FISHERIES MANAGEMENT IN TROUBLED WATERS: THE NEED FOR SCIENTIFICALLY INFORMED DECISION MAKING

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Management of fish stocks operates against a backdrop of natural, social and legal uncertainties. Society views science as a way to control or eliminate these uncertainties. The view prevails that with enough research, enough analysis, and just the right model, uncertainty can be overcome and a clear path will be revealed that will operate within our social and economic constraints. We conclude that this view has hobbled efforts to devise rational fisheries policies. Fish populations and ecosystems are inherently variable over both short and long time frames. The social setting for fisheries management shifts as a result of changing social views, economic constraints and legal priorities. Given these uncertainties, managers and scientists constantly sift through the available information searching for clear, and socially compatible, answers. Because such clarity is not to be had, the result is "analysis paralysis," and limited progress on issues ranging from salmon recovery to the role of aquaculture and artificial production in fisheries management. At the same time, due to increasing human population and global climate change, the environmental context of fisheries decisions is rapidly shifting. The result is an inability to make meaningful change, with significant ramifications for recovery and management of fish stocks and their ecosystems.

As an alternative to the quest for scientific certainty, we suggest the approach of scientifically informed decision making. This approach is characterized by two significant attributes. The first attribute is a decision process that is prepared to operate in a climate of uncertainty and high variability. Science can address identified uncertainties but environmental variability and changes in social priorities mean that new uncertainties will emerge. As a result, decision makers and scientists must abandon notions of scientific predictability in favor of a process that accepts change and the need for course corrections as a result of new information and changed circumstances.

The second attribute of scientifically informed decision making is an explicit working hypothesis that serves as the "compass and gyroscope" (Lee 1993) to chart the course across a variable and uncertain future. This working hypothesis (usually codified as a working model), is based on knowledge available at a point in time, and may include quantitative as well as qualitative information. The working hypothesis differs from more academic models in its focus on charting a course and creating a coherent conclusion from available knowledge. The working hypothesis informs and guides decision making in the absence of perfect knowledge—uncertainty does not become an excuse for inaction.

While these notions seem simple, it is clear that they are not employed in existing scientific and decision-making processes associated with fisheries management. The inability to move forward is itself a significant environmental action because of large and small scale shifts in both the environmental and social landscape of fisheries decision-making. We contend that better actions will result from a process that accepts uncertainties and the need for continued participation. The ideas embodied in scientifically informed decision-making are being implemented for salmon recovery and management in Puget Sound through a process termed Managing for Success (MfS). MfS is being developed by the Washington Department of Fish and Wildlife (WDFW) and Tribal co-managers. MfS consists of:

- A set of planning tools and models (the compass and gyroscope).
- A database of detailed management, biological, and physical objectives based on the planning models.
- A database of actions implemented to achieve the objectives.
- Monitoring data that tracks progress toward the objectives.

The planning models define the working hypothesis for salmon management and address what fisheries managers refer to as the "4-H's": habitat, hatcheries, hydroelectric dams and harvest. A simple overall planning model, the All-H Analyzer (AHA), brings together results of more detailed models addressing each of the H's. Managers use AHA to explore options for balancing production and harvest with estimates of the capacity and productivity of existing and future habitat conditions.

Results of the AHA analysis help managers set broad-scale objectives for habitat, hatcheries, hydroelectric dams and harvest that are expected to meet management and recovery goals. These objectives can be analyzed further through the individual component models to provide finer scale objectives for biological and physical attributes.

The MfS actions database links projects with specific objectives, and tracks implementation of the actions through time. This allows implementers and funding agencies to understand how actions relate to the overall recovery and management objectives. The system also allows managers to balance investments across objectives to ensure that the recovery plan is moving forward.

Finally, MfS is linked to monitoring activities that track progress, and facilitate refinement of the guiding working hypothesis over time. On a separate but essential track, scientific investigation tests and refines the basic elements of the hypothesis. Scientific research and experience come together through deliberative refinement of the working hypothesis. As a result, the restoration trajectory is re-cast through a formal, scheduled process, allowing a more nimble response to natural and social shifts in fisheries environments.

Lee, K. N. 1993. Compass and Gyroscope: Integrating Science and Politics for the Environment. Island Press, Washington, DC.