

## ICES/PICES Theme Session E

### Do foodweb dynamics matter in fisheries management

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The world-wide occurrence of abrupt shifts in marine ecosystem function and structure, trophic cascades in exploited foodwebs, and altered species interactions preventing recovery of depleted fish stocks, show the importance of accounting for foodweb dynamics in the management of human activities in marine systems. While there has been much recent progress in the understanding of foodweb dynamics in marine ecosystems, the application of this knowledge in marine management is however, still scarce. Overcoming this 'application gap' is essential to advance marine management using an ecosystem approach as well as sectorial approaches like ecosystem-based fisheries management (EBFM). Using EBFM as an example, bridging this gap would require knowledge on (1) How can foodweb responses to exploitation be monitored and predicted?; (2) How do foodweb dynamics mediate the impacts of fisheries on marine ecosystems, and the effects of system productivity on fisheries?; (3) Which aspects of foodweb dynamics are necessary to account for in fisheries management to ensure sustainable use of marine ecosystems, and which are not? Applying such knowledge into advice for management will require evaluation of existing advice and management performance, as well as development of new decision support tools highlighting, for example, how foodweb interactions affect trade-offs between management objectives, determine the time and probability to achieve management objectives, or provide guidance on the robustness of the advice.

This session was particularly in the context of “What is Good Environmental Status” for the MSFD and what does GES mean to fisheries management? Yet it also emphasize more broadly global examples for the broader EBFM context, with a few PICES presentations from the Pacific. The geographic coverage also included the South Atlantic and Mediterranean, in addition to the usual north Atlantic seas and ecosystems more common in ICES. Generally, talks focused on various facets of foodwebs and subsets of foodwebs to explore this topic.

This session had papers on the following topics: Observation or modelling studies on dynamics and functioning of exploited marine foodwebs, identifying intra- and inter-specific interactions within or across ecosystems that are key for fisheries management; Comparative simulation studies of single-species vs. multispecies or food-web based management strategies; Studies advancing foodweb indicators for marine management (e.g. within the EU Marine Strategy Framework Directive, Descriptor 4) by linking them to food-web functioning and dynamics; Modelling studies addressing the inclusion of foodweb dynamics in operational assessment and management; Innovative decision support tools for marine management accounting for foodweb dynamics, and their uncertainty. There were 18 oral presentations given, and as many again poster presentations.

Given the wide range of topics covered in these talks, it was informative to note that food web dynamics and associated metrics were useful for informing living marine resource management, but that there was some uncertainty as to how precisely this

could be done. Many presentations explored dynamics of food webs as a whole, with many changes noted and attempts to explore possible drivers of those changes. Some presentations covered important theoretical features of food webs. Other presentations focused on how facets of food web information could inform models of stock assessment, particularly as predation mortality, addressing more specific applications of how food web information could elucidate fisheries management—this was especially viewed as an obvious, feasible step for implementing EBFM. Although the discussion was largely focused on the fisheries sector, it was clear that broader EBM applications (i.e. IEAs) could readily be informed by these food web indicators. The need to specify the level of management (and associated modeling uses and data needs)—Single species fisheries management cognizant of food web features (EAF), systemic fisheries management cognizant of full food web dynamics (EBFM), or full system management (EBM) is very clearly need to avoid further confusion as to the application and utility of incorporating food web information into a fisheries context.

Another item we note: for the love of God, we kindly ask this expert community to come up with a better acronym for Alternate Steady States when presenting that topic. As is, the current one is, although mildly amusing, mainly stultifying to the debate.

The session title posed a question: Do food web dynamics matter to management? The answer was clearly yes, but the emerging question was: What do we do about it? Or: how do we handle food web info more clearly? One item that emerged was the need for operational stomach sampling and that associated food habits data. Another noteworthy item was the communication that there will likely be an ICES workshop in spring 2014 on food web indicators (FooWI). Co-chair of WKFooWI, Stuart Rogers, elaborated on the rationale and expected efforts for the continuation of this collective effort on food webs.

In sum, this session illuminated the topic, but also identified features for further examination.