

Executive Summary

The 2012 meeting of WGEKO was held at the ICES HQ in Copenhagen, Denmark from the 11–18 April 2012. The meeting was attended by 27 delegates from 13 countries, and was chaired by Dave Reid (Ireland). The WG addressed seven terms of reference.

- a) MSFD indicator and target evaluation. Request from ACOM;
- b) DCF Indicators on fishing pressures/impacts and possible developments/improvements in these. Request from ACOM;
- c) Evaluate approaches and propose elements for inclusion for Ecosystem Impact Assessment of bottom fishing. Request from NEAFC;
- d) Indicators of foodweb condition in reference to MSFD Indicator 4;
- e) LFI development;
- f) Review of the state-of-the-art in understanding the combined effects of multiple ecosystem pressures, including advice for future research;
- g) Trade-off in biodiversity conservation and sustainable use.

The first two ToR were based on requests from ACOM in the context of ICES advice on the MSFD and CFP reform processes. The third was based on an advice request by NEAFC. The remaining four were based on ongoing work of WGEKO designed to inform the process of including ecological indicators in management, and particularly in the context of the MSFD.

The first ToR on developing criteria for the evaluation of indicators and targets chosen for GES by various member states turned out to be very difficult to complete, and the report given here should only be considered as an indication of work in progress. Essentially, the work on criteria for indicators condensed and updated a number of other approaches already in the public domain and tried to take the best of these and where necessary supplement them. Criteria for evaluating target levels were essentially taken as refinement of the criteria for indicators, although it was recognized that these could be added to. A number of approaches to analysing multiple indicators and/or surveys were also explored. Again, this was work in progress and will be continued next year, and was reported as such in **Chapter 3**.

The DCF has stipulated a number of indicators for collection and analysis over recent years. The WG examined a number of these including:

- Conservation status of fish species;
- Proportion of large fish;
- Mean maximum length of fishes;
- Size at maturation of exploited fish species;
- Fishing pressure based on VMS;
- Discarding rates of commercially exploited species;
- Fuel efficiency of fish capture.

Each indicator was evaluated in terms of the calculations stipulated, and outcomes for a number of directed case studies. A number of suggestions for changes and improvement were outlined in **Chapter 4**.

The third ToR considered ecological risk assessment and its particular application to deep-sea fishing in the NEAFC region. Initially the WG reviewed a wide range of ecological risk assessment methodologies and evaluated their strengths and weakness. This included a number of case studies carried out for each example. Based on this study a series of recommendations were developed for NEAFC, and these are reported in **Chapter 5**.

The MSFD includes at descriptor 4 an area where the decision document considers that there is a considerable need for further research. The initial work examined any gaps and shortcomings of current MSFD Foodweb Indicators. The broad conclusion was that ideally one would want indicators of foodweb *function* but that for the most part; data available was restricted to foodweb *structure*. The role of models to elucidate the link between structures and functions was examined, and the possible use of fluxes as foodweb functions. The work then went on to identify a series of attributes of foodweb structure that should be maintained, and proposed approaches to work with these through structural metrics, reported in **Chapter 6**.

The Large Fish Indicator (LFI) has been a focus of work for WGEKO for some years and this was continued in 2012. In particular we looked at tuning the indicator for the Baltic Sea and the Gulf of Cadiz. In addition we explored the potential effects of interaction between different sampling gears and fish communities. Finally, we considered the application of the LFI in MSFD subregions which are sampled by several independent fisheries surveys. This work is reported in **Chapter 7**.

Cumulative impacts were investigated to investigate the occurrence of additive, synergistic and antagonistic impacts of pressures and climatic drivers. Potential interference between multiple pressures is likely to be widespread; and the first attempts at mapping multiple pressures suggest that this potential overlap occurs in many parts of the marine environment. The few experimental studies available, and some worked examples, suggest that, more often than not, interactions between multiple pressures are not simple; with both synergistic and antagonistic effects happening. The development of integrated models will be necessary to better frame research needs and support management; as well as for complex statistical models, this might require increased computational power. There is also a need for field studies of the most important interactions at various scales. Integrated observation systems are going to be increasingly needed, with a wide variety of physical, biological, ecological and human observations collected on potentially large-scales. Active adaptive management *sensu* Walters (1986) may be very useful to investigate and manage cumulative impacts. This work is reported in **Chapter 8**.

Trade-offs between biological conservation and social and economic targets were the subject of the final ToR. Our review first looked at a range of international conventions (CBD, MSFD, CFP) and what was said about societal and economic targets and trade-offs. We then examined what social and economic indicators were available for use, or at least potentially. The next step was examination of a number of possible methodologies for examining such trade-offs, and finally a number of case studies where attempts to quantify what is involved in such trade-offs was examined. This work is reported in **Chapter 9**.