



Northwest Territories Environmental Studies Research Fund

**Annual Report and Budget
2017-2018**



Table of Contents

Message from the Chair.....	2
Introduction	2
Summary of Activities in 2017-2018.....	3
2017-2018 Funded Projects	4
Conveying caribou: developing effective community-based communication tools to support sustainable caribou stewardship	4
Trajectory surveillance tools for Boreal caribou conservation and management.....	4
Using novel technology to survey methane emissions in the Mackenzie Delta	5
Native seed bank genomic characterization and use for revegetation.....	5
Multi-year Funded Projects – Updates	6
Assessing terrain sensitivity to permafrost thaw and fire to understand and predict Boreal caribou habitat and forage quality in the Sahtú.....	6
Regional hydrologic and ecologic characterization and baseline assessment of remote northern Canadian terrain in advance of shale oil and gas development	6
Multi-species monitoring using winter track surveys in the Sahtú Settlement Region	7
Budget for NWT ESRF Supported through 2018-2019 Levies	8
Financial Statement of the NWT ESRF for the Fiscal Year 2017-2018	9
Proposed Budget of the NWT ESRF for the Fiscal Year 2018-2019.....	9

Northwest Territories

Environmental Studies Research Funds (ESRF)

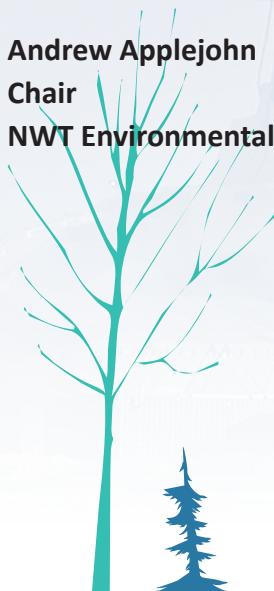
Message from the Chair

I am very pleased to present the third annual report for the Northwest Territories Environmental Studies Research Fund (ESRF). Continuing to support high-calibre research related to the energy industry in the NWT remains the priority of the Management Board. To this end, the ESRF has provided multi-year funding to three projects related to caribou and groundwater, and is also providing funding to innovative projects such as the Aurora Research Institute native seed initiative. This fund will continue developing cost-effective strategies for maintaining baseline monitoring programs across those areas of the territory likely to see development in the future. Maintaining research programs that support fact-based decision-making related to energy development is an excellent investment in the future of the energy industry in the NWT.

Andrew Applejohn

Chair

NWT Environmental Studies Research Fund



Introduction

The Northwest Territories Environmental Studies Research Fund (ESRF) is a research program established to finance environmental and social studies relating to oil and gas activity in the NWT. The fund is supported through the collection of levies from all interest holders of petroleum lands in the onshore areas of the NWT – Exploration Licences, Production Licences, and Significant Discovery Licences alike. Levy rates are determined by the ESRF Management Board on an annual basis, and interest holders are invoiced based upon their total land holdings (total number of hectares under licence) within the onshore NWT.

The purpose of the fund is to finance research focused on the environmental side of oil and gas development to increase knowledge and understanding of the impacts of such activity with the intention to inform decision making and to allow for best practices to be implemented during all stages of a project. As per the ESRF, “environment” is interpreted in the broadest possible context, including the physical environment, biological environment issues and socio-economic concerns.

ESRF is administered by the Management Board, which is composed of representatives from government, industry and public of the NWT. The members bring a wide range of perspectives and industry experience to help determine what type of research is needed to support decision making in the territorial oil and gas sector, and also focus on the need to consider the strong foundation of traditional knowledge to benefit any type of activity in the NWT.

Management Board Membership

Chair: Andrew Applejohn – ENR, GNWT member

Vice-Chair: Ken Hansen – industry member

Menzie McEachern – ITI, GNWT member

Scott Gedak – industry member

Ray Case – public member

Summary of Activities in 2017-2018

Communications

Scott Gedak represented the NWT ESRF at the Canada US Northern Oil and Gas Research Forum in Anchorage, AK, October 11 to 13, 2017, participating in two panels:

1. Science-informed Decision-making
2. Meaningful Engagement of Indigenous Peoples in Oil and Gas Activities Beyond Consultation – Understanding Differences, Trust and Respect, Indigenous Knowledge

Presentation by Ken Hansen, Vice Chair NWT ESRF Management Board, at NWT Geoscience Forum in Yellowknife, NT, November 14 to 16, 2017:

- *NWT ESRF: Providing funding for research in the NWT related to the energy industry*

Project reports available at <https://www.nwt-esrf.org/publications>:

- *Regional hydrologic and ecologic characterization and baseline assessment of remote northern Canadian terrain in advance of shale oil and gas development*
- *Locating priority groundwater monitoring locations in the Central Mackenzie Valley using thermal and optical band landsat imagery*
- *Assessing terrain sensitivity to permafrost thaw and fire to understand and predict boreal caribou habitat and forage quality in the Sahtú*

Management Board Meetings

Two face-to-face meetings of the NWT ESRF Management Board took place in 2017-2018 – one in Inuvik June 14 to 16, 2017, and one in Yellowknife on October 4, 2017. Key program direction included:

1. Wildlife and groundwater to be maintained as the two priority areas with multi-year funding commitments for previously approved research projects.
2. Levy rate for industry would remain the same as 2017-2018.
3. \$10K to be provided to assist with development of cost-effective communication tools to promote responsible caribou stewardship.
4. Targeted call issued to GNWT Environment and Natural Resources Wildlife Division, Aurora Research Institute, and the Gwich'in Renewable Resources Board stemming from June Management Board meeting in Inuvik. Call resulted in two new programs being provided funding in 2017-2018 using existing surplus: Native Seed Bank Genomic Characterization and Use for Re-vegetation (\$50K) and Using Novel Technology to Survey Methane Emissions in the Mackenzie Delta (\$25K). Both proposals were submitted by the Aurora Research Institute.



Photo courtesy of Aurora Research Institute

2017-2018 Funded Projects

Conveying caribou: developing effective community-based communication tools to support sustainable caribou stewardship

Project Leader: Jean Polfus

Organization: Sahtú Renewable Resources Board

Project Description

The goal of the proposed research project is to develop and assess relevant cross-cultural methods to communicate Indigenous and scientific knowledge about caribou in a clear, compelling and adaptive manner. By focusing on effective communication, the project will produce a framework for evaluating and improving communication among researchers, managers, policy-makers and Indigenous communities. The aim is to provide interdisciplinary tools that will have the potential to inform forthcoming conservation and management decisions, with a focus on the following questions:

1. What are the appropriate communication approaches and tools needed to relay scientific and traditional knowledge (TK) about caribou to a diverse audience?
2. How can a prominent focus on Indigenous languages in the communication of caribou TK be used to enhance conservation initiatives and build unifying dialogue?
3. How can increased public understanding of the state of caribou knowledge enhance and inform management actions across multiple levels of governance institutions?
4. How can communication be tailored to improve engagement in research and generate new knowledge related to caribou ecology and population dynamics?

NWT ESRF Funding: \$10,000

Trajectory surveillance tools for Boreal caribou conservation and management

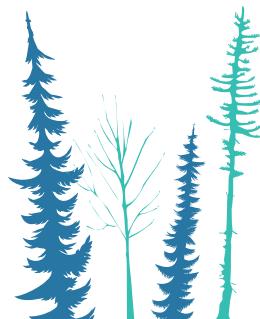
Project Leader: Dr. Colin Robertson

Organization: Wilfrid Laurier University

Project Description

The use of GPS collaring to track individuals and populations has grown extensively in recent years. New methods for estimating home ranges, species interactions, movement patterns and individual behaviour modelling have proliferated in the spatial analysis academic literatures. Yet the application of cutting edge methods in applied conservation and management remains limited. This study will investigate the application of different approaches for modelling individual and population parameters from trajectory data for conservation and planning of Boreal caribou. Different home range estimation methods will be compared from the perspective of examining range changes over time. Existing caribou collar data will be used for this study, covering the period 2008 to 2016 in the Dehcho and South Slave regions. While previous methods derived from telemetry data with low temporal resolution have been used for range mapping, new higher resolution trajectory data offer the opportunity for more fine-grained understanding of animal movement and space use. The project team will assess the utility of home range mapping methods relative to the short and medium-term conservation and planning needs for Boreal caribou. Finally, testing and implementation of these approaches within an automated modelling context and developing decision-support tools based on these findings will be undertaken.

NWT ESRF Funding: \$10,000



Using novel technology to survey methane emissions in the Mackenzie Delta

Project Leader: Ron Layden

Organization: Aurora Research Institute (ARI)

Project Description

ARI, in partnership with Dr. David Risk, propose to undertake a pilot study to explore the potential for new detection equipment and software to be used in winter to measure and map the extent of methane (CH_4) gas emissions from soil and sub-surface locations. Dr. Risk is the Altus Chair in Emissions Research and Associate Professor in the Department of Earth Sciences at St. Francis Xavier University (StFX). His research focuses on soil gas and tracer studies, both for applications in natural soil emissions and in industrial applications.

The equipment that is being developed is sensitive to very small emissions. When it is coupled with mapping software, it can quickly be used to survey and map fairly large areas, in the range of 10s to 100s of kilometres. The current analyzer configuration allows for the use of ATVs and snowmobiles to carry the payload and operate the equipment using packages as small as 18 kilograms (40 pounds), which are all-weather capable. Dr. Risk's team has recently acquired the knowledge for mounting the gas inlets and anemometer on snowmobiles for optimal data acquisition. The benefits of monitoring in the winter, especially in the Arctic, are many-fold, including access over the many water bodies in the region, limiting damage to plants and landscape features, and the ability to quickly cover large areas. Monitoring gas emission by snowmobile opens up tremendous opportunities for Arctic research and monitoring. While the ExACT system has clearly demonstrated its utility in southern oilfields, this will be the first opportunity to demonstrate its utility for Arctic mapping studies.

ARI has recently hired a GIS (Geomatic Information Systems) expert in Inuvik who will work with the team on this project and help map and plan the routes of interest. ARI is also conducting studies using GPS and visual observations to locate slump activity along the Mackenzie River, which will provide a further catalogue of sites that will be much easier to locate in winter for this CH4 study.

NWT ESRF Funding: \$25,000

Native seed bank genomic characterization and use for revegetation

Project Leader: Ron Layden

Organization: Aurora Research Institute

Project Description

Re-vegetation with native plant species has been increasingly promoted because of the need to maintain ecological integrity, natural successional processes, wildlife habitat and environmental aesthetics. Native plant species have been particularly successful in re-vegetation of extreme environments because these species are adapted to local climatic conditions, which can increase long-term survival as well as decrease maintenance and fertilizer requirements. Northern environments are becoming increasingly vulnerable because of climatic change due to global warming.

In order for plant species to adapt to these changes, genetic diversity must be maintained and developing genomic markers for plants in the ARI native seed collection will allow for more rapid plant identification and alignment of characteristics, which are important for growth and re-vegetation work.

ARI has partnered with Queen's University researcher Robert Colautti, a professor of evolutionary biology and ecological genomics, who uses molecular techniques to study plant evolution and species adaption to climate and other changes in their environment. With the assistance of Dr. Colautti and a graduate student working at the ARI during the summer growing seasons, we will enhance identification of species and regional ecotypes in the seed collection using chloroplast DNA. We will use chloroplast DNA markers to study the post-glacial history of colonization of species across the territories. This will assist re-vegetative projects to identify the most suitable plants and seeds for individual projects.

NWT ESRF Funding: \$50,000



Photo courtesy of Aurora Research Institute

Multi-year Funded Projects – Updates

Assessing terrain sensitivity to permafrost thaw and fire to understand and predict Boreal caribou habitat and forage quality in the Sahtú

Project Leaders: Dr. Jennifer Baltzer Dr. Merritt Turetsky

Organization: Wilfrid Laurier University/
University of Guelph

Progress during 2017-2018 Funding Year

1. Assembly of research team: We have recruited an excellent team of researchers to support this work. For 2018 field work, we will be directly collaborating with HQP from the research groups of Drs. David Rudolph and Derek Gray to promote integration of hydrologic (Rudolph), aquatic ecosystem (Gray) and terrestrial measurements (Baltzer/ Turetsky) measurements in the region.
2. Community consultation: For this project, some of our main deliverables for the 2017-2018 year focused on community consultation to ensure that the research was addressing community concerns and priorities. During 2017-2018, our team made two trips to the Sahtú to support consultation with the community regarding research priorities and community involvement in the research program.

NWT ESRF Funding: \$50,000/year for four years

Full project update available at

<https://www.nwt-esrf.org/publications>



Né K'a Dene Ts'lıı Forum, Sahtú Landscape Change Workshop, Tulita, NT

Regional hydrologic and ecologic characterization and baseline assessment of remote northern Canadian terrain in advance of shale oil and gas development

Project Leader: Dr. David Rudolph

Organization: University of Waterloo

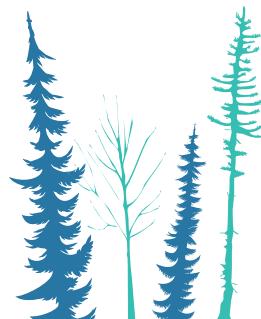
Progress during 2017-2018 Funding Year

The Year 1 work activities associated with the project have been focused on: 1) forging of collaborations and connections with the key stakeholders, researchers and local community members within the research area of interest (Sahtú Settlement Area (SSA)); 2) initial compilation of existing relevant data; 3) initial site visit; 4) the evaluation of optical remote sensing data; 5) enlisting graduate students; and 6) planning for the field season for 2018. Through discussions with the research team, industrial partner Husky Oil Operations Ltd., government officials and local community member groups, the decision was made to focus the baseline monitoring activity within the Husky lease EL 494.

NWT ESRF Funding: \$100,000/year for five years

Full project update available at

<https://www.nwt-esrf.org/publications>



Multi-species monitoring using winter track surveys in the Sahtú Settlement Region

Project Leader: James Hodson

Organization: GNWT Environment and Natural Resources

Progress during 2017-2018 Funding Year

The winter track survey project kicked off this year with meetings with the Tulít'a Renewable Resources Council (TRRC) and Sahtú Renewable Resources Board (SRRB) on December 7, 2017, and with the Norman Wells (Tłegóhh) RRC on December 8, 2017, to discuss the results from winter 2017 and to plan for the winter 2018 field season.

The TRRC agreed to take the lead again on coordinating the field work in Tulít'a, as this approach worked well in winter 2017. Four monitors have been hired to conduct the surveys in Tulít'a, working in teams of two (one elder + one youth). Tulít'a monitors have already completed one round of surveys on nine different survey routes and are currently half way through the second round of surveys. Survey routes are located on both the east and west side of the Mackenzie River to capture areas where shale oil exploration has recently taken place. Tracks from 10 different species have been recorded so far this winter, with marten, lynx and moose being the most common species. Caribou, wolverine and wolf tracks have also been encountered.

Field logistics for the Norman Wells program are being coordinated by the regional GNWT Environment and Natural Resources office, and two monitors have been hired through the NWRRRC. Surveys have been conducted on three routes around Norman Wells to date.

The monitors from Tulít'a and Norman Wells, as well as ENR project leads, had the opportunity to attend a three-day workshop on landscape change in Tulít'a, hosted by the Né K'è Dene Ts'ìlì Forum (Sahtú Environment Research and Monitoring Forum), on February 12 to 14.

We received positive feedback on the project from both the monitors and RRC board and believe it is a successful example of how to work with local organizations to design and implement a community-based monitoring program. There was much discussion at the workshop about the negative impact of forest fires on wildlife habitat. We were able to offer some insights from the data collected from the track survey program, which indicates that many wildlife species, especially lynx and moose, have returned to the large areas that burned around Tulít'a in the mid-1990s. We highlighted the long-term value of the track survey project in documenting changes in wildlife distribution before and after landscape changes from forest fire. The workshop also provided an opportunity to meet with researchers involved with the "Assessing terrain sensitivity to permafrost thaw and fire to understand and predict Boreal caribou habitat and forage quality in the Sahtú" project and to discuss opportunities to sample common areas.

Track surveys are planned to continue until the end of March 2018, and we are working with a statistician to develop a set of simple annotated codes to run occupancy analyses.

NWT ESRF Funding: \$50,000/year for four years



Photo courtesy of the Government of the Northwest Territories.

Budget for NWT ESRF Supported through 2018-2019 Levies

1. Administration of the Fund

This budget provides funding for a half-time equivalent position to perform Secretariat functions. Other costs associated with the budget are related to Board travel, direct meeting expenses and communications.

Administration Budget		
Compensation and Benefits	\$	60,000
Travel	\$	30,000
Communications and Promotions	\$	10,000

2. Science Program Budget

The following science programs were recommended for approval by the ESRF Management Board.

NWT ESRF Project Funding		
Industrial activity and caribou populations	\$	100,000
Proposed Baseline Hydrogeological Evaluation of Central Mackenzie Valley Oil and Gas Exploration Areas Sahtú Region, NWT	\$	100,000
Various Projects	\$	75,000

3. Summary

Overall funding requirement recommended for support through levies is the total for both administration and initial science program support. The budget breakdown is as follows:

Administration	\$	100,000
Science Programs	\$	275,000
Total	\$	375,000



Photo courtesy of Husky Energy's Remote Camera Wildlife Monitoring Program, Slater River Program Area, Sahtú Region

Financial Statement of the NWT ESRF for the Fiscal Year 2017-2018

Revenue *		
Industry Levies (Collected in 2016-2017)		\$ 265,053
Expenses		
Administration		
Compensation and Benefits	\$	-
Travel	\$	(14,781)
Communications and Promotions	\$	-
Publications	\$	(1,835)
Other	\$	(1,760)
Total Administration Expenses	\$	(18,376)
Science Program		
Caribou Studies	\$	(120,000)
Sahtú Groundwater	\$	(100,000)
Sahtú Hydrogeological Baseline	\$	-
Various Studies	\$	(75,000)
Total Science Program Expenses	\$	(295,000)
Total 2017-2018 Surplus (Deficit)	\$	(48,323)

Summary		
Opening Balance (April 1, 2017)		\$ 746,318
Revenue *		\$ 265,053
Expenses		\$ (313,376)
Closing Balance (March 31, 2018)		\$ 697,995

Proposed Budget of the NWT ESRF for the Fiscal Year 2018-2019

Revenue *		
Industry Levies (Collected in 2017-2018)		\$ 246,000
Expenses		
Administration		
Compensation and Benefits	\$	(60,000)
Travel	\$	(30,000)
Communications and Promotions	\$	(10,000)
Publications	\$	-
Other	\$	-
Total Administration Expenses	\$	(100,000)
Science Program		
Caribou Studies	\$	(100,000)
Sahtú Groundwater	\$	-
Sahtú Hydrogeological Baseline	\$	(100,000)
Various Studies	\$	(75,000)
Total Science Program Expenses	\$	(275,000)
Total 2018-2019 Surplus (Deficit)	\$	(129,000)

Summary		
Opening Balance (April 1, 2018)		\$ 697,995
Revenue *		\$ 246,000
Expenses		\$ (375,000)
Closing Balance (March 31, 2019)		\$ 568,995

* The ESRF budget and actuals are provided each year in the main estimates as information. As 2018-2019 progresses and information on the current budget is updated, the revised main estimates for 2018-2019 will be reflected in the 2019-2020 main estimates.

2017-2018 Levy by Interest	Hectares	Amount Levied
Significant Discovery Licence	464,737	\$ 150,110.05
Exploration Licences	239,397	\$ 77,325.23
Production Licences	36,265	\$ 11,713.60
Petroleum Land Leases	21,107	\$ 6,817.56
Total	761,506	\$ 245,966.44

2017-2018 Levy by Region	Hectares	Amount Levied
Arctic Islands	10,719	\$ 3,462.24
Mackenzie Delta	123,285	\$ 39,821.06
Central Mackenzie Valley	511,655	\$ 165,264.57
Southern NWT	115,847	\$ 37,418.58
Total	761,506	\$ 245,966.44

The levy rate for 2017-2018 was \$0.323/hectare

www.nwt-esrf.org