



2011 Work Plan Oil Spill Recovery Institute

October 2010

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Prince William Sound Oil Spill Recovery Institute

2010 Work Plan

I. Purpose and organization of this document

This document describes the Oil Spill Recovery Institute (OSRI) 2011 Work Plan in the context of the overall Science Plan approved by the OSRI Board in February 2010 for fiscal years 2011 through 2015. The Science Plan should be referenced for detailed descriptions of the OSRI Program, the planning process and supporting documents. The annual reports and previous work plans should be referenced for more information regarding previously funded projects. The 2011 Work Plan provides descriptions of projects proposed for funding in the 2011 fiscal year beginning October 1, 2010 and a brief description of projects funded in previous years that have funding continuing into fiscal year 2011 (FY11). The OSRI Science Plan and previous OSRI Work Plans can be found on the internet at: www.pws-osri.org.

II. OSRI Strategic Goals and FY11 Work Plan New Projects

The Advisory Board of OSRI and the Executive Committee of the Board of Directors for the PWSSC conducted a strategic planning session in 2008. The purpose of the planning session was to evaluate the past, the present, and plan for the future of OSRI. Four goals were identified as part of the strategic plan: Understand, Respond, Inform, and Partner (see OSRI Science Plan). The fiscal year 2011 Work Plan has been placed in the context of these four goals.

A. Goal #1 Understand:

Attain an interdisciplinary understanding of: the fate and effects of spilled oil in Arctic and sub-Arctic marine environments; and the recovery of those environments following a spill.

Real time physical observations of surface and subsurface current direction and magnitude and biological observations on resources in the path of the spill are absolutely essential to effective and timely oil spill response. Without a reliable forecast of the direction and speed of a spill, and knowledge of the resources likely to be impacted, even the best clean up technologies in the world may be misapplied.

This goal addresses the OSRI mandate to “determine, document, assess, and understand the long-range effects of Arctic or subarctic oil spills”. The objectives listed in the science plan are to:

- Evaluate short and long-term effects.
- Identify chemical, biological, and physical impacts and consequences.

- Emphasize the nearshore region.
- Identify the impacts of oil spill response options.
- Profile potential impacts from oil spills on the economy, life-style and well-being of communities and resource users.

This work plan describes projects totaling \$239K for projects related to Goal #1. OSRI has elected to fund a portfolio of initiatives.

- (1) Support for operation of Snotel meteorological stations in partnership with AOOS.
- (2) Research leading to validation of hydrological models.
- (3) Continued partnership with NPRB for biological research.
- (4) Projects to help improve our understanding of natural temporal variability in environmental conditions or how to connect the variability into static maps.

1. Physical science programs

The OSRI science plan outlines an approach for addressing goal #1. This approach builds upon lessons learned during 2009 Sound Prediction experiment that tested the modeling and observational capabilities of the Prince William Sound Observing System (PWSOS). There are two primary goals of the Prince William Sound Observing System. The first is to combine long-term monitoring with short-term hypothesis-driven process studies to understand mechanisms underlying the regional ecosystem dynamics. Understanding the circulation and the patterns of water exchange will provide a solid scientific foundation for addressing fisheries and ecosystem management needs related to long term oceanic and climatic variability. The second goal is to provide information to the major user groups in PWS including the coastal communities, oil and gas transportation industry (tanker traffic and oil spill response), air taxis, commercial fishermen, recreational and commercial boaters, and Coast Guard search and rescue operations.

Coastal surface circulation is commonly determined by freshwater input. The high quantities of rainfall in southern Alaska, the very few gauged rivers, amount of freshwater flowing in small creeks, and the contribution of freshwater from glacial melt all make our ability to predict freshwater input difficult. Errors in the modeling of freshwater input led to biases in the modeled salinity that potentially led to errors in modeled surface currents that are important to oil spill response. The PWSOS includes several SNOTEL meteorological stations that are designed to help improve our understanding of freshwater input. We desire to build off of these stations to build an observation program designed to test the hydrological model.

These programs address the surface circulation portion of the OSRI five-year plan.

a. Meteorology (OSRI cost: \$24K)

Understanding the circulation of Prince William Sound requires accurate measurements of wind fields and precipitation. Snow melt runoff and rain fall leads to a freshwater layer that sets up the surface circulation. Wind stress then modifies the circulation creating local and seasonal circulation patterns. By understanding the basic meteorological conditions including precipitation we hope to improve our ability to model the hydrology of Prince William Sound, improve our understanding of the forcing driving seasonal changes in circulation, and provide oil spill response organizations with necessary data.

Snowpack Telemetry (SNOTEL) meteorological stations set up in partnership with the Natural Resources Conservation Service (NRCS) and the Alaska Ocean Observing System (AOOS), measure precipitation from snow and rain throughout the year and are needed to establish the freshwater budget. Since the summer of 2005, six new SNOTEL stations have been deployed at sea level in PWS, and two stations at alpine elevations. Each station in PWS measures wind speed and direction, air temperature, air pressure, precipitation from rain and snow, and solar radiation. With several years worth of data available we are able to begin to test our understanding of freshwater input into PWS.

The SNOTEL stations provide important information about the amount of freshwater stored as snow in the watershed of Prince William Sound, an important driver of summertime circulation in the Sound. Deployment of the SNOTEL Stations was funded by a combination of grants to the Prince William Sound Science Center (PWSSC) from the National Oceanic and Atmospheric Administration (NOAA), Exxon Valdez Oil Spill Trustees Council (EVOS) and AOOS (Congressional earmarks), PWS Regional Citizens' Advisory Council, and OSRI.

The annual operating cost for the weather stations is about \$5,000 per station per year. The operating costs include regular maintenance, calibration of sensors, access to the sites, and telemetry related expenses. The FY11 budget includes \$24K for NRCS maintenance of eight sites. Additional funding from AOOS will be required for telemetry and logistics required in maintaining the sites.

b. Hydrological Model Validation (OSRI cost: \$85K)

A bias in the modeled salinity was observed during the 2009 Sound Predictions exercise. This bias underlined the difficulty of hydrological modeling in a region with limited information on freshwater flow and large input of freshwater from precipitation and glacial melt. The existing hydrological model relies on river gauge data from the Copper River, which has a very different watershed than PWS, and modeled precipitation, which has not been validated. In 2009 the meteorological modeling effort funded by OSRI

included a precipitation validation component. However, nothing is available for estimating input from glacial melt.

OSRI will seek proposals for a three year project to validate the hydrological model currently being used as input to the oceanographic model developed for Prince William Sound. The modeling effort is currently being led by Dr. Yi Chao at the Jet Propulsion Laboratory. The successful applicant can either work with Dr. Chao or run a stand-alone version of the hydrological model. We expect that the analysis will include a section on how errors in the hydrological modeling may affect the circulation results.

The effort should be designed to identify the influence of rainfall on freshwater input. We recommend a design that aims to validate small portions of the PWS watershed with more clearly defined inputs, such as no glaciers versus glacial dominated. The ability to link freshwater flow to the measured precipitation is desired.

The overall project budget is expected to be \$300K with \$85K in FY11, \$125K in FY12, and \$90K in FY13. This budget profile assumes a larger field component in FY12. We are seeking an additional \$25K, \$50K, and \$50K through the three year period from the Alaska Ocean Observing System.

2. Biological science programs

The current five-year research plan includes an emphasis on nearshore biology and a desire for working in partnership. To understand the recovery from an oil spill requires a biological research program capable of helping define baseline conditions and monitor recovery. To achieve the objective laid out in the Science Plan, OSRI will fund the following research programs.

a. Funding partnership with the North Pacific Research Board (NPRB) (OSRI cost: \$100K)

The NPRB and OSRI have science plans that encourage research partnerships. Section 4.2.3 of NPRB's science plan directly responds to a strong recommendation of the National Research Council to seek partnerships with other entities to support joint research and funding of projects of mutual interest. Similarly, Section III.A.1 of OSRI's science plan identifies a potential partnership with NPRB to support ecological research projects in Arctic and sub-Arctic climates. The NPRB and OSRI have science and implementation plans that provide the foundation for defining research priorities of mutual interest in any given year.

Again this year, an opportunity exists to conduct collaborative research. OSRI and NPRB each plan to commit \$100K for biological research in FY11. It has been noted that the near shore environment is the most likely area to be impacted by an oil spill, therefore knowledge of the environment and ecology of this zone is of greatest use to OSRI. A 2010 workshop co-sponsored by OSRI with CRRC and NOAA examined what are some of

the biological information needs for natural resource damage assessment in the Arctic. With increased desire to include more Arctic work and at the same time build on previous work we expect to look for proposals that address the following areas.

What follows are the descriptions of topics for the FY11 joint RFP. OSRI may contribute up to a total of \$100K for one or more projects in these areas.

Fish and Shellfish movement

The NPRB is seeking proposals that will assess the movement and stock structure of fish and shellfish. Expanded tagging efforts are needed to support the development of spatially explicit assessments. Priority species include: walleye pollock, Pacific cod, sablefish, yellowfin sole, rock sole, arrowtooth flounder, Pacific ocean perch, rockfish, Atka mackerel, lingcod, and Tanner, snow and red king crab in the eastern Bering Sea. The goal of this research may include an improved understanding of the spatial importance of predator-prey interactions, stock structure and spawning ground identification as related to management boundaries, including seasonal changes and responses to environmental variability. Proposals could also focus on stock delineation to appropriately account for the impact of incidental catch, as well as on mechanisms driving movement, connectivity and benthic habitat utilization (e.g. age or seasonal environmental changes) patterns. A focus on the use of genetic markers to estimate genetic stock structure is also of interest. The identification of genes under natural selection mined from EST databases or genes involved in immunology (e.g. major histocompatibility complex, MHC genes) might improve stock definitions of high gene flow marine species, and the development of molecular markers (e.g. single nucleotide polymorphisms, SNPs) to take advantage of existing databases for spawning-populations of Pacific salmon across the North Pacific is also of interest. Proposals should explicitly build on previous information and include retrospective analyses where appropriate. Proposals that include a tagging component must demonstrate, or make it part of their proposal, that barotrauma and/or tagging mortality concerns have been addressed to support a full scale movement pattern study.

Under Cooperative Research:

Oil spill research in Arctic and subarctic marine ecosystems

Proposals to this category should investigate direct effects of oil on marine mammals, seabirds, fish, and invertebrates in the Bering Sea and Arctic Ocean., as well as the effects and persistence of dispersants, the ability to recover oil spilled under ice and the weathering and persistence of oil in ice conditions. Proposals could also include the assessment of coastal environments and their risk to oil exposure in case of a spill, as well as the standardization of scientific methodology and protocols to be used during a response.

Data rescue

Marine research in Alaska has produced a lot of new information and insights and large amounts of data have been collected. Many of these datasets have been digitized and submitted to national data centers such as NODC for storage and retrieval by the broader scientific community. Yet a variety of datasets spanning from oceanography to fisheries, seabirds, marine mammals and humans are currently not in a format accessible by other researchers (gray literature reports, paper files, field notes, local and traditional knowledge) and as a result cannot be used to help answer many current science management questions. In light of limited resources for marine research and in order to maximize investment into new research, the NPRB is interested in supporting proposals that will rescue datasets that are currently inaccessible and transform them into shared digital formats. Applicants must describe the nature and state of the data to be rescued (location, format, content); ensure that they do not form part of any accessible database, and describe the utility of the dataset in terms of current and relevant science and management questions. Proposals should include integration of the rescued data into appropriate national data centers or databases and could also include subsequent analyses of these data. This year, the NPRB is especially interested in historic data and associated metadata related to the Arctic and their inclusion into one or more of the currently available data systems that cover marine systems in the Arctic and subarctic including such as Alaska Ocean Observing System (<http://www.aoos.org/>), Arctic Ocean Diversity (<http://www.arcodiv.org/>), or the Slope Science Initiative (<http://catalog.northslope.org/>), or the Ocean Biogeographic Information System (OBIS, <http://www.iobis.org/>).

b. Temporal variability (OSRI cost: \$30K)

A large issue in understanding recovery from a spill is the natural interannual variability ecosystems experience. Baseline data collection should be put in context of the natural variability. ShoreZone provides a high-spatial resolution map of geological and biological variables in the intertidal zone; however, variability of some organisms in this zone can be extremely high. For example, the photographic record at Mearn's Rock has shown dramatic changes in the Fucus coverage over the past 20 years http://oceanservice.noaa.gov/education/stories/oilymess/downloads/photo_series.pdf. It is important to account for this variability when trying to understand when, interpreting conditions from a map like ShoreZone, to show when a system has recovered, and when analyzing for habitat association.

OSRI will seek proposals to host a workshop to develop a white paper outlining approaches for economical monitoring programs designed to identify temporal variability in nearshore biological and geological habitat variables. Merging of monitoring results with high-resolution habitat maps should also be considered. OSRI will provide up to \$30K to support one proposal on this subject.

B. Goal #2 Respond:

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

This goal addresses the OSRI mandate to “identify and develop the best available techniques, equipment, and materials for dealing with oil spills in the Arctic and subarctic marine environment”. The objectives listed in the science plan are to:

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

The components to achieve these objectives are described below.

1. Technology research and development

This work plan describes projects totaling \$225K for projects related to Goal #2, oil spill response, OSRI has elected to fund a portfolio of initiatives.

- (5) Co-sponsorship of a cold climate spill response project received by one of our partners.
- (6) Spill response information tools.
- (7) Analysis of the 2009 Field Predictions Exercise

a. Partnership proposals. (OSRI cost - \$150K)

A number of agencies and organizations as well as industry fund research designed to improve spill response. The missions of the various groups can be diverse, but have overlap with OSRI’s mandate to identify and develop the best available techniques, equipment and materials for dealing with oil spills in the Arctic and sub-Arctic marine environment. Such organizations include, but are not limited to, Bureau of Ocean Energy Management, Regulation and Enforcement (www.boemre.gov), Coastal Response Research Center (www.crrc.unh.edu), Alaska Clean Seas (ACS, www.alaskacleanseas.org), Prince William Sound Regional Citizens Advisory Council (PWSRCAC, www.pwsrcac.org), United State Coast Guard (USCG, <http://www.uscg.mil/hq/cg9/rdc/>), and the oil industry. At this time industry is looking to put together several potential Joint Industry Program (JIP) to fund projects related to Arctic oil spill response.

By pursuing potential partnerships OSRI can leverage its limited funds to engage in larger projects. It should be noted that it is inherently expensive to work in the Arctic

and sub-Arctic regions, which increases the cost of proposals. OSRI will look to contribute to a JIP aligned with our research goals. If a partnership in a JIP or elsewhere are unavailable for the OSRI developed research topics OSRI will develop and release an RFP as the sole funding source. The research topics will be guided by the OSRI science plan response subjects.

- 1) Oil Spill Detection and Tracking
- 2) Spill Response in Ice
- 3) Best Practices

Potential areas of research include, but aren't limited to:

- 1) Development of airborne Ground Penetrating Radar for detection of oil in ice.
- 2) Demonstration of the ability to track oiled ice using satellite remote sensing.
- 3) Test techniques to prevent ice buildup on recovery equipment.
- 4) Testing new spill recovery equipment in Arctic and sub-Arctic waters.
- 5) Developing best practices and tactic guides for spill response.

A total of \$150K is expected to be used to fund one or more proposals under this topic area.

b. Spill Response Information Tools. (OSRI cost \$50K)

One direction OSRI expects to move towards in the next five years is the development of information tools for spill responders. Several products useful to spill responders have been developed in the recent years. In Alaska these include the ShoreZone maps; the Geographic Response Strategies, the Geographic Resource Information Network, Alaska Oil Spill Permits Tool, and the Alaska Ocean Observing System. These are just a few of the tools and places that contain valuable information for spill responders. Because there can be so many areas where information is available, some personnel may not be aware of the local resources, and it can be difficult to find the information needed during an emergency, OSRI would like to support the development of new information tools that help gather the existing information and provide it in an easy to visualize manner. The tool should also be designed to work with the Alaska Department of Environmental Conservation's Spill Tactics for Alaska Responders (STAR).

One such tool that has been developed recently is the Environmental Response Management Application (ERMA) that was developed through a grant from the Coastal Response Research Center. It is a geographic information tool that contains historical and real-time information for spill responders with mechanisms to input information during a spill. NOAA's Emergency Response Program has plans to develop an Arctic version of the ERMA tool in the upcoming year. OSRI will look to partner with NOAA in development of the Arctic ERMA. It is expected that the development of the Arctic ERMA will also incorporate lessons learned from its use in the Gulf of Mexico.

A total of \$50K is expected to be used to fund one or more projects under this topic area.

c. Model Validation Experiment (OSRI cost \$25K)

Over the last several years OSRI has contributed to the development and refining of atmospheric and oceanic forecast models, and installation and upgrade of measurement systems. In July and August of 2009 an experiment was held to collect the data necessary to test the ability of the ocean and atmospheric circulation models and to provide data to oil spill response models. The model runs and field data should be processed by the beginning of this fiscal year, but an understanding of the model performance will require the data to be analyzed. Analysis of the model performance should include the ability to make accurate forecasts with and without data assimilation. It may be desirable to also conduct a hindcast once additional data from non-real-time sensors become available. Of particular interest is in evaluating the models capabilities to determine surface water circulation as measured using high-frequency radar and drifting buoys, and the prediction of mixed layer depth. This analysis will test the null hypothesis that the oil spill response models ability to predict buoy positions cannot be improved by inclusion of information from the observing system.

OSRI is prepared to contribute up to \$25K in FY11 for completion of an analysis and report of model performance, and a final report on findings during the summer 2009 experiment. Additional funding is available from AOOS for this effort. The Research Program Manager will be responsible for ensuring the completion of this project. Originally this was to be completed in 2010; however, the Deepwater Horizon spill in the Gulf of Mexico occupied the time of many of the people needed to contribute to this effort.

C. Goal #3 Inform:

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

The objectives of this goal are to:

- Facilitate the exchange of information and ideas through education and outreach.
- Brief the scientific community and oil spill responders on OSRI products.
- Develop and maintain a web page that provides relevant and timely information.
- Provide graduate and undergraduate fellowships and internships.

The approach to reaching these objectives OSRI proposes to spend \$150K to fund a suite of projects related to education and outreach along with supporting workshops and conferences that provide a means to disseminate OSRI research.

1. Education

Development of future researchers, engineers, and others involved in oil spill response requires an education component that exposes students to the issues important to ecology and technology. OSRI has been a strong supporter of education programs targeting students from kindergarten to graduate school. OSRI intends to continue building upon the existing regional education and outreach programs.

a. Graduate Research Fellowships (OSRI Cost: \$50K)

Support of graduate students provides a means of focusing people at the start of their careers on oil spill related issues. OSRI funds are provided to support graduate projects that will better understand the social and economic effects of oil spills on coastal communities, provide information needed by managers and decision-makers for oil spill response and recovery, improve the technologies available to spill responders, and improve public awareness and understanding of marine and estuarine ecosystems.

Masters students may be supported for two years and doctoral students for up to three years. Applications for extensions beyond that time frame will be considered during the last year of existing funding. Students will be expected to present results to the OSRI Board at some point in their fellowship. Two Graduate Research Fellowship projects will be supported in FY11. We anticipate that will be the continuation of one student from FY10 and advertising one new position in FY11.

b. Undergraduate Internship (OSRI Cost: \$15K)

Undergraduate internships provide a mechanism to support students who will become the future workforce, but who are not necessarily continuing their education in graduate school. This is particularly true of students getting degrees designed to prepare for jobs with oil spill recovery organizations. In 2007 OSRI began a technology scholarship and internship program with the Kenai Peninsula College. We are looking to modify the program to provide internships only. This program will be designed to provide internships for students to work with oil spill response organizations on activities related to Arctic and subarctic issues.

OSRI will seek proposals from a spill response related organization to support an internship of up to \$15K at their organization.

c. K-12 School Year Programs: (OSRI Cost: \$45K)

OSRI supports the Prince William Sound Science Center's Discovery Room school year programs in order to introduce younger students to the concepts important to understanding oil spill response and the recovery of the environment. Programs included oceanographic monitoring, environmental education, and an introduction to oceanographic technologies. Beyond classroom delivery OSRI is requesting that a

strategy be developed to transfer the classroom activities to other geographic areas, particularly rural communities, and effectively develop partnerships.

OSRI will seek a three-year proposal to continue the Discovery Room environmental and technical education at the K-12 level. Funding in FY11 is expected to be \$45K with a three-year total of \$135K.

d. Ocean Science and Technology: (OSRI Cost: \$10K)

While the OSRI sponsored education program has been very strong, it has a limited geographic scope and is just beginning to include technology components. It is desirable to develop products or programs that take the education programs beyond the Prince William Sound area and develop new technology programs.

To achieve that objective OSRI will seek a one-year proposal up to \$10K to develop kits with necessary parts to conduct a technology related activity for school aged students. The proposal must include a description of how the kits would be made available to students throughout Alaska.

e. Summer Programs: (OSRI Cost: \$10K)

Summer programs provide an opportunity to expand the geographic extent and age distribution of students reached by the education programs. Camps, weekend education programs, and day activities can be used to work with students of all ages to provide hands-on learning opportunities about marine ecosystems and spill response.

OSRI will be seeking to fund a single, five-year proposal that demonstrates the capability to identify oil spill related activities and avenues to develop partnerships that can lead to spill related activities being included in several different summer programs. The intent is for the first year to be for planning – including identifying specific activities and partners, the second year for activity development and testing, and out years for implementation with the partners. Funding for years two through four is dependent on providing a high quality plan. The anticipated funding profile is FY11 (\$10K), FY12 (\$10K), FY13 (\$12K), FY14 (\$12K) and FY15 (\$15K).

2. Outreach

Outreach to the public, researchers, and spill responders is important in ensuring OSRI's activities provide benefits and are peer-reviewed. Several means have been used to outreach OSRI's activities including sponsoring workshops and conferences, outreach activities of the Research Program Manager, and supporting public outreach through lecture series, radio programs, and development of printed materials. This year the funding for the latter activities has been included in the Research Program Manager's budget.

a. Workshops and Conferences (OSRI cost: \$20K)

These funds are for workshops or special projects at the discretion of the OSRI Advisory Board. Funding is set aside for regularly scheduled conferences where OSRI funded research is presented and for supporting workshops that help OSRI achieve its mission. Workshops being considered for FY10 support include:

(1) **Alaska Marine Science Symposium.** (OSRI cost: \$2K) Each January, researchers from throughout Alaska are invited to participate in a 3-4 day conference. It is an excellent opportunity for presentation of new results and networking. OSRI will contribute \$2K to support this workshop, which will be held in late January in Anchorage.

(2) **Alaska Forum on the Environment.** (OSRI cost: \$5K) OSRI will continue its support of the Alaska Forum on the Environment, which is typically during February in Anchorage. The conference covers many issues relevant to understanding the potential impact of oil spills in Arctic and sub-Arctic marine environments. OSRI will allocate \$5K to the Alaska Forum on the Environment. A limited number of registration waivers will be available for the staff, Board, and STC to attend the workshop.

(3) **Workshops of opportunity.** (OSRI cost: \$13K) It is recognized that many important workshops occur that could provide improved products as outcomes with a little additional support. The support provided here is intended to help cover the cost of running the workshop, the addition of teleconference capabilities, providing a facilitator or report editor, or other needs. OSRI will allocate a total of \$13K to support workshops that align with the OSRI mission.

D. Other Programs

1. Program coordination (OSRI cost: \$150K). The position of OSRI Research Program Manager is a programmatic expense. The total costs include salary, benefits, travel and commodities. The Research Program Managers responsibilities include:

- Preparation of annual work plan in consultation with the Board-appointed Work Plan Committee and in accordance with the Five-Year Science Plan adopted in 2005. Compile information about potential projects, write brief project descriptions and prepare project budget estimates.
- Implement the work plan as approved by the Board. This includes drafting requests for proposals based on the Annual Work plan priorities, and coordinating the peer review process with OSRI's Scientific and Technical Committee and with other organizations OSRI partners with for research projects.
- Coordinate with the Chair of OSRI's Scientific and Technical Committee (STC) to assure regular transfer of information between the OSRI Board and the STC. Also provide assistance, as requested by the STC Chair, in scheduling meetings.
- Meet 2-3 times per month with the OSRI Executive Director (ED) to exchange information concerning program issues and contract awards. Work with the ED to develop a monthly program report for distribution to the OSRI Board.

- Assist the Executive Director to ensure compliance with all policies and procedures of the OSRI Grant Policy Manual.
- Coordinate the processing of contracts for successful proposals. Monitor progress and final report deadlines for these contracts.
- Prepare bi-annual reports on OSRI grant awards and research and education programs for distribution to the OSRI Board.
- Prepare and publish an Annual Report for broad distribution.
- Supervise maintenance of the OSRI website.
- Collaborate with the OSRI Executive Director to develop and maintain cooperative agreements with other organizations for research and education programs, for example with the Exxon Valdez Oil Spill Trustee Council, two Regional Citizens' Advisory Councils, and the Alaska Department of Environmental Conservation, the Alaska Ocean Observing System (AOOS), the North Pacific Research Board, the UNH/NOAA Coastal Response Research Center, US Minerals Management Service, and Norwegian SINTEF's Joint Industry Program.
- Periodically represent OSRI at professional meetings and workshops.
- Maintain files and a library on oil pollution issues
- Provide leadership in planning future research programs and work plans.
- Prepare technical reports on OSRI programs.
- The Research Program Manager oversees many outreach activities as a component of that position. These include presenting at workshops and conferences, maintaining the OSRI website, and publishing the OSRI annual report. This year there will also be an effort to develop materials to support an OSRI booth at conferences. These materials are intended to provide greater visibility to OSRI sponsored efforts. In FY 11 the Program Manager will be responsible for the development of booth materials (\$5K and sponsoring OSRI specific outreach \$10K). The desire is to disseminate OSRI efforts through a wide array of media options, such as printed materials, radio broadcasts, and video or computer presentations.

OSRI funding will provide approximately \$115.2K personnel, 9K travel, 25K contractual, and 0.8K commodities for a total of \$150K.

2. OSRI Science and Technical Committee meetings (OSRI Cost: \$10K).

Funds are set aside to support the functions of the OSRI Science and Technical Committee, and to support Board and STC travel related expenses associated with OSRI partnerships such as the JIP, NPRB, etc.

E. Partnerships

The use of partnerships is a goal outlined in the OSRI strategic plan. While there is not any funding that is dedicated solely to the development or maintenance of partnership programs, there are many existing partnerships and opportunities to develop new partnerships. We continue to partner with the Alaska Ocean Observing System (AOOS)

to support an ocean observing system in Prince William Sound and to validate the physical and biological models developed through efforts by OSRI and AOOS. The meteorology and oceanography programs described in the Understand section contribute to this partnership. We worked with AOOS to develop a partnership on the hydrological model validation component as well. In the biological sciences we continue to refine the partnership with NPRB to find ways to make it more effective.

To achieve our objectives under the Respond goal requires partnerships. We are looking to work with an industry sponsored research program that aligns with OSRI's science plan. Industry is currently considering the development of six different programs, four of which are closely linked with the goals outlined in the OSRI science plan. The Spill Response Information Tools category is likely to be a partnership between OSRI and NOAA, which has \$100K for development of an Environmental Response Management Application (ERMA) for the Arctic. The continued analysis of the 2009 Sound Predictions field experiment continues the partnership with AOOS.

Our Inform goal related projects are also heavily dependent on partnerships, most often developed by the programs we fund. OSRI contributes a portion of the cost of the education programs outlined. These programs gain additional funding from several private, corporate, and grant contributions. The Discovery room is also a collaboration with the U.S. Forest Service. OSRI contributes small amounts to the Alaska Marine Science Symposium and the Alaska Forum on the Environment. The workshops of opportunity section is designed to provide an opportunity to develop new partnerships to achieve OSRI's goals.

F. FY11 New Programs Spending Summary

Area	Project	FY11 Work Plan
Understand		
	Meteorological Stations	\$24K
	Hydrological Model Validation	\$85K
	NPRB Partnership	\$100K
	Temporal Variability	\$30K
		\$239K
Respond		
	Partnership Projects	\$150K
	Spill Response Information	\$50K
	Model Validation	\$25K
		\$225K
Inform		
	K-12	\$45K
	Science and Technology	\$10K
	Summer Programs	\$10K
	Undergraduate Intern	\$15K
	Graduate Fellowships	\$50K
	Workshops	\$20K
		\$150K
Other		
	Research Program Manager	\$150K
	STC travel	\$10K
		\$160K
Administration		
	Based on 20% of total expenditure	\$193.5K
Total		
		\$967.5K

III. Prior Years' Encumbered Projects Continuing in FY11

Because the OSRI projects are started at the beginning of each quarter many projects funded in 2010 will continue into fiscal year 2011. The purpose of this section is to identify those projects so that the work plan aligns with the FY11 budget sheets. These projects are listed as the Prior Years' Encumbered portion of the budget. If an existing project is to get new funding in FY11 – multi-year grants – the project description will reference the previously provided section. Because the exact amount of funds that are being carried forward will not be known until sometime in October, there are no dollar amounts provided with the individual projects.

A. Goal #1 - Understand

1. Physical science programs

a. Oceanography (*Halverson, PWSSC, Contracted through 03/31/11*)

Water exchange between PWS and the Gulf of Alaska and seasonal variations of hydrographic properties in central PWS

A primary component in improving our understanding of the circulation of Prince William Sound is the collection of oceanographic measurements. These measurements allow direct studies of circulation, the exchange of water between Prince William Sound and the Gulf of Alaska (GOA), and provide validation data for testing circulation models.

The OSRI funded oceanography work is a constituent of the Prince William Sound Observing System (PWSOS). In its current state, the program encompasses three components: 1) Long-term monitoring of the water exchange between the Gulf of Alaska and Prince William Sound, and 2) Monitoring of the seasonal variability of the hydrographic properties and circulation in PWS,

The goal of the water exchange component of the five-year observational oceanography program is to provide an improved description of the flow through the straits connecting PWS with the GOA. This is a necessary step towards a better understanding of the relationship between circulation variability and biological variability in PWS. The current mooring program addresses two limitations of previous mooring programs (lateral variations not accounted for and lack of data in the near surface part of the water column). Knowledge acquired from this five-year program should provide an understanding of measurements made using a single downward-looking ADCP at the NDBC buoys, which is the long-term monitoring planned for the area.

This program is currently in the analysis phase. All equipment was removed from the water in the spring of 2010 to allow the focus to be on analyzing the data collected. The

program worked with Dr. Musgrave to analyze historic Conductivity-Temperature-Depth (CTD) data to provide a report on the climatology of oceanographic conditions in Prince William Sound with a focus on the near surface conditions that drive circulation and decisions on response techniques. The mooring data continues to be processed and analyzed to determine the currents responsible for water exchange in PWS.

2. Biological science programs

a. Larval Trajectory Mapping (*CJ Beegle-Krause, Research 4D, contracted through 6/30/2011*)

Understanding larval transport and survival is critical to effective fisheries management. Larval transport models aid fisheries, habitat and marine protected area decision makers in understanding how ocean circulation and larval behavior affect survival. This project continues development of a community larval transport model, LarvaMap, and expands the Regional Ocean Modeling System (ROMS) model time-series data for Prince William Sound (PWS) in 2004 and 2009 to a 7-year time series from 2004 to 2010. The LarvaMap / ROMS combination will be used to generate probability maps of settlement for Pacific herring and Dungeness crab.

LarvaMap is a 3D web-based larval fish and invertebrate transport model connected to ROMS circulation fields for the northeast Pacific, funded by the NOAA Alaska Fisheries Science Center (AFSC). LarvaMap can use any circulation dataset formatted using the network Common Data Format for Climate and Forecast (NetCDF CF) available through a Thematic Realtime Environmental Distributed Data Services (THREDDS) data server (TDS). Both NetCDF and TDS are oceanographic community standards. LarvaMap output can be viewed in combination with field data and circulation model results using HabitatSpace, a 4D data analysis tool previously developed by members of this team for the AFSC.

LarvaMap will be enhanced with user capability to construct egg and larval stage drift and behavior characteristics by leveraging Sarah Hinckley's (NOAA/AFSC) larval behavior model and new research. The Herring and Dungeness crab organisms constructed in this study will be available in LarvaMap's library for direct use or modification.

b. PWSSC Fellowship (*Thorne and Bochenek, PWSSC and Axiom, Contracted through 06/30/11*)

The objective of this project is to develop a data management system for data collected by Prince William Sound Science Center (PWSSC) investigators. A well designed data management structure will benefit PWSSC in many manners. It facilitates the interchange of data and ideas, which creates ah-ha moments of discovery, it provides easier exchange of information with education and outside groups, and it reduces data loss allowing for projects to readily build upon previous work. A well crafted design

should also reduce the data management burden currently on the individual Principal Investigators (PIs).

OSRI has funded significant levels of research at PWSSC over the past decade and it is important that data remain available into the future. Work funded by other organizations will create a more complete picture of the biology of Prince William Sound. This project therefore will support OSRI's mission to understand the impacts of oil spills by ensuring that relevant data is maintained in a manner that can be supported for a long duration.

The project will include an assessment of the data available and planned for collection and the form it and its metadata is in. Based on that assessment a data management plan will be developed, and tools developed to allow PIs to easily manage the data and prepare it for storage and submission to other agencies as required. A firm with experience in data management will provide the management plan and tools for data submission. The PWSSC scientists will provide the information for the data assessment and begin to populate the data system.

B. Goal #2 Respond:

1. Partnership projects

a. Testing facility at CISPRI (*Paxton, CISPRI, Contracted through 06/30/11*)

This project contributes to the development of a new oil spill response training and testing facility at Cook Inlet Spill Prevention and Response Inc. The facility will allow for testing of large equipment under cold weather conditions. There are three phases of this project: Phase 1 of the CISPRI Test Tank Project was to build and successfully use a 12'x12'x4' steel, coated test tank. During the early spring of 2010, the tank was designed by CISPRI, built by Udelhoven, and utilized by SLRoss to conduct some skimmer validation testing at CISPRI. Phase 1 scope of work also included the installation of temporary containment and associated facilities to facilitate the ASTM testing that was conducted by SLRoss. Phase 2 is the permanent slab installation planned for this summer. Phase 3 will be the construction and installation of a 25'x25'x4' steel, coated test tank planned for summer, 2011.

a. ShoreZone mapping analysis (*Harper, Coastal & Ocean Resources Inc., Contracted through 06/30/11*)

This project contributes to the analysis of the high-resolution intertidal mapping project called ShoreZone. This effort is a partnership between a large number of different groups with an aim to provide maps of geomorphological and biological conditions along the coast. OSRI is supporting the analysis of the imagery of 420 km of coastline in South Central Alaska. The collection of the imagery was supported by the Prince William Sound Citizens' Advisory Council and OSRI is supporting the analysis of the imagery to provide the shape files of geomorphology and biology observed in the images.

C. Goal #3 Inform:

1. Graduate Research Fellowships

- a. **Cultural Dimensions of Community Response Preparation and Vulnerability to Future Oil Impacts of the Copper River Region**; Emilie Springer, University of Alaska Fairbanks Ph. D. student (Contracted through 6/30/11)

The research objectives of this project are to investigate the cultural dimensions of community response preparation and vulnerability to oil impacts of the Copper River region in Prince William Sound. Basic demographic information will be considered but the intention is to focus on cultural connections between individuals and their communities, the knowledge systems people may refer to in the event of a disaster related to oil contamination and the way that information is communicated across community boundaries. Three case studies will be performed: 1) the physical community of Cordova, 2) the occupational community of S01A permit holders, and 3) the institutional community of the Prince William Sound Regional Citizen Advisory Commission.

Research methods for this project are grounded in qualitative social science. They will include: participant observation, focus group interviews, individual interviews, surveys, response mapping and preparation of a final chart to demonstrate knowledge variations within each case-study. Following preliminary fieldwork, a cultural consensus analysis may be applied to one or more of the three cases.

This project responds to the OSRI research focus area 3: **Socio-economics**. It will be valuable to the efforts of OSRI because it will identify and compare local, industry and institutional knowledge of the Copper River ecosystem, perceived¹ oil-related threats to the ecosystem and current concerns that the groups hold about management plan strategies. Understanding knowledge diversity and varied attitudes towards environmental protection and oil-related problems can contribute to improved response, observation and monitoring activities in the region. This social theme has not been widely cataloged in previous research related to human dimensions of oil-spills.