

DFO's MEQ approach in the determination of marine indicators

Glen Jamieson¹ and Brenda McCorqudale²

Abstract

A second Pacific Region MEQ Indicators Workshop was held in March, 2004, as a continuation of the regional initiative to determine operational objectives for monitoring the success of ecosystem-based management in the pilot proposed Pacific North Coast Integrated Management Area (PNCIMA). This workshop differed from the first (Jamieson et al. 2003) in that while keeping in mind the high level, nationally-defined conceptual ecosystem objectives (Jamieson et al. 2001), it considered a "bottom-up" perspective in an effort to allow better focusing on those human activities actually impacting on the environment. The development of MEQ objectives and indicators was determined by looking at key issues or "stressors" on ecosystem components in three areas: a potential Coastal Management Area (Quatsino Inlet CMA), the deep-water trawled areas of Queen Charlotte Sound, and in the overall proposed PNCIMA, i.e., a potential Large Ocean Management Area. This "bottom-up" approach utilised estimates of tangible threats to marine ecosystem health in the assessment of potential MEQ objectives and indicators.

Overall Workshop conclusions relative to MEQ in general were that:

- MEQ currently is a "DFO thing" done within a sector, and the concept and approach needs to be adopted more broadly (at both a regional and national level) for it to be successfully adopted;
- A "concrete proposal" of specific initial indicators for MEQ is needed to help in communicating the concept and fostering support, with perhaps case studies as examples;
- A broader group of interests (including people from within and beyond DFO) should be brought together to work with a few indicators and stressors in a focused and real situation. Representatives within this group may have differing mandates, but should be tasked to establish a common approach; and
- Effective MEQ indicator monitoring should "provide warnings before chaos happens."

1 Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, BC, V9T 6N7

2 Fisheries and Oceans Canada, PO Box 2159, Unit 10, 9250 Trustee Rd, Port Hardy, BC V0N 2P0

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Introduction

Fisheries and Oceans Canada's (DFO) ecosystem approach within Integrated Management (IM) incorporates ecosystem considerations in management activities and ocean spaces. Integrated Management (IM) is one of three key principles of Canada's *Oceans Act*. As part of Canada's Oceans Strategy, the *Policy and Operational Framework for the Integrated Management of Estuarine, Coastal, and Marine Environments in Canada* (Canada, 2002) describes how ecosystem objectives (EOs) will be established as a part of an Ecosystem-based Management (EBM) process at the Large Ocean Management Area (LOMA) and Coastal Management Area (CMA) scale. EOs, which should be consistent within DFO-defined ecoregions (Powles et al. 2004), are set at the LOMA scale, and Marine Environmental Quality (MEQ) objectives and indicators are developed at the CMA scale to ensure that EBM is being achieved. An ecosystem-based management approach thus addresses issues assessing cumulative impacts from a number of possible sources through the monitoring of specific conditions of the marine ecosystem in which management actions are being taken (Jamieson et al. 2003).

An ecosystem objectives framework needs provision for the setting of ecosystem-based objectives for each LOMA, as part of a nested set of high-level policy objectives to lower-level, more detailed operational objectives. The groundwork for the approach being utilised was laid by the inter-sectoral Working Group on Ecosystem Objectives (WGEO). The "Dunsmuir Workshop" proceedings (Jamieson et al. 2001) provides a summary of discussions and thinking, prior to their review and acceptance by the national Policy Committee, of ecosystem-system conceptual objectives and a process to unpack them through to operational objectives.

The ecosystem objectives framework accepted necessitates setting ecosystem-based objectives in three key conceptual areas:

1. Maintain enough components (e.g., communities, species, populations) to ensure natural resilience of ecosystems;
2. Maintain function of each component of ecosystem to allow it to play natural role in food web (i.e., not cause any component of ecosystem to be altered such that it ceases to play its natural role); and
3. Maintain physical and chemical properties of ecosystem.

Marine Environmental Quality (MEQ), or operational, objectives are measurable targets embedded in IM and Marine Protected Area (MPA) plans, against which management decisions are evaluated and made. The degree to which MEQ objectives are being achieved is the science rationale for justifying management decisions with respect to environmental issues within an IM or MPA plan (Jamieson et al. 2003)..

The goal of the first regional DFO workshop (Jamieson et al. 2003) was to begin the process of applying the required EO and MEQ approach in the Central Coast Large Ocean Management Area (CC LOMA) and the Quatsino Sound Coastal Management Area (QS CMA). The Workshop produced the following results:

- Participants recommended approaches relating to the 'unpacking' exercise and how it should be applied in the CC LOMA;

- Participants ‘unpacked’ the broad ecosystem objectives and developed examples of potential MEQ objectives, along with possible associated indicators and their monitoring program;
- A strategic approach was recommended for the development of a comprehensive approach to MEQ in the QS CMA; and
- Project proposals were solicited from participants at the workshop that supported the strategic approach recommended by the group.
- MEQ objectives options for the QS CMA need to be examined in more detail in the context of the development of an IM Plan in the area, Central Coast managers’ identified priorities, and recent workshop discussions; and
- Criteria should be outlined for the development of MEQ objectives.

Finally, participants in the workshop recommended that local information and local experts be involved in the development of MEQ objectives. Participants also recommended that the process for incorporating social and economic values into the development of MEQ objectives be further developed.

A second Pacific Region MEQ Indicators Workshop was held in March, 2004, as a continuation of the regional initiative to determine operational objectives for monitoring the success of ecosystem-based management in the pilot Pacific North Coast Integrated Management Area (PNCIMA) (an enlarging of the IM area to include both the North and Central Coasts). This workshop differed from the first (Jamieson et al. 2003) in that while keeping in mind the high level, nationally-defined conceptual ecosystem objectives, it primarily considered a “bottom-up” perspective in an effort to allow better focusing on those human activities actually impacting on the environment.

Objectives were:

1. To inform participants of the work to date on and current status of:
 - a. The national Marine Environmental Quality (MEQ) Framework;
 - b. Related federal work to develop marine indicators at large [i.e., Large Ocean Management Area (LOMA)] and local [i.e., Coastal Management Area (CMA)] scales; and
 - c. Related British Columbia provincial work to develop marine indicators.
2. At the CMA and LOMA scales, to:
 - a. Recommend a draft candidate ‘suite’ of MEQ indicators that would provide an assessment of the overall health and impacts of stressors of relevant marine ecosystems; and
 - b. Evaluate the utility of using a “bottom-up process” to develop such a candidate suite of MEQ indicators.
3. To suggest appropriate “next steps” for parties involved in identifying MEQ indicators at the CMA and LOMA scales for the Pacific Region.

Approach

The Dunsmuir Workshop was held with the goal of identifying ecosystem-level objectives, with associated indicators and reference points, which could be used in managing ocean activities. An approach to construct objectives for Ecosystem-based Management was developed. At the highest level, conceptual objectives are stated in general terms that are intended to be understandable to a broad audience – and can be considered as policy statements. An operational level objective, however, needs more specificity, and was defined as *consisting of a verb* (e.g., maintain), a specific measurable biological property or *indicator* (e.g., biomass), and a *reference point* (e.g., 50,000 t), which together allows an action statement for management (e.g., maintain biomass of a given forage species greater than 50,000 t). The process of refining conceptual objectives to successively more specific levels until operational objectives are defined is termed “unpacking”. Operational objectives are derived from high-level policy objectives by going to greater levels of specificity (a process of “unpacking”) (Figure 1).

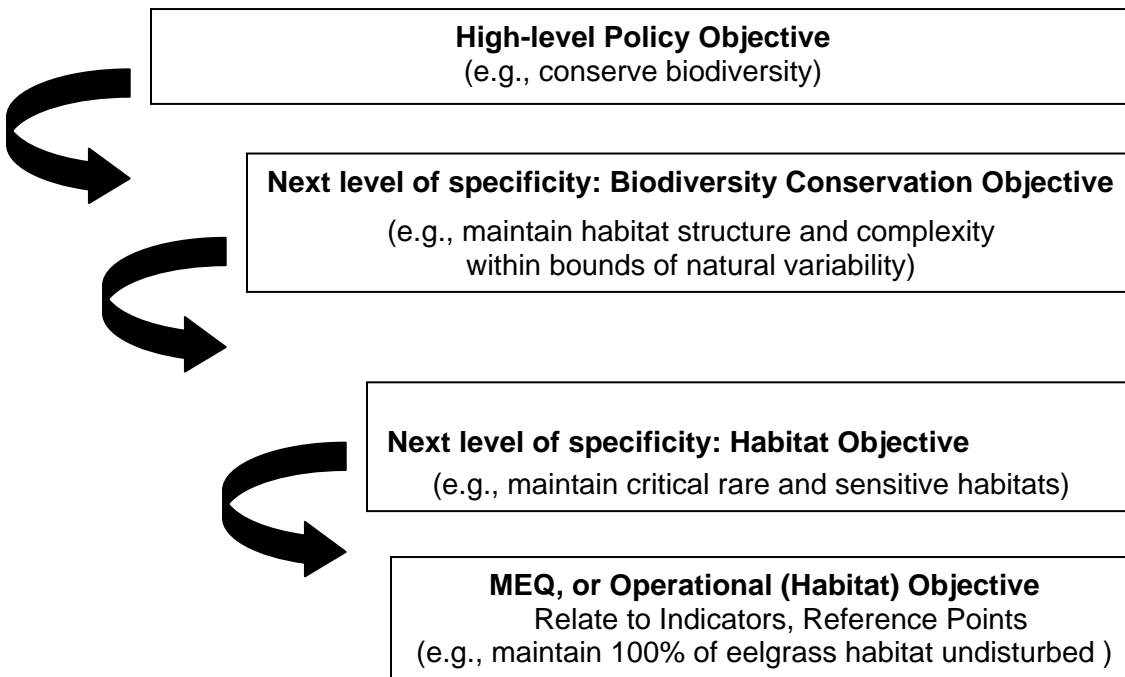


Figure 1: An example of the conceptual objective unpacking process. Examples and diagrams have been revised following presentation at the Dunsmuir workshop to incorporate suggestions made during the workshop.

Results and Discussion

The development of MEQ objectives and indicators during the 2004 workshop (Jamieson and McCorquodale 2004) was determined by looking at key issues or “stressors” on ecosystem components in three areas: the potential Quatsino Sound CMA, the deep-water trawled areas of Queen Charlotte Sound, and in the overall proposed PNCIMA, which is a potential LOMA.

This “bottom-up” approach utilised estimates of tangible threats to marine ecosystem health in the assessment of potential MEQ objectives and indicators.

A workshop (J. Rice, DFO, Ottawa, ON, pers. comm..) involving about 20 representatives representing all regions was held in February 2004 in Halifax to determine guidelines for operationalising EOs. This workshop was the first concerted attempt to determine the utility of conceptual objectives at an operational level. Workshop output considered the utility and application of conceptual objective terms and elements such as mean generation time, bounds of natural variability, primary productivity, historic role in the food web, resilience, habitat, communities, species, and populations. Guidelines were developed for the consideration and use of these terms in the unpacking process.

IM will ultimately take place at the Pacific Region, LOMA and CMA scales, and on an inter-governmental basis, including First Nations and local government, which will involve a broad stakeholder engagement. This process will include:

- Increased communication;
- Improved information management and access; and
- Development and implementation of adaptive management processes.

Some CMA scale planning activities that were relevant to workshop discussions included:

- The Turning Point (http://www.davidsuzuki.org/Forests/Turning_Point.asp) initiative involving several North and Central Coast First Nations, which addresses both terrestrial and marine issues; and
- Joint initiatives that involve four levels of government, including several BC-led coastal plans, and the pilot federal/provincial integrated Quatsino Sound Coastal Plan.

Current CMA level planning has focused on collecting available information for a specific area, and identifying the social preferences of local community members for the siting of various activities. Generalized available environmental data has been used to identify where various activities may or may not be appropriate. Improvements in the quality of environmental data are seen to be a key aspect of improving planning related to activity siting recommendations. Specifically, the development of CMA level MEQ objectives and indicators is seen as being an essential part of the development of ecosystem-based IM processes. A “flow chart and decision tree” (Figure 2) for the development and adaptation of MEQ objectives and indicators at LOMA and CMA scales provides a schematic overview of a likely operational process.

The concept of “performance” and “health” indicators was discussed: performance indicators are those that if monitored parameter ranges were exceeded, would result in clear, direct management actions. Health indicators are broader measures of ecosystem health (e.g., in humans, the use of body temperature provides some information about general human health) and may not directly result in any specific management response until further research demonstrated that a specific response was relevant and appropriate. Jamieson et al. (2002) suggested that a ratio of about 70% performance to 30% health indicators would be appropriate for determining a suite of indicators, based not necessarily on science or experience, but rather “common sense” at this time.

With respect to the flow diagram in Figure 2, there must also be LOMA EOs that are measured/monitored at the LOMA scale and that are not dependent on a rollup of CMA indicators, as:

1. the latter may not capture ecosystem processes and features at the LOMA scale (e.g., maintain integrity of deepwater (Jamieson and Chew 2002) sponge reef complexes in the Queen Charlotte Basin VS protecting eelgrass beds of specific size in Chatham Sound), and
2. there may be only a few CMA's within a LOMA area. LOMA VS CMA pressures (hence indicators and objectives) may be different, and since monitoring resources are limited, this may mean that all indicators cannot be monitored at all desired locations.

Summary

Overall, a bottom-up approach (Jamieson and McCorquodale 2004) had merit and resulted in a more tractable suite of potential indicators than resulted from the solely top-down approach investigated at the earlier workshop (Jamieson et al. 2003). Many suggestions were provided as to how to effectively utilize this approach, but a key concern raised by participants in final discussions was that overall progress to achieving ecosystem-based management was being impeded due to the perceived low priority given to this issue by senior management within DFO. Participants raised concern about the ability of the department to move forward on these initiatives without a significant increase in the allocation of resources to ecosystem-based management initiatives. Workshop summary comments (Jamieson and McCorquodale 2004) for next steps towards developing MEQ indicators and practising Integrated Management thus related to DFO's future role in developing MEQ indicators, the potential for the Federal/Provincial Oceans'-related Memorandum of Understanding on the implementation of Canada's Oceans Strategy to advance this issue, and the importance of integrating effective involvement of all relevant regional DFO Branches and personnel in future MEQ initiatives.

In summary, the process to date has not been to develop a final unified list of candidate MEQ indicators but rather to evaluate the potentials of different processes (e.g., bottom-up) in the identification of an acceptable mix of appropriate MEQ indicators to monitor to assess progress in achieving ecosystem-based management. Progress was made in that a bottom-up process was recommended to become a significant process in the determination of final MEQ indicators. Major challenges relate to addressing scale issues in terms of how EOs in CMAs and LOMAs relate to each other, if at all, and in determining the extent to which relevant higher level ecological objectives can be addressed by primarily considering indicators relevant for a few known impacts.

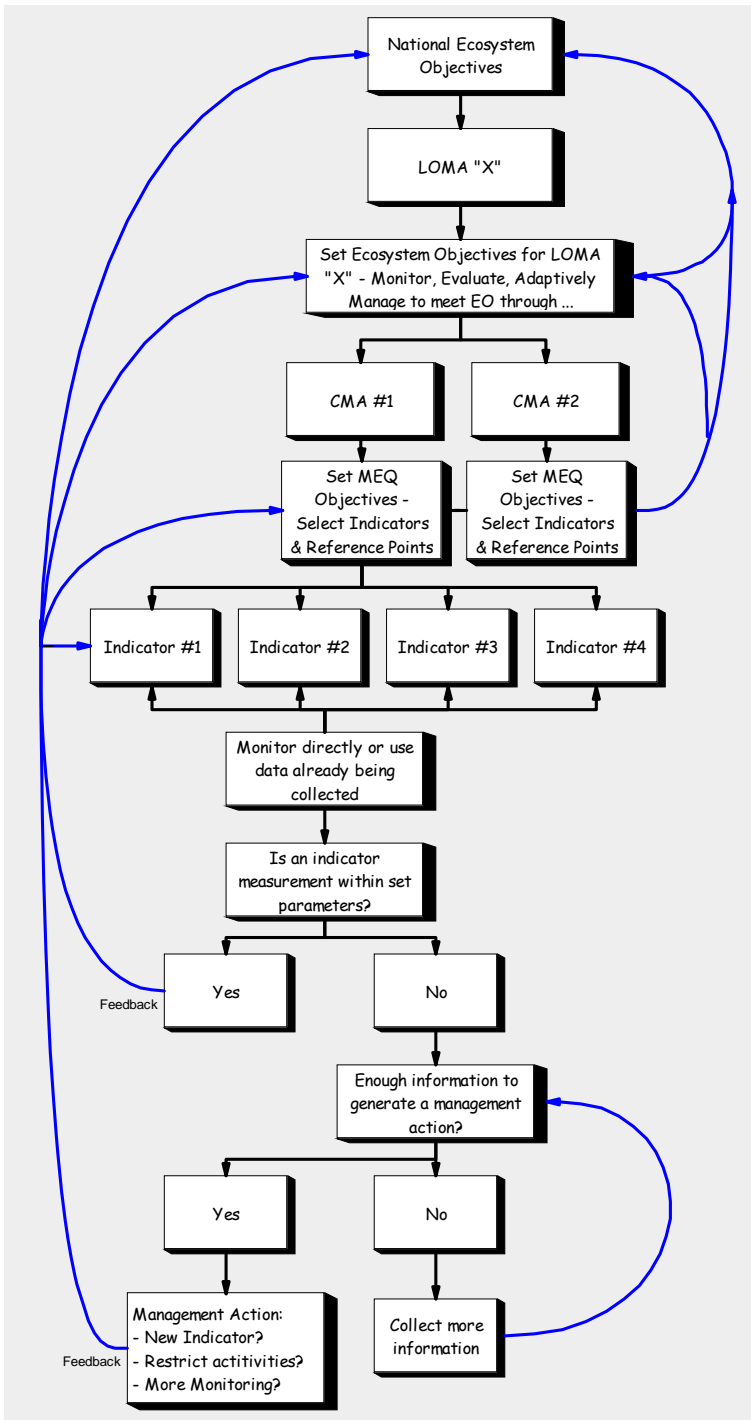


Figure 2: A flow diagram demonstrating how decisions at a CMA scale may be made with respect to the establishment of indicators and responses to indicator measures.

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