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Natural Resources Canada
House of Commons
Ottawa, Ontario
K1A 0A6

The Honourable Chuck Strahl, P.C., M.P.
Indian Affairs and Northern Development
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Ministers:

On behalf of the Environmental Studies Research Funds Management Board, it is my pleasure to submit the 2007 Annual Report for the Environmental Studies Research Funds in accordance with the *Canada Petroleum Resources Act*, paragraph 79(1)d.

Sincerely yours,

Robert Steedman, Ph.D.
Environmental Studies Research Funds
Management Board

ENVIRONMENTAL STUDIES RESEARCH FUNDS

ANNUAL REPORT

2007

FEBRUARY 2008

Environmental Studies Research Funds Profile

The Environmental Studies Research Funds (ESRF) sponsor environmental and social studies designed to assist government decision-making related to oil and gas exploration and development on Canada's frontier lands. The ESRF program, initiated in 1983 under the *Canada Oil and Gas Act* (COGA), now receives its legislated mandate through the superseding legislation, the *Canada Petroleum Resources Act* (CPRA) proclaimed in February 1987. Funding for the ESRF is provided by industry through levies on exploration and production properties on frontier lands. The ESRF is directed by a joint government / industry / public Management Board and is administered by a secretariat which resides within the National Energy Board in Calgary, Alberta.

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Background on the Structure and Operation of the Funds

The Environmental Studies Research Funds (ESRF) finance environmental and social studies pertaining to the manner in which, and to the terms and conditions under which, petroleum exploration, development and production activities on frontier lands should be conducted. Section 101(1) of the *Canada Petroleum Resources Act (CPRA)* defines an environmental study as “A work pertaining to the measurement or statistical evaluation of the physical, chemical, and biological elements of the lands, oceans, or coastal zones, including winds, waves, tides, currents, precipitation, ice cover and movement, icebergs, pollution effects, flora and fauna, both onshore and offshore, human activity and habitation, and any related matter.”

The Environmental Studies Research Funds (ESRF) is directed by a twelve-member Management Board which has representation from the federal government, the regional petroleum boards, the oil and gas industry, and the general public. Robert Steedman, Professional Leader Environment of the National Energy Board, is the current chair of the ESRF Management Board.

The ESRF Management Board directs the business of the ESRF, sets priorities for study topics, determines the program budget, and facilitates the development of study proposals on behalf of the Minister of Natural Resources Canada and the Minister of Indian Affairs and Northern Development.

The program operates on a calendar year basis. The Board generally meets three times a year; however, the frequency of meetings may be adjusted as circumstances dictate. The Board assesses the information requirements of government and industry to determine priorities for the study program for the coming year. The budget to support the study program and its administration forms the basis for the calculation of the levy rate schedule. The budget and levy rates are submitted to the Ministers for approval by November 1 of each year. The projects under the study program are initiated following the collection of the levies that generally occurs in the first quarter of the calendar year.

Activities in 2007

The total value of the 2007 ESRF program was \$1,398,000 for the 8 new and 14 ongoing projects. The budget included \$295,500 for project management services, Management Board logistics and administration of the ESRF research activities program.

A total of \$855,200.98 in funding was raised for the 2007 studies and administration program through Levy #19 (refer to Table 1). This levy covered the new study program, the administration budget, and the continued funding of ongoing studies. The difference in the total amount levied and the program value was the result of a land sale after the calculation of the levy and prior to the issuance of invoices. Excess funds raised in these circumstances are credited against future years' levies. The collection of unpaid levies is pursued as an ongoing basis by the ESRF Secretariat. Maps of the ESRF levy regions can be viewed on the ESRF website at: <http://www.esrfunds.org/legislation.html>.

In 2007, two appointments and one re-appointment to the Management Board were made. Please see Appendix 2, 2007 ESRF Management Board Members.

A Northern Advisory Committee (NAC) and East Coast Advisory Committee (ECAC), chaired by an ESRF Management Board Member, and comprising public, industry and government members, have been established to advise the Management Board on regional research priorities, project proposals and emerging issues related to the ESRF mandate. The NAC and ECAC members meet in advance of the MB meetings, and are a very important element of the ESRF annual research cycle.

TABLE 1
ESRF LEVY #19

REGION	LEVY #19 \$/ha 2007	TOTAL LEVIES INVOICED 2007	TOTAL LEVIES COLLECTED 2007	BACK LEVIES COLLECTED 2007	TOTAL REVENUES COLLECTED 2007
1 Queen Charlottes North	\$0.0000				
2 Hecate Strait	\$0.0000				
3 Queen Charlottes South	\$0.0000				
4 Vancouver Island	\$0.0000				
5 Labrador North	\$0.0000				
6 Labrador Central	\$0.0000				
7 Labrador South	\$0.0000				
8 Northeast Newfoundland	\$0.0580	160.83	160.83		160.83
9 Newfoundland Slope	\$0.0280	127,879.73	127,879.73		127,879.73
10 Grand Banks North	\$0.1101	81,404.97	81,404.97		81,404.97
11 Grand Banks South	\$0.0580	135,333.72	135,333.72		135,333.72
12 Scotian Shelf East	\$0.0785	84,757.47	37,718.54		37,718.54
13 Scotian Shelf West	\$0.0580	6,585.90	5,485.64		5,485.64
14 Scotian Shelf	\$0.0580	128,260.16	50,722.91		50,722.91
15 Gulf of St. Lawrence	\$0.0533	68,721.88	20,585.05	6,925.26	27,510.31
16 Hudson Bay	\$0.0000				
17 Beaufort South	\$0.2207	101,964.50	89,592.72		89,592.72
18 Beaufort North	\$0.2216	67,772.37	6,665.73		6,665.73
19 Western Archipelago-Offshore	\$0.1027	767.07	767.07		767.07
20 Central Archipelago-Offshore	\$0.1027	27,734.99	24,734.99		24,734.99
21 Eastern Archipelago-Offshore	\$0.0489	1,263.14	1,263.14		1,263.14
22 Baffin Bay	\$0.0000				
23 Yukon North	\$0.0000				
24 Yukon South	\$0.0000				
25 Mackenzie Delta	\$0.0000				
26 Mackenzie North	\$0.0784	21,716.29	17,051.97		17,051.97
27 Mackenzie Central	\$0.0000				
28 Mackenzie South	\$0.0000				
29 Western Archipelago-Onshore	\$0.0000				
30 Central Archipelago-Onshore	\$0.0184	877.96	877.96		877.96
31 Eastern Archipelago-Onshore	\$0.0000				
TOTAL		855,200.98	600,244.97	6,925.26	607,170.23

2007 Study Program

Recent Publications

In 2007, ESRF published or prepared for publication the following reports in the ESRF Technical Report Series.

#161 Kavik-AXYS Inc. *Review of the Ikhil Gas Development and Pipeline Regulatory and Environmental Process: Lessons Learned*. January 2007. 48 p.

#162 Harwood, Lois, Thomas G. Smith, Humfrey Melling. *Assessing the Potential Effects of Near Shore Hydrocarbon Exploration on Ringed Seals in the Beaufort Sea Region 2003-2006*. November 2007. 103 p.

Ongoing Studies in 2007

The following studies continued through 2007.

- **Data Collection Optimization** – East Coast. (study commenced in 2004)
 - Two studies pertaining to physical environment monitoring offshore were terminated in 2007. These studies aimed at comparing platform-based radar for monitoring local wave climate versus wave rider buoy measurements and evaluating a regional approach to monitoring of waves and currents versus installation-specific monitoring. Technical difficulties were encountered in obtaining data sets of sufficient quality, size and representative of the variance in environmental conditions of interest for analysis, within the time and financial scope allotted. The Management Board decided to terminate these projects; consider the lessons learned; and, determine the need to pursue similar projects in the future.

- **Mapping of Spawning and Juvenile Habitat of Selected Fish Species in the Laurentian Channel** - East Coast. (study commenced in 2005)
 - This project was completed in 2007 and will be published in early 2008 in conjunction with a similar atlas for the Scotian Shelf also completed in 2007. These initiatives together with a previous atlas for the Grand Banks display the temporal and spatial variability in spawning/rearing habitat use for important fish species in these areas to assist in regulation of exploration activity in minimizing any effects of these activities on aquatic resources.

- **Effects of Hydrocarbon Sheens on Pelagic Seabirds** – East Coast. (study commenced in 2005)
 - The laboratory and reporting phase of this project was completed in 2007. Publications of the results of the study in both the ESRF Report series and in a peer-reviewed journal are anticipated in 2008. The purpose of the study, undertaken by Dr Patrick O’Hara of the University of Victoria, was to explore how hydrocarbon sheens affect the ultra-structure of pelagic seabird feathers.

- **Evaluation of Seismic Impacts on Invertebrates** – East Coast. (study commenced in 2005)
 - Following on the studies by of the effects of seismic exploration on Atlantic snow crab by Fisheries and Oceans Canada Center for Offshore Oil and Gas Environmental Research (COOGER) this project focused on American lobster exposing them to controlled seismic energy in the laboratory and field to evaluate the long-term effects on various the health condition indices and behavioral changes. Following workshop sessions held with stakeholders in the Maritimes and Newfoundland and Labrador to communicate the results a final report was prepared in 2007 and issued as Canadian Technical Report of Fisheries and Aquatic Sciences No. 2712 and will also be published in the ESRF Reports series in 2008.

- **Fate and Transport of Drilling Mud and Fluid Discharges** – East Coast.(study commenced in 2006)
 - Initiated in 2007 this study examines the biodegradation of representative synthetic oil based drilling muds and the toxicity of the metabolic by products of their microbially mediated degradation under natural conditions. Typical samples of drilling mud and cuttings as discharged from operating drill rigs were supplied by East Coast operators in support of this research. This approach will allow a preliminary evaluation of the chronic effect, if any, of the metabolic by products resulting from microbial degradation under natural conditions in the sediment.

➤ **Evaluation of Produced Water Toxicity and Environmental Significance** – East Coast.
(study commenced in 2006)

- The initial phase of a two-step approach to this important issue was completed in 2007. In October of 2007 a conference was convened in St. John's Newfoundland and Labrador by Fisheries and Oceans Canada's Centre of Offshore Oil & Gas Environmental Research (COOGER) on behalf of and funded by ESRF. This conference brought together over 130 Canadian and international experts in research on produced water and its environmental effects. The conference proceedings will be compiled as a peer reviewed volume in 2008 or early 2009. In the meantime, the conclusions of the workshop will be taken in to account in the final development of the second phase of this project. This phase will determine the research needed to assess the potential for and nature of any environmental risk from produced water discharges.

➤ **Offshore Seabird Monitoring Program** – East Coast. (study commenced in 2005)

- 2007 saw the completion of the second year of a three year program being carried out by the Canadian Wildlife Services, with ESRF funding aimed at carrying out systematic and opportunistic seabird monitoring in the Newfoundland and Labrador and Nova Scotia marine areas. As well as monitoring activities carried out from industry supply vessels engaged in their routine activities, quality control and training initiatives with industry seabird observers are underway. Quarterly reporting on progress indicates that the process of collaboration with industry on this project is working well. In conjunction with this program ESRF also contributed to a larger study on the flight behaviour of common murre, with the ultimate goal of determining how that behaviour influenced the risk of encountering sea surface oil slicks in the event of a marine hydrocarbon spill.

- **Assessment of Influence of Seismic Testing on Fish Movements and Behaviour** – East Coast. (study commenced in 2006)
 - This study was designed to qualify the effect of a typical seismic survey on the real-time behavior, movement and survival of fish as a result of exposure to seismic energy in the field and to evaluate short and/or long term physiological effects of this exposure. In 2007 Fisheries and Oceans Canada researchers, through COOGER completed the first of two years of pilot studies planned for this project. The purpose of these pilot studies is to prove the viability of the experimental when the full scale project goes ahead, as currently scheduled for the summer of 2009. In addition, experts from other jurisdictions and organizations have continued to advise on experimental design and execution. Fisheries and Oceans and ESRF continue to seek partners and collaborators for this unique project.

- **Synthesis of Marine Mammals Observations** – East Coast. (study commenced in 2006)
 - During 2007 a process to confirm the approach to this project and to define the datasets to be used was undertaken by the Technical Advisory Group in consultation with the consultant. Work to extract behavioral information from marine mammal observations made on the East Coast during seismic surveys can now proceed in 2008.

- **CSA Structures** (study commenced in 2004)
 - ESRF continued to support the CSA Offshore Structures Program in 2007 to ensure that International (ISO) Offshore Structures Standards are adopted in Canada as they become available, with national annexes that include unique Canadian requirements.

➤ **Monkfish & Seismic** (study commenced in 2007)

- Monkfish, a commercially exploited species on the East Coast and in other parts of the world, lay eggs embedded in large sheet-like membranes or “veils” that can be several meters long. These veils float on the surface of the sea during the summer spawning season. Fishers have expressed concern over the potential effects of seismic surveys on monkfish veils. ESRF has partnered with the Fish Food and Allied Workers Union and Fisheries and Oceans Canada to attempt to determine the effects of air guns used in seismic surveys on monkfish egg veils. The 2007 field season was used to develop methods to collect these egg veils and transport them to shore where pilot experiments exposing portions of the veils with eggs could be exposed to sound pressure energy from a typical air gun in a controlled, laboratory setting. Lessons learned from the 2007 collection and laboratory efforts were documented in anticipation of follow up work in 2008.

➤ **Drill Cuttings Treatment Technology Evaluation** (study commenced in 2007)

- In anticipation of a review of the Offshore Waste Treatment Guidelines, which set standards for oil and gas industry offshore discharges of drill cuttings among other waste streams, ESRF issued a request for proposals for a consultancy to undertake an evaluation of the best technology currently available for treatment of drilling waste on offshore platforms. Bid were received and reviewed by late 2007 and an award will be made in early 2008. As well as documenting currently available technology the consultant will canvass Canadian operators experience with technologies currently in use on their offshore platforms in terms of its effectiveness.

➤ **Review of Traditional Knowledge Manual: Using Traditional Knowledge in Impact Assessment** (study commenced in 2006)

- The objective of this study is to review the TK Manual (2005/06) with community representatives from the ISR. Note, the Manual was prepared for use by proponents, consultants and regulators who use or require TK in the impact assessment process in the ISR (ESRF-04-048). The manual provides approaches to developing collection and TK use protocols. It was based on past examples of TK use in EIAs and Inuvialuit expertise in collection and use of TK. A workshop was held in June 2007. This report will be published in 2008.

➤ **Biophysical Research Requirements (Data Gaps) for Beaufort Sea Hydrocarbon Development, 2007** (study commenced 2007).

- This study is to summarize and prioritize biophysical research gaps related to Beaufort Sea offshore oil and gas exploration and development. Data gaps should relate to industry activities, key issues and cumulative effects. The scope includes identification of research gaps through literature review to determine status of current research. It shall also determine research priorities – baseline conditions, regulatory requirements, key issues (e.g. seismic), community concerns (e.g. harvesting), and the length of time to collect the data. Stakeholder input will be solicited to confirm the priority areas based on the data gaps. This report will be published in 2008.

New Research for 2008

In 2008, the ESRF Management Board will initiate work on the following eight projects. Technical Advisory Groups, comprising a cross-section of stakeholder interests, will be formed to develop detailed terms of reference and review technical reports for work to be offered for contract. Dollar amounts provided are budget estimates intended to indicate the relevant scale of the studies.

- Assessment of Waste Disposal Options In the ISR \$150,000
- Development of Ecologically-Based Criteria to Assess The Impact And Recovery of Seismic Lines \$75,000
- Bosworth Creek NWT Monitoring Project \$35,000
- Best Practices – Barriers to Local Consultants in the North \$50,000
- Provide Services Related to Standards Development Activities CSA 2008 \$331,836
- Assessment of Influence of Seismic Testing on Fish Movements and Behaviour, Phase II \$626,000
- Effect of Seismic on Monkfish \$80,000
- Seismic Effects on Lobster Feeding \$50,000

Financial Statement

ESRF Regions	Revenue Forwarded Jan 1, '07	Administrative Expenditures 2007	Study Payments 2007	Levy Revenues & Adjustments	Outstanding Study Commitments	Uncommitted Funds as of Dec 31, 07
South (NRCan 1-16 North (IAND) 17- 31						
South	\$2,481,005.96	\$126,660.08	\$636,256.46	\$459,291.39	\$1,987,986.64	\$189,394.17
North	\$918,352.82	\$84,440.05	\$222,973.49	\$140,953.58	\$748,395.23	\$3,497.63
Total	\$3,399,358.78	\$211,100.13	\$859,229.95	\$600,244.97	\$2,736,381.87	\$192,891.80

Plans for 2008

In September 2007, the ESRF Management Board established the budget for the 2008 program, which will be supported by Levy #20. This program was recommended by the Management Board and has been approved by the Minister of Natural Resources Canada and the Minister of Indian Affairs and Northern Development. The program has an estimated value of \$2,093,336 which includes funding for continuing 2007 programs and for new programs within the established priority areas of seismic impacts, cumulative effects, waste management, traditional knowledge, and effects on waterfowl and marine mammals, specifically in the northern offshore.

A budget of \$295,500 was approved for 2008 to cover ESRF project management services, Management Board logistics, and administrative costs of the ESRF Secretariat and to support travel by some members of the Management Board.

Publication of 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. Reports are distributed to oil and gas companies, universities, federal, provincial and territorial government libraries, and research institutes. The series is documented on several international databases including the Canadian Institute for Scientific and Technical Information (CISTI).

ESRF now utilizes a website for publishing Requests for Proposals, notification of new publications, and general information on ESRF. Please visit our website at www.esrfunds.org

Since its inception in 1983, the ESRF has published 162 reports which are distributed free of charge. The latest reports have been posted on the ESRF website. You may obtain copies of reports by visiting the website at www.esrfunds.org or contacting:

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Appendix 1 - ESRF Reports, 1993 - 2007

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.

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.
- 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.
- 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 Nenninger, 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. (ed.) and S.L. Davies (ed.) *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 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*. 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 Montevicchi, W.A., F.K. Wiese, G. Davoren, A.W. Diamond, F. Huettmann, 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, Denis H., Jack W. Lawson and Anne 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, 7-8 September 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. Calgary. 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.

- Calgary. 43 p.
- 144 Christian, John R., Anne Mathieu, Denis H. Thomson, David White and Robert A. Buchanan. *Effect of Seismic Energy on Snow Crab (Chionoecetes opilio)*. November 2003. Calgary. 106 p.
- 145 Racca, Roberto G., David E. Hannay, R. Bruce Murray, William B. Griffiths, and Michael Muller. *Testing Fish Deterrents for Use Under-Ice in the Mackenzie Delta Area*. March 2004. Calgary. 118 p.
- 146 Buchanan, Robert A., Joanne A. Cook and Anne Mathieu. *Environmental Effects Monitoring For Exploration Drilling*. December 2003. Calgary. 86 p
- 147 Dillon Consulting Limited with DMT Cordah. *Pollution Prevention Opportunities in the Offshore Oil and Gas Sector - Final Report*. October 2003. Calgary. 73 p
- 149 Trudel, K. 2004. *Workshop on Dispersant Use in Eastern Canada*. Environmental Studies Research Funds, Report No. 149, Calgary Alberta, 109 pp.
- 150 Martec Limited, CEF Consultants Ltd, DRDC Atlantic, St. Francis Xavier University. *Effects of Pipelines/Gathering Lines on Snow Crab and Lobster*. December 2004, Calgary, 61 p.
- 151 Lee, K., H. Bain, and G.V. Hurley, (eds). 2005. *Acoustic Monitoring and Marine Mammal Surveys in the Gully and Outer Scotian Shelf Before and During Active Seismic Programs*. December 2005. Calgary, 154 p + appendices.
- 152 Ellis & Associates. *Drilling Waste Management – Recommended Best Practices*. January 2005. Calgary. CD-Rom.
- 154 AMEC Earth & Environmental. *Inuvialuit Settlement Region Drilling Waste Disposal Sumps Study*. February 2005. Calgary. CD-Rom.
- 155 Dillon Consulting Limited and Salmo Consulting. *Beaufort-Delta Cumulative Effects Project*. February 2005. Calgary. CD-Rom.

- 156 Moulton, V.D., and B.D. Mactavish. *Recommended Seabird and Marine Mammal Observational Protocols for Atlantic Canada*. March 2004. Calgary. 80 p
- 157 Christian, John R., Anne Mathieu, and Robert A. Buchanan, *Chronic Effects of Seismic Energy on Snow Crab (Chionoecetes opilio)*. March 2004. 45 p.
- 159 Kemper, J. Todd. *Vegatation Changes on Seismic Lines from Recent (2000-2001) and Historic (1970-1986) Seismic Programs in the Mackenzie Delta Area*. May 2006. 29 p.
- 161 Kavik-AXYS Inc. *Review of the Ikhil Gas Development and Pipeline Regulatory and Environmental Process: Lessons Learned*. January 2007. 48 p.
- 162 Harwood, Lois, Thomas G. Smith, Humfrey Melling. *Assessing the Potential Effects of Near Shore Hydrocarbon Exploration on Ringed Seals in the Beaufort Sea Region 2003-2006*. November 2007. 103 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 Witherspoon, 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.
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