

OSRI





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Photos by Prince William Sound Science Center staff and others:
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message from the director



December 2005

It was extremely rewarding to learn, in August, of Congress' extension of OSRI's life to match that of oil and gas exploration and development in Alaska! This new permanence to OSRI's existence is excellent news because OSRI's mission is even more vital now than when Congress first established it in 1990.

Returning to specific activities during 2003 and 2004 highlighted in this report, OSRI continues to support oceanographic surveys and circulation and atmospheric modeling for Prince William Sound. This investment in real-time model outputs are intended to inform spill responders on prevailing atmospheric and oceanic circulation patterns so that more accurate trajectories can be predicted. Building from the foundation of prior research programs, such as the Sound Ecosystem Assessment and the Prince William Sound Nowcast-Forecast System, OSRI is collaborating with the Prince William Sound ocean observing system (PWSOS) to develop tailored products to meet the needs of a wide variety of users including industry, scientists, educators, resource managers, search and rescue and security agencies.

A major highlight of the two-year period was the Lagrangian Drifter Buoy Experiment, conducted in late July and early August of 2004. This field trial of the ocean current and atmospheric models developed since 1999 taught us a lot about our strengths and weaknesses. The experiment was a good opportunity to work and communicate with others interested in the region. We plan to repeat the drifter experiment in 2007 when the Regional Ocean Modeling System (ROMS) for Prince William Sound will be complete. Additional data from meteorological sites installed in 2004 and also from the oceanographic instruments now moored in the major entrances to the Sound should improve the models' performances.

New partnerships have developed, both as a result of PWSOS (to name a few, with the Natural Resources Conservation Service, the University of Alaska Fairbanks, and the Exxon Valdez Oil Spill Trustee Council), and also with other organizations to solicit research proposals on topics of mutual interest in both the ecology and technology arenas. OSRI now issues a joint Request for Proposals focused on cold climate technology developments in conjunction with three other national organizations (the Coastal Response Research Center – CRRC, the Cooperative Institute for Coastal and Estuarine Environmental Technology – CICEET, and Minerals Management Service – MMS). In 2005, a second joint RFP focused on ecology-related issues was released in partnership with the North Pacific Research Board.

Finally, significant planning and discussion during 2004 resulted in the adoption of a Five-year Science Plan in February 2005. This strategic plan identifies specific projects to implement the four goals – understand, respond, inform, and partner – identified by the Board during their 2002 strategic planning discussions. The Science Plan, along with recommendations from OSRI's Scientific and Technical Committee, provide the basis for future Board decisions on annual work plans and project awards.

OSRI's accomplishments result from work by the many researchers whose projects are summarized in the pages that follow. It is thanks to teamwork by the broadly representative Advisory Board, in collaboration with the Scientific and Technical Committee and support staff, that guidelines and direction for OSRI's grant programs are determined. Be sure to visit us when you are in Cordova, or learn more through our website, www.pws-osri.org!

Sincerely,

Nancy Bird
Executive Director

advisory board

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mission and goals

The purpose of the Prince William Sound Oil Spill Recovery Institute (OSRI) is to support research, educational projects and demonstration projects, all of which are designed to address oil spills in Arctic and sub-Arctic marine environments.

Authorized by Congress through the Oil Pollution Act of 1990 (and amendments passed in 1996, 2002 and 2005), the OSRI programs are determined by a 16-member Advisory Board with assistance from a Scientific and Technical Committee. The OSRI is administered through the Prince William Sound Science Center (PWSSC), a non-profit research organization founded in 1989 to facilitate and encourage ecosystem studies in the Greater Prince William Sound region.

Annual work plans are adopted by the OSRI Advisory Board, usually at their fall meeting held in September, and are based on four goals and the Science Plan (2005-2010). The annual work plan determines the issuance of proposal solicitations. Proposals are accepted from individuals, organizations and businesses nationally and internationally.





Goals

Understand

Attain a four-dimensional (meaning time and 3-dimensional space – x, y, z coordinates) interdisciplinary understanding of Prince William Sound to enable detection and prediction of spill-related impacts and subsequent recovery.

- Design Nowcast/Forecast observation and modeling system, demonstrate its utility, and seek long-term operational funding. (www.pwsoos.org)
- Conduct environmental research.
- Profile potential impacts on the economy, life-style and well-being of communities and resource users in Prince William Sound.

Respond

Enhance the ability of oil spill responders to mitigate impacts of spills in Arctic and sub-Arctic marine environments.

- Fill knowledge gaps on behavior of spilled oil.
- Fill knowledge gaps on use and effectiveness of specific mitigation techniques.
- Identify and evaluate new prevention and response technologies.

Inform

Disseminate information and educate the public on the issues of oil spill prevention, response and impacts.

- Publish scientific and technical results in the open literature.
- Brief oil spill responders on OSRI products and assist to include them in operational activities.
- Facilitate the exchange of information and ideas.
- Provide graduate and undergraduate fellowships and internships.

Partner

Partner with other organizations to take advantage of pooled funding, facilities, knowledge and experience.

- Collaborate with other partners in achieving a long-term coastal and ocean observing system for Alaska.
- Coordinate with the efforts of other related programs, such as the Gulf Ecosystem Monitoring (GEM) program and programs of the North Pacific Research Board (NPRB).

history



In Alaska, 1989 is remembered as the year of the Exxon Valdez oil spill. In the science world, it was two years later, 1991, that an international group of marine scientists identified a need to understand how global change affects the abundance, diversity and productivity of marine populations. They concluded that our ability to predict natural changes in marine animal population is very limited and initiated the GLOBEC (Global Ocean Ecosystem Dynamics) program. GLOBEC aims to advance our knowledge of the structure and functioning of the world's oceans and the ocean's response to physical forcing. It identifies the development of numerical models that assimilate real-time environmental information to track and forecast natural physical and biological conditions. These models will improve our ability to predict marine animal population change, and that predictive ability is a prerequisite for assessing anthropogenic impacts such as an oil spill on marine ecosystems. In turn, improved predictive abilities will result in much more effective oil spill prevention and response strategies.

The Prince William Sound (PWS) Oil Spill Recovery Institute (OSRI) was authorized in 1990 by the United States Congress to "identify and develop the best available techniques for preventing and responding to oil spills in the Arctic and sub-Arctic" (Title V, Section 5001, Oil Pollution Act of 1990); and, also to "assess and understand the long range effects of Arctic or sub-Arctic oil spill impacts on the natural resources of Prince William Sound. . . and the environment, the economy and the lifestyle and wellbeing of the people who are dependent on them." OPA90 identifies the PWS Science and Technology Institute (known as the PWS Science Center) in Cordova, Alaska, as administrator and home for OSRI. Between 1992 and 1995, Congress appropriated \$500,000 for the OSRI program. Since 1996, when amendments instituted a funding mechanism for OSRI, the program has received annual interest earnings from a \$22.5 million trust held by the U.S. Treasury. OSRI's research program will continue as long as oil exploration and development occurs in Alaska.

OSRI's first strategic plan for oil pollution research and development (1995) focused on the risks and costs of oil spills. Recognizing GLOBEC's conclusions about our weakness in making physical and biological predictions, and the consequential impact on our understanding of damages caused by oil spills, the OSRI program incorporated GLOBEC's goal and approach to improve prediction of natural changes. This approach also improves our assessment of costs, a key element in identifying the best oil spill prevention and response technologies.



OSRI solicited its first proposals for grant projects in late 1997. Since 1998, OSRI has awarded an annual average of 1 million dollars supporting a wide range of projects. Today, OSRI is building from the foundation of prior research programs, such as Sound Ecosystem Assessment and the Prince William Sound Nowcast-Forecast System to help support an integrated ocean observing system. National and regional US ocean observing systems (aoots.org) are in development with goals to monitor real-time ocean observations and provide products from processed data and model simulations developed from those observations. The Prince William Sound Observing System is tailored to also address marine safety, security and ecosystem monitoring needs specific to the Sound.

The OSRI Advisory Board meets twice each year to set policies and review the implementation of OSRI programs. The Board's structure includes four committees – Executive, Scientific and Technical, Financial and Work Plan – each of which meet as needed throughout the year. Annual work plans are adopted by the Advisory Board in the early fall and determine continuing projects and new project solicitations to be issued in the coming year.

The annual work plans are based on a five-year Science Plan adopted by the Board in 2005. The Science Plan is organized around four goals identified by the Board in 2002; those goals are to Understand, Respond, Inform and Partner. The Science Plan includes continuing support for physical oceanography and meteorological programs that are part of the PWS Observing System. It also promotes partnerships and joint solicitations with other research programs (such as the Coastal Research Response Center and the North Pacific Research Board). Finally, it includes graduate student fellowships and supports education programs in the Prince William Sound region.

The Advisory Board meets annually with the Prince William Sound Science Center's Board of Directors to discuss issues of mutual interest and assure complementary development of the two organizations.

grants awarded



understand

■ 2004 Prince William Sound Lagrangian Field Experiment

In 2003, OSRI's Scientific and Technical Committee suggested a series of field trials for the Prince William Sound Nowcast Forecast (PWSNF) system. PWSNF was a marine research program funded primarily through OSRI from 1998-2004, and was designed to develop an ecosystem level understanding of the Prince William Sound and Copper River Delta regions. During 2003 and 2004, when planning for the field experiments occurred, PWSNF evolved into the Prince William Sound Observing System, a pilot project of the Alaska Ocean Observing System.

The primary goals of the 2004 Lagrangian Field Experiment were to identify areas for improvement in the application of physical and oil spill modeling to the Prince William Sound region and, also to further collaboration and communication among the oil spill research and response communities active in the region. The experiment was conducted during a two-week period in late July and early August 2004.

In addition to the OSRI funded researchers – located at the PWS Science Center, University of Miami, University of Alaska Anchorage, and SINTEF – the experiment involved NOAA/Hazmat, the University of Alaska Fairbanks, and the Alaska Dept. of Environmental Conservation. Alaska Clean Seas loaned drifter buoys for use during the experiment. A detailed, written report describing the methods used and results is posted at the OSRI website. Some of the costs associated with these field experiments were included within PWSNF project budgets. Additional OSRI awarded funds are detailed below. The PWS Science Center also provided funds for staff coordination and vessel charters.

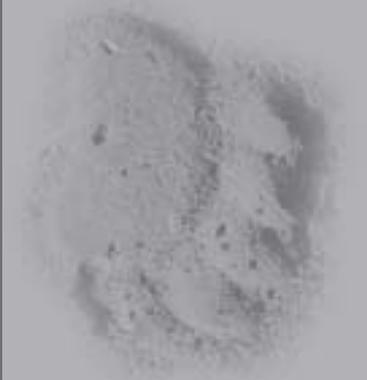
2004 Grant Award: *PWS Science Center (purchase of drifter buoys), \$23,500*

2004 Grant Award: *Mark Reed, Ph.D., SINTEF, Norway, \$12,000*

■ Nowcast-Forecast System for Ocean Circulation and Surface Winds: Observational component

This project's primary goal is to collect oceanographic observations through seasonal hydrographic cruises. These observations of ocean currents, temperatures and salinity are used in the continued validation of the Princeton Ocean Model (POM) for Prince William Sound. The observational cruises consist primarily of acoustic Doppler current profiler (ADCP) surveys for measuring ocean currents in the mid-Sound and Hinchinbrook Entrance, as well as expendable conductivity, temperature, and depth profiler measurements at various stations within the Sound. During the spring and summer of 2004 the Operational Oceanography program participated extensively in a series of lagrangian field experiments. These experiments involved the release of multiple drifter buoys to simulate both surface slicks and subsurface plumes for analysis and modeling by the PWSNF system. In the fall of 2003, leadership of this program transitioned from Dr. Vaughan to Dr. Stephen Okkonen, University of Alaska Fairbanks.

2003 Grant Award: *Shari Vaughan, Ph.D., PWS Science Center, Cordova, Alaska, \$150,000*



■ Observational Oceanography for Ocean Circulation and Surface Winds

From 1998 to 2004 OSRI funded development of a Nowcast/Forecast System for PWS. The goal of the original project was to create a coupled ocean circulation, atmospheric, and oil fates and effects model capable of simulating ocean and atmospheric conditions in near real-time (nowcasts) and predicting conditions in the future (forecasts), as well as in the past (hindcasts). The initial coupling of the circulation, atmospheric, and oil fates and effects model has been completed. The next step is to connect the physical measurements and modeling to the living resources of the region, the resources at risk.

The overall objectives of the physical oceanography component are to acquire measurements of currents and hydrography (temperature and salinity) necessary for continued validation of the coupled atmosphere/ocean model and for understanding and predicting circulation and water mass variability and their relationships to the PWS ecosystem.

2004 Grant Award: *Stephen Okkonen, Ph.D. (Univ. of Alaska Fairbanks), and Claude Belanger, Ph.D. PWS Science Center, Cordova, Alaska, \$150,000*

■ Developing a Mesoscale Atmospheric Model for the Prince William Sound with Nowcasting/Forecasting Capability

The objective of this ongoing project is to develop a high-resolution numerical weather simulation/prediction system for the Prince William Sound region. At the heart of this system is the Regional Atmospheric Modeling System (RAMS), a multi-purpose numerical prediction model. This modeling system uses real-time observational data sets and large-scale forecast model data obtained from the National Weather Service and some other sources to build initial and boundary conditions for RAMS simulations. The RAMS forecasts are available in the form of graphical products on the Alaska Experimental Forecast Facility web page. Gridded data sets are also available for use by researchers. This atmospheric model is linked with the ocean circulation model for Prince William Sound.

2003 Grant Award: *Peter Q. Olsson, Ph.D., University of Alaska Anchorage, Alaska, \$114,999*

2004 Grant Award: *Peter Q. Olsson, Ph.D., University of Alaska Anchorage, Alaska, \$123,797*



Equipment is ready for deployment of the ADCP moorings in Hinchinbrook Entrance and Montague Straits

■ Nowcast-Forecast System for the Prince William Sound Region: Ocean Circulation Model

The numerical ocean circulation model – based on the Princeton Ocean Model (POM) – is at the center of the Prince William Sound Nowcast/Forecast System (NFS). The overall goal is to develop a predictive capability for estimating the currents and temperature and salinity structure of Prince William Sound in near real-time. The Prince William Sound POM was validated using historical data from the Sound Ecosystem Assessment (SEA) program and the University of Alaska Fairbanks' Institute of Marine Science. It is forced by near real-time measurements of winds and sea level and by monthly means of surface heat flux and throughflow at Hinchinbrook Entrance.

The model is capable of producing animated current, temperature and salinity maps, animated particle trajectories, and transects of temperature, salinity and currents. Results are archived and are available on a website. The ocean circulation model has been linked with the SINTEF Oil Spill Contingency and Response (OSCAR) chemical fates visualization model. A meso-scale atmospheric model is being developed which will be linked with the ocean circulation model. Future plans also include linking the ocean circulation model with a biological nutrient plankton zooplankton detritus (NPZD) model.

2003 Grant Award: *Christopher N.K. Mooers, Ph.D., University of Miami, Florida, \$150,000*

2004 Grant Award: *Christopher N.K. Mooers, Ph.D., University of Miami, Florida, \$125,000*

■ Meteorological Data Collection and PWS Tide Height Data Collection

This project aimed to increase the data sites providing real-time information on weather and tide conditions in Prince William Sound. During the summer and early fall of 2002, tide and meteorological stations were installed at Grass Island on the Copper River Delta (this site was later moved to Kokinhenik Bar), Pigot Point, Tatitlek and Chenega Bay, Applegate Island and Nuchek. The data was made available in real-time via a website. It is used for multiple research and public purposes (i.e., utilized in forcing and validating atmospheric and oceanographic models) and as data sets in ecological research efforts. It also is a resource to improve predictions of local climate conditions and to increase safety of navigation. In the event of an oil spill, this additional information would be useful for operational support purposes.

2003 Grant Award: *Michael Lilly, GW Scientific, Fairbanks, Alaska, \$30,000*

2004 Grant Award: *PWS Science Center, Cordova, Alaska, \$30,000*



Installation of new meteorological stations, like this one on Mt. Eyak, near Cordova, was completed in 2005.



■ Biological Monitoring of Herring and Pollock in Prince William Sound

The objectives of this project are to obtain estimates of the abundance and distribution of adult herring and adult pollock in Prince William Sound (PWS). The herring assessment is conducted annually, while pollock assessments are typically done every other year. The project continues a time series that initiated in 1993 when a post-Exxon Valdez oil spill (EVOS) collapse of the herring population became apparent. The acoustic estimates and aerial surveys of herring spawn have been used to show that the herring population decline began coincident with EVOS, but was exacerbated by continued commercial fishing. The herring population began to recover in 2002. Results of this project have shown continuing recovery in 2003 and 2004. Recent research has also shown that the herring provide critical overwinter forage, and the herring population crash following EVOS resulted in parallel declines in many marine birds and mammals, including the endangered Steller sea lion. In contrast to the herring population, the pollock population in PWS has been relatively stable over the past decade.

2003 Grant Award: *Richard E. Thorne, Ph.D., PWS Science Center, Cordova, Alaska, \$75,000*

2004 Grant Award: *Richard E. Thorne, Ph.D., PWS Science Center, Cordova, Alaska, \$75,000*

■ Biological Monitoring of Spring Zooplankton and Nekton in PWS

The overall goal of this project is to develop and apply a cost effective approach to the estimation of the pink salmon food supply and predator abundance. The specific objectives are to measure the abundance of zooplankton as food supply for juvenile pink salmon and the abundance of predators. Pink salmon were a major impacted species by the Exxon Valdez oil spill. Accurate forecasting of adult pink salmon returns is critical to the economics of the Prince William Sound community. The project was initiated in 2000. It consists of three spring-period cruises that use a combination of multi-frequency acoustics and net tows to measure abundance of both plankton and fish in Prince William Sound. The results have shown strong correlations between pink salmon survival and the abundance of large zooplankton, specifically large-bodied copepods and euphausiids. Results of the study and measurements made in 2003 were used to accurately predict the poor adult salmon return during 2004.

2003 Grant Award: *Richard E. Thorne, Ph.D., PWS Science Center, Cordova, Alaska, \$75,000*

2004 Grant Award: *Richard E. Thorne, Ph.D., PWS Science Center, Cordova, Alaska, \$75,000*

■ River Otters in Prince William Sound

A Plan to Estimate Distribution, Relative Abundance, and Density based on Coastal Latrine Sites.

Population estimates of river otters, a keystone species in the land-margin ecosystem, are necessary for monitoring the health of the coastal ecosystem. This inter-agency survey is being done in collaboration with the Alaska Department of Fish and Game and the Chugach National Forest. River otters in coastal Alaska tend to select old-growth forest habitat where their chief food items are marine bottom-dwelling fishes. The effects of oil contamination and logging on habitat use, movements and food habits of river otters indicate these animals are sensitive to disturbances such as oil contamination, logging harvest and human use. Current population monitoring methods estimate the distribution and use of latrine sites and the deposition rates of scat. This Sound wide survey, employing modern DNA identification of intestinal cells, will give managers useful tools to assess population status and trend.

2004 Grant Award: *Merav Ben-David, Ph.D., University of Wyoming \$3,000*



A hydrofoil airboat used to access mud flats for invertebrate core sampling on the Copper River Delta.

■ Intertidal Resources at Risk

Ecology of the Copper River Delta

The Copper River Delta Intertidal mudflats and network of sloughs serve as a critical connection between the Gulf of Alaska and a vast expanse of wetlands, rivers, lakes and glaciers. The ultimate goal of this research is to understand the spatial and temporal dynamics of the biological community of the Copper River Delta in order to predict how this community would respond to anthropogenic or naturally induced changes in the physical/chemical environment. The approach to achieve this goal has been to focus on the central part of the food web (benthic invertebrates) and then to add components that focus on higher (predators) and lower trophic levels (primary producers) as funding allows. The researchers are beginning to collaborate with others working on the Nowcast-Forecast system to evaluate data for incorporation into a biological model for Nowcast-Forecast.

Field work includes collection of invertebrate core samples and small otter trawl tows to collect bottom fish and crabs. Both the invertebrates and bottom fish collections represent the first time these communities have been sampled on the Copper River Delta. Other aspects of the study include primary production, nutrient measurements and stable isotope analysis performed to more accurately characterize the food web of the Delta.

2003 Grant Awards: Sean Powers, Ph.D., University of South Alabama, \$39,260
Mary Anne Bishop, Ph.D. PWS Science Center, \$60,734

2004 Grant Awards: Sean Powers, Ph.D., University of South Alabama, \$39,266
Mary Anne Bishop, Ph.D. PWS Science Center, \$60,732

respond

■ Geographic Information System for Living Resources at Risk to Oil

OSRI is cooperating in a five-year agreement with NOAA/Hazmat for completion of environmental sensitivity index (ESI) maps for the entire Alaska coastline. In previous years, ESI maps were completed for Prince William Sound, Southeast Alaska and Northwest Alaska. In fiscal years 2003 and 2004, work was completed for the Yukon-Kuskokwim Delta region, Bristol Bay and Chukchi Sea regions.

2003 Grant Award: *NOAA/ Hazmat, Seattle, Washington, \$60,000*

2004 Grant Award: *NOAA/ Hazmat, Seattle, Washington, \$60,000*

■ Joint Viscous Oil Pumping Workshop

The Joint Viscous Oil Pumping System (JVOPS) Project was a multi-national effort by engineers, scientists, first responders and pollution equipment manufacturers to promote and improve heavy viscous oil at-sea first response. OSRI's award was in support of a Heavy Oil Workshop (held Nov. 8-10, 2003, it was the sixth in a series) where techniques and tools available for pumping extremely high viscosity oils and bituminous materials were practiced and operational improvements developed. The workshops have already resulted in technological advancements and improvements of US and Canadian viscous oil response inventories. OSRI's contribution was primarily in support of the final workshop report, which is posted at the OSRI website.

2004 Grant Award: *Jim MacKey, Hyde Marine, Cleveland, Ohio, \$24,999*

■ Research and Development Priorities: Oil and Ice

This project continued prior work to identify the critical deficiencies in the current state of knowledge concerning all aspects of oil spill response in ice-covered waters. The starting point was a review of all papers presented at the Oil and Ice workshop held in April 2000 in Anchorage, Alaska. A draft document was prepared as the basis for discussions among invited experts at a 2-day workshop held in November 2003. Following the workshop, a final report was prepared and published in collaboration with the Arctic Research Commission. Titled *Advancing Oil Spill Response in Ice-Covered Waters*, March 2004, and designed to focus future research and development efforts in the areas of arctic oil spill prevention and response. The U.S. State Department later provided assistance in translating and publishing this report in Russian. Both the English and Russian versions are posted at the OSRI and Arctic Research Commission websites.

2003 Grant Award: *David Dickins, DF Dickins Associates, Ltd., La Jolla, California, \$24,910*

2004 Grant Award: *Eric Cline, TERRAgraphica, Anchorage, Alaska, \$9,400*

inform

■ Science of the Sound

This collaborative program involves various agencies and educators in the Prince William Sound region and is designed to enhance science education in three of the Sound's communities through hands-on learning experiences. Its goals are to provoke inquiry into the natural world, increase science and ecological literacy, and to foster stewardship for the sound use of our natural resources. There are four main components to Science of the Sound programs which are primarily a partnership of the PWS Science Center and the Cordova Ranger District/U.S. Forest Service. The Discovery Room program serves K-6 grade students in Cordova. Outreach Discovery takes Discovery Room topics and educators to the Native Villages of Chenega Bay and Tatitlek, where they are adapted to fit the school's interests and curricula.



Additional components include field trips and coaching of Cordova High school students participating in the National Ocean Science Bowl. Educators have coordinated a Science Festival that combines display of the school district's annual Science Fair projects with science demonstrations by staff from Anchorage's Imaginarium. Finally, Community Programs of Science of the Sound, geared for adults and families, are presented on a weekly to bi-weekly basis during the school year.

2003 Grant Award: *Katie Olson, PWS Science Center, Cordova, Alaska, \$24,000*

2004 Grant Award: *Kate Alexander, PWS Science Center, Cordova, Alaska, \$24,000*

■ From the Forest to the Sea

"From the Forest to the Sea" Science Camp is a field based camp program run in collaboration with the US Forest Service, Cordova Ranger District. "From the Forest to the Sea" camp program provides an opportunity for campers to experience the natural wonders that surround them in an exciting and educational way. During their stay at camp, participants hike through the rainforest, observe glaciers up close, canoe through wetlands, and kayak through tide pools and the ocean. Lessons are developed to explore scientific principals through outdoor, hands-on explorations. By the end of the week, campers understand that from the forest to the sea... it's all connected.

2003 Grant Award: *Katie Olson, PWS Science Center, Cordova, Alaska, \$11,000*

2004 Grant Award: *Kate Alexander, PWS Science Center, Cordova, Alaska, \$13,000*

■ Scientific Publications

This project awarded funds for completion of two manuscripts for submittal to scientific journals. The manuscripts detailed investigations in 2001 and 2002 to evaluate the effectiveness of LIDAR (Light Detection and Ranging) to survey herring and marine mammal populations, and also to monitor returning salmon in the Copper River. LIDAR is a technique that uses a short pulse of laser light in much the same way that radar uses a short pulse of radio waves or an echo sounder uses a short pulse of sound. LIDAR has the advantage that it can operate from a small aircraft and cover large areas more quickly.

2003 Grant Award: *James H. Churnside, Ph.D., Environmental Technology Laboratory/NOAA, Boulder, Colorado, \$25,000*



workshops

■ Nowcast/Forecast and Biological Modeling Workshop

This workshop was organized and hosted in June 2003 by OSRI to review Phase I (1999-2003) of the Prince William Sound Nowcast Forecast System (PWSNF) and plan the potential expansion into biological modeling in Phase II of the PWSNF. Specifically, the goals of the workshop were to (1) critically review Phase I and plan Phase II (2004-2007) physical monitoring and modeling activities, (2) examine means for incorporating biological modeling within PWSNF, and (3) provide for increased interaction with research funding organizations.

The workshop included invited presentations from about five representatives of similar operational marine programs from throughout the country, as well as updates by principal investigators of PWSNF physical monitoring and modeling efforts. The workshop resulted in a report, posted at the OSRI website, and also drafting of a request for proposals to develop a biological model focused on herring.

2003 Grant Award: *Prince William Sound Science Center, \$15,380*

■ Pink Salmon Predictive Conference

This grant award provided support for a three-day workshop relevant to pink salmon return forecasting. Held in Cordova in March 2004, the workshop brought together a wide variety of fisheries researchers, aquaculture operators and fishermen. It resulted in two companion research proposals submitted for funding support to the Exxon Valdez Oil Spill Trustee Council, both of which were awarded funds. The workshop report is posted at the OSRI website.

2004 Grant Award: *Ken Adams and Ross Mullins, Prince William Sound Fisheries Research and Application, \$3,000*

■ Alaska Marine Symposium

OSRI contributed toward the meeting costs for this annual symposium held in Anchorage to highlight results of research programs in Alaska.

2004 Grant Award: *Exxon Valdez Oil Spill Trustee Council, \$2,500*



The commercial salmon fishery is the foundation of the economy and life-style of the PWS region.

fellowships

■ **Jeremy Kasper, University of Alaska Fairbanks –**
Advisor: Tom Weingartner, Ph.D.

Modeling the effects of river discharge, windstress and sea ice on Arctic coastal circulation

This project examines the dynamics of wind and buoyancy forced coastal currents on Arctic Ocean shelves. Simple, process type three-dimensional numerical models will be used to elucidate the effects on the coastal circulation of a (rapidly) time-varying fresh-water discharge subject to a variety of surface stress distributions that mimic the effects of seasonally varying sea-ice distributions and alongshore winds. This research effort represents the first systematic effort to understand the unique physics of buoyancy-forced flows in the presence of a complex distribution of surface stresses associated with sea ice. The results will improve our understanding of potential contaminant pathways on arctic shelves. They will also guide the development of more sophisticated regional circulation models that might be used in predicting pollutant transport.

2003 Fellowship Award: \$25,000

■ **Monica J. Dozier, University of North Carolina at Chapel Hill –**
Advisor: Charles H. Peterson, Ph.D.

Trophic dynamics of the Copper River Delta: response of subarctic fish communities to environmental perturbation.

Vast expanses of Intertidal sand/mud flats serve as a critical link in the food web of nearshore communities along the Alaska coastline. The rich abundance of benthic invertebrates residing within the sediments of Intertidal flats and the large network of subtidal channels that intersect these flats provide a significant prey resource for numerous species. Changes in the abundance of invertebrate prey due to the effects of oiling have been shown to result in changes throughout the food chain. Due to its rich natural resources and ecological sensitivity, the Copper River Delta and Flats are in need of ecological assessment in case of catastrophic oiling.

The central component of this fellowship is to characterize the demersal (bottom-feeding) and salmonid fishes of the Delta and to quantify the linkage between benthic invertebrate prey and these fishes through detailing of the gut content analysis of collected fish and synthesis of fish collection data.

2003 Fellowship Award: \$24,750



■ **Heidi Hansen, University of Wyoming –
Advisor: Merav Ben-David, Ph.D.**

Monitoring protocol for river otters for the benefit of wildlife managers and conservation biologists.

Coastal river otters, fish predators that feed near the apex of the trophic pyramid, readily accumulate high levels of pollutants. Consequently, this mustelid serves as a sentinel species for monitoring acute and chronic effects of toxins, including biomagnification of heavy metals, and accumulation of petroleum hydrocarbons. This semi-aquatic species is one of the few species affected by the Exxon Valdez oil spill (others being salmon and nesting seabirds) that link marine and terrestrial ecosystems. Long term monitoring programs will be crucial for assessing damage and potential recovery from possible future spills. Because of their role as keystone species of the land-margin ecosystem, population estimates of river otters are necessary for monitoring the health of the coastal ecosystem. This project will develop monitoring protocols for coastal river otters based on individual identification with DNA analysis of feces coupled with mark-site modeling.

2003 Fellowship Award: \$25,000

■ **Xinglong Wu, Rosenstiel School of Marine and Atmospheric Science,
University of Miami – Advisor: Christopher N.K. Mooers, Ph.D.**

*Analysis of Open Boundary Conditions for the Extended Prince William Sound
Nowcast/Forecast System (EPWS/NFS)*

Expansion of the model domain beyond Prince William Sound is the focus of Wu's project. The Extended Prince William Sound - Princeton Ocean Model (EPWS-POM) includes the continental shelf of the Northern Gulf of Alaska. Simulations suggest that the physical ocean variability inside the two main entrances from PWS to the Gulf of Alaska are very complex and unstable. This project seeks to develop an accurate model which will employ data from other effective models.

2003 Fellowship Award: \$24,500

2004 Fellowship Award: \$24,500

■ **Internship Program**

The Prince William Sound Meteorological and Tide Gauge Data Network has data stations located in the communities of Chenega Bay, Tatitlek, and Whittier. GW Scientific developed an internship training program for volunteers and students interested in helping to collect information useful to network operations.

2003 Grant Award: *Michael Lilly, GW Scientific, Fairbanks, Alaska, \$5,000*

financials

Funds for the Oil Spill Recovery Institute were authorized by the United States Congress through the Oil Pollution Act of 1990 (OPA'90) and amending legislation. The Prince William Sound (PWS) Science Center, a non-profit research and education institution in Cordova, Alaska, administers the OSRI programs as directed by OSRI's Advisory Board.

The PWS Science Center receives the interest earnings from a \$22.5 million trust held by the U.S. Treasury and dedicated to finance the OSRI programs. The interest earnings equal about \$1 million per year and will continue as long as oil exploration and development occurs in Alaska. The original source of the \$22.5 million trust fund was the Trans-Alaska Pipeline System (TAPS) fund which is now part of the National Oil Spill Liability Trust Fund.

The following pages include the Statements of Financial Position for the Prince William Sound Science Center and the Financial Position and Statement of Activities related to OSRI programs for the fiscal years 2003 and 2004.

Professional audits of the PWS Science Center's financial records, including the OSRI program fund, are completed annually by a nationally recognized accounting firm. The FY03 and FY04 audits were completed by Mikundra Cottrell (Anchorage, Alaska). Copies of the audited financial statements are available on request to Penelope Oswald, Finance Director, PWS Science Center, P.O. Box 705, Cordova, AK 99574, or e-mail penya5@pwssc.gen.ak.us.

Summary of OSRI program expenditures FY03 and FY04

Program Areas	FY03	FY04
Administration	205,212	146,684
Research (Understand & Respond)	987,523	933,656
Public Education & Outreach (Inform)	177,342	150,914
Other Programs	140,159	144,762
TOTALS	1,510,236	1,376,016



Prince William Sound Science and Technology Institute (d.b.a. Prince William Sound Science Center)

Statement of Financial Position

Including the Oil Spill Recovery Institute
September 20, 2002 and 2001

	General Fund	Plant Fund	Program Funds	Totals	
				2004	2003
Assets:					
Cash	\$ 53,997	-	161,113	215,110	129,388
Accounts receivable	8,038	-	-	8,038	6,836
Accrued interest receivable	-	-	17,352	17,352	26,231
Grants receivable	-	-	215,193	215,193	95,995
Prepays and other assets	39,868	-	-	39,868	41,610
Investments	-	-	2,174,299	2,174,299	2,699,609
Due from other funds	222,614	-	25,077	247,691	226,774
Leasehold	109,500	-	-	109,500	127,500
Property and equipment, net of accumulated depreciation	-	379,760	-	379,760	190,400
Total assets	\$434,017	379,760	2,593,034	3,406,811	3,544,343
Liabilities:					
Accounts payable	\$202,202	-	-	202,202	184,946
Wages, taxes & benefits payable	104,590	-	-	104,590	81,986
Deferred revenue	5,090	-	1,024,877	1,029,967	1,506,097
Due to other funds	25,077	-	222,614	247,691	226,774
Total liabilities	336,959	-	1,247,491	1,584,450	1,999,803
Net assets:					
Temporarily restricted	109,500	-	-	109,500	127,500
Unrestricted	(12,442)	379,760	1,345,543	1,712,861	1,417,040
Total net assets	97,058	379,760	1,345,543	1,822,361	1,544,540
Total liabilities & net assets	\$434,017	379,760	2,593,034	3,406,811	3,544,343

**Prince William Sound Science and Technology Institute
(d.b.a. Prince William Sound Science Center)**

**Oil Spill Recovery Institute (OSRI) Programs
Combining Statement of Financial Position**

Years ended September 30, 2004 and 2003

	OSRI 2004	OSRI 2003
Assets:		
Cash	\$ 161,113	93,125
Accrued interest receivable	17,352	26,231
Investments	2,174,299	2,699,609
Total assets	\$ 2,352,764	2,818,965
Liabilities:		
Deferred revenue	\$ 999,800	1,472,711
Due to other funds	7,421	102,393
Total liabilities	\$ 1,007,221	1,575,104
Net assets - unrestricted	1,345,543	1,243,861
Total liabilities and net assets	\$ 2,352,764	2,818,965



**Prince William Sound Science and Technology Institute
(d.b.a. Prince William Sound Science Center)**

**Oil Spill Recovery Institute (OSRI) Programs
Combining Statement of Financial Position**

Year Ended September 30, 2004 and 2003

	Consolidated OSRI 2004	Consolidated OSRI 2003
Revenues:		
Grants and contributions - Federal	\$ 1,376,016	1,510,536
Interest	85,704	97,853
Unrealized gains on investments	15,979	26,448
Total revenues	\$ 1,477,699	1,634,837
Expenses:		
Salaries and benefits	499,127	407,468
Supplies	9,489	7,903
Professional services	7,559	50,297
Subcontracts and charter costs	79,181	28,237
Telephone	18,220	22,562
Utilities	6,830	6,346
Insurance	2,849	2,812
Advertising	687	3,144
Postage and freight	941	1,940
Printing, publications and copying	1,661	3,071
Equipment maintenance	4,456	-
Facilities and equipment rent	2,756	1,922
Other	3,888	6,873
Travel	42,141	69,941
Grants awarded	537,829	796,776
Total expenses before interfund facility and equipment costs and indirect costs	1,217,614	1,409,292
Interfund facility and equipment costs	13,140	13,140
Indirect costs	102,676	79,958
Total expenses	\$ 1,333,430	1,502,390
Change in net assets	144,269	132,447
Net assets at beginning of year	1,243,861	1,119,560
Transfers to Plant Fund	(42,587)	(8,146)
Net assets at end of year	\$ 1,345,543	1,243,861

2003-2004 publications

2003 and 2004 Journal publications

- Bishop, M.A., N. Warnock, & J. Takekawa. In press. Differential spring migration of male and female Western Sandpipers at interior and coastal stopover sites. *Ardea*.
- Churnside, J. H. and J. J. Wilson, "Airborne lidar imaging of salmon," *Appl. Opt.* 43, 1416-1424 (2004).
- Churnside, J. H., R. E. Thorne, "Comparison of airborne lidar measurements with 420 kHz echo sounder measurements of zooplankton," *Appl. Opt.* 44 (2005) in press.
- Johnson, O.W., C. D. Adler, L.A. Ayres, M.A. Bishop, J.E. Doster, P.M. Johnson, R.J. Kienholz, & S.E. Savage. 2004. Radio-tagged Pacific Golden-Plovers: Further insight concerning the Hawaii-Alaska migratory link. *Wilson Bulletin* 116: 158-162.
- Powers, S.P., M.A. Bishop, & J. Grabowski. In press. Biotic and abiotic limitations on the invasive potential of a suspension feeding bivalve: distribution of *Mya arenaria* L. on tidal flats of southcentral Alaska. *Journal of Sea Research*.
- Thomas, G.L. and R.E. Thorne. 2003. Acoustical-optical assessment of Pacific herring and their predator assemblage in Prince William Sound, Alaska. *Aquatic Living Resources* 16:247-253.
- Warnock, N., J.Y. Takekawa, & M.A. Bishop. 2004. Migration and stopover strategies of individual Dunlin along the Pacific Flyway. *Canadian Journal of Zoology* 82(11): 1687-1697.





Other publications

Cox, W. editor. The Prince William Sound 2004 Lagrangian Field Experiment, 108 pgs.

DF Dickins Associates Ltd., editor. Advancing Oil Spill Response in Ice-covered Waters, March 2004, 18 pgs, English and Russian editions.

Mooers, C. 2004. "Comparisons of Numerical Simulations of the Circulation and Stratification of Prince William Sound with Observations" presented at Eastern Pacific Ocean Conference, September 22-25.

Mooers, C., I. Bang, P. Olsson, "A First Assessment of the Response of a Mesoscale Coastal Ocean Model to Forcing by a Mesoscale Coastal Atmospheric Model" presented at AMS Conference on Coastal Oceanic and Atmospheric and Oceanic Prediction and Processes, 6 - 8 August 2003, Seattle, WA.

Mooers, C., I. Bang, P. Olsson, "An Assessment of the Response of a Coastal Ocean Model (EPWS-POM) to Forcing by a Regional Atmospheric Model (PWS-RAMS)" presented at AGU Ocean Sciences Meeting, 26 - 30 January 2004, Portland, OR.

Mooers, C., I. Bang, "Influence of Velocity Structure at Hinchinbrook Entrance on Circulation and Stratification in Prince William Sound, Alaska" presented at AGU Ocean Sciences Meeting, 26 - 30 January 2004, Portland, OR.

Mooers, C., I. Bang, "Towards Data Assimilation for Prince William Sound, Alaska Ocean Circulation Nowcast/Forecast System" presented at TOS/ASLO Ocean Research Conference, 15 - 20 February 2004, Honolulu, HI.

Thorne, R.E., G.L. Thomas and M. Foster. 2003. Application of combined optical and acoustic technologies for fisheries and marine mammal research in Prince William Sound and Kodiak, Alaska. Proceedings Ocean 2003 MTS/IEEE (Electronic), Holland Publications, Escondido, CA.

Thorne, R.E. 2004. Factors Governing Pink Salmon Survival in Prince William Sound, Alaska. Pp 67-72 in Keong, V. (ed) Proceedings of the 21st Northeast Pink and Chum Salmon Workshop, February 26-28, Victoria B.C., Pacific Salmon Commission, Vancouver, B.C.

Thorne, R.E. 2004. Acoustic Surveying of Pelagic Fish in Shallow Water. Proceedings IGARSS04 (Electronic), IEEE Publications, Escondido, CA., 4 p.

staff



Nancy Bird
Executive Director
(2003 – present)



G. Carl Schoch
Science Director
(2004 – 2005)



Penny Oswalt
Finance Director
(1992 – present)



Nancy DiNapoli
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(2004 - present)



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