



Environmental Studies Research Fund



ANNUAL REPORT 2016 - 2017

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The Environmental Studies Research Fund

ANNUAL REPORT 2016 - 2017

Message from the Chair

I am very pleased on behalf of the ESRF Management Board to submit the Environmental Studies Research Fund (ESRF) 2016 - 2017 Annual Report.

This year, one new project commenced and eleven other exciting research projects continued, all of which helped to advance understanding of the research focus areas. In the Southern regions, the Management Board remained committed to improving knowledge on the effects of seismic sound on marine life, while in the Northern regions, support continued on the work involved in regional effects assessment and management. The research that has been supported on spill preparedness and response in all Canadian offshore regions has helped inform industry and regulatory decision-making in this important subject.



The Fund's ongoing support of research in Canada's frontier lands would not be possible without the dedication of the Management Board Members. This year, I would specifically like to thank Francine Wight and Michel Chenier (whose terms on the Board have expired) for their service to the Board. Their insights over their years of service have contributed greatly to our ongoing success. I would also like to welcome Sherry Becker, Steve Bettles, and Mark Hopkins as new Members of the Management Board. They bring with them combined experience with the Canadian oil and gas industry, environmental management, and northern issues.

This year also concludes my term on the Management Board. It has been a pleasure serving as the Chair of the Management Board over the past six years.

I am pleased to introduce Ms. Jennifer Matthews, as the new Chair of the Management Board. Ms. Matthews is currently the Health, Safety and Environment Policy Advisor, Atlantic Canada, for the Canadian Association of Petroleum Producers. She brings with her significant experience in offshore energy research, gained through her previous roles as Director of Operations and Research for the Fundy Ocean Research Centre for Energy and as Research Manager for Nova Scotia's Offshore Energy Research Association.

I wish the ESRF Management board much success as they continue their efforts to deliver a high quality study program that meets its research priorities and the ongoing information needs within the ESRF mandate.

A handwritten signature in black ink that reads "R. Paul Barnes". The signature is written in a cursive, flowing style.

Paul Barnes
2016-17 Chairperson, ESRF Management Board
May 31, 2017

Mandate

The Environmental Studies Research Fund (ESRF) is a research program that sponsors studies on environmental and social implications related to oil and gas exploration and development in Canada's frontier lands.

The information arising from these studies is designed to assist all involved stakeholders, including citizens, companies and government, in their decision-making related to oil and gas exploration and development.

Initiated in 1983 under the *Canada Oil and Gas Act (COGA)*, the ESRF now receives its legislated mandate through the superseding legislation, the *Canadian Petroleum Resources Act (CPRA)*, proclaimed in February 1987.

ESRF research is funded by levies on oil and gas companies that hold licenses for exploration and development in Canada's frontier lands.

The Minister of Natural Resources, is responsible for the administration of the ESRF South Account for regions mainly south of 60° latitude, including the Hudson Bay, and the Minister of Indigenous and Northern Affairs, is responsible for the administration of the North Account for regions north of 60° (See Annex 1 for specific details).

The ESRF is directed by a twelve-member joint government/industry/public Management Board and is administered by a Secretariat that resides within the Office of Energy Research and Development of Natural Resources Canada.

FRONTIER LANDS

The *Canada Petroleum Resources Act* "frontier lands" definition was amended on April 1, 2014, to include:

- (a) that part of the onshore that is under the administration of a federal minister,
- (b) Nunavut,
- (c) Sable Island,
- (d) the submarine areas in that part — of the internal waters of Canada or the territorial sea of Canada — that is not situated
 - (i) in a province other than the Northwest Territories, or
 - (ii) in that part of the onshore that is not under the administration of a federal minister, or
- (e) the continental shelf of Canada,

but does not include the adjoining area, as defined in section 2 of the *Yukon Act*.

ESRF Management Board Members

Private Sector

Paul Barnes, Chairperson *(Term ended Feb. 2017)*
Canadian Association of Petroleum Producers

Jennifer Matthews, Chairperson *(NEW)*
Canadian Association of Petroleum Producers

Greg Janes
Suncor Energy

Francine Wight *(Term ended July 2016)*
Husky Energy

Sherry Becker *(NEW)*
Imperial Oil

Stephen Bettles *(NEW)*
Husky Energy

Public Sector

Norman Snow
Northern Regions

Government of Canada

Robert Steedman, Vice-Chairperson
National Energy Board

Michel Chenier *(Term ended Feb. 2017)*
Indigenous and Northern Affairs Canada

Mark Hopkins *(New)*
Indigenous and Northern Affairs Canada

Marc D'Iorio
Environment and Climate Change Canada

Patrice Simon
Fisheries and Oceans Canada

Offshore Petroleum Boards

David Burley
Canada-Newfoundland and Labrador Offshore Petroleum Board

Eric Theriault
Canada-Nova Scotia Offshore Petroleum Board

The ESRF Management Board members are selected for their expertise and specialized technical knowledge relative to the mandate of the Fund.

Members of the Management Board are appointed jointly by the Minister of Natural Resources and the Minister of Indigenous and Northern Affairs.

The ESRF Management Board directs the business of the Fund, sets priorities for study topics, determines the program budget and facilitates the development of study proposals.

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ESRF Secretariat
Natural Resources Canada
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ESRF Research Priority Areas 2015-2018

In 2013, the ESRF Management Board developed and approved a new selection process for studies to be funded by the ESRF. This selection process is adapted from those used by other governmental programs, including the ecoEnergy Innovation Initiative. Annex 2 and Annex 3 provide a complete description of the current research priorities and selection process.

In brief, the selection process starts by the ESRF Management Board defining research priority areas, informed by industry and based on current knowledge gaps. The current priority areas are for the period 2015-2018. Potential proponents are invited to submit study proposals for consideration as part of an open call for proposals. The ESRF Management Board, in consultation with the necessary technical reviewers, evaluates the proposals and fund the best suite of studies that collectively address each research priority.

Research Priority Areas

The four research priority areas for its 2015-2018 funding cycle (see Annex 2 for the full description of each area) are:

North

1. **Spill Preparedness and Response, Fate and Effects:** to support marine safety by studying the fate and effects of accidental releases of petroleum and other hazardous substances in the Arctic marine environment and improve responses.
2. **Regional Effects Assessment and Management:** to support stakeholders in preparing and reviewing applications for oil and gas activities on themes including biophysical, socio-economic, traditional knowledge and cumulative effects.

Atlantic Offshore

3. **Seismic:** to improve the understanding of the effects of seismic sound on commercial fish and invertebrates, as well as marine mammals and/or species at risk.
4. **Oil and Gas Liquids Spill Fate and Effects:** to support marine safety by studying the fate and effects of accidental releases of petroleum in the Newfoundland-Labrador and Nova Scotia Offshore Areas.

Current Studies (2017 – 2018)

SOUTHERN REGIONS

Mid-Labrador Marine Megafauna and Acoustic Surveys on the Labrador Coast (2010-07S). Baseline Surveys for Seabirds on the Labrador Sea (2010-08S). These two projects are documenting the occurrence and population densities of marine mammals and seabirds along those parts of the Labrador Sea potentially of interest for oil and gas development. The marine mammal surveys are supplemented by the deployment of acoustic recorders at two locations to record cetacean vocalizations. Another objective of the projects is to involve and transfer survey skills to local individuals, particularly Indigenous Labradoreans, whenever possible.

Effectiveness of Observers in Visually Detecting Dead Seabirds on Open Ocean (2010-21S). This field study assesses the accuracy of observers in evaluating seabird mortality from a vessel platform in the open ocean. To achieve this objective, simulated seabirds, equipped with satellite telemetry, will be released into an area of open ocean in advance of a survey vessel carrying observers. Since the number and location of the simulated seabirds will be known, the effectiveness of the observers can be evaluated. The outcome of this experiment will improve the models used by the Canadian Wildlife Service to help evaluate seabird mortality from hydrocarbon spills.

Data Display and Source Apportionment of Volatile Organic Compounds and Particulate Matter on Sable Island, Nova Scotia, Canada (2011-05S). This study measures airborne volatile organic carbons and particulate matter through sensors placed on Sable Island. The experimental design will permit researchers to determine the proportion of these air contaminants that originate from nearby gas production installations versus marine traffic sources and natural sources.

The ESRF has sponsored and published over 200 studies on oil and gas exploration and development on frontier lands, including such topics as:

- *environmental effects on fish, bird and animal habits and habitats;*
- *iceberg detection and flow patterns*
- *oil spill prevention and countermeasures;*
- *dispersant effectiveness in cold waters and ice;*
- *social and economic issues*
- *improving accuracy of ocean and weather forecasting; and*
- *verification of codes and standards.*

Development, Validation and Implementation of an Operational Ocean Forecasting System for the Grand Banks and Orphan Basin for Daily Operational Delivery at the Canadian Meteorological Centre (2013-03S). Accurate forecasting of oceanographic and weather conditions to support routine offshore oil and gas operations and emergency response operations is essential. This project will provide a significant enhancement in the resolution and hence, the accuracy of ocean forecasting services provided through Environment Canada over a large part of the Newfoundland and Labrador Offshore Area and northern parts of the Nova Scotia Offshore Area. The project will provide improved forecast data for input into oil spill modelling and iceberg drift scenarios and modelling through the Canadian Meteorological Center. Additionally, research and development is occurring to benchmark the ocean forecast system performance in real time with oceanographic observations that are made available.

Assessment of the Potential Risks of Seismic Surveys to Affect Snow Crab Resources (2014-01S). The snow crab fishery is one of the highest landed value fisheries in the Newfoundland and Labrador region. Fisheries have expressed concern over the potential reductions the catch of snow crabs in proximity to active seismic survey operations. This study aims to investigate potential effects of seismic exploration activity on commercial snow crab catch rate using scientific measures of changes in crab behaviour (i.e. movement), commercial catchability, and physiological effects in response to seismic air gun operations.

Acoustic Modeling and Monitoring on Canada's East Coast (2014-02S). This study will record the natural soundscape on Canada East Coast and study seismic sound propagation. It will create new knowledge on the natural soundscape in the region, generate accurate models of the effects of seismic surveys, and validate particle motion models for seismic airguns.

Assessing the Quality of Marine Mammal Detections using Three Complementary Methods (2014-03S). Monitoring for marine mammals is a required mitigation measure during the performance of marine seismic surveys in Canada. Routinely, sound energy emissions from seismic survey air gun arrays are halted when marine mammals and/or species at risk move within 500 meters of an array. Efficient and accurate observations of marine mammals are important in this context. This project will evaluate the comparative effectiveness and efficiency of three different methods of detecting marine mammals in the field.

Investigation of effects of East Coast Canada Water Accommodated Fraction and Chemically Enhanced Water Accommodated Fraction on Early Life Stages of Commercially Harvested Marine Species (2014-04S). The potential effects of exposure of commercial fish species to a crude oil spill and any dispersants used to mitigate the effects of such a spill are a concern. This study examines the toxicology of those fractions of a representative east coast crude oil that are entrained in water, both naturally and as a result of dispersant use, to the early life stages of Atlantic herring, Atlantic cod, American lobster and Northern shrimp

Effect of Platform discharges on juvenile fish in field (2016-01S). The potential biological effects of operational discharges from the oil production platforms on the early life stages of commercial fish species. This study will collect samples of juvenile fish and measure these samples for petroleum hydrocarbons and associated indicators of contaminant exposure linked to operational discharges.

NORTHERN REGIONS

Quantitative Assessment of the Interaction between Beaufort Sea Crude Oils and Mackenzie River Delta Suspended Sediments (2013-06N). Extensive bench-scale testing will be conducted on oil-sediment interaction at low temperatures with and without chemical dispersants, using selected crude oils from the Beaufort Sea and Norman Wells and selected sediment samples from the Mackenzie River Delta and Norman Wells.

Experimental Spill to Research Spill Treating Agent Use in the Beaufort Sea: Preparation of Detailed Experimental Plan (2014-01N). There has been a renewed effort to develop and improve countermeasures techniques that deal with some of the unique aspects of Arctic spill response. Spills in pack ice conditions have long been a difficult problem for spill responders. In particular, the remoteness of potential spill locations means that storing, transferring, and disposing of collected materials present a significant logistical challenge. As well, the presence of ice can greatly complicate the ability to collect and concentrate oil using containment booms for skimming. This project will develop three detailed experimental plans that include large-scale field tests to study the effectiveness and operational issues of three promising marine spill responses.

Integrated Beaufort Observatory (2014-02N). This study will establish a regional ocean, sea ice and atmosphere observing system in the Canadian Beaufort Sea called the integrated Beaufort Observatory (iBO). The project will use a series of integrated state-of-the-art environmental technologies deployed on ocean moorings in the Beaufort Sea to enable systematic observation of the marine environment including ice and ocean conditions. Ultimately, this information will enhance the numerical models required for planning and review of offshore activities throughout the region.

Financial Statements

STATEMENT OF FINANCIAL POSITION

The ESRF Management Board is responsible for the presentation of the annual financial statements to the Ministers of Natural Resources and Indigenous and Northern Affairs pursuant to the *Canada Petroleum Resources Act*.

Levies are collected from oil and gas companies that hold licenses for exploration and development in Canada's frontier lands. In accordance with the *Canada Petroleum Resources Act*, when a license is issued during the course of the year, levies are collected for the current year and the two years prior. The collection of unpaid levies is pursued on an ongoing basis by the ESRF Secretariat.

Table 1 below shows the fiscal information for the annual expenditures for ESRF in the 2016-17 fiscal year. All expenses are paid out of the fiscal year in which they are invoiced.

The total study expenditures for the ESRF over the full 12 month period amounted to \$4,429,646. Administration costs for this period amounted to \$307,137. Revenues were \$6,281,589, with \$326,775 remaining in outstanding levies in the South as of March 31, 2017 (refer to Table 2 for details).

Table 1 – ESRF Expenditures April 1, 2016 to March 31, 2017 (in dollars)

REGION	OPENING CASH BALANCE APRIL 1, 2016 (\$)	TOTAL REVENUE, LEVIES & RETURNS (\$)	ADMINISTRATION COSTS (\$)	STUDY PROGRAM COSTS (\$)	CLOSING BALANCE MARCH 31, 2017 (\$)
SOUTH REGION	3,288,238	5,911,404	177,855	3,778,647	5,243,140
NORTH REGION	1,068,361	370,185	129,282	650,998	658,266
TOTAL	4,356,600	6,281,589	307,137	4,429,646	5,901,406

NOTE: The Public Accounts of Canada closing balances for the Southern and Northern Regions at the end of the 2016-17 fiscal year may differ. Given accounting processes at year end, the equal distribution of Administration Costs between the regional accounts is not possible until the new fiscal year. The Administration Costs in this table account for the redistribution of funds between the accounts.

Table 2 – ESRF Regional sub accounts – Levy income 2016-17 (in dollars)

REGION	LEVY RATE Levy #28 2016-2017 (\$/Hectare)	REVENUES Levy #28 2016-2017 (\$)	REVENUES Back Levies (\$)	TOTAL LEVY INCOME (\$)	
1	Queen Charlottes North	0	-	-	
2	Hecate Strait	0	-	-	
3	Queen Charlottes South	0	-	-	
4	Vancouver Island	0	-	-	
5	Labrador North	0	-	-	
6	Labrador Central	0.2537	3,851	-	3,851
7	Labrador South	0.2537	1,431	-	1,432
8	Northeast Newfoundland	0.6240	-	6,735	6,735
9	Newfoundland Slope	0.6181	1,749,322	1,442,999	3,192,321
10	Grand Banks North	0.5781	362,574	268,107	630,680
11	Grand Banks South	0.6154	881,715	76,705	958,420
12	Scotian Shelf East	0.5517	192,566	-	192,566
13	Scotian Shelf West	1.5621	58,829	-	58,829
14	Scotian Slope	0.1656	659,474	-	659,474
15	Gulf of St. Lawrence	0.5987	176,716 ¹	30,380	207,096
16	Hudson Bay	0	-	-	-
	Total South		\$4,086,478	\$1,824,926	\$5,911,404
17	Beaufort South	0.0281	20,430	136,434	156,864
18	Beaufort North	0	-	213,321	213,321
19	Western Archipelago-Offshore	0	-	-	-
20	Central Archipelago-Offshore	0	-	-	-
21	Eastern Archipelago-Offshore	0	-	-	-
22	Baffin Bay	0	-	-	-
23	Yukon North	0	-	-	-
24	Yukon South	0	-	-	-
25	Mackenzie Delta	0	-	-	-
26	Mackenzie North	0	-	-	-
27	Mackenzie Central	0	-	-	-
28	Mackenzie South	0	-	-	-
29	Western Archipelago-Onshore	0	-	-	-
30	Central Archipelago-Onshore	0	-	-	-
31	Eastern Archipelago-Onshore	0	-	-	-
	Total North		\$20,430	349,755	\$370,185
	TOTAL				\$6,281,589

¹Levy amounts of \$326,775 remain outstanding in this region as of March 31, 2017.

Annex 1: ESRF Regions

ESRF Southern Regions (Natural Resources Canada)

Region 1: Queen Charlottes North

Region 2: Hecate Strait

Region 3: Queen Charlottes South

Region 4: Vancouver Island

Region 5: Labrador North

Region 6: Labrador Central

Region 7: Labrador South

Region 8: Northeast Newfoundland

Region 9: Newfoundland Slope

Region 9: Newfoundland Slope

Region 10: Grand Banks North

Region 11: Grand Banks South

Region 12: Scotian Shelf East

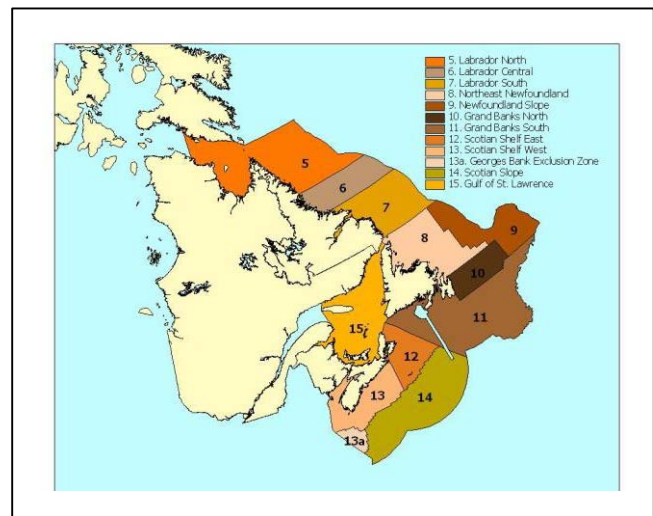
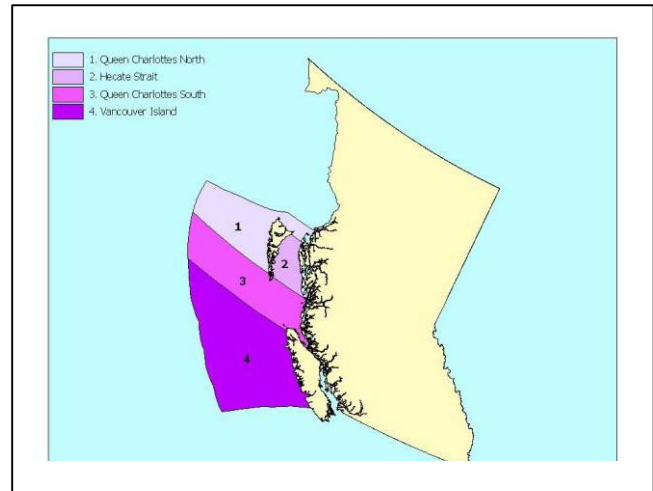
Region 13: Scotian Shelf West

Region 13a): Georges Bank Exclusion Zone

Region 14: Scotian Slope

Region 15: Gulf of St. Lawrence

Region 16: Hudson Bay



ESRF Northern Regions (Indigenous and Northern Affairs Canada)

Region 17: Beaufort South

Region 18: Beaufort North

Region 19: Western Archipelago — Offshore

Region 20: Central Archipelago — Offshore

Region 21: Eastern Archipelago — Offshore

Region 22: Baffin Bay

Region 23: Yukon North

Region 24: Yukon South

Region 25: Mackenzie Delta

Region 26: Mackenzie North

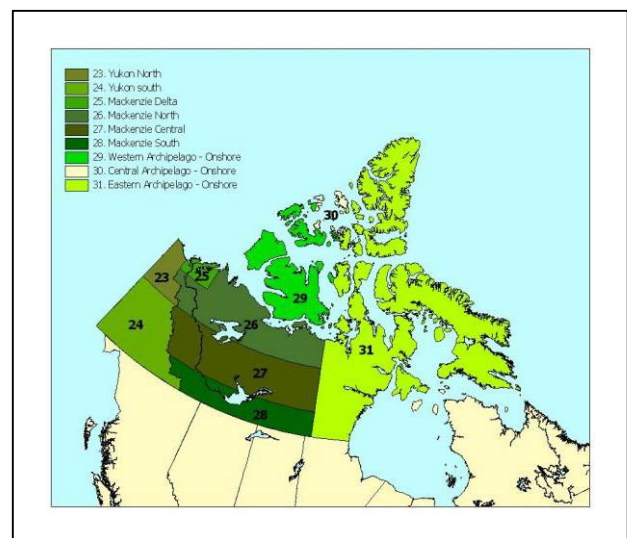
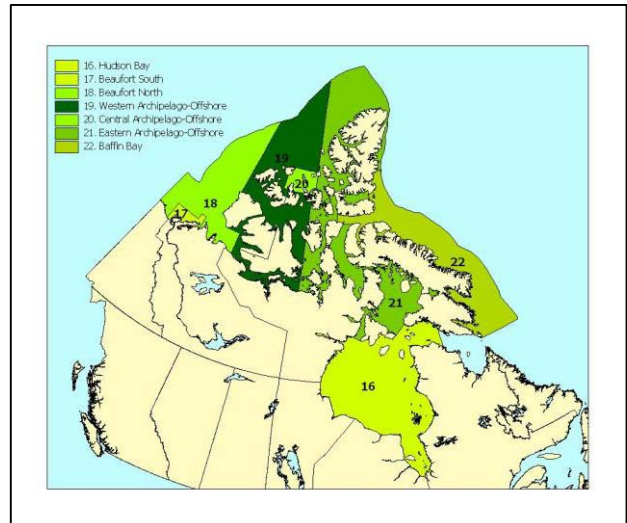
Region 27: Mackenzie Central

Region 28: Mackenzie South

Region 29: Western Archipelago — Onshore

Region 30: Central Archipelago — Onshore

Region 31: Eastern Archipelago — Onshore



Annex 2: Complete description of the ESRF Research Priority Areas for the 2015-2018 cycle

Northern Research Priority Areas

1. Research Priority Area #1: Spill Preparedness and Response, Fate and Effects

Summary: Studies will build on knowledge of the fate and effects of accidental releases of petroleum hydrocarbons and other hazardous substances in the Arctic marine environment and would be directed at the improvement of responses to such accidental releases.

Targeted Area: Eligible spill research areas include, but are not limited to, the biophysical, socio-economic, impact and assessment aspects of spills in the following categories:

- In-situ Burning;
- Dispersants;
- Mechanical Recovery;
- Shorelines;
- Spill Modelling; and,
- Detection and Monitoring.

Details regarding each of the eligible research areas can be found in the following report prepared by C-CORE for the ESRF Management Board. This report is on the ESRF website: <http://www.esrfunds.org/sites/www.esrfunds.org/files/pdf/publications/194.pdf> - C-CORE (2013) Strategic Plan for Oil Spill Research in Canadian Arctic Waters, C-CORE Report R-13-108-1018, Revision 3.1.

Description: The risk of accidental releases of petroleum hydrocarbons and other hazardous substances into the Arctic marine environment has increased with the growing interest in the development of offshore petroleum operations in the Canadian Arctic. Hydrocarbon exploration is or might be taking place in both the near and offshore waters of the Beaufort Sea. In terms of oil spill response, the Arctic presents unique challenges, including the remote locations of potential spill sites, cold temperatures and limited availability of first-response personnel. Most of the research data on oil fate, effects and spill response in the Arctic have been derived from laboratory studies and field trials conducted in the 1970-1980's, with the exception of the recent Joint Industry Project effort by SINTEF in Norway (completed in 2009). The consensus of the international scientific community is that field trials are essential to advance the development of oil spill countermeasures for use in the Arctic. Unless methodologies can be validated in the field, they may not be fully accepted by regulators, Indigenous communities and the public as operational tools. Research in this priority area will focus on filling gaps in current spill countermeasures knowledge that will contribute to the production of effective environmental protection through the improvement of operational guidelines and best practices.

Studies should demonstrate benefit to stakeholders in areas where offshore petroleum operations are either ongoing or expected in the foreseeable future. Canada In the North, offshore petroleum operations are anticipated in the foreseeable future only in the Beaufort Sea, encompassed by ESRF regions 17 and 18.

Exclusions: Research proposed exclusively for onshore areas.

2. Research Priority Area #2: Regional Effects Assessment and Management

Summary: Studies will focus on environmental and socio-economic studies that will build a knowledge base that extends to a regional scale, beyond single oil and gas lease blocks or operations. The information gathered by these studies is intended for use by all interested stakeholders in preparing and reviewing applications for oil and gas activities on Canada's northern frontier lands.

Targeted Area: Eligible research areas include:

- Biophysical studies;
- Socio-economic studies;
- Traditional knowledge studies; and,
- Studies contributing to the assessment and management of cumulative effects.

Description: Studies building on other regional research programs may be of particular interest including areas around offshore fish and bird populations and habitats, maintenance of long-term oceanographic observatories, and remote sensing, monitoring and modelling of sea ice.

Studies should demonstrate benefit to stakeholders in areas where petroleum operations are either ongoing or expected in the foreseeable future. In the North, offshore petroleum operations are anticipated in the foreseeable future only in the Beaufort Sea, encompassed by ESRF regions 17 and 18.

Exclusions: Research proposed exclusively for onshore areas.

Southern Research Priority Areas

3. Research Priority Area #3: Seismic

Summary: Studies will build on knowledge of the effects of the sound energy released to the marine environment during marine seismic surveys and be directed particularly at improving the understanding of the nature of seismic sound energy and its effects on commercial fish and invertebrate species as well as marine mammals and/or species at risk.

Targeted Area: Eligible research areas include but are not limited to:

- Understanding the "natural" underwater sound environment in the absence of sound energy arising from seismic survey operations;
- Measuring the particle motion and sound pressure levels experienced by organisms at specified distances from seismic survey operations; modelling the propagation of sound energy from marine seismic surveys and the in-field verification of those model predictions documenting commercial fish and invertebrate behaviour in response to marine seismic survey sound energy in the field;
- Documenting the effects of marine seismic survey sound energy on commercial fish and invertebrate physiology and gene expression associated with behavioural responses in the field; understanding of the quality (i.e., accuracy, data resolution) of the observations made by marine mammal observers and/or passive acoustic monitoring techniques; and,
- Best practice for training and qualifying observers and passive acoustic monitoring operators.

Description: The effects of the sound energy released into the water column from the routine operation of airgun arrays used in marine seismic surveys on fish and invertebrate behaviour and, potentially, commercial harvesting of these species, are not fully understood.

There have been some attempts to study this issue in the field and the laboratory over the last twenty

years but there is no consensus on the nature and/or significance of the effects observed. In recent years, workshops and conferences, some sponsored by the ESRF, have attempted to come to terms with this issue. These efforts were driven in no small measure by the concern for the socio-economic effects of seismic surveys on fish harvesters. Without an understanding of the behavioural effects of the sound energy, including particle motion, resulting from marine seismic surveys' air gun arrays, the effects on marine species and their behaviour, and consequently on harvesting these species, is difficult to assess.

For the purposes of focussing this research priority area, the commercial fish species of greatest interest are Northern Shrimp, Snow Crab and Atlantic Cod.

Exclusions: Laboratory scale studies, unless as part of a field study.

4. Research Priority Area #4: Oil and Gas Liquids Spill Fate and Effects

Summary: Studies will build on existing knowledge of the fate and effects of accidental releases of petroleum hydrocarbons in the Newfoundland- Labrador and Nova Scotia Offshore Areas.

Targeted Area: Eligible research areas include, but are not limited to:

- Water column and benthic fate and effects of crude oil or natural gas liquids that may or may not have been treated with dispersants;
- Surface and water column detection and monitoring of dispersed and non-dispersed crude oil or natural gas liquids;
- Taint, toxicology and persistence of dispersed and non-dispersed crude oil or natural gas liquids in commercially harvested fish and invertebrate species;
- Toxicology and persistence of dispersed and non-dispersed crude oil or natural gas liquids in seabirds;
- Toxicology and persistence of dispersed and non-dispersed crude oil or natural gas liquids to benthic, zooplankton and/or phytoplankton species;
- Modelling the fate and behaviour of dispersed and non-dispersed crude oil or natural gas liquids in deep water environments; and,
- Socio-economic effects of a major spill event on the fisheries sector, particularly, the impact of markets refusing to purchase commercially harvested fish species and how those effects might be mitigated.

Description: This priority area is directed at improving the understanding of the effects of such releases on marine species, ecosystems and commercial fisheries.

Research proposed in response to this call should take into account recent research undertaken by the ESRF (e.g. ongoing studies that address: biodegradation rates for dispersed and non-dispersed crude oil and gas liquids and oceanography of the Flemish Pass) and findings and lessons learned arising from international research efforts, e.g., research on the Macondo Spill. Project proponents should also take in to account the trend to exploration in continental shelf break and deep-water areas of Canada's East Coast.

Exclusions:

- Laboratory scale, unless specifically linked to field studies or large scale experiments in wave tanks.
- Research designed and focussed exclusively on shorelines.
- Mechanical countermeasures and in-situ burning.

Annex 3: Study Selection Process

ESRF funding can be provided solely to legal entities validly incorporated or registered in Canada, including companies, industry associations, research associations, standards organizations, Indigenous and community groups, academic institutions as well as federal, provincial, territorial and municipal governments and their departments and agencies. These organisations are invited to participate in the ESRF study selection process.

The study selection process has three distinct phases:

- Letters of Interest
- Full proposals
- Funding Agreements (or Memoranda of Understanding)

The selection process is launched with the ESRF Call for Letters of Interest (LOI). The received letters are reviewed by technical review committees and the ESRF Management Board members. The ESRF Management Board decides which proponents should be invited to submit full proposals.

Proponents who were successful in having their Letter of Interest selected are invited to submit a full proposal, presenting a detailed version of their proposed research study. The received full proposals are reviewed, similarly to Letters of Interest, by technical review committees and the ESRF Management Board members.

The ESRF Management Board decides which full proposal proponents should be invited to negotiate a Funding Agreement or, if the proponent is a federal, provincial or municipal government organization, a Memorandum of Understanding.

Selection Criteria

The LOI and proposals that meet basic requirements regarding eligibility and completeness of information will be reviewed by a committee of technical experts mandated by the ESRF Management Board. These Technical Review Committees use the criteria provided in the LOI and full proposal Applicants' Guides to evaluate:

- the significance of the potential impact of the study being proposed; and,
- the probability that the study achieves its stated objective.

In addition to the above, the ESRF Management Board may consider other criteria, such as regional balance, in the final project selection. Any such criteria will be applied equitably to all Project Proposals reviewed.

Commitment to fairness and transparency

The ESRF Management Board and Natural Resources Canada are committed to manage the selection process for the ESRF studies fairly and transparently. All assessments and decisions will be done in accordance with this commitment. No specific guidance or advice on preparing a LOI or full project proposal will be provided to any of the proponents. No meetings on the ESRF call for LOIs or call for full project proposals will be held between any applicant and anyone involved

with the project selection process. Further, to avoid the risk of real, perceived or potential conflict of interest, members of expert technical committees who have a vested interest as a potential participant in a particular project will be required to sign a declaration regarding their interest in the project and will not be allowed to participate in the assessment of that project.

Annex 4: Published Reports

All ESRF studies are subject to a scientific/technical peer review. Reports that are deemed to be scientifically or technically significant are published in the ESRF Technical Report Series. Since its inception in 1983, the ESRF has published over 200 reports and related studies.

Recent reports and studies are available for download through the ESRF website: <http://www.esrfunds.org/174> with earlier reports available on request by contacting the ESRF Secretariat at NRCan.ESRF-FEE.RNCan@canada.ca.

Publications are listed on the ESRF website under the following categories:

- Environmental Effects and Monitoring
- Frontier Social and Economic Issues
- Ice-Icebergs-Ice Detection
- Oil Spill Research and Countermeasures

Annex 5: Bibliography of Past ESRF Publications, 1985 - 2016

Bibliographies

- 010 Goodwin, C.R., J.C. Finley and L.M. Howard. *Ice Scour Bibliography*. July 1985. 99 p.
- 026 Young, S.C. *Bibliography on the Fate and Effects of Arctic Marine Oil Pollution*. March 1986. 212 p.
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