Foreword

This project entitled "*Integration of ecological indicators for the North Pacific with emphasis on the Bering Sea: A workshop approach*" was developed from a proposal submitted in response to the North Pacific Research Board's (NPRB's) request for proposals for 2005, specifically Project Need 1, Item 2, as stated below:

> ***Evaluate the Utility of Ecosystem Indicators in Explaining Processes underlying Marine Production.*** *Processes related to physical (e.g., atmospheric forcing, ocean temperature, salinity, sea level, freshwater discharges, transport of planktonic life history stages, sea ice extent and duration, turbulence and cold pool extent), chemical (e.g., nutrient/micronutrient availability to phytoplankton), and biological (e.g., predation, timing of plankton/zooplankton production, commercial catch composition, biomass/abundance trends) phenomena provide indicators of ecosystem status. The project would report on the current understanding of ecosystem indicators in the Bering Sea and Aleutian Islands, evaluate pros and cons of existing indicators, and identify next steps toward developing and/or validating indicators and evaluating their performance (e.g., using hind-casts of indicators and various marine populations). In addition, the report will describe how indicators can best be used as a tool for resource managers. The approach would include a workshop of regional experts to address the challenge of developing indicators and interpreting their utility.*

The North Pacific Marine Science Organization (PICES) appreciates NPRB funding for this work, which attempts to further the development of integrated ecosystem indicators for the Bering Sea.

The following four objectives/activities were central for the PICES/NPRB Indicators Workshop held on June 1–3, 2006, in Seattle (Washington, U.S.A.):

1. Involve the Bering Sea and international communities in developing a set of operational objectives for the southeastern Bering Sea ecosystem;
2. Evaluate two status reports with a goal of integrating results and streamlining the presentation:
   a. NPFMC. 2005. Appendix C: Ecosystem Considerations for 2006. North Pacific Fishery Management Council, Anchorage, Alaska (http://access.afsc.noaa.gov/reem/EcoWeb /index.cfm);
   b. PICES. 2004. Marine Ecosystems of the North Pacific, PICES Special Publication 1, 280 p. (http://www.pices.int/publications/special_publications/NPESR/2005/npesr_2005.aspx)
3. Investigate methodologies to monitor system-wide structural changes within the marine ecosystem;
4. Identify steps to validate indicator performance, improve the monitoring network, and integrate into predictive models.

In conducting these activities there was a focus on the southeastern Bering Sea because it represents the center of the Bering Sea/Aleutian Islands large marine ecosystem (LME), one of three LMEs (the other two are the Gulf of Alaska and Arctic Ocean) defining the NPRB research region (NPRB, 2005). Although the project focused on the southeastern Bering Sea, the intent was to provide insights, findings, and recommendations more broadly applicable to the North Pacific and adjacent seas, a larger area representing the PICES region, including waters bordering China, Japan, South Korea, Russia, Canada, and the United States.

The primary product of the project is this *PICES Scientific Report*, which includes three white papers developed for the Indicators workshop, and a summary of workshop discussions, outcomes, and recommendations. Outcomes of the workshop has also been used by NPRB to prepare an integrated ecosystem research plan for the Bering Sea.