



European member states are failing to protect the European eel.

Ranking report of the European member states on the target met with the eel management plan.

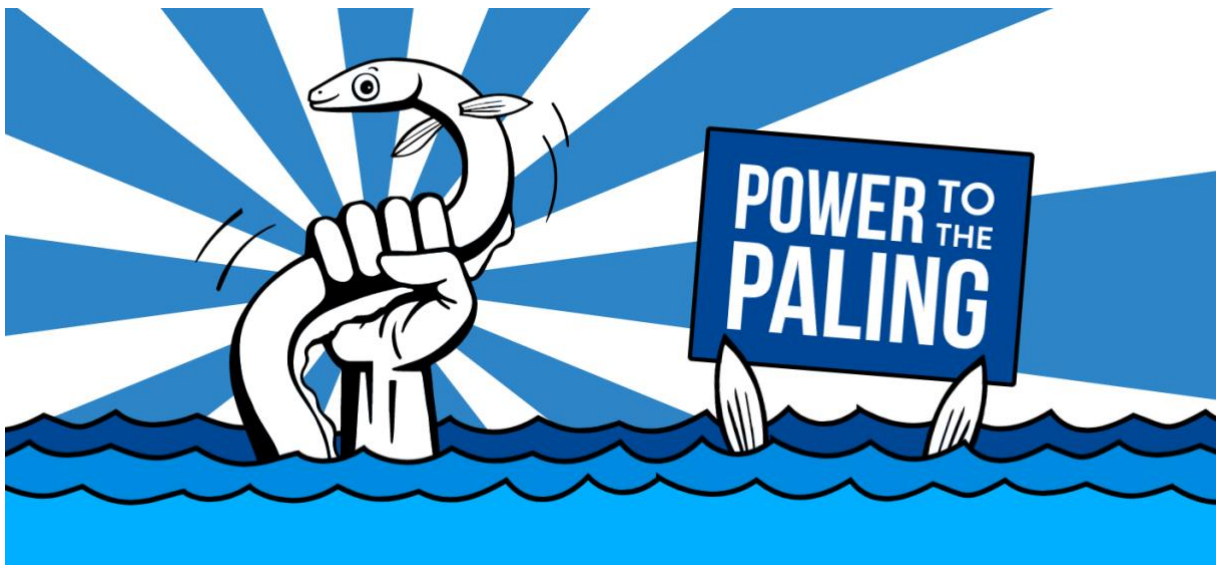
Kerkewijk 46
3901 EH Veenendaal
The Netherlands

info@goodfish.nl
www.goodfish.nl
+31 318 76 92 87

KvK 60859903
IBAN NL33 TRIO0197878474
BIC/SWIFT TRIONL2U



Good Fish
Kerkewijk 46
3901 EH Veenendaal
The Netherlands
www.goodfish.nl



This report is part of the project 'Power to the Paling', a collaboration between Good Fish and RAVON to save the European eel. This project is financed by the Dutch National Postcode Lottery.



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Table of content

- Summary 4
- Introduction..... 5
 - The EU Eel Regulation 5
 - Eel management plans 5
 - Targets in the Eel Regulation 6
 - Reporting requirements..... 7
- Ranking..... 7
- Key countries..... 9
- Effectiveness of the Eel Regulation..... 10
 - Discussions around the Eel Regulation 10
 - Restocking 11
- Conclusions..... 12
- References..... 13

Summary

The European Eel (*Anguilla anguilla*) stock has declined drastically since the mid-1900s. Despite the implementation of the Eel Regulation in 2007, the species is still listed as critically endangered on the IUCN Red List of Threatened Species (Pike, Crook & Gollock, 2020). The Eel Regulation has not resulted in the desired degree of recovery and protection. Evaluations by ICES (ICES, 2013,2015b) and an official evaluation by the European Commission (European Commission 2020) and national country reports (ICES, 2020b) showed that the targets set in the Eel Regulations were not met.

We have ranked the EU member states with an Eel Management Plan based on their progress in meeting targets set in the Eel Regulation. We used data reported for each member state in the Country report in 2018 or 2020 when available. We have ranked the member states on: 1. Meeting the current silver eel escapement target, 2. reported anthropogenic mortality and 3. whether or not a member states has reported all required information for all targets and/or all Eel Management Units (EMUs).

Our ranking shows that only 4 out of 19 member states have reached the silver eel escapement target from the Eel Regulation. It must be noted however, that this number also includes restocked eels of which their actual contribution to the spawning biomass is uncertain. For 10 member states, one or two points were deducted in our ranking because data reporting was lacking for some EMUs or one or more targets.

Looking at member states with a high estimated pristine eel biomass, we conclude that these countries are not performing well in our ranking. France has the highest estimated pristine eel biomass and an estimated current silver eel escapement of only 4%. It is essential that all European member states with natural eel habitat contribute to eel protection and recovery and implement as much measures as possible. However, some key countries have a vital role due to their relatively big importance for the eel. Without maximum effort from these key countries, the eel will not recover and measures implemented in other, less important member states will not show any significant effect.

Important steps have been made towards the recovery and protection of the European eel with the implementation of the Eel Regulation. However, member states are failing to protect the European eel by not meeting the objectives in the eel regulation, some are nowhere near full protection to allow eel recovery. Despite this, the commission has not taken action against member states for failing to provide data, submit reports or reach their targets.

Introduction

The European Eel (*Anguilla anguilla*) stock has declined drastically since the mid-1900s. The species is listed as critically endangered on the IUCN red-list (Pike, Crook & Gollock, 2020). The glass eel recruitment to the European coasts was only 1-6% in 2019, compared to the recruitment in 1960-1979 (ICES, 2020). The ICES advise has remained unchanged since 2003 being that all anthropogenic impacts that decrease production and escapement of silver eels should be reduced to, or kept as close as possible to, zero (ICES 2020).

As a response to the critical status of the European eel, the International Council for the Exploration of the Sea (ICES) has stated that a recovery plan for the stock is urgently needed (European Commission, 2003). Following this, the European Council has formulated the Eel Regulation in 2007: a protection and recovery plan for the European eel stock (European Commission, 2007). The regulation was adopted by the European Union, obliging all member States to formulate a national Eel Management Plan (EMP). Specific targets were set with the common objective to restore and protect the European eel stock.

The eel regulation has obliged the member states to implement measures to protect the European eel on a national level. Since the implementation, measures have been taken and a lot of data has been collected. However, up until now, the Eel Regulation has not resulted in the desired degree of recovery and protection. Evaluations by ICES (ICES, 2013,2015b) and an official evaluation by the European Commission (European Commission 2020) and national country reports (ICES, 2020b) showed that the targets set in the Eel Regulations were not met.

With this report, we present a ranking of 19 EU member states with an Eel Management Plan. The ranking is based on to what extent the silver eel escapement target and anthropogenic mortality target in the Eel Regulation were achieved and their compliance to the data reporting requirements.

The EU Eel Regulation

Eel management plans

The wide distribution of the European eel stock, its occurrence in national and EU waters and its long life-cycle complicate the management of the species. The average generation time of the European eel is estimated at 8.5 years for males and 11.8 years for females and the species only reproduces once in a life time (Dekker, 2004). Due to this long life-cycle, effects on the population are only detectable after many years. Moreover, the effects of protective measures are also only visible after a considerable amount of time.

The European Union has adopted a protection and recovery plan for European eel on 18 September 2007; the Eel Regulation (European Commission, 2007). The Eel Regulation was initiated in 2003 by the European Commission, requesting proposals for long-term management of eels in Europe (European Commission, 2003). This request followed from the repeated scientific advice from the International Council for the Exploration of the Sea (ICES) in which they stated that the European eel stock is outside safe biological limits and that the current fisheries practices are not sustainable. In their advice, ICES emphasizes on the need for an immediate recovery plan of the whole European eel stock, including restricting human activities affecting the stock as close to zero as possible. The

planning and execution of measures should be applicable to a specific area, adapted to local conditions (European Commission, 2007). To achieve this, the member states of the European Union were called out to develop national Eel Management Plans (EMPs). Each member state may identify Eel Management Units (EMUs) within their territory. The combined EMUs in a member state form the area covered by the EMP of that member state. This distribution of control allows a regional approach of the management which is thought to increase effectiveness. Member states agreed on the international targets set in the Eel Regulation.

The Eel Regulation was formulated in 13 articles (European Commission, 2007). Exemption is only possible if a member State can show that there are no river basins within its national territory that are natural habitat for the European eel (European Commission, 2007). Every EMP must contain measures that the member State would take and the specific areas included. The EMP would finally be approved by the European Commission and implementation should start from 1 July 2009, or earlier if possible (European Commission, 2007).

The European eel is subjected to many mortality factors throughout its life. These factors can be anthropogenic or natural mortality factors and range from climate change to habitat loss, changing ocean currents and fisheries. It is thought that not one of these factors, but a combination of these simultaneously, have caused the decline of the eel population (Dekker, 2004). Therefore, measures described in the national eel management plans are diverse and can include measures relating to commercial and recreational fisheries, migration pathways, water quality, eel restocking and translocation, and traceability.

Targets in the Eel Regulation

Four targets were formulated in the Eel Regulation. The main target of each EMP is to reach a silver eel escapement biomass (B_{CUR}) of at least 40% relative to the pristine escapement. Pristine silver eel escapement (B_0) is defined as the silver eel escapement biomass before any anthropogenic mortality existed on the stock in that EMU. The 40% escapement target is a long-term objective.

The 40% escapement target is accompanied by an anthropogenic mortality target. The anthropogenic mortality rate (ΣA) is the total mortality caused by human influences on the stock and is a combination of fisheries mortality (ΣF) and other anthropogenic mortality (ΣH) such as hydropower stations. The anthropogenic mortality target can be regarded as a short-term target to reach the long-term objective of 40% silver eel escapement.

The following additional targets were formulated. If a member state has a glass eel fishery, at least 60% of the glass eel catch must be used for restocking by 2013. This can be achieved gradually but must start with at least 35% in the first year, increasing with 5% per year. Also, the evolution of market prices of glass eels must be monitored annually. If a member state has active eel fisheries in community waters, fishing effort or catch must be reduced with at least 50% relative to the average catch of 2004-2006.

In addition to the Eel Regulation, the Joint Declaration on strengthening the recovery for European was adopted in 2018. This Joint Declaration included a temporary closure of fisheries for eel of an overall length of 12 cm or longer in Union Waters of ICES areas, including the Baltic Sea. The

provisions for the three-month closures was set out in the regulation for fishing opportunities for 2018 (Council Regulation (EU) 2018/120). These provisions include a prohibition for Union fishing vessels to fish for European eel of an overall length of 12 cm or longer for a consecutive three-month period. The exact period is to be determined by each member state.

Reporting requirements

A tri-annual reporting requirement was set in the Eel Regulation. Each Member States must report to the commission every third year after the implementation. These reports must outline the monitoring, effectiveness and outcome of the implemented measures of the EMP. Member states must in particular report on the silver eel escapement biomass, best estimate of the pristine escapement, fishing effort and reduction in fishing effort on eel, level of anthropogenic mortality factors and the amount of glass eel caught and used for restocking or other purposes.

Ranking

The Eel Regulation has not led to the desired degree of protection and recovery of the European eel. Although serious efforts have been made in many member states, most did not meet any or only some targets set in the Eel Regulation. Meanwhile, the status of the European eel remains critical.

We have gathered the latest publicly available information of all EU member states with an approved Eel Management Plan. We have used the information provided in the country reports section in the WGEEL 2020 report. Both information on the current silver eel escapement relative to the estimated pristine escapement (B_{cur}) and the reported anthropogenic mortality rate ($\sum A$) was recorded for each EMU. Additionally, it was noted when information for one or more EMUs and/or one parameter was missing or incomplete. We have combined the reported data for each individual Eel Management Unit to gain insights in the progress made on the national level.

Subsequently we have ranked the member states on each of these three elements. The member state with the highest reported escapement (B_{cur}) received the highest score, to the lowest. For the anthropogenic mortality rate ($\sum A$), the scoring was the other way around, the member states with the lowest anthropogenic mortality rate ($\sum A$) received the highest score, the highest anthropogenic mortality rate ($\sum A$) receives the lowest score. When data was missing for one or more EMUs or one or more parameters, a score of -1 was assigned. A score of -2 was assigned when either data on a parameter is missing completely or no country report was provided in ICES (2020b) nor ICES (2018) (Figure 1).

Ranking progress in the National Eel Management Plans

RANKING	Country	Current escapement	Score current escapement	Mortality	Score mortality	Rapporting	TOTAL SCORE
1	Estonia*	73%	19	0,2	16	-1	34
2	Germany	43%	15	0,18	17	0	32
3	Lithuania	56%	18	0,40	12,5	0	31
4	Ireland	47%	16	0,27	14	0	30
5	Belgium	12%	11	0,16	18	0	29
6	Spain*	9%	8	0,09	19	-1	26
7	Denmark*	11%	10	0,22	15	0	25
8	Italy	18%	13	0,4	12,5	-1	25
9	Portugal	50%	17	1,56	6	0	23
10	Netherlands	13%	12	0,66	10	0	22
11	Sweden*	20%	14	1,08	8	-1	21
12	United Kingdom	10%	9	0,78	9	-1	17
13	France*	4%	6	0,43	11	0	17
14	Greece*	7%	7	1,53	7	-1	13
15	Poland	2%	5	1,87	5	0	10
16	Latvia	1%	4	x	0	-2	2
17	Finland*	x	0	x	0	-2	-2
18	Luxembourg*	x	0	x	0	-2	-2
19	Czech Republic*	x	0	x	0	-2	-2

Figure 1: Ranking of the EU member states with an implemented Eel Management Plan. This ranking is based on the information provided in the country reports published in ICES (2020b). Member states of which information on one of the parameters is missing and/or for one or more Eel Management Units are indicated with *.



Ranking: ranking of the member states and their progress made in the protection and recovery of the European Eel under the Eel Regulation. Ranking made by Good Fish based on reported data in country reports published in ICES (2020b). When national data was missing, data per EMU was combined for some member states.

Scoring rationale: escapement target, highest points for highest escapement. Anthropogenic mortality: highest score for lowest reported mortality rate. Reporting, minus 1 point when data in one or more EMU() is missing, minus 2 when information on a parameter is missing completely or no country report is provided at all.*

The data shows that only 5 member states have reached the 40% escapement target. Germany, Lithuania, Ireland, Estonia (not all EMUs) and Portugal have reported an escapement higher than 40% relative to their calculated pristine escapement.

Estonia, Germany and Lithuania are the top-3 best performing countries in our ranking. This ranking is a combination of progress made in reaching the escapement target, lowest eel mortality rates and fulfilling the reporting requirements.

It must be noted that in the Eel Regulation evaluation report published by the European Commission (2020) it is stated that the silver eel escapement target reported by Estonia is most likely an overestimate. Moreover, in the same report it is stated that Lithuania has not reached the escapement target, however the data gathered in our research does show that Lithuania has reached the escapement target. Most probably because we used data from the progress report from 2018 or 2020, and the data reported by European Commission (2020) includes progress reports for 2013 and 2017 only.

The reported mortality rates include fisheries mortality (ΣF) and anthropogenic mortality due to factors other than fisheries (ΣH) and is presented as anthropogenic mortality rate (ΣA). When a member state has reached the escapement target, the maximum anthropogenic mortality rate (ΣA) needed to achieve the desired level of protection is set at 0.92. When the escapement target is not reached, this anthropogenic mortality rate must be lower in order to reach the desired escapement and is dependent on the current escapement figures. Of the four countries that have reached the escapement target, only Portugal has an anthropogenic mortality rate higher than 0.92.

Our ranking figure also exposes how member states fail to meet the reporting requirements. Data is missing on one EMU entirely and/or for one of the targets in 10 out of the 19 member states. Finland, Czech Republic and Luxembourg have not reported any data in their 2017-2018 country report. France only reported data on silver eel escapement. Misreporting has a consequence in our ranking, however more importantly, misreporting is a serious issue in monitoring the effectiveness of the Eel Regulation and therefore eel recovery. If member states are not providing any data or information on their progress made and the status of the eel stock in their territory, it is impossible to take appropriate measures and to evaluate progress on the European level.

Key countries

The natural distribution area of the European eel stretches throughout the European continent. However, some countries are of more importance for the eel than others. These countries have a higher pristine eel stock, due to a high natural eel recruitment because of their geographical location (bordering the Atlantic Ocean) and/or large surface area with suitable eel habitat. The table below presents the ten member states with the highest estimated pristine eel stock as given in the country reports published (ICES, 2020b).

Table 1: The ten EU member states with the highest estimated pristine biomass (ICES, 2020b).

	Country	Estimated pristine biomass B_0 (t)	Ranking result
1	France	100613	13
2	Germany	11299	2
3	Netherlands	10400	10
4	Spain	10355	6
5	United Kingdom	7318	12
6	Italy	3408	8
7	Poland	2812	15
8	Sweden	1718	11
9	Portugal	1401	9
10	Denmark	1110	7

The highest estimated pristine eel stock is in France, followed by Germany and Netherlands (Table 1). These estimates are determined by each member state individually, mostly based on historical data available on the eel stock, fisheries landings and habitat availability.

Almost all of the countries with the highest estimated pristine eel biomass listed above have not reached the top-5. Only Germany is within the top-5 in our ranking. France, the Netherlands, the United Kingdom, Poland and Sweden did not even reach the top-10 of our ranking. France has by far the highest estimated pristine eel biomass within its territory, but ends up 13th in our ranking. The reported silver eel escapement for France is only 4%.

Effectiveness of the Eel Regulation

Our ranking and gathered data shows that many member states with an eel management plan are not meeting the targets from the Eel Regulation. The 40% escapement target is not being met by most member states and reporting is a serious issue. Similar conclusions were drawn from an official evaluation of the Eel regulation published by the European Commission in 2020.

In this document, the implemented measures and targets met by the member States are evaluated. In this evaluation, it is concluded that despite the implemented measures there is no evidence that these have led to a significant progress towards meeting the escapement target for every member state. Current silver eel escapement is below the target set in the Eel Regulation for most EMUs. Fishing effort has been reduced in some member states but has risen in others. Especially for glass eel fisheries, where catches are steadily increasing. In addition, not all countries have achieved the target of restocking 60% of the total glass eel catch (European Commission, 2020).

On top of most targets not being met, the evaluation concludes that member states also fail to meet the reporting requirements. For many years and again for 2018, reporting by the member states was incomplete, according to the evaluation document. Two member states did not report at all and five member states did not report any data tables or only some. Also the required monitoring reports on glass eel prices have not been delivered by every member state with a glass eel fishery for every reporting year. This lack of data reporting is also partially reflected in our analysis and ranking, 10 out of 19 member states received minus points for not submitting the required data.

Discussions around the Eel Regulation

The Eel Regulation was drafted for the protection and the recovery of the European eel. However, there has been a lot of debate about the 40% silver eel escapement target. Because of contrasting interests and heavy debates between stakeholders in the member states, policy makers have difficulties in formulating and implementing measures. This is hampering the protection and recovery of the European eel. Due to the many uncertainties in the stock dynamics of the European eel and a lack of data on the population and mortality factors in the member states, the effectiveness of the management measures is hard to evaluate.

Some stakeholders do not regard the 40% silver eel escapement target as unjustified and unachievable. With this, the Eel Regulation loses part of its credibility. The main objection with the 40% escapement target is that for many member states, the habitat availability is reduced to such an extent that the 40% escapement cannot be reached. However, reduced habitat availability does not only occur because of permanent constructions. Many migratory barriers have been built in the

member states that could be either fully resolved or their effect can be mitigated. For example, by placing fish passes and ladders or by adjusting the operating regime. In this way, habitat availability can be greatly increased. In addition, the best possible silver eel escapement (B_{BEST}) was also not reached by most member states. This doesn't require solving migration barriers but a reduction in anthropogenic mortality. Moreover, the Eel Regulation explicitly stresses that the objective of the Eel Management Plan must be to reduce anthropogenic mortality to reach the 40% silver eel escapement target. So, even though it can be argued that the escapement target is infeasible due to a reduced habitat availability, at least the anthropogenic mortality should be reduced to a level to allow for a recovery of the eel stock. This, however, was also not realized by most member states (Figure 1).

Restocking

Data about restocking was not included in this ranking. When a member state has an active glass eel fishery, at least 60% of the total glass eel catch must be reserved for restocking purposes. The other 40% can be sold for aquaculture. Restocking is the translocation of glass eel from their capture region to inland habitats such as lakes and rivers. The EU catch of glass eel is around 60 tonnes per year, and the majority is caught in France, followed by the UK and Spain. The glass eels are restocked all over Europe.

A total of 16 member states have included restocking as measure in their eel management plan. Restocking of eel is being practiced in Europe for many years now, in the Netherlands restocking of glass eel was even practiced before 1940's. Originally, glass eel restocking was practiced to supply local eel fisheries. Nowadays, restocking of glass eel is considered by many as a conservation measure. Glass eels are mostly restocked in freshwater areas upstream, however every individual member states has set up specific regulations regarding the conditions under which a specific water body is a suitable restocking location.

In the past, restocking has contributed to the yellow and silver eel production in the recipient water system. However, as long as river connectivity is not improved and migration pathways for eel are not free of barriers restocking will in the end not lead to an increased silver eel escapement and will subsequently not lead to an actual biomass increase. In some member states, like Sweden, freshwater eel production is almost entirely dependent upon artificial restocking.

The effectiveness of restocking in contributing to increased silver eel escapement remains an uncertainty. Even though restocking can contribute to a yellow and silver eel production in the recipient water, there is limited evidence that of an actual contribution of restocking to spawning and actual biomass increase (European Commission, 2020). The same conclusion has been drawn in published reviews by ICES about restocking as a management measure (ICES 2010b and 2013c). In the Eel Regulation evaluation report, it is even concluded that restocking is a short to medium term measure that is unsustainable and should be phased out as natural recruitment improves and water connectivity is improved (European Commission, 2020).

Despite this lack of evidence of effectiveness, restocking is implemented in 16 member states. Moreover, these restocking practices are subsidized by national tenders of the European Maritime and Fisheries Fund (EMFF) even though there is no evidence of a positive effect of restocking in terms of contributing to the silver eel escapement. Monitoring the effectiveness is also not a requirement to receive funding (European Commission, 2020).

Data on the amount of restocked eels and the achievement of the restocking target in the Eel Regulation was not included as a measure in our ranking directly. However, restocking practices do influence our ranking outcome. Eels of restocked origin are included in the estimation of the current escapement ($B_{current}$) (European Commission, 2020). When glass eel restocking is being practiced on a large scale, this will have a positive effect on the estimated silver eel escapement figure. Meaning that member states that have relatively high restocking efforts, are favoured in our ranking over member states that restock less, even though it remains unknown if high restocking efforts actually lead to an increased silver eel escapement and biomass.

Conclusions

The Eel Regulation has set the long-term objective to achieve a 40% silver eel escapement relative to the pristine silver eel escapement in each Member State. This should be achieved by reducing anthropogenic mortality on the short term to allow for a recovery in the eel stock. This ranking and the official evaluation report of the eel regulation has shown that most Member States haven't reached the 40% silver eel escapement target from the Eel Regulation. The Eel Regulation has not led to the desired degree of protection and recovery for the European eel.

The European eel stock stretches throughout the European continent, national measures in a few countries will not provide sufficient protection to enable the eel stock to recover. Serious efforts throughout the natural distribution area of the European eel are needed. By looking at the national level, we have gained insights in which member states are making progress in terms of meeting the targets set in the Eel Regulation and which are still lacking behind.

Looking at the importance of the individual countries in terms of potential eel biomass, it can be concluded that only 1 country out of the top 10 countries with the highest estimated pristine eel biomass has reached our top 5/scores high in our ranking, indicating a poor performance. Especially France, a very important country for eel in terms of recruitment and habitat, is lacking behind as illustrated by their current silver eel escapement of only 4%. It is essential that all European member states with natural eel habitat contribute to eel protection and recovery and implement as much measures as possible. However, some key countries have a vital role due to their relatively big importance for the eel. Without maximum effort from these key countries, the eel will not recover and measures implemented in other, less important member states will not show any significant effect.

The management of the European Eel is a complex issue. Due to the transboundary nature of the species, poorly understood mortality factors and its long life-cycle. Nevertheless, this unique species deserves and urgently needs protection. Important steps have been made towards the recovery and protection of the European eel with the implementation of the Eel Regulation. However, member states are failing to protect the European eel by not meeting the objectives in the eel regulation, some are nowhere near full protection to allow eel recovery. Despite this, the commission has not taken action against member states for failing to provide data, submit reports or reach their targets.

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