WCPFC
MANAGEMENT OBJECTIVES WORKSHOP

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MEASURING SUCCESS: INDICATORS OF MANAGEMENT PERFORMANCE

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Agenda 4.1 - Measuring success: indicators of management performance

This paper describes the role of Performance Indicators within the Management Framework, as tools for measuring whether management is successfully achieving the agreed Objectives and for clarifying the trade-offs that result from competing Objectives.

Review of indicators

To understand whether fishery management objectives are being met, specific related indicators are selected to monitor the performance of the fishery. In this section we provide some examples of indicators for some different examples of management objectives: biological; economic and social.

Biological

Biological objectives generally relate to 'stock sustainability' or maintaining the fish stock at levels that will not reduce the long term viability of the population. Indicators for this generally relate to the size of the stock, be it the overall size (total biomass), or the size of the adult portion (spawning stock biomass). These indicators generally relate to quantities that come out of stock assessment models.

Economic

Indicators for economic objectives, including 'maximising fishery profitability' or 'minimising year on year variability', can come directly from the fishery exploiting the stock (e.g. catch rates, profits), or from the assessment of the stock being exploited (a larger stock size generally reduces annual variability in catch rates and increases profitability). While WCPFC has good data to support development of biological indicators, information on economic indicators is limited. Revenue information (catch or product and the price) is relatively easy to obtain. Essential information on cost structures for different fleets, and the associated processing chain, is not readily available. This will have a bearing on the selection of indicators.

Selection of the indicator depends on the particular economic circumstances of the fishery under consideration. For example, fewer vessels and lower competition may result in greater profitability for a fleet, a larger stock and higher catch rates. However, where an economic objective is focused on maximising licensing revenue in the short term, more vessels with lower profitability may be more desirable.

Social

Examples of social objectives include 'maximising employment' (which is also related to economics at a country level) and protecting artisanal fisheries and local fleets. Maximising employment could be related to vessel numbers or catch levels (e.g. for processing plants), and implies indicators from the fishery, or national statistics (e.g. numbers employed in processing plants, quantity of fish processed in-country). For artisanal fisheries, where indicators are harder to develop, the number of commercial vessels or the size of the fish stock could act as indicators; lower vessel numbers and larger stock sizes may ensure sufficient fish remain for artisanal fishers to catch. Achieving social objectives therefore frequently involve a trade-off with the conditions required to achieve economic objectives.

Current approach to presenting indicators

The current approach used within the WCPFC is based upon the Kobe plot (Figure 1). This plot relates stock assessment results for each key tuna species to the level of maximum sustainable yield (MSY), more specifically to the biomass level at MSY (B_{MSY} or SB_{MSY}) and the fishing mortality level required to achieve MSY (F_{MSY}). MSY implies a sustainable stock size and in theory ensures a sustainable fishery where catches are highest. Fishing beyond the MSY level implies overfishing or an overfished stock, both of which can be related to biological, and less explicitly to fishery, objectives. In Figure 1, the size of the WCPO skipjack tuna stock is currently greater than the size it would be at MSY (SB/SB_{MSY} is greater than 1) and the current fishing mortality level is lower than it would be to achieve MSY (F/F_{MSY} is less than 1). Hence the stock is not overfished, and overfishing on skipjack is not currently occurring (it currently lies within the green area of the plot). In contrast, for the WCPO bigeye tuna stock, the current fishing mortality is higher than that required to achieve MSY (F/F_{MSY} is greater than 1), although the size of the stock (biomass) is currently just larger than it would be at MSY (SB/SB_{MSY} is around 1.1). The stock is therefore subject to overfishing, but not currently overfished. However, fishing at this level should, over time, lead to the stock indicator moving into the overfished category (the red area of the plot).

MSY may not meet desirable fishery objectives such as maximising profits or minimising inter-annual variability, for example. Hence the discussions at the WCPFC MOW may define alternative indicators and reference point levels (see subsequent papers).

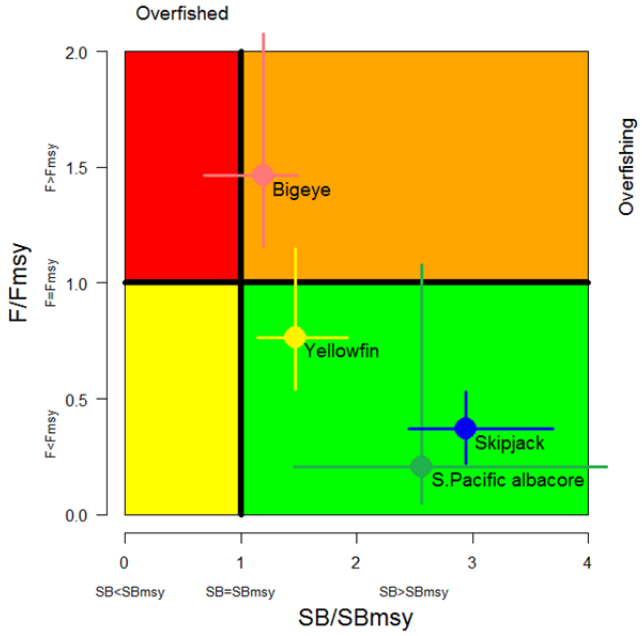

Figure 1. Kobe plot of the latest stock assessment results of four key WCPFC tuna stocks.

Competing objectives and trade-offs

Where there are many stakeholders within a fishery, competing objectives can arise. As noted above, for example, two Management Objectives that look to maximise profits and to maximise employment in different sectors of the fishery may imply that very different situations within the fishery need to be achieved. There is therefore a trade-off to be made between the objectives, as potentially only one, or the other can be achieved in full, or a state of the fishery can be identified that partially fulfills both objectives satisfactorily.

Indicators selected to monitor how well the Management Objectives are being achieved allow those trade-offs to be examined. High catches may meet objectives of employment in the shore-based processing sector. However, higher catches generally equate to lower catch rates and greater inter-annual variability in catches and hence reduced profitability for the fishing vessel industry, and dependent on the level, potentially more risk to the long-term status of the exploited stock. In turn, in multispecies fisheries, there is a balance between the catch levels of target stocks, and the status of non-target stocks, that needs to be struck.

Based on the evaluation results from scientists, the level of trade-offs between objectives arising from alternative management frameworks can be discussed and the most agreeable framework selected. This is discussed further in the paper for Agenda item 4.3.

Further reading

FAO. 2002. Indicators for sustainable development of fisheries. http://www.fao.org/docrep/W4745E/w4745e0f.htm.

Rice, J.C., and Rochet, M-J. 2005. A framework for selecting a suite of indicators for fisheries management. ICES J. Mar. Sci. 62: 516-527.