ICES Annual science conference - Session K, Managing in a complex environment: defining approaches for multiple species and ecosystems

Building fleet-based management plans, a pathway to implement an effective EAFM in European Seas

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Summary

The experts working group on the "Development of the ecosystem approach to fisheries management (EAFM) in European seas" has been set up by STECF (Scientific technical and economic committee of the European commission) in 2010. It is requested to develop a pragmatic feasibility approach to provide some useful assessments and ecosystem advices in support of EAFM. The presentation will focus on the main conclusions and the general approach developed within this working group.

1. As a first step of EAFM implementation, a reference list of 14 ecosystems has been defined by STECF in European seas (Fig. 1). The feasibility analysis conducted by the working group in 2012 took into account seven ecosystems, from the Baltic Sea to the Iberian coast and confirmed that these ecosystems represent the appropriate scale:

. to synthesise stock status and analyse trends in the ecosystem indicators,
. to study ecological impacts and economic performances of fleet segments,
. to analyse trade-offs between economy and ecology in order to develop fleet-based management of fisheries,
. to define long term management plans,
. to improve dialogue and involve stakeholders in participative management of fisheries.

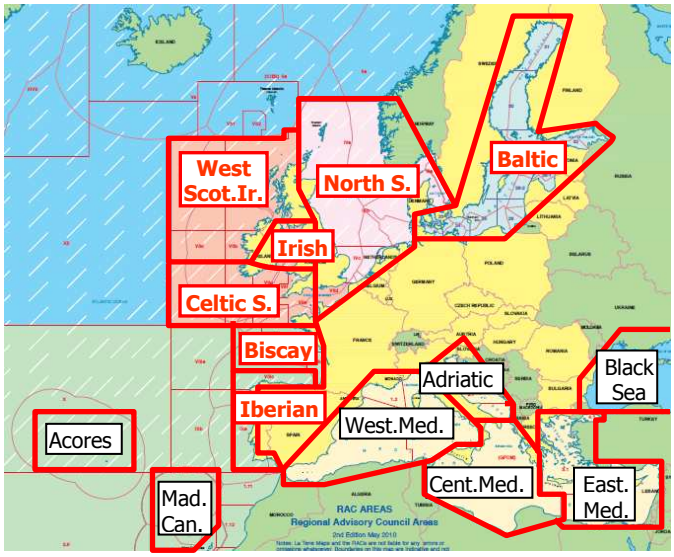

Figure 1. *Limits of the 14 European Marine Ecosystems defined by STECF as functional units used for EAFM implementation. The 2012 WG report refers to ecosystems in red.*

Reference ecosystems should now be considered in all data collection programs related to fisheries, resources, habitats, etc. They should also be considered as functional units used in several ICES, CGFM and STECF working groups.

2. Three key aspects constitute the work that has to be performed on a regular basis to implement a scientific-based EAFM in European Seas:

- Diagnoses on ecosystem health have to be defined and regularly updated for each of the 14 European ecosystems. Such diagnoses have to take into account stock-based and ecosystem indicators (see below and Fig. 2), in close cooperation with the implementation of the MSFD (on the good environmental status of marine ecosystems).
- Both the environmental impacts and the socio-economic performances of the various fleets operating within each ecosystem have to be assessed and monitored (see below and Fig. 3).
- For each European ecosystem, one or a limited set of ecosystem and bio-economic models should be set up and used on a regular basis for advice-oriented purposes, to assess the ecosystem impacts of fisheries and to simulate various management options. The working group suggested this should be undertaken in the near future through a specific call of DG-Mare and setting up a new organisation of working groups devoted to EAFM.

3. As a feasibility test, the working group provided a first diagnosis on the health of seven European ecosystems (Fig. 2). In all these ecosystems, the fishing mortality index exhibits a decreasing trend over the last years, highlighting a decrease in the mean fishing pressure applied to the assessed stocks. But at the same time, the whole spawning biomass of assessed stocks is still decreasing in some ecosystems (Irish Sea, Iberian coast), while it exhibits an improving trend in others (North Sea, Celtic Sea, Bay of Biscay). Even in this (favorable) latter case some ecosystem indicators are still decreasing. The working group concluded that the decrease observed in fishing pressure seems to have not been strong enough or not long enough to allow the recovery of ecosystems from a generally depleted state. It also noticed that some contrasts do exist within ecosystems (for instance, the Bay of Biscay ecosystem seems in better shape or better trend than the West of Scotland/Ireland ecosystem).

		Land. Y	Effort E	Mortal. F	Biom. SSB	Recr. R	Sust. F*	Survey LFI	Survey MMLw	Survey MTL	Land. MMLw	Land. MTL	% asses.
Baltic Sea		↘	→	↘	↺	→	😐	↺	↺	↺	↘	↘	≈ 95
North Sea		↘	↘	↘	↗	↘	😐	↘	↘	?	Low	low	≈ 85
North western Atlantic waters	West Scot./Irl.	↘	↘	↘	?	↘	😐	?	↘	↘	↘	↘	≈ 90
	Irish Sea	↘	↘	↘	↘	↘	?	→	↗	↘	→	↘	≈ 35
	Celtic Sea	↘	↘	↘	↗	↘	☺	?	?	?	low	↘	≈ 40
South western Atlantic waters	Bay of Biscay	→	?	↘	↗	↘	?	↗	→	→	↗	→	≈ 45
	Iberian Coast	↘	?	↘	↘	↘	?	→	→	↗	→	↘	≈ 40

Figure 2. *Trends over the last 5 to 10 years in the main indicators of the Ecosystem health in the seven ecosystems considered as case studies: total landings Y, fishing effort E, mean fishing mortality F of assessed stocks, total stock spawning biomass SSB, mean recruitment index R, index of mean sustainable fishing mortality F*, large fish indicator from surveys LFI, mean maximum length MMLw from surveys or from landings, mean trophic level MTL from surveys or from landings, % of landings due to assessed stocks.*

4. Ecological impacts and socio-economic performances of the major fleet segments operating within each of the seven considered ecosystems were analyzed, using a set of 13 indicators (Tab. 1). We notably showed whether each fleet segment, on average, sustainably exploits the stocks (Fig. 3, as an example).

Table 1. *Social, economic and ecological indicators used to assess the socio-economic performances and the ecological impact of each fleet segment operating in a given ecosystem*

Indicator	Value in 0	Value in 1
Employment (FTE)	0	max.observed
Wage per FTE	0	max.observed
Subsidies	min. observed	max.observed
Income	0	max.observed
Gross Value Added	0	max.observed
Operating cash-flow	0	max.observed
Profits / losses	min .observed	max.observed
Energy consump. / ton landed	0	max.observed
F* sustainability	min .observed	max.observed
B* sustainability	min .observed	max.observed
Partial F	0	max.observed
Food Web impact index (PPR)	0	max.observed
Seafloor impact index	0	max.observed

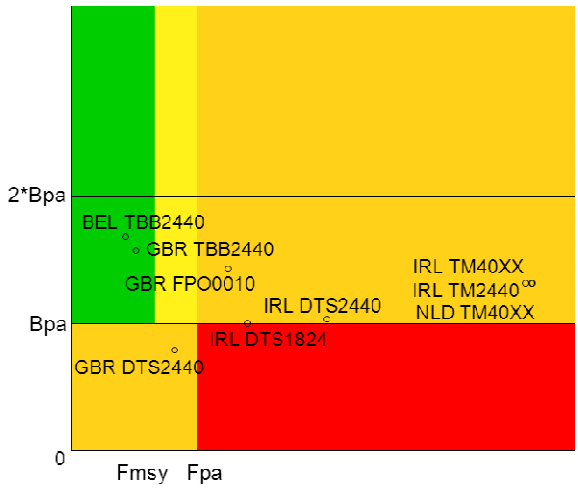

Figure 3 *- Sustainability index of the major fleet segment operating in the Irish Sea (as an example). The position of each fleet segment on the graph relates to the weighted (by the values of the landings per stock) averages of the normalized fishing mortalities F* and biomass B* for all stocks that are exploited by the fleet and assessed by ICES. The sustainability index is an indicator of the mean status of the stocks exploited by the fleet. It allows assessing if a fleet segment is economically dependent on stocks that are globally in good or bad shape, compared to the reference points defined by ICES.*

A first attempt to draw a synthesis on fleet segments performances is presented on Figure 4 based on averaged indicators. Although the method still needs improvements and results are preliminary due to the poor quality of available data, the analysis showed that simple indicators can be estimated and clearly highlight contrasts which do exist between fleet segments. On average, the major fleet segments (in terms of vessels number) have similar socio-economic performances, but very different ecological impacts. A few fleet segments have high ecological impacts, some with high socio-economic performances (for instance large UK purse seiner operating in the North sea) while others exhibit rather poor economic performances (for instance Belgium beam trawlers 24-40m operating in the Irish sea).

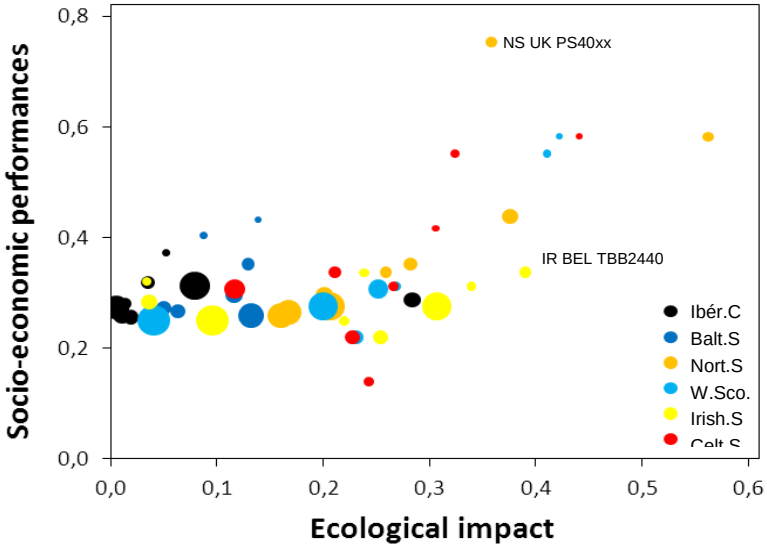

Figure 4. *Ecological impact and economic performances of the major fleet segment operating within each ecosystem. Mean ecological impact and socio-economic performance of each fleet refer to averages of the 7 and 6 related indicators (see Table 1). Bubbles size is proportional to the number of vessels per fleet segment.*

The working group concluded that this kind of fleet-based assessment is the pathway for implementation of an efficient EAFM in European Seas (see also Gascuel et al, 2012, *Marine Policy*). In the future, it should clearly be part of a framework used to determine which fleet segments would need to be reduced and which could be developed and to what extent. Fleet-based environmental assessments should also be used to guide the definition of long term management plans, including some regulation of the fishing effort and fleet-based access rights. It could also support introduction of economic incentives in order to encourage fleets to improve their fishing practices.

Such an approach can contribute to progress from a stock-based to an ecosystem-based management. Implementing EAFM is a task that has to be conducted in respect to the Marine strategy directive framework (MSFD), but whose purpose is not only to ensure the good environmental status of ecosystems. Indeed, EAFM aims to take into account ecological sustainability, but also economic profitability and social fairness. In this context, building long term fleet-based management plans allows to analyse tradeoffs between ecology, economy and social aspects, the tree pillars of the sustainable development of fisheries.

Keywords: Ecosystem approach, fleet-based management, ecological impact, economic performances, European fisheries.

Related references:

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Gascuel D., Döring R., Kenny A., Druon J-N., (eds), 2012 - Scientific, Technical and Economic Committee for Fisheries. Development of the Ecosystem Approach to Fisheries Management (EAFM) in European seas (STECF-11-13). Publications Office of the European Union, Luxembourg. EUR – Scientific and Technical Research series, ISSN 1018-5593, 178 p. (Available on the STECF website: http://stecf.jrc.ec.europa.eu/reports/strategic-issues)