Summary of the 6th National Meeting of the Scientific Coordination Subcommittee of the Council Coordinating Committee

San Diego, California
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This is not a comprehensive review of the meeting, but rather a brief summary of some of the discussion that occurred. A comprehensive report will be published by the host Pacific Fishery Management Council later in the year.

The overriding theme of the 6th National Scientific Coordination Subcommittee meeting (also known as the National SSC Workshop) was the use of management strategy evaluation (MSE) to inform management decisions made by the Regional Fishery Management Councils.

Sub-themes that were addressed in separate sessions during the meeting included:

- Use of MSEs in evaluating and modifying harvest control rules.
- Estimating and accommodating uncertainty
- Adjusting harvest control rules in changing environments/non-static maximum sustainable yield.

The meeting began with introductions followed by remarks from Michael Jones (Michigan State University) and Dan Holland (NWFSC) on overarching comments about MSE. Definitions of MSE in the published literature are generally along the lines of,

> MSE is a general methodology for designing and testing decision rules (heuristics) or broader management strategies that (1) meet objectives of decision makers and stakeholders, and (2) are robust to diverse sources of uncertainty. MSE is a process that integrates science and management.

MSE best practices should include the following.

- Specifying clear management objectives (but see below).
- Developing quantifiable performance measures for each objective.
- Identifying alternative management options.
- Evaluating the performance of each option:
    - across range of objectives
    - accounting for uncertainty
- Communicating the results to decision-makers and stakeholders.

Despite having a formal definition, questions kept recurring during the meeting of what is an MSE and what is not an MSE. Processes that do not include all of the above components are not considered "full" MSEs, but may be referred to as desktop MSEs or MSE-light. These types of MSEs may be appropriate when there is less stakeholder input, or when simpler models are used.

Some meeting participants felt that management objectives did not necessarily need to be specified at the outset, or if specified, they could be revised as part of the MSE process. As a result, there appear to be two types of MSEs emerging: 1) a rigorous MSE that clarifies objectives at the beginning of the process, and 2) a more flexible MSE where objectives may change in response to the analysis and trade-

offs. Consequently, the final determination of the objectives may become an output of the process rather than an input. In some cases, the MSE may start out as a rigorous type, but evolve into the flexible type as the process proceeds.

Although the evaluation of the management options can be conducted through computer simulations, simulation analysis alone is not an MSE. Rather, MSE is a process that integrates science and management. The purpose of MSE is not to seek an "optimal" strategy, but rather to focus on trade-offs so that stakeholders and decision-makers can weigh options and consider risks and uncertainty with various strategies.

MSE places a strong emphasis on including stakeholders in the process. Analysts conduct simulations and communicate results to stakeholders and decision makers, and explain and discuss trade-offs (including trade-offs between stakeholders) and uncertainty. The goal is for stakeholders and decision makers to agree on a strategy to adopt, when it will be re-evaluated, and what to do when things go wrong. It may take several cycles of analysis and discussion before an agreed-upon strategy is reached.

One component of stakeholders that is often overlooked is the "invisible" stakeholders. These are fishermen or others who utilize or have an interest in the resource, but who do not come to meetings or make their voices heard. Social scientists can play an important role in identifying who these stakeholders are, and in finding ways to bring them into the process.

During a round-table discussion, moderators asked each of the SSC delegations to provide examples of applications where their Council was using MSE. The level of involvement by each Council varied greatly. For example, the New England SSC cited their use of MSE to establish a long-term control rule for specifying ABC for herring fishery in an ecosystem context. The North Pacific SSC noted that they are using NMSE to evaluate alternative apportionment strategies for the Gulf of Alaska/Bering Sea and Aleutian Islands migratory species. The South Atlantic SSC discussed the use of MSE to evaluate catch limits for data-poor species using the data-limited methods toolkit (DLMToolkit). The Gulf SSC noted the following applications:

- DLM assessments (SEDAR 49)
- Extraordinary ecological impacts (e.g., red tide events)
- Spatial habitat management (i.e., HAPCs)
- ICCAT related MSEs (not directly Council related, but involves many analysts involved with Council activities)

Rick Methot gave an overview on the development of MSEs by NMFS. NMFS began putting more emphasis on MSEs following program reviews in 2012-2014, and is taking steps to incorporate MSEs into the Council process. This involves establishing a national MSE capability with complementary expertise at each Science Center. NMFS is currently in the process on hiring an MSE-dedicated staff person at each science center. A working group has been formed, and MSE technical training began in January 2018 under André Punt (University of Washington). To date, 82 completed, ongoing and planned projects have been identified within 4 general categories: 1) performance testing of surveys and assessments to understand impact on advice; 2) Performance testing of fishery control rules; 3) Response of ecosystems and fisheries to climate drivers; and 4) integrated ecosystem assessments.

In more general discussions, the SSC discussed who is a stakeholder vs. a decision-maker. These roles need to be clearly defined. For best practices, stakeholders should decide who will lead their meetings. It is generally not advisable to have stakeholder meetings run by scientists. Scientists tend to be too technical and detailed for stakeholder groups. Facilitators can run meetings more smoothly, but may not accomplish much relative to other approaches.

Social and economic factors need to be a part of MSE. These factors should be incorporated into the trade-off analysis as they generate different questions than what fishery managers may ask.

A main advantage of MSE is the ability to address uncertainty through various "what if" scenarios. However, the more uncertainty that is considered, they more simulations that need to be run to account for all reasonable scenarios.