Annex 2 on key scientific principles for stock management in the context of CFP reform

The CFP reform will yet again be an important topic of discussion at the upcoming Fisheries Council meeting, and the outcome of the Belgian Presidency conference on 'improved fisheries and science partnerships as policy drivers', taking place in Ostend at the time of writing, will then be presented.

Considering the widespread lack of reliable data and distrust in science among sector interests, better cooperation between fishers and scientists is a way forward that addresses both these problems. Efforts contributing to more and better data on fisheries will in turn contribute to more robust scientific advice, which is the foundation of good fisheries management decisions. However, for all fisheries a level of uncertainty inevitably exists due to the vast nature and complexity of the marine environment. Decision-makers need to recognise this inherent uncertainty and adopt a science-based, precautionary approach to fisheries management. In this context, we would like to take the opportunity to offer our views on some scientific principles for stock management as a contribution to the CFP reform discussion.

LONG-TERM MANAGEMENT PLANS AS A FRAMEWORK

For too long, annual haggling over TACs and quotas has persisted, with catch opportunities being set far above what has been recommended by scientists. In order to rebuild the EU's fish stocks, this practice has to stop. The Commission has recently stated that scientific advice needs to be at the root of decision making[1] and that Long Term Management Plans (LTMPs) need to be put in place for all stocks[2].

LTMPs provide with a way out of the annual TAC and quota haggling. However, as they are expected to be operational for a long time after adoption, it is of utmost importance that they are precautionary and that environmental sustainability is set as primary target. Future LTMPs should be ambitious; once they have reached beyond recovery mode, they should ensure that European fish stocks become productive, providing the basis for a profitable European fishing industry. Most importantly, however, they should ensure that European fish stocks have a healthy size and composition and are resilient to environmental change and natural fluctuations.

The foundation of the LTMPs are the harvest control rules (HCRs) used to establish targets for biomass and fishing mortality, leading to the annual TACs and quotas. It is important that the HCRs are responsive to the state of the stock and do not impede recovery by limiting reductions

[1]http://europa.eu/rapid/pressReleasesAction.do?reference=MEX/10/0902&format=HTML&aged=0&language=EN&guiLanguage=en
[2]http://www.fishsec.org/article.asp?CategoryID=1&ContextID=581

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when these are neccessary. Future LTMPs should also incorporate additional factors such as other sources of mortality, particularly in mixed species fisheries.[3]

GOING BEYOND MSY

The Commission is now making an attempt to move away from the current over-exploitation towards a more ambitious fisheries management by aiming to achieve Maximum Sustainable Yield by 2015 (COM(2006)360) and fulfil the political commitments made at the Johannesburg World Summit on Sustainable Development in 2002. As a result, MSY provides the new benchmark used in a number of the EU's LTMPs. The main objective of the plans is often pronounced along the following lines 'to maintain a biomass level that allows sustainable exploitation in accordance with Maximum Sustainable Yield (MSY), while at the same time aiming at stability and profitability for the fishing sector'.

We would like to highlight that for decades scientists have challenged the concept of MSY as a valid management objective from an economical as well as biological point of view[4]. MSY as a simple calculation ignores the size and age of the individuals being taken, their reproductive capacity, assumes a constant recruitment level, and is single-species oriented, not taking wider ecosystem effects such as predator-prey interactions into account[5]. Furthermore, MSY is a maximum value beyond which productivity is assumed to decline. It is calculated using estimates rather than sound data, meaning it can easily lead to the over-exploitation of fish stocks.

In our opinion, under current circumstances, exploitation at MSY constitutes a major improvement in fisheries management for a majority of the European fish stocks. However, we believe that in a longer-term perspective more ambitious harvest control rules are needed. As stated in the UN Fish Stocks Agreement, MSY should only be considered an intermediate target to achieving abundance. Alternative objectives that are more conservative should be developed. We would therefore like to draw your attention to a recently proposed set of harvest control rules that is more precautionary in nature, and yet economically sound and compatible with ecosystem-based management

The concept was presented in a paper written by Froese *et al.* (2010)[6], where a set of harvest control rules built on the MSY concept is described. They propose a precautionary target biomass 30% larger than MSY and annual catches of 91% of MSY. The harvest control rules allow catch

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[3]http://www.europarl.europa.eu/activities/committees/studies/download.do?language=en&file=29811#search=%20management%20plans%20

[4]See for example Holt (2007): A briefing paper for the WWF European Policy Office. Available online at: http://assets.panda.org/downloads/briefing_for_wwf_new_policy_objectives_and_management_procedures_for_eu_fisheries.pdf

[5]See for example Larkin (1977): An epitaph for the concept of maximum sustained yield. Available online at:
http://webcache.googleusercontent.com/search?q=cache:0ZITmBnzlDUJ:fiesta.bren.ucsb.edu/~gsd/595e/docs/22.%2520Larkin_Epitaph_Max_Sust_Yield.pdf+Larkin+1977+%22An+epitaph+for+the+concept+of+maximum+sustained+yield%22&hl=en&gl=nz

[6]Froese, R., Branch, T. A., Proelß, A., Quaas, M., Sainsbury, K. and Zimmermann, C. (2010) Generic harvest control rules for European fisheries. Fish and Fisheries, no.
doi: 10.1111/j.14672979.2010.00387.x. Available online at:
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-2979.2010.00387.x/abstract

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limits to decline steeply when stocks fall below MSY levels, and to be set to zero when stocks fall below half of the MSY level. According to the authors, this system would lead to higher long-term catches from larger stocks at lower costs and with less adverse environmental impact.

The idea is that the harvest control rules should be established in long-term management plans, gradually replacing TAC negotiations altogether. The rules are built on experiences of harvest control rules used in regions outside of the EU. In the paper it is demonstrated how the concept would have prevented the collapse of North Sea herring in the 1970's.

The harvest control rules are presented below:

1. **Reference and Trigger Biomass**: The reference biomass B_{msy} for the subsequent rules and reference points is the biomass that can produce Maximum Sustainable Yield. This biomass also acts as a trigger when stocks fall below this level, see Rule 5.
2. **Target Biomass**: The target biomass, to be achieved over approximately 5 years, is 1.3 B_{msy}. The target biomass can be increased as required by economic, ecosystem or other considerations.
3. **Limit Biomass**: The limit biomass B_{lim}, which is to be avoided with a high probability, is 0.5 B_{msy}. A higher biomass limit may be set for species with low resilience to exploitation.
4. **Total Allowable Catch**: A maximum total allowable catch (TAC) is set for each stock, so that the respective target biomass is maintained on average. This maximum TAC may be taken as long as biomass fluctuations remain above B_{msy}.
5. **TAC Reductions**: If the biomass falls below B_{msy}, then the TAC is linearly reduced, as a function of biomass, to reach zero catch at B_{lim}.
6. **Mixed Fisheries**: In fisheries where several target species are caught with the same gear, the maximum TACs for the respective stocks will be set in such a way that the most sensitive stocks do not fall below B_{msy} on average over five years, with a high probability of not falling below B_{lim}.
7. **Discard**: No discard of commercially exploited species will be allowed, except for species with a demonstrated high discard survival rate.
8. **By-catch**: Ecological risk assessment will be conducted on bycatch species and the potential damage to the environment caused by fishing will be assessed, followed by measures to be taken to minimise either risk.
9. **Size structure**: The mean size and age in the catch will be adjusted to minimise changes in age structure caused by fishing, and to reduce the effects of fisheries-induced unnatural selection.

We hope that this summary shows that there is a path to take us beyond MSY towards even more resilient fisheries, once we have achieved the targets agreed in Johannesburg in 2002.

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