

NORTH PACIFIC RESEARCH BOARD RESEARCH SERIES



OTHER PROMINENT ISSUES & RESEARCH PARTNERSHIPS *Ocean Challenges*

2002-2008 RESEARCH SUMMARY



The North Pacific Research Board (NPRB) was established by Congress in 1997 to develop a comprehensive science program of the highest caliber that provides a better understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems and their fisheries.

The NPRB carries out science planning, prioritizes pressing fishery management and ecosystem information needs, coordinates with other ocean science programs, competitively selects research projects, and communicates research results to diverse audiences.

Since its founding, the North Pacific Research Board has developed a comprehensive program of marine research. The *Science Plan*, developed with guidance from the National Research Council of the U.S. National Academies of Sciences, serves as the foundation for annual requests for proposals organized by major research themes, including:

- Lower Trophic Level Productivity
- Fish Habitat
- Fish and Invertebrates
- Marine Mammals
- Seabirds
- Humans
- Other Prominent Issues
- Integrated Ecosystem Research
- Other Research and Partnerships

The annual requests for proposals result in the majority of the funded projects, which are numbered by the year they were funded (e.g., #201 funded in 2002). The Board also supports integrated ecosystem research programs that look in-depth at Alaska's major ocean ecosystems, with a program ongoing in the Bering Sea and in development for the Gulf of Alaska.

This research summary describes research funded from 2002 through 2008.

OTHER PROMINENT ISSUES AND RESEARCH PARTNERSHIPS

North Pacific Research Board members represent a broad array of federal, state, and other entities involved in research off Alaska. By its very composition and nature, the Board can provide coordination among research programs and encourage partnerships and other approaches to research. NPRB provides leadership in working with other agencies and entities to identify science, management, and monitoring needs.

Other prominent issues span a variety of topics, but most projects under this category have focused on contaminants and harmful algal blooms.

- contaminants
- harmful algal blooms
- cooperative research
- research partnerships



OTHER PROMINENT ISSUES AND RESEARCH PARTNERSHIPS

(CONTAMINANTS, HARMFUL ALGAL BLOOMS, INVASIVE SPECIES, AQUACULTURE)

421	Identification of polybrominated diphenyl ethers (PBDEs) in sediments and biota in a pristine southeast Alaska watershed and near a municipal waste landfill in Juneau, Alaska. <i>L. HOFERKAMP, S. TAMONE</i>
422	Ecological implications of fisheries-based economical development in Nelson Lagoon: Steller's eider critical habitat. <i>E. LANCE, K. TRUST</i>
534	Expanding the seabird tissue archival. <i>P. BECKER, D. ROSENEAU, G. YORK</i>
642	Seasonal distribution, habitat use, and energy density of forage fish in the nearshore ecosystem of Prince William Sound. <i>S. JOHNSON</i>
644	Response and intervention system for climate change induced paralytic shellfish poisoning in Aleut communities. <i>V. GOFMAN, R. RALONDE, B. WRIGHT</i>
704	Developing the Alaska Marine Information System. <i>M. JOHNSON</i>
726	Sediment quality triad assessment in Kachemak Bay, Alaska: Characterization of soft bottom benthic habitats and contaminant Bioeffects Assessment. <i>D. APETI, S. HARTWELL, K. KIMBROUGH</i>
727	TBT contamination and impacts in Alaskan seaports. <i>L. HOFERKAMP, D. TALLMON</i>
729	Residency and movement of copper rockfish <i>Sebastes caurinus</i> and lingcod <i>Ophiodon elongates</i> in nearshore areas of Prince William Sound. <i>M. BISHOP</i>
730	A cooperative pollock acoustic biomass survey for management of fisheries interactions with steller sea lions in the Aleutians Islands. <i>E. LOGERWELL, S. MOLLER, P. STABENO</i>
731	Temperature data collections on Bering Sea groundfish vessels to evaluate temperature at depth and catch rates for target and bycatch species in order to reduce bycatch and increase knowledge of how ecosystem variables affect fishing. <i>J. GAUVIN, J. IANELLI, P. STABENO</i>
821	Using blue mussels as an indicator species for testing domoic acid toxicity in subsistence bivalve harvest. <i>B. HIMELBLOOM, R. RALONDE, B. WRIGHT</i>
822	Mercury levels in murre and gull eggs harvested for food in the Norton Sound region and potential sources of contamination. <i>P. BECKER, D. ROSENEAU</i>
825	Assessment of Bristol Bay red king crab resource for future management action: implementing a cooperative approach. <i>S. HUGHES</i>
826	Monitoring, avoiding, and deterring humpback whale bycatch in coastal Alaska fisheries: A cooperative approach. <i>K. WYNNNE</i>
827	Ambient noise monitoring in the Beaufort Sea using autonomous vertical arrays. <i>A. THODE</i>
901	Continued development of the Alaska Marine Information System (AMIS). <i>M. JOHNSON</i>

Contaminants

THE TRANSPORT, BIOACCUMULATION, AND BIOMAGNIFICATION OF CONTAMINANTS IN THE MARINE ECOSYSTEMS OF ALASKA ARE OF UTMOST CONCERN.

The National Research Council noted in its guidance to the Board that there are three primary risks from contaminants moving through the food web. These include toxicity to individual organisms; toxicity to humans, especially Alaska Natives who may depend predominantly on aquatic foods, and contamination of commercially-fished species, which may affect marketability and cause health problems.

The Board responded to these concerns by including a contaminants priority in each of the eight RFPs from 2002 to 2008, mainly directed at the sources, transport, and accumulation of contaminants and their effects on ecosystem structure and function.

OTHER PROMINENT ISSUES :: Contaminants

Flame Retardant Chemicals in Invertebrates in Southeast Alaska

Project 421

IN 2004, THE BOARD'S FIRST CONTAMINANTS STUDY, Project 421, examined the levels of polybrominated diphenyl ether (PBDE) in sediments and invertebrates collected from two study sites in Southeast Alaska: one at Lemon Creek near an industrial landfill in Juneau, and a second, more pristine site, at Peterson Creek north of Juneau.

PBDEs are man-made chemicals widely used as flame retardants from 1970 to 1980. U.S. production has been curtailed, but PBDEs continue to be produced elsewhere. Bioaccumulation of PBDEs and transmission up the food web may be of particular concern in North Pacific ecosystems if they become concentrated in commercially important fish and shellfish species. PBDEs are neurotoxins that can act as endocrine disruptors and impact thyroid hormone regulation.

The research concluded that even the highest PBDE levels, found at Lemon Creek, were four to twenty-seven times lower than those found in surface sediments from bodies of water bordering heavily industrialized areas, such as the Great Lakes or in the North Sea. Unlined municipal solid waste landfills bordering the Lemon Creek estuary appeared to be a significant source for PBDEs. In Peterson Creek, concentrations were much less, though measurable. Those contaminants may be spread to glaciers through atmospheric transport and then carried into estuaries through ice melt. Researchers studied a number of invertebrate species including amphipods, mussels, clams and isopods, finding the highest concentrations in filter-feeding clams.

OTHER PROMINENT ISSUES :: Contaminants

Looking for Hydrocarbons in Nelson Lagoon

Project 422

PROJECT 422 EXAMINED POLYCYCLIC AROMATIC HYDROCARBON (PAHs) contamination in blue mussels in Nelson Lagoon, on the north coast of the Alaska Peninsula. These mussels are important prey for threatened Steller's eiders that gather by the thousands in the lagoon to molt beginning in July. Boating activities, salmon fishing, and accidental oil discharges ran the risk of polluting the water with hydrocarbons. PAHs are associated with chronic risks of cancer, reproductive anomalies, and endocrine dysfunction. Researchers found very low concentrations of PAHs in the marine sediments, tissues of invertebrates, and in the water. In general, the lagoon remains relatively pristine.



Nelson Lagoon from the air.

Ellen Lance

FEATURE PROJECT

OTHER PROMINENT ISSUES :: Contaminants

Monitoring Seabird Eggs

Project 534

A LONG-TERM PROGRAM TO MONITOR CONTAMINANTS MEASURED IN seabird eggs, an important subsistence food for local residents, began in 1997 and the Board began funding it in 2005. Project 534 helped support a collaborative project with the U.S. Fish and Wildlife Service and residents of 15 communities to monitor trends in Alaska marine environmental quality by collecting seabird eggs, and processing and banking the samples to ensure chemical stability during decadal storage.

The overall program, called the Seabird Tissue Archival and Monitoring Project (STAMP), seeks to provide a record of long-term anthropogenic contaminants, such as chlorinated pesticides, polychlorinated biphenyls (PCBs), PBDEs, and mercury in murre and gull eggs from the Gulf of Alaska and Bering Sea.

Examining north-south and east-west patterns helps provide clues to contaminant sources and transport patterns, and their impact on the food web. NPRB's support was used to analyze contaminants in eggs collected in 2002-2005. Researchers found that PCBs and dichlorodiphenyldichloroethylene (DDE) were higher in the Gulf of Alaska than the Bering Sea, while levels of hexachlorobenzene (HCB) had just the opposite pattern.

Levels of persistent organic pollutants appear to have declined in Alaska murre colonies since the mid-1970s. Mercury levels in murre eggs were comparable to levels reported elsewhere in the world. Mercury levels around Norton Sound were higher than elsewhere and may reflect historical mining activities on the Seward Peninsula and natural inputs from the Yukon River and smaller drainages.



The 1999-2007 Seabird Tissue Archival and Monitoring Project (STAMP) seabird egg collecting sites



Murre eggs, St. George Island.



Francis Wise

Carrie Eischens

OTHER PROMINENT ISSUES :: Contaminants

Assessing Mercury Levels in Murres and Gulls in Norton Sound

Project 822

RELATED TO STAMP (PROJECT 534), PROJECT 822 supports an assessment of mercury contamination in murre and gull eggs in the Norton Sound region to determine if contaminant levels correlate with large estuarine wetlands, river outflows, or historical gold mining sites. When completed in 2010, the study will provide local residents with important information about the contaminant levels in bird eggs used for subsistence purposes. It will also help identify potential sources of contaminants and the presence of those contaminants at traditional egg harvesting locations.

OTHER PROMINENT ISSUES :: Contaminants

Characterizing Kachemak Bay Sediments

Project 726

RESEARCHERS ARE ASSESSING HABITAT CONDITIONS that influence biodiversity and distribution of soft bottom benthic infaunal communities in Kachemak Bay in Project 726. By characterizing sediment properties, benthic infaunal community distribution and condition, sediment contaminant concentrations, and toxicity, the study will provide important benthic community and sediment toxicity data that can be integrated with other national status and trends databases.

OTHER PROMINENT ISSUES :: Contaminants

Analyzing Mussels and Dogwinkles for TBT Contamination

Project 727

TRIBUTYL TIN (TBT) IS ONE OF THE MOST TOXIC COMPOUNDS EVER TO COME ON THE MARKET, AND POSES A POTENTIAL threat to subsistence harvest, mariculture, and natural populations of marine resources in Alaska. Project 727 will assess TBT impacts throughout Southeast Alaska and the Gulf of Alaska to determine whether levels are elevated in ports used by large ships. The study will also obtain baseline data for long-term monitoring of nearshore ecosystems. By analyzing mussels and file dogwinkles, researchers will quantify TBT contamination in and near harbors and compare changes at Auke Bay and Kodiak over twenty years.



Mussels on beach.

Ryan Soderlund

Harmful Algal Blooms

PARALYTIC SHELLFISH POISONING (PSP) IS THE MAJOR HARMFUL ALGAL BLOOM (HAB) CONCERN IN ALASKA.

Caused by dinoflagellates, PSP toxins accumulate in filter-feeding shellfish and transfer through the food web to those who feed on shellfish. People with PSP poisoning feel symptoms that can include tingling or numbness in the lips and extremities, nausea, dizziness, shortness of breath, and in extreme cases, paralysis and death.

OTHER PROMINENT ISSUES :: Harmful Algal Blooms

Community Monitoring for Shellfish Poisoning

Project 644

THROUGH PROJECT 644, THE BOARD SUPPORTED AN effort to educate local residents in the Aleutians and Commander Islands about PSP and train them to use test kits to monitor the toxin. Shellfish specimens were collected and analyzed from 21 communities extending the length of the Aleutians. Only low levels of PSP were found. Test kits provided an efficient method for rapid screening for PSP, but the technique had a high percentage of false positives.

The project also included interviews of 13 local residents in Sand Point, Alaska, and 30 in Nikolskoye on Bering Island in Russia. The respondents were asked about learning and teaching about shellfish, indicators of shellfish safety, and shell collection and preparation habits. The project sought to develop a complementary relationship between scientific research and traditional knowledge, and between natural and social sciences that would improve

understanding of the risks of PSP to human health in Aleut communities. Researchers concluded that local and traditional knowledge, on its own, cannot equip local residents with sufficient knowledge about safe harvesting of shellfish.



A Sand Point technician and her assistant prepare a sample of butter clams to be tested for PSP.

Bruce Wright

OTHER PROMINENT ISSUES :: Harmful Algal Blooms

Testing for Domoic Acid Toxins

Project 821

PROJECT 821 SUPPORTS A SHELLFISH TESTING PROGRAM for domoic acid for multiple coastal sites from Southeast Alaska to Dutch Harbor. Domoic acid is produced by several diatom species and can be incorporated as a toxin in shellfish, similar to other toxins, such as PSP. The seriousness of domoic acid as a toxin with human health implications was first discovered in North America in 1987 when an outbreak occurred in Eastern Canada, causing 107 illnesses and three deaths. Toxicity is extremely variable depending on the general health and age of the victim. Low doses cause gastrointestinal illness and moderate neurological symptoms including loss of short term memory (termed amnesiac shellfish poisoning). At high

doses domoic acid is fatal, particularly among the elderly and immuno-compromised shellfish consumers. The occurrence of domoic acid poisoning is underreported in Alaska, even though it could have devastating impacts for the marine environment, coastal economies, and human health. The intent of this project is to determine if domoic acid is prevalent in Alaska, measure concentration levels in blue mussels as an indicator species, and design a sampling and testing program that will enable Alaska to adequately monitor for domoic acid. Local residents are being trained to test for domoic acid and send samples to the Fishery Industrial Technology Center in Kodiak for analysis.

Cooperative Research

THE *SCIENCE PLAN* ENCOURAGES COOPERATIVE RESEARCH WITH INDUSTRY. IN SEPTEMBER 2005, NPRB APPROVED ADDING GENERAL LANGUAGE TO THE PREAMBLE OF THE 2006 RFP ENCOURAGING PROPOSALS THAT INVOLVED COOPERATIVE RESEARCH WITH INDUSTRY.

In March 2006, the Board noted that it had already funded several projects that involved cooperative research, but wanted to be more proactive in generating cooperative research with industry. NPRB considered the following:

- (1) continuing the more passive approach
- (2) placing a specific priority in the 2007 RFP to require cooperative research
- (3) contracting with someone to actively build our cooperative research program
- (4) partnering with other organizations that were doing cooperative research

The Board decided to seek ways to broaden participation in cooperative research, for example, by supporting industry and scientists working together on gear modifications to reduce impacts on fish habitat. It also wanted to include cooperative research with the oil and gas industry, so it placed a cooperative research priority in the 2007 RFP

at the \$250,000 level. Topics for the oil and gas industry included seaduck migration and potential impacts of infrastructure, walrus distribution and habitat use in the Chukchi Sea, polar bear distribution and abundance in the Chukchi Sea, and salmon distribution and abundance. The Board also identified topics for the fishing industry, including gear modification, fisheries monitoring, bycatch reduction, and ecosystem monitoring and research. Six proposals were submitted and two were funded for a total of \$329,000.

The Board continued to include cooperative industry topics in 2008. Three of the six submitted proposals were funded for a total of \$481,000.

In the fall of 2008, the Board raised the level of funding in the 2009 RFP for this category to \$600,000, and five proposals were submitted.

OTHER PROMINENT ISSUES :: Cooperative Research

Steller Sea Lion Interactions with Fisheries

Project 730

LIKE SEVERAL OTHER MARINE MAMMAL POPULATIONS in the North Pacific, the western population of Steller sea lions has dramatically declined since the 1970s, resulting in their endangered species listing in 1997. Although researchers still do not know the causes of the population decline and the factors constraining recovery, resource managers put a suite of protective measures in place to mitigate potential competition between fisheries and sea lions, including trawl exclusion zones around sea lion rookeries and haulouts to protect sea lion critical habitat. Implicit in the designation of the trawl exclusion zones is that competition between fisheries and sea lions occurs at local scales.

In light of this, resource managers need new strategies at local scales for assessing groundfish abundance, and the impact on sea lions of groundfish removals. Project 730 is investigating whether cooperative biomass assessments and surveys can be an effective way to manage fisheries at the local scales that are important to Steller sea lions or other predators.

Working collaboratively with the fishing industry, scientists are trying to determine if winter acoustic survey data obtained from commercial vessels are of sufficiently high quality to conduct a biomass assessment at local scales. They're also collecting information about Steller sea lion distribution and diets in winter. By synchronizing the timing and spatial scale of the acoustic fishery survey and the sea lion work, researchers hope to determine how sea lions use the local area to forage relative to the biomass available, and the potential impact of reducing that biomass through fishery harvests.



OTHER PROMINENT ISSUES :: Cooperative Research

Exploring Temperature and Bycatch Rates

Project 731

TO FURTHER PREVENT SALMON BYCATCH IN THE pollock fishery, Project 731 is investigating the relationship between water column structure and temperature, and the spatial patterns in the catch of pollock, salmon, and other species. Researchers think temperature is one of the strongest factors controlling where pollock live. We know less about the specific temperature preferences for adult and young salmon in the Bering Sea, which Project 204 revealed to have substantial variation.

Scientists participating in this study are deploying up to 20 temperature-depth recorders on the trawl nets of Bering Sea fishing vessels to collect the necessary physical data to relate to the catch information. If a significant relationship between temperature and catch rates for pollock, salmon, and other incidental species is found, this could be a quick and useful tool for fishermen to predict bycatch rates of salmon and other species, resulting in more selective "temperature-directed fishing."

OTHER PROMINENT ISSUES :: Cooperative Research

Improving Existing Assessment Technologies

Projects 625, 825

IMPROVING POPULATION ESTIMATES INVOLVES MORE than just developing new technologies for assessing difficult species, but also ensuring the accuracy of current methodologies, especially in light of significant uncertainties about gear selectivity and catchability. Such is the case for the Bristol Bay red king crab, which for more than 30 years has been annually assessed by trawl surveys to determine crab densities, biomass estimates, guideline harvest levels, and biological parameters for sustained yield management.

Project 625 developed and conducted an alternative, cost-effective survey for Bering Sea crab resources that eliminates or greatly reduces bias and uncertainty in the estimates of crab biomass for all relevant life stages of crab. Based on a successful pilot study by the Bering Sea Fisheries Research Foundation in cooperation with

the National Marine Fisheries Service and the Alaska Department of Fish and Game in 2005, a full survey of 241 random site tows was conducted over approximately 24,000 square nautical miles in 2007.

The new survey gear, sampling methodology, and geo-statistical approach proved highly effective and lowered the uncertainty of the abundance estimates for large male Bristol Bay red king crab of about 37% from the standard NMFS survey over the past ten years to about 13%. Results also showed significantly higher estimated mean abundance and reduced variance from the Bering Sea Fisheries Research Foundation survey for all sizes and sexes as compared to the National Marine Fisheries Service survey. Recognizing that one survey season, although promising, does not set a new standard, Project 825 continues this effort with another full-scale side-by-side assessment in 2008.



Photos from the 2007 BSFRF trawl showing footrope configuration along wing sections (left) and the throat section (right).

OTHER PROMINENT ISSUES :: Cooperative Research

Ambient Noise in the Beaufort Sea

Project 827

OVER THE PAST FEW YEARS, THE USE OF SEISMIC AIR-guns to map subsurface hydrocarbon deposits has added new sources of acoustic noise to the marine environment, spurring concerns about the potential impact on the long-term viability of the regional marine mammal population, with a particular concern about potential impacts on bowhead whales during their fall migration across northern Alaska. In collaboration with the oil and gas industry,

researchers participating in Project 827 are examining and monitoring ambient noise in the Beaufort Sea near Deadhorse, Alaska. Using autonomous vertical arrays, they measure ambient noise levels, directionality, and spatial structure to distinguish between local and distant noise sources. Investigators track airgun signals, bowhead whale calls, and other discrete sound sources to understand how they are influenced by the physical environment.

OTHER PROMINENT ISSUES :: Cooperative Research

Humpback Whale Entanglements

Project 826

AS HUMPBACK WHALE POPULATIONS IN THE CENTRAL North Pacific increase at an annual rate of 6-10%, interactions with the fishing industry are also on the rise. As many as 71% of the humpbacks in Southeast Alaska bear evidence of prior entanglements. These large baleen whales get tangled in nearly every type of coastal fishing gear in Alaska, from gillnets, longlines, and seines to shrimp and crab pots used in commercial, sport, and personal use fisheries.

Through workshops, cooperative observations, and monitoring of fishing practices and humpback whale behavior, researchers participating in Project 826 will improve our understanding of the nature of humpback whale encounters. The study will also reveal the effectiveness of devices and techniques currently being used by the fishing fleets to deter or respond to entangled whales in nearshore fisheries in Southeast Alaska.



Bill Neuhauser

Research Partnerships

NPRB ENCOURAGES PARTNERSHIPS AND OTHER APPROACHES TO RESEARCH AND PROVIDES LEADERSHIP IN WORKING WITH OTHER AGENCIES AND ENTITIES TO IDENTIFY SCIENCE, MANAGEMENT, AND MONITORING NEEDS. NPRB INTENDS FOR ITS SCIENCE PROGRAM TO BE VIEWED AS A SOURCE OF UNBIASED, HIGH-QUALITY INFORMATION.

Oil Spill Recovery Institute

In 2005, the Board received a draft protocol for working with OSRI. Nancy Bird, executive director for OSRI, indicated that her board was most interested in research in or near the vicinity of Prince William Sound, even though their geographical purview covers all of Alaska. The Board stated its intent to adopt the draft protocol as a five-year umbrella agreement, the details of which would be worked out by staffs of OSRI and NPRB. The Board identified the OSRI collaboration on forage fish as a component of its 2006 RFP. One proposal focusing on forage fish in Prince

William Sound was submitted and funded for a total of \$75,000. In the 2007 RFP, the categories included tracking and monitoring of marine organisms and modeling community impacts. Three proposals were submitted, and one studying rockfish and lingcod in Prince William Sound was funded for \$145,000. The Board included three categories in the 2008 RFP, which included modeling community impacts, contaminant baseline assessment, and forage fish and nearshore habitat associations. None of the four proposals received was approved for funding.

RESEARCH PARTNERSHIPS :: OSRI

Forage Fish in Nearshore Habitats

Project 642

FOCUSED ON PRINCE WILLIAM SOUND, PROJECT 642 examined seasonal distribution, habitat use, and energy density of forage fish in the nearshore areas of eel grass beds, bedrock outcrops, and kelp. Scientists most frequently encountered Pacific herring, saffron cod, pink salmon juveniles, and capelin, which used the nearshore habitat for about six months. Pink salmon were most abundant in spring, herring in summer and capelin in fall. These areas serve as nursery habitat and are particularly susceptible to oil spills or other shoreline disturbances.



NOAA-NMFS

Because nearshore habitats are vulnerable to human disturbance, a better understanding of how the nearshore environment supports ecologically important forage fish species is needed to help managers conserve forage fish populations and protect essential habitats.

RESEARCH PARTNERSHIPS :: OSRI

Home Ranges for Copper Rockfish and Lingcod in Prince William Sound

Project 729

LOCATED IN NORTHEAST PRINCE WILLIAM SOUND, Project 729 studied residency and movements of copper rockfish and lingcod in nearshore areas using acoustic telemetry. Researchers surgically implanted acoustic transmitters in 45 fish captured in three habitats: artificial reef, low-relief natural reef, and patch high-relief rock reef. The homing experiment demonstrated that rockfish have the ability to return to capture sites following a four kilometer displacement. Rockfish and lingcod appear to exhibit very high site fidelity and long periods of residence at the sites studied. Fish on the artificial reef moved least, while those in low-relief natural reef areas maintained the largest home range. The artificial reef also attracted fish from the other habitats and appears to have the potential to provide refuge habitat in the event of physical disturbances such as oil spills and coastal development.

Alaska Ocean Observing System

In 2002, the Board began efforts to fund what became known as the Alaska Marine Information System (AMIS). The purpose was to build an online portal to data and information about Alaska's oceans, and was initially developed through a web-based GIS application and included a series of oceanographic, fisheries, and bio-geographic information to illustrate how this could be achieved and the type of products and applications of such a system. During the project it became clear that all major research institutions that conduct work in Alaska needed to participate, and that the operational center needed to be institutionalized.

As a result, the Board partnered with the Alaska Ocean Observing System (AOOS) and the University of Alaska Fairbanks in projects 704 and 901 to develop, expand, and

maintain a searchable database that has an advanced project browser searchable by researcher, contact information, project location, funding source, and project duration. Other variables such as fisheries and biogeographic information for the Alaska region would be included, as well as a data access and display center that are key ingredients to successful project planning, research, and management.

The intent for the development of the AMIS and the Board's own data system is to provide access to historical information on projects as well as provide access to relevant current and real-time datasets around Alaska. In March 2006, the Board started budgeting \$100,000 annually, starting in 2007 and inflation proofed by 4% in future years, for support for AMIS at UAF.



US Geological Survey

RESEARCH PARTNERSHIPS :: USGS

NPRB Metadata and Data Management

One of the legacies for a science funding organization is the data collected and the products developed with its funding. Since 2007, the Board has maintained an online publication library showcasing all the primary literature that resulted from NPRB funded research (<http://publication.nprb.org/list.jsf>).

Publishing research results is the standard way for most scientists to propagate new knowledge gained. Many are less familiar with submitting datasets and creating the associated metadata. The Board adopted a metadata and data policy in 2006 and now requires delivery at the end of each project as one of the contractual obligations of the principal investigators, and it is also part of the review criteria when considering proposals by previously funded researchers.

To help develop the necessary know-how for all involved, the Board started hosting metadata workshops at the annual Alaska Marine Science Symposia (AMSS) run by U.S.G.S. metadata specialists. The Board also identified

more than \$860,000 within the BSIERP solely for data management and distribution.

After a slow start, metadata and data records started arriving and presented NPRB with the challenge of establishing proper QA/QC protocols. Based on the previous relationship with U.S.G.S. in regards to the AMSS workshops, NPRB staff worked out an incredibly valuable collaboration with U.S.G.S. in which they have agreed to run QA/QC scripts on submitted files, and even work with the PIs in the creation of metadata records should such direct support become necessary. In return, NPRB has agreed to allow the publication of all metadata records on the National Biological Information Infrastructure website (<http://metadata.nbii.gov/clearinghouse/>). With this collaboration, NPRB is ensuring that high quality data and metadata records of all funded projects are retained for future reference and use. Metadata and data records are also made available on the NPRB project websites (<http://project.nprb.org/>).



North Pacific Fishery Management Council

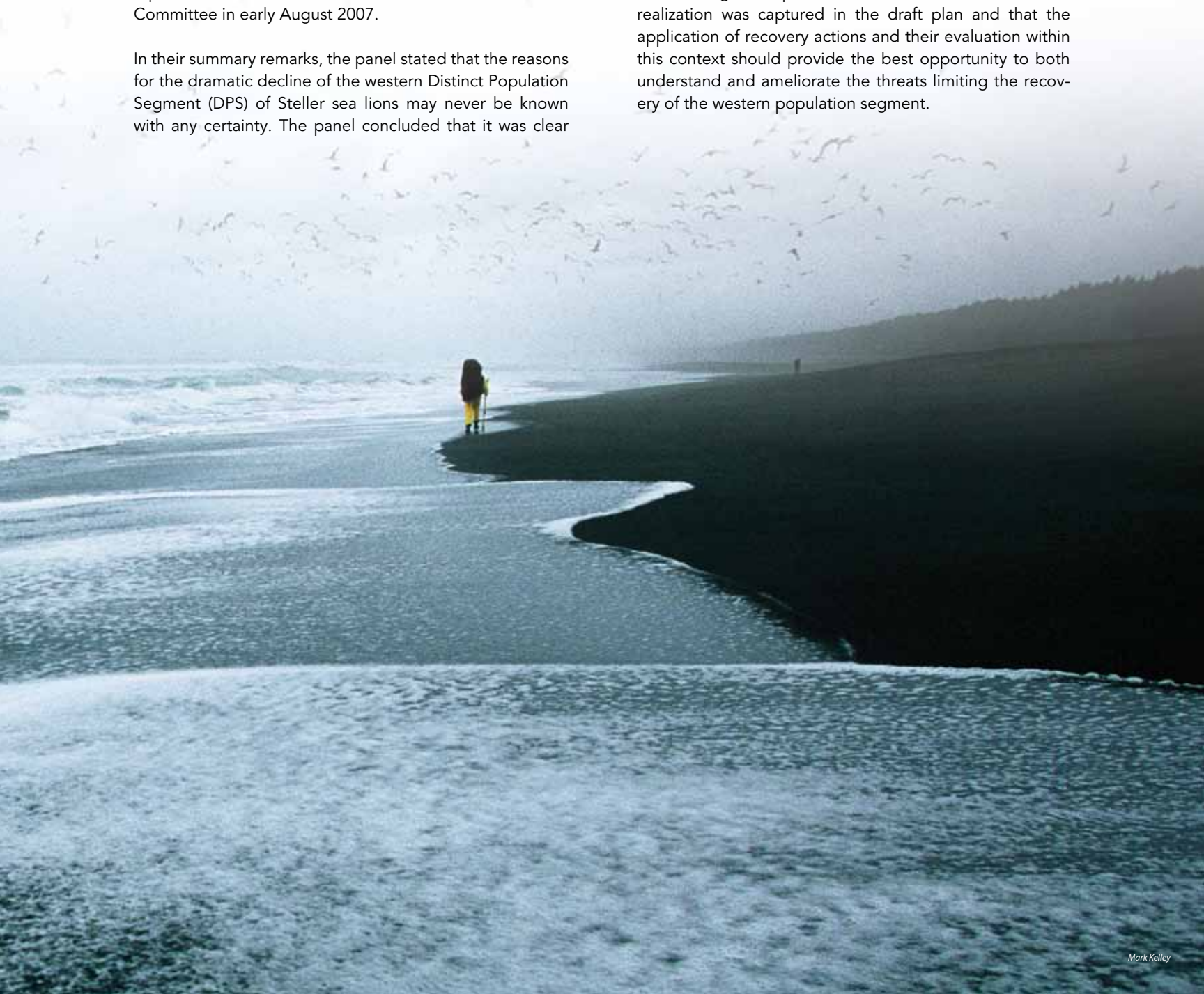
RESEARCH PARTNERSHIPS :: NPFMC

Requests for Scientific Review by Other Organizations

In April 2007, the Board was contracted by the North Pacific Fishery Management Council (Council) to assemble an independent group of experts to conduct a review of the National Marine Fisheries Service's second draft of a revised Steller sea lion recovery plan. To conduct the review, three independent experts, Drs. Don Bowen, Lloyd Lowry, and Daryl Boness, were contracted to perform the review. Review questions were prepared in consultation with Council staff. The review was provided in writing to the Council offices in July and Don Bowen, committee chair, reported to the Council and its Scientific and Statistical Committee in early August 2007.

In their summary remarks, the panel stated that the reasons for the dramatic decline of the western Distinct Population Segment (DPS) of Steller sea lions may never be known with any certainty. The panel concluded that it was clear

that some conservation measures, such as protection from killing were having positive impacts on the dynamics of Steller sea lions, but the benefit of others, such as critical habitat and fishery conservation measures remained uncertain. Nevertheless, the recent increase in numbers in the western segment of the population was a welcome development. The increase, however, had not been observed uniformly across the western portion of the U.S. population, which underscored the need to recognize that limiting factors must differ either in nature or magnitude throughout the range. The panel concluded that this fundamental realization was captured in the draft plan and that the application of recovery actions and their evaluation within this context should provide the best opportunity to both understand and ameliorate the threats limiting the recovery of the western population segment.



OTHER PROMINENT ISSUES & RESEARCH PARTNERSHIPS

Ocean Challenges

2002-2008 RESEARCH SUMMARY



NORTH PACIFIC RESEARCH BOARD

Mission

NPRB supports research to build a clear understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems that enables effective management and sustainable use of marine resources.

Other Prominent Issues and Research Partnerships is one in a series of publications produced by the North Pacific Research Board in support the 2005 *Science Plan* developed with guidance from the National Research Council of the U.S. National Academies of Sciences.



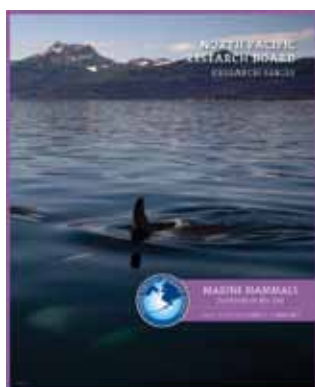
OCEANOGRAPHY & PRODUCTIVITY



FISH HABITAT



FISH & INVERTEBRATES



MARINE MAMMALS



SEABIRDS



HUMANS



OTHER PROMINENT ISSUES
& RESEARCH PARTNERSHIPS

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