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REPORT OF THE SECOND MEETING OF THE SUBGROUP ON REVIEW OF STOCKS. (SGRST-06-02) OF THE SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

EEL MANAGEMENT

Ispra, 21-24 March 2006

This report was evaluated by the Scientific, Technical and Economic Committee for Fisheries (STECF) in its plenary session of 3-7 April 2006

This report does not necessarily reflect the view of the European Commission and in no way anticipates the Commission's future policy in this area.

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Summary

The subgroup on review of stocks (SGRST-06-02) of the Scientific, Technical and Economic Committee for Fisheries (STECF) - EEL MANAGEMENT recommends guidelines for the content of eel management plans to be developed by member states. These recommendations address eel management in inland waters and estuaries whereby the group stresses that comparable management has to be developed for coastal waters as well.
The specific recommendations include:

1) The reference level for silver eel should be established hierarchically depending on the quality of data available for a specific river basin. Preference should be given to historic data on silver eel escapement reflecting a near natural situation followed by other available historic data on eel which need modelling and inference to link them to silver eel escapement. If no historic data concerning eel for a given river basin exist other methods for inference of natural silver eel escapement are advised.
2) Methods to measure silver eel escapement are advised again in a hierarchical order referring to standard stock estimation methods.
3) The expert group advises not to set intermediate (or proxy) targets at the moment but recommends to adopt a long term strategy which is based on enhanced future scientific insights, combined with short term, immediate management measures. The latter include:
    - A considerable immediate reduction in all fishing effort on all life stages of eel.
    - A comparable immediate reduction in turbine and pumping stations mortality.
    - A total ban on trading of glass eels for purposes other than restocking of open waters within the eels natural distribution area.
4) The expert group states that the inclusion of eel into the Data Collection Regulations (DCR) of the commission is highly supported and advises that efforts to implement these regulations should be intensified with pilot projects endorsing recommendations on data collection methods from previous workshops.

Terms of Reference (ToR)

ToR FOR SGRST 06-02: Eel Management, March 21-24, 2006, Ispra

Background: The Commission has proposed that the primary instrument for management of European eel should be the development by Member States of "eel management plans". The objective of each plan should be to achieve an escapement of 40% from each river basin. This 40% level is established with reference to a situation in which eel recruitment is at a normal historic level, the full productive extent of the eel habitat is utilised, there are no barriers to migration and no mortalities from fishing, turbines or pollution.

ToR: Develop guidelines for the content of eel management plans. These should include :

a) How to establish the reference level for escapement (e.g. in terms of Kg silver eel escapement per hectare of eel habitat);
b) How to measure silver eel escapement, and any other relevant parameters;
c) How, and whether, to establish intermediate (or proxy) targets such as settlement rates for glass eel, population densities for yellow eel, maximum mortality rates due to fishing or turbine passage, or relevant water quality parameters;
d) Provisions for data collection, monitoring and the follow-up and enforcement of regulations. Such data collection should be adequate to allow an estimation of whether compliance with the target has been achieved.

STECF comments on the Report of the Subgroup on eel management

Establishing the reference level for escapement

A pragmatic approach utilizing available data in a hierarchical way was proposed by the Subgroup. STECF considers that the flexibility and sensitivity of the approach can accommodate the variable quality of eel data throughout Europe and offers a way of establishing a reference level in even the most data poor situations.

Measuring silver eel escapement

The Subgroup highlighted the value of fishery independent data for the measurement of silver eel escapement, but again offered an hierarchical approach allowing other forms of data to be utilised. The importance of independent survey information is well recognized and for areas dependent on less reliable data, attempts should be made to introduce such surveys as a matter of urgency.

Intermediate (or proxy) targets – outline of a strategy and immediate measures

The subgroup decided that present scientific knowledge and data hindered discussions on the adoption of proxy's for the 40% escapement of silver eels. This discussion is for the future and requires improvements in understanding of the relationships between various stages in the eel life cycle. Outputs from parallel work such as the EU funded project SLIME (Study Leading to Informed Management for Eel, Project Number: FP6 - 022488) expected during the latter half of 2006 may well furnish some of the information required. For the present however, the Subgroup considered it crucial to offer advice on a long term strategy combining improved knowledge base and immediate management measures to address the universally agreed poor state of the populations of this species, particularly exemplified by the drastically reduced recruitment.

STECF agrees with the Subgroup's view that the longer term strategy and management plans will take some time to be effective and that immediate measures are necessary. The subgroup made three key recommendations for action addressing)fishing effort on adults, ii)turbines/pumping mortality and iii)limiting trade in glass eels in order to achieve an immediate increase in silver eel output. The immediate management measures attracted the most debate from STECF, in particular the Subgroup's recommendation to reduce fishing effort by 50%.

During discussion of how the 50% reduction figure had been determined and whether this was considered adequate, it emerged that this figure had been arrived at as a compromise and was not based on any single piece of scientific advice. The lack of a clear scientific outcome on this issue, gave STECF little confidence of its suitability. Various modeling studies were presented to the Subgroup some of which had suggested larger effort cuts were required. The Subgroup Chairman pointed out that models suggesting the largest required reductions in effort on eels were derived from northerly populations which have very long generation times and are not representative of other populations throughout most of the eel's range. However, the long-term stock response is more dependent on production capacity of the stock to provide a level of recruitment corresponding to a certain size of spawning stock or recruits per spawner. There was also concern in STECF that these modeling approaches generally might be making unwarranted assumptions about the relationship between page 32 22nd STECF Brussels,-7 April 2006 Conservation issues fishing effort and fishing mortality but in the absence of comprehensive data STECF could not consider this further. STECF was of the view that where a range of possible options existed, these should be presented to managers who are in a position to take consideration of appropriate levels of risk. Adopting a very risk averse attitude would imply that directed fishery should be closed for a while to see first the response in adult stock, and then, later on, in recruitment.

Furthermore, the suggested 50% fishing effort cut should be viewed *in conjunction* with the measure to cut turbine mortalities. However, as there is no certainty about time schedule to be applied in turbine modifications, and this is also outside of the power of fisheries managers, there is a need to make a sufficient management actions before the other actions are known.

The Subgroup had found difficulty in agreeing to very stringent action being applied to fishermen in the absence of efforts to reduce unquantified but likely significant mortality from other anthropogenic sources. A 50% effort cut coupled to reductions in turbine mortality achieved the widest support in the subgroup, but it is difficult for STECF to find clear scientific justifications for the conclusion. The observations of severely reduced recruitment alone, underline the need for a much more significant reduction in effort but there are additional considerations related to genetic variability that also point to the need for sustained periods of low fishing mortality on eel populations. Genetic characteristics determining longer residency in freshwater in some eels allows for excessive effort to operate on this portion of the population to the extent that genetic diversity is lost. Eel populations and the fisheries they potentially support could then be put at long-term risk and may no longer possess the characteristics to recover.

STECF emphasizes the need to ensure that the measures applied to deliver the effort reduction are effective in doing so. For example, reliance on regulation of days fishing in those elements of the fishery utilizing traps (fyke nets etc) is unlikely to achieve the target and it is necessary to ensure that schemes applied locally are appropriate to the fisheries concerned. There is also a need to ensure that the unit of fishing effort remains the same. Technological change in response to the imposition of effort controls (and other management measures) will almost certainly undermine the effort reduction measure.

STECF expressed concern that reductions in fishing opportunities would lead to the development of illicit fishing and encourage a black market particularly involving nonprofessional fishermen. There was particular concern over whether permitting a fishery for glass eels albeit for restocking purposes, provided opportunities for illegal trade. Details

for effective management of this aspect and the prevention of trade other than for restocking need to be carefully worked out. It was felt that a major difficulty might arise in relation to the use of glass eels in aquaculture. Unlike the rearing of salmon or trout, aquaculture sytems for eels do not remove the risk of overfishing, since, for the present, eels cannot reproduce in the rearing systems and wild caught juveniles are used instead. Demand for eel products produced in aquaculture as well as capture fisheries therefore contributes to the mortality of wild eels. STECF is of the view that for the measure on restricting trade in glass eels to be effectively limited to restocking purposes only, special efforts will be needed to ensure these do not end up in aquaculture enterprises. STECF wishes to make a clear statement that provision of uncontrolled trading opportunities at the time of a fishing ban encourages illegal fishing – this must be prevented.

There was some discussion of the need for a fishery for glass eels at all. It was not possible for STECF to exhaustively discuss and evaluate the benefits of restocking programmes. Some work suggests that restocked animals do not subsequently contribute to spawning but during the Subgroup's discussions, it was agreed that direct stocking of glass eels into habitats that had otherwise become unavailable (for example through barriers preventing upstream migration of glass eels) might potentially contribute to future spawning and should not therefore be excluded from management plans. STECF had concerns about aspects of the adaptive management elements of the plans discussed in the Subgroup's report – some members of STECF felt that adaptive management was inappropriate and that a simulation based approach adopting a highly risk averse approach was required. STECF recognised that reaching the 40% escapement objective could take of the order of 3 generation times. This means some considerable time might elapse between the management measures applying to young and adult eels in river systems and the time when significant improvements in recruitment might be detected.

Large delays between management measures and measurable response do not facilitate the effective use of adaptive management. Responses in the mortality of adult eels within inland systems following management measures is, however, potentially detectable on a shorter time scale but owing to the uncertain relationship between effort and fishing mortality and in the future spawning stock – recruitment relationship in the spawning areas, effort reductions would have to be large in order for impacts to be detectable and effective. In utilizing adaptive approaches, there is a need for response measures to any failures in existing plans to be based around the latest information and knowledge rather than on outdated measures conceived in data poor circumstances.

Data collection, monitoring and follow up

In its report, the Subgroup outlined the current status of data collection for eels and concluded that the important elements and framework are in place but that the process needs to be rapidly and effectively implemented. Member States need to give urgent attention to the actual collection and delivery of data relevant to eel management.

STECF was of the opinion that the supply of eel fishing capacity information under the DCR was not particularly important but that collection and supply of fishing effort data was essential and urgently required.

STECF considered that an important aspect of the follow up to this initiative is the dissemination of information and consultation with all stakeholders including industrial interests and officials responsible about water way management.

STECF recommendations

STECF considers that the constructive report of the Subgroup represents a significant step forward and should form the basis of early management action on eels. In the light of this

STECF recommends:

1. that the plans developed here, applying to inland waters and estuaries, should be accompanied by parallel plans for coastal waters as well.

2. That the reference level for silver eel should be established hierarchically depending on the quality of data available for a specific river basin. Preference should be given to historic data on silver eel escapement reflecting a near natural situation followed by other available historic data on eel which need modelling and inference to link them to silver eel escapement. If no historic data concerning eel for a given river basin exist other methods contained in the Subgroup report should be used for inference of natural silver eel escapement.

3. that methods to measure silver eel escapement should be adopted in a hierarchical order using various standard stock estimation methods depending on the quality of data available for a specific river basin. Preference should be given to data from fishery independent surveys where available

4. The Subgroup recommended that an immediate reduction in all fishing effort on all life stages of eel (professional and recreational as realised in COM(2005) 472 by a 15 day closure or by some other mechanism that reduces fishing effort by 50%. However, STECF can find no justification for the choice of this figure and recommends that as an immediate measure, the exploitation rate should be reduced in line with advice from ICES. This states that "ICES repeats its recommendation that a recovery plan for the whole stock be developed urgently, and that exploitation and other anthropogenic impacts be reduced to as close to zero as possible, until such a plan is agreed upon and implemented."

5. That in any implementation of effort reductions, in an attempt to reduce exploitation, careful attention is paid to ensuring the mechanisms for reduction are tailored to the different types of fishery to ensure effective reduction in fishing mortality.

6. That an immediate reduction in turbine and pumping stations mortality, with the initial emphasis placed on actions addressing mortality in the lowest reaches of the river basins. Special consideration should be given to achieving good quality spawner escapement from places where known contaminant levels or disease and parasite (Anguillicola) infections are absent or low

7. That a total ban on trading of glass eels for purposes other than restocking of open waters within the eels natural distribution area, until the stock has attained the level in the ICES advice which is 50% of virgin biomass.

8. That special attention is paid to the elimination of the glass eels trade for aquaculture. There should be no opportunities for uncontrolled trading to lead to illegal fishing that undermines efforts to reduce fishing mortality.

9. The longer term Management Plans should be developed in two phases and include milestones to be achieved at specific dates. The timetable for the implementation of the National Management Plans should remain unaltered. These should be submitted in December 2006 for approval and implementation by July 2007 at the latest. The final management measures should be established and implemented not later than 2015 and should, with all probability, achieve a full recovery of spawner escapement to 40% of the pristine level within three eel generations (that is: circa 20 years in the Mediterranean and up to 45 years or more in Northern Europe). In the calculation of the required protection levels, it can be assumed that equally protective measures are taken in the whole distribution area, and that increased spawner production results in recovery of recruitment, subsequently contributing to the full recovery in three generations time.

10. The Water Framework Directive time plan of implementing environmental and ecological monitoring (2006), a programme of measures (2009) and the achievement of good ecological status (2015) should have a positive impact on eel escapement and spawner quality. STECF notes that it is difficult to predict the real impact of these on eel populations in Europe. Additional eel specific measures should be adopted into the Water Framework Directive programme, such as reintroductions where absent in its natural distribution area, protection of waters where contaminants and parasites are low/absent and ensuring upstream passage for recruits and downstream passage for silver eels. Under the implementation of the Water Framework Directive specific extensions should be implemented for eel as an indicator of river connectivity and ecological and chemical status. The WFD should use of eels as a biomonitoring organism for monitoring the chemical status of surface waters with respect to hazardous substances, because of several ecological and physiological traits of this species.

11. That a campaign to disseminate the management ideas to all stakeholders (including large scale industries – eg hydro) is an important requirement.

12. That there is urgent implementation of agreements on data collection on eels

Scope of management plans

The guidelines proposed in the present report refer to management of eels in rivers and estuaries. The subgroup recognises that this only covers a part of the total eel fishery and that there is a need for development and implementation of corresponding management plans for the eel fishery in coastal waters also. Such actions must be in step with the management of inland water if the desired effect on eel recruitment should be reached.

Guidelines for the content of eel management plans

Regarding ToR a: How to establish the reference level for escapement (e.g. in terms of Kg silver eel escapement per hectare of eel habitat)

The expert group advises that for eel management plans the reference level for escapement should be established according to the following hierarchical procedure:

1) Preferentially from available historic data on silver eel escapement in terms of kg silver eel per hectare of eel habitat if it is plausible that such data reflect a near natural situation in which no barriers to migration existed as well as no mortalities from fishing, turbines, pumping or pollution. Reference periods have to be chosen in relation to specific river basin characteristics and based on recruitment observed at historic natural levels at least before 1980.
2) Where such data are not available the reference level for escapement should be inferred from other available data on e.g. (again in hierarchical order):
    a) Time series of eel (yellow and silver eel) density data
    b) Time series of catch data of silver eels
    c) Time series data of catches of yellow eels
    d) Time series data of recruitment of juvenile eel

    if it is plausible that the time series spans back to a near natural situation as described above and it can be shown (by appropriate models) how these variables relate to silver eel escapement.

    3) Where neither historical data on silver eel escapement nor a modelling approach using other historical eel data can be pursued, the reference level should be inferred from either
    a) the nearest comparable (in terms of geology, morphology, etc.) river basin for which data exist,
    b) an estimate of silver eel escapement based on a refined habitat suitability models (ICES, WG eel 2004), or
    c) a present survey of one or several life stages of eel as mentioned under 2 in combination with the general decline in eel recruitment observed throughout Europe and related to silver eel escapement using the same models as in 2, or a combination of two or more of these options.

Regarding ToR b: How to measure silver eel escapement, and any other relevant parameters

The expert group advises that silver eel escapement should be measured using the following options in hierarchical order:

1) Preferentially by direct measurement using total census trapping,
2) By population estimates of silver eel using standard stock assessment methods (e.g. mark recapture techniques)
3) By an estimate of escapement based on catch of silver eel and gear efficiency.
4) By an estimate of silver eel escapement based on yellow eel catches using appropriate models to relate the two variables as used in guidelines regarding ToR a, option 2.
5) By an estimate of silver eel escapement based on juvenile eel catches using appropriate models to relate the two variables as used in guidelines regarding ToR a, option 2.

For guidelines how to measure other relevant parameters see ToR d.

Regarding ToR c: How, and whether, to establish intermediate (or proxy) targets such as settlement rates for glass eel, population

densities for yellow eel, maximum mortality rates due to fishing or turbine passage, or relevant water quality parameters

In the majority of River Basin Districts the 40% silver eel escapement target is viable only as a long-term policy objective and not as an operational target, since current stock abundance is based on recent recruitment of much less than 40% of historical recruitment. Eel management plans cannot therefore be based on this target in the short-term.

The recovery of eel should be achieved through the development of management plans which identify those measures needed to be in place by 2015 at the latest in order to ensure compliance with the 40% escapement target within 3 eel generations and should comply with a short term suite of measures implemented at the local level as outlined below.

Strategy

The long term strategy for reaching the 40% escapement target with respect to pristine conditions, which should include scientific investigations (i.e. recruitment and escapement rates, mortality factors) and data collection systems, and include interim targets, monitoring and financing mechanisms, will need to address re-establishment of the distribution, controls of fishing mortality and effort, continuity of migration (barriers, turbines, pumping), and predation by natural predators (e.g. cormorants).

The short term strategy implemented by the Commission, independent of the acceptance of a viable Management Plan (July 2007), must introduce immediate actions addressing fishing mortality and effort, and turbines/pumping mortality to achieve an immediate increase in silver eel output. These should include:

- a considerable immediate reduction in all fishing effort on all life stages of eel (professional and recreational), as realised in COM(2005) 472 by a 15 day closure or by some other mechanism that reduces fishing effort by 50%
- a comparable immediate reduction in turbine and pumping stations mortality, with the initial emphasis placed on actions addressing mortality in the lowest reaches of the river basins. Special consideration should be given to achieving good quality spawner escapement from places where known contaminant levels or disease and parasite (Anguillicola) infections are absent or low
- A total ban on trading of glass eels for purposes other than restocking of open waters within the eels natural distribution area, until the stock and recruitment have recovered to historic levels.

Where existing national measures already ensure, for specified river basins, that the objective of 40% silver eel escapement is met, the Member State concerned may submit a request for exemption from the immediate reductions specified above. This exemption procedure is in line with the proposals in Article 4(1) of COM(2005) 472.

Within the boundaries of an implemented Management Plan, a member state may request to modify fishing and/or turbine/pumping station restrictions to a level that results in the

immediate achievement of a demonstrable 40% escapement target. Otherwise, the restrictions listed above remain in place at least until the first post-evaluation date of June 2009.

Eel Management Plans

The Management Plans should be developed in two phases and include milestones to be achieved at specific dates.

The timetable for the implementation of the National Management Plans should remain unaltered. These should be submitted in December 2006 for approval and implementation by July 2007 at the latest.

The final Management measures that will lead to a full stock protection should be established and implemented not later than 2015 and should, with all probability, achieve a full recovery of spawner escapement to 40% of the pristine level within three eel generations (that is: circa 20 years in the Mediterranean and up to 45 years or more in Northern Europe). In the calculation of the required protection levels, it can be assumed that equally protective measures are taken in the whole distribution area, and that increased spawner production results in recovery of recruitment, subsequently contributing to the full recovery in three generations time.

Adaptive Management

In the event of the failure of a Member State to implement a Management Plan, or for a Management Plan failing to adequately demonstrate the ability to achieve the long-term target, or the failure of a member state to implement or achieve the required short-term immediate actions while implementing the Management Plan, the immediate actions (50% reduction in fishing and turbine/pumping station mortality) should be carried through into the Management Plan and post-evaluated in June 2009. By that date, the absence of a demonstrable positive effect of the immediate measures, or a further failure to implement Management Plans must result in additional restrictions, a further reduction in fishing effort and turbine/pumping station mortality and subsequent shortening of the evaluation period.

Water Quality and Habitat Continuity

The Water Framework Directive time plan of implementing environmental and ecological monitoring (2006), a programme of measures (2009) and the achievement of good ecological status (2015) should have a positive impact on eel escapement and spawner quality. Additional eel specific measures should be adopted into the Water Framework Directive programme, such as reintroductions where absent in its natural distribution area, protection of waters where contaminants and parasites are low/absent and ensuring upstream passage for recruits and downstream passage for silver eels. Under the implementation of the Water Framework Directive specific extensions should be implemented for eel as an indicator of river connectivity and ecological and chemical status. The WFD should use of eels as a biomonitoring organism for monitoring the chemical status of surface waters with respect to hazardous substances, because of several ecological and physiological traits of this species (WG EEL ROME 2006).

Regarding ToR d: Provisions for data collection, monitoring and the follow-up and enforcement of regulations. Such data collection should be adequate to allow an estimation of whether compliance with the target has been achieved

The eel has been included in the EU Data Collection Regulation (Council regulation 1543/2000 and Commission regulations 1639/2001, 1581/2004). Required sampling levels have only been indicated tentatively, and only few countries have actually included eel in their sampling programmes. A Workshop on Data Collection for the European Eel, organised by the Swedish Board of Fisheries, in Sånga Säby (Sweden) from 6th-8th September 2005 has specified minimum requirements on sampling levels for fishery-dependent and fishery-independent data, for the three exploited life stages (glass eel, yellow eel and silver eel), in both inland and coastal waters.

Those requirements as well as registration of fishing capacity, effort and landings of commercial eel fisheries (both marine and inland) should be mandatory under the DCR. Estimation of non-commercial catches should be investigated in pilot studies. Catch composition sampling, recruitment surveys (glass eel, young yellow eel), stock surveys (yellow eel) and assessment of spawner production and anthropogenic impacts on the stock should be implemented where non-existent. To this end, an internationally co-ordinated pilot project, to establish a cost-effective system for monitoring of spawner escapement rate and fishing mortality by spatial management units should be set up. The results of the pilot project can be used to identify precision levels and sampling intensities, and for setting up routine monitoring sampling programs to be included in the DCR.

Appendix 1 List of participants

Invited experts:

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