



Environmental Studies Research Fund



ANNUAL REPORT 2019 - 2020

Table of Contents

Mandate	2
ESRF Management Board Members.....	3
ESRF Research Priority Areas 2015-2020.....	4
Studies in 2019-2020	5
SOUTHERN REGIONS	5
NORTHERN REGIONS	6
Financial Statements	7
STATEMENT OF FINANCIAL POSITION	7
Table 1 – ESRF Expenditures April 1, 2019 to March 31, 2020 (in dollars)	7
Table 2 – ESRF Regional sub accounts – Levy income 2019-20 (in dollars)	8
Annex 1: ESRF Regional Map	9
Annex 2: Complete description of the ESRF Research Priority Areas for the 2019-2020 cycle	10
Northern Research Priority Areas.....	10
Southern Research Priority Areas.....	10
Annex 3: Study Selection Process.....	11
Selection Criteria	11
Commitment to fairness and transparency.....	11
Annex 4: Bibliography of Past ESRF Publications, 1985 - 2020	13
Bibliographies	13
Environmental Effects and Monitoring	13
Environmental Loading and Design	17
Frontier Social and Economic Issues	17
Ice – Icebergs – Ice Detection.....	18
Oil Spill Research and Countermeasures.....	18
Sea Bottom Ice Scour.....	20
Sediment Transport.....	21
Waves	21

The Environmental Studies Research Fund

ANNUAL REPORT 2019 - 2020

Message from the Chair

I am very pleased, on behalf of the ESRF Management Board, to submit the Environmental Studies Research Fund (ESRF) 2019 - 2020 Annual Report.

Over this past year, the Fund has welcomed three new Board members and set new priority areas for future research related to the environment and social impacts of offshore oil and gas activities on Canada's frontier lands in the areas of the migratory behavior of Atlantic salmon, Indigenous Knowledge and seabirds.

Looking ahead to our upcoming year, the Management Board has concluded an open call for research targeted on Atlantic salmon migratory behaviour while at sea that will increase our understanding of possible interaction between this species and with offshore oil and gas activities on Canada's east coast. The Management Board looks forward to awarding research contract(s) this spring. In addition to the Atlantic salmon call for research we are also busy preparing future calls for proposals for new priority research areas.

The Fund's ongoing support of research in Canada's frontier lands would not be possible without the dedication of the ESRF Management Board Members and Secretariat. This year, I would specifically like to thank Eric Theriault (who has retired after many years representing the Canada-Nova Scotia Offshore Petroleum Board) and Robert Steedman (who has retired after many years representing the National Energy Board) for their service to the Board. Their insights over their years of service have contributed greatly to the program ongoing success. I would also like to welcome, Anastassia Manuilova, Dena Murphy and Vicki Sahanatien as new Members of the Management Board. They bring with them combined experience with the Canadian oil and gas industry, environmental management, regulatory and southern and northern issues.

In closing, best of luck to all researchers this field season and we look forward to discussing progress made and research findings.



Jennifer Matthews
Chairperson, ESRF Management Board
May 27, 2020



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 Crown-Indigenous Relations and Northern Affairs Canada, 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

Jennifer Matthews, Chairperson
Canadian Association of Petroleum Producers

Marielle Thillet
Encana Corporation

Stephen Bettles
Husky Energy

Sherry Becker
Imperial

Public Sector

Vicki Sahanatien
Northern Regions

Philip Walsh
Southern Regions

Government of Canada

Mark Hopkins / Daniel VanVliet
Crown-Indigenous Relations and Northern Affairs
Canada

Janine Murray
Environment and Climate Change Canada

Patrice Simon / Mike Stoneman
Fisheries and Oceans Canada

Robert Steedman (Vice-Chairperson) / Anastassia
Manuilova
National Energy Board

Offshore Petroleum Boards

Elizabeth Young
Canada-Newfoundland and Labrador Offshore
Petroleum Board

Dena Murphy
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 Crown-Indigenous Relations and Northern Affairs and the Minister of Natural Resources.

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.

Contact Information:

ESRF Secretariat
Natural Resources Canada
14th Floor
580 Booth Street, Ottawa ON

E-mail:

NRCan.ESRF-
FEE.RNCan@canada.ca

Website:

www.esrfunds.org

ESRF Research Priority Areas 2015-2020

The five research priority areas for the 2015-2020 funding cycle were:

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.
5. Atlantic salmon migration at sea.

Studies in 2019-2020

SOUTHERN REGIONS

Atlantic Salmon Migration at Sea (2020-01S). Arising from concerns raised by Indigenous groups in Eastern Canada during the Regional Environmental Assessment for Exploration Drilling this study will follow tagged Atlantic salmon (*Salmo salar*) along their East Coast migratory routes to determine their presence in specific Canadian offshore regions. The outcomes will support the decision-making process for current and future offshore oil and gas activities by providing science-based information on Atlantic salmon migratory patterns at sea, especially in areas of offshore oil and gas activities in eastern Canada.

Assessment of Potential Risks of Seismic Surveys to Affect Ground fish Resources (2018-01S). Oil and gas exploration in Southern Atlantic frontier regions has been very active at a time when the fishing industry in this same area is becoming increasingly reliant on rebuilding the ground fish fishery. The effects of ocean noise on marine life is a growing concern globally, however the specific impacts including non-lethal effects and how they are manifested remains poorly defined for many species groups including fish. This project will examine potential risks of seismic air gun surveys to affect commercially important and culturally important ground fish species, including commercial catchability, and fish behaviour (i.e., movement).

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. Fishers have expressed concern over the potential for reduction in catch of snow crab in proximity to active seismic survey operations. This study aims to investigate potential effects of seismic exploration activity on commercial snow crab catch rates using scientific measures of changes in crab behavior (i.e. movement), commercial catchability, and physiological effects in response to seismic air gun operations. This study is completed. The ESRF report is being finalized and publications arising from the research are being submitted to peer-reviewed journals.

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.*

Reports can be accessed at:
www.esrfunds.org/174

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. This study is completed. The ESRF report is being finalized and publications arising from the research are being submitted to peer-reviewed journals.

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). This report covers the development to implement a Canadian east coast operational coupled ocean and ice forecast system for the Grand Banks and Orphan Basin capable of ingesting the vast quantities of available operational satellite data and limited in-situ data for the region to provide reliable assessed and forecast currents any ocean depth. The operational forecast output is available for interested third parties to: run iceberg drift predictions; to run oil spill scenario tests; environmental characterization for environmental assessments, strategic planning and operations; and if ever needed to run oil spill drift and fate predictions for environmental response. Overall this project enables an increase in resolution of the ocean forecast model for the east coast along with improving initial conditions for the forecast system. The model output will increase the realism of drift prediction scenarios for the east coast of Canada. (ESRF Report # 213; Query report #213 at <https://www.esrfunds.org/174>)

NORTHERN REGIONS

Integrated Beaufort Observatory (2014-02N). This was a four-year mooring program aimed at contributing key oceanographic information required for decisions on development and regulations in the offshore Canadian Beaufort Sea. The project used 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. The project built upon time-series acquired by Fisheries and Oceans Canada since the 1970's and a number of other related projects that took place between 2002-2015. Key observations derived from the project can be found in ESRF Report #218. Data from the program is also available publicly through the Polar Data Catalogue. (Query report #218 at <https://www.esrfunds.org/174>)

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 Crown-Indigenous Relations 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 2019-20 fiscal year. All expenses are paid out of the fiscal year in which they are invoiced.

In 2019-20 the total study expenditures for the ESRF amounted to \$1,597,533. Administration costs for this period were \$268,001. Revenues collected through levies were \$1,628,111.

Table 1 – ESRF Expenditures April 1, 2019 to March 31, 2020 (in dollars)

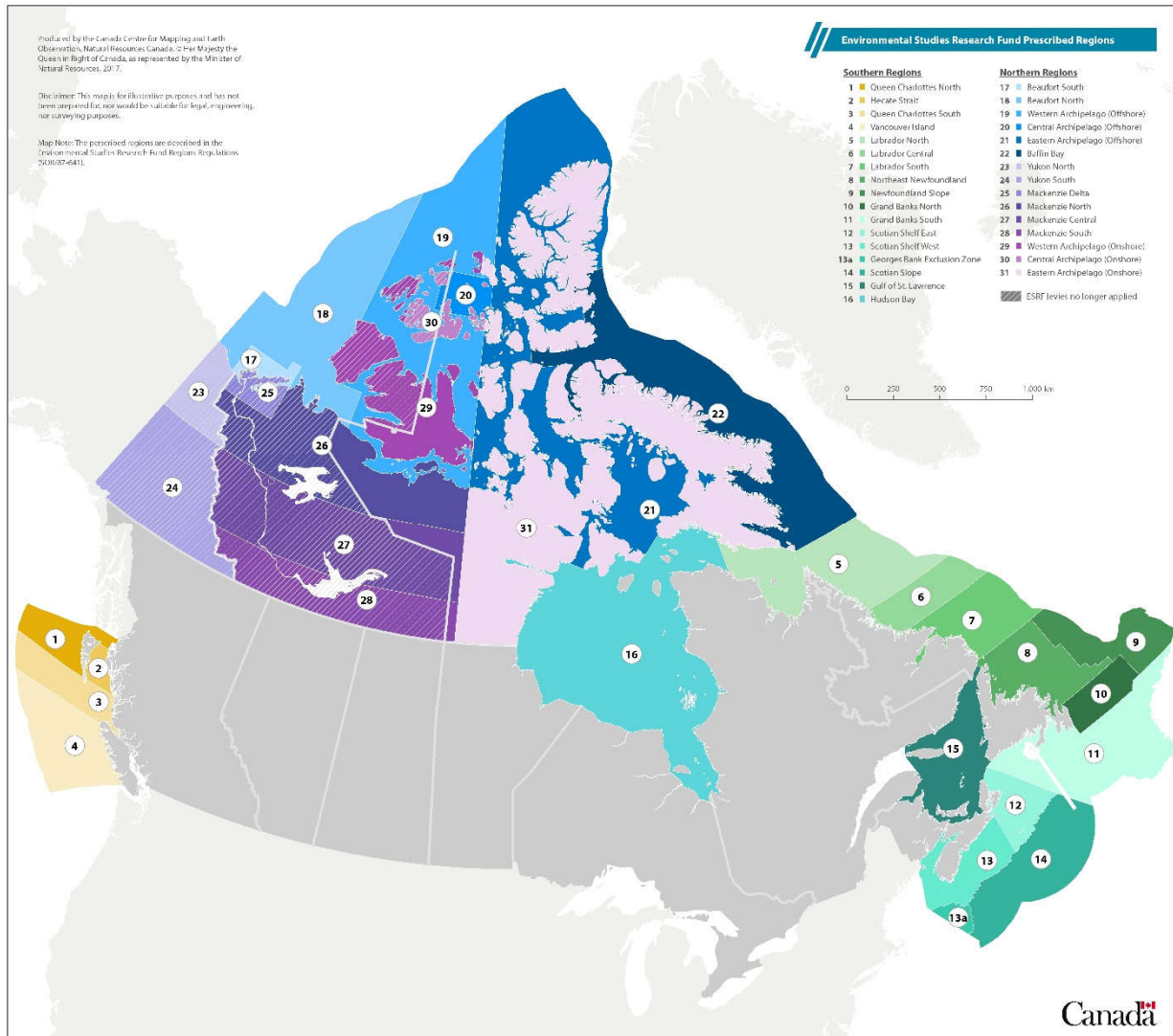
REGION	OPENING CASH BALANCE APRIL 1, 2019 (\$)	TOTAL REVENUE, LEVIES & RETURNS (\$)	ADMINISTRATION COSTS (\$)	STUDY PROGRAM COSTS (\$)	CLOSING BALANCE MARCH 31, 2020 (\$)
SOUTH REGION	5,838,925	1,628,111	268,001	1,478,342	5,720,693
NORTH REGION	274,139			119,191	154,948
TOTAL	6,113,064	1,628,111	268,001	1,597,533	5,875,641

NOTE: The Public Accounts of Canada closing balances for the Southern and Northern Regions at the end of the 2019-20 fiscal year may differ. Given accounting processes at year-end, the 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 2019-20 (in dollars)

REGION		LEVY RATE Levy 31 2019-2020 (\$/Hectare)	REVENUES Levy 31 2019-2020 (\$)	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	0.1194	392	-	392
6	Labrador Central	0.1684	2,556	-	2,556
7	Labrador South	0	-	-	-
8	Northeast Newfoundland	0.427	110,532	-	110,532
9	Newfoundland Slope	0.2018	808,920	-	808,920
10	Grand Banks North	0	-	104,069	104,069
11	Grand Banks South	0.3912	112,979	136,467	249,446
12	Scotian Shelf East	0.2163	25,087	-	25,087
13	Scotian Shelf West	0	-	-	-
14	Scotian Slope	0.2448	307,058	-	307,058
15	Gulf of St. Lawrence	0.2899	20,051	-	20,051
16	Hudson Bay	0	-	-	-
	Total South		\$1,387,575	\$240,536	\$1,628,111
17	Beaufort South	0	-	-	-
18	Beaufort North	0	-	-	-
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		\$0,00	-	\$0,00
	TOTAL				\$1,628,111

Annex 1: ESRF Regional Map



Annex 2: Complete description of the ESRF Research Priority Areas for the 2019-2020 cycle

Northern Research Priority Areas

A five-year moratorium was established in 2016 on Arctic offshore oil and gas exploration. Therefore, ESRF-supported research activities in that region are currently not prioritized.

Southern Research Priority Areas

In 2019 the ESRF Management Board reviewed its research priorities for the 2019-2020 funding cycle. A number of potential research topics were discussed arising from consultations with the Management Board's East Coast Advisory Committee, past research priorities and topics raised during current environmental assessment processes. On that basis, a number of research topics were identified and ranked as short-term for consideration as proposal calls for 2020; medium-term to be reviewed as potential 2021 calls and long-term for consideration post-2021 calls.

The short-term priorities were identified as Seabirds and Indigenous Knowledge. Additional details and the status of work related to these priorities is summarized below.

1. Research Priority Area #1: Seabirds

With respect to seabirds, potential research could encompass oil spill preparedness and response focussing on effects on seabirds; the population dynamics of Leach's Storm Petrel in Atlantic Canada; and, the attraction of seabirds to light sources offshore. ESRF has undertaken consultations with Environment and Climate Change Canada to develop more precise research needs. The outcome of that discussion will be reviewed by the Management Board to inform any proposal calls that will be issued in 2020.

2. Research Priority Area #2: Indigenous Knowledge

With respect to Indigenous Knowledge, the Management Board took note of the outcomes of the engagement with more than forty Indigenous Groups in Atlantic Canada during a Regional Environmental Assessment of Exploration Drilling. To help determine how and what kind of an ESRF research project could usefully address this issue, the Management Board has undertaken exploratory discussions with representatives of indigenous people in Atlantic Canada, and other knowledgeable individuals. The end goal is to collaboratively scope a project that incorporates Indigenous Knowledge, in order to address some of the concerns raised during the Regional Environmental Assessment of Exploration Drilling, and to help maximize the value of ESRF undertakings to local Indigenous communities.

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 project 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 LOIs 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 LOIs, 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 LOIs 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' Guide 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, Natural Resources Canada and Crown-Indigenous Relations and Northern Affairs 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: Bibliography of Past ESRF Publications, 1985 - 2020

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.

All published reports and studies are available for download through the ESRF website:
<http://www.esrfunds.org/174>.

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.
- 030 Howard, L.H. *Icebergs: A Bibliography Relevant to Eastern Canadian Waters*. May 1986. 277 p.
- 050 Finley, J.C. and C.R. Goodwin. *The Training and Employment of Northern Canadians: An Annotated Bibliography*. November 1986. 206 p.
- 130 Hunter, S.P. and J.H. Vandermeulen. *Bibliography of Aquatic Oil Pollution Fate and Effects*. December 1994. CD-Rom.
- 136 *Coastal Resource Inventory: Great Northern Peninsula*. Not published.
- 009 Harwood, L.A. and A. Borstad. *Bowhead Whale Monitoring Study in the Southeast Beaufort Sea*. July-September 1984. August 1985. 99 p.
- 021 Tidmarsh, W.G., R. Ernst, R. Ackman and T. Farquharson. *Tainting of Fishery Resources*. January 1986. 174 p.
- 025 Kingsley, M.C.S. *Distribution and Abundance of Seals in the Beaufort Sea, Amundsen Gulf & Prince Albert Sound*. 1984. February 1986. 16 p.
- 028 Thomson, D.H., D.B. Fissel, J.R. Marko, R.A. Davis and G.A. Borstad. *Distribution of Bowhead Whales in Relation to Hydrometeorological Events in the Beaufort Sea*. March 1986. 119 p.
- 036 Norton, P. and L.A. Harwood. *Distribution, Abundance and Behavior of White Whales in the Mackenzie Estuary*. June 1986. 73 p.
- 057 Duval, W.S. (ed.). *Distribution, Abundance and Age Segregation of Bowhead Whales Relative to Industry Activities and Oceanographic Features in the Beaufort Sea, August-September 1985*. March 1987. 117 p.

Environmental Effects and Monitoring

- 001 McLaren, P.L. and R.A. Davis. *Distribution of Bowhead Whales in the Beaufort Sea*. Summer 1983. February 1985. 62 p.
- 005 Thomas, D.J., W.S. Duval, C.S. Johnston, G.S. Lewbel, A. Birdsall, M.S. Hutcheson, G.D. Greene, R.A. Buchanan and J.W. MacDonald. *Effects Monitoring Strategies and Program for Canada's East Coast*. May 1985. 88 p.
- 060 Yunker, M.B. and R.W. Drinnan. *Dispersion and Fate of Oil from Oil-based Drilling Muds near Sable Island, N.S.* January 1987. 169 p.
- 063 Drinnan, R.W., M. Yunker, A. Gillam, N. Charchuk and S.R.H. Davis. *Options for Treatment and Disposal of Oil-based Mud Cuttings in the Canadian Arctic*. February 1987. 167 p.
- 066 Nennering, R.D. *Monitoring a Sump Containing Drilling Mud with High Salt Content*. March 1987. 47 p.
- 075 Cross, W.E. and B. Humphrey. *Monitoring the Long-Term Fate and Effects of Spilled Oil in an Arctic Marine Subtidal Environment*. August 1987. 120 p.

- 080 Ernst, R.J., W.M.N. Ratnayake, T.E. Farquharson, R.G. Ackman and W.G. Tidmarsh. *Tainting of Finfish by Petroleum Hydrocarbons*. September 1987. 150 p.
- 089 Ford, J.K.B., J.C. Cabbage and P. Norton. *Distribution, Abundance, and Age Segregation of Bowhead Whales in the Southeast Beaufort Sea, August-September, 1986*. November 1987. 53 p.
- 090 Wainwright, P.F. and B. Humphrey. *Analysis of Sediment Data from the Beaufort Shorebase Monitoring Program, 1982-1984*. March 1988. 78 p.
- 093 Hardy BBT Limited and Stanley Associates Engineering Ltd. *Handling and Disposal of Waste Drilling Fluids from On-Land Sumps in the Northwest Territories and Yukon*. February 1988. 58 p.
- 101 Erickson, P., B. Fowler, and D. Thomas. *Oil-based Drilling Muds: Off Structure Monitoring-Beaufort Sea*. June 1988. 188 p.
- 102 Nakashima, D.J. and D.J. Murray. *The Common Eider of Eastern Hudson Bay: A Survey of Nest Colonies and Inuit Ecological Knowledge*. November 1988. 174 p.
- 109 Lawrence, M.J. and S.L. Davies (eds.). *Wildlife and Wildlife Habitat Restoration and Compensation in the Event of an Oil Spill in the Beaufort Sea*. March 1993. 88 p.
- 110 Hurlbut, S.E., D.P. French and B.J. Taylor. *Evaluation of the Potential Effects of Major Oil Spills on Grand Banks Commercial Fish Species as a Result of Impacts on Eggs and Larvae*. January 1991. 53 p.
- 117 Sekerak, A.D., N. Stallard and W.B. Griffiths. *Distribution of Fish and Fish Harvests in the Nearshore Beaufort Sea and Mackenzie Delta During Ice-Covered Periods, October-June*. November 1992. 157 p.
- 118 Thomas, D.J. *Considerations in the Design of Effects Monitoring Strategies: Beaufort Sea Case Study*. January 1992. 54 p.
- 121 S.L. Ross Environmental Research Limited and Ledrew, Fudge and Associates. *The Risk of Tainting Flatfish Stocks During Offshore Oil Spills*. January 1993. 67 p.
- 122 Mackinnon, D.S. and P.A. Lane. *Saltmarsh Revisited – The Long-Term Effects of Oil and Dispersant on Saltmarsh Vegetation*. September 1993. 24 p.
- 123 Duval, W.S. *Proceedings of a Workshop on the Beaufort Sea Beluga February 3–6, 1992, Vancouver, B.C.* March 1993. 26 p.
- 134 Richard, P.R., A.R. Martin and J.R. Orr. *Study of Summer and Fall Movements and Dive Behaviour of Beaufort Sea Belugas, Using Satellite Telemetry. 1992–1995*. March 1987. 34 p.
- 137 Hatch Associates Limited and Griffiths Muecke Associates. *Workshop on Cumulative Environmental Effects Assessment and Monitoring on the Grand Banks and Scotia Shelf*. 2000. 61 p.
- 138 Montevecchi, W.A., F.K. Wiese, G. Davoren, A.W. Diamond, F. Huettmann and J. Linke. *Seabird Attraction to Offshore Platforms and Seabird Monitoring from Offshore Support Vessels and other Ships Literature Review and Monitoring Design*. 1999. 56 p.
- 139 Thomson, D. H., J. W. Lawson and A. Muecke. *Proceedings of a Workshop to Develop Methodologies for Conducting Research on the Effects of Seismic Exploration on the Canadian East Coast Fishery, Halifax, Nova Scotia, September 7–8 2000*. April 2001. 92 p.
- 142 ERIN Consulting Ltd. and OCL Services Ltd. *Sheens Associated with Produced Water Effluents – Review of Causes and Mitigation Options*. March 2003. 46 p.
- 143 Mortensen, Pål B., Lene Buhl-Mortensen, Susan E. Gass, Donald C. Gordon Jr., Ellen L.R. Kenchington, Cynthia Bourbonnais and Kevin G. MacIsaac. *Deep-Water Corals in Atlantic Canada: A Summary Of ESRF-Funded Research (2001–2003)*. December 2004. 43 p.
- 144 Christian, J. R., A. M. Mathieu, D. H. Thomson, D. White and R. A. Buchanan. *Effect of Seismic Energy on Snow Crab (Chionoecetes opilio)*. November 2003. 106 p.
- 145 Racca, R. G., D. E. Hannay, R. B. Murray, W. B. Griffiths, and M. Muller. *Testing Fish Deterrents for Use Under-Ice in the Mackenzie Delta Area*. March 2004. 118 p.

- 146 Buchanan, R. A., J. A. Cook and A. M. Mathieu. *Environmental Effects Monitoring for Exploration Drilling*. December 2003. 86 p.
- 147 Dillon Consulting Limited with DMT Cordah. *Pollution Prevention Opportunities in the Offshore Oil and Gas Sector – Final Report*. October 2003. 73 p.
- 148 Dillon Consulting, BMT Cordah Ltd. *Standardizing the Reporting of Air Emissions to Ambient Air from Atlantic Canada Offshore Petroleum Activities*. March 2003. 52 p.
- 149 Trudel, K. *Workshop on Dispersant Use in Eastern Canada*. 2004. 109 p.
- 150 Martec Limited, CEF Consultants Ltd, DRDC Atlantic, St. Francis Xavier University. *Effects of Pipelines/Gathering Lines on Snow Crab and Lobster*. December 2004. 61 p.
- 151 Lee, K., H. Bain, and G.V. Hurley, (eds.). *Acoustic Monitoring and Marine Mammal Surveys in the Gully and Outer Scotian Shelf Before and During Active Seismic Programs*. December 2005. 154 p + appendices.
- 152 Ellis & Associates. *Drilling Waste Management – Recommended Best Practices*. January 2005. CD-Rom.
- 154 AMEC Earth & Environmental. *Inuvialuit Settlement Region Drilling Waste Disposal Sumps Study*. February 2005. CD-Rom.
- 155 Dillon Consulting Limited and Salmo Consulting. *Beaufort-Delta Cumulative Effects Project*. February 2005. CD-Rom.
- 156 Moulton, V.D., and B.D. Mactavish. *Recommended Seabird and Marine Mammal Observational Protocols for Atlantic Canada*. March 2004. 80 p.
- 158 Christian, J. R., A. Mathieu, and R. A. Buchanan. *Chronic Effects of Seismic Energy on Snow Crab (Chionoecetes opilio)*. March 2004. 45 p.
- 159 Kemper, J. Todd. *Vegetation Changes on Seismic Lines from Recent (2000–2001) and Historic (1970–1986) Seismic Programs in the Mackenzie Delta Area*. May 2006. 29 p.
- 160 Armsworthy, S.L., A. Muecke and P.J. Cranford. *Workshop on Offshore Oil and Gas Environmental Effects Monitoring*, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, May 26-30. November 2003. 125 p.
- 161 Kavik-AXYS Inc. *Review of the Ikhil Gas Development and Pipeline Regulatory and Environmental Process: Lessons Learned*. January 2007. 49 p.
- 162 Harwood, L., T. G. Smith, H. Melling. *Assessing the Potential Effects of Near Shore Hydrocarbon Exploration on Ringed Seals in the Beaufort Sea Region 2003-2006*. November 2007. 103 p.
- 163 Kavik-AXYS Inc. *Biophysical Research Requirements for Beaufort Sea Hydrocarbon Development*. August 2008. 125 p.
- 164 Goodard, D.R., L. Peters, R. Evans, K. Wautier, P. A. Cott, B. Hanna and V. Palace. *Development of histopathology tools to assess instantaneous pressure change-induced effects in rainbow trout (Onchorhynchus mykiss) early life stages*. 2008. 93 p.
- 167 Ollerhead, L.M.N., M.J. Morgan, D.A. Scruton and B. Marie. *Mapping the Spawning Times and Locations for Ten Commercially Important Fish Species Found on the Grand Banks of Newfoundland*. 2004. 42 p.
- 168 Ollerhead, L.M.N. *Mapping Spatial and Temporal Distribution of Spawning Areas for Eight Finfish Species Found on the Scotian Shelf*. June 2007. 54 p.
- 169 Ollerhead, L.M.N., J. Lawrence. *Mapping the Spatial Distribution of Juveniles for Nine Selected Finfish Species Found in the Gulf of St. Lawrence*. June 2007. 64 p.
- 170 Payne, J.F., J. Coady and D. White. *Potential Effects of Seismic Airgun Discharges on Monkfish Eggs (Lophius americanus) and Larvae*. July 2009. 32 p.
- 171 Payne, J.F., C.A. Andrews, L.L. Fancey, A.L. Cook and J.R. Christian. *Pilot Study on the Effects of Seismic Air Gun Noise on Lobster (Homarus americanus)*. 2007. 34 p.
- 172 Antoniuk, T., S. Kennett, C. Aumann, M. Weber, S. Davis Schuetz, R. McManus, K. McKinnon and K. Manuel. *Valued Component Thresholds (Management Objectives) Project*. March 2009. 164 p.
- 173 AMEC Earth & Environmental. *Assessment of Drilling Waste Disposal Options in the Inuvialuit Settlement Region*. December 2009. 140 p.

- 174 SENES Consultants Limited and G. Guthrie. *Bosworth Creek (NWT) Literature Review*. October 2009. 28 p.
- 175 AECOM. *Considerations in Developing Oil and Gas Industry Best Practices in the North*. April 2009. 36 p.
- 176 Centre for Offshore Oil, Gas and Energy Research and K. Lee. *Environmental Persistence of Drilling Mud and Fluid Discharges and Potential Impacts*. December 2009. 35 p.
- 178 Courtenay, S.C., M. Boudreau and K. Lee. *Potential Impacts of Seismic Energy on Snow Crab: An Update to the 2004 Peer Review*. April 2009. 181 p.
- 181 Waugh, D., T. Inkpen., M. Hingston., S. Keast., J. McPherson., D. Worthy., G. Forbes. *Sable Island Air Monitoring Program Report: 2003-2006*. June 2010. 56 p.
- 182 Moulton, V.D., M. Holst. *Effects of Seismic Survey Sound on Cetaceans in the Northwest Atlantic*. June 2010. 28 p.
- 183 Fifield, D.A., K. P. Lewis, C. Gjerdrum, G. J. Robertson, R. Wells. *Offshore Seabird Monitoring Program*. December 2009. 68 p.
- 185 Collins, L.A., C.D. Murray and R.T. Stainton. *Bosworth Creek Water Quality Data Study: Final Report*. May 2011. 69 p.
- 188 French, E.B.S., Ollerhead, L.M.N. *Mapping the Spatial Distribution of Juvenile and Spawning Activities for Five Selected Finfish Species off the Labrador and Northeastern Newfoundland Shelf*. December 2010. 31 p.
- 190 CEF Consultants Ltd. *Report of a Workshop on Fish Behavior in Response to Seismic Sound*. November 2011. 109 p.
- 192 Bayne, Dr. E., H. Lankau and J. Tigner. *Ecologically-based criteria to assess the impact and recovery of seismic lines: The importance of width, regeneration, and seismic line density*. December 2011. 103 p.
- 193 H. Niu and K. Lee. *Refinement and Validation of Numerical Risk Assessment Models for use in Atlantic Canada*. March 2013. 147 p.
- 195 Stantec Consulting Ltd. *Effects of Offshore Oil and Gas Production on Air Quality in Canada's East Coast Offshore Areas*. June 2013. 372 p.
- 196 Courtenay, S., M. Lyons, M. Boudreau, L. Burridge and K. Lee. *Biological Effects of Produced Water from Offshore Canadian Atlantic Oil and Gas Platforms on Various Life Stages of Marine Fish*. September 2013. 109 p.
- 197 Payne, J.F., C.D. Andrews, J. Hanlon, J. Lawson, A. Mathieu, A. Wadsworth, and B. French. *Effects of Seismic Air-Gun Sounds on Lobster (Homarus americanus): Pilot Laboratory Studies with (i) a Recorded Track from a Seismic Survey and (ii) Air-Gun Pulse Exposures over 5 Days*. December 2015. 14 p.
- 199 Hoover, C., C. Hornby, M. Ouellette, V. Torontow, K. Hynes and L. Loseto. *Arrival and distribution of beluga whales (Delphinapterus leucas) along the Mackenzie Shelf: Report on the spring aerial surveys*. January 2016. 38 p.
- 202 Greenan, B.J.W, D. Hebert, D. Cardoso, E.L. Kenchington, L. Beazley and A. van der Baaren. *Ocean Currents and Benthic Habitat in the Sackville Spur Region*. February 2016. 144 p.
- 203 Majewski, A.R., K.D. Suchy, S.P. Atchison, J. Henry, S.A. MacPhee, W. Walkusz, J. Eert, M. Dempsey, A. Niemi, L. de Montety, M. Geoffroy, C. Giraldo, C. Michel, P. Archambault, W.J. Williams, L. Fortier and J.D. Reist. *Uniqueness of Fishes and Habitat Utilization in Oil & Gas Lease Blocks Relative to Non-Lease Areas in the Canadian Beaufort Sea*. February 2016. 99 p.
- 204 Environment and Climate Change Canada. *Beaufort Regional Coastal Sensitivity Atlas*. December 2014. 63 p.
- 211 J.W. Lawson, C. Gomez, G.L. Sheppard, A.D. Buren, A-L. Kouwenberg, G.A.M. Renaud and H.B. Moors-Murphy. *DFO Mid-Labrador Marine Megafauna Visual and Acoustic Study*. November 2017. 142 p.
- 212 M. Gibson, P. Chem, P. Eng and S. Craig. *Source Apportionment of Volatile Organic Compounds and Aerosols on Sable Island*. July 2018. 257 p.
- 214 LGL Limited and Oceans Limited. *Exposure of Juveniles of Four Marine Fish Species to Hydrocarbon Discharges from Oil and Gas Production Platforms on the Grand Banks*. Dec 2018. 167 p.

- 215 J. Delarue, K. Kowarski, E. Maxner, J. MacDonnell and B. Martin. *Acoustic Monitoring along Canada's East Coast: August 2015 to July 2017*. 2018. 204 p.
- 216 G. Warner, A. MacGillivray and B. Martin. *Analysis of Acoustic Particle Motion Data from the Svein Vaage Airgun Study*. 2018. 100 p.
- 217 T. J. Deveau, J. Delarue, B. Martin and K. Lucke. *Transmission Loss Modelling of Seismic Airgun Sounds: Predicted Received Levels, with Frequency Weighting, off Atlantic Canada*. 2018. 679 p.
- 015 Gardner, M. *Construction Projects – Frame of Reference for Oil & Gas Developments in Atlantic Canada*. November 1985. 86 p.
- 024 DPA Group Inc. and Intergroup Consulting Economics Ltd. *Northern Employment and Training in the Oil and Gas Industry*. March 1986. 105 p.
- 040 Storey, K., J. Lewis, M. Shrimpton and D. Clark. *Family Life Adaptations to Offshore Oil and Gas Employment*. July 1986. 207 p.
- 046 Constable, G.A., R.M. Griggs, N.E. Millbank and M.S. Sinclair. *Business Opportunities Related to Oil and Gas Exploration and Production in Northern Canada*. August 1986. 269 p.

Environmental Loading and Design

- 111 Maddock, B., G. Khng and M. Gerin. *Verification of CSA Code for Fixed Offshore Steel Structures*. October 1992. 92 p.
- 112 Allyn, N., W.J. Cichanski and P. Adebar. *Verification of CSA Code for Fixed Offshore Concrete Structures*. November 1992. 62 p.
- 116 Traynor, S. and S.R. Dallimore. *Geological Investigations of Proposed Pipeline Crossings in the Vicinity of Taglu and Niglintgak Islands, Mackenzie Delta, NWT*. May 1992. 115 p.
- 131 Allyn, N., et al. *Environmental Loading Studies for the CSA Offshore Structures Code*. January 1995. 86 p.
- 135 Dallimore, S.R. and J.V. Matthews, Jr. *The Mackenzie Delta Borehole Project*. April 1997. CD-Rom.
- 047 IDP Consultants Ltd. *Public Information on Oil and Gas Activities*. September 1986. 170 p.
- 067 Pinfold, T. *An Evaluation of the Utility of Large-Scale Economic Models for Socio-Economic Impact Assessment*. March 1987. 34 p.
- 071 Atlantic Consulting Economists Limited. *Local Business Adaptation to East Coast Offshore Energy Development*. July 1987. 57 p.
- 085 Groves, S., W.G. Green and J.R. Harper. *Queen Charlotte Islands Coastal Zone: Digital Mapping and Linked Data-Base System*. September 1988. 115 p.
- 087 Storey, K. and M. Shrimpton. *Planning for Large-Scale Construction Projects: A Socio-Economic Guide for Communities, Industry and Government*. October 1987. 78 p.

Frontier Social and Economic Issues

- 002 Gardner, M. *Interaction Between the Fisheries & the Oil and Gas Industry off the East Coast of Canada*. March 1985. 70 p.
- 003 Cleland Dunsmuir Consulting Ltd., Community Resource Services Cooperative Ltd., Maritime Resource Management Services and H. Mills. *Petroleum-Related Socio-Economic Issues – Atlantic Canada*. March 1985. 101 p.
- 004 Usher, P.J., D. Delancey, G. Wenzel, M. Smith and P. White. *An Evaluation of Native Harvest Survey Methodologies in Northern Canada*. April 1985. 249 p.
- 153 Fedirchuk, G. J., S. Labour, N Nicholls, FMA Heritage Resources Consultants. *Traditional Knowledge Manual Volume 1 & 2: Literature Review and Evaluation and Using Traditional Knowledge in Impact Assessments*. August 2005. CD-Rom
- 179 Kavik-Axys Inc. 2010. *Review of Tuktoyaktuk Harbour as a Base for Offshore Oil & Gas Exploration and Development*. August 2010. 100p.
- 189 Sikimuit Environmental Management Ltd. *An Assessment of Predicted Socio-Economic Impacts of Labrador Shelf and Gas Activity on Labrador Communities and Individuals*. December 2011. 156 p.

Ice – Icebergs – Ice Detection

- 008 Ryan, J.P., M. Harvey and A. Kent. *The Assessment of Marine Radars for the Detection of Ice and Icebergs*. August 1985. 127 p.
- 011 Gammon, P.H. and J.C. Lewis. *Methods for the Fracturing of Icebergs*. July 1985. 91 p.
- 014 Buckley, T., B. Dawe, A. Zielinski, S. Parashar, D. MacDonald, H. Gaskill, D. Finlayson and W. Crocker. *Underwater Iceberg Geometry*. September 1985. 216 p.
- 016 Rossiter, J.R., L.D. Arsenault, E.V. Guy, D.J. Lapp, E. Wedler, B. Mercer, E. McLaren, and J. Dempsey. *Assessment of Airborne Imaging Radars for the Detection of Icebergs*. September 1985. 320 p.
- 022 Ryan, J.P. *Enhancement of the Radar Detectability of Icebergs*. January 1986. 83 p.
- 035 Harvey, M.J. and J.P. Ryan. *Further Studies on the Assessment of Marine Radars for the Detection of Icebergs*. June 1986. 82 p.
- 038 Marko, J.R., D.B. Fissel and J.R. Birch. *Physical Approaches to Iceberg Severity Prediction*. July 1986. 104 p.
- 042 Anderson, D.G., D. McDonald, P. Mitten, S. Nicholls and D. Tait. *Management of Small Ice Masses*. August 1986. 195 p.
- 044 Hay & Company Consultants Inc. *Motion and Impact of Icebergs*. September 1986. 146 p.
- 045 Canpolar Consultants Ltd. *Iceberg Detection by Airborne Radar: Technical Review and Proposed Field Program*. September 1986. 235 p.
- 048 Davidson, L.W., W.I. Wittman, L.H. Hester, W.S. Dehn, J.E. Walsh and E.M. Reimer. *Long-Range Prediction of Grand Banks Iceberg Season Severity: A Statistical Approach*. October 1986. 163 p.
- 052 de Margerie, S., J. Middleton, C. Garret, S. Marquis, F. Majaess and K. Lank. *Improvement of Iceberg Drift Forecast – Grand Banks*. November 1986. 86 p.
- 081 Warbanski G. and E. Banke. *Evaluation of a Modified Water Cannon System to Control Small Iceberg Masses*. August 1987. 142 p.
- 091 Klein, K., J.P. Ryan and M. House. *Ryan Evaluation of Two Search Radar Systems for Detection of Ice Masses*. January 1988. 240 p.
- 104 Terry, B.F., D.J. Lapp, C.L. Balko, K.E. Hancock and P.A. Lapp. *Ice Data Management System*. July 1989. 151 p. + appendices.
- 113 Finlayson, D.J., J. Bobbitt, P. Rudkin and I.J. Jordan. *Iceberg Trajectory Model: Real-Time Verification*. March 1992. 47 p.
- 115 Pilkington, G.R., M.C. Hill, M. Metge and D. McGonigal. *Beaufort Sea Ice Design Criteria – Acquisition of Data on EIFs*. October 1992. 154 p.
- 125 Davidson, L.W. *Long-Range Ice Forecasting System (LRIFS) Applied for the Beaufort Sea*. May 1993. 58 p.
- 132 Rossiter, J.R., et al. *Remote Sensing Ice Detection Capabilities – East Coast*. April 1995. 172 p.
- 133 Davidson, S.H. and A. Simms. *Characterization of Iceberg Pits on the Grand Banks of Newfoundland*. February 1997. 162 p.
- 198 Lu, Y., G. Smith, M. Buehner and T. Carrieres. *Improving the Accuracy of the Short-term Ice and Ocean Forecasts in the Beaufort Sea*. January 2016. 32 p.

Oil Spill Research and Countermeasures

- 006 Belore, R.C. *Effectiveness of the Repeat Application of Chemical Dispersants on Oil*. June 1985. 66 p.
- 012 Harper, J.R. and E.H. Owens. *Shoreline Monitoring Programs for Oil Spills-of-Opportunity*. September 1985. 50 p.
- 013 Abdelnour, R., T. Johnstone, D. Howard and V. Nisbett. *Laboratory Testing of an Oil-Skimming Bow in Broken Ice*. January 1986. 60 p.
- 018 S.L. Ross Environmental Research Ltd. *Testing of an Oil Recovery Concept for Use in Brash and Mulched Ice*. January 1986. 43 p.
- 019 Wotherspoon, P., J. Swiss, R. Kowalchuk and J. Armstrong. *Oil in Ice Computer Model*. December 1985. 129 p.
- 031 Harper, J.R. and B. Humphrey. *Stranded Oil in Coastal Sediments: Permeation in Tidal Flats*. April 1986. 23 p.

- 033 Harper, J.R. *Practical Insights into Decision-Making for Shoreline Cleanup of Oilspills*. May 1986. 44 p.
- 034 Belore, R.C. *Development of a High-Pressure Water Mixing Concept for Use with Ship-Based Dispersant Application*. May 1986. 51 p.
- 051 S.L. Ross Environmental Research Ltd. and Energetex Engineering. *Decision-Making Aids for Igniting or Extinguishing Well Blowouts to Minimize Environmental Impacts*. November 1986. 119 p.
- 053 MacNeill, M.R. and R.H. Goodman. *Oil Motion During Lead Closure*. January 1987. 13 p.
- 058 S.L. Ross Environmental Research Ltd. and Hatfield Consultants Ltd. *Countermeasures for Dealing with Spills of Viscous, Waxy Crude Oils*. October 1986. 59 p.
- 062 S.L. Ross Environmental Research Ltd. and D.F. Dickins Associates Limited. *Field Research Spills to Investigate the Physical and Chemical State of Oil in Pack Ice*. February 1987. 116 p.
- 064 Brown, H.M. and R.H. Goodman. *In Situ Burning of Oil in Ice Infested Waters*. February 1987. 27 p.
- 068 Belore, R.C. *Mid-Scale Testing of Dispersant Effectiveness*. April 1987. 82 p.
- 069 Hatfield Consultants Ltd. *Spills-of-Opportunity Research*. February 1987. 124 p.
- 070 Lane, P., M.J. Crowell, D.G. Patriquin and I. Buist. *The Use of Chemical Dispersants in Salt Marshes*. May 1987. 100 p.
- 072 Nawwar, A., A. Godon, H.W. Jones, E. Yeatman, J. Ohuja, M.B. Frish and I. Arvin. *Acoustical Methods for Measuring Thickness of Oil on Water*. April 1987. 57 p.
- 074 Bennett, J., I.R. McAllister, L. Pertile and D. McQuillan. *Removal of Stranded Oil from Remote Beaches by In-Situ Combustion*. March 1987. 122 p.
- 077 Comfort, G. *Analytical Modelling of Oil and Gas Spreading Under Ice*. August 1987. 57 p.
- 078 Reimer, E.M. and J.R. Rossiter. *Measurement of Oil Thickness on Water from Aircraft: A. Active Microwave Spectroscopy. B. Electromagnetic Thermoelastic Emission*. August 1987. 82 p.
- 079 S.L. Ross Environmental Research Ltd. and L.C. Oddy Training Design Ltd. *The Development of a Canadian Oil-Spill Countermeasures Training Program*. May 1987. 194 p.
- 082 Belore, R.C. and D. MacKay. *Drop Size and Dispersant Effectiveness: Small-Scale Laboratory Testing*. July 1987. 31 p.
- 083 Thorpe, J.W. and K.E. Hellenbrand. *Microbial Degradation of Hydrocarbon Mixtures in a Marine Sediment Under Different Temperature Regimes*. September 1987. 48 p.
- 084 S.L. Ross Environmental Research Limited and D. MacKay. *Laboratory Studies of the Behaviour and Fate of Waxy Crude Oil Spills*. December 1988. 250 p.
- 086 Pelletier, E. and C. Brochu. *Prototype, Mesoscale Simulator for the Study of Oil Weathering Under Severe Conditions*. November 1987. 55 p.
- 092 Trudel, B.K., B.J. Jessiman, S.L. Ross and J.J. Swiss. *Guide to Dispersant – Use Decision Making for Oil Spills in the Canadian Southern Beaufort Sea*. February 1988. 227 p.
- 095 D.F. Dickins Associates Ltd., S.L. Ross Environmental Research Ltd. and Seakem Oceanography, Ltd. *Evaluation of Hovercraft for Dispersant Application*. February 1988. 57 p.
- 098 Goodman, R.H. *Simple Remote Sensing System for the Detection of Oil on Water*. December 1988. 32 p.
- 100 Swiss, J.J. and N. Vanderkooy. *Beaufort Sea Dispersant Trial*. July 1988. 44 p.
- 106 S.L. Ross Environmental Research Ltd. *Proceedings of a Workshop to Establish Canadian Marine Oil Spill Research and Development Priorities*. April 1990. 56 p.
- 108 Harper, J.R. *Development of a National Directory of Canadian Oil Spill Specialists*. October 1991. 62 p.
- 119 Guenette, C. *Modification and Testing of a Portable Reciprocating Kiln for Cleaning Oiled Sand and Gravel*. March 1992. 46 p.
- 120 Guenette, C. *Development and Testing of a Prototype Rock Washer for Cleaning Oiled Beach Cobble*. January 1991. 45 p.
- 124 Englehardt, R. *Oil Base Drilling Mud Toxicity*. December 1989. 47p. (Unpublished)

- 126 Koski, W.R., S.D. Kevan and W.J. Richardson. *Bird Dispersal and Deterrent Techniques for Oil Spills in the Beaufort Sea*. December 1993. 122 p.
- 127 Dempsey, J., A. Simms, J. Harper, E. Lambert, and R. Hooper. *West Coast Newfoundland Oil Spill Sensitivity Atlas*. March 1995. 62 p.
- 140 Jacques Whitford Environment Limited. *Atlas of Ecologically and Commercially Important Areas in the Southern Gulf of St. Lawrence*. 2001. CD-Rom.
- 141 *Oil Pollution Seabird Mortality Assessment on the Sable Island Bank*. Not published.
- 165 Newfoundland and Labrador Environmental Industry Association, L. Grattan & Associates and the Institute for the Advancement of Public Policy, Inc. *An Integrated Approach to Oil Spill Preparedness and Response*. May 2008. 60 p.
- 166 Jacques Whitford Stantec Limited. *Cuttings Treatment Technology Evaluation*. July 2009. 100 p.
- 177 SL Ross Environmental Research Ltd., DF Dickins Associates LLC., Envision Planning Solutions Inc. *Beaufort Sea Oil Spills State of Knowledge Review and Identification of Key Issues*. November 2010. 126p.
- 194 C-CORE. *Strategic Plan for Oil Spill Research in Canadian Arctic Waters*. July 2013. 38 p.
- 200 SL Ross Environmental Research Limited, IMG Golder Corporation Environmental Consulting and Golder Associates. *Roadmap for Planning Controlled Oil Spill Countermeasures Research in the Canadian Beaufort Sea*. June 2015. 158 p.
- 201 National Research Council Canada and Fisheries and Oceans Canada - Centre for Offshore Oil, Gas and Energy Research. *Biodegradation of Naturally and Chemically Dispersed Crude Oils and Scotian Shelf Condensate from Atlantic Canada*. October 2015. 109 p.
- 205 Fifield, D. A., S. Avery-Gomm, L. A. McFarlane Tranquilla, P.C. Ryan, C. Gjerdrum, A. Hedd, M.G. Fitzsimmons, and G. J. Robertson. *Effectiveness of Observers in Visually Detecting Dead Seabirds on the Open Ocean*. March 2017.
- 207 Amec Foster Wheeler Environment & Infrastructure. *Upstream Oil and Gas Waste Stream Study*. July 2016. 239p.
- 209 Khelifa, A., B. Fieldhouse and C. Brown. *Quantitative Assessment of the Interaction between Beaufort Sea Crude Oils and Mackenzie River Delta Suspended Sediments*. March 2017. 72 p.
- 210 SL Ross Environmental Research Limited. *Plan for Experimental Field Study of the Application of Mineral Fines to Oil Spills in Pack Ice*. August 2016.

Sea Bottom Ice Scour

- 007 El-Tahan, M., H. El-Tahan, D. Courage and P. Mitten. *Documentation of Iceberg Groundings*. May 1985. 162 p.
- 032 Shearer, J., B. Laroche and G. Fortin. *Canadian Beaufort Sea 1984 Repetitive Mapping of Ice Scour*. May 1986. 93 p.
- 037 Comfort, G. and B. Graham. *Evaluation of Sea Bottom Ice Scour Models*. June 1986. 115 p.
- 039 Woodworth-Lynas, C.M.T., D.W. Bass and J. Bobbitt. *Inventory of Upslope and Downslope Iceberg Scouring*. July 1986. 103 p.
- 043 Geonautics Ltd. *Design of an Iceberg Scour Repetitive Mapping Network for the Canadian East Coast*. March 1987. 45 p.
- 049 Lewis, C.F.M., D.R. Parrott, P.G. Simpkin and J. T. Buckley (eds.). *Ice Scour and Seabed Engineering. Report on Calgary Workshop, February 1985*. November 1986. 322 p.
- 055 Gilbert, G. and K. Pedersen. *Ice Scour Data Base for the Beaufort*. December 1986. 93 p. + appendices.
- 094 Hodgson, G.J., J.H. Lever, C.M.T. Woodworth-Lynas and C.F.M. Lewis (eds.). *Dynamics of Iceberg Grounding and Scouring. Volume I The Field Experiment. Volume II Maps and Charts*. June 1988. 316 p.
- 097 Gilbert, G.R., S.J. Delory and K.A. Pedersen. *Beaufort Sea Ice Scour Data Base (Scourbase)*. Update to 1986. March 1989. 99 p.
- 105 Geonautics Limited. *Regional Ice Scour Data Base Update Studies*. October 1989. 177p. + appendices.

- 107 Davidson, S.H., W.T. Collins and P.G. Simpkin. *An Experiment to Monitor Four Iceberg Scours on the Grand Banks of Newfoundland*. December 1991. 110 p.
- 128 Geonautics Limited. *East Coast Repetitive Seafloor Mapping 1979/1990*. March 1991. 49 p. + appendices.
- 129 Myers, R., S. Blasco, G. Gilbert, and J. Shearer. *1990 Beaufort Sea Ice Scour Repetitive Mapping Program*. March 1996. 147 p + appendices.
- 157 Sonnichsen, G.V., T. Hundert, P. Pocklton and R. Myers. *Documentation of Recent Iceberg Grounding Events and a Comparison with Older Events of Know Age - Northern Grand Banks, Canada*. April 2006. 206 p.
- 208 Woodworth-Lynas, C., S. Blasco, D. Duff, J. Fowler, E.B. İşler, J. Landva, E. Cumming, A. Caines and C. Smith. *Geophysical and geological data compilation outer shelf and upper slope Southern Beaufort Sea: A handbook of geohazard conditions*.

Sediment Transport

- 017 Keith Philpott Consulting Ltd. with Acres Consulting Services Ltd. *Scour Around Seafloor Structures*. April 1986. 225 p.
- 027 Hodgins, D.O., D.A. Huntley, W.D. Liam Finn, B. Long, G. Drapeau and A.J. Bowen. *Sediment Transport – Present Knowledge and Industry Needs*. April 1986. 394 p.
- 029 Plasse, D. *Surficial Geology Surveys on the Scotian Shelf: Compilation of Maps from Government, Industry, University & Foreign Sources*. April 1986. 47 p.
- 041 Hodgins, D.O., G. Drapeau and L.H. King. *Field Measurements of Sediment Transport on the Scotian Shelf - Volume I. The Radio-isotope Experiment*. June 1986. 160 p.
- Hodgins, D.O. and O.J. Sayao - *Volume II. Boundary Layer Measurement and Sand Transport Prediction*. August 1986. 222 p.
- 054 Hodgins, D.O., O.J. Sayao, E.D. Kinsella and P.W. Morgan. *Nearshore Sediment Dynamics – Beaufort Sea*. December 1986. 195 p.

- 061 Judge, J.T., R.K. Watanabe and J.L. Warner. *Seafloor Stability Study, Inner Scotian Shelf*. May 1987. 88 p.
- 096 Gillie, R.D. *Beaufort Sea Artificial Island Erosion Data*. May 1988. 119 p.

Waves

- 020 Brown, R.D., P. Roebber and K. Walsh. *Climatology of Severe Storms Affecting Coastal Areas of Eastern Canada*. February 1986. 233 p.
- 023 Murray, M.A. and M. Maes. *Beaufort Sea Extreme Wave Studies Assessment*. January 1986. 97 p.
- 056 Lemon, D.D. *Wind Speeds from Underwater Acoustic Measurements During the Canadian Atlantic Storm Program*. December 1986. 116 p.
- 059 Dobrocky Seatech Ltd. *Wave Climate Study – Northern Coast of British Columbia*. May 1987. 93 p.
- 065 LeDrew Environmental Management Ltd. (ed.). *Proceedings of the International Workshop on Wave Hindcasting and Forecasting. Halifax Workshop, September 1986*. February 1987. 370 p.
- 073 Hodgins, S.L.M. and D.O. Hodgins. *Evaluation of Wave Forecasting Models and Forecast Wind Fields in the Canadian Context*. June 1988. 356 p.
- 076 Eid, B.M. and V.J. Cardone. *Operational Test of Wave-Forecasting Models During the Canadian Atlantic Storms Program (CASP)*. August 1987. 256 p.
- 088 Penicka, F.X. *Wave Hindcast Sensitivity*. April 1987. 114 p.
- 099 Juszko, B.A. *Comparison of Directional Wave Spectra*. July 1988. 227 p.
- 103 Hodgins, D.O., C.T. Niwinski and D.T. Resio. *Comparison and Validation of Two Shallow Water Spectral Wave Models*. June 1989. 143 p. + appendices.
- 114 Eid, B.M. and V.J. Cardone. *Beaufort Sea Extreme Waves Study*. March 1992. 143 p.