Evaluation of EMP for MS Netherlands – Version 2 after receiving additional data and analysis from the NL on stocking, effect of measures, recovery time and "Third opinion" on target.

1. **Compatibility/consistency of methods used to estimate biomass in shared river basins;**

    a. **General:**

Four river basins extending beyond national boundaries are recognized by the plan: the river Ems basin shared with Germany; the River Rhine shared with Germany, Luxembourg, Switzerland, France, Austria, and Liechtenstein; the river Meuse basin covers Belgium, Luxembourg, France, and Germany; the river Scheldt basin shared with Belgium and France. The existing international river commissions related to this area have a long history of coordination on water quality issues. Coordination related to fisheries management is in the formative stages. For this reason the Dutch have submitted one national plan.

    b. **Special attention devoted to the Baltic Sea and European waters falling outside the scope of Directive 2000/60/EC in the context of transboundary coordination as specified in the preamble (11) of Council Regulation (EC) No 1100/2007:**

Not an issue in this area.

2. **Estimate of silver eel escapement;**

    a. **Reliability of methods used (Is the model scientifically sound and is it supported with sufficient and reliable data), as referred to in Article 2(5) of the Regulation to calculate potential silver eel escapement:**

The Dutch methods for estimating targets for silver eel migration are based on yields and the available production area (Dutch EMP, p. 43). The EMP reports of an internal debate on the reliability of existing data and suitability of method applied.

i. Estimate of pristine escapement:

Two methods provide an estimate of 10 000-15 000 tonnes independently of each other. This translate into a target of 4000-6000 tonnes. A "Third opinion" estimate gives a target value of 2600-8100 tonnes (and thus total escapement of 6500-20250 tonnes) without considering density dependent factors and states that it is most probably lower than 4000-6000 tonnes if density dependent effects and carrying capacity are taken into acount. We evaluated the "Third opinion" analysis and found that the density dependent factors are weaker than indicated and that carrying capacity is higher than suggested (see Annex 1). We were not able to point at one estimate as better than the other. As the aim is to get one value the mean of the first interval is 12500 and the other is 13375 tonnes, it seems reasonable to set the pristine escapement to 13000 tonnes.

ii. Estimation of current escapement:

Current escapement is reported to be 400 tonnes of silver eel. Of this total, 200 tonnes is estimated to be originating from neighboring countries (primarily produced from the Rhine RBD) and 200 tonnes is attributed to eels originating from the Netherlands.

iii. Current potential escapement given no fishing:

1120 tonnes (2004 values) is caught in the commercial and recreational fishery. If this fishery is stopped the potential escapement corresponds to at least this amount plus the 200 tonnes already escaping giving an estimate of 1320 tonnes of silver eel escapement.

iv. **Current potential escapement given no anthropogenic mortality at all:**

To estimate potential escapement without anthropogenic mortality 61-167 tonnes (Table 2.4.1) must be added to the current potential escapement given no fishing, for mortalities from hydropower and water pump stations, plus an unknown fraction of mortality related to barriers. This will result in a 1381-1487 tonnes plus an unknown fraction due to barriers.

b. Accuracy (estimated range or confidence intervals) of estimates of current and pristine silver eel escapement:

Based on the information provided in the EMP, the accuracy has been subjectively determined to be medium.

c. Coherency of estimates for shared river basins:

The plans of shared basins are yet to be received at ICES.

d. Compatibility of methods used for shared river basins:

The plans of shared basins are yet to be received at ICES.

3. **Restocking**

a. Expected contribution of restocking measures to reaching the escapement target:

The plan is to stock with at most 1000-1600 kg of glass eels and that is claimed to result in 100 tonnes of silver eel escapement in 2027 (p.24).

b. Appropriateness of areas and times selected for restocking with respect to restocked eels completing their inland lifecycle and beginning their spawning migration from the restocked area:

Specific geographical areas have not yet been identified. However, it is apparent from the EMP that there will be suitable areas for restocking measures. An independent stakeholder organization, *Future for Eel* will coordinate restocking efforts.

c. Does the EMP include the requirement for reserving 35% increasing to 60% of eel less than 12 cm caught (live and dead glass eel), for stocking (Article 7, (1 &2)?

The Netherlands does not have a commercial catch of glass eel.

4. **Quantification of expected contribution (in terms of silver eel biomass) of each proposed measure towards the achievement of the escapement target:**

The plan quantifies silver eel escapement related to each proposed measure on p. 33 (Dutch EMP) and in Tables 3-2 to 3-4 in Klein Breteler (2009, Eel Management Plan The Netherlands. Supplement: ICES Comments). The values based on analysis by Klein Breteler (2008) are focusing on individual measures implemented and the amount of survivors. It is assumed that they are not dying due to other causes. This is of course an unrealistic assumption and the aim of the calculations is only to indicate the relative effectiveness of each measure against the others. Improvements of survival at pumping stations, fishing free zones and angling and recreational fishing are the most important tools in the medium to long term.

5. **Achieving with high probability and in the long term, the escapement to the sea of at least 40% of silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock (Regulation (EC) 1100/2007, Article 2 (4);**

There is no overall effect given for the impacts of proposed measures on silver eel escapement in the short, medium, and long term.

a. **Time schedule for the attainment of the target level set in Article 2, (4 & 9):**

i. **Reported time schedule for reaching the 40% goal:**

Not given.

ii. **Intermediate time schedule reflecting the 'gradual approach':**

Not given.

iii. **Measures as of the first year:**

Measures planned for the first year of implementation (2009) include: Mitigation of impacts from migration past barriers and hydroelectric stations including transport and release of silver eels. Restrictions on the fishery include fishery-free zones, measures to limit impacts from angling in both marine and inland waters, and restocking.

iv. **Expected recruitment level:**

Not given.

v. **Likelihood/probability of achieving the target within the timeframe mentioned:**

No timeframe given. The Netherlands plan of achieving the target will dependent on an almost complete recovery of the natural recruitment to the pre-1980 level.

b. **With two or more plans, achieving the 40% target for all or as national average:**

N/A

6. **Inclusion of adequate measures to monitor and verify successful implementation of the plan(s); Monitor and verify management target:**

Research has begun in 2008 for the development of an eel monitoring program.

7. **Qualitative analyses of the plan(s);**

a. **Qualitative analysis of possible effectiveness of the (each) plan as a whole:**

As discussed above the main issue with the Dutch EMP relates to the assumption of recruitment recovery in the long term to the pre-1980 level. This assumption is dependent on the impacts of measures related to the eel Regulation at a pan-European scale.

Short- and medium-term improvements of survival in eel of a similar magnitude as a reduction in fishing intensity to less than 15% of the present level is needed for reversing the downwards decline in the eel stock. As the Dutch EMP is not resulting in this level of improved survival of eel in the short and medium term the Dutch plan will only be effective if other countries are compensating for this shortage.

Alternatively*, if the aim is to use stocking to reach the target and be independent of natural recruitment, restocking could be increased to about 40 times the planned restocking, i.e. 40-64 tonnes of glass eel (0.3 g). Taking into account the mortality in the process of catch and transport, this corresponds to a catch of glass eel of 80 – 130 tonnes.

b. Qualitative analysis for plans pertaining to a shared river basin:

The plans of shared basins are yet to be received at ICES.

8. *Possible negative impact of one plan on the effectiveness of other plans for shared river basins, parts of the Baltic Sea area, and and European waters falling outside the scope of Directive 2000/60/EC in the context of transboundary coordination as specified in preamble (11) of Council Regulation (EC) No 1100/2007:*

The plans of shared basins are yet to be received at ICES.

*This should not be viewed as a recommendation/endorsement to necessarily rely on stocking to reach targets but is one possibility and is part of the larger evaluation of EMPs where the intention is to sum the possible need for comparison with the available supply.

Annex 1.

Copenhagen 9/7-2009

ICES consideration of the "Third Opinion"/ Eijsackers commission report NL EMP.

There is unfortunately a lack of historic data on eel stocks and habitat to support the development of precise estimates of pristine silver eel escapement. Therefore, a balanced judgement of the data and analysis available are needed. ICES strives to do that objectively and free of political influence. The main points in the so-called "Third Opinion" or Eijsackers commission report seem to be (taken from the Conclusions):

"The models used by IMARES and VIVION for their target scenarios

- are generally accepted methods and in line with the eel Regulation of the EU. They were applied correctly but less suitable for the calculation of a natural reference population if they are based on unfished populations

Neither method took sufficient account of factors that played a role before 1980 like

- Density related mortality and growth (IMARES), and
- Eutrophication and cormorant predation (VIVION) –

If these had these factors been taken into account, target scenario numbers would have been lower."

Regarding the first bullet point ICES WGEEL (see: EG WGEEL ICES CM 2008/ACOM:15 - http://www.ices.dk/workinggroups/ViewWorkingGroup.aspx?ID=75), consisting of about 40 of the worlds leading experts in eel biology, found that generally the methods used by IMARES and VIVION are appropriate for this specific purpose. This is not to say that ICES cannot be wrong, but we are then talking about breaking new ground scientifically. The "Third Opinion" work and report provides good input to the ICES process of constantly striving to improve the scientific foundation of the advice. The ICES scientific community will take this into consideration in their further work on improving the basis for the eel advice.

At this stage we would like to point out that maybe the difference in opinion is not very large. To illustrate this, we focus on the scenario analysis presented in Fig. 1 in the "Third Opinion" report:

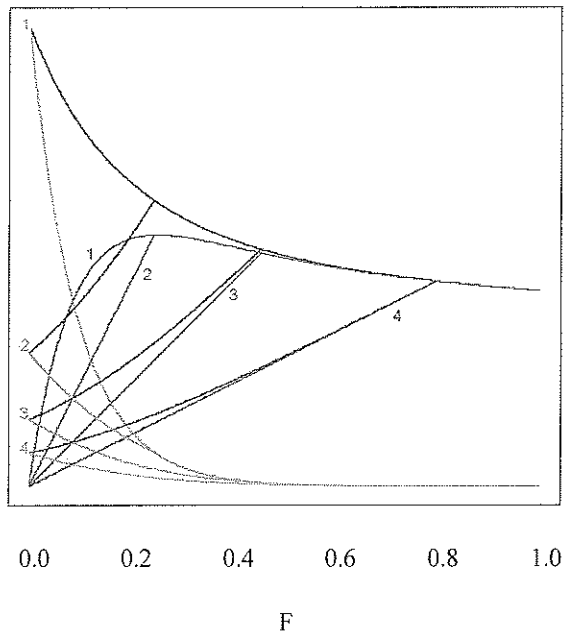

Fig. 1. Silver eel migration is indicated in green lines harvested brown eel in red as function of fisheries mortality F. The black lines give the sum of migration and harvest. Calculations are based on the Committee's simple model which takes account of the density related natural mortality of the smallest and unfished year classes. The lower the carrying capacity, the higher mortality rates here. The results given are based on 4 assumed carrying capacity scenarios: (1) in which carrying capacity is limitless; 2) in which carrying capacity is 50 kg/ha; 3) in which carrying capacity is 25kg/ha; (4) in which carrying capacity is 12.5 kg/ha.

The carrying capacity values used are all, except of course option 1), on the low side of the realistic values-judged from studies mainly in other countries than the Netherlands. In Denmark for instance, direct measurements of silver eel escapement have shown values in excess of 50kg/ha meaning that the standing stock biomass carrying capacity must at least be that high and probably significantly higher. Tesch (Tesch F. W. The Eel. (2003) 3rd edn. Blackwell, London. 416) gives several examples of over 100 kg/ha standing stock biomass of eel. He also lists biomasses of New Zealand eels, two very similar species to the European eel. These are interesting because they are closer to the pristine situation due to quite undisturbed rivers and lakes and little fishery. These values are several factors higher than 100 kg/ha so there seem to be little reason to suspect that from an ecosystem point of view there should be problems with high biomass values and thus high carrying capacity. Thus, for Dutch waters, which are to be counted as well suited for eel, carrying capacity are probably higher than the scenario 2)-4) shown in the Fig. 1. A more realistic figure is well above 100 kg/ha. If we extrapolate from the plot in Fig.1 with carrying capacity of 100-200kg/ha, escapement is higher than the catch. Thus, the method by VIVION is probably rather an underestimate than an overestimate, because it is unlikely that fishing in the past was at Fmax and that all catch was reported.

It is agreed that eutrophication level and cormorants density probably were different in the pre-1980 period compared to the real pristine period, but so were other factors like wetted areas and predators on eel predators (i.e so-called second order effects), working in the opposite direction. Furthermore, the Eel Regulation specifically states in Article 2, 5 (a) "use of data collected in the most appropriate period prior to 1980, provided these are available in sufficient quality and quality."

In conclusion we maintain that our suggested target of 5200 t silver eel escapement is a balanced estimate of the 40% pristine silver eel escapement target, based on the data and analysis available.