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Review of the Trans-border management plan for European eel, *Anguilla anguilla*, in the Polish-Russian zone of the Pregola River basin and Vistula Lagoon

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Contents

1 Introduction

This is a review of the Trans-border management plan for European eel, *Anguilla anguilla*, in the Polish-Russian zone of the Pregola River basin and Vistula Lagoon (2014) (TEMPP).

The Eel Management Unit (EMU) consists of the Pregola, Banówka and Świeża river systems that drain into the Russian part of the Vistula Lagoon, and the lagoon itself. The surface area of this brackish water lagoon is about 838 km^2, with about 510 km^2 in Russia and 328 km^2 in Poland. Neither the total drainage nor the total wetted area of inland waters are provided. The rivers and lakes in Poland all drain through the Russian zone.

The state of eel populations in inland waters of Poland is described in terms of the length, weight, sex ratio, condition factor, age, length at age and annual growth rates, of feeding or not-feeding (equivalent to yellow and silver) in eels caught by commercial fisheries and scientific surveys of select lakes. No information was presented for Russian waters. The state of eel populations in the Vistula lagoon (Poland and Russia) is described in terms of length frequency, age structure, silvering index of commercial catches.

Commercial catches from inland waters are reported for three fishing companies, representing 55% and 86% of the lake area in the Polish parts of the Lyna and Anagrapa basins, respectively. These data are presented as total for all inland waters (Poland and Russia), despite acknowledgement of three other fishery companies of significant size, 9 smaller companies in the Polish zone and an unknown quantity of fishery operations in the Russian zone. Average annual catch from these fisheries was about 60 tons in the 1970s, reducing to about 9 tons in the 2000s (2.83 down to 0.41 kg/ha). No information on effort is reported. Natural recruitment has been very low since the early 1900s – though external literature contains unquantifiable indications of substantial abundances before - and commercial catches have been heavily based on restocking. Recreational catches for all inland waters have not been recorded, but are estimated on the basis of a study in one lake system that suggested recreational catch was about 0.27x the commercial catch. This proportion has been applied to the commercial catch data reported in the plan, and the result presented as the recreational catch for all inland waters. No information is presented on the numbers of recreational fishers or fishing effort. Eel landings from Polish and Russian commercial fisheries in Vistula lagoon are presented from 1888 to 2007. The report states that the landings have been heavily influenced by levels of eel restocking throughout much of this period, but the relationship is complex and not clear from the data presented. Current combined catches are about 10 tons. Illegal and unreported (IUU) catches from inland waters are estimated as about 40 tons per annum. There are no estimates of IUU catches from the Vistula lagoon.

There are hydropower installations and other barriers to eel migration throughout most of the Polish inland waters, although it is difficult to be certain how much eel habitat is impacted. There are three further hydropower installations in the Russian parts of these river basins (downstream of Polish waters) but no information from the main Russian Pregola River. Silver eel mortality due to turbine passage is estimated, using rates based on turbine types, at 79% for eel leaving Polish waters, or 25% for eels leaving the total area including the lagoon. Other possible impacts described are predation by cormorants, contaminants and diseases, but these impacts are not quantified in the plan.

Restocking of Polish inland waters was about 2 million glass eel per annum in the 1970s, declining to about 150 000 in the 1990s and none from 2003 onwards. Restocking of reared fry (elvers) has increased over the same period to about 50 000 per annum during 2003–2012. Restocking of the Vistula lagoon began in the early 20th Century, but at a variety of levels and with no restocking in some periods. Most recently, the lagoon has been restocked with fry from 2005 onwards, increasing to about 1 million in 2013. Restocking is mandated in some agreements for fisheries exploitation and in the Poland EMP.

The stock assessment is based on the same mathematical modelling used in the Poland EMP (2008). The model for estimating resources and characterizing the history of their dynamics is based on catches, their age composition, the length and weight of each age group within the catches, and levels of restocking. Recruitment was inferred from indices at the western end of the Baltic. Eel were aged using the thin slice otolith method (Poland) or scale reading (Russia). The historic escapement is estimated at about 161 500 silver eel, making a 40% target of about 64 600 silver eel. Escapement in 2010–2012 was estimated at 6300 silver eel, that is 3.9% of historic and therefore far below the 40% target. Annual escapement will have to increase by 58 300 silver eels to reach the target (or about nine times).

The model for forecasting silver eel under various management scenarios was based on the whole-stock life cycle model of Astrom and Dekker (2007). The potential effects of a variety of management actions are forecast, predicting target achievement in 25+ years. The management actions proposed are restocking, reducing fishing and reducing mortality from passage through hydropower turbines.

The management actions planned are annual restocking of about 2 million glass eel or 400 000 fry, reducing fishing mortality by 25% by imposing a 1 month close season, reducing mortality rates during passage at hydropower facilities, limiting illegal catches and limiting cormorant predation. Most of these actions were to have been implemented in Polish waters from 2010, but are proposed for Russian waters from 2015 onwards. Supplementary actions proposed are a 2 fish bag limit for angling in Polish waters, unifying minimum landing size and increasing selectivity of gears in Polish waters, and reducing catch quotas in Russian waters.

Forecast modelling of various management scenarios is reported to predict target achievement by around 2040 or 2056, depending on scenario. No time schedule is presented for the proposed set of management actions.

Escaping silver eel will be monitored at some hydropower facilities to improve knowledge of mortality rates. Other monitoring will be in line with DC-MAP requirements but these have yet to be confirmed by EU legislation. The responsibilities of a range of bodies are described in terms of delivering the management actions, but there is no mention of how the success of these actions will be measured – a reporting requirement of the Regulation.

2 Method of the Review

A panel of three independent scientific eel experts was commissioned by ICES to undertake the review. This report was submitted to ICES, providing findings in the manner of general comments, recommendations for improving the plan, and specific answers to the questions and instructions posed by the European Commission.

3 General findings of the reviewers

3.1 Overview

The Regulation EC 1100/2007 requires EU Member States to:

- identify basins lying within their national territory that constitute natural habitats for the European eel (eel river basins) which may include maritime waters;
- prepare an eel management plan with the objective (in the long term) to reduce 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;
- provide an analysis of the present situation of the eel population in the eel river basin and relate it to the target level of escapement;
- include within the plan measures to attain, monitor and verify the objective;
- Include within the plan a time schedule for attaining the target level of escapement, following a gradual approach and depending on an expected recruitment level;
- implement appropriate measures as soon as possible to reduce the eel mortality caused by factors outside the fishery, including hydroelectric turbines, pumps or predators, unless this is not necessary to attain the objective of the plan;
- describe the control and enforcement measures which will apply;
- establish a control and catch monitoring system adapted to the circumstances and to the legal framework already applicable to their inland fisheries; and to,
- take measures necessary to identify the origin and ensure the traceability of all live eels imported or exported from their territory, to determine whether the eel harvested in and exported from their territory was caught in a manner consistent with Community conservation measures, and to take measures to determine whether the eel harvested in the waters of any relevant regional fisheries organisation and imported into their territory was caught in a manner consistent with the rules agreed in the regional fisheries organisation in question

The plan documents the available information for the Polish zone but very little information for the Russian zone. The purpose of the Eel Regulation is to protect and recover the stock, and to enable sustainable exploitation. However, the plan relies heavily on restocking to achieve its goals and appears to have been devised to enable a fishery to be continued. There are some shortcomings in the information presented throughout the plan (explained further below). The data and methods applied are not described in sufficient detail, nor with enough reference to supporting materials, for the reviewers to be confident of the assessment or that the objectives of the plan will be achieved. The plan estimates silver eel escapement number whereas the Regulation requires an estimate of biomass. The relation to the objectives of the Eel Regulation is rather weakly analysed, and the monitoring programme will need considerable strengthening. The plan requires a dedicated discussion of the assessment results and the management actions in terms of the standard stock indicators (B_0, B_{best} and $B_{current}$, and sum of anthropogenic mortality rates ΣA).

The Polish part of the Vistula lagoon was part of the Vistula Eel Management Unit (EMU) in the Poland Eel Management Plan (PEMP). It is not clear from the TEMPP

whether this plan is entirely separate from the PEMP, or the PEMP will adjusted to exclude the lagoon.

This review hereafter explains these shortcomings and makes suggestions for how the description of the plan, and the plan itself, might be improved. The page numbers and section headings referred to below are those in the 2014 Word version of the TEMPP, which differs slightly from the available pdf-version.

In the years since the adoption of the Eel Regulation, considerable progress has been made by EU countries in their implementation and monitoring, as well as in the national and international assessments. Our evaluation of this management plan TEMPP as requiring major revisions relates to the current knowledge and expertise, as available at the international level. Clearly this constitutes a high entry-threshold for a new EMP. In the coming years, close communication to other countries and involvement in the international developments will be required to make up the arrearage. However, we note that nothing new is being asked for that has not been included in the Regulation or the other EMPs and therefore the main gaps and weaknesses identified by the reviewers remain valid.

The reviewers consider that the following 4 broad issues should be addressed as a matter of urgency:

1. The recent and future restocking should be fully described;
2. The assessment should be presented and discussed in terms of the stock indicators – the three indicators of biomass, and total anthropogenic mortality rates;
3. The management measures, and their implementation, should be clearly defined and described in space and time, and their contribution to silver eel escapement quantified;
4. The eel habitats and pressures should be described for the whole EMU.

3.2 The description of the EMU

The Pregola and its tributaries are defined as a Unit under the WFD. However, the mapping does not seem to be complete. The Banowki and Swieza basins are only discussed in the section on hydropower impacts (Section 4) but not for fisheries (Section 3). Information for inland waters in the Russian zone are particularly lacking. Several tributaries to the north of the main Pregola River, and the River Deyma that appears to flow north from the Pregola to outflow into the Curonian Lagoon, are apparent on Google Earth © but not described or shown in Figure 2 in the Plan. The mapping for the WFD (The Report from the Commission to the European Parliament and the Council, on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans (Member State: Poland)) shows a small area of the Pregola River Basin District (RBD), separated from the main part of the TEMPP area by the Nemunas RBD, that is absent from maps in this Plan.

The size of the river basin is described variously as drainage area, wetted surface area, and the length of rivers, depending on circumstances (Section 1.2) but nowhere is it described in its entirety. This makes it difficult to relate fisheries, other anthropogenic impacts, restocking or management actions within the context of the whole EMU.

3.3 The state of the eel population

The eel population is described in terms of various biological parameters (size, age, gender, maturity status), but these should be discussed in terms of their relevance to assessment and management.

The document acknowledges different age ranges between eel in Polish and Russian catches from the lagoon (p22), and we have concerns about the reliability of the age data because of the methods employed. Using thin sections or scales for age determination (p22) introduces a real risk of underestimating the age and over-estimating growth rate. This will have a knock-on impact in the modelling section. References are required for the methods used, and future plans should strongly consider adopting the standard methods described in the WKAREA 2011 report (ICES, 2011), and conducting inter-calibration of the two Polish and Russian data. The section on growth rates (p21) is confusing because the lengths-at-age appear to start from age 1 (about 12 cm) but the text refers to growth rate determined at age 8+ and years thereafter.

The fish capture methods and the time periods for the eel data need to be clarified, as these could influence the findings. For example, were the eels in the lagoon (Section 2.2) collected from commercial catches or with scientific surveys, and what was the selectivity of the fishing gears? The pdf version of the plan indicated that the female data from the Masurian lakes (Table 3) were current but the male data were archival, in which case their comparability would be questionable.

The length frequency data for the lagoon eels are only presented for five years whereas over 40 years of data were apparently available (p21). Noting that natural recruitment, restocking and fishing have changed considerably over the decades, it would be worthwhile to provide some trend information.

3.4 The fisheries and other anthropogenic impacts

There is a section on managing eel catches in Poland (p10), but not one for Russian fisheries. Are there no fisheries, commercial or recreational, on the main Russian section of the Pregola River? There is brief mention of a catch quota system in Russia, very late in the report (Table 21) but nothing on how this is managed, or on its effects on catch levels which could potentially negate the conclusions on catch data and trends used in the Plan. This quota system must be fully described. No information on fishing effort is reported.

Commercial catches from inland waters are reported for three fishing companies, representing 55% and 86% of the lake area in the Polish parts of the Lyna and Anagrapa basins, respectively (Section 3.1). These data are then presented as the total for all inland waters (p26), despite acknowledgement of three other Polish fishery companies of significant size, nine smaller companies in the Polish zone (p23) and an unknown quantity of fishery operations in the Russian zone. Information is required on the non-reported companies, for example a table of lake name and surface by company, for all 15, would be best to support the decision to ignore these in the assessments.

There is no need to report data for fisheries in the Lyna and Anagrapa basins, and then the whole Pregola inland basin (p26), when the latter is simply the sum of the data from the Lyna and Anagrapa basins. If there are no data for other parts of the inland waters, this should be stated explicitly.

Recreational catches have not been recorded for inland waters. They are presented as though they exist (Section 3.3) but they have been estimated on the basis of one study of lake fisheries where recreational catch was about 0.27x the commercial catch (p24).

As this study (Wołos and Mickiewicz, 2013) was not available to the reviewers, it is not possible to be confident of the reliability of this method, nor of its representativeness for EMU. This proportion has been applied to the commercial catch data reported in the plan, and the result presented as the recreational catch for all inland waters. No information is presented on the numbers of recreational fishers, on fishing effort, or their spatial distribution. All are necessary to support the decision to use commercial landings as a proxy.

No information is presented for recreational fisheries in the Russian territory, nor for the entire Vistula Lagoon. The recreational fishery in the Lagoon is described as being "presumably…..of inconsequential magnitude" (p46) so there are no data to support this statement and even the authors are not convinced.

Eel landings from Polish and Russian commercial fisheries in the Vistula lagoon are presented from 1888 to 2007 (Section 3.2). The report states that the landings have been heavily influenced by levels of eel restocking throughout much of this period, but the relationship is no doubt complex and not clear from the data presented. Current combined catches are about 10 tons.

Estimates of illegal and unreported (IUU) catches from inland waters are presented within Section 4 – *Mortality caused by factors other than fisheries*. However, IUU should be treated as a form of fishing mortality and therefore reported in Section 3. The IUU catch is estimated to be about 40 tons per annum (p44), but the methods used should be described. There are no estimates of IUU catches from the Vistula lagoon.

The reviewers note that few other EMPs have estimated IUU catches.

The Plan declares numerous barriers to eel migration in the Polish inland waters (though later 107), 47 of which are linked with hydroelectric power facilities in the Pregola basin and one more in the Swieza basin (p34). Turbine mortality on downstream migrating silver eel is the only mortality associated with the barriers. The description of the amount of eel habitat upstream of hydropower is confusing, but the amount appears to be very significant in terms of the total Poland zone waters.

The "size of escapement" described on page 37 is the mortality-weighted surface area, not the mortality-weighted silver eel production. Since production is where restocking has been - and not where the surface is – these are not the same.

There are no Russian data for the number or impact of barriers on eel escapement. This is important, as the Russian part of the catchments are downstream of the Polish parts and therefore any escapement leaving Poland will be impacted on further before getting to the sea. Two hydropower facilities on the Russian Lyna and one on the Russian Anagrapa are mentioned, but no information on their impact is reported, or whether they will be restored to reduce mortality. It would be futile for Poland to increase stocking and escapement if resulting silver eels were to be impacted on their downstream migration.

It is estimated that about 79% of silver eel emigrating from Polish waters are killed at hydropower facilities (p48). The document indicates that when taking into account silver eel production from the inland waters downstream of hydropower and the Vistula Lagoon, the turbine-associated mortality is 25% of the silver eel production (p48). However, there is not sufficient information provided to understand how this has been calculated. For example, the water surface area accessible to eel and above 1 to 4 hydropower facilities should sum to equal the total water surface area, but Table 13 does not confirm to this. This lack of information and clarity should be addressed.

The section on eel predation by Great Cormorants (Section 4.2) discusses eel consumption but provides no evidence to quantify this mortality on eel. Such information would be necessary to support a review of associated management actions.

The sections on contaminants and diseases (Sections 4.3 and 4.4) conclude that neither are impacting eel in the Pregola EMU although a comment on physiology (e.g. total protein, cortisol) would appear contradictory, but the necessary information on what eels were sampled from where and when, is missing. The contaminant and disease information needs to be discussed in context of the production of silver eel escapement.

3.5 Restocking

The section of the report providing information on restocking (Section 6) is towards the end but should be moved to near the start of the document because understanding what types and quantities of eel were restocked where and when is essential for understanding the eel production dynamics in the inland waters and the lagoon.

No information is provided as to the source(s) of the restocking material.

No restocking information is provided for inland waters of the Russian zone, only in the lagoon.

The suggestion that one glass eel is equivalent to five eel fry (p62), is the opposite of what would be expected, and contrary to the relative numbers of glass eel or fry restocking, so we assume that this is a typographical error but that should be confirmed.

The proposed optimum release period for survival is reported as September/October (p62). Although we do not know the waters or other circumstances, restocking this late in the year would give the eels very little time to "settle in" to their new environment before winter.

There are a number of statements made and conclusions drawn about the restocking in, and catches from, the Vistula lagoon from 1988 onwards, but there is not sufficient evidence or references supporting these statements/conclusions.

3.6 The stock assessment and forecasting scenarios

The model used to estimate present eel resource and historic characteristics (Section 5.1) is the same model used for the Polish EMP. The Polish model has not been published, other than in a grey report in Polish. The modelling exercise is not described with sufficient detail and clarity to provide confidence in the results presented. There are some questions on the details of the model (see below). To address these issues, peer-review and publication of the model should be prioritized.

The modelling exercise appears to rely on recruitment indices from the western part of the Baltic (p46) with no explanation of how this was adjusted for losses prior to the Pregola basin. The plan needs to discuss how these indices could/should be adjusted to account for any impacts on recruitment through the southern Baltic. However, natural recruitment to the Vistula and Pregola would appear to be low historically and probably negligible in recent years. The stock and fisheries were completely maintained by restocking in the past and the current plan also relies on restocking.

The model estimates annual fishing mortality values. The presentation in Figure 19 (annual estimates, plus a smooth trend over the years) indicates that the authors themselves consider the model to be over-parameterised. Further noting that the current stock is predominantly derived from restocking, and that restocking effectively came to an end around 1990, we question the inclusion of such a long historical period of

data. An assessment from 1990 (or even later) until present would benefit from a relative wealth of information, would exclude a regime-shift in the restockings, and the apparent regime-shifts in the exploitation over the historical decades.

There appear to be issues with the data and parameter values used in the modelling exercise, some of which have been mentioned in this report already.

- The age determination may be incorrect because of the methods used. Russia uses scales and Poland is using thin slicing, both known to underestimate age. Scale reading in eels hasn't been used in decades and is unreliable.
- The report states that Russian data are used in the model, but in the sections describing the data there is almost no data from Russia presented. These Russian data must be described.
- The recreational catch data are presented as real data but in fact are derived from commercial catch data, so cannot be treated as independent of the commercial data.
- The commercial landings data are for a subset of lakes in two tributary basins along with the Vistula lagoon. All other fisheries in Polish, or Russian, waters are ignored.
- Silver eel age is fixed in the model to 12, 13 or 14 years (p47), with only 1% that could be older, in contrast to the information provided in Table 6 (p18). The reviewers' experience with other eel models indicates that the maturity ogive details are extremely important to biomass estimates, and therefore must be based on the actual data rather than a subset.
- The natural mortality rate for restocked glass eel was assumed to be M at 1.0 (p47), but this value should be justified with supporting evidence.
- The years when observed catch numbers were available must be detailed, because Equation 4 (p47) sums over y and a, so that is catch-at-age per year, whereas the text describes catch per year. This gives heavy weight to the years with age-data available which means there may be an imbalance in the modelling but this cannot be judged without knowing which years it concerns.

The model used to forecast the effect of management scenarios is based on the whole life cycle model of Astrom and Dekker (2007). There are some concerns with the manner in which it has been applied.

- It appears to assume that future recruitment is directly related to silver eel escapement from the Pregola (p49). This is contrary to current understanding of eel stock dynamics (panmictic reproduction by silver eels from many rivers/areas), with the consequence that future recruitment and escapement may be far less than predicted (and time to achievement of target far greater).
- It is not certain whether anthropogenic mortality from non-fishing impacts (e.g. hydropower) are included in the forecasting (p49). They must be, and therefore this must be clarified.

The results of the assessment of resources (Section 5.4.1) suggest that eels are exploitable at age 3 but this seems unlikely based on knowledge of fyke net selectivity, and the lengths-at-age reported earlier in the report.

Assessment results (Figure 18–20) indicate a considerable contrast between the pre-1960 and post-1960 periods. Pre-1960, results indicate a high stock abundance, low and declining fishing pressure; post-1960, reported catches and estimated fishing mortalities are roughly proportional – which suggests that stock abundance varied to a much lesser extent. Figure 18, however, shows large multi-annual fluctuations (the difference

also showing up in the residuals-plots; Figure 20a has an upward trend and multi-annual fluctuations). The results seem to be mostly driven by the catch-at-age data. Not having insight in what years catch-at-age data were available (in contrast to years without age-data), we cannot judge the result.

The data presented switches between biomass and numbers and back. The numbers presented in Figure 18 could be construed as indicating that escapement was higher than biomass, but this is not possible, unless the Figure presents both biomass and numbers in the one graph. This needs to be clarified.

Presentation of the escapement relative to the EU target is given in numbers, not biomass. In numbers, the predicted silver eel escapement is at 3.9% of the historic reference estimate. The fact that this estimate is presented as about 10% of the target rather than a % of historic escapement causes the risk that readers will erroneously think the escapement is closer to the target.

The conclusion that the results of minimizing sums of squares indicates the model results are "fairly reliable" (Section 5.4.1) is potentially misleading because, at best, the model does a reasonable job of representing the input data, but this takes no account of errors or gaps in the data.

The number of silver eels potentially escaping to the sea from inland waters appears to ignore the prior impact of yellow eel fisheries, hence underestimating reference production. These aspects need to be addressed. Furthermore, the mortality rates due to hydropower are not explained with sufficient detail to provide the reviewers with confidence in the estimates of reference escapement or the management target. The assessment of the impact of migration barriers appears to be rather ad hoc, and not always correct (the formula calculating escapement through barriers, p. 37 – estimating a weighted sum of surface areas, instead of eel biomasses). More detail is needed to evaluate the assessment results.

The impact of hydropower is estimated as 79% mortality of downstream migrating silver eels, as far as the Polish border. There is no estimate provided for the mortality associated with Russian hydropower. The total mortality is only 25% at the sea, because the escapement is assumed to be that from above and below the hydropower. The implicit assumption is that the silver eel production in the Russian inland waters and the Vistula lagoon must be much greater than that from upstream of the hydropower, in order to reduce the total mortality rate down to only 25%. This distribution of production needs to be explained in much greater detail and this implicit assumption needs to be substantiated with data and analyses.

The assessment results are described in Section 5.4.2 and illustrated in Figure 18. The reference level is reported to be 161 500 silver eels, of which 40% is 64 600 individuals, but Figure 18 does not support these statements.

Given that present escapement is estimated as 6300 silver eel, 3.9% of reference, despite annual eel restocking, we are far from convinced that the restocking proposed will achieve the target. Restocking in the 1970s was about 2 million glass eel per annum (Table 20) but escapement was very small (Figure 18), so the Plan must explain how restocking at a similar level now will have a different result.

The assessment must be presented in terms of silver eel biomass stock indicators of B_0, B_{best} and $B_{current}$, and anthropogenic mortality rates, according to the EU requirements of the 2012 EMP Progress Reports. The assessment, management scenarios, actions and their implementation must be discussed in relation to these stock indicators.

Section 5.4.3 presents the forecasting of consequence of management scenarios based on reducing fishing mortality and various amounts of restocking. The lack of detail on how fisheries are managed in Russia, and the lack of information on where eel would be restocked, means it is not possible to review the potential effectiveness of such controls.

3.7 Management measures proposed

The relation between the acquired results and the required protection status should be explicitly discussed, in a dedicated section, discussing both the status versus the targets, and the expected effects of suggested/agreed management measures in relation to the targets.

Section 6.2 states that the overall level of restocking required was determined using the level of restocking mandated to date by existing agreements for fisheries exploitation of surface waters and the realization of the PEMP. As such, the plan appears devised to enable a fishery to be continued, to access EMFF funds. We need a clear documentation of B_0, 40% B_0 and B_{best}, and a derivation why that corresponds to 2 million glass eels restocked. Moreover, there are conflicting impacts: restocking and fishing. The Plan needs to document how much of restocking ultimately escapes, and how much is caught.

Section 8 discusses a range of management actions that might be implemented but provides very little information on where, when and how these actions will be implemented. As a consequence, the management measures proposed and the limited information on how they will be implemented fail to convince us that anthropogenic mortality will be reduced to any great extent or that the target will be achieved, at least in a realistic timeframe.

Information on management measures for Russia are lacking.

It is our opinion that a short close season, in the middle of the present season, will not lead to a reduction in catch if the latter is not enforced with a quota. There is mention of a quota system in Russia very late in the report but no information on how this is managed and how successful it is.

The illegal catch is a cause for concern where 20% of the stock is being lost to poaching and it remains to be seen whether the measures proposed to counteract this will have any impact.

Table 21 shows that many of the proposed management actions (measures) for Polish waters were to have been implemented from 2010 onwards. If this has happened, the Plan should document how these have been implemented and their impact on eel biomass and escapement to date. Reference to the Oder and Vistula river basins in Table 21 suggests that this table is a copy from the Poland EMP.

3.8 Monitoring to evidence the success of the plan

Some details of future monitoring silver eel escapement are presented in Section 7. These plans are for telemetry studies of downstream migrating eel as they pass hydropower facilities. The desire to improve estimates of mortality associated with hydropower are commendable. However, these expensive studies will do little on their own to improve the reliability and accuracy of silver eel escapement estimates for the entire EMU. Other monitoring/data collection and analyses are required, especially on the distribution and impact of fisheries throughout the EMU, and on testing the effects of past and future restocking.

Future monitoring plans are presented in Section 8, though in very little detail – the focus is on assigning responsibilities, not on which knowledge gaps should be filled, and how. The emphasis should be on what the plans are and how they will be implemented. Developing a comprehensive monitoring plan is an indispensable condition for future progress. This plan should take account of the lagoon, rivers and lakes; both countries; all impacts; all life stages; standardized/calibrated methods; etc.

4 References

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