentially infected by the parasite and that it continues to spread. Six catchments in Ireland have major hydropower installations in the lower catchments. 46% of the available wetted habitat is upstream of major barriers, although there is a greater proportion (53%) of the potential silver eel production when the differences in relative productivity are taken into account. An average mortality of 28.5% per turbine installation (ICES 2003) was used in assessing the impact of hydropower. It is intended that immediate measures will be put in place to mitigate against turbine mortality, including trap and transport on the Erne, Shannon and Lee.

Natural mortality of eels is a major, but relatively unknown, factor in the population dynamics of eels and mortality caused by predation is one of the factors contributing to natural mortality. The most recent census of cormorants in Ireland (Seabird 2000 breeding survey) reports that the Irish coastal population has remained stable since the previous census (1985-88).

The Eel Fishery

Glass eel and elver fishing in Ireland is prohibited by law (1959 Fisheries Act). The commercial eel fishery involves harvesting both brown and silver eel in freshwater and in estuarine or tidal waters. Brown eel are fished using a variety of techniques, the most common of which are baited long-line, fyke nets and baited pots. When silver eel are migrating downstream they are caught in fyke nets and stocking-shaped nets called "coghill nets" which are attached to fixed structures in the river flow, often at "eel weirs". The declared commercial eel catch in the Irish Republic, 2001-2007, ranged from 86t to 120t involving about 150-200 part-time fishermen, but inadequate reporting and illegal fishing makes this difficult to quantify accurately and it maybe a substantial under estimate. A total maximum of 278 licences were issued in 2006 and a maximum of 182 of these were actively fished in 2005. The value of the reported catch was therefore in the order of €0.5 million to €0.75 million.

Monitoring of elver migrating at Ardnacrusha (Shannon) and Cathaleen's Falls (Erne) is undertaken by the Electricity Supply Board (ESB). Indications are that recruitment is low. In May 2008, a bye-law was introduced (Conservation of Eel Fishing (Annual Close Season) Bye-law No. C.S. 297, 2008) restricting the fishing season for both brown and silver eel. Analysis of the impact of implementing a Brown eel fishing season from 1st June to 31st August and a Silver eel season from the 1st of October to 31st December showed the impact of the reduced fishing season would have been different in each Region with the level of reduction ranging from 7 to 42% in brown eel catch and 0-40% in silver eel catch.

Recreational eel fishing is only carried out by a minority of rod anglers and there is no legal, or voluntary, declaration of catch which is probably relatively small. There is no legislation protecting eels from angling. All other fishing engines, including, fyke net and baited pots, are authorized under the commercial legislation. There is no eel culture in Ireland at the present time and none is envisaged in the near future.

Escapement – Local Stock Modelling

The Irish Management Plans include a time period for detailed data collection and a parallel programme of stock assessment, including silver eel escapement estimates, and model development. The approach outlined in Article 2 of Council Regulation (EC) No 1100/2007 was followed to calculate pristine and current escapement and a simple model was proposed to project the impact of management actions on escapement from freshwaters.

No estimates of truly pristine escapement exist for Irish eel catchments. Recruitment of juvenile eel to Irish catchments (2003-2007) has declined to between 4% (Shannon) and 23% (Erne) of historical (1979-1984) and has been particularly poor in 2008. Historical production of silver eels was calculated (for freshwaters only) using catch series for four catchments (where the fishery efficiency was estimated) for periods prior to 1980. These data were calibrated using eel growth rates for 17 catchments and a regression model was developed relating production to catchment geology, a proxy for productivity. This gave historic production rates of 0.9kg/ha (Burrishoole – unproductive) to 5.5kg/ha (Moy – productive) and total historic silver eel potential production (without anthropogenic mortality) of 595 t per annum.

Current silver eel production was estimated using a similar approach with rates of 1.3kg/ha (Burrishoole – unproductive) to 2.7kg/ha (Ennell – productive) and total current silver eel escapement of 140t. Irish escapement expressed as a percent of historic production (EU target = 40%) range from 8% in the Shannon International River Basin District (ShIRBD) to 64% in the South Western River basin District (SWRBD). The national percent escapement is 24%.

Due to the last 18+years of low and declining recruitment, regardless of which management actions are taken, achieving the 40% EU target in the long term will require a recovery of recruitment arising from concerted international action and cannot be achieved in Ireland alone. It was difficult to assess a timeframe for recovering the predicted downward trend in escapement in the absence of knowing what the European recruitment levels will be in the future and in the absence of a clear timeframe from the EU. To facilitate setting a timescale to recovery it was decided to adopt the approach used by Astrom and Dekker (2007) in predicting the recovery time for recruitment under different reduced levels of mortality. Two assumptions were made: the first that Europe responds in a similar fashion to reducing mortality and the second, that as recruitment recovers towards historical, the Spawning Stock Biomass is recovering towards the target. Therefore, recruitment recovery is used as an alternative target towards the escapement target. It is also possible that the EU biomass escapement target may be reached in a shorter timescale than full historical recruitment.

Stocking

Currently in Ireland there are two types of stocking carried out, both coming under the heading of "assisted migration" upstream. Purchase of glass eel for stocking from outside the state does not currently take place. During the monitoring programme, 2009-2011, an evaluation of recruitment levels will take place. This will facilitate an assessment of possible stocking strategies as a useful tool to aid stock recovery. This assessment will be guided by the Eel Scientific Committee. Any stocking taking place can, and will be, included in the assessment of the local stocks and the modelling of escapement and stock recovery. Assisted migration of upstream migrating pigmented elvers takes place in the Shannon (Ardnacrusha) and Erne (Cathaleen's Falls) and of pigmented young eel (bootlace) on the Shannon (Parteen). It is proposed to continue this operation. Currently, small amounts of glass eel and elver are taken in the Shannon estuary and in neighbouring catchments and these are stocked into the Shannon above Ardnacrusha and Parteen. Given the widespread presence of *Anguillicola* and the move towards risk averse management strategies at low recruitment levels, this practice

will be discontinued. It is proposed that in the event of recovering recruitment, a stocking strategy will be developed by stocking "surplus" recruits into good quality (e.g. low contaminants, no *Anguillicola*) catchments where stocks are identified to be low. Stocking will be for conservation and will be undertaken in a risk averse manner.

Monitoring & Post-evaluation

The national plans describe a comprehensive programme of monitoring and evaluation of management actions and their implementation, and also a programme of eel stock assessment to establish a stock baseline, estimate silver eel escapement and monitor the impact of the management actions on the local stocks.

Ireland is committed to compliance with the Data Collection Regulation (DCR) and submitted a provisional plan for 2009 and 2010 to the EU. Given the cessation of the eel fishery there will be no obligation to undertake sampling under the DCR.

Management Actions

There are four main management actions aimed at reducing eel mortality and increasing silver eel escapement in Irish waters. These are a cessation of the commercial eel fishery and closure of the market, mitigation of the impact of hydropower, including a comprehensive silver eel trap and transport plan, ensure upstream migration of juvenile eel at barriers and improve water quality including fish health and bio-security issues.

Eel traceability and catch and sales reporting will not be required under the management option of a ceased fishery and a closed market. Compliance with CITES will only be relevant where a fishery expects to export outside the EU and this will require a scientific non-detriment finding declaration. Given the cessation of the fishery this will not be an issue in the immediate future. The CFB and eel fishermen will be engaged in investigating possible diversification schemes for the former commercial fishermen.

Summary

Irish silver eel escapement from freshwaters expressed as a percent of historic production (EU target = 40%) ranges from 8% in the ShIRBD to 64% in the SWRBD. The national percent escapement is 24%. Management actions described will contribute to achieving a recovery in recruitment in 90 years (assuming an equivalent EU wide action), thereby aiming to achieve the EU escapement target in less than that timeframe. It is imperative that equivalent EU-wide action is taken at this level so as not to diminish the impact of Ireland's contribution

EEL MANAGEMENT PLANS FOR THE UNITED KINGDOM

Executive Summary

In accordance with Article 4 of Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel, the UK submitted 15 Eel Management Plans for approval by the Commission in December 2008. These plans are set at the River Basin District level, as defined under the Water Framework Directive 2000/60/EC, covering England and Wales, Scotland and Northern Ireland.

The Eel Management Plans have been drawn up by the relevant UK authorities with each of the devolved administrations; the Environment Agency, The Scottish Executive, Department of Culture, Arts & Leisure, and assessed by the appropriate scientific agencies.

Outlined below is a brief summary of the management actions that the UK intends to take in the coming years to attain the silver eel escapement target:

<u>England and Wales Eel Management Plans</u>

Habitat based estimates of present escapement were used to calculate the current escapement level of silver eel, and these will then be compared with a standard, habitat-based escapement level under pristine conditions. For each River Basin District (RBD) in England and Wales, estimates of current silver eel escapement were assessed from yellow eel data, using an index river catchment to represent the entire RBD. The level of escapement was compared with an escapement target from the literature, according to the habitat type and area for the index river within each RBD and, by association, the waters of the whole RBD. The North West, Western Wales, Severn, South West, South East and Thames RBDs are all considered to meet or exceed the escapement target. The Dee, Northumbria, Humber and Anglian RBDs are all considered to be failing, and it is uncertain as to whether the Solway Tweed RBD is or is not meeting the escapement target.

The estimation of the wetted area of each River Basin encompasses the entire river network, regardless of the location of natural or man-made structures. This thereby provides an estimate of the potential productive area of river available to eel in the absence of anthropogenic impacts, as required by the Regulation.

A number of measures will be used to meet the requirements of the Regulation. These mainly focus on the potential across England and Wales for 1) a reduction in fishing pressure, 2) improving access and habitat quality, and 3) reducing the impacts of entrainment. Specifically –

1) New powers to manage eel fisheries are being introduced through the Marine and Coastal Access Bill which will be used to limit the number of fishermen and reduce fishing pressure. Byelaws will be introduced that allow better regulation of eel and elver fisheries through the introduction of close seasons, improving the quality of catch returns, geographical limitation of fisheries including prevention of net fishing for elvers at vulnerable locations, and further specification of fishing methods and equipment. We anticipate that the new byelaws will be introduced before the start of the next eel fishing season (February 2010).

2) Legislation is being introduced that will give the Environment Agency the power to require the provision of eel passes. A number of research projects are currently being undertaken to assess the passability of eels at obstructions. This will inform the development of a plan of priority actions for improving eel passage by the provision of eel passes within each RBD. Ongoing programmes aimed at achieving better river quality and good ecological status under the Water Framework Directive (WFD) will also contribute to increasing eel production.

3) The legislation referred to above will also give the Environment Agency the power to require the provision of screens. These powers will be used to reduce entrainment, along with on-going work on assessment of turbine mortality and solution design.

In addition, further monitoring is already underway in England and Wales, biennially for yellow eel, annually for elver and silver eel, which will provide the necessary data needed to make more accurate estimates of escapement in the future.

Lastly, it should be noted that, in considering appropriate measures to implement England and Wales management plans, restocking will not be relied upon to meet the escapement target, due to the potential concerns with the source and amount of stocking material available and/or required.

Pristine spawner escapement was estimated as the mean of three separate estimates, two based on data from Ireland, and one based on historic escapement from a small catchment in Scotland. A habitat-based assessment of compliance was made using the measured escapement of silver eels from three Scottish catchments of differing altitude. In assessing compliance a number of currently untested assumptions were involved at different stages, but these assumptions erred on the side of caution (where it could be identified) so that although it would be unrealistic to attach numerical error estimates to the estimate of pristine or current escapement, nevertheless the assessment is thought to be reasonably robust. The conservative, best estimate of current spawner escapement is 46% of the estimated pristine escapement.

A number of refinements in terms of testing of assumptions and improved modelling are expected to be applied to existing data. These, together with the data collected on standing stocks under the monitoring programme outlined in the plan, are expected to provide a more accurate assessment of compliance, together with confidence estimates, to be reported in the first triennial report, due in 2012.

The principal management action to implement the Scottish plan is represented by *The Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008.* This newly introduced regulatory measure prohibits all fishing for eels, save as authorised by the Scottish Executive. This is the first time that the eel fishery has been regulated in Scotland. It is considered 'highly unlikely' that any licence to fish commercially for any eels (in particular those <12cm in length) will be granted by Scottish Ministers, but if such licence were granted, a condition would be imposed on the licencee to report the number and size of eels caught. Further information will therefore be provided in the triennial reports, as provided for in Article 9 of the Regulation.

Problems related to habitat accessibility for eels will be addressed through *The Controlled Activities Regulations (CAR) 2005* implemented by the Scottish Environment Protection Agency (SEPA) as part of the WFD. Further measures to alleviate barriers to eel movements are being instituted under the River Basin Management Planning Process Restoration Fund, operated by SEPA. It is expected that future project applications to the restoration fund addressing fish movements will specifically consider eels, and that this will be incorporated into the assessment process for awarding funding. In addition, Marine Scotland will

encourage River Fisheries Trusts to provide guidance on eel pass design to managers to alleviate barriers for eels. Thus far two eel passes have been installed in this way.

Northern Ireland Eel Management Plans

A number of management actions have been foreseen as part of the Northern Irish plans. The Neagh Bann eel management plan provides for comprehensive state and fishery owner fisheries management regimes including restrictive licensing, closed seasons, quotas, method restriction, minimum sizes, free gaps in weirs and enforcement patrols. An ongoing glass eel stocking policy linked to European Fisheries Fund (EFF) funding, ongoing data collection and scientific monitoring programmes to verify escapement are also in place to ensure effective management of the fishery. New regulations banning all eel fishing in the North Eastern RBD of Ireland will be introduced and monitoring of eel stocks will be harmonised with the WFD sampling, and salmon management electro-fishing programmes. As well as new regulations banning all eel fishing, all eel fisheries will be closed in the area covered by the North West eel management plan. Other significant measures foreseen in the plan include trap and transport of silver eel to by-pass dams, the assessment of turbine mortality and the design of solutions to reduce turbine impacts, trans-boundary monitoring and enforcement programmes.

Summary of the Eel Management Plan for Belgium

1) Introduction

This summary focuses on the measures included in the Eel Management Plan for Belgium. Belgium has an area of 30 528 km^2 and belongs, for the most part, to the international river basin districts of the Scheldt and the Meuse. Each of Belgium's three regions (Flanders, Wallonia and Brussels) is autonomously responsible for implementing the Eel Regulation (Regulation (EC) No 1100/2007) within its territory and is therefore to be regarded as an Eel Management Unit. In view of the small area of Brussels (167 km^2), the Brussels Region is dealt with only briefly in this document. Flanders is mostly part of the Scheldt river basin district, while Wallonia is primarily in the Meuse river basin district. Brussels lies entirely within the Scheldt river basin district.

2) Fishing-related measures in inland waters

- Flanders

Since as early as 2006, steps have been taken to limit fishing pressure with a view to protecting the eel stock. Legislative measures have been adopted under which commercial fishing is no longer permitted and some recreational fishing gears are also prohibited. As a result of these measures, it is estimated that the annual eel harvest has been reduced by 29.3 tonnes. Additional measures to reduce the eel harvest still further were put forward in the Eel Management Plan and will fully enter into force from 2010, reducing the eel harvest by a further 12 tonnes. The eel harvest in Flanders will be 42 % lower in 2010 than in 2006 and is expected to amount to only 30 tonnes (only recreational angling).

- Wallonia

In Wallonia, there is no commercial eel fishing, only recreational fishing. Since 2006, however, anglers in Wallonia have to return all eels they catch to the water, because they are contaminated with various pollutants. The quantity of eel harvested before 2006 is not known, but is estimated to be much lower than in Flanders.

Conclusion:

Since as early as 2006, ahead of the Eel Regulation, various measures have been adopted in Belgium to allow the recovery of the eel stock, as a result of which commercial eel fishing is no longer permitted in inland waters and all fishing gears other than the rod and line are prohibited for recreational fishing. From 2010, the total eel harvest in Belgium will still be around 30 tonnes (primarily yellow eel), accounting for approximately 1% of the reported total eel harvest in Europe (reported to ICES and the FAO).

NB: in Belgium's marine and coastal waters, eel is only a sporadic and non-targeted by-catch. The catches are negligible. Catching glass eel is not permitted anywhere in Belgium, neither in inland waters nor at sea.

3) Non-fishing-related measures: eliminating bottlenecks for upstream migration

In Flanders, 577 migration bottlenecks have already been identified in watercourses that are important for eels. The aim is to eliminate the most significant bottlenecks in the short term (by 2015), thus making as large a nursery area as possible passable for eels again. The remaining bottlenecks will be tackled in the second phase. The most important migration bottlenecks have also been identified for Wallonia. Various significant obstacles have already been eliminated along Wallonia's main axis (the Meuse). By 2015, some significant migration bottlenecks on the Meuse and its tributaries and on the Scheldt will have been eliminated.

4) Non-fishing-related measures: reducing eel mortality as a result of cooling-water extraction

In Flanders, there is no significant eel mortality at the various cooling-water intakes. In Wallonia, an infrasound barrier has been built on the Meuse at the site of the Tihange nuclear power plant.

5) Non-fishing-related measures: reducing eel mortality at hydro-electric power plants during downstream migration

- Flanders

Owing to the gentle gradient of the watercourses in Flanders, the number of hydro-electric power plants is very small, as is their capacity (total capacity for all existing plants comes to less than 1 MW). For the planned project for hydro-electric power plants on the Albert Canal, a fish-friendly design is a prerequisite.

- Wallonia

In Wallonia, it is estimated that the six successive hydro-electric power plants on the Meuse are responsible for almost 70% of mortality among the current silver eel production in the Meuse river basin.

Plants with a capacity greater than 10 MW are subject to an environmental licence, which should involve an assessment of their impact on mortality. For new hydro-electric power plants, strict criteria will be set as regards eel mortality. For small new plants on non-navigable watercourses, the competent authorities require either the installation of grills with narrow apertures or the use of fish-friendly turbines.

For the existing hydro-electric plants, the authorities will set criteria with regard to eel mortality when renewing their licences. Where licence renewal is not envisaged in the medium term, or for small plants that do not require a licence, the necessary adjustments can be provided for through negotiations or subsidies.

6) Non-fishing-related measures: reducing eel mortality at pumping stations during downstream migration

Flanders has pumping stations to pump water from the low-lying polders. Those pumps are a cause of mortality among migrating silver eel. In the period 2009-10, an inventory will be taken of all pumping stations in Flanders and an estimate made of the mortality caused by them. It will then be determined which pumping stations cause the most damage and in which cases improvements would make a significant contribution to the recovery of the eel population. The possible solutions for improving the pumping stations will also be given. After the inventory has been taken, priorities for improvement will be set on the basis of all the above-mentioned data, and the improvement schemes will be integrated into the River Basin Management Plans.

7) Non-fishing-related measures: good surface water status in Belgium

The measures put forward in the programme of measures under the River Basin Management Plans to implement the Water Framework Directive (2000/60/EC) are intended to achieve good ecological status or good ecological potential for surface water by 2027 at the latest. As achieving good ecological status or good ecological potential is seen as a prerequisite for the recovery of the habitat for eels, those measures can be referred to in the programme of measures put forward under the River Basin Management Plans for the three Belgian Regions (Flanders, Wallonia and Brussels).

8) Non-fishing-related measures: release of glass eels

In Flanders, glass eels have been released in inland waters for many years now, because the eels cannot reach the nursery areas and recruitment of glass eels from the sea is, for the time being, insufficient. Until there is an improvement in the number of glass eels migrating up our rivers from the sea and until the migration bottlenecks have been eliminated, glass eels will continue to be released in Flanders. A release strategy is set out in the Eel Management Plan. In total, approximately 1 500 hectares of suitable habitat have been designated for releases (target release density for glass eel is 1 kg/ha). For practical and budgetary reasons, one tenth of this is achieved each year. In Wallonia, 500 hectares of suitable habitat have been designated for releases. However, no releases of glass eels are envisaged in Wallonia in the short term, and priority is being given to other measures.

9) Non-fishing-related measures: enforcement in inland waters (non-Community waters)

Eel poaching is an important issue in Flanders. Since 2008, a separate body has become operational with responsibility for monitoring compliance with, among other things, fisheries legislation in inland waters. Various measures have already been taken or are being planned specifically to combat eel poaching.

In Wallonia, the focus is primarily on compliance with the return requirement for eel.

10)Summary table of measures in the Scheldt and Meuse river basin districts in Belgium

Scheldt river basin district Current percentage escapement of silver eel = 19 % (target: 40 %)		
Measures	**Region**	**Estimated percentage contribution towards achieving the target**
New fishing restrictions (in addition to the measures that have applied since 2006)	Flanders	10 %
Fisheries enforcement (combating eel poaching)	Flanders Wallonia	
Temporarily releasing glass eels in areas that are currently not passable (until there is sufficient natural recruitment)	Flanders	5 %
Eliminating bottlenecks for upstream migration. This is expected to lead to natural recovery of the eel stock in existing areas and new areas of colonisation, provided that there is sufficient natural recruitment, which in turn depends on the overall recovery of the eel population at European level.	Flanders Wallonia	35 %
Reducing mortality during downstream migration (primarily pumping stations)	Flanders	15 %
Overall recovery of the ecological quality of surface waters (water quality, structure quality and bottom sediment)	Flanders Wallonia Brussels	35 %

Meuse river basin district Current percentage escapement of silver eel = 30 % (target: 40 %)		
Measures	**Region**	**Estimated percentage contribution towards achieving the target**
New fishing restrictions (in addition to the measures that have applied since 2006)	Flanders	5 %
Releasing glass eels in areas that are currently not passable (until there is sufficient natural recruitment)		
Fisheries enforcement (combating eel poaching)	Flanders Wallonia	
Eliminating bottlenecks for upstream migration. This is expected to lead to natural recovery of the eel stock in existing areas and new areas of colonisation, provided that there is sufficient natural recruitment, which in turn depends on the overall recovery of the eel population at European level.	Wallonia Flanders	20 %
Reducing mortality during downstream migration (hydro-electric turbines and cooling-water intakes)	Wallonia	45 %
Overall recovery of the ecological quality of surface waters (water quality, structure quality and bottom sediment)	Flanders Wallonia	30 %

MINISTÈRE DE L'INTÉRIEUR
ET DE L'AMÉNAGEMENT DU TERRITOIRE
Administration de la Gestion de l'Eau

Hydrology Division – Fishing Department

References :
Contact person: Max Lauff
Tel.: 26 02 86 - 47
E-mail: max.lauff@eau.etat.lu

Luxembourg, 4 February 2009

Eel Management Plan

LUXEMBOURG

1. Description of the units of the Eel Management Plan

Under the Water Framework Directive, the territory of Luxembourg is subdivided into two river basins:

1. the Meuse river basin district
2. the Rhine river basin district

The competent authority for implementing the Luxembourg Eel Management Plan is the Ministry of Internal Affairs, Regional Planning and Water Management.

In addition to the district-based plans, the International Commission for the Protection of the Rhine (ICPR) will submit an eel management plan for the entire hydrographic district of the Rhine.

2. The Meuse river basin district

The Meuse river basin district mainly comprises two smaller rivers: the headwater of the Chiers and the Mierbach. The drainage basin of the Meuse on Luxembourg territory is approximately 51 km². There are no eels to be found today in this heavily populated and industrialised area.

3. The Rhine river basin district

3.1. Situation and presence of eels

The Moselle and the Sûre and their numerous tributaries also belong to this river basin district. The Sûre drainage basin covers 4 286 km² (area of Luxembourg: 2 586 km²). Around a third of the Sûre drainage basin is in Germany, in the Rhineland-Palatinate (Prüm, Nims, Enz). The course of the Sûre is 159 km, 44 km of which borders the Federal Republic of Germany. The Sûre flows into the Moselle 130 metres above sea level at Wasserbillig. Only the Syre and some other tributary streams flow directly into the Moselle.

Historically, the European eel (Anguilla anguilla) was common in all the country's rivers (De La Fontaine 1872, Feltgen 1902, Ferrant 1915). Accoring to Von dem Borne (1883), masses of glass eels swum up the Sûre in the springtime. There is a long tradition of eel fishing in Luxembourg. Fishing was concentrated on valley traps and fish weirs, with various catching devices (nets, fish traps, etc.).
There are still eels in the Moselle, the Sûre and almost all their tributaries (e.g. the Alzette, Clerve, Wiltz, Schwarze Ernz, Weiße Ernz, Attert, Eisch, Mamer) (1988-2008 inventories).

In terms of figures, the eel makes up approximately 1.8% of all fish species present in the rivers examined.

Today there are insurmountable obstacles for eels swimming up the upper Sûre (Esch/Sûre, height: approx. 40 m) and the Our (Vianden, pumping power station, height: approx. 25 m). There has not been any upstream migration of eels from these unpassable weirs since the end of the 1950s. As no restocking measures were taken above the dammed valleys since their construction, there are no longer any eels in these sections of the rivers.

A third major obstacle to the eels moving upstream is the Rosport/Ralingen (L/D) hydropower station on the lower Sûre. A fish pass here allows the eels to swim upstream without any problems. This will be optimised for all fish species in 2010 during the planned renovation of the hydropower station.
Any other smaller river obstacles should not pose any major difficulties to eels swimming upstream at present.

A digital river continuity register is currently being established in Luxembourg and will be used as the basis for developing a set of measures and management plans in line with the EU Water Framework Directive.

3.2. Fisheries

There are no commercial fisheries or other commercial fishing activities in Luxembourg.

Under the Fishing Act of 28 June 1976, eels may only be caught by sport or hobby fishermen using a handline. Fish caught may not then be used commercially. We are unable at present to provide figures on how many eels are caught by hobby fishermen. We do know that eels are not fished much in Luxembourg these days.

Eels caught, in inland and border rivers, in public and in leased rivers, must by law be at least 40 cm long.

Eels may not be fished in inland waters from January to February, or in border waters managed jointly by Germany and Luxembourg from 1 March to 14 June inclusive.

3.3. Eel restocking

To date there has not been any restocking of glass, young or adult eels in the Sûre river basin. We do not have any official data on the import or export of eels for restocking.
There are no eel breeding facilities in Luxembourg at present.
Current eel stocks in Luxembourg rivers can be traced back to the restocking measures with eels from aquaculture production in the dams of the Moselle in the Rhineland-Palatinate (D) between Coblenz and Trier, since we can assume that not enough glass eels can naturally swim up the Rhine delta to ensure their spread in the upper reaches of the river system, such as the Sûre and its tributaries.

3.4. Contamination, parasites, predators

In Luxembourg, as throughout the Rhine river basin, eels are relatively heavily contaminated with dioxin-like PCBs (polychlorinated biphenyl). A few years ago, the Luxembourg government issued a health warning about eating eels. Unlimited consumption of eels could

damage consumers' health. Heavy metals should be considered as far less problematic harmful substances.

Occasionally eels in Luxembourg rivers are infected by the endoparasitic swimbladder worm (Anguillicola crassus).

Only scarce quantities of eels are caught by Great Cormorants in the winter months. This type of fish accounts for less than 2.5% of the Cormorant's overall diet (Proess R., 2003).

3.5. Eel migration

As there are no commercial fisheries in Luxembourg, if we disregard the harm that could be caused to eels passing the turbines, the migration rate of the catadromous fish in the Sûre system could be approximately 100%.

On account of the fishing carried out under the Luxembourg eel protection initiative during the migration phases of the eel, we could estimate - in the absence of anthropogenic mortality factors and using various fishing quotas (traps and net fishing) - potential eel production in the Sûre river basin at approximately 2 000 eels per year. This equates to a weight of approximately 1.5 tonnes (Hehenkamp, 2006).

3.6. Eel protection initiatives at the Rosport hydropower station

In the 1960s, the weir of the Rosport hydropower station dammed the river Sûre in the area of Rosport/Ralingen. The upper water trench is approximately 950 m long and branches off to the right from the Sûre around 400 m above the weir. The length of the underground water trench from the hydropower station to where it flows into the Sûre again is 80 m.
The hydropower station uses the gradients of the approximately 4 400 m long loop of the Sûre, which is bisected by the trenches feeding the power station.
The weir of the Rosport hydropower station has two 25 m wide, movable sluice gates. The dam height is approximately 7 m.

At present, the Rosport hydropower station, which has two Kaplan turbines on vertical axes discharging water at 70 m^3/sec, is the greatest threat to migrating eels in the Sûre river basin.

To protect the eels migrating to the sea from turbine damage, since 2004 fish traps and nets have been used to remove migrating silver eels from the upper reaches of the weir (Hehenkamp, 2004-2008). The eels are then transported to the Rhine, with a comparatively high overall survival rate as they do not have to pass the 10 power plants on the Moselle between Trier and Coblenz (D).

If the water discharged in the hydropower station's turbine trenches exceeds 70 m^3/sec, the Sûre overflows the main weir, thereby allowing the eels to migrate without any problems.

The measures taken to catch and transport the eels targets a 100% rate of protection from turbine damage for the migrating silver eels. The Sûre drains around 100% of its river basin at Rosport before it flows into the Moselle 15 km further downstream.

Between 2004 and 2008, 300 to 960 eels were caught in this way every year and then transported intact to the Middle Rhine. These measures are part of Luxembourg's contribution towards the protection of stocks of the European eel and will be continued in coming years.

Fish-friendly turbine management by turning off the turbines during the migration peaks of silver eels or operating the turbines in such a way so as to minimise harm to the fish could be a second option for protecting migratory eels at the Rosport hydropower station.

Eel Management Plans of the German Länder

implementing Council Regulation (EC) No 1100/2007 of 18 September 2007

establishing measures for the recovery of the stock of European eel

for the Eider, Elbe, Ems, Meuse, Oder, Rhine, Schlei/Trave, Warnow/Peene and Weser river basins

Contents

1 Framework

1.1 Introduction

1.1.1 Trend in stock and possible reasons for the decline

The European eel is an important species for the European commercial fishery. According to Moriarty & Dekker (1997), about 25 000 people throughout Europe earn their income from eel fishing or farming.

Recruitment of glass eels in Europe has declined sharply since the end of the 1970s (e.g. FAO 2003). Compared to the very high values of the 1970s, the figures have fallen to about 1% (North Sea) to 10% (British Isles) (ICES, in prep.). There is also a slump in the yields from commercial fishing for yellow and silver eels, but to a considerably lesser extent (Ringuet et al. 2002, Dekker 2003, FAO 2003).

Some pronouncements on the trend in stocks need to be put into perspective, however. For instance, it was often to be heard that the eel ***stocks*** had fallen to 1% of their "normal" or historical size. This account has to be discounted. The figure of 1% refers only to the decline in the recruitment of glass eel and that too only in relation to the extremely high values of the 1960s and 1970s. In the case of yellow and silver eel stocks, the statistics are currently distinctly higher, on average at about 20% to 30%. In many cases, in the absence of precise stock data, commercial catches are referred to here. However, these are also influenced by general economic conditions. The rise in general costs and, for example, the keener competition though an increase in farm eel production have exacerbated these conditions. For this reason, declining eel catches are attributable at least in part too to a reduction in eel fishing as a whole. Moreover, the yellow and silver eel stocks of individual waters are influenced to very varying extents by restocking. In a study, Knights et al. (2006) also come to the conclusion that the eel stock is subject to huge fluctuations and that the present yellow and silver eel stocks are not necessarily abnormally low.

Eels are an old species and in the course of their development have had to contend with extreme, even large-scale changes to their habitat. These include geological phenomena, such as the continental drift, but also climatic changes, such as Ice Ages, for example. Whereas there is possibly a connection between the continental drift and the fascinating life cycle of the European eel and the huge differences between spawning and nursery habitats, the glaciation which affected large parts of Northern and Central Europe resulted in the present eel habits being uninhabitable for long periods. Significant fluctuations in the recruitment of juveniles have occurred in the history of the species, very likely in a purely natural way.

Eel are carnivorous and are catadromous migratory fish. At present, most of the research results indicate that the eel constitutes a panmictic population (e.g. Dannewitz et al. 2005). This is of importance for the management of the species. The life cycle of the eel is characterised by long migratory journeys in both the sea and the inland waters. It is precisely in the inland waters that the continuity of the waters is therefore of great importance to allow the colonisation of the potential eel nursery habitats and the growth of sufficiently large spawner stocks. The spawning of eel takes place in the Sargasso Sea, about 5 000 to 7 000 km from the European coasts. The time between the floating of the larvae and the arrival at the European coasts for the European eel probably amounts to about 3 years. During this time, the larvae first develop into *leptocephali*. The metamorphosis into glass eels takes place at the coast. Little is known about the living conditions of the larvae before they arrive at the coast. Precise knowledge about the routes and mechanisms of the migration from and to the spawning grounds does not exist to date. In the past, it was assumed that the majority of eels migrate into the inland waters. However, more recent

findings indicate that a considerable proportion of the population remains in the coastal waters or in brackish waters and does not ascend the rivers at all. In the Baltic, this proportion may amount to up to 80% (Wickström, personal communication).

After a largely stationary phase as yellow eels, a further metamorphosis into silver eels takes place prior to the escapement to the spawning grounds. In southern countries, the migration may already occur after about 5 years, whereas in Scandinavia it may take 25 years or more before escapement. Female silver eels have an average length of about 55-60 cm, whereas males already escape at about 35-40 cm (Tesch 1999). Depending on their body size, the females produce about 2-3 million ova. During the migration, the digestive canal starts to reduce in size and the onset of gonadal maturation occurs.

Eels colonise and cross habitats in the ocean, in brackish water and naturally also a wide variety of inland waters. The various influences on the development of the stock of the species are correspondingly multifarious.

The reasons for the sharp decline in recruitment since the early 1980s are still unclear. Various potential factors have been identified, although the relative significance of the individual causes for the decline in the recruitment of glass eel is so far not yet known.

A differentiation is possible according to various points of view. So far, it is generally assumed that the decline in the recruitment of glass eel was and/or is caused by a lack of parent eels. This approach is also at the basis of Regulation (EC) No 1100/2007. Accordingly, consideration focuses on factors which lead to mortality from the glass eel stage, i.e. primarily ***fishing*** and in particular ***the massive export of glass eels to Asia, mortality caused by power stations*** or the ***pressure of consumption by cormorants***.

A further group of factors relates not only to the quantity of the spawners but to their quality. This field covers, for example, the ***pollutant loads, diseases*** and ***infestation with parasites***.

A third explanatory approach consists in possibly sufficient parent animals spawning, but the conditions for the earliest life stages of the eels having a negative impact on the survival rates. Here therefore ***ocean-climate factors and associated indirect biological effects*** should be mentioned.

A detailed assessment of the situation of the eel population is so difficult especially because so far it has not been possible to clarify conclusively which of the various approaches to an explanation is the more important in reality. However, it seems clear that in total, factors from all groups influence the dynamics of the stock.

An in-depth discussion of the reasons for the decline is not undertaken at this point and reference is made to the many scientific publications and overviews (e.g. the reports of the EIFAC/ICES Working Group on Eels). For practical reasons, it makes sense to differentiate between oceanic-climatic factors on the one hand and continental factors on the other, with both natural and anthropogenic factors having an impact in the continental field.

Starting points for active support and promotion of the eel stocks arise in the short term only in the continental field.

1.1.2 Political and legal developments

On account of the alarming trend in the stock, the European Commission asked the scientific bodies for comments and proposals to improve the situation. The International Council for the Exploration of the Sea (ICES) then established that the eel stock is "outside safe biological limits". In view of the alarming nature of the present decline in glass eel recruitment, an urgent need for protection and management measures was concluded to guarantee sufficiently large spawner stocks (Russell & Potter 2003). The assumption of a panmictic population necessarily infers an international approach to protection of the stock. In consequence, the European Commission saw itself forced to take action.

It first presented a programme on the "development of a Community Action Plan for the management of European eel". As a follow-up, consultations were carried out with representatives of the Member States and the various associations. In October 2005, the Commission then presented a first draft "*Council Regulation establishing measures for the recovery of the stock of European eel*", the adaptation of which was the subject of discussion over a protracted period. Under the German Council Presidency, a technical agreement was finally reached in June 2007; the formal adoption of the Regulation took place in autumn 2007 ("Regulation establishing measures for the recovery of the stock of European eel", Council Regulation (EC) No 1100/2007). The recitals to the Regulation state that both the protection and sustainable use of the population of eel are strived for.

The objective of the Regulation, which applies to both inland waters and EU maritime waters is to permit the escapement of 40% of adult eels measured in terms of the situation without anthropogenic influences. To ensure this, all Member States are to present Eel Management Plans for the relevant waters. The plans are not to be drawn up for each individual river, but where possible relate to the river basin districts established in the context of the implementation of the European Water Framework Directive (2000/60/EC).

On the basis of scientific observations, the European Commission adopts the standpoint that in the Black Sea and its tributaries the eel is at the extreme limit of its natural distribution area and its natural presence is only sporadic. The preparation of management plans for these waters would represent a considerable financial burden and would be of negligible benefit to the stock. This Decision was taken by the Commission on 4 April 2008 (C(2008) 1217 final). For Germany, this means that no Eel Management Plan is to be drawn up for the "Danube" River Basin District, since the Danube is not the subject of Regulation (EC) No 1100/2007 according to Article 1.

1.1.3 Eel fishery in Germany – legal bases

On account of Germany's federal structure, fisheries are regulated in the Land Fisheries Acts. The regulatory principle is standard that the appropriation of unowned fish is regulated exclusively by means of a right equivalent to ownership in the form of fishing rights.

Such a fishing right requires the maintenance, promotion and management of a fish stock corresponding to the size and nature of the respective waters in a semi-natural species variety.

The fishing licences issued on the basis of the fishing rights or by means of the leasing of rights to exploit a fishery granted permit the sustainable exploitation of the fish stocks in all river basins in Germany and are therefore the only legal requirement for catching and therefore the appropriation of fish.

1.1.4 Eel fishery in Germany – yield and significance

The eel is an important species for the fisheries sector in Germany. Especially in the North German inland fishery, a substantial proportion of the financial yield is obtained from eels.

According to a study by the Institut für Binnenfischerei e.V. Potsdam-Sacrow, the eel accounts for a 56% share of the market output in the commercial fishery of Brandenburg and is therefore, economically speaking, the decisive factor in the yield from own catches (Knösche et al. 2005). In Berlin, in 2007 the eel accounted for 42% of the proceeds from own fishing without processing; the proportion of processed eel products in the proceeds from commercial fishing are far higher (Jürgensen, Fischereiamt Berlin, oral communication). In Mecklenburg-Western Pomerania, despite the decline in yield, the eel has in recent years been the most important fish species exploited in inland fisheries, with a share of about 30% in the total yield. In 1992, the share in the total yield of the inland fisheries was still over 50% (anonymous 1994-2005). However, in small-scale cutter and coastal fisheries too, despite the smaller share of about 0.5% of the total landings, about 7% of the total yield was obtained from eel (anonymous 2001-2007). These examples show that the economic viability of the undertakings is to a large extent secured by the eel fishery. Compared to other fish species, it obtains by far the highest selling price and records a permanent high demand.

In Germany, the fishery focuses mostly on yellow and silver eel. Fyke nets in various shapes and sizes are the main fishing gear used by commercial fishers for eel. These also include the widespread use of eel pots. To a limited extent, dip nets and eel schokkers are also used specifically for eel. In the coastal waters, longlining is also significant. Anglers are authorised to catch eel by means of pole-and-line fishing and also regionally with small fyke nets.

The yield from eel of the German inland fishery has fallen in the past 15 years by about 50%, with no further decline being recorded in the past 4 years (Table 1). According to the statistics, it now amounts to just under 200 tonnes per year. The fact that at least the present level could be maintained is primarily attributable to restocking.

In the coastal fishery, yield has fallen sharply since the 1970s. Whereas in the North Sea area in the 1960s and 1970s eel yields of about 200 to 300 tonnes per year were reported (Aker & Koops 1974), the catches in the past ten years stood at about 20-40 tonnes (Wysujack & Ingendahl 2007) and in 2007 at 24 tonnes. However, this was caused by a decline in the fishing intensity. For instance, in the North Sea there was intermittent trawling for eels, which in the meantime has been stopped, which at times accounted for 50% of the yields. Whereas in the 1960s and 1970s consequently both genuine coastal waters and the lower reaches of the North Sea rivers contributed to the yields of the coastal fishery, fishing today still takes place only in the area of the transitional waters (lower reaches of the rivers).

The eel fishery is still very important in the coastal waters of the Baltic. For Schleswig-Holstein and Mecklenburg-Western Pomerania together in recent years, for instance, catches of 100-130 tonnes of eel per year were reported (Wysujack 2008). However, this too represents a clear reduction compared to the 1970s. In 2007, according to the statistics, the catches amounted to 87 tonnes. In the Baltic too, trawling for eel has in the meantime been discontinued.

The annual quantities of eel produced from aquaculture (Table 2) have remained relatively constant in recent years at about 350-400 tonnes. In 2006 and 2007, however, a clear increase in production to 740 tonnes was observed. The increase in production of advanced farm eels for restocking purposes was primarily responsible for this.

Table 1: Eel yields from the German inland fishery since 1995 (Source: Annual reports on the German inland fishery)

Year	Eel yield (tonnes)
1995	369.3
1996	300.2
1997	280.7
1998	251.9
1999	261.0
2000	276.4
2001	239.3
2002	236.9
2003	170.9
2004	168.6
2005	174.4
2006	185.6
2007	206.0

Table 2 Production of eels in the recirculatory systems in Germany

Year	Production (tonnes)
1995	186
1996	204
1997	221
1998	approx. 260
1999	approx. 400
2000	422
2001	347
2002	381
2003	372
2004	328
2005	329
2006	567
2007	740 (of which 300 tonnes of advanced farm eels for restocking)

The eel is very highly appreciated for pole-and-line fishing too. It is to be assumed that the catches at least regionally are in the same order of magnitude as the yields from the commercial fishery. However it is to be emphasised that the participation of the angler clubs in the restocking is very significant and therefore they also contribute to the management of the stock.

Carrying out restocking has already long been a key component of eel stock management. In some areas, there is evidence that these go back right to the 1870s (Anonymous, 1935; Meyer, 1951). In particular at the time of the very high recruitment of glass eel in the 1950s to 1970s, large quantities of glass eel were used for restocking in order to support the natural ascent by eel which had been impeded through the increasing waterway construction and obstruction, but also to exploit the production capacity of the waters. Glass eel prices were very low at this time, whereas good prices could be obtained for eel for consumption. These restocking measures compensated for the reduced upstream migration on account of the river obstruction, but at the same time served to ensure and/or increase the fishing yield.

In Germany, the eel stocks have been supported by restocking in watercourses too for over 100 years.

Despite the enormous hike in the prices for glass eel in recent years to up to EUR 1 000 per kg, restocking with eel still took place in Germany at a significant level. In total, in 2007, abut 13.5 million eels of varying sizes were used for restocking. Details are to be found in the following plans of the individual river basin districts. Investigations by Brämick et al. (2006) showed that in the Havel river basin (Elbe River Basin District) in past years about six times as many eels were restocked as those migrating upstream naturally as a result of the declining recruitment of glass eel at the coast. This emphasises the importance of the restocking and thereby also attests to the importance of the fishery for maintaining the eel stocks in the German inland waters.

On account of the sharp decline in the occurrence of glass and ascending eels, in the Elbe river basin for example, already before the adoption of Regulation (EC) No 1100/2007, a pilot project was launched to increase the eel spawner stock. Under this project, a considerable increase in the restocking was achieved, with funding from FIFG resources, participation from the public budgets of the Länder concerned and own funds of commercial and pole-and-line fisheries. Details are presented in the Management Plan of the Elbe River Basin District.

In 2007, in support of the stock, about 13.5 million eels of various sizes costing approximately EUR 4 million were restocked in Germany.

1.2 National implementation of Regulation (EC) No 1100/2007

In reaction to the EU activities, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) already set up a Federal and Länder Eel Working Group, in which representatives from the administration, academic circles, associations and practitioners cooperate. This Working Group has met regularly and at an early stage embarked on the preparation of the Management Plans. As a result, it was possible to draw up a sufficient database and scientific basis to carry out the stocktaking and the management recommendations and to discuss the situation and problems together with practitioners and the administration.

The preparation of the Eel Management Plans is also to be seen in connection with the **listing of the eel in Appendix II to the Convention on International Trade in Endangered Species (CITES)**. Both Regulation (EC) No 1100/2007 and the listing in Appendix II to CITES aim to protect the eel and to avoid activities detrimental to the stock. The new legal position will above all also bring about an improvement in the data situation on the eel, since both fishing data and trade movements will be recorded more precisely.

The implementation of the Eel Regulation requires some control mechanisms (recording of the fishing undertakings and persons first placing the eel on the market, guarantee of the traceability of imported and exported eels), which the implementation of CITES can also facilitate. Synergies arise here which can be used to the benefit of the eel stock.

The object of the Management Plans is both to protect the eel stock and also to maintain the eel fishery. On the basis of the available data and information, the stock was taken of the eel population in the plans. The results are used to assess the situation and to make forecasts for the future development of the stocks. This procedure enables the difficult balance to be achieved between protection of the species and at the same time maintaining the fishery.

This document summarises the content of the Eel Management Plans for the nine German river basin districts. The plans of the respective river basin districts include self-contained stocktaking of the eel population and descriptions of the waters and the measures to be introduced. General questions and common situations applying to all participating Länder are presented in the general part (framework). This summary part also represents the overall escapement balance.

The European Commission guidance for the preparation of Eel Management Plans was taken into consideration.

In accordance with Regulation (EC) No 1100/2007, Eel Management Plans were drawn up in the Länder for the natural eel river basins in order to stabilise and replenish the eel stock and at the same time to ensure sustainable management of the stock.

On the basis of the strived-for link with the European Water Framework Directive, Eel Management Plans for Germany were drawn up for the following river basin districts, which follow this introductory section as individual plans (Fig. 1):

a) Eider
b) Elbe
c) Ems
d) Meuse
e) Oder
f) Rhine
g) Schlei/Trave
h) Warnow/Peene
i) Weser

River Basin Districts in the Federal Republic of Germany
(Directive 2000/60/EC – Water Framework Directive)

The marking and identification of the parts of international river basin districts located outside the boundaries of the Federal Republic of Germany serve merely as illustration and do not affect stipulations by other States or international agreements.

Basis of the map:
Länderarbeitsgemeinschaft Wasser (Länder Working Group on Water Problems - LAWA)
Bundesamt für Kartographie und Geodäsie (Federal Agency for Cartography and Geodesy - BKG)

Source: Umweltbundesamt (Federal Environment Agency), June 2004

Fig. 1: Map of the river basin districts in Germany (Source: Umweltbundesamt (Federal Environment Agency)

1.3 Water power utilisation and Eel Management Plans

Undoubtedly the eel stock in the inland waters is also subject to various in some cases significant negative influences through non-fisheries-related factors. Mention should be made here first and foremost of transverse structures, including hydroelectric power stations, cooling-water intakes and pumping stations, as well as increased consumption pressure from an enormously increased cormorant population. The attempt was therefore made to make improvements, especially concerning "mortality caused by hydroelectric power stations" and dialogue was sought with the power station operators. Since this was initially coordinated at Federal level, an overview on the subject is given below.

In the light of the current debates on climate protection and climate change, electricity generation from renewable sources is becoming increasingly important. Within the renewable energies, the use of water power is very important. In Germany, the share of water power in total generation is about 3.5% (21.6 GWh, situation 2006). As a result, hydroelectricity in Germany currently accounts for the second highest share of electricity generation among the renewable energies after wind power. On the one hand, it is a renewable and virtually emission-free form of electricity generation, with relatively high efficiency and the possibility of producing electricity to ensure the baseload in line with demand. On the other hand, however, the use of hydroelectricity is often associated with considerable interference with nature and the landscape. The assessment of hydroelectricity consequently requires differentiated weighing-up between the interests of climate, nature and water protection. In particular, the reduced continuity of the waters for long-distance migratory fish, such as salmon and eel, is recognised as a pressing problem.

In Germany, there are currently about 7 700 hydroelectric power stations. It is to be assumed that all installations are located at one of the approximately 55 000 transverse structures currently recorded. In this respect, 90-92% of the hydroelectricity is generated by 355 installations with output in excess of 1 MW and the remaining 8-10% by about 7 300 small power stations. Total installed capacity in Germany amounts to about 4 700 MW, of which 3 420 MW with power rating in excess of 5 MW.

Transverse structures often cause considerable ecological changes in the water. This relates to both abiotic factors (temperature, oxygen conditions, current conditions, substrate properties, etc.) and changes to the biological communities caused by them. Whereas there are now many efficient solutions and concepts for the upstream migration of fish at transverse structures (although still not all transverse structures by far are equipped with functioning fish passage facilities), there is still enormous potential for improvement for downstream migration of fish. The sometimes very high fish mortalities at power station turbines have in the meantime been documented in many studies and are indisputable. The degree of damage in this respect depends on various factors (including type of turbine, fish size, velocity), so it is not possible to indicate a universal value. However, there are overviews which document the range of injury rates (e.g. ICES 2003) and which indicate a range of 20-60% of injured or killed eels per turbine passage as being possible.

Remuneration for electricity from hydroelectric power stations is regulated by the "Act on the reorganisation of the law on renewable energies in the electricity sector and amending related provisions of 25.10.2008" (*Gesetz zur Neuregelung des Rechts der Erneuerbaren Energien im Strombereich und zur Änderung damit zusammenhängender Vorschriften vom 25.10.2008)* (EEG). The Act provides that only electricity from such installations which are ecologically sustainable is remunerated under the EEG. According to Section 23, the remuneration under the EEG is confined to cases where "demonstrably a good ecological status is achieved or the ecological status is essentially improved compared to the previous status."

Hydroelectric power has already reached a high level of development in Germany. The installations are naturally not distributed evenly, but are concentrated in waters which are particularly suitable. For instance, the use of hydroelectricity in the North German Plain has so far played a secondary role, whereas waters in the southern regions, such as the Main, the Neckar or the Moselle, are very heavily used and compromised.

The use of renewable energies and therefore of hydroelectric power nevertheless has a high political priority. It is consequently not to be expected that the use of hydroelectric power will be subject in the foreseeable future to particularly heavy restrictions or requirements in relation to damage to migratory fish. The fisheries industry must face up to these facts including in relation to the Eel Management Plans.

The use of hydroelectricity can result in negative ecological effects for the waters. However in connection with the current debate on climate protection and climate change, the use of renewable sources of energy has a high political priority, so further development of the use of hydroelectricity is likely.

For this reason, at the request of the Länder under the lead of the BMELV in the context of drawing up the Eel Management Plans, dialogue was sought with the hydroelectric power station operators. In connection with these talks, the four largest firms operating hydroelectric power stations (E.ON, RWE, Vattenfall, EnBW), acting as an association (BdEW), have in principle recognised their responsibility in this context and declared that they are prepared to cooperate actively. A corresponding position paper is enclosed as Annex 1.

Since really efficient technical possibilities can only be implemented with difficulty or in practice not at all at large installations and precise prediction of migration peaks is not yet possible, in the short term solutions such as “Trap & Truck” are favoured. Building on the position paper, in future corresponding detailed solutions will be sought at local and regional levels and the corresponding projects will be initiated. However, it is clear that this requires a certain time and the start of the first projects will not be possible before 2009 at the earliest.

When planning and carrying out such projects, it is possible to benefit from the positive experience of a project on the Moselle, where such a project has already been carried out successfully since 1994 with a budget of currently about EUR 200 000 to 300 000 per year. These funds made available by RWE are used for restocking, “Trap & Truck” and research projects. In the context of this initiative, it has been possible to maintain the commercial fishery in this area and to trap several tonnes of silver eel per year in front of the transverse structures and to transport them to water areas not compromised by turbines.

A brief description of the Moselle Eel Protection Initiative is appended as Annex 2.

The Federal Ministry of Food, Agriculture and Consumer Protection has conducted talks between fisheries authorities of the Länder and the major hydroelectric power station operators, during which the energy firms accepted to cooperate actively in the protection of the eel. In this respect, the hydroelectric power station operators favour “Trap & Truck” projects at priority waters in the short term.

1.4 Brief description of the eel stock model used

The decisive reference figure of the Regulation is the escaping silver eel biomass. However, silver eel escapement data were not available or only as estimates (e.g. Rhine; Klein Breteler et al. 2007, Ingendahl et al. 2008). For this reason, the development of a suitable stock

model was necessary to estimate the escapement and the trend in the eel stock in the German waters.

This model was developed in cooperation between the Institut für Binnenfischerei e.V. Potsdam-Sacrow and the Institut für Ostseefischerei of the Johann Heinrich von Thünen-Institut (vTI; Bundesforschungsinstitut für Ländliche Räume, Wald und Fischerei). The model was adapted and applied for most of the river basin districts. Only in the Eider and Schlei/Trave river basin districts was the database insufficient for the use of this model on account of the inclusion of the coastal waters pursuant to Directive 2000/60/EC, so the escapement of silver eels for these waters was calculated according to a different method (in this respect, see comments on the monitoring). The method used for these waters is described in the respective plans.

The aim was an age-based model which describes the stock dynamics of the eel stock as a number per year group. To include the most significant factors for the development of the stock, natural upstream migration, restocking, natural mortality, commercial and recreational fishing, eel catches by cormorants, mortality at hydroelectric power stations and the growth of the eel and metamorphosis from yellow to silver eel are considered in the model. Various simplifying assumptions were necessary for this.

Basic structure of the model

On the basis of the stock input parameters of natural upstream migration and restocking, an estimate was made of the quantity of silver eel escapement on the basis of numbers of eels considering various mortality factors. The conversion to biomass takes place by means of a length-to-weight ratio which was determined using eels from the Havel.

The calculation is undertaken by year group and separately for all eel age groups. Starting from the size of the stock at the start of a year (old stock from the previous year + natural upstream migration + restocking), the number of eels lost (natural mortality, commercial fishing, anglers, cormorants, hydroelectric power stations, silver eel escapement) is subtracted. The resulting final stock at the same time represents the initial stock for the following year.

On account of the lack of detailed data, it is assumed that the fishing mortality (commercial fishers + anglers) exclusively affects yellow eel, i.e. silver eel catches of a year group are treated in the same way as yellow eel catches of the same year group. Furthermore, it is assumed that the hydroelectric power station mortality affects escaping silver eels only. Yellow eels are affected to such a minor extent that they can be disregarded.

Both are assumptions which are not entirely correct. In both cases, however, the proportions of the silver or yellow eel concerned are not known precisely at present so the assumptions described were necessary. Ad hoc investigations into these aspects could in future lead to more exact modelling. However, since the effects cancel out at least in part, these assumptions are reasonable and justifiable with the present data situation.

The model assumes, for simplification, a life stage of the eel in freshwater of a maximum of 20 years. To estimate the current silver eel escapement (2005-2007), it runs from 1985 to 2007 and can subsequently also be used to calculate forecasts.

The metamorphosis from yellow to silver eel is described by a mathematical formula. Male eels are recorded and considered in the model insofar as a small percentage of the eels in the length category of 32-45 cm turn silver and escape. For simplification, it is assumed that males grow as quickly as females and in principle are subject to the same mortality factors.

The potential influence of diseases (e.g. HVA, EVEX) and parasitical infestation (e.g. *Anguillicola crassus*) on the survival rate and ability to reproduce of the eel is disregarded in the model. No empirical data are available on this subject.

The model consists of individual data sheets for which the following particulars are necessary:

Recruitment

- Number of the ascending eels migrating naturally upstream per year in relation to the respective river basin district (where necessary with the help of recalculations)
- Length frequency distribution of the ascending eels migrating naturally upstream (where necessary an average value or data from other waters)
- Number of eels restocked in relation to the respective river basin district (broken down by size of fish for restocking: glass eels (Ao), advanced farm eels (Av) and bootlaces (As)).

Natural mortality

- The natural mortality was selected with reference to Dekker (2000). It was assumed there to be constant at about 13% (corresponding to M=0.14) over the entire lifespan. Since for eels, density-related mortality exists, it must be assumed that the natural mortality was higher with the high densities of the reference situation than at the present time. There are few quantitative pronouncements on the subject. Published data from Lough Neagh, Northern Ireland (ICES 2008, and R. Rosell, personal communication) indicate however that the difference regarding the local stocking density could stand at about 2-4% annual mortality. For this reason, depending on the data available, a sliding adjustment of natural mortality was included depending on the stock density (Elbe; about 14% reference to about 11% today) or a graduated adjustment (other river basin districts in which the model was used; 14% reference, 13% transitional period in the 1990s, 12% today). Details are given in the respective stocktaking.

Mortality caused by professional fishing

- Total catch in kg per year in relation to the respective river basin district.

Mortality caused by anglers

Either
- Number of anglers in relation to the respective river basin district
- Standard catch in kg per angler and per year (existing data or data from other waters

Or
- Total catch in kg in relation to the respective river basin district (e.g. from catch statistics).

Mortality caused by cormorants

- Number of breeding pairs in relation to the respective river basin district
- Number of chicks per breeding pair (known value, estimate or data from another district)

- Number of overwintering breeding birds in relation to the respective river basin district (known value or estimate)
- Number of non-breeders within the colonies in relation to the respective river basin district (known value or estimate)
- Number of non-breeders outside the colonies in relation to the respective river basin district (known value or estimate)
- Number of migrants/resting birds in relation to the respective river basin district
- Length of stay of the aforementioned cormorant sub-populations (known value, estimate or data from another district)
- Proportion of eel in the cormorant diet (known value, estimate or data from another district)
- Length-frequency distribution of eels in the cormorant diet (known distribution or data from another district)

Mortality caused by hydroelectric power stations

- Mortality rate in % at the respective location for the years concerned (known value or estimate)
- Total water area above the respective location (eel river basin)
- With these data, it is possible to indicate the area percentages which are subject to a certain mortality caused by hydroelectric power stations and also to estimate the effects of improvements at individual locations

Silver eel escapement

- Length-frequency distribution of the escaping silver eel (own data or data from other waters)

The “results” data sheet will record the individual mortalities and the escaping quantity of silver eels for each individual year in both numbers and biomass.

Forecast function and recalculation

The model offers the possibility to present the trend in the stock in the case of modifications of input parameters (forecast function). This allows the effectiveness of various management measures to be examined. For example, the following simulations are possible:

- Increase in the restocking amount and/or changes in the size of fish used for restocking
- Change in the natural upstream migration of eel
- Reduction in the catches by fishers and/or anglers (e.g. as a result of closed seasons, limited issue of angling permits)
- Increase in the minimum size, introduction of a maximum size for the fishery (commercial fishers and anglers)
- Introduction of a restriction on catches for anglers (reduction in the unit catch)
- Reduction of the cormorant population (broken down by breeding pairs, migrants, non-breeders, etc. possible)
- Change in the proportion of eel in the cormorant diet (e.g. in coastal waters)
- Change in the mortality caused by hydroelectric power stations.

Since separate starting data are available for each year and all age groups (in numbers), the possibility also exists of modelling the starting stocks. This may be important especially in cases of paucity or non-existence of data on recruitment for specific times.

The model can also be used to calculate the reference value if in the case of known or plausibly derived recruitment figures the anthropogenic mortality factors are eliminated. With the exception of the Schlei/Trave and Eider River Basin Districts, this procedure was used by the German river basin districts to ascertain the reference value.

The reference values for the recruitment were ascertained by linking known up-to-date figures with the data on the trend in the glass eel or ascending eel index since the 1970s.

For the coastal waters of the Warnow/Peene River Basin District, the recruitment currently becoming effective in the catch was recalculated using the model and subsequently also linked to the trend in the recruitment index for the Baltic.

The use of the model to ascertain the reference value has the advantage that for both periods (reference 1970s and current situation) the same model structure was used with known or at least justifiably estimated variations of individual influential factors.

Plausibility check

The model provides various control values which are suitable for comparison with field data. The more estimates from field data available, the better the starting values of the model can be adapted and substantiated.

If data are missing for particular points, a qualified and justifiable estimate must be made ("best estimate" in accordance with Article 2(4) of Regulation (EC) No 1100/2007).

In the model random variations are incorporated which allow pronouncements to be made on possible ranges of parameters and therefore on the robustness of the model. At present, the random variations are set at a very low level (near zero) in order to allow the precise calculation of values.

The model developed for the Elbe, for example, is submitted for publication in a scientific journal. This manuscript (Oeberst et al., in preparation) is appended as Annex 3 and contains the mathematical formulas used and a precise description of the model.

1.5 Overall stocktaking of the silver eel escapement from the eel river basins of German waters

The stocktaking carried out shows that the eel population in the German waters and the escapement of silver eels have declined sharply compared to the reference situation. However, this decline is less marked than possibly might have been expected on the basis of the dramatic decline in glass eel recruitment. At present, in most river basin districts the required escapement rates are achieved and exceeded.

The reference values calculated (100%) for the escapement of silver eels under uninfluenced conditions range from 6.9-9.5 kg/hectare for the Ems, Weser, Elbe and Eider Rivers (inland and transitional waters) flowing into the North Sea to 1.9-2.8 kg/hectares for the river basin districts which flow into the Baltic (Schlei/Trave, Warnow/Peene, Oder – inland and coastal waters). For the Rhine and Meuse River Basin Districts, a value of 4.2 kg/hectare was calculated. The difference in this value compared to the other rivers discharging into the North Sea is attributable to the fact that in both rivers the typically high eel yields and densities brought by the waters near the coast are not contained in the German stocktaking. Instead, especially in the case of the Rhine, waters very distant from the coast are included that are naturally characterised by a considerably lesser upstream migration of eels. The

differences between the North Sea and the Baltic river systems are plausible, since they reflect a distinctly lesser upstream migration of eels in the Baltic area.

Table 3: Summary of the stocktaking of silver eel escapement from the individual river basin districts and overall stocktaking

River Basin District	Detail	Reference 100%	Target 40%	Current escapement (average 2005-2007)
Eider	Inland waters	91 tonnes	36 tonnes	37 tonnes (41%)
	Coastal waters	149 tonnes	59 tonnes	90 tonnes (60%)
Elbe	Inland and transitional waters	1381 tonnes	552 tonnes	425 tonnes (31%)
Ems	Inland and transitional waters	406 tonnes	162 tonnes	284 tonnes (70%)
Meuse	Inland waters	4 tonnes	2 tonnes	0 tonnes (1%)
Oder	Inland and transitional waters	195 tonnes	78 tonnes	100 tonnes (51%)
Rhine	Inland waters	252 tonnes	101 tonnes	173 tonnes (68%)
Schlei/Trave	Inland waters	200 tonnes	80 tonnes	66 tonnes (33%)
	Coastal waters	441 tonnes	176 tonnes	292 tonnes (66%)
Warnow/Peene	Inland waters	73 tonnes	29 tonnes	20 tonnes (28%)
	Coastal waters	961 tonnes	384 tonnes	802 tonnes (84%)
Weser	Inland and transitional waters	424 tonnes	169 tonnes	261 tonnes (62%)
Total		**4 573 tonnes**	**1 826 tonnes**	**2 550 tonnes (56%)**

The stocktaking in the individual river basin districts also allows a rough overall presentation of all sources of mortality. Accordingly, commercial fishing (inland and coastal fishing) accounts for about 470 tonnes and recreational fishing about 390 tonnes per year. Only just below this or at a comparable level, however, there are the mortalities caused by technical installations (hydroelectric power stations, cooling-water intakes) with about 390 tonnes and consumption by cormorants at 340 tonnes.

On the other hand, there are enormous restocking measures. According to the information in the individual plans, in Germany in 2007 about 7.4 million glass eels, 4.9 million advanced farm eels and 1.1 million bootlaces were restocked in the waters, i.e. some 13.5 million eels in total.

In the overall stocktaking for the German inland and coastal waters considered in the plans, the escapement measured as the best estimate with no influence stands at 56%. This is attributable essentially to the restocking measures carried out at a high level for many years. With the exception of the coastal waters and some inland waters near the coast, restocking with eel occurred almost comprehensively. Both the commercial and recreational fishers are involved in this. In addition, there is now considerable assistance from public funds. Moreover, funds are paid as compensation by the hydroelectric power station operators which are also used for restocking. Without this restocking, a sufficient recruitment to the waters by the eels even with “normal” natural upstream migration would have become impossible given the some 55 000 transverse structures.

Related to Germany as a whole, the current silver eel escapement at 56% of the reference situation currently exceeds the target escapement rate of 40%.

1.6 Monitoring – general aspects

At this point, a general overview will be given and classification of the measures in the context of Germany as a whole, as well as research initiatives of the Federal Government to clarify open questions.

Special aspects concerning the monitoring in individual river basin districts are dealt with in the individual plans, at least where activities beyond the points described here are planned.

The stocktaking of the eel population and the escapement rates presented are model calculations. These are based in part on known data from the respective river basins, in part on data from the specialised literature and in part on assumptions and generalisations. In future, these model assumptions and results must be examined and the models adapted where necessary. For this purpose, monitoring of various parameters is necessary. On account of the enormous areas and the very different geographical conditions, this is not possible comprehensively. In particular, silver eel monitoring in the lower reaches of the major rivers is extremely difficult and at present not yet practicable. Comprehensive silver eel monitoring will consequently not be possible.

1.6.1 Glass eel and ascending eel monitoring

It is planned to continue the existing projects for the monitoring of ascending eels (e.g. in the Warnow/Peene, Oder, Ems and Elbe River Basin Districts) and where possible to open up still further monitoring stations. In Schleswig-Holstein, a budget has been applied to carry out monitoring of ascending eels from 2010.

1.6.2 Yellow eel monitoring

Yellow eel monitoring programmes are currently under way in two North German canals and in seven Brandenburg lakes. In Schleswig-Holstein, a budget has been applied for from 2010 for yellow eel monitoring in selected waters. In the context of restocking with public aid, a survey of the yellow eel stocks in the Meuse tributaries is to be conducted in North Rhine-Westphalia.

1.6.3 Silver eel monitoring

At some waters, studies were and at present are being carried out on the escapement of silver eel. An international project has been running for some time on the Rhine to record migration of different fish species, including eels, by means of radio-telemetric investigations which were also combined with colour markings (Klein Breteler et al. 2007; Ingendahl et al. 2008). In the Havel (Elbe River Basin District), the Institut für Binnenfischerei e.V. Potsdam-Sacrow launched a study with hydroacoustic transponders. Here too, colour markings are also used in accompaniment. In the Warnow (Warnow/Peene River Basin District), silver eel monitoring on a basis unrelated to fishing has been started up. The catches from a dip net operated by the Fisheries Institute of the Land Agriculture and Fisheries Research Institute of Mecklenburg-Western Pomerania are evaluated under a colour marking experiment. The intention is to work with hydro-acoustic transponders in these waters too in 2009 and as a result to obtain still more detailed information. However, approval of the funding for this study has not yet been granted.

1.6.4 Monitoring in coastal waters

In the coastal waters of Mecklenburg-Western Pomerania (Baltic, Warnow/Peene River Basin District), a monitoring system is to be developed under which randomly selected, defined areas are to be fished with a fixed fishing gear combination (with reference to the ICES International Young Fish Survey). As a result, knowledge of the eel stock in the coastal waters is to be improved, which if possible will also provide information on the stocking density. The preliminary work is currently under way, which means that the first results could already be available in 2009.

However, the planned investigations in Mecklenburg-Western Pomerania are only a first approach to this problem. In general it is to be noted that so far no convincing methodological approaches exist to survey eel stocks in coastal waters with regard to habitat and quantity. Therefore at present no comprehensive monitoring projects can be planned either. It would be desirable for the European Commission to take up this problem with the scientific advisory bodies available to it and provide technical assistance in this respect. This corresponds to the view of the EIFAC/ICES Working Group on Eels, which supports the establishment of a "Study Group on anguilid eels in saline (brackish/salt) waters" (ICES in preparation). The ICES has planned a first workshop on this subject in 2009 so that potentially scientific progress is to be expected in this respect.

In the 1970s, the Federal Fisheries Research Institute of the time made estimates of the size of the eel stock in German Bight (North Sea). At present, the Institute for Fisheries Ecology of the vTI (Federal research institute) is examining the extent to which these investigations can be repeated to allow a comparison of the stock density at that time with the present in the German Bight area. Its results could be included in the first report in 2012. In particular, they would serve to check the figures from the coastal waters which are very important in terms of area. Since the earlier investigations took place precisely in the period used to determine the reference situation, a direct comparison of the reference situation with the status quo would also be possible.

1.6.5 Future projects to determine sources of mortality

In the coming years, the mortality factors with an impact on the eel stock will be analysed comprehensively in two inland sub-basins by way of an example. The Federal Agriculture and Food Agency approved funding in 2008 amounting to **EUR 394 024** and **EUR 313 289** for two projects. The project results will help to check the assumptions contained in the model calculations and in this way lead to an improvement and back-up to the stocktaking in the future. At the same time it will be possible through this to check the model results which will allow the development of indicators relatively simple to establish for the trend in the stock and the level of escapement of eels.

The silver eel monitoring is of particular importance as it focuses directly on the target set in the Regulation, i.e. the quantity of escaping silver eels. On the basis of the expected results, the model is to be improved and the assumptions, as far as possible, replaced by more precise data. Through investigations, some of which require considerable effort and are cost-intensive, the attempt is to be made to determine indicators for the silver eel escapement which can be determined more easily and more economically in the future.

1.6.6 Link with the European data collection programme

From 2009, under the EU data collection programme in the context of the common fisheries policy, it will also be compulsory to collect data on the eel fishery in inland waters (Council Regulation (EC) No 199/2008, Commission Regulation (EC) No 665/2008 (implementing Regulation) and Commission Decision 2008/XXX/EC (publication in the Official Journal

shortly) – these are the successor Regulations to those indicated in point 4.3 of the Guidance Document). This includes both fishing and biological data. To meet these requirements, in 2009 a scientist will be recruited for an 18-month period at the Johann Heinrich von Thünen-Institut (vTI), Federal Rural Area, Forestry and Fisheries Research Institute; Institute for Fisheries Ecology. As a result, it will be ensured that the necessary sampling and data collection are carried out in full. In connection with the more detailed catch statistics of the fishing undertakings, the information to be gathered on the fishing effort and the results of other research projects, the data will bring about a considerable improvement in the data situation which will be reflected in the first report in 2012. The basis for the modelling of the stock dynamics will improve substantially as a result. For example, more detailed results on the growth of eels in the individual River Basin Districts will be available which can replace the hitherto necessary use of data from other river basins.

Comprehensive silver eel monitoring will not be possible either now or in the foreseeable future. At present and in the coming years, however, considerable efforts will be made to improve the database for the modelling of the stock dynamics of the eel stocks and the silver eel escapement. At the same time, the development of easily ascertainable indicators for the silver eel escapement at individual waters will be strived for by means of studies at these waters. This will in future allow ongoing checking of the results of the modelling.

1.7 Control and enforcement

Regulation (EC) No 1100/2007 requires Member States to establish a control and catch monitoring system (Article 10). This is to be consistent with the provisions of Regulation (EEC) No 2847/93, which lays down the documentation and control system for sea fishing under the common fisheries policy of the EU. The provisions are however to be adapted to the conditions prevailing in the inland fisheries.

On account of the federal structure of Germany, the responsibility for drawing up and implementing the legal provisions lies with the respective Länder. The control and enforcement measures called for in Regulation (EC) No 1100/2007 are implemented in the Länder in a comparable but not necessarily identical form.

A comprehensive presentation of the intended regulations is presented for the Land of Mecklenburg-Western Pomerania in the Management Plan for the Warnow/Peene River Basin District. The documents and forms attached as Annexes thereto are however Land-specific. (They are attached as Annexes once again here *as examples*: Annexes 4-8). These measures are managed in a similar or the same way by the Länder. To meet the requirements, the fishing undertakings are to keep monthly statistics on their eel catches. This is considered as implementation of Regulation (EEC) No 2847/93 adapted to the conditions of inland fishing.

In connection with these statistics, the fishing effort is also to be indicated. This takes account of Article 9 of Regulation (EC) No 1100/2007, which requires the fishing effort to be recorded.

On the basis of the CITES listing of the eel, a ledger for outgoing invoices is to be drawn up and kept in which the sales to commercial retailers are documented. Article 11 of Regulation (EC) No 1100/2007 provides for the registration of all fishing undertakings, their fishing vessels and the persons undertaking the first marketing. This registration is carried out by all Land authorities. However, differences in the formal procedure are possible.

In accordance with Regulation (EC) No 1100/2007, the resulting list of undertakings and their fishing vessels will be submitted to the European Commission on request.

Furthermore, the Länder have to introduce accompanying documents on the sale (apart from sale to end consumers) and transport of eel. This document is to stipulate, inter alia, the registration number of the selling undertaking. This is to allow verification of whether the fish originate from a registered undertaking and are caught under an Eel Management Plan. As a result, reference to the implementation of the CITES listing is also made. No later than 1 July 2009, the responsible institutions are to take all the measures necessary to be able to identify the origin of imported and exported eels, in accordance with Article 12 of Regulation (EC) No 1100/2007. Talks have taken place on this subject between representatives of the Federal Ministries concerned (Federal Ministry for Food, Agriculture and Consumer Protection, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) and the fisheries administrations of the Länder.

Through the abovementioned registrations of the fishing undertakings and the introduction of relevant accompanying documents, the identification of origin is guaranteed for eels caught in Germany. On import from European Community Member States into Germany, however, there is only a limited possibility for control. Here, it is necessary to rely on comparable arrangements being made in the other States permitting identification of the origin.

The fisheries authorities of the Länder carry out the necessary control and enforcement measures to meet the requirements of Regulation (EC) No 1100/2007. This will ensure sustainable fisheries and compliance with the legislation.

1.8 Modification or adjustment of the Eel Management Plans

In accordance with point 7 of the Guidance Document, the Eel Management Plans may be revised and adjusted if new findings arise concerning the stock situation or on the effectiveness of the management measures concerning the attainment of the target for silver eel escapement.

1.9 Summary and final observations

The following unanimous decision was taken at the meeting of the Länder and Federal fisheries advisers on 5 and 6 November 2008 in Berlin in case the 40% escapement rate is not met.

A list of measure options is integrated in the Eel Management Plans which will be implemented by the Länder in the event of failure to meet the 40% silver eel escapement rate.

List of measures (different according to the river basin):

1) Maintain and, where appropriate, increase restocking measures

2) Increase minimum size to 45 cm (or 50 cm respectively), where appropriate introduce a maximum size

3) Establishment of closed seasons (during the main migratory period of silver eels) of 2 months to the entire year and/or ban on night-time pole-and-line fishing

4) Reduction of the fishing effort (e.g. limitation of fishing gear)

5) Transport of eels from waters distant from the coast to waters near the coast ("Trap & Truck")

Although the stocktaking shows that in most river basin districts and for Germany as a whole the required 40% escapement rate is at present achieved, various measures have already been introduced now in the Eel Management Plans to achieve long-term stabilisation and recovery of the eel stocks.

Key points in this respect are:

- Maintaining and increasing the restocking
- Overall clear increase in the minimum size in the Länder (45/50 cm)
- Introduction of a 5-month closed season for the Rhine, the mainstem of the most significant river systems discharging into the North Sea.

In addition to this mix of fishery-related measures (including restocking), the Länder

- are tackling the problem of mortality caused by hydroelectric power stations immediately. Direct measures to protect eels are expected from the "self-commitment" of the energy generators achieved.
- Furthermore, various relatively large-scale research projects serving the aim of Regulation (EC) No 1100/2007 have been commissioned.
- Precisely too with a view to the protection of eel, Federal Minister Aigner spoke in favour of pan-European cormorant management during the Fisheries Council in November 2008.

In view of the sharp decline in the natural upstream migration of eels, the ICES established in 2005, at the request of the EU concerning the stock, that the benefits of restocking outweigh

the risks (possible spread of diseases, etc.) (cited in ICES 2007). The stocktaking in Germany shows that the eel stocks in the inland waters and the silver eel escapement would already today be significantly lower without the massive restocking of the past. On account of the very low level of natural upstream migration, there is no reasonable alternative to restocking at present or in the medium-term future.

Restocking is undertaken in Germany by the fisheries sector, in some cases with public aid. Excessive restrictions on fishing would result in neither the motivation nor the financial resources for restocking being available. Subsequently, the situation would arise that restrictions on fishing would even lead to a further decline in eel stocks.

The results of the stock modelling show that the eel stocks in most German waters are very heavily dependent on restocking measures. Without comprehensive restocking, achieving the required 40% escapement rate would be precluded. An excessive restriction of fishing would place this restocking in jeopardy.

In addition, involvement of the hydroelectric power station operators has been initiated. The readiness in principle of the hydroelectric power station operators to cooperate has been laid down in writing and is in future to be reflected in concrete projects in various priority waters. Gradual improvements in the eel habitat are to be expected as a result of the implementation of the European Water Framework Directive.

The implementation of the fisheries-related management measures requires amendments to the Fisheries Acts and Orders in the Länder. Since certain parliamentary procedures and deadlines have to be respected in this respect; full implementation is possible during 2009 at the earliest. If the European Commission approves the Management Plans, the Länder will take the relevant steps forthwith.

In drawing up and implementing the Eel Management Plans, the German fisheries authorities and representatives of the commercial and recreational fishers contribute their share to sustainable eel management. In this respect, considerable efforts have been and are being made in Germany and considerable financial resources have been spent. However on account of the assumed panmictic nature of the eel stock, positive effects on the development of the European eel stock as a whole are possible only if this is also successful in the other relevant parts of the distribution area.

Regulation (EC) No 1100/2007 has both protection and sustainable exploitation of the eel stock as its aim. The management measures planned in the respective river basin districts, accompanied by considerable scientific guidance effort, are well-suited to achieving both objectives in the German waters concerned.

EUROPEAN COMMISSION

Brussels, XXX
SEC(2010) XXX final

SUMMARY OF ANNEX

French Eel Management Plan

French Eel Management Plan

In compliance with Regulation (EC) No 1100/2007, France submitted its Eel Management Plan by 31 December 2008. The plan was twice assessed by ICES (the International Council for the Exploration of the Sea), which led to the text being supplemented and specified in more detail, resulting in a final version submitted to the European Commission on 3 February 2010.

The French plan is in line with the objective set by the Regulation of recovering the European eel stock. It contains measures to reduce the leading causes of mortality on which it is possible to act in the short, medium and long term. These measures will not, however, be able to bear fruit in terms of stock recovery unless there is an improvement in the quality of the environment (water, sediment, habitats), the productivity of the stock being conditional upon this.

Management measures have been decided taking account of what is at stake and with the following objectives in mind:

- achieving the recovery objectives specified in the Regulation by acting to reduce the main causes of eel mortality,
- improving environmental conditions so as to enable optimum productivity of the environment,
- maintaining an economically viable professional eel fishery and socially significant recreational fishing,
- reconciling eel stock recovery and the promotion of renewable energies,
- improving the quality, collection and availability of monitoring and assessment data,
- curtailing as far as possible the illegal fishing and sales which exacerbate stock depletion,
- regulating the whole commercial sector better (formal authorisation, traceability).

The Regulation is applicable to all river basins in mainland France. The boundaries of the management plan were determined with reference to the natural range of eel and to management constraints.

The national measures are aimed at incorporating the requirements of the Regulation and proposing a standardised framework for their implementation in river basins, taking account of the characteristics of each territory. The status of eel populations, habitats and pressure factors have been accurately diagnosed for each river basin and aggregated at national level.

In order to ensure, in line with the Regulation, "*the escapement to the sea of at least 40% of the silver eel biomass*" (Article 2(4)), mortality on account of fishing would have to be reduced by 50% and that from other man-made causes by 75% in order to have a chance of recovering the stock.

The French authorities are committed to achieving this long-term objective by taking gradual action through a series of three-year plans, 2009-2012, 2012-2015 and 2015-2018.

As part of this series, the current plan is intended to start the process of reducing the various mortality factors, to make it possible to obtain the data needed to achieve the objectives of the Regulation and to facilitate a review of the implementation of the plan in 2012 with a view to adjusting it for the following years.

With regard to the glass eel fishery (eels less than 12 cm in length), the French authorities give a commitment to reduce eel fishing mortality by 40% by the end of 2012 and achieve the goal of a 60% reduction by 2015. The planned reductions in mortality will be achieved by reducing fishing effort (for instance, making the fishing season shorter).

With regard to other eel development stages (yellow and silver eel), the management plan objective for the period 2009-2012 is to reduce mortality nationally by 30% in three years. The French authorities undertake to continue to reduce fishing mortality by 10% a year so as to achieve an overall 60% reduction by 2015. These arrangements also apply to recreational fishing. Recreational fishing of yellow eel only is permitted; recreational fishing of glass eels (less than 12 cm long) and silver eel is prohibited.

With regard to other causes of mortality, the objective of the first phase of the management plan, 2009-2012, is to reduce mortality by 30% by 2012. The French authorities are committed to reducing other causes of mortality by 50% by 2015 and by 75% by 2018.

The implementing arrangements planned under the management plan are aligned with the following:

- water planning and management guidelines adopted at the end of 2009 by the river basin districts pursuant to Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy,

- the French plan for the restoration of the ecological continuity of watercourses, which covers among other things the rearrangement or elimination of the 1555 obstacles identified in the eel management plan,

- the national PCB plan,

- the national research and development programme concerning ecological continuity for the eel, allocated a budget of EUR 4.8 million.

To improve downstream migration and reduce mortality due to turbines, a range of measures will be taken depending on the local situation, technical or economic feasibility and expected results. The measures deployed on a case-by-case basis will include the following:

- downstream migration by-passes in combination with devices to prevent eels passing through turbines (fine-mesh grids, speed reduction and ultrasound deterrence system, etc.),

- fish-friendly turbines (fish mortality between virtually zero and zero),

- shutdown of turbine operation during downstream migration peaks.

France will respect its obligations in terms of keeping aside glass eels (less than 12 cm long) for Member States that wish to restock their river basins and will set up the necessary regulatory framework and funding in order for local restocking operations to be carried out under a national restocking programme. A quota system has been created, complying with the

percentage of glass eels (less than 12 cm long) that have to be kept aside for restocking, 5 to 10% of which will go to restock French waters.

The objective of the French management plan is to achieve, through the various three-year plans, the escapement to the sea of at least 40% of the silver eel biomass. To this end, the proposed plan addresses the various causes of mortality, fishing, construction works, water quality and restocking, adopting an ambitious and gradual approach. Every possible measure is being deployed with a view to fulfilling the regulatory obligations imposed by Regulation (EC) No 1100/2007 as speedily as possible.

Polish Eel Management Plan (PEMP):
Summary

Introduction

The Polish Eel Management Plan (PEMP) was developed in three stages. During the first two stages, a team of experts from the Sea Fisheries Institute in Gdynia and Inland Fisheries Institute in Olsztyn compiled and analyzed scientific data in detail and designated the basic principles of the project stages. The third stage of this project was the compiling of a comprehensive document that presents the results, conclusions, and proposed tasks to be undertaken with the aim of rebuilding resources of European eel.

During the preparation of the basic principles of the plan, consultations were held with a wide range of representatives from fisheries communities, scientists, and national and local government administrations, as well as with delegates from other member countries that share transboundary river basins with Poland. These consultations are reflected in the final text of the PEMP.

Management units

The Polish eel management plan includes two units for managing eel resources (EMU), namely the Vistula Basin EMU and the Oder Basin EMU. Each of these is based on one of the two major drainage basins in Poland, which together cover nearly the entire territory of the country. The neighboring inner and territorial marine waters are included in both of the EMU, as are the transboundary basins that are located in the vicinity of the Polish borders (Pregoła, Nemen, Świeża, Jarft, Ücker). Consequently, the PEMP includes nearly all of the surface waters of Poland (inland and marine). Only the Polish parts of the Elbe and Danube river basins (and, of course the Dniester - Black Sea basin) were excluded from the plan since eel do not naturally occur in these mountainous areas.

Evaluation of resources

In order to formulate the plan, qualitative and quantitative data regarding the following were collected and processed: the management of the fishery targeting eel in Poland; fishing trends and stocking programs; recreational fisheries; cormorant predation; environmental conditions and eel habitats; biological parameters of stocks; hydroelectric plants and their impact on the mortality of migrating eel.

a) Mathematical modeling

Mathematical models were developed for evaluating present and historical eel resources in Polish waters and to simulate the impact of resource management taking into consideration a variety of alternative options. Two, complementary models were developed (Appendix 1, PEMP):

- model for evaluating resources that characterizes historical dynamics;
- model for forecasting eel resources using different variations of anthropogenic and environmental impacts.

b) Data analysis

The available historical data were analyzed and yielded preliminary information regarding the state of resources in Polish waters and growth and mortality rates.

The target eel escapement coefficient was calculated in accordance with Council Regulation (EC) No. 1100/2007, Art. 2, paragraph 5, point a. The mean recruitment indicator from the 1960s and 1970s was used as stock recruitment up to the reference period.

c) Hydro-power mortality

Based on the method applied (Appendix 2, PEMP), the mortality calculated that was linked to hydroelectric plants is very high, at 60% in the Vistula basin inland waters, and 44% in those of the Oder basin. Assuming that there are no hydro-power barriers in the inner marine waters and considering the proportion of resources in marine and inland waters, it was calculated that mortality caused by hydroelectric barriers in both of the eel management units was 44% in the Vistula basin and 30% in the Oder basin.

d) Escapement of silver eel

The number of eel escaping freely during the reference period, as based on calculations, was as follows for the two EMPs:

- Vistula EMU – 2 102 thou. indiv., of which 40% is – 841 thou. indiv.;
- Oder EMU – 2 522 thou. indiv., of which 40% is – 1 009 thou. indiv.

The numbers of eel entering the sea in the 2005-2007 period are estimated to be:

- Vistula EMU – 371 thou. indiv. potentially escaping, of which about 56%, or 208 thou. indiv. will clear the hydro-power barriers;
- Oder EMU – 308 thou. indiv. potentially escaping, of which about 70%, or 216 thou. indiv. will clear the hydro-power barriers.

In both basins, the current eel escapement numbers represent from 21% to 25% of target escapement.

Stock dynamics prognosis

The stock evaluation results served only as the starting point for stock dynamics prognoses with different options regarding the exploitation intensity and stock rebuilding measures (e.g., stocking programs). The prognosis was run through to 2090.

a) Resource management options

The options chosen for realization are as follows:

- Vistula EMU – reduction **in fishing mortality by 25%, improving passability of migration routes by 34%, stocking 7 million glass eel individuals annually** (or the equivalent number of reared fry);
- Oder EMU – reduction **in fishing mortality by 25%, improving passability of migration routes by 29 %, stocking 6 million glass eel individuals annually** (or the equivalent number of reared fry).

b) Time frames

Implementing the proposed options permits reaching the goal (40% of potential escapement from the reference period) in the following time frames:

- Vistula EMU – from 2066;
- Oder EMU – from 2048.

Means for realizing the target

In accordance with the options selected for managing eel resources, reducing fishing mortality/fishing effort and achieving the planned levels of stocking will be done in 2009 or 2010. However, the required river (migration route) passability will be achieved by 2019.

a) Making migration routes passable

The plan recognizes the necessity for either regional or individual approaches to the issue of reducing mortality caused by river barriers. Total or partial passability can be achieved through the following:

- removing barriers;
- building fish passes and devices that steer the fish toward the passes;
- closing down hydroelectric plants periodically;
- other technical modifications such as changing turbine types, using existing passes, transfers, etc.

b) Limiting catch mortality/fishing effort

- **Establishing closed seasons.** According to the calculations, in order to reduce fishing mortality by 25% it is necessary to set a month-long closed season from 15.06 to 15.07 that applies to all Polish surface waters (marine and inland).

Supplementary fishing limitation will be enforced, including:

- **Unifying minimum length.** The minimum length for all catches of eel will be 50.0 cm.
- **Improving fishing gear selectivity.** Increasing the selectivity of the most common trap gear in use by installing selective sieves or increasing the mesh size in the last chamber to 20 mm (mesh size).
- **Catch limits on recreational fishing to 2 eel per day.** National regulations do not take into consideration daily recreational catches. This will counteract increasing mortality caused by recreational fishing that is above the level used in the population model.
- **Limiting predatory pressure of black cormorants.** Implementing a plan for protecting the eel through increasing the intensity and effectiveness of stocking and limiting exploitation can lead to changes in feeding preferences of cormorants and to increasing predatory pressure on eel.

Limiting illegal, undocumented, and unregulated catches. This will be accomplished through stricter monitoring.

c) Stocking

It is estimated that rebuilding stocks to the targeted levels will require introducing 1 million glass eels into Polish waters annually. The recommended stocking intensity for the Vistula EMU is 7 million individuals (2.33 tons), and for the Oder EMU it is 6 million individuals (2 tons). Stocking can also be performed with an equivalent quantity of different sized aquacultured elvers measuring not more than 20 cm. It is also assumed that supplementary stocking will be performed in waters that are free of limitations for migrating fish, including protected areas.

Monitoring

The plan includes a timetable and means for realizing monitoring studies within PEMP that correspond to the required reporting periods.

Eel management plans (EMP) in the Czech Republic – executive summary

In accordance with the Water Framework Directive (WFD, 2000/60/EC), the hydrological network within the Czech Republic territory consists of three internationally recognized river basins (Elbe, Oder and Danube river basins). Based on the final decision within implementation of Regulation No. 1100/2007, two of them (Elbe and Oder river basins) represent important area of natural distribution of European eel (*Anguilla anguilla*), all extending beyond Czech boundaries. Therefore the eel management *sensu* Regulation No. 1100/2007 is planned as two distinct documents. The main reason for that is geographical isolation, in general different state of ecological status and in particular the issue of individual river basin connectivity (prerequisite condition particularly for diadromous fish) within or outside Czech territory.

Inevitably, there is strong belief and research support that the only meaningful eel management leading to population recovery must be done at the river basin level. From this view, the highest effort of the Czech Republic will be to cooperate on the development of trans-boundary eel management plans to be shared with Germany (Elbe River basin) and Poland and Germany (Oder River basin). Both current Czech eel management plans (EMP Elbe, EMP Oder) are therefore assumed to be preliminary plans which are to be incorporated within trans-boundary eel management plans (planned activity already in 2009). International individual river basin planning as mentioned above will further support eel management effectiveness allowing more options to be applied particularly in research and monitoring areas as well as coordination in river restoration and rehabilitation measures at river basin scale according to WFD. The important role might be further seen from the viewpoint of international committees of individual river basin (e.g. IKSE/MKOL) particularly in research and planning.

Current status of eel population and fishery

In the Czech Republic, there is no commercial eel fishery (glass eel, yellow eel). The only exception is very extensive (1 facility) farming of glass eels to produce larger eels for restocking purposes only. The total catch of silver eels, is done by anglers and ranges between 42 to 24 thousand eels yearly (1990-2006) with sharply declining tendency (the observed decline in catch is more than two times compared to situation in 1980, three times in 1970 respectively).

Recreational eel angling has a long-term tradition (more than 100 years) and both angling unions significantly contribute on eel conservation e.g. via restocking program for many decades.

However, there is only limited information available especially on estimation of eel population density, estimates of other mortality factors than angling such as hydropower, dams, parasites, predation by cormorants etc. and more research is urgently needed, relatively high level of organization of recreational angling in long-term scale, datasets concerning catch and restocking of eels respectively, makes possible the current eel population to be modelled (with help of published mortality estimates across European continent and spatial analyses of such cases within Czech territory). All current analyses and estimates are therefore based on recreational angling data. Expected model limitations and errors will be further subject of modelling verification as planned in future years within each river basin Eel Management Plan (EMP Elbe, EMP Oder) based on monitoring, research and control measures within EMP (to be evaluated in the 2012 report).

Silver eel escapement

Total escapement rate of silver eels outside Czech territory was estimated being extremely low. In the Elbe River basin, it is suggested that only about 16% of eels continue to migrate

downstream. In the Oder River basin, currently the escapement rate was estimated at level of 22%.

Measures to be taken to achieve target 40% eel escapement (Measure Effectiveness on Escapement in Elbe River basin – EMU Elbe; Oder River basin EMU Oder is given in parentheses).

1) Fisheries regulation (MEE; EMU Elbe 0.4; EMU Oder 1%)
Recreational eel angling is currently regulated by minimum landing size (45cm), total number of fish to be kept per day (maximum 7kg) and since 2007 by eel fishing ban during downstream migration (1 September to 31 December). There are several other restrictions to regulate sport fishing in general such as limited fishing time (no night fishing) defined by national legislation. Every angler needs special permission and classification for fishing as well as registration in anglers unions. The only exception from registration and thus central evidence exists in private waters.

As a first step to dramatically regulate eel angling, the Czech Republic prohibited eel angling during its catadromous migration from 1 September to 31 December since 2007 onwards. Within context of EMP, landing size was increased up to 50cm and total number of eels to be kept per day will be restricted to maximum of 2 individuals. All other types of gears except of 2 fishing rods per angler are not allowed except of research projects.
All these measures will be in force from 2010, obligatory in the whole Czech territory with estimated reduction in catch of about 50% in relation to 2006 (Regulation No. 1100/2007). Effects of this measure are estimated to increase the total silver eel escapement at 16.4% - EMU-Elbe; 23% EMU-Oder).

2) Eel management unit/s (EMU) (MEE; EMU Elbe 6.6%; EMU Oder 10%)
However, there are often more state-specific reasons for decline of European eel as e.g. commercial fishing existing in particular states, based on analyses given in detail in EMP, the most crucial source of mortality of European eel in the Czech Republic are human induced impacts related to status of river connectivity, particularly presence of migration barriers especially these in combination with use of hydropower limiting anadromous migration and thus directly limiting the natural range of distribution and downstream catadromous migration with consequences like individual isolation, increased risk of mortality caused by turbines, higher fishing exposure, parasites, all with cumulative effects on eel's survival.

To reasonable manage and conserve eel population, hydrological river network (spatial distribution of major barriers and their potential risk) was analysed by means of expected eel mortality risk attached at particular river basin scale (Elbe and Oder river basins). Based on score statistics, the EMU was defined by first dam located in each of river within river basin representing habitats with lowest mortality risk. The effectiveness of this measure was estimated to increase total silver eel escapement at 23% (EMU-Elbe), 33% (EMU – Oder) respectively and is planned from 2009.

3) Turbine mortality
The eel management plans includes measures on how to mitigate the most significant mortality issue caused by turbines of hydropower stations in relation to their location within or outside EMU.

a) Reduction of silver eels mortality at level of 50% in the whole Czech territory (MEE 50%; EMU Elbe 4%; EMU Oder 9%) – planned in 2011
b) Reduction of silver eels mortality at level of 75% within EMU areas (MEE 75%, EMU Elbe 3%, EMU Oder 3%) – planned in 2013

All measures described in more detail in EMP will be automatically modified in relation to current research knowledge since there is no ideal option for downstream eel migration at this moment. Nevertheless, reduction of turbine mortality has major effect on eel escapement

and the effectiveness of these measures were estimated to increase total silver eel escapement at 29% (EMU-Elbe), 42% (EMU – Oder) at level of 50% reduction, at 32% (EMU-Elbe) and 45% (EMU – Oder) at level of 75% reduction respectively.

4) Restocking (MEE; EMU Elbe 46%; EMU Oder 55%)
The Czech Republic will use restocking as management measure. The initial planned number of glass eels (refers to situation in 1980 and within EMU) is estimated at approximately 1.2 million glass eels to be stocked yearly. This number will be modified in relation to ongoing research activities particularly in area of anadromous migration and population estimates in the whole river basin. However, there will be specific preconditions for restocking in EMU. Restocking of glass eels will be financed by the European Fisheries Fund only when EMP will be approved by Commission and restocking itself must follow methodological protocol to allow free downstream migration at any circumstances. The protocol will further provide classification of individual river ecological quality and instructions related to number of eels to be restocked in individual rivers taken into account ecological requirements, environmental situation and risk attached. Goal of this measure is among other reasons translocation of significant number of eels to the main river basin corridor.

The effectiveness of this measure was estimated to increase total silver eel escapement at 46% (EMU-Elbe) and 55% (EMU – Oder) and if all measures mentioned above will be realized, it should achieve to target 40% escapement of silver eels outside Czech territory.

5) Other measures/steps to be implemented within EMP
Payments from the European Fisheries Fund Eel are not possible for aquaculture.

Necessary precondition of Eel management plans is research particularly in areas of anadromous and catadromous migration within trans-boundary level as controlling measures leading to eel modelling verification.