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

The Honourable Andy Scott, P.C., M.P.
Indian Affairs and Northern Development
House of Commons
Ottawa, Ontario
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Dear Ministers:

On behalf of the Environmental Studies Research Funds Management Board, it is my pleasure to submit the 2004 Annual Report for the Environmental Studies Research Funds in accordance with the *Canada Petroleum Resources Act*, paragraph 79(1)d.

Sincerely yours,

Bonnie J. Gray
Chair
Environmental Studies Research Funds
Management Board

ENVIRONMENTAL STUDIES RESEARCH FUNDS

ANNUAL REPORT

2004

FEBRUARY 2005

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) are 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. Bonnie J. Gray, Professional Leader-Environment of the National Energy Board, is the current chairperson 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 quarterly; however, the frequency of meetings is 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 2004

The ESRF undertook an ambitious program of activity for 2004, meeting three times during the year. The total value of the 2004 program was \$1,439,000, which included a \$250,000 operational budget for administration and management of the ongoing study program.

A total of \$1,539,540 in funding was raised for the 2004 studies and administration program through Levy #16 (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 being pursued by the Management Board.

TABLE 1
ESRF LEVY #16

| REGION | LEVY #16 \$/ha 2004 | TOTAL LEVIES INVOICED 2004 | TOTAL LEVIES COLLECTED 2004 | BACK LEVIES COLLECTED 2004 | TOTAL REVENUES COLLECTED 2004 |
|---------------------------------|---------------------------|----------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| 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 | \$0.1070 | \$296.71 | \$296.71 | | \$296.71 |
| 9 Newfoundland Slope | \$0.0473 | \$142,999.20 | \$142,999.20 | | \$142,999.20 |
| 10 Grand Banks North | \$0.1251 | \$86,085.56 | \$86,085.56 | | \$86,085.56 |
| 11 Grand Banks South | \$0.1109 | \$183,642.08 | \$183,642.08 | \$259,096.45 | \$442,738.53 |
| 12 Scotian Shelf East | \$0.1250 | \$276,333.78 | \$193,709.38 | \$15,100.25 | \$208,809.63 |
| 13 Scotian Shelf West | \$0.1251 | \$59,774.03 | \$49,151.79 | | \$49,151.79 |
| 14 Scotian Shelf | \$0.0330 | \$148,170.13 | \$136,125.79 | \$986.17 | \$137,111.96 |
| 15 Gulf of St. Lawrence | \$0.0932 | \$76,616.83 | \$46,204.74 | | \$46,204.74 |
| 16 Hudson Bay | \$0.0000 | | | | |
| 17 Beaufort South | \$0.3338 | \$245,212.15 | \$245,212.15 | | \$245,212.15 |
| 18 Beaufort North | \$0.1899 | \$5,712.19 | \$5,712.19 | | \$5,712.19 |
| 19 Western Archipelago-Offshore | \$0.0269 | \$200.92 | \$200.92 | | \$200.92 |
| 20 Central Archipelago-Offshore | \$0.0269 | \$6,478.78 | \$6,478.78 | | \$6,478.78 |
| 21 Eastern Archipelago-Offshore | \$0.0000 | | | | |
| 22 Baffin Bay | \$0.0000 | | | | |
| 23 Yukon North | \$0.0000 | | | | |
| 24 Yukon South | \$0.0000 | | | | |
| 25 Mackenzie Delta | \$0.2157 | \$182,593.29 | \$182,593.29 | | \$182,593.29 |
| 26 Mackenzie North | \$0.0674 | \$69,595.62 | \$48,821.46 | | \$48,821.46 |
| 27 Mackenzie Central | \$0.0641 | \$42,328.76 | \$37,222.04 | | \$37,222.04 |
| 28 Mackenzie South | \$0.0641 | \$12,174.19 | \$10,143.25 | | \$10,143.25 |
| 29 Western Archipelago-Onshore | \$0.0270 | \$43.07 | \$43.07 | | \$43.07 |
| 30 Central Archipelago-Onshore | \$0.0269 | \$1,283.53 | \$1,283.53 | | \$1,283.53 |
| 31 Eastern Archipelago-Onshore | \$0.0000 | | | | |
| TOTAL | | \$1,539,540.82 | \$1,375,925.93 | \$275,182.87 | \$1,651,108.80 |

2004 Study Program

Recent Publications

In 2004, ESRF published or prepared for publication the following reports¹ in the ESRF Technical Report Series.

- #142 *Sheens Associated with Produced Water Effluents Review of Causes & Mitigation Options*. ERIN Consulting Ltd. and OCL Services Ltd.
- #143 *Deep-Water Corals In Atlantic Canada: A Summary Of ESRF-Funded Research (2001-2003)*. Pål B. Mortensen, Lene Buhl-Mortensen, Susan E. Gass, Donald C. Gordon Jr., Ellen L.R. Kenchington, Cynthia Bourbonnais and Kevin G. Macisaac
- #144 *Effects of Seismic Energy on Snow Crab*. John R. Christian, Anne Mathieu, Denis H. Thomson, David White and Robert A. Buchanan.
- #145 *Testing Fish Deterrents for Use Under Ice in the Mackenzie Delta*. JASCO Research Ltd.
- #146 *Environmental Effects Monitoring for Exploratory Drilling*. Robert A. Buchanan, Joanne A. Cook and Anne Mathieu
- #147 *Pollution Prevention Opportunities in the Offshore Oil and Gas Sector*. Dillon Consulting Limited with DMT Cordah
- #148 *Standardizing the Reporting of Air Emissions to Ambient Air from Atlantic Canada Offshore Petroleum Activities*. Dillon Consulting Limited
- #149 *Workshop on Use of Dispersants on Oil Spills*. K. Trudel
- #150 *Effects of Pipelines and Gathering Lines on Snow Crab and Lobster*. Martec Limited, CEF Consultants Ltd, DRDC Atlantic, St. Francis Xavier University
- #151 *Acoustic Monitoring and Aerial Surveys in the Gully and Outer Scotian Shelf during an Active Seismic Program*. Centre for Offshore Oil and Gas Environmental Research

Results of several studies to which ESRF contributed have or will soon be published in the other report series, including:

- **Sensitivity Mapping of Spawning and Nursery Areas on the Grand Banks** – published as #2522 in DFO Technical Report Series. ESRF provided funding to the Department of Fisheries and Oceans (DFO) to support this study which identified the locations and timing of spawning and nursery areas on the Grand Banks that may be affected by seismic exploration activity. Maps were generated for a number of commercial finfish and shellfish species to show the locations and seasonality of spawning and nursery areas. The final report provides the data sources, methodologies employed, summary meteorological data, and an atlas of all mapping products.
- **Atlas of Fish Spawning, Nursery and Larval Concentrations on the Scotia Shelf** - published as #2514 in the DFO Technical Report Series. ESRF funding was provided to the Department of Fisheries and Oceans (DFO) to support a study to identify the locations

¹ Complete citations appear in the list of published reports at the end of this annual report.

and timing of spawning and nursery areas for commercial finfish and shellfish that may be affected by seismic exploration activity on the Scotian Shelf.

- **Offshore Oil and Gas Environmental Effects Monitoring: Approaches and Technologies.** Edited by Shelly L. Armsworthy, Peter J. Cranford, Kenneth Lee. Batelle Press. 2004. Environmental effects monitoring (EEM) of the potential effects of oil and gas activities on the marine environment has evolved rapidly in the past three or four decades. EEM is now a part of ecological risk assessment in both North American and European waters and is an important tool for environment managers and regulators. This book, the product of a workshop held at the Bedford Institute of Oceanography, May 2003, presents papers and discussion from international participants representing an overview of current practice in the field of EEM in offshore waters. The workshop and publication were funded in part by ESRF.

Ongoing Studies

The following studies continued through 2004.

- **Assessment of Hearing Structures of Large Pelagic Species** - This study was undertaken to evaluate the potential sensitivity of the hearing structures of large pelagic fish species to sounds associated with seismic surveying based solely upon the physical characteristics of those hearing structures. It is in the final report stage.
- **Data Collection Optimization** – ESRF will soon issue a Request for Proposal for a study and a workshop to investigate the use and effectiveness of regional monitoring, as opposed to installation-specific monitoring of physical environmental parameters that is currently undertaken by individual offshore operators.
- **Mapping of Spawning and Juvenile Habitat of Selected Fish Species in the Laurentian Channel** - This project will extend the sensitivity mapping work undertaken for finfish and shellfish on the Grand Banks and Scotian Shelf to the Laurentian Channel. The product of the work will be an atlas that displays the temporal and spatial variability in spawning/rearing habitat use for important fish species in the area. The atlas will be an important tool to assist in regulation of exploration activity to minimize effects on aquatic resources.
- **Effects of Oils and Sheens on Pelagic Seabirds** - This study will be carried out in two phases. Phase 1 involves a comprehensive literature review of oil and sheen concentrations that are lethal or sub-lethal to seabirds, sources of oil and sheens, and persistence under various conditions. This phase would also be used to identify any significant information or data gaps in relation to this issue. Based on the above results, the need for laboratory evaluation would be determined and designed if required, to measure physical/physiological effects, based on a range of variables, such as temperature, salinity, oil/sheen type, species type.

- **Regional Sump Study** - This study was conducted to inventory all known drilling sump locations within the Inuvialuit Settlement Region and to review literature and document supplementary data including ground temperatures, ground-ice conditions, surficial materials, physiographic region, abandonment issues and mitigation. In addition, the study characterized drilling waste disposal sumps using the protocol developed by the Technical Advisory Group (TAG). Utilizing the protocol developed by TAG, site assessments were conducted at a limited number of orphan sump locations. The study is in the final report stage.
- **Mitigation of Effects of Seismic Energy in Shallow Water Environments - Mackenzie Delta** - ESRF has provided funding to DFO for a study to explore potential mitigation measures that might be applied to winter seismic exploration operations in the Mackenzie Delta.
- **Traditional Knowledge in the Inuvialuit Settlement Region** - Phase 1 of a 2-phase study to produce a guidance document that will assist proponents and regulators to obtain, use, present and evaluate traditional knowledge in environmental assessment and regulatory applications has been completed. This phase synthesized and consolidated existing information and practice with respect to traditional knowledge; identified key issues and concerns and developed a project design for Phase 2 (2005); the product of Phase 2 will be a guidance document based in part on consultation with key stakeholders.
- **Assessing the potential effects of nearshore hydrocarbon exploration activity on ringed (*Phoca hispida*) and bearded (*Erignathus barbatus*) seal populations in the nearshore Beaufort Sea** - ESRF will contribute to the continuation of this three-year study to examine the potential impact of the winter oil and gas exploration activities on local seal populations and advise on appropriate mitigation measures and suitable monitoring programs which could be implemented.
- **Cumulative Effects Assessment – Development of Ecologically Based Thresholds for the Beaufort-Delta Region** – Through this study, thresholds, carrying capacity, and/or limits of acceptable change for environmental and social indicators of importance to the people of the Inuvialuit Settlement Region are being developed for application in cumulative effects assessment.
- **CSA Structures** - ESRF continued to support the CSA Offshore Structures Program, in 2004, to ensure that International (ISO) Offshore Structures Standards are adopted into Canada as they become available, with national annexes that include unique Canadian requirements.

2005 Research Program

In 2005, the ERSF Management Board will initiate work in the following priority and subject areas. Technical advisory groups, comprising a cross-section of stakeholder interests, will be formed to develop detailed terms of reference for work to be offered for contract.

- **Synthesis of Marine Mammal Observation Data** - \$50,000 - The ESRF Management Board will commission work to consolidate and interpret marine mammal observation data collected on the East Coast. Collection of these data has been required by the CNOBP and CNSOPB for many years, but the results have not been integrated or accessible for decision-making. This study will make available a valuable source of observational data on marine mammals.
- **Evaluation of Passive Acoustic Monitoring to Determine Presence of Marine Mammals as a Mitigation Measure during Seismic Surveys in Offshore Eastern Canada** – \$150,000. This study will be undertaken to determine the effectiveness of passive acoustic monitoring in detecting the presence of marine mammals in advance of seismic operations. If effectiveness is proven, the study will develop recommended methods for use of passive acoustic monitoring as a mitigation measure.
- **Field Verification of Sound Propagation Models for Offshore Regions** - \$300,000. This study will be undertaken to define with better accuracy an acceptable ‘safety zone’ to prevent injury or other harm to marine mammals by measuring real world distances at which sound levels of potential relevance to marine mammals are received. The study will validate models for sound propagation under varying oceanographic conditions during active seismic programs.
- **Evaluation of Seismic Impacts on Invertebrates** - \$200,000. This study will build on the extensive work already funded by ESRF on effects of seismic exploration on the biophysical environment on the East Coast. The study will examine the overall effect of seismic surveys on commercial invertebrate species such as crab and lobster. It will include consideration of long-term health effects, effects on a wide range of physiological stages and provide increased scientific rigour through expanded use of controls. The results will be of value in development and application of regulatory policy.
- **Fate and Transport of Drilling Mud and Fluid Discharges** - \$50,000. The ESRF Management Board will support a study to review the applicable predictive transport models for accidental bulk discharges of synthetic-based drilling muds in the offshore environment. The study will develop protocols for the delineation/validation of the discharge zone and identify reference points of concern for evaluation of risk to pelagic and benthic organisms.

- **Assessing the Potential Impacts of Hydrocarbon Industry Activity on the Seasonal Use of the Eastern Beaufort Sea by Beluga Whales** - For 2005, the ESRF Management Board has decided to contribute \$100,000 to a tagging study to monitor movements of beluga whales in the eastern Beaufort Sea. This study is already underway and is led by Department of Fisheries and Oceans, with direct and in-kind contributions from industry participants. It has become relevant to ESRF with the development of new options for field development in the Mackenzie Delta.
- **Waste Management – Use of Sumps and Other Disposal Methods in the Northwest Territories** – \$100,000. The ESRF Management Board anticipates that the results of the current Regional Sumps Study may require follow-up and has set aside \$100,000 for potential work arising from the completion of that study in early 2005.
- **Traditional Knowledge in the Inuvialuit Settlement Region – Phase 2** - \$115,000. This work will build on phase 1 of a study on traditional knowledge already underway in the Inuvialuit Settlement Region. In Phase 2, a manual will be developed providing specific guidelines for the collection, integration, use and assessment of traditional knowledge in impact assessments in the ISR.
- **Cumulative Effects Assessment – Development of Ecologically Based Thresholds for the Kendall Island Bird Sanctuary** – \$100,000. This proposed work will build on the thresholds study that is currently ongoing for the Beaufort-Delta region. In the study, a development scenario will be proposed, Valued Components will be developed and confirmed with stakeholders, existing data and data gaps will be evaluated, and estimates of thresholds, carrying capacity and/or limits of acceptable change will be developed for the Valued Components. This information will aid regulatory decision-making on development in and adjacent to KIBS.
- **Post-Construction Study of the Environmental Impacts of the Ikhil Pipeline near Inuvik, NWT**- \$30,000. This study will evaluate the actual impacts of construction of the Ikhil pipeline (regulated under the *Canada Oil and Gas Operations Act*) and the effectiveness of mitigation implemented to reduce or eliminate potential impacts.
- **CSA Structures** - \$195,000. ESRF will continue to support the CSA Offshore Structures Program in 2005 to ensure that International (ISO) Offshore Structures Standards are adopted into Canada as they become available, with national annexes that include unique Canadian requirements.

Financial Statement

| ESRF Regions South (NRCan 1-16 North (IAND) 17-31 | Revenue Forwarded Jan 1, '04 | Administrative Expenditures 2004 | Study Payments 2004 | Levy Revenues & Adjustments | Outstanding Study Commitments | Uncommitted Funds as of Dec 31, 04 |
|--|---|---|--------------------------------|--|--------------------------------------|---|
| South | \$313,411.18 | \$81,845.58 | \$750,636.02 | \$1,113,398.12 | \$588,398.96 | \$5,923.74 |
| North | \$1,102.64 | \$54,563.72 | \$364,611.41 | \$537,710.68 | \$116,545.91 | \$3,092.28 |
| Total | \$314,513.82 | \$136,409.30 | \$1,115,247.43 | \$1,651,108.80 | \$704,944.87 | \$9,021.02 |

Plans for 2005

In September 2004, the ESRF Management Board established the budget for the 2005 program, which will be supported by Levy #17. 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 \$1.5 million which includes funding for continuing 2004 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 \$250,000 was approved for 2005 to cover the administrative costs of the ESRF Secretariat and to support travel by some members of the Management Board.

In 2004, four appointments to the Management Board were made.

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).

In addition to the technical report series, the ESRF publishes a newsletter, UPDATE, which contains information on the status of the program. This includes notification of requests for proposals for studies, and brief descriptions of study results. UPDATE is circulated to a broad

audience of about 1400 across Canada and selected international institutes. Should you wish to have your name or organization added to the general distribution list, please contact the ESRF Secretariat (below).

List of ESRF Reports

Since its inception in 1983, the ESRF has published 141 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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Telephone: (403) 292-4800
Facsimile : (403) 292-5503

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 Montevocchi, 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** 10 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. 43p
- 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. Environmental Studies Research Funds Report No. 144. Calgary. 106 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. 73p
- 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.

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.
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