The North Sea Regional Advisory Council

NSRAC

Nephrops

Long Term Management Plan

Short Briefing note

Role of the Group

To build a Long Term Management Plan (LTMP) for Nephrops (Nephrops Norvegicus) and present said plan to the Demersal Working Group (DWG) of the North Sea Regional Council.

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1. The development of a LTMP for Nephrops would, at first glance, seem to be straightforward however, notwithstanding its relatively healthy biological status there are some particular aspects of North Sea Nephrops (Nephrops Norvegicus) which make it a rather complex stock to deal with by comparison. Notwithstanding these complexities, which will be well explained on the day, it is important that we approach the task at hand with a clear vision and a blank sheet of paper.

2. A small criticism of many existing LTMP's is their failure to take 'reasonable account' of economic factors; this group may use the opportunity to explore how such criteria may be introduced into the Nephrops LTMP. The group may wish to investigate an approach based on maximum economic yield (MEY) and the potential of such an approach to deliver rewards aligned to the social optimum.

3. In the absence of stock reference points the group should consider the methodology best suited for determining the health of the stock and should similarly consider the mechanism, or mechanisms, required to retain the required stock status.

4. The current management regime (by management area) fails to take account of the various functional, unit based fisheries; ICES and STECF have both highlighted the risks involved with such an approach. The group may wish to investigate alternative approaches and/or safeguards against the threat of localised stock depletion.

5. The group should be aware of the issue of discards and the wider contribution of Nephrops fisheries to mortality on depleted stocks.

6. Annexes to this note

Annex I – *Guiding principles for the introduction of Community, Long Term Management Plans (Article VI of Council Regulation (EC) No 2037/2002).*

Annex II – *Guiding Principles for the introduction of recovery plans (Article V of Council Regulation (EC) No 2037/2002.)*

Annex III – *Extract from the Commission Staff Working Document (21st Report of the Scientific, Technical and Economic Committee for Fisheries)*

Annex I

Article 6

Management plans

1. The Council shall adopt management plans as far as necessary to maintain stocks within safe biological limits for fisheries exploiting stocks at/or within safe biological limits.

2. Management plans shall include conservation reference points such as targets against which the maintenance of stocks within such limits shall be assessed. Points (a) to (d) of Article 5(2) shall apply.

Management plans may include targets relating to other living aquatic resources and the maintenance or improvement of the conservation status of marine eco-systems.

Where more than one target is set, management plans shall specify the order of priority of these targets.

3. Management plans shall be drawn up on the basis of the precautionary approach to fisheries management and take account of limit reference points recommended by relevant scientific bodies. They shall ensure the sustainable exploitation of stocks and that the impact of fishing activities on marine eco-systems is kept at sustainable levels.

They may cover either fisheries for single stocks or fisheries exploiting a mixture of stocks, and shall take due account of interactions between stocks and fisheries.

The management plans shall be multi-annual and indicate the expected time frame for reaching the targets established.

4. The management plans may include any measure referred to in points (d) to (i) of Article 4(2) as well as harvesting rules which consist of a predetermined set of biological parameters to govern catch limits.

The measures to be included in the management plans shall be proportionate to the objectives, the targets and the expected time frame, and shall be decided by the Council having regard to:

(a) the conservation status of the stock or stocks;

(b) the biological characteristics of the stock or stocks;

(c) the characteristics of the fisheries in which the stocks are caught;

(d) the economic impact of the measures on the fisheries concerned.

5. The Commission shall report on the effectiveness of the management plans in achieving the targets.

Annex II

Article 5

Recovery plans

1. The Council shall adopt, as a priority, recovery plans for fisheries exploiting stocks which are outside safe biological limits.

2. The objective of recovery plans shall be to ensure the recovery of stocks to within safe biological limits.

They shall include conservation reference points such as targets against which the recovery of the stocks to within safe biological limits shall be assessed.

Targets shall be expressed in terms of:

(a) population size and/or

(b) long-term yields and/or

(c) fishing mortality rate and/or

(d) stability of catches.

Recovery plans may include targets relating to other living aquatic resources and the maintenance or improvement of the conservation status of marine eco-systems.

Where more than one target is set, recovery plans shall specify the order of priority of these targets.

3. Recovery plans shall be drawn up on the basis of the precautionary approach to fisheries management and take account of limit reference points recommended by relevant scientific bodies. They shall ensure the sustainable exploitation of stocks and that the impact of fishing activities on marine eco-systems is kept at sustainable levels.

They may cover either fisheries for single stocks or fisheries exploiting a mixture of stocks, and shall take due account of interactions between stocks and fisheries.

The recovery plans shall be multi-annual and indicate the expected time frame for reaching the targets established.

4. Recovery plans may include any measure referred to in points (c) to (h) of Article 4(2) as well as harvesting rules which consist of a predetermined set of biological parameters to govern catch limits.

Recovery plans shall include limitations on fishing effort unless this is not necessary to achieve the objective of the plan. The measures to be included in the recovery plans shall be proportionate to the objectives,

the targets and the expected time frame, and shall be decided by the Council having regard to:

(a) the conservation status of the stock or stocks;

(b) the biological characteristics of the stock or stocks;

(c) the characteristics of the fisheries in which the stocks are caught;

(d) the economic impact of the measures on the fisheries concerned.

5. The Commission shall report on the effectiveness of the recovery plans in achieving the targets.

Annex III

5.2.3 *Nephrops* stocks

STECF was asked the following:

Identify which harvest rates for stocks of Nephrops are consistent with exploiting the stocks at maximum sustainable yields (or suitable proxy) and, if relevant economic information is available, STECF should also identify which harvest rates are consistent with exploiting the stocks at maximum economic yield. This request applies to all stocks of Nephrops where ICES provided advice in the form of a table of harvest rates in October 2005.

5.2.3.1 Background

ICES advice on the status of *Nephrops* stocks has been based since 1992 on XSA assessments using sliced length composition data. In recent years, however, the quality of official landings data has been called into question leading to doubts about the reliability of both the TAC advice and the analytical assessments conducted by ICES. In its 2005 analysis, ICES did not include assessments based on landings data – in particular because of unreliability and uncertainties in the suitability of the XSA method for *Nephrops*. ICES did, however, provide information on the state of some stocks using fishery independent data; specifically, underwater television surveys. These avoid the problem of variable catch rates in trawls surveys that arise from the emergence behaviour of *Nephrops*. ICES further showed that for a number of *Nephrops* stocks (in the North Sea and West of Scotland) current levels of exploitation appear sustainable but advised against any increase in effort. ICES/ACFM also noted the need for mandatory collection of accurate data to assist in the future assessment process.

Based on the available fishery independent data (underwater television surveys), ICES went on to advice on potential catch levels for 2006; this advice was obtained by applying a range of possible harvest ratios (HR) to the TV abundance data. However, in the absence of a more suitable approach, these harvest ratios were based on a comparison with reported landings. Given that the quality of landings and other official data is questioned in the ICES report, the appropriateness of harvest ratios based entirely on these data is problematic.

5.2.3.2 STECF comments

STECF considered an alternative approach, based on yield per recruit analysis, to determine more appropriate harvest ratios, (see ICES *Nephrops* assessment WG Report 2004). Although the use of length cohort analysis (LCA) or other similar techniques have shortfalls, the concerns mainly relate to estimating the current state of exploitation, and not the overall shape of the yield per recruit curve, and, consequently, reference points based on that curve. Yield per recruit analysis provides estimates of a number of reference points including F_{max} (a proxy for MSY) and the more cautious F0.1. STECF noted both that F_{max} is more difficult to estimate than F0.1 and that F*msy* is normally expected to be at or below Fmax but also depends also on stock recruit relationships that are unknown for these stocks. Given these uncertainties STECF is of the opinion that F0.1 is an appropriate fishing mortality to recommend for exploitation: this would be

consistent with the precautionary approach. Data from six major *Nephrops* fisheries (in two groups of 3 stocks, in the North Sea and to the West of Scotland) and for which extensive data exist, were considered and the results, F_{max}, F0.1 and the corresponding harvest ratios (HR), are shown in the Table 5-1

Table 5-1 F_{max}, F0.1 and the corresponding harvest ratios (HR)

Stock	F_{max}	HR%	$F_{0.1}$	HR%
Group 1: West of Scotland stocks.				
North Minch	0.40	33.1%	0.23	20.5%
South Minch	0.55	42.4%	0.23	20.7%
Clyde	0.36	30.0%	0.23	20.4%
Mean		35.2%		20.5%
Group 2: North Sea stocks.				
Fladen	0.39	32.4%	0.21	19.2%
Forth	0.36	30.5%	0.22	19.4%
Moray Firth	0.45	36.1%	0.24	21.0%
Mean		33.0%		19.9%

The (combined sex) yield per recruit curves for these two groups are also shown. Both the yield per recruit curves and the estimated reference points generated from the curves are relatively consistent between areas. This is not unexpected given the similar growth and natural mortality and selection patterns in the fisheries.

- F_{max} varies between 0.36 and 0.55, and exploitation at this level would imply an average harvest ratio between 33 – 35%.
- A more precautionary level, F0.1 appears particularly consistent, ranging from 0.21 to 0.24, equating to a harvest rate of approximately 20%.

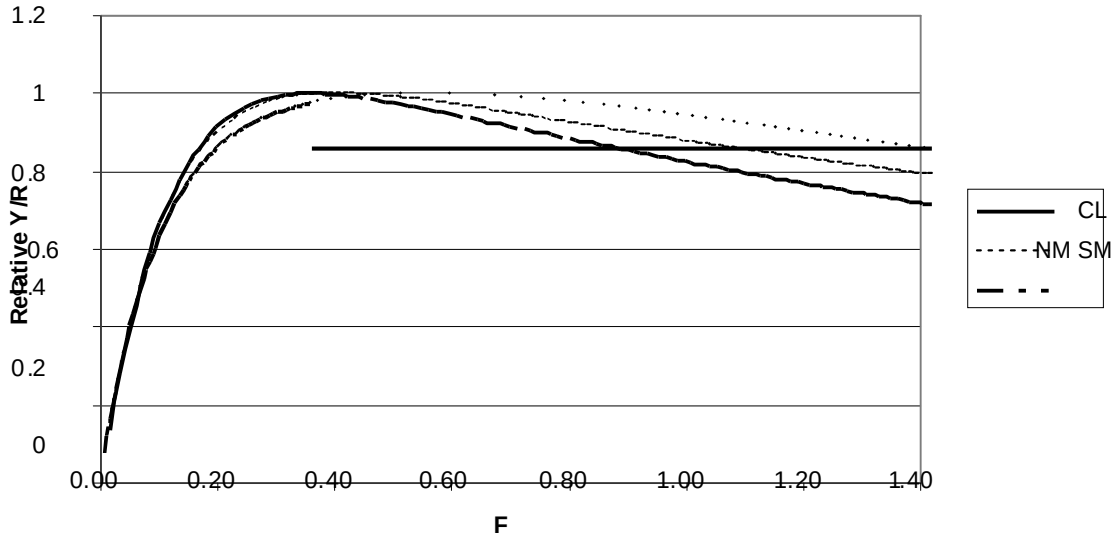

Figure 5-1 Combined sex relative yield per recruit curve for West of Scotland Nephrops stocks, based on LCA.

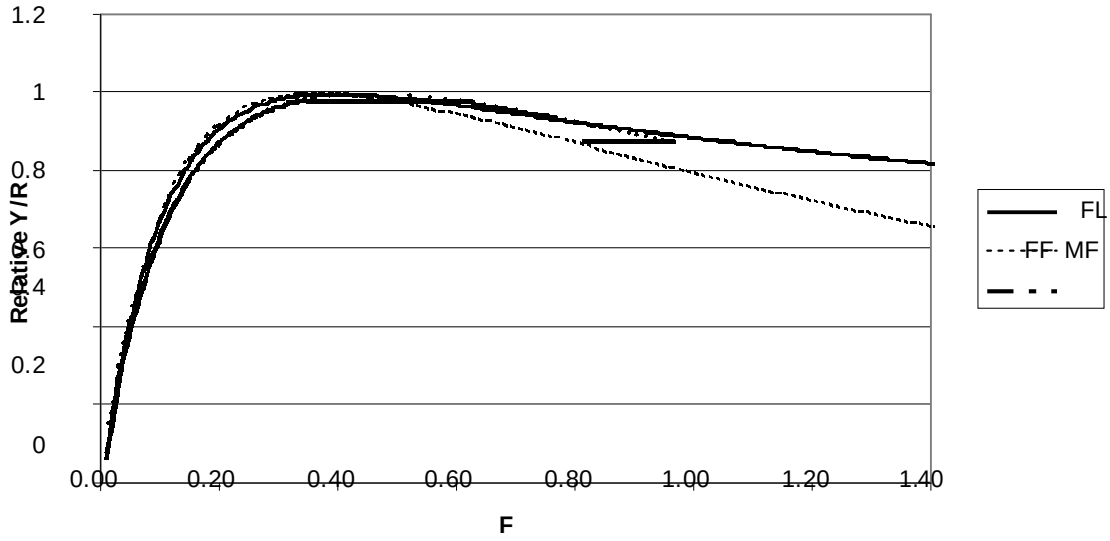

Figure 5-2 Combined sex relative yield per recruit curve for Northern North Sea Nephrops stocks, based on LCA.

5.2.3.2.1 TV survey abundance and use of the harvest ratios to provide catch advice.

Based on the available fishery independent data (underwater television surveys), ICES has reported that the six *Nephrops* stocks considered here are stable or in some cases increasing in abundance. STECF considered trends in TV abundance and trends in mean size in the landings and catch and concurred with the ICES conclusion. Increases in abundance were particularly evident for the West of Scotland *Nephrops* stocks. Mean size of the larger component of the landings are generally stable while in the small component there is more fluctuation, reflecting recruitment variability. The stable mean size of the larger components provides a further indicator of the healthy nature of these stocks.

5.2.3.3 Economic Aspects

When the production (income) and cost curves are not known in detail it is not possible to calculate the maximum economic yield (MEY). When the maximum sustainable yield (MSY) (or other biologically based exploitation rate) has been established, it is possible to determine the appropriate maximum number of vessels (capacity) taking into account the days at sea, and the harvest per day at this exploitation rate. When this level is achieved in practice, a step by step procedure should start with cuts in capacity in order to explore the shape of the production curve as the maximum economic yield is more conservative than the MSY. The commission should investigate this further through a WG with appropriate TOR.

5.2.3.4 STECF Conclusions

The results given here, which provide guidance for the general exploitation targets for *Nephrops* functional units in VIa (North Minch FU 11, South Minch FU 12, Clyde FU 13) and in the North Sea (Fladen FU 7, Forth FU 8, Moray Firth FU 9). STECT considers that implementation of these exploitation rates needs to take the following points into consideration.

- There is evidence of unreported catch (from ICES reports and an EU project
  99/OJ C122) and therefore current catches are already higher than reported landings. As a result current exploitation rates as estimated by landings data and reported by ICES are almost certainly underestimates.
- Management is currently carried out on a management area basis, within which are several Functional Unit based fisheries. If the object is to manage these areas in accordance with an F0.1 objective there is a need to ensure that appropriate harvest rations are maintained in each of the functional units. i.e. separate *Nephrops* stocks must be managed separately.
- Some of the "*Nephrops*" fisheries make an important contribution to mortality on depleted stocks. Therefore there is a need for effort management and mandatory by-catch mitigation methods that are consistent with recovery plans and management plans for other stocks that are caught in fisheries for *Nephrops*.

Taken together these points lead to the following STECF conclusions for exploitation of *Nephrops*.

STECF considers that $F_{0.1}$ is a suitable sustainable exploitation target for *Nephrops* Functional Units in VIa (North Minch FU 11, South Minch FU 12, Clyde FU 13) and in the North Sea (Fladen FU 7, Forth FU 8, Moray Firth FU 9) and that is best achieved through a functional unit based effort management regime with accompanying by-catch mitigation measures. Any such regime should be consistent with recovery plans and management plans for other stocks that are caught together with *Nephrops*.

STECF notes that exploiting *Nephrops* at F0.1 implies an approximate harvest rate corresponding to a catch/biomass ratio of about 20%. However, given the concerns regarding unreported catch, the harvest rates for the above *Nephrops* Functional Units presented in the ICES advice, which are based on the ratio of reported landings to the estimated biomasses from underwater TV surveys, are almost certainly underestimated.

Taking into account the requirements of recovery plans and management plans for other stocks that are caught in fisheries that exploit *Nephrops,* together with the uncertainty regarding current harvest rates, STECF makes the following two recommendations:

1. STECF recommends that there should be no increase in the exploitation rate on *Nephrops* Functional Units in VIa (North Minch FU 11, South Minch FU 12, Clyde FU 13) and in the North Sea (Fladen FU 7, Forth FU 8, Moray Firth FU 9). STECF stresses that this means that *Nephrops* catches i.e. landings and discards, and effort in these fisheries for *Nephrops* should be capped at the recent (2004) level or reduced in line with the requirements of recovery plans and management plans for other stocks that are caught together with *Nephrops* from these Functional Units.
2. STECF recommends that without a move to a functional unit based effort management regime with accompanying by-catch mitigation measures there should be no move to $F_{0.1}$ as a target.

Marrs, S.J., Tuck, I.D., Arneri, E., La Mesa, M., Atkinson, R.J.A., Ward, B., Santojanni. A. 2002. Technical Improvements in the assessment of Scottish *Nephrops* and Adriatic clam fisheries.(99/077 Study Project in support of the Common Fisheries Policy call for proposals 99/OJ C122)

Report of the Working Group on *Nephrops* Stocks 28–01 April 2004 Lisbon, Portugal ICES CM 2004/ACFM:19