



2018 Work Plan Oil Spill Recovery Institute

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Prince William Sound Oil Spill Recovery Institute

2018 Work Plan

I. Purpose and organization of this document

This document describes the Oil Spill Recovery Institute (OSRI) 2018 Work Plan in the context of the overall Research Plan approved by the OSRI Board in October 2015 for fiscal years 2016 through 2020. The Research 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 2018 Work Plan provides descriptions of projects proposed for funding in the 2018 fiscal year beginning October 1, 2017 and a brief description of projects funded in previous years that have funding continuing into fiscal year 2018 (FY18). 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 FY18 Work Plan New Projects

The Advisory Board of OSRI and the Executive Committee of the Board of Directors for the Prince William Sound Science Center (PWSSC) conducted a strategic planning session in 2014. The purpose of the planning session was to evaluate the past, the present, and plan for the future of OSRI. During that planning session the mission of OSRI was identified to be: **Support research, education, and demonstration projects that improve understanding and response to oil spills in the Arctic and sub-Arctic marine environments.** Four goals were identified as part of the strategic plan: Understand, Respond, Inform, and Partner (see OSRI Science Plan). The fiscal year 2018 Work Plan has been placed in the context of these four goals.

A. Goal #1 Understand:

Attain an interdisciplinary understanding of Arctic and sub-Arctic marine environments as it pertains to: baseline conditions; the sources, fate, and effects of spilled oil; and the recovery of those environments following a spill.

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.
- Identify impacts of oil spill response options.
- Evaluate impacts from oil spills on the economy, lifestyle and well-being of people, and resiliency of communities and resource users.
- Achieve long-term coastal and ocean observing capabilities.

This work plan describes projects totaling \$296K for projects related to Goal #1. OSRI has elected to support a portfolio of initiatives, including:

- (1) Supporting the operation of SNOTEL meteorological stations in partnership with the Alaska Ocean Observing System (AOOS).
- (2) Oil degradation agent effectiveness.
- (3) Continuing partnership with NPRB for biological research.
- (4) Arctic cod sensitivity to oil and impacts on growth

a. SNOTEL stations (OSRI cost: \$10K)

One objective of the research plan is to achieve long-term coastal and ocean observing capabilities. AOOS and OSRI have had a long standing partnership in developing, testing, and maintaining the Prince William Sound Ocean Observing System. 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 Prince William Sound (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.

Understanding the circulation of Prince William Sound requires accurate measurements of wind fields and precipitation. Snowmelt runoff and rainfall creates a freshwater layer that sets up aspects of the surface circulation. 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 forces 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 SNOTEL stations have been deployed at sea level in PWS, and two stations at alpine elevations. Each station in PWS measures temperature, wind speed and direction, precipitation, and solar radiation. With several years of data now available, we are able to test, more

quantitatively, our understanding of freshwater input into PWS. The weather measurements are also important for oil spill trajectory modeling.

The annual operating cost for the weather stations is about \$3.5K per station per year. The operating costs include regular maintenance, calibration of sensors, access to the sites, and telemetry related expenses. Funding for operation of these sites has been transitioned to AOOS. The OSRI FY18 budget includes \$10K for upgrades and repairs to the eight existing systems.

b. Degradation additive effectiveness (OSRI cost: \$111K)

In FY16 OSRI released a request for proposals to address the effectiveness of degradation agents. Several products have been proposed as additives to spilled oil to speed up the natural degradation of oil by microbes. Few have been tested in conditions expected in the Arctic or sub-Arctic. Some have not been tested by independent parties. We desire to test the efficacy of these agents prior to a spill so we can understand their potential for spill remediation and their potential effects on the environment. There is a need to understand, if the agents are enhancing degradation or dispersing the oil, what the natural response time is to the additive, and what end and intermediate products are produced.

OSRI selected to fund a proposal from Dr. Leigh of the University of Alaska Fairbanks. The work aims to 1) evaluate the effectiveness of Oil Spill Eater II on crude oil and marine diesel degradation and detoxification in Arctic and sub-Arctic seawater, 2) determine its mode(s) of action, 3) compare its efficacy to that of chemical dispersants (Corexit 9500A), and 4) to assess effects on indigenous microbial communities. The proposal outlined a three-year research project to address these objectives.

This is the second year of a three-year research project and OSRI will provide \$111K of support in FY18.

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

The NPRB and OSRI have science plans that encourage research partnerships and the two organizations have been partnering to fund research of joint interest since 2006. 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 research plan identifies a potential partnership with NPRB to support ecological research projects in Arctic and sub-Arctic climates. NPRB and OSRI have science and implementation plans that provide the foundation for defining research priorities of mutual interest in any given year.

This year OSRI will review proposals from many potential topic areas in the NPRB request for proposals that overlap with OSRI's research plan. The OSRI research plan

notes that the nearshore 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. There is also increasing pressure from shipping and oil development in the Arctic that makes that area of particular interest.

OSRI may contribute up to a total of \$100K in FY18 for one or more projects relevant to its research plan.

d. Arctic cod sensitivity to oil and impacts on growth (OSRI cost: \$75K)

This project takes advantage of previous sublethal exposure experiments conducted by the NOAA Alaska Fisheries Science Center. In 2017, funding from NOAA-ORR and in kind support from NOAA-NMFS (AFSC and NWFSC), supported the first embryonic exposure experiment of Arctic cod to low concentrations of crude oil (100 - 900 ug/L whole oil exposure equivalent to 1 – 9 ug/L total PAH). Embryos were exposed to environmentally relevant concentrations of oil for a short 3 day period (~5% of their egg stage duration) using a new continuous generated oil dispersion laboratory (SINTEF methods). Results indicated a clear dose-response effect in larval phenotypes, particularly in cardiac and craniofacial defects that have been described in other fish species. Exposed embryos also had reduced size-at-hatch and reduced initial growth during the first 2 weeks after yolk absorption. Collectively, the experiment indicated Arctic cod embryos are very sensitive to oil exposure, showing toxic effects at the lowest dose tested, approximately 1 ppb total PAHs. However, several questions remain: 1) Are these non-lethal effects of early life stage exposure to oil apparent at later life stages and 2) how do they impact survival potential and ecosystem services by way of reduced growth and lipid content?

The NOAA-AFSC is currently holding Arctic cod larvae exposed to control and low dose conditions (1 ug/L PAH) in separate, quadruplicate tanks at the Hatfield Marine Science Center (HMSC). This project will determine and quantify the possible delayed impacts on growth and condition (lipid content) on these fish as they develop through the juvenile phase. This represents a unique value-added opportunity that capitalizes on nearly 5 years of broodstock development and live-animal research on Arctic cod (~\$900,000 of NOAA and NPRB) and \$200,000 of new 2016-17 investment by NOAA ORR towards carrying out the first oil exposure experiment on Arctic cod embryos.

This is a single-year research project and OSRI will provide \$75K of support in FY18 to NOAA-AFSC and Oregon State University.

B. Goal #2 Respond:

Enhance oil spill response and mitigation capabilities 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 Research Plan are to:

- Identify and evaluate new prevention and response technologies.
- Evaluate relative benefits and consequences of specific response and mitigation techniques.
- Fill knowledge gaps on behavior of spilled oil.

The components to achieve these objectives are described below.

1. Technology research and development

This work plan describes projects totaling \$190K for projects related to Goal #2, oil spill response, OSRI is looking to fund projects in partnership with other organizations or that complement ongoing research programs.

a. Partnership proposals. (OSRI cost - \$100K)

A number of agencies, organizations, and industry members fund research designed to improve spill response. The missions of the various groups can be diverse, but 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 (BOEM, www.boem.gov), Bureau of Safety and Environmental Enforcement (BSEE, www.bsee.gov), Coastal Response Research Center (www.crrc.unh.edu), Alaska Clean Seas (ACS, www.alaskacleanseas.org), Cook Inlet Regional Citizens Advisory Council (www.circac.org), Prince William Sound Regional Citizens Advisory Council (PWSRCAC, www.pwsrcac.org), United State Coast Guard (USCG, <http://www.uscg.mil/hq/cg9/rdc/>), Emergency Preparedness Prevention and Response, North Slope Borough (www.north-slope.org), American Petroleum Institute (www.api.org), and the oil industry.

BSEE and USCG continue to fund research related to improving spill response in the Arctic and it may be possible to develop partnerships with them. A new Canadian research program is expected to be announced in 2017 in which partnership opportunities will be sought. Additional work with oil in ice may be available at the Cold Regions Research and Engineering Laboratory in partnership with Alaska Clean Seas or other organizations using that facility.

By pursuing potential partnerships OSRI can leverage its limited funds to engage in larger projects, expanding the total budget for innovation. It should be noted that it is inherently expensive to work in 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 is 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 these OSRI science plan response subjects:

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

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

- 1) Improvements in herder and burning technologies
- 2) Improvements and demonstrating of oil detection technologies.
- 3) Testing new spill recovery equipment in Arctic and sub-Arctic waters.
- 4) ShoreZone mapping of coastal regions for input into spill response information tools.
- 5) Trajectory modeling improvements
- 6) Determining the recovery characteristics of skimmers.
- 7) Food safety
- 8) Developing best practices and tactic guides for spill response.

A total of \$190K is expected to be available to fund one or more proposals under this topic area. Of particular interest is a potential joint industry program on herding and burning agent delivery. Description of two expected activities follows.

Skimmer Rating: (OSRI Cost: \$60K)

OSRI is interested in partnering with industry and regulatory agencies to evaluate the appropriate name plate derating for oleophilic skimmers. The desire is to determine if appropriate testing can be used as the basis for a more realistic skimmer rating. Multiple skimmers should be tested in oil thicknesses likely to be observed during a spill.

OSRI expects to spend up to \$60K in FY 18 to support this type of effort.

Food Safety: (OSRI Cost: \$30K)

Release of oil and contaminants into the environment generate a host of concerns. Among these concerns is the safety of subsistence, commercial, and recreational food sources that might be at risk from pollution release or the response to such a release. The Alaska Regional Response Team desires the development a Food Safety and Security guidance document for use during oil spills. The development of such a guidance document requires the gathering of information on existing policies to determine who the pertinent authorities are and what information they need to make decisions regarding closing and opening access to food items. In examining the data needs it should be possible to identify information gaps so a plan can be developed to fill those gaps. OSRI intends to support the effort required to document current laws, state and federal authorities, data needed for decision making, and identified gaps. This may include references, decision flow charts, and examples from prior incidents.

OSRI expects to spend up to \$30K in FY 18 to support this type of effort.

C. Goal #3 Inform:

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

The objectives of this goal are to:

- Publish scientific and technical results in open literature
- Brief the response community on OSRI products.
- Facilitate the exchange of information and ideas through workshops and other forums.
- Educate future researchers and responders through K-12 programs, undergraduate internships, and graduate fellowships.
- Convey information to the general public through various media.
- Be a source of expertise.

The approach to reach these objectives OSRI proposes spending \$165K 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 existing regional education and outreach programs.

a. Graduate Research Fellowships (OSRI Cost: \$60K for up to two students)

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 four 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. Up to three Graduate Research Fellowship projects will be supported in FY18. We anticipate one fellowship will support continuing students and OSRI will release an RFP for the selection of one additional student. Up to

\$30K of support per year will be available to each fellowship. A twenty five percent match by the proposing institution is required.

Continuing fellowship: Fate and Effects of Petroleum Contamination and Chemical Dispersants in Arctic Marine Environments Gofstein, University of Alaska Fairbanks. This study examines how Arctic marine ecosystems may be impacted by petroleum contamination by examining the fate of petroleum contaminants and chemical dispersants, their interactions with the environment, and the factors which influence their biodegradation. This project seeks to: 1) assess the influence of the dispersant Corexit 9500 on oil biodegradation processes in Arctic seawater; 2) investigate the fate of Corexit in marine environments; 3) study the effects of chemical dispersants on microbial community structure and function and identify the organisms responsible for degrading each in the Arctic; and 4) to investigate the extent of the role that nutrients play in driving the biodegradation of hydrocarbons, including identifying any nutrients that are possible limiting factors. Incubations of seawater from the Arctic Ocean in the presence of Alaska North Slope crude oil, Corexit 9500, and both together will be performed over a 60-day time course. Degradation of both components will be measured by GC/MS for the crude oil and by LC/MS/MS for the Corexit. Microbial analyses will be performed for each treatment using 16S rRNA sequencing using an Illumina MiSeq. Nutrients (NO_2^- , NO_3^- , NH_4^+ , PO_4^{3-} and SiO_4^{4-}) will be measured flow injection analysis and total iron by atomic absorption spectroscopy. Results from this study will help enable decision makers to make an informed choice of appropriate response strategies in the event of a spill as well as increase our general understanding of petroleum biodegradation in the Arctic marine environment.

OSRI will provide \$30K of support for this Ph.D. project. This is the third year of a three-year proposal.

b. K-12 Programs: (OSRI Cost: \$60K)

OSRI will continue to support the Prince William Sound Science Center's Headwaters to Ocean program in order to introduce younger students to the concepts important to understanding oil spill response and the recovery of the environment. Programs include components such as oceanographic monitoring, environmental education, and an introduction to oceanographic technologies. Beyond classroom delivery in PWS, OSRI is requesting that portions of the Discovery Room program be delivered to at least two other geographic areas in the north, west, or Aleutian Island regions of the state, or at a gathering that brings together people from those areas. OSRI desires a proposal that continues to support the existing education efforts and includes travel for delivery of materials to other communities.

This funding is for a single year to continue the Headwaters to Ocean environmental and technical education at the K-12 level. OSRI will provide \$60K in FY18. The total cost of this program is between \$130K and \$150K and is supported by a wide array of other funding sources including grants and contributions.

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 publicize 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.

a. Workshops and Conferences (OSRI cost: \$25K)

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 FY18 support include:

(1) **Alaska Marine Science Symposium.** (OSRI cost: \$5K) 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 \$5K 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 Scientific and Technical Committee to attend the workshop.

(3) **Alaska Oil Spill Technology Symposium.** (OSRI cost: \$5K) The Alaska Oil Spill Technology Symposium is held biennially. It brings together oil spill response practitioners and researchers to exchange information on new research and identified needs. OSRI will allocate \$5K for support of the Alaska Oil Spill Technology Symposium.

(4) **Northern Oil and Gas Forum.** (OSRI cost: \$5K) The Northern Oil and Gas Forum is a biennial conference held in Alaska or in Canada to discuss topics of mutual concern related to oil and gas development and transport. Marine oil spill response and environmental conditions are among the different tracks included in the conference. OSRI will provide \$5K of support for travel of invited speakers.

(5) **Workshops of opportunity.** (OSRI cost: \$5K) Many important workshops occur that could provide improved products 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. We foresee several opportunities to support such workshops this fiscal year. This year we expect that support may be provided to the Northern Oil and Gas Forum, travel to the International Oil Spill Conference, or support of the Alaska Oil Spill Technology Symposium. OSRI will allocate a total of \$5K to support workshops that align with the OSRI mission.

b. OSRI Accomplishment Outreach (OSRI cost: \$20K)

OSRI began funding projects in 1998 so as of FY 18 OSRI will have completed twenty years of supporting research, education, and demonstration projects associated with oil spill response in the marine environment. We will seek the development of outreach products such as a short video or infographics that can be used to inform various stakeholder groups about the accomplishments of OSRI. OSRI will allocate a total of \$20K to support developing outreach materials that describe OSRI's accomplishments.

D. Other Programs

1. Program coordination (OSRI cost: \$104K). The position of OSRI Research Program Manager is a programmatic expense. The total costs include salary, benefits, travel and commodities. The Research Program Manager's responsibilities include:

- Preparation of the annual work plan in consultation with the Board-appointed Work Plan Committee and in accordance with the Five-Year Science Plan adopted in 2005. Compiling information about potential projects, writing brief project descriptions and preparing project budget estimates.
- Implementing 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.
- Coordinating 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.
- Meeting 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.
- Assisting the Executive Director to ensure compliance with all policies and procedures of the OSRI Grant Policy Manual.
- Coordinating the processing of contracts for successful proposals. Monitor progress and final report deadlines for these contracts.
- Preparing bi-annual reports on OSRI grant awards and research and education programs for distribution to the OSRI Board.
- Preparing and publishing an annual report for broad distribution.
- Supervising maintenance of the OSRI website.
- Collaborating 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, the Alaska Department of Environmental Conservation, the Alaska Ocean Observing System (AOOS), the North Pacific Research Board, the UNH/NOAA Coastal Response Research Center, Bureau of

Safety and Environmental Enforcement, Bureau of Ocean and Energy Management, and Joint Industry Programs.

- Periodically representing OSRI at professional meetings and workshops.
- Maintaining files and a library on oil pollution issues.
- Providing leadership in planning future research programs and work plans.
- Preparing technical reports on OSRI programs.
- Overseeing many outreach activities including presenting at workshops and conferences, maintaining the OSRI website, and publishing the OSRI annual report. Other outreach efforts are aimed 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 \$81.6K personnel (6.0 months), \$9.65K travel, \$11.3K contractual, and \$1.45 K commodities for a total of \$104K.

2. OSRI Science and Technical Committee meetings (OSRI Cost: \$5K).

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. We are examining new partnerships with AOOS as they transition into their next five-year research plan. We continue to partner with NPRB to gain knowledge on the ecology of Alaskan waters and examine issues regarding oil toxicity. We are looking to partner with organizations like the Defenders of Wildlife and the North Slope Borough Wildlife Department that also have research related to understanding the impacts of oil spills.

To achieve our objectives under the Respond goal requires partnerships. We are looking to work with industry-sponsored research programs that align with OSRI's science plan. The Arctic Technology JIP includes six different programmatic areas, four of which are closely linked with the goals outlined in the OSRI science plan. Many of their projects will be completed in this year and gaps in their efforts identified for future funding opportunities. BSEE and USCG also have important programs to follow. BSEE recently had a call for white papers that included several topics related to improving spill response in the ice environment. The USCG continues work to test technologies in

the ice environment. Their work provides a relatively low cost to test some emerging technologies.

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 collaborative effort with the U.S. Forest Service and the Copper River Watershed Project. OSRI contributes small amounts to the Alaska Marine Science Symposium and the Alaska Forum on the Environment. The workshop of opportunity section is designed to provide an opportunity to develop new partnerships to achieve OSRI's goals.

F. FY18 New Programs Spending Summary

Area	Project	FY18 Work Plan
Understand		
	Meteorological Stations	\$10K
	Biodegradation Agent Effectiveness	\$111K
	NPRB Partnership	\$100K
	Arctic Cod	\$75K
		\$296K
Respond		
	Partnership Projects	\$100K
	Skimmer Rating Testing	\$60K
	Food Safety	\$30K
		\$190K
Inform		
	Graduate Fellowships	\$60K
	K-12	\$60K
	Workshops	\$25K
	OSRI Accomplishment Outreach	\$20K
		\$165K
Other		
	Research Program Manager	\$104K
	STC Travel	\$5K
		\$109K
Subtotal		\$760K
Administration		
	Based on 20% of total expenditure	\$190K
Total		\$950K

III. Prior Years' Encumbered Projects Continuing in FY18

Because OSRI projects are started at the beginning of each quarter, many projects funded in previous years will continue into fiscal year 2018. The purpose of this section is to identify those projects so that the work plan aligns with the FY18 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 FY18 – multi-year grants – the project description exists in 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

No continuing projects in this goal.

B. Goal #2 Respond:

No continuing projects in this goal.

C. Goal #3 Inform:

a. Graduate Research Fellowships

Continuing fellowship: Crude Oil Movement in Sea Ice: Development and Validation of a Parametric Model of Oil Migration Oggier, University of Alaska Fairbanks.

Economic interests of the oil and gas industry as well as the maritime shipping sector have increased in the Arctic over the past few decades. Despite a decline in the summer sea ice extent, Arctic waters will remain infested with sea ice for a significant part of the year in the foreseeable future. Hence, the hydrocarbon industry will need to cope with sea ice during routine operations. Understanding and predicting the fate of oil in sea ice is crucial to assess risks to ecosystems and people and to effectively respond to an oil spill in Alaskan Arctic waters.

The objective of the proposed research is three-fold:

- Development of a simple oil migration model that draws on previous work; the model is run in parallel with an oil spill laboratory experiment for parameterization and validation of predictions of onset and extent of oil percolation (depth penetration, volume of oil pervading ice matrix, expected surfacing time).
- Validation of the model based on observed oil percolation with the aid of X-ray tomography and sea-ice thin/thick optical sections.

- Evaluation of the utility of a portable X-ray tomographer to characterize the oil distribution and support prediction for operational purposes in an experiment setting representative of conditions in the field.

The following methods will be applied:

- (1) Development of the oil migration model. The model will run with simple input such as ice conditions (thickness, temperature and porosity), weather variables (temperature, HR ...) and oil parameters (volume, physical properties).
- (2a) Controlled oil spill simulation in a laboratory experiment under conditions representative of the field with continuous in-situ temperature, relative humidity measurements
- (2b) Simulation of oil percolation with daily update based on measured experimental variables
- (3) Comparison between simulation and experiment, based on (1) daily observations (ice surface, temperature) and (3) X-ray tomography data and thin-thick section.

The proposed research is significant in advancing knowledge through better prediction of oil percolation in case of an oil spill. Such understanding and the availability of a model suitable for operation prediction will help recovery efforts, e.g., in determining the most suitable time frame for the clean-up response and the choice of the method applied, and in supporting NRDA exposure evaluation.