Final Summary

NPRB Science Panel
January 15-16, 2004
Anchorage, Alaska

The Science Panel met on January 15-16, 2004, at the Hotel Captain Cook in Anchorage, Alaska. Present were Rich Marasco (Chairman), Vera Alexander (Vice Chairman), Shannon Atkinson, Richard Beamish, Jim Berner, Dan Goodman, Anne Hollowed, Gordon Kruse, Tom Royer, Pat Tester, David Witherell, and Doug Woodby. Absent were Don Bowen and Ed Houde. The meeting was staffed by Clarence Pautzke and Misty Ott.

The primary meeting purpose was to receive the interim report of the National Research Council concerning development of a science plan for the NPRB. The Science Panel also discussed assignments for reviewing proposals received in response to the 2004 request for proposals and the process for ranking proposals at their March meeting in Seattle.

NRC Report

The interim report was presented by Dr. Lynda Shapiro, chair of the NRC committee. Panel members sought clarification of various points raised in the report. In the ensuing discussion, the Science Panel made the following points about developing a science plan:

1. The plan needs to strongly encourage collaborative, interdisciplinary research off Alaska. There are several good examples of interdisciplinary science programs that could serve as models: Southeast Bering Sea Carrying Capacity Program, EcoHab, and PINCERS, among others. It was noted that the National Institute of Health also strongly encourages scientists to work together toward a common goal. The Marine Science Symposium held in Anchorage on January 12-14, 2004, also showed that scientists are coming together in collaborative programs and this needs to be sustained over the long term of the science program.

2. NPRB should provide oversight in coordinating and establishing the direction of marine research off Alaska. NPRB should not be just another funding agency. It needs to be proactive in describing and planning to address research needs.

3. The NRC report has provided a good starting point for developing a science plan, particularly with regard to establishing thematic areas for research. The themes identified can be viewed as boundaries for research initiatives, but the harder task will be to define the core areas of research that the Board must address over the next 5-7 years.

4. The core research initiatives should focus on fisheries and related oceanographic conditions and relate back to the Board's mission and goals as noted on p. 3 of the NRC report. The Science Panel believes those are well written and laudable and provide an adequate basis for developing cornerstone hypotheses to provide direction for research. The three goals include: (1) improving understanding of the dynamics of the North Pacific marine ecosystem and use of resources; (2) improving our ability to manage and protect the healthy fish and wildlife populations and provide long-term sustained benefits; and (3) improving our ability to forecast and respond to effects of changes, through integration of various research activities, including long-term monitoring.

5. The Science Panel believes that long-term monitoring and continuity of data are key to improving our prediction capabilities and must be protected in times of funding shortfalls. This is justified because the program is attempting to describe long-term variability in the marine ecosystem. We need to consider not only how humans may be impacting the ecosystem, but also how humans are impacted by the ecosystem. A workshop on long-term monitoring should be convened to ensure that the right parameters are being monitored in the right places.

6. Specific research questions may center on linkages between the atmosphere, ocean, fisheries, and people. Some believe the important missing link is water column measurements that would provide seasonal maps of ocean conditions and how they relate to zooplankton prey fields for fish populations. The Bering Sea moorings will be extremely important in that regard, as will future deployment of the Alaska Ocean Observing System.

7. Some members believe that a portion of research funding by the Board should be directed at more strategic research, i.e., attempting to lay the foundation for answers that may be needed far in the future, for example, the impacts of an ice-free Arctic Ocean and the opening of a Northwest passage. This may only require a small portion of the funds, but it should be included in long term planning.

8. The Science Panel does not anticipate that the actual science plan document will be more than about 50 pages. It should not be top-heavy with background or synthesis material, but rather a clear, concise statement of the conceptual foundation, hypotheses to be explored, research priorities, initiatives that should be carried out in the next 5-7 years, synthesis activities, collaborative opportunities, data management, and outreach and education goals. The plan may also include performance indicators that would provide a basis for review after five years by an outside review group. The bottom line is that the science plan, while taking a longer term view, should focus on an integrated research plan for the next 5-7 years with a funding base of about $30 million.

9. The Science Panel identified several hypotheses that could form the basis for the conceptual foundation:

Hypothesis 1:

Ocean variability is the principle factor influencing fish production, distribution and growth. Relative to ocean forcing, predator prey interactions are a secondary forcing factor that has relatively minor impacts on temporal trends in fish production.

Sub-hypothesis 1a. Species that exhibit autocorrelated time series of abundance are species where annual production is influenced by timing, abundance, and species composition, phytoplankton and zooplankton production, larval transport to favorable nursery areas or both. Decadal shifts in atmospheric forcing have direct impact on the timing of the spring bloom and transport.

Sub-hypothesis 1b. Fish that exhibit high levels of interannual variability in production and synchronous patterns of high annual production with other species are species where annual production is influenced by several factors (more than 4) all of which must align to allow for high survival. Patterns of synchrony in production suggest that factors underlying years of high survival could be associated with spatial overlap of predators and prey.

Hypothesis 2:

Predator prey interactions may act in concert with ocean variability to cause interannual and long-term trends in fish production. Patterns of synchrony in production suggest that factors underlying years of high survival could be associated with interannual changes in spatial overlap of predators and prey.

Sub-hypothesis 2a. Most variability in recruitment is attributed to variability in early life survival during larval and juvenile stages. Survival in the larval stage is driven largely by advection, quantity and quality of prey availability, and predation. Survival in the juvenile stage is dominated by variability in predation.

Sub-hypothesis 2b. Major ecosystem restructuring can result in a trophic cascade in which changes in dominant predators can adversely affect the long-term productivity of lower trophic levels. In turn, changes in lower trophic levels can be manifested in long-term increases or decreases in other top-level predators.

Hypothesis 3:

Human exploitation of marine resources is the largest direct source of anthropogenic mortality and benthic habitat alteration in Alaskan ecosystems. If managed appropriately, Alaskan ecosystems are resilient enough to absorb this mortality without causing irreparable harm to the species within them or the communities (including humans) that utilize these resources.

10. The Panel discussed potential performance indicators. There was much discussion of improving our ability to predict changes in the ecosystem. This could involve improvements in ecosystem models and our understanding of key processes and metrics that will help to shed light on major drivers of ecosystem change. Increasing predictive capability may be a risky indicator to use, but current forecast models do not do a good job of indicating direction of change, let alone the magnitude of change in principal components of the ecosystem.

11. Models can be used for more than just predicting change. They help us to learn about and conceptualize the marine ecosystem. They also help to identify potential areas for research by identifying gaps in knowledge. Success also may be stated in terms of whether our research results have changed our ideas about how the system works. If nothing else, the models and new research should show directional change, even if quantitative estimates are lacking. Modelers also need to improve their ability to predict locations of major domains that we are interested in and food web dynamics within those important domains.

12. Performance indicators should include more than improving our predictive capabilities. They could include better outreach and education, improved conceptual pictures of the Beaufort Sea, Bering Sea and Aleutians, and Gulf of Alaska, similar to that which GEM developed for the Alaska Coastal Current. Another performance indicator could be enhanced data management. NPRB should be a data integrator and play an active role in ensuring that data are archived and accessible.

13. The Science Panel recommends that the Board adopt a core area for research where support will be maintained even if funds are limited. The Panel believes that their recommendation from August is still most appropriate, i.e. identifying the core area for Board research as the Bering Sea, Aleutian Islands, and the western Gulf of Alaska. The Board should also consider how it could interact with the SEARCH program in the Arctic in addition to other programs mentioned in the NRC report.

14. Concerning the role of the Proposal Selection Committee (PSC), recommended by the NRC committee, the Science Panel noted that if such a committee is convened, it may be better used to help the Panel determine which proposals are of sufficient scientific merit that they could be funded. The Science Panel still should have a prominent role in recommending which of the meritorious proposals should be funded, to ensure continuity in the research program and responsiveness to NPRB goals and objectives, and that a balanced, integrated suite of proposals is recommended for funding consistent with the science plan. The Panel noted that NSF-like reviews focus on the science, but the Board's program is not solely a science program. Communities want to be involved and their needs are important. There must be a strong linkage back to the needs of resource managers and users, and the Science Panel can help to provide that. PSC members could be invited as experts to sit with the Science Panel from time to time to help in specific areas of scientific expertise not represented on the Panel.