

Northern Ecosystem Initiative (NEI)

Building Capacity and Delivering Results

Environment Canada's Contributions to the
Northern Environmental Agenda 2003 - 2008



Canada

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Environment Canada's Contributions to the Northern Environmental Agenda

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Northern Ecosystem Initiative (NEI)

Building Capacity and Delivering Results

Environment Canada's Contributions to the
Northern Environmental Agenda 2003 - 2008

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Message from Regional Director General

I am pleased to share the Northern Ecosystems Initiative (NEI) Phase II Report, 2003 – 2008. Originally implemented in 1998, this 10 year initiative was created to increase the understanding of northern ecosystems and to identify and respond to issues at the local and regional levels. During the five years of phase II, 98 projects were completed with an investment of \$22,186,357.00 in cash and in kind contributions from the federal government, industry, universities, communities and other partners. Added to the results from phase I, that brings the total number of projects to 152 for a total investment of \$37,982,357 million dollars and in kind contributions in NEI sponsored projects.

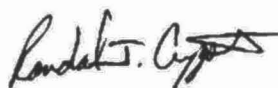
Environment Canada is proud of its science and technology activities North of 60 and recognizes its critical role as the North continues to experience unprecedented economic, environmental, and political transformation. NEI is one of the ways that the department is working with Northerners and other partners to protect, preserve, and enhance the quality of the natural environment.

The Northern Ecosystem Initiative recognized that environmental issues could not be effectively addressed without considering social, economic and cultural factors. Over the last 10 years, NEI linked researchers and communities and helped bring together western science and traditional knowledge for a more complete understanding of northern ecosystems.

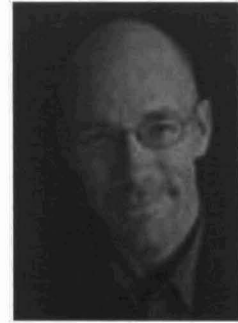
Phase II was a continuation of the planning and work begun in phase one which focused on the needs identified by northern partners. By combining natural and social sciences with local and traditional knowledge, governments and organizations can more readily identify, track and respond to change to ensure healthy ecosystems and sustainable communities across northern Canada.

The scope of ecosystem issues in the North is enormous and there is a growing recognition that assessing components of ecosystem change can no longer be dealt with in isolation; an integrated approach is needed. NEI's partnership approach to program management and project delivery serves as a model for effective collaboration in the North. The program promotes multi-disciplinary approaches which consider land, water, and people while recognizing the important link between the environment and human well-being. This report highlights some of those activities and outcomes including workshops, pilot projects, publications and involvement in national and international forums.

The invaluable participation, creativity and commitment of Environment Canada staff, researchers, community and committee members and the many others involved in NEI's innovative projects has made a significant contribution to understanding and preserving the diverse ecosystems across Canada's North – thank you.



Randal Cripps



Message from Aboriginal Partners

Council of Yukon First Nations, Dene Nation, Inuit Tapiriit Kanatami, Innu Nation

As northern leaders, we are very happy to be celebrating 10 years of partnership with the Northern Ecosystem Initiative (NEI). Research conducted by scientists, Arctic communities and Aboriginal organizations under the NEI has connected science with traditional knowledge and has had a positive impact upon the northerners who are most affected by changes to Arctic ecosystems.

Aboriginal community members and organizations worked in collaboration with Environment Canada staff to build partnerships, identify priorities, and develop solutions to conditions that influence northern communities and the environment. NEI highlights the importance and value of Aboriginal and northern voices in Arctic research and our contribution to Canada's stewardship of the North. It also increased the capacity of northerners to address environmental concerns that affect us directly - climate change and contaminants. NEI is an example of how science is connected to people's lives and how it has created a shared understanding and appreciation of our northern ecosystem.

The North is attracting international attention, particularly within the context of climate change – melting polar ice, increased access to and the opening of the Northwest Passage, on shore and off shore discoveries of oil and gas, and increasing infrastructure vulnerabilities and requirements. Therefore, it is essential that Canada work with northerners and lead the

way in crafting a comprehensive and long-term northern policy for the Arctic.

Canada needs to continue to invest in partnerships with northerners, develop local knowledge, build capacity, and encourage a new wave of Arctic research. Arctic shareholders, residents, governments and industry, need to be engaged and continue to work together to ensure that the Arctic will remain protected and that traditional lifestyles can be maintained through this time of dramatic change.



Andy Carvill,
Grand Chief
Council of Yukon
First Nations



Bill Erasmus,
National Chief,
Dene Nation



Mary Simon, President
Inuit Tapiriit Kanatami



Mark Nui,
Grand Chief
Innu Nation

The Northern Québec Regional Steering Committee

Integrated and Co-operative Planning

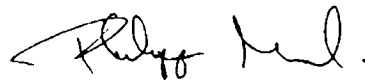
Enhancing the health and sustainability of communities and ecosystems in Canada's North is a task as vast as the land and as diversified as its inhabitants. The best way to succeed in meeting this challenge is to encourage the involvement of those who live on, travel across, and know the land. Northern Quebec, an area of about 750,000 km² with a population of 20,000, is no exception.

For the past 30 years, the James Bay and Northern Québec Agreement and the North-eastern Québec Agreement facilitated the participation of the Cree, Inuit and Naskapi in the management of their land. These Nations, through traditional awareness and respect of their environment, have been key contributors to planning sustainable development for the region.

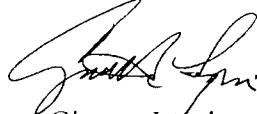
In 1999, under the Northern Ecosystem Initiative (NEI), Environment Canada established the Northern Québec Steering Committee. It brought together representatives from 10 organizations to develop a co-operative action plan for northern Quebec. Since then, the Cree Regional Authority, the Kativik Regional Government, the Naskapi Nation of Kawawachikamach and the Innu from Matimekossh-Lac John have worked together with research institutions and relevant federal and provincial organizations and have learned from one another.

Our main objectives have been to reach a better understanding of northern Québec and to reinforce the protection of its environment. The committee has proved to be a focal point for information exchange, strategic planning and co-operative action on environmental issues. Joint areas of action, priorities, and regional goals are all part of a multi-year action plan that has continued to be implemented throughout phase II of NEI.

Several of our success stories are highlighted in this report. But beyond individual projects, this initiative has shown us how effective it is when we start with real, local concerns about the land and its people and from there move jointly to actually reaching concrete environmental results. It is also living proof of the benefits of including all types of knowledge and contributions from a variety of stakeholders when tackling global issues. Looking at the challenges now facing the North, it is reassuring to be able to build on the positive outcomes of the integrated and co-operative approach that arose from the Northern Ecosystem Initiative.



Philippe Morel,
Co-chair of the NQRSC,
Environment Canada



Ginette Lajoie
Co-chair of the NQRSC,
Cree Regional Authority

Overview of NEI • Phase II 2003-2008

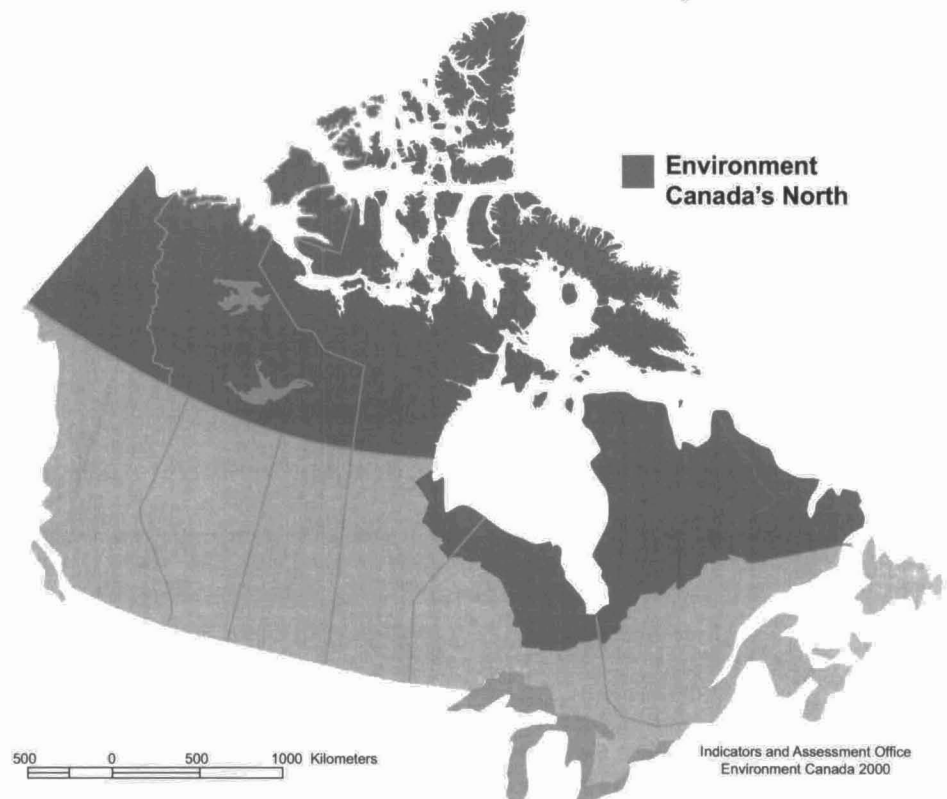
Canada's North is home to a number of distinct cultures and ecosystems. This vast, complex area is undergoing rapid changes in climate, governance and resource development. These changes provide both challenges and opportunities for northerners.

The Northern Ecosystem Initiative (NEI) was established by Environment Canada in 1998 to enhance the future health and sustainability of northern communities and the ecosystems they depend upon. Ecosystem Initiatives bring partners together to identify shared priorities and work cooperatively to address them.

Recognizing the importance of Aboriginal Peoples in Canada's North, NEI developed active and evolving partnerships with national level Inuit and First Nation organizations, including the Inuit Tapiriit Kanatami, Dene Nation, Council of Yukon First Nations and Innu Nation.

These organizations helped to define priorities and assess research needed to understand changes in the environment and contribute to sustainable development. Their participation in the program has ensured that the research supported by the NEI remains relevant to northerners.

In Phase II, NEI continued to focus on the four broad priorities established in its first five years: climate change, contaminants, resource use activities and monitoring. The program built on the accomplishments of phase I by identifying key knowledge gaps in these areas and developing strategic funding objectives to address them. Capacity-building remained a cross-cutting priority that was part of all NEI projects.





We appreciate NEI's interest in, and support for, research processes and relationship-building that has been so integral in reaching the point where we are today in collaborative research with northern communities. NEI's ongoing interest in exploring different forms of expertise, and how these can complement one another, to address complex issues related to the northern ecosystem is to be commended. This is especially imperative in the northern context, and we do hope that our results can contribute positively to northern decision-making and government programs that will include northern contributions, for the benefit of northerners. (Furgal and Laidler 11)

NEI also continued its focus on linking science with traditional and local knowledge. Besides being an important source of information in areas where there was little historical monitoring, local perspectives provide a more complete understanding of northern ecosystems.

During Phase II (2003-2008), 98 projects were completed and \$22,186,357 dollars invested, \$8.97 million of which came from Environment Canada. NEI supported projects that built science and capacity from the Yukon to Labrador, including northern Québec and Ontario. These projects were led by or involved partnerships with Aboriginal organizations, communities, universities, northern colleges and research institutes, non-governmental organizations, as well as government and international agencies. This northern "national" approach addressed important local and regional information gaps in Canada's North as well as broader circumpolar efforts related to ecosystem health. Throughout its second five years, NEI assisted in the development and implementation of new tests and innovative research that are generating new knowledge, adaptation measures and better resources management across the North.

NEI Governance

National Steering Committee

The NEI was guided by a National Steering Committee which helped to determine program priorities, provided direction and evaluated proposals. In addition to Environment Canada staff, this steering committee included representatives from other federal departments, the Inuit Tapiriit Kanatami, Council of Yukon First Nations, Innu Nation and Dene Nation. This diverse membership provided pan-northern insights into ecosystem issues and federal priorities.

These organizations led projects and were also active in national and circumpolar forums important to northern ecosystem and overall community health. These partnerships serve as a hallmark of NEI as they provided invaluable identification of and feedback on northern ecosystem issues.

Partner-Issue Tables

A new development in Phase II was the establishment of Partner-Issue Tables for each of the program priorities. Each of the Partner-Issue Tables and the Northern Québec Regional Steering Committee developed strategic project investment approaches and solicited proposals for both short (one year) and long-term (up to four years) projects. The tables, and the Northern Québec Regional Steering Committee, in conjunction with NEI's funding, were instrumental in facilitating multi-disciplinary broad-based project partnerships.

These partnerships ensured that the projects reflected and addressed the shared concerns of both Environment Canada and northerners.

Northern Québec Regional Steering Committee

In 1999, Environment Canada, Québec Region, established the Northern Québec Regional Steering Committee (NQRSC) to encourage potential partners, including Aboriginal organizations, to reach consensus on northern environmental issues and to develop a co-operative plan based on the Northern Ecosystem Initiative's priorities. This group includes representatives from Cree, Inuit, Naskapi, and Innu organizations, the federal and provincial governments, Hydro-Québec and research centres interested in northern issues.

In NEI's Phase I (1998-2003), the NQRSC developed its action plan which integrated the five priorities of phases I and II: toxic substances and contaminants, climate change, resource use, monitoring ecosystem status and trends, and capacity-building. Between 2004 and 2008, the NQRSC implemented its Phase I action plan and provided funds to 14 community-oriented projects.

NEI partnerships enabled organizations and communities to seize opportunities, investigate solutions to local Aboriginal concerns, encourage and effectively support community-based projects, and reduce the administrative burdens by funding multi-year projects. Ultimately, the experience was all about knowledge exchange and co-operation on environmental issues.

NEI Program Priorities

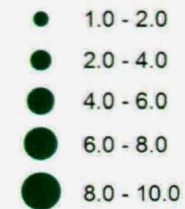
The NEI Steering Committee determined research priorities and project funding with input from Partner-Issue Tables. The five priorities included evaluation criteria and emphasized the collection of measurable results, a consultative process, and collective pan-northern insight into ecosystem issues.

- **Climate Change:** to improve the understanding of the impacts of climate change and the ability to adapt in key areas: caribou, freshwater ecosystems, marine ecosystems, mercury-climate, habitat and migratory birds, and community knowledge and leadership.
- **Monitoring:** to support the development of a northern monitoring network including status and trend reporting.
- **Contaminants:** to increase the understanding of impacts of contaminants on ecosystem health.
- **Resource Use:** to develop tools to assess and manage cumulative effects.
- **Capacity-Building:** to ensure all projects have elements of capacity-building to increase the adaptive potential of northern communities.

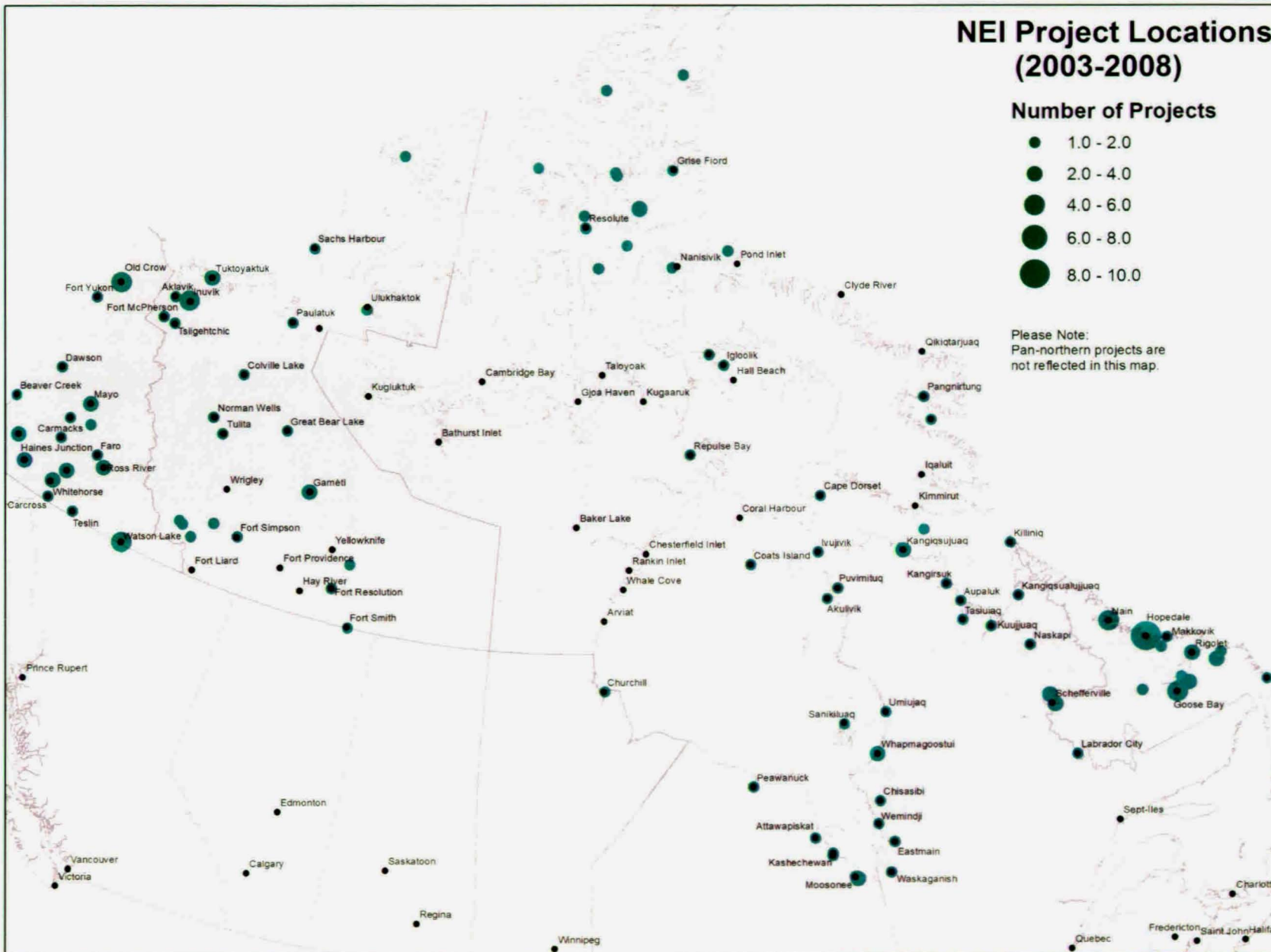
Many projects contributed results to more than one priority area and the following overviews highlight some of the results under each priority area. Individual project outcomes for each region are presented at the end of this document.

NEI Project Locations (2003-2008)

Number of Projects



Please Note:
Pan-northern projects are
not reflected in this map.



Map of NEI Project Locations

Climate Change

To improve the understanding of the impacts of climate change and the ability to adapt in key areas: caribou, freshwater, marine ecosystems, mercury-climate, habitat and migratory birds, and community knowledge and leadership.

NEI Climate Change Partner-Issue Table identified six ecosystem and related community priorities that were important to better understand climate change effects and vulnerabilities of northern ecosystems: caribou, freshwater ecosystems, marine ecosystems, mercury-climate, habitat and migratory birds, and community knowledge and leadership. Twenty-three projects were completed in five of the six priority areas; results from habitat and migratory birds are captured more effectively in projects funded through the contaminants and monitoring issue tables.



Photo: Yukon Government

Rangifer (caribou and reindeer) are a cultural and economic base and are an important food source for many northern people.

Caribou

Reindeer and caribou (rangifer) populations across the circumpolar North are indicators of ecosystem health. These animals play a critical role in the health and well-being of northern Aboriginal peoples, and serve as an economic and cultural base. The six caribou projects conducted contributed to the understanding of the effects of climate change on caribou.

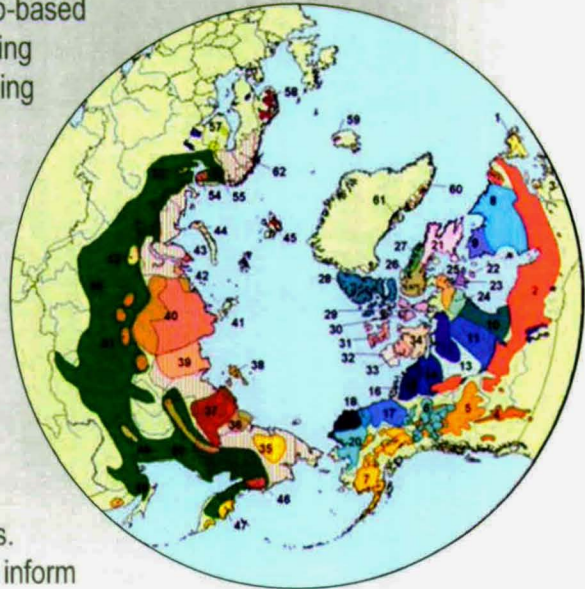
CASE STUDY

CARMA: CircumArctic Rangifer Monitoring and Assessment Network

NEI funding helped to establish the CircumArctic Rangifer Monitoring and Assessment network (CARMA). This web-based monitoring network (www.carmanetwork.com) links existing satellite caribou/reindeer monitoring programs with ongoing visual observations. The information helps to track and assess the impact of environmental and social changes on human-caribou/reindeer systems in Alaska, Canada, Russia, Greenland and Nordic countries.

CARMA supports four international initiatives: it is part of the Circumpolar Biodiversity Monitoring Program (CBMP); a working group of the Arctic Council; a project of the International Arctic Science Committee; and an initiative of International Polar Year (IPY).

The CARMA network is developing a comprehensive comparative analysis of circumarctic rangifer populations. The ongoing application of this interdisciplinary data will inform rangifer-related land and resource management decisions in the coming decades and help to form public policy related to rangifer-human interactions.



Circumpolar distribution of 62 Rangifer herds.



Photo: Department of Fisheries and Oceans

Freshwater Ecosystems

The changing climate is expected to significantly alter the quality and quantity of freshwater ecosystems across the North. For this reason, assessing the integrated effects of climate change on key northern aquatic ecosystems was identified as a priority. Results from eight projects established reference data for ongoing monitoring; pulled together observations about drinking water quality and quantity; and standardized methods for monitoring water quality across the North.

Many of these projects combined local, traditional and scientific knowledge which resulted in new integrated tools for measuring change. Expanded freshwater monitoring efforts will better prepare resource managers and local decision-makers to address observed changes.

CASE STUDY

Sensitivities of High-Latitude Lakes to Climatic and Development Disturbances

Photo: M. Thompson



The picture shows the side of a lake that has slumped in the Beaufort Delta region of the NT. Some lakes have undergone immense losses and appear to have drained almost overnight when ice and permafrost holding them in place gave way. Other lakes are changing more gradually as the ground melts and mud and ice slumps into the lakes.

NEI supported Canada's first comprehensive monitoring and process-based study that addressed climate change impacts on Arctic aquatic systems in the Mackenzie Delta region of the Northwest Territories. The objective of the study was to develop a comprehensive and integrated water/landscape model for small Arctic lakes that could be used to research and monitor the effects of climate change on lakes, rivers, and wetlands. The study sites in the delta represent Canada's first coordinated response to recommendations made in 2005 by the Arctic Climate Impact Assessment (ACIA) to the Arctic Council and the international science community.

Results are already providing Canada with a way to detect the effects of climatic shifts on freshwater systems. The findings also contributed to a network of key representative freshwater sites which allow researchers to compare processes and modeling studies among Arctic regions. The study provided the first known evidence that melting permafrost is introducing a significant and distinct supply of carbon to northern lakes which is altering the structure and function of these lakes.

With continued support from International Polar Year (IPY) funding, this study will continue to help scientists assess the ecological health of these upland lakes and to determine the water levels required to maintain aquatic life.

Marine Ecosystems (sea ice)

Ice, a dominant feature of the northern landscape, provides important habitat for wildlife, access to marine resources, and transportation for northern communities. There is abundant evidence that the distribution, thickness and duration (timing) of sea ice coverage is changing. These changing conditions affect many species and make it more difficult and dangerous for people to navigate traditional ice routes and access traditional food sources. The management of key species such as marine birds, ringed seals, and polar bears is also impacted by the changes.

To help communities adapt and respond to challenges brought on by the changes to the ice, phase II of NEI supported development of an assessment model that will provide a benchmark for measuring and predicting future changes. The results from six projects provided the preliminary foundation for this assessment model.

Three community-based monitoring projects in the western, central and eastern Arctic looked at sea ice, ringed seals, and sea birds as indicators for determining the impacts of changes to sea ice. These projects combined traditional and western knowledge systems and established standardized monitoring methods.

Scientists, traditional resource users, and other stakeholders gained insight into altered sea ice conditions through these projects and three others related to changing ice conditions. Organizations and communities benefited as their ability to monitor, understand, and ultimately adapt to changing sea ice conditions was improved. The information is already being used by some communities to create new travel routes to access resources.

CASE STUDY

Landfast Ice and Ringed Seal Productivity

The preferred breeding and pupping habitat of ringed seals is landfast ice that forms in coastal areas and does not move with ocean currents. Pups are born in a lair that is excavated by the female in a snow drift near a pressure ridge or ice hill. The lair provides protection from the cold and from predators such as polar bears and foxes during the six week nursing period.

Since changing sea ice and snow conditions could make it more difficult for females to find suitable pupping habitat, the ringed seal may be a good indicator of climate change in coastal Labrador.

This northern Labrador community-based sea ice research program developed and refined methods for monitoring landfast ice and snow conditions and for identifying ringed seal pupping habitat in order to document the impacts of changes to the ecosystem. The data was then integrated with new and existing satellite image analysis techniques and local ecological knowledge to better understand the link between the reproductive ecology of ringed seals and their habitat. This information can also be used to evaluate the adaptive capacity of the species to both climate variability and man-made changes.

For this project, 12 hunters from the Labrador communities of Rigolet, Hopedale, and Nain were trained to collect, archive, and help analyze sea ice habitat data, focusing on snow deposition and ice formation. Some of the data as well as information on pupping times were useful for the Voisey's Bay Nickel Company when monitoring the effects of winter shipping on pupping seals and planning spring seal surveys.

The ice monitors, as well as other hunters in the community, also provided observations and biological samples from approximately 300 ringed seals. These were used to determine whether the diet, reproductive status, and general body condition varied with changing ice conditions.

Over seven years (2001-2008), the study results indicated that there were significant annual changes in the availability of quality pupping habitat along the central and northern coast of Labrador. These habitat conditions likely contributed to the changes in the distribution and decreased availability of pups observed by hunters and other community members each spring.

These findings have several ramifications for Inuit hunters including the cost and amount of time spent hunting when seals are less plentiful or when ice conditions make travel difficult and unsafe.

The research to date will allow the Labrador project to be integrated with ongoing and future climate change studies in other Arctic regions. This project has links to two International Polar Year projects that are examining aspects of sea ice and marine mammals. As well, the ArcticNet supported Nunatsiavut Nuluak project will help to facilitate a new community-based sea ice monitoring component. This will continue to build on some of the sea ice research data that has already been developed and provide a legacy to the landfast ice and seal productivity project.



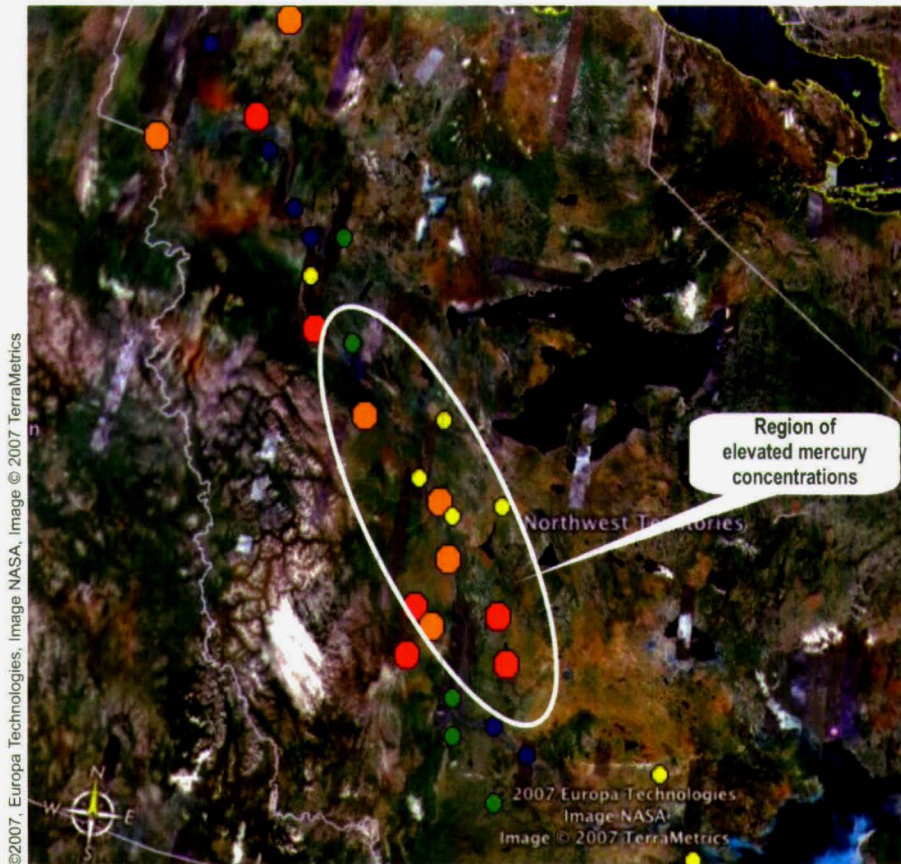
Fully moulted pup shortly after emergence from the birth lair in early May.



Nain "on ice" team documenting ringed seal pupping habitat.

“The most important capacity-building aspect of this project is the enhancement of learning opportunities and technical skills development that will be transferable to future climate change research initiatives in Labrador and other Arctic regions (e.g. integrating TEK, GIS mapping technology and satellite image interpretation, planning and conducting a field research program, and building long-term databases) This type of knowledge and skills-based capacity-building will ensure Labrador communities have the information they need to make informed decisions on the sustainable use of resources and the development of environmental management plans (e.g. marine transportation plans and environmental effects monitoring programs).” (Sjare 7)

Mercury-Climate



Map of mercury in sediments throughout the Mackenzie River basin. Red circles denote highest values of mercury, followed by orange, yellow and green, while blue ones mark the lowest values.



Electrofishing Arctic char to examine mercury levels.

Photo: D. Muir

Changes in climate could affect contaminant pathways and levels in Canada's North. Because fish, marine mammals, and sea birds are an important component of the northern diet, increasing exposure to contaminants could have implications for human health.

NEI supported seven studies identifying and verifying baseline mercury levels in animals, plants, lake sediments, rivers, and predatory fish. These studies occurred in the Northwest Territories, Nunavut, northern Québec and Labrador.

Despite reductions in atmospheric mercury inputs from industrialized areas of North America and Europe, mercury levels have not declined. Several studies across the High Arctic, western Arctic, and Nunavik are finding high levels of mercury in predatory fish. One project examined the link between a warming climate and increased mercury levels of landlocked char in different lakes in Nunavut. In landlocked Arctic char (as opposed to sea run char), mercury is slowly increasing and global warming may be the reason.

While the links between a warming climate and mercury levels are still being explored, the level of mercury seems to be related to the length of the food chain rather than the level of mercury in the surrounding water. Mercury tends to build-up in the food chain, so large predatory fish species tend to have higher levels than non-predatory fish or species at lower levels in the food chain. Mercury concentrations were found to be highest in the lakes with the longest food chains - where top predators in the food chain feed on many smaller fish and plants.

Where Does Mercury Come From?

There are many sources of mercury in the environment:

NATURAL	HUMAN ACTIVITY
<ul style="list-style-type: none"> • Volcanoes • Soils • Undersea vents • Mercury-rich geological zones • Forest fires • Freshwater lakes, rivers and the oceans 	<ul style="list-style-type: none"> • Burning of fossil fuels, in particular coal • Production of metals, cement, chlorine and caustic soda • Incineration of mercury containing waste • Base metal smelting • Chlorine alkali processing for the manufacture of specialty chemicals and pharmaceuticals • As well as from flooded soil at new hydroelectric dam sites

Although humans have extracted and used mercury for centuries, mining and industrial applications for the metal have increased by as much as two to four times since the industrial revolution in the 18th Century. The amount of mercury moved and released due to human activities has greatly increased, leading to elevated concentrations in air, water, soil, sediments, and living organisms.

Mercury in the Arctic originates from both local and long-range sources. Mercury exists in natural geological depositions such as recently collected coal samples near Tulita, Northwest Territories. These samples exceed levels of mercury found in world average coals by up to 25 times and have implications for resource decisions in the area. From a health perspective, human bodies naturally eliminate trace amounts of natural mercury which occur in the environment.

Other sources of mercury in the Arctic are from long-range atmospheric transport. Mercury can enter the atmosphere as a gas or bound to other airborne particles and circulates until removal, primarily through rainfall, snow, fog or as particles settling to the Earth's surface (such as dust settling).

Relatively large fragment of huminitic (coaly) material found near the coal bed near Tulita, NT. The highest concentration of such particles was found in this region, supporting our hypothesis that the coal bed is acting as a source of mercury to the Mackenzie. Photomicrograph under white light.

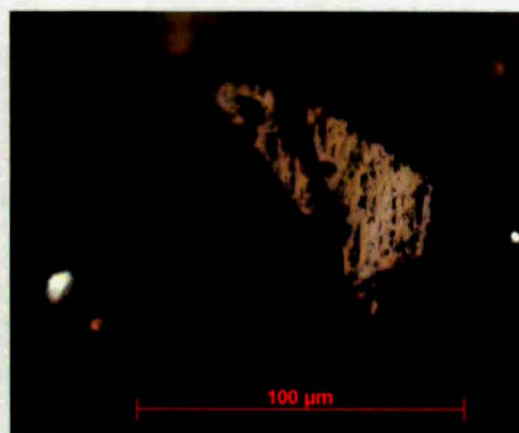
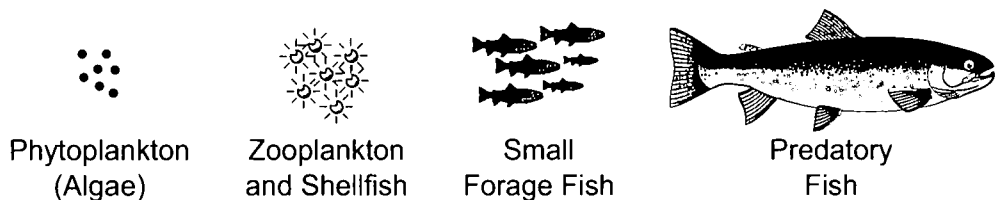


Photo: Department of Fisheries and Oceans

Food Chains

While fish consumption is a direct source of exposure for many to mercury, Health Canada advises that the benefits and risks of eating fish should be balanced, since fish are an excellent source of high-quality protein and omega-3 fatty acids, and are low in saturated fat.

While NEI supported the collection of data on baseline mercury levels in many areas of Canada's North, much uncertainty about mercury-climate interactions exists. More research is needed to clarify the relationship between lake size and mercury as well as the possible impact of events such as global warming on fish mercury levels. For example, increased runoff and/or permafrost melting may result in more mercury entering lake ecosystems. Forest fires also play a significant role in the transformation of naturally occurring mercury in lakes or lake-watershed systems. Alternatively, increased climate temperatures and a longer ice free season could result in more rapid fish growth rates which might reduce mercury levels in fish.



United States Environmental Protection Agency

Food chains begin with tiny floating plants called phytoplankton and small animals called zooplankton. The next step in the chain is a small fish, like a ciscoe, which eats the small organisms. The next step is a larger fish like a trout eats the smaller fish. Each organism feeding on a smaller organism represents a link in the food chain.

Community Priorities and Observations/Knowledge

NEI projects use “citizen scientists” to effectively incorporate local and traditional knowledge into scientific research. This knowledge is a useful resource in assessing the status of Arctic ecosystems and can help identify areas that require further research and adaptation strategies. Local observations and traditional knowledge are a valuable way to cost-effectively record baseline information and change in the vast and vulnerable Arctic region.



Photo: Scot Nickels



Photo: Scot Nickels



Photo: Scot Nickels and Mark Buell



Photo: Scot Nickels and Mark Buell

Aboriginal Input into the Development of a Conceptual Framework for a Community-Based Environmental Monitoring Network in the Hudson Bay Bioregion (HUBB)

Inuit and Aboriginal hunters and trappers identified a set of ecosystem health indicators and measurements for monitoring status and trends in the region. The indicators - rivers, shorelines, sea currents, sea ice, snow, weather, animals, human health, and traditional management - are monitored in select locations on a daily, seasonal, and/or annual basis by local Inuit and Aboriginal People. During the Sanikiluaq workshop, lakes, sea water,

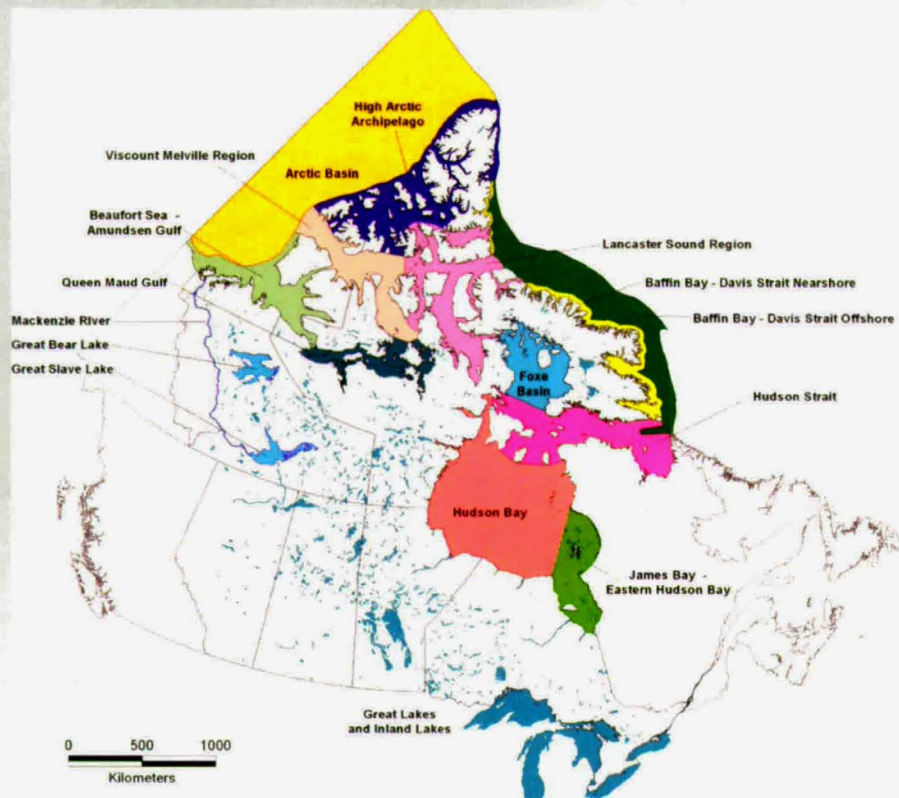
These indicators were endorsed by environmental monitoring experts from Parks Canada and the BC Ministry of Environment. Since Parks Canada is responsible for monitoring in national parks bordering Hudson Bay, consistency with their practices and policies, as well



Photo: Nunavut mmi Tasijiarisamiqunatiniit Kahitiqaliiniit/ NTK

as those of the BC Ministry of the Environment, helps to strengthen the environmental monitoring efforts in Sanikiluaq. The Government of Nunavut is considering the use of the HUBB initiative as a way to conduct community-based monitoring for the Nunavut General Monitoring Plan (NGMP). Moreover, the standardized procedures used within the HUBB framework have been shared with other NEI researchers who are also responding to requests for regional monitoring networks.

The Arctic Climate Impact Assessment recognized the need to focus future assessments on smaller regions or at a local level to maximize relevance to, and use by, residents. The work underway in the Hudson Bay marine and coastal ecosystem represents a significant step forward in responding to community needs.



Map Source: Stewart, D.B. and Lockhart, W.L. 2005.

An overview of the Hudson bay marine ecosystem. *Can. J. Fish. Aquat. Sci.* 2586

Monitoring

To support the development of a northern monitoring network including status and trend reporting

The long-term goal under this program priority was to contribute to the development of a monitoring network that would provide information about northern ecosystems to its stakeholders: academia, researchers, governments, and northern organizations and communities. Results from 24 funded projects across the three territories, northern Québec and Labrador helped to measure and understand changes in land and seascapes.

Several projects support Canada's contributions to circumpolar networks monitoring caribou, water, contaminants, and seabirds. Approximately 15 million seabirds inhabit the Arctic at various times of the year and Canada has an international responsibility to manage migratory birds under the international Migratory Birds Convention.

Given that climate, landscape, animals and plants are interconnected, when one aspect of this biodiversity is altered, a domino effect can occur. Work done on Prince Leopold Island in Nunavut is among the first to demonstrate that the extent of Arctic sea ice cover affects marine bird reproduction. The research at Cape Vera and Prince Leopold Island in Nunavut adds to the growing body of scientific evidence linking climate related sea ice changes to affects on Arctic and Antarctic polar marine birds. Other

projects related to eider ducks, thick billed murres, northern fulmars, and ivory and glaucous gulls, provided information about the general ecology of marine birds, including numbers and population trends in Canada's northern coastal waters.

Monitoring projects and activities in Phase II of NEI are helping Canada to better track and understand the human and physical causes and effects of change across the North.



Photo: G. Gilchrist



Photo: Environment Canada



Photo: K. Truman

CASE STUDY

Enhancing and Expanding Long-Term Ecological Monitoring Sites

Traditional and local knowledge observations increase the understanding of how changes on the land affect people. NEI's local and traditional knowledge studies have enhanced information from three long-term scientific monitoring sites strategically located in northeastern Canada, the central Arctic, and northwestern Canada. Scientific studies conducted in the Mealy Mountains in Labrador, Bylot Island in Nunavut, and the Kluane Region of the Yukon have all included local and traditional knowledge which has resulted in a better understanding of climate driven changes to the ecosystem. Over time, these various monitoring projects will be a valuable way to track the health of the local environment and identify important trends. In all three studies, clear evidence exists that the environment is changing.

Climate models predict that some of the most rapid changes in vegetation will occur on inclines, such as mountain slopes. In both the Kluane Region and the Mealy Mountains, projects documented how the treeline is advancing upward into alpine zones. This replacement of alpine meadows by trees and shrubs is expected to result in less habitat and food for caribou and Dall sheep. Long-term monitoring and on-going data collection will make comparative analysis between the regions possible.

The on-going systematic collection of information on the changing physical and biological world in the southeast Yukon, High Arctic and northeastern Canada adds to our knowledge of local climate change impacts and will contribute to mitigation and adaptation activities, and research planning.



Photo: Labrador Highlands Research Group

A century-old white spruce tree on a tundra patch in the Red Wine Mountains bears witness to an earlier warm period as well as the severity of recent winters.

“We have shown that the integration of (Traditional Ecological Knowledge) TEK and scientific knowledge is possible and can serve as a powerful tool to get a clearer picture of the Bylot Island ecosystem... Indeed, unlike the NEI program, traditional funding sources for university researchers do not specifically allow funds for community workshops or interactions. Thus, we are clearly in need of such programs to maintain these important partnerships.” (Gauthier and Cadieux 15)

Contaminants

To increase understanding of impacts of contaminants on ecosystem health

Contaminants found in the North often come from sources far away. Where temperatures are warmer, they evaporate and then travel on winds and clouds until they reach colder temperatures where they condense back to Earth. This is known as the “grasshopper effect”. The cycle can occur several times until these chemicals become “trapped” in the North where temperatures are cold.

The Grasshopper Effect

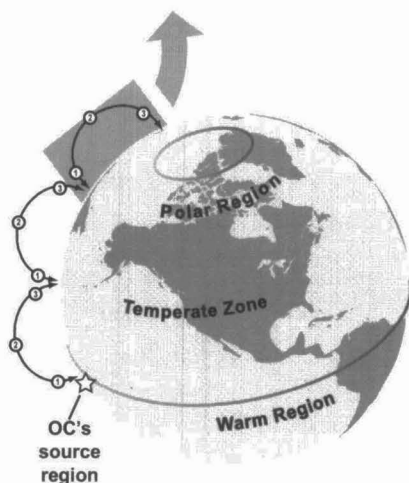
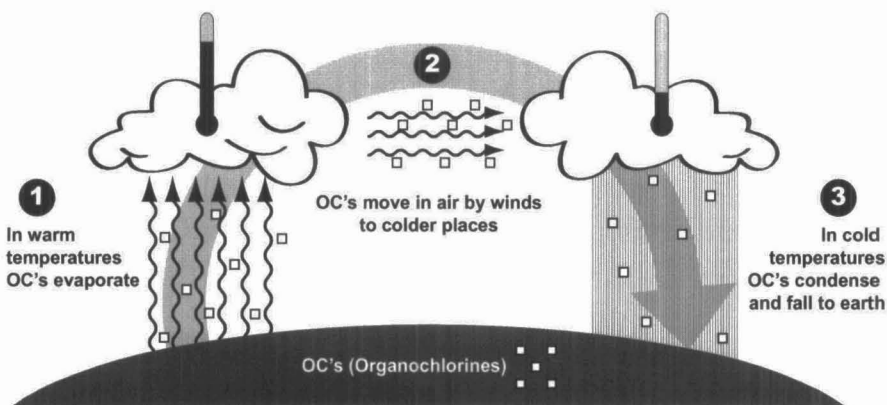


Diagram: Indian and Northern Affairs Canada

Local sources of northern contaminants include a local dump, industrial or military site. As of 2003, Indian and Northern Affairs Canada's (INAC) Northern Contaminants Program (NCP) focused exclusively on contaminants from long range sources and regions of the Canadian Arctic where contaminant related risks to human health were highest. As a result, some projects related to local contaminant concerns fell outside the new scope of the program. Recognizing the importance of local contaminant concerns to its northern partners, the NCP approached the NEI for support. Through its involvement with NCP regional contaminant committees, and primarily the Northwest Territories Environmental Contaminants Committee, NEI provided financial and in-kind support. This collaborative arrangement ensured the continuation of research into local contaminant concerns.

During Phase II, the NEI Contaminants projects focused on two themes: local contaminant concerns (LCC's) and ecosystem health.

Local Contaminant Concerns (LCC's)

As part of the LCC approach, contaminant committees in five regions were responsible for developing an inventory of contaminated sites and investigating local contaminant concerns. Results from the 27 projects funded during Phase II revealed a wide variation in local coordination capacity and the application of common project criterion. Regional variances made it difficult to interpret national results.

On average, twenty to seventy-five percent (20 to 75%) of LCC funds were reallocated to other NEI priority areas or projects each year due to a lack of proposal submissions. Therefore, NEI sought to broaden the scope of proposals by moving towards a national northern delivery of LCC projects.



CASE STUDY

Evaluation and Rehabilitation of Abandoned Mining Exploration Sites in Nunavik

Batteries, barrels, and dilapidated buildings are a legacy of the hundreds of abandoned, military, and industrial sites that dot the landscape of Northern Canada. As a result of NEI support, inventories of abandoned mining and military sites and other local contaminant concerns have now been updated in the Yukon, Labrador, and Nunavik.

In Nunavik, community driven efforts provided the mandate and direction for the Kativik Regional Government (KRG) to investigate contaminated sites and to assess and remediate abandoned mining exploration sites in Nunavik.

In 2005 and 2006, the KRG implemented two remediation pilot projects made up of community members from Kawakachikamach and Matimekosh Lac-John who received training on how to handle hazardous material and proceeded with the removal of the waste in accordance with applicable laws and regulations. Locally, over a dozen people were trained in hazardous waste disposal methods and received employment in these ventures. As a result of this work, the Cleaning and Handling Hazardous Products in Abandoned Mining Exploration Sites in Nunavik was developed for communities in Nunavik, which was distributed by the KRG in 2005.

At the same time, work on cleaning up a third site in Nunavik was carried out by the Makivik Corporation and its tourism subsidiary Cruise North Expeditions. Since it began, the Inuit-owned company has offered passengers the opportunity to participate in the annual Arctic Clean-Up Mission. This eco-tourism commitment is one way that Cruise North demonstrates its commitment to

preserving the integrity of the North. It is a reason Condé Nast Traveler recognized Cruise North as the only cruise line worthy of inclusion in the magazine's prestigious 2006 Green List. Under the supervision of the Kativik Regional Government, eco-tourist volunteers collected all hazardous materials which were shipped to Newfoundland for proper disposal.

As part of the project in Nunavik, mining exploration companies cleaned up abandoned mining exploration sites in northern Quebec.

Many organizations and community members also contributed updates to the inventory of abandoned mining exploration sites in Nunavik. These initiatives represent the initial stage of a proposed Nunavik-wide clean-up project.

The initial four-year project, supported by NEI, was completed in spring 2008. However, the work will continue with funding investments

from the Government of Québec (\$4 million) and \$1.5 million from private industry for another four years. This will ensure that Nunavik's abandoned mineral exploration sites are cleaned up.

This successful project built and strengthened relationships between government, corporations, non-profit organizations, and local communities. For example, First Air contributed to the Cruise North Expeditions project with a special discounted round-trip airfare from Montreal to Kuujuaq. Other in-kind contributions were made by local air charter companies who removed waste, by mining exploration companies who provided logistical support and advice, and by participants from the Inuit and Naskapi Nations.



Photo: L. Olivier



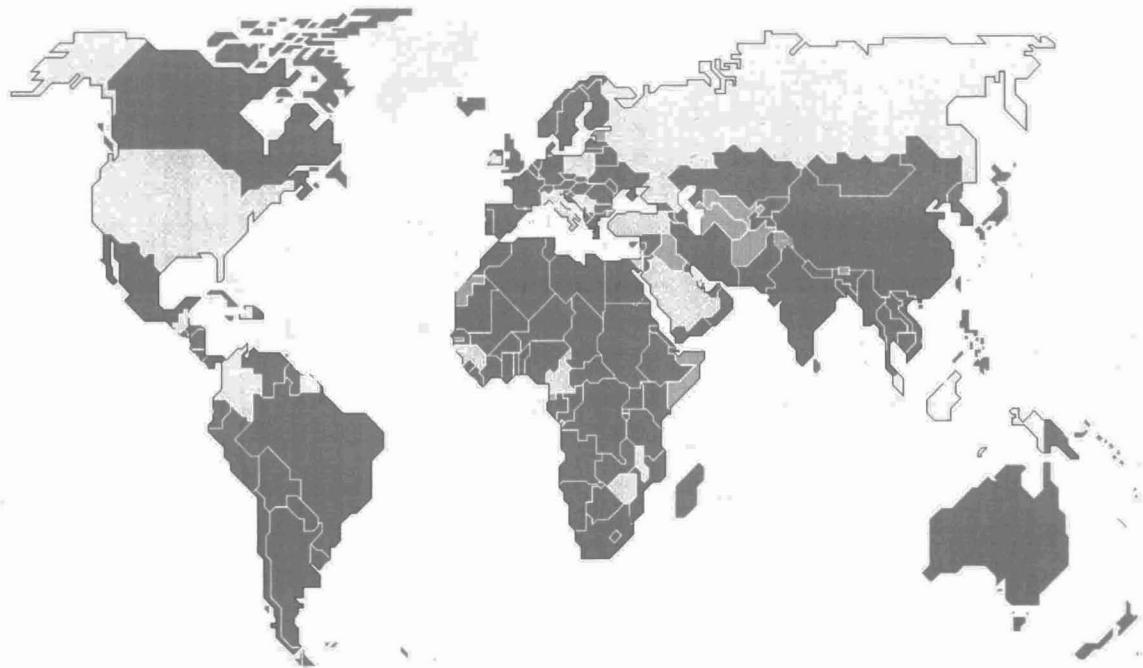
Ecosystem Health

Contaminants are present in varying levels in Northern Canada's land, water, air, and soil. However, the impact on wildlife and humans is largely unknown.

Five projects examining contaminant levels in a variety of Arctic seabirds increased the understanding of the adverse biological effects of contaminants on the health of Arctic ecosystems. Information from a project examining the role of contaminants in the decline of the ivory gull population contributed to the status of this species being changed from "species of concern" to "endangered" in the Canadian Arctic.

Studies such as these also help monitor progress towards eliminating persistent organic pollutants (POPs). Many POPs pose such significant threats to health and the environment that on May 22, 2001, the world's governments met in Sweden and adopted the Stockholm Convention, an international treaty aimed at restricting and ultimately eliminating their production, use, release and storage. Currently 128 countries are parties to the Convention.

World Map showing Signatories and Parties to the Stockholm Convention



Map No. 3933 Rev. 2 UNITED NATIONS
August 1999

■ Signatories and Parties to the Stockholm Convention

Department of Public Information
Cartographic Section

CASE STUDY

Impact of Contaminants on Gulls and Humans

The relatively high levels of contaminants in adult glaucous gulls make it a good representative species for examining the effects that contaminants may have on the health and fitness of other Arctic-dwelling wildlife. Preliminary analysis of data collected between 2004 and 2006 indicated that exposure to contaminants is not harming the immune system of nestling glaucous gulls in the Canadian Arctic. As of fall 2008, it appears that contaminant levels in glaucous gull chicks are low at both freshwater and marine nesting areas resulting in little evidence of contaminant-induced health problems.

The preliminary results of this study do not provide any basis for concluding that environmental contaminants are harming the marine ecosystem in the Canadian Arctic. This news comes as a relief especially in light of recent



Photo: N. North

research from the European Arctic and Antarctic that has demonstrated subtle effects of contaminants on adult glaucous gulls and great skuas. However, more definitive conclusions will not be possible without additional research on adult birds, particularly glaucous gulls, since they are likely to have much higher contaminant levels than young growing chicks.

Resource Use

To develop tools to assess and manage cumulative effects

At the beginning of Phase II, the Resource Use Partner-Issue Table decided to collaboratively design and support a single, multi-disciplinary research project to proactively and holistically manage cumulative effects. The Working Landscapes project developed social, wildlife and aquatic indicators. Both the wildlife and aquatic indicators can be linked to statistical models to measure landscape change. By being able to measure changes on the landscape and the corresponding change in any of these indicators, a way to measure agreed upon acceptable change is created. Regions using this approach have a tool to monitor their landscapes and make adjustments before irreversible changes occur.

Results from three years of research (2004 to 2007) in the Yukon and the Northwest Territories are at the forefront of Canadian efforts to identify and quantitatively assess the complex interactions between various land use decisions and cumulative effects.

In addition to the work supported through the NEI Resource Use Table, the Northern Québec Regional Steering Committee funded three long-term wildlife and habitat resource use projects. Standard procedures were developed for collecting migratory bird data, documenting the patterns and intensity of eider use and eiderdown harvesting, and re-vegetating disturbed areas.



Resource Use in Northern Québec

The project on Migratory Bird Data Collection and Information Sharing in Northern Cree Communities contributed to building a constructive partnership between the Cree Trappers Association, the Cree Regional Authority and Environment Canada's Canadian Wildlife Service. This partnership enabled the organizations to build the foundation for more long-term collaboration in research and mutual sharing of information and recognized Cree environmental knowledge. It has also fostered the interest of Cree young people in wildlife management and increased the capacity of the Cree to participate in research design, data collection and data interpretation. *Source: Regional Cree Authority, Final Report 2008.*

Indoor Photos: G. Lajoie
Outdoor Photos: C. Otter Tetreault

CASE STUDY

Working Landscapes

Formally initiated in 2004, the primary goals of the Working Landscapes project were to develop a common approach to understanding how different land uses affect water, wildlife, and people; to develop integrated modeling tools to analyze the benefits and costs of proposed developments in a holistic manner; and to recommend changes to legal and administrative systems so that regions would be able to manage the cumulative effects of development.

The Working Landscapes project consisted of five case studies in the Yukon and Northwest Territories. The case study in the southeast Yukon with the Kaska First Nation began in 2004. Researchers collaborated with the Kaska First Nation to identify a set of relevant socio-economic indicators that could be used to measure the impacts of cumulative effects on community well-being. A survey was conducted with the Kaska communities of Faro, Ross River, Upper Liard, and Watson Lake to understand the tradeoffs associated with different development paths based on these indicators. Results were linked to landscape simulation scenarios to show how communities could use this information in land use planning.

Socio-economic indicators were also developed with the Champagne and Aishihik First Nations in the southwest Yukon. The goal of this case study was to improve the study and understanding of cumulative social impacts in order to apply the finding more effectively to environmental assessments and other land use planning initiatives in Champagne



Photo: Jim Hawkings



Photo: North Yukon Planning Commission



Photo: Environment Canada

and Aishihik traditional territory. Special consideration was given to the relationship between landscape change and social and cultural impacts, and to culturally appropriate methods for the evaluation of cumulative effects.

Aquatic thresholds were developed and tested in the Yukon and Northwest Territories, and wildlife thresholds were developed and tested in parts of northern Alberta, the Yukon, and the Northwest Territories.

The wildlife indicators and thresholds developed for the Working Landscapes project are ready to be used in the boreal forests and taiga/tundra areas of Canada's North. A way to measure the relationship between the level of human disturbances in an area and changes in a wide variety of mammal and bird species has been created. This relationship data can be used to forecast future scenarios for land use planning purposes. The mammal index developed within the wildlife component has been improved and now allows users to examine the overall population of the mammal community as well as the state of individual species.

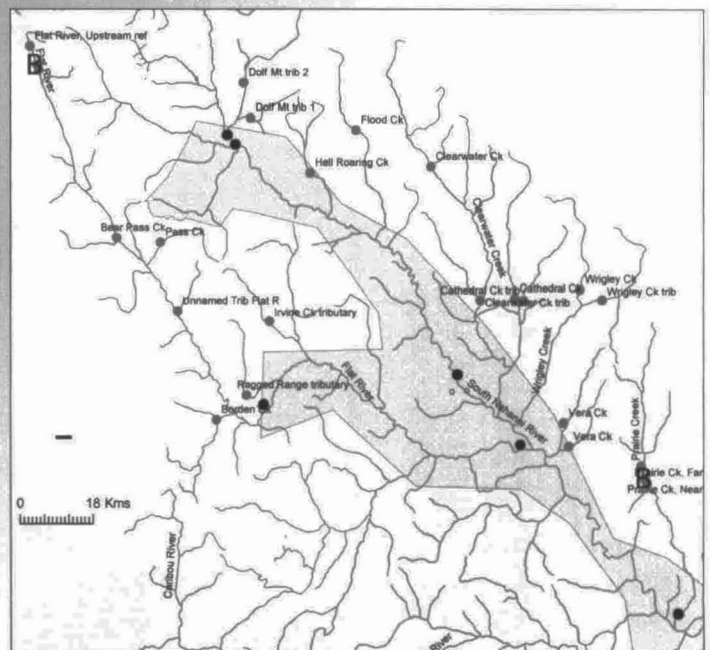
Cumulative effect thresholds for northern freshwaters and reference conditions for aquatics have been established in the internationally renowned Nahanni River watershed in the Northwest Territories. These effect thresholds form the basis of Parks Canada's monitoring program in northern parks.

The North Yukon Planning Commission incorporated the working landscapes approach into their planning process. A local land use planner was trained to use A Landscape Cumulative Effects Simulator (ALCES), and created a landmark thresholds-based land use plan for the north Yukon planning region. A stakeholder review of the plan was completed and submitted to the Yukon and Vuntut Gwitch'in governments for formal review in the spring of 2008. The land use plan is a significant milestone in cumulative effects management.

The use of specific indicators and the projection of future scenarios to examine potential ecological, economic, and to a lesser extent, social outcomes of those scenarios, is an approach that can empower better land use decision-making.

By recognizing that land size is fixed while demands on the land are increasing in number and intensity, stakeholders have the opportunity to ensure that up-front planning occurs so that development is coordinated and competing interests for lands are considered before irreversible changes occur.

The development of computer modeling tools in Phase II of NEI to assist with cumulative effects assessment and management laid the ground work for every ecosystem across the North to examine tradeoffs for new and existing land use activities.



Sites sampled for sediment and water quality, algae, bottom-dwelling insects, and fish, August 21 to September 2, 2006 in Nahanni watershed of the NT.

Capacity-Building

Building capacity refers to the exchange of information between governments, scientists, and communities to increase knowledge and enhance the collective ability of all parties to address common concerns.

At the beginning of phase II (2003 to 2008), the NEI created a Capacity Advisory Committee to provide capacity-building best practice recommendations to its National Steering Committee.

Although seven projects were earmarked as capacity-building projects during phase II, the NEI Steering Committee quickly realized that capacity-building was an over-arching element of all the projects supported by NEI.

Since 2004, NEI has formally measured the level of project-related capacity-building through its Results Management Accountability Framework. This framework offers a means for NEI staff to systematically collect data from projects and evaluate results. Capacity is formally tracked through four measures:

- maximizing local participation in a project;
- incorporating traditional knowledge in the design and delivery of a project;
- determining associated education, training and employment opportunities; and
- considering whether or not activities will continue after NEI funding ceases.

Between 2004 to 2008, local participation was rated at medium to high in approximately seventy-eight percent (78%) of the projects, and seventy-one percent (71%) of projects used more than one knowledge system. The combination of local engagement and knowledge exchange fostered data collection and linkages necessary to adaptively manage issues impacting people, landscapes, seascapes, and freshwater systems across a rapidly changing North.

NEI funded projects were important to both scientists and Northerners: seventy-eight percent (78%) offered training and employment opportunities enhancing the capacity of residents to address their own ecosystem priorities; eighty-three percent (83%) continued after NEI funding stopped.

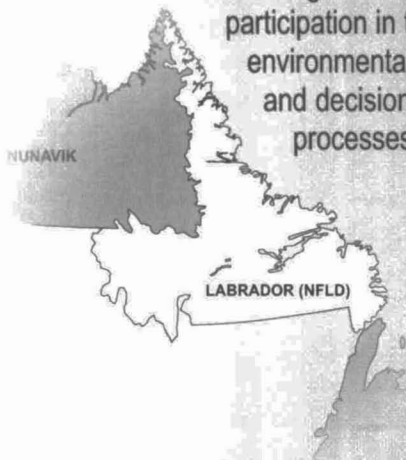
In addition, out of 39 NEI supported projects in fiscal 2005/06, 182 events such as workshops, presentations, and community meetings occurred. Over four years, researchers, on average, held four project-related events annually. These events all helped to collect and disseminate important information locally and regionally with many different people and organizations.

CASE STUDY

Capacity-Building in Labrador: An Innovative Approach to Research

Labrador represents more than fifty-three percent of the Atlantic Region of Canada. The landscape spans four major ecozones: the Arctic Cordillera, the Taiga Shield, the Boreal Shield and the Atlantic Marine ecozone. Each of these zones has distinct plants and animals. As in many areas of Northern Canada, development activities

and use of natural resources are increasing and Aboriginal participation in the environmental assessment and decision-making processes is essential.



Since 1998, the NEI has supported the development of comprehensive baseline ecological data of the Labrador landscape from both Innu and western scientific perspectives. The information collected by the Innu Nation, social scientists from the Gorsebrook Research Institute of St. Mary's University (Nova Scotia) and Environment Canada has been used to incorporate social sciences and community involvement into environmental monitoring programs to inform land use decisions.

"It is most important to the Innu Nation, and the Innu elders that we work with, to be involved in the scientific research (so that) their knowledge and their land use and their resource use and their practices are (seen as) equally important, and brought into the learning process."

Trudy Sable
Gorsebrook Research Institute, Saint Mary's University



Photo: M. Van Wyk

Central to this work was a shift in western science methods to incorporate Innu understanding of cultural landscape features. For example, the Innu Nation suggested ashkui sites as a research focus for Environment Canada. Ashkui (areas of early or permanent open water on rivers, lakes and estuaries) are frequently used by Innu families today. Innu oral history and archeological evidence suggests this has been the case for many generations. The relationship of ice, ashkui, and animals is well known to Innu. Ashkui are also critical habitats for migratory birds, fish, and other animals.



Photo: V. Courtois

Climate Change module involving Memorial University and Innu Guardians.

A rich and comprehensive body of knowledge has been compiled that mutually benefits the Innu community and environmental scientists. Unexpected spin-offs, such as NATO low level jets altering their flight corridors to avoid the waterfowl staging areas, resulted from the tshishennuat (Innu elders) identifying productive ashkui sites, which, in turn, led to Environment Canada designating these sites as waterfowl staging areas. The work has evolved into assisting the Innu with a community capacity-building project referred to as the Innu Environmental Guardians Program (IEGP). For the past six years, Saint Mary's University has offered credit for the IEGP modules, and is now working with the Innu

Nation to create a fully accredited Innu Studies certification program. The Innu Nation's Environmental Guardians are presently involved in a range of environmental management initiatives including: co-management of forestry resources; environmental management and monitoring at Voisey's Bay; and fisheries conservation and enforcement. In addition, Environmental Guardians are directly involved as co-researchers in research and monitoring partnerships with government and university-based scientists.

Interest in the Guardians program continues to grow and almost every jurisdiction in Canada has expressed interest in the program. This interest is most evident in the North where there are opportunities within current policy structures to implement such a program and adapt it to various regions. The Gorsebrook Research Institute/ Saint Mary's University (GRI/SMU) and the Innu Guardians also received funding through the International Polar Year (IPY) and a Social Science and Humanities Research Council of Canada (SSHRC) grant to build capacity to undertake ongoing monitoring of climate change. NEI supported researchers at Memorial University are networking with the GRI/SMU and the Innu Guardians to look at long-term ecosystem change.

The true significance of this project has been in the relationship between the collaborators, and the way research is conducted so that Innu priorities are respected and their needs for building capacity met. This approach to research requires a holistic view of the landscape, an integrated, interdisciplinary approach to knowledge, and a deep appreciation of the 'translation' process and role of the 'translators'. This study has shown that communities are willing to take on these roles, develop a hybridized language to work with issues, and step forward into decision-making roles to bring about policy changes.



Photo: D. Wilson

In-Country Meetings enhance western science approaches.

NEI Financial Summary 2003-2008

Fiscal Year	DEPARTMENTAL CONTRIBUTIONS		Partner Contributions (leverage) Cash & In-kind	Total Resources
	NEI	Other Contributions		
2003-2004	\$1,292,779	\$695,950	\$2,239,836	\$4,228,565
2004-2005	\$1,340,958	\$1,085,843	\$3,826,078	\$6,252,879
2005-2006	\$1,157,761	\$998,060	\$2,385,024	\$4,540,845
2006-2007	\$844,100	\$685,829	\$2,499,134	\$4,029,063
2007-2008	\$812,419	\$63,500	\$2,259,086	\$3,135,005
PHASE 2 Total	\$5,448,017	\$3,529,182	\$13,209,158	\$22,186,357

Throughout Phase II, NEI emphasized a strategic project funding approach. During the first three years (2003 to 2006), NEI concentrated its efforts on soliciting and funding multi-year projects that supported its strategic objectives. In its last two years, NEI focused on maintaining existing multi-year projects and also provided funding for six new projects.

For every dollar contributed by NEI for a project, on average, three dollars were received through in-kind and cash support. In fiscal 2005/06, NEI, together with a total of 350 stakeholders, supported 39 projects. Between 2004 to 2008 involvement in NEI projects averaged a participation rate of 9.3 stakeholders per project. This participation built shared capacity through the development of new knowledge, skills, tools, and research methodologies, and helped Canada deliver results on national and international commitments.

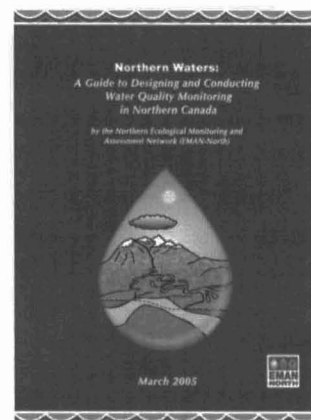
Future ecosystem work in the North has the opportunity to build on the network of research and partnerships NEI developed across the Canadian North since its inception in 1998.

List of Guides and Manuals available for Community Groups and Researchers

Accessible, understandable, useable information

NEI supported a variety of local, regional and national projects that were used to: develop methods for gathering and organizing data, create templates, develop protocols (standardized methods), establish management thresholds that indicate where an activity may change an animal or plant species, and present information for consideration by resource managers and decision-makers.

For example, *Northern Waters: A Guide to Designing and Conducting Water Quality Monitoring in Northern Canada* is a plain language manual that outlines and explains standard sampling methods across the North. It provides key information about the design of water quality monitoring and assessment projects for freshwater and marine systems. The manual is intended to be used by people who are not specialists in water quality monitoring, but who have an environmental background and who are responsible for designing and conducting monitoring and assessing projects.



Copies of this manual were distributed by the Dene Nation to participants at an indigenous conference on water issues in the Northwest Territories in 2005 and electronic copies are available through the NEI office.

Some of the materials created during NEI Phase II include:

Atlas/Maps:

- archive of observed hydrometric (water) for the Mackenzie Basin (1913 to 2002) - Mackenzie Basin
- archive of observed hydrometric (water) data for the Mackenzie Delta region (1951 to 2000) (1976 to 2006)
- atlas of plants of Nunavik villages
- maps of contemporary (1961 to 1990) and future (2070 to 2099) temperature and precipitation for the Mackenzie Delta region of the Northwest Territories. These future scenarios are based on climate model outputs and are useful for identifying potential changes to the northern environment
- maps of contemporary observed break-up and freeze-up dates for northern Canada (1913 to 2002) - includes entire Mackenzie Basin for break-up, break-up trend analysis for the Basin (1970 to 2002)
- maps of contemporary observed break-up and freeze-up dates for northern Canada (1951-80, 1961-90, 1971-2000)

- maps created in 2005 identifying waste management/contaminated sites throughout Yukon First Nations' traditional territories
- maps and reports on abandoned mining exploration sites in Nunavik and Cree communities

Indicators:

- a substantial body of community-based indicators has been developed for monitoring the Hudson/James Bay ecosystem, which may be adapted to other ecoregions
- assessment of indicators of ecosystem health for the boreal forest communities in Kluane National Park, Yukon to help guide medium to long-term planning, management, and research in this area
- standard monitoring protocols for ecosystem indicators in Kluane National Park, including community monitoring observations in the Mayo, Whitehorse, and Watson Lake areas of the Yukon

Learning Guides and Information Tools:

- accredited environmental management curriculums incorporating the local and traditional knowledge of the Innu and western technical and scientific disciplines relevant to environmental protection, management, and resource use specifically in the areas of forestry, monitoring of waterfowl and wetlands
- brochure on eiderdown duck harvesting techniques
- Canadian Tundra and Taiga Experiment (CANTTEX) manuals are tools that are being widely used across Northern Canada and elsewhere to guide and standardize the approach to tundra plant community monitoring. The CANTTEX manual is being used to improve and expand the number and quality of measurements at International Tundra Experiment (ITEX) sites within Canada
- compendium of protocols used for ecological monitoring on Bylot Island, Nunavut. This is in Sirmilik, an important National Park of Canada
- draft protocols to standardize the collection of information on the body conditions of caribou/reindeer
- English/Inuktitut glossary of freshwater terms
- guidelines for restoring vegetation in disturbed areas
- plain language manual on cleaning and handling hazardous products in abandoned mining exploration sites and contaminants in Nunavik
- prototype databases to house observation of plants in the Yukon and Manitoba
- protocols that link local knowledge with scientific discoveries regarding climate change and berry ecology - will be used to expand school monitoring programs across Canada and integrate information with Canadian Tundra and Taiga Experiment (CANTTEX) and PlantWatch
- traditional knowledge template developed to enter information into a database

For information on how to access this information, please contact: nei@ec.gc.ca



GLOSSARY & BIBLIOGRAPHY

Glossary

Biodiversity: A contraction of 'biological diversity', biodiversity is the term given to the variability among living organisms of all kinds. It includes diversity within species and between species and ecosystems.

Bioregion: Also known as an ecoregion, a bioregion is an ecologically and geographically defined area of land or water. A bioregion provides regional information on biodiversity.

Cumulative Effects: The combined effects on the environment of past, present and future activities. While the impact of a single activity or project may be minor, the cumulative effects of several activities or projects are often significant.

Ecoregion: an 'ecological region', is a part of an ecozone that has distinctive regional factors like plants, soils or climate. It is sometimes called a bioregion.

Ecosystem: a natural community of living things that work together with non-living elements of the environment. An ecosystem can be as big as the planet or as small as the palm of your hand.

Ecozone: large areas with common characteristics, such as major land or plant formations, such as mountains or forests. The prairie and boreal shield are two of Canada's ecozones.

Rangifer: Reindeer (*Rangifer tarandus*), also known as the caribou when wild in North America, is an Arctic and sub-Arctic-dwelling deer found in North America, Europe and Asia.

Sustainable: is the capacity to maintain a certain process or state indefinitely. Applied to the human community, sustainability has been expressed as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

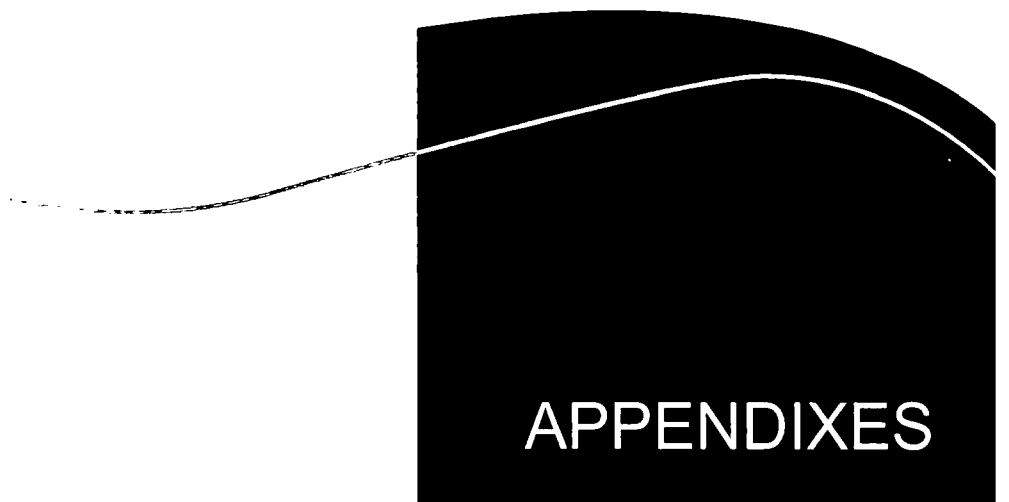
Threshold: the point at which something begins or changes. An ecological threshold is the point at which a relatively small action causes a significant change in an ecosystem. When an ecological threshold (maximum or limit) has been passed, the ecosystem may no longer be able to return to its original state.

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APPENDIXES

Aboriginal Partner Fact Sheets



Council of Yukon First Nations (CYFN)

What is the Council of Yukon First Nations?

The Council of Yukon First Nations (CYFN) is the central political organization for the First Nation people of the Yukon. CYFN provides a collective and national voice for Yukon First Nations and addresses issues of vital importance for the preservation of Yukon First Nations' identity, culture, and way of life.

Established: 1973

Membership Representation: CYFN's membership includes 11 of the 14 Yukon First Nations representing approximately 60 percent of Yukon First Nations population in the Yukon Territory.

CYFN membership also includes four Gwich'in communities in the NT: Fort McPherson, Tsiigehtchic, Aklavik, and Inuvik.

Membership Population: approximately 4600 people, or 20 percent of the Yukon Territory, and 1400 people within the Mackenzie Delta of the Northwest Territories.

Geographic Scope: First Nations within the Yukon and Mackenzie Delta, Northwest Territories.

Land Claim Status: Ten of the 11 members of the CYFN in the Yukon Territory have settled claims. The White River First Nation's claim is outstanding. As well, the Liard First Nation and Ross River Dena Council who are not part of CYFN's membership have unsettled claims. The four Gwich'in communities within the NT have a settled land claim through the Gwich'in Tribal Council.

Formalized Partnership with NEI: 2003

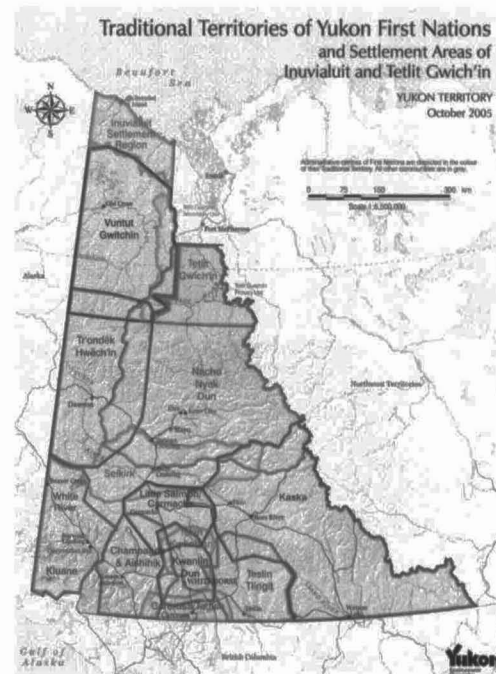
The Circumpolar Relations Department within the CYFN supports Yukon First Nations on matters of regional, national, and international interest. Circumpolar Relations works directly with Yukon First Nations on issues such as contaminants and climate change. The CYFN is a founding member of the Arctic Athabaskan Council – Canada, a permanent participant to the Arctic Council and has been actively involved in circumpolar affairs since 2000.



Photo: M. Bartheaux

“NEI has assisted northern organizations and communities to build capacity. We've been able to connect more science to relevant community concerns.”

Cindy Dickson, Council of Yukon First Nations 2005



Department of Environment Map ID: GIS2003-047-02 © 2004 Environment Yukon

Aboriginal Partner Fact Sheets



Dene Nation

What is the Dene Nation?

The Dene Nation represents the national voice of the Dene in Canada and addresses issues of vital importance for the preservation of Dene identity, culture, and way of life.

Established: 1970 as the National Indian Brotherhood - NT.

Membership Representation: All of the Northwest Territories 29 Dene communities.

Membership Population: Approximately 12,000.

Geographic Scope: First Nations within the Northwest Territories.

Land Claim Status: Three of the five regions represented by the Dene Nation have reached land claim and self-government agreements. The settled land claims are the Gwich'in, the Sahtu, and the Tlicho final agreements. Unsettled claim areas are the Deh Cho Region and the Akaitcho Territory.

Formalized Partnership with NEI: 2003

The Dene Nation Lands and Environment department works directly with the Dene leadership and the technical staff of each regional government and provides support on matters of regional and national interest. The Dene Nation is a founding member of the Arctic Athabaskan Council-Canada, a permanent participant of the Arctic Council, and has been actively involved in circumpolar affairs since 2000. The Dene Nation also works closely with the Assembly of First Nations, a national organization of all First Nations in Canada, which brings Dene environmental views to international forums.



Photo: J. Ward

“It’s so profoundly important that NEI has brought together ITK, CYFN, and the Dene Nation to work on understanding where things are going in the North and how we can be involved with the federal government on this northern program that looks at ecosystem health.”

Chris Paci, Dene Nation 2005

Aboriginal Partner Fact Sheets



Inuit Tapiriit Kanatami (ITK)

What is Inuit Tapiriit Kanatami?

Inuit Tapiriit Kanatami (ITK) is a non-profit organization that provides the national voice of Inuit in Canada. ITK has expanded its aims and objectives in response to the changing social, health, economic, environmental, and political challenges facing Inuit. It

has done so in a manner that reflects the emerging relationship between Inuit and the rest of Canada and between ITK and the four Inuit regional organizations in the Inuvialuit, Nunavut, Nunavik, and Nunatsiavut areas. ITK also works closely with the Inuit Circumpolar Council of Canada (ICC), which represents Inuit in Canada at international forums.

Established: 1971

Representation: Inuit living in 53 communities within the Inuvialuit Settlement Region (ISR) of the Northwest Territories, Nunavut, Nunavik (northern Quebec) and Nunatsiavut (northern Labrador).

Membership Population: more than 53,000

Geographic Scope: Inuit living within the Inuvialuit Settlement Region of the Northwest Territories, Nunavut, Nunavik (northern Quebec) and Nunatsiavut.

Land Claim Status: To date, Inuit representatives have signed four land claim settlements: Nunavik (northern Quebec), Inuvialuit Settlement Region (NT), Nunavut, and Nunatsiavut (Labrador).

Formalized Partnership with NEI: 2003

Inuit Tapiriit Kanatami's Department of Health and Environment works within a complex context that includes: Inuit communities in the Arctic; Inuit living in the South; the land claim organizations; the federal/territorial/provincials governments; and non-government stakeholders such as researchers/universities, health organizations, and Inuit organizations.

“There are no other mechanisms for us to have the capacity to engage staff to work with Environment Canada on an issue, on an initiative.” *Scot Nickels, Inuit Tapiriit Kanatami, 2005*

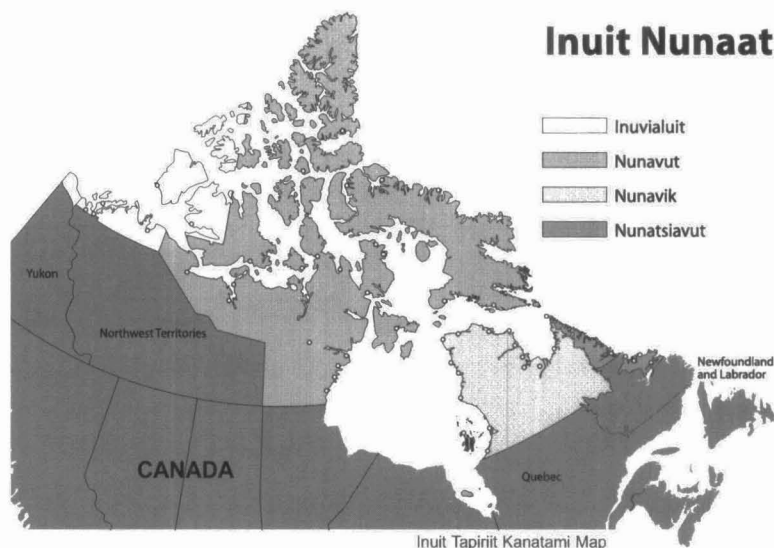
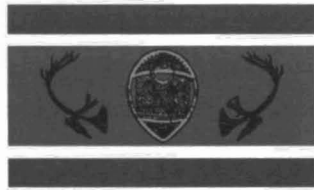


Photo: S. Kneen

Aboriginal Partner Fact Sheets



Innu Nation

What is the Innu Nation?

The Innu Nation is the voice for the Labrador Innu. Through the Innu Council of Nitassinan, a non-government organization (NGO) it has special consultative status to the Economic and Social Council of the United Nations, participates in international forums, including the Convention on Biodiversity and the Permanent Forum on Indigenous Peoples. The Innu Nation is a tribal political organization with a mandate to protect Innu rights and lands, and the Innu way of life, as well, to prepare Innu communities for the responsibilities that they will assume with self-government under a pending final land rights settlement.

Established: 1977

Membership Representation: All Innu who are registered or eligible to be registered as members of either the Sheshatshiu or Natuashish Innu First Nations.

Membership Population: 2,800

Geographic Scope: Innu people of Labrador and the communities of Sheshatshiu and Natuashish.

Land Claim Status: Agreement in Principle in negotiation.

Formalized Partnership with NEI: 2006

Innu Nation maintains an active Environmental office with 18 staff including a registered professional forester, an environmental analysis, and a planner/GIS specialist. The Innu Nations' Environmental Guardians program is engaged in numerous active research or monitoring partnerships with government departments and academic institutions. It also participates in co-management activities under negotiated agreements between Innu Nation and the provincial and federal governments. Innu Nation closely coordinates with Innu organizations in Québec who represent the nine Innu communities there, and is seen as a leader on environmental issues within the region.



Photo: F. Goudie

“While the Innu Nation is a new partner, it has already benefited immensely from the knowledge and expertise of the NEI program, staff and other partners. We now have an opportunity to have input into the collective understanding of northern ecosystems, participate in assessing impacts and finding solutions.” *Valerie Courtois, Innu Nation, 2008*

International Collaboration and Contributions to Climate Change

United Nations Climate Change Conference in Montreal,
Arctic Climate Impact Assessment, International Polar Year

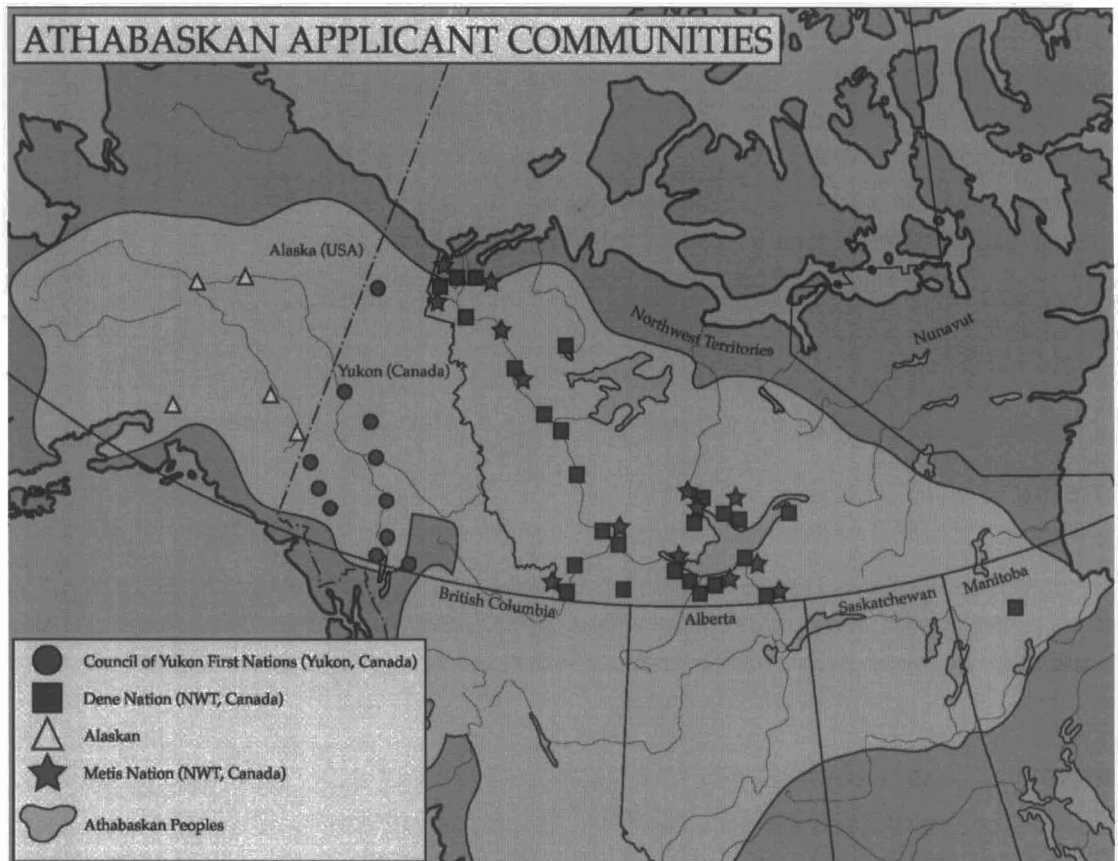
NEI's strategic pan-northern approach to climate change issues created international opportunities for partners and projects at the United Nations Climate Change Conference in Montreal, the Arctic Climate Impact Assessment (ACIA), and International Polar Year (IPY). These activities and reports increased awareness about northern concerns related to the changing environment.

United Nations Climate Change Conference in Montreal

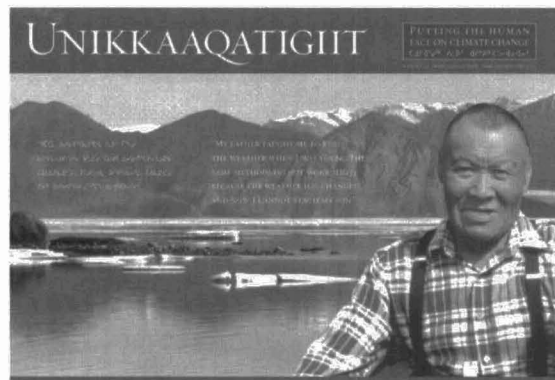
In 2005, Canada hosted the eleventh session of the Conference of Parties to the United Nations Climate Change Convention (COP 11) in Montreal. It was the largest intergovernmental climate conference since the Kyoto Protocol was adopted in 1997 with approximately 10,000 participants from 160 nations.

Arctic Day, an event within the larger international convention, highlighted how climate change is threatening the peoples, cultures, and ecosystems in Northern Canada and other circumpolar regions. Two NEI projects were showcased at Arctic Day: the documentary *Through Arctic Eyes* and *Unikkaaqatigiit: Putting the Human Face on Climate Change*.

The 27 minute video, *Through Arctic Eyes – Athabaskan Observations on Climate Change*, was released by the Council of Yukon First Nations and the Arctic Athabaskan Council. This documentary explores the Athabaskan peoples' observations on the effects of climate change. It brings together traditional knowledge and scientific research to reveal how intricately linked a local environment is to the global ecosystem. To view this film, please visit: <http://www.arcticpeoples.org/2006/09/29/through-arctic-eyes/>



The Athabaskan peoples reside in Arctic and sub-Arctic Alaska, USA, the Yukon Territory and the Northwest Territories of Canada. This region is the fastest warming sub region within the circumpolar North.



The Inuit Tapiriit Kanatami (ITK), the national organization of Inuit in Canada, launched its book, *Unikkaaqatigiit: Putting the Human Face on Climate Change* at Arctic Day. During phase II, NEI supported workshops to gather local observations and traditional knowledge of climate change in the four Inuit regions: Nunatsiavut (Labrador); Nunavik (Quebec); Nunavut; and the Inuvialuit Settlement Region (ISR) of the Northwest Territories. Findings from these workshops provided the information that was critical to the development of the book which chronicles the effects of climate change in these regions and Inuit efforts to adapt to these changes.

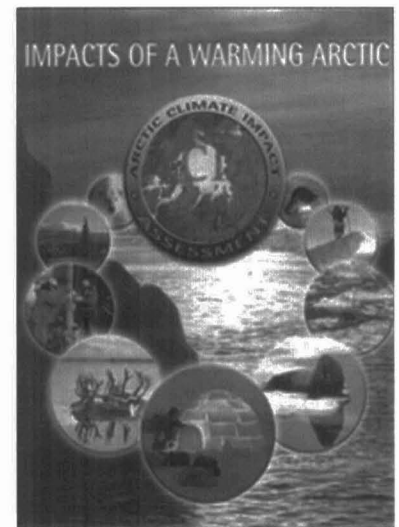
Arctic Climate Impact Assessment

The Northern Ecosystem Initiative provided financial support to a variety of northern organizations and scientific researchers who contributed to the Arctic Climate Impact Assessment (ACIA) which was an Arctic Council and the International Arctic Science Committee (IASC) project.

More than three hundred scientists from fifteen countries worked on the Arctic Climate Impact Assessment which is the world's most comprehensive and detailed regional assessment of climate change. The report, presented at the ACIA International Scientific Symposium in Reykjavik, Iceland in November 2004, concluded that the impacts of a changing climate are already being felt and are projected to become much greater, affecting many aspects of life in Canada's North. This landmark document provides important direction on current and future priorities for climate change research in the circumpolar north.

Funding was provided to several organizations to participate in the ACIA. In addition to supporting Inuit and Yukon First Nations' initiatives associated with climate change, NEI funded three workshops hosted by the Northwest Territories Denendeh Environmental Working Group (DEWG). The workshops brought together community members from Denendeh (the Northwest Territories) representing the Gwich'in, Sahtu, Dehcho, Tlicho, and Akaitcho regions. At these workshops, participants discussed their observations, local and regional climate change issues, and the impacts. These perspectives provided case study information for the Dene Nation's participation in the ACIA.

For more information on the Arctic Climate Impact Assessment, visit: <http://www.acia.uaf.edu/>



International Polar Year (IPY)

The International Polar Year (IPY) 2007-2008 is a two-year science, research and education program focused on the Arctic and Antarctic. As part of IPY, the Government of Canada supported programs for its northern regions: climate change impacts and adaptation and the health and well-being of northern communities. This IPY was the first to include the human, social, and economic aspects of life in the North. The focus was compatible with NEI's integrated approach to scientific research.

Eleven of the 44 Canadian science and research projects selected for IPY 2007-08 had links to NEI. The Northern Ecosystem Initiative climate change and community-based projects aligned with and contributed to IPY; therefore, projects that began with NEI funding were able to continue and expand under International Polar Year.





Betsy Etidloie and Peter Tookalook from Nunavik working on a local climate change project which involved mapping local trail networks.

NEI Project Partners 2003-2008

In addition to the partnerships that exist at the NEI program level through the Steering Committee, many projects also involved partnerships with other funding organizations. Through the establishment of project partnerships, universities, scientific and research institutions leveraged funding and in-kind resources to examine northern ecosystem issues. For every institution, university or research centre involved in an NEI project, there were on average, four other partner organizations providing cash or in-kind support. On average, each project had five participating organizations. The more partners involved, and support provided for a project, the more likely it will continue after NEI funding ends.

As support for a project grew, the impact of NEI activities on local and regional planning and decision-making was strengthened through community awareness, involvement, and engagement. For example, a project co-led by Laval University's Centre d'études nordiques and Ouranos Consortium helped to document the impact of climate change on local trail networks used by four northern Québec communities. An Internet site (<http://climatechange.krg.ca>) provides information that can be accessed by communities and regional agencies for land use planning, community education and by individuals who would like to know about ice safety issues before accessing the trails. This project is the first of its kind in the region and since its inception has garnered great support and interest among the participating communities and regional organizations. As of winter 2007, the group involved with this project will be contributing to the development of a community-based research project in Sanikiluaq, Nunavut and is also involved with two IPY projects: *Variability and Change in the Canadian Cryosphere- A Canadian contribution to the "State and Fate of the Polar Cryosphere"* and another project on the study and the use and occupation of sea ice by the Inuit.

The following organizations contributed financial or in-kind resources to NEI projects during Phase II.

A

Acadia University
Akaitcho Territory Government, NT
Ajunnginiq Centre
Alberta Conservation Association
Alberta Ingenuity Fund
Alberta Research Council
Alberta Sustainable Resource Development
Alberta Sports Parks and Recreation
Akulivik Landholding Corporation
Alsek Renewable Research Council
Anglo American Exploration Canada
Arctic Athabasca Council
Arctic Borderlands
Ecological Knowledge Co-operative
Arctic Council
Arctic Institute of
North America Research Station
Arctic Program at GRID-Adrendal in Norway
ArcticNet
Armitage Toponym
Ashini Goupil
Aurora Research Institute/Aurora College
Austrian Academy of Science
Avataq Cultural Institute Inc.
AXYS Environmental Consulting Ltd.

B

Beverly /Qamanirjuaq
Caribou Management Board
Botanical Gardens
Conservation International

C

Canadian Arctic Shelf Exchange Study
Canadian Arctic Tundra
and Taiga Experiment (CANTTEX)
Canadian Circumpolar Association
Canadian Conservation Institute
Canadian Energy
Pipeline Association (CEPA)
Canadian Foundation for
Climate and Atmospheric Sciences
Canadian Helicopters
Canadian Heritage
Canadian Institute of Resources Law
Canadian Network for
Isotopes in Precipitation
Canadian Nuclear Safety Commission
Canadian Royalties Incorporated
Canadian Space Agency
Canadian Zinc Corporation
Carlton University
Champagne - Aishihik First Nation
Churchill Northern Studies Centre
Circumpolar Biodiversity Monitoring Program
Community of Cape Dorset
Community of Hopedale
Community of Igloolik
Community of Kangiqsujuaq
Community of Kangisqsuallujjaq
Community of Kuujuaq
Community of Nain
Community of Pangnirtung
Community of Puvirnituq
Community of Rigolet
Community of Quaqtaq
Community of Salluit
Community of Tasuijaq

C

Conoco-Phillips
Consortium OURANOS
Council of Yukon First Nations
Cree Nation of Chisasibi
Cree Nation of Eastmain
Cree Nation of Mistissini
Cree Nation on Nemaska
Cree Nation of Waswanipi
Cree Nation of Wemindji
Cree Nation of Whapmagoostui
Cree Regional Authority
Cree Trapper Association
Cruise North Expeditions
Cygnus Consulting
Cryosphere System in Canada

D

Dawson District Renewable Resource Council
Deline Renewable Resources Council
Dene Nation
Denendeh Environmental Working Group
Deninu Kue First Nation
Department of Energy, Mines and Resources

- Department of Environment
- Department of Forestry Management

DIALOG (Le réseau québécois d'échange sur les questions autochtones/le réseau de recherche et de connaissances relatives aux peuples autochtones)
Ducks Unlimited Canada

E

Ecology North (NT)
ÉEM/Dessau-Soprin Consulting
Environment Canada:

- Atlantic Region
- Ontario Region
- Pacific and Yukon Region
- Prairies and Northern Region
- Québec Region
- Environmental Stewardship Directorate
- Meteorological Services of Canada
- Science and Technology Directorate
- Strategic Policy Directorate
 - Ecological Monitoring and Assessment Network (EMAN)
 - Plantwatch North (Alberta, Manitoba, Newfoundland/Labrador, Northwest Territories, Nunavut, Yukon)

Environmental Dynamic Incorporate
Environmental Management Planning Committee – Labrador (EMPC)
Environmental Sciences Group (Royal Military College)
Exchange for Local Observations and Knowledge in the Arctic

F

Falconbridge-Noranda Limited

Faroese Local Government – Faroe Islands

- Food and Environmental Agency
- Fédération des coopératives du Nouveau- Québec

First Nation of Na-Cho Nyak Dun

Fisheries and Oceans Canada

- Central and Arctic Region
- Newfoundland and Labrador Region

Fonds québécois de recherche sur la nature et les technologies

Fonds Restor-Action Nunavik

Foramec Inc.

Forem Technologies

Fort Resolution Environmental Working Committee

Foundation EJLB

G

GeoArctic International Limited

Government of the Northwest Territories

- Department of Environment and Natural Resources
- Department of Health and Social Services

Grand Council of the Crees (Eeyou Istchee)

Great Bear Lake Working Group

Gwich'in Elders and Harvesters

Gwich'in Renewable Resources Board

Gwich'in Tribal Council

H

Hamlet of Arctic Bay

Hamlet of Cape Dorset

Hamlet of Igloolik

Hamlet of Kugaaruk

Hamlet of Pangnirtung

Hamlet of Repulse Bay

Health Canada

Human Dimension of the Arctic Systems

Human Resources and Skills Development Canada

- Aboriginal Human Resource Development Strategy

Hunters and Trappers Associations of Nunavik

Hunters and Trappers Committee of Ulukhaktok, NT

Hunters and Trappers Committee of Paulatuk, NT

Hunters and Trappers Committee of Sachs Harbor, NT

Hunters and Trappers Committee of Tuktoyaktuk

Hydro Quebec

I

Institute of Arctic Biology

Institute for Environmental Monitoring
and Research

Institut national de la recherche scientifique

Indian and Northern Affairs Canada

- Atlantic Region
- NT Region
- Nunavut Region
- Ontario Region
- Yukon Region
- Contaminants and
Remediation Directorate
- Intergovernmental Affairs
and Inuit Relations Directorate
- Northern Science and
Contaminants Research Directorate
- Renewable Resources
and Environment Directorate
 - Initiative on Avian Influenza

Innu Band Councils

Innu Nation

Innu Nation of Matimekossh-Lac John

Institute of Arctic Biology

International Arctic Science Committee

International Atomic Energy Association

International Polar Year Program

Inuit Tapiriit Kanatami

Inuvialuit Joint Secretariat, Inuvik NT

J

Jacques Whitford Environment Limited

James L. Baillie Memorial Fund

K

Kakivak Corporation

Kaska Forest Resources Stewardship Council

Kaska Tribal Council

Kativik Environmental Advisory Committee

Kativik Regional Government

KJW Environmental
and Biological Consulting

L

Labrador Contaminants Working Group

Labrador Highlands Research Group

Labrador Highway Project

Labrador Inuit Association Ecological
Research Unit and Guardian Program

Labrador Institute

LB Gespion

Liard First Nation

Liidlii Kue First Nation

Louis Marie Herbarium

M

Mackenzie GEWEX Study

Makivik Corporation

Manitoba Naturalist Society

Mayo District Renewable Resource Council

McGill University

Centre for Indigenous Peoples'
Nutrition and Environment (CINE),
McGill University

McMaster University

Memorial University

Ministère des Ressources naturelles
et de la Faune du Québec

Municipality of Sanikiluaq

Mushkegowuk Lands and Resources

N

Nasivvik
 Naskapi Nation of Kawawachikamach
 Naskapi Band Council
 Naskapi Development Corporation
 Naskapi Elders
 Naskapis Adoschaouna Services
 National Aboriginal Forestry Association
 National Aboriginal Health Organization (NAHO)
 National Opinion Research Services
 National Science Foundation
 Native Communications Society
 Natural Resources Canada
 Earth Sciences Sector
 Energy Sector
 Natural Resources Institute
 Natural Science and Engineering Research Council of Canada (NSERC)
 Nature Serve Yukon
 Newfoundland and Labrador Government

- Department of Conservation and Environment
- Department of Fisheries and Aquaculture
- Department of Forestry and Agri-foods
- Department of Labrador and Aboriginal Affairs
- Department of Tourism, Culture, and Recreation
- Department of Transportation and Works

Noetix Research Inc
 NORPAQ Adventues and Services Air Charters
 North American Tungsten
 North Yukon Planning Commission

Northern Aboriginal Resource and Development Alliance (NARDA)
 Northern Climate ExChange
 Northern Québec Village of Aupaluk
 Northern Québec Village of Tasiujaq
 Northwest Territory Métis Nation
 Norwegian Polar Institute
 Novawest Resources Incorporated
 Nunatsiavut Government
 Nunavik Regional Board of Health and Social Services
 Nunavik Research Centre
 Nunavik Rotors
 Nunavut Government
 Nunavut Research Institute
 Nunavut Tungavik Incorporated
 Nunavut Wildlife Management Board

O

Ocean Management Research Network
 Oikitaaluk Inuit Association
 Ontario Ministry of Natural Resources
 Ouje-Bougoumou Cree Nation

P

Parks Canada

- Atlantic Service Centre
- Ontario Service Centre
- Western and Northern Service Centre

Patuxent Wildlife Research Center
 Personal Accommodations
 Porcupine Caribou Management Board

Q

Qekeirriaq
 Qikiqtaaluk Wildlife Board

R

Raglan Mines
Regional Inuit Organization in Nunavik
Regional Inuit Organizations/Hunter and Trapper Organizations
Ross River Dena Council

S

Sahtu Dene Council
Sahtu Land Use Planning Board
Saint Mary's University/
Gorsebrook Research Institute
Salmo Consulting
Schools on Board
Sea Duck Joint Venture
Social Sciences and
Humanities Research Council
Société Duvetnor
South Slave Research Centre
Southern Lakes Caribou Steering Committee

T

The Bridge Fund
The Yukon River Inter-Tribal Watershed Council
Tlicho Government
• Tlicho Logistics
Transport Québec
Trent University
Tshikapisk Foundation

U

United States Geological Survey
University of Alberta
• Integrated Landscape Management Group, University of Alberta
• Sustainable Forest Management Network, University of Alberta
University of British Columbia
University of Calgary
University of Colorado
University of Guelph
University of Innsbruck, Austria
University Laval
• Centre of Northern Studies
• Centre for Inuit Health and Changing Environments
• Centre Hospitalier Université Laval (CHUL)
• University of Manitoba
• Centre For Earth Observation Science (University of Manitoba)
• University of New Brunswick
• University of Northern BC
• University of Quebec
• Centre Hospitalier Universitaire de Québec (CHUQ)
Université of Québec at Rimouski
Université of Québec at Trois-Rivières
University of Saskatchewan
University of the Arctic
University of Toronto
University of Victoria
University of Washington
University of Western Ontario
University of Windsor
• Great Lakes Institute for Environmental Research
University of Winnipeg

W

Walter and Duncan Gordon Foundation

Waskaganish First Nation

Western Arctic Herd Working Group

Whapmagoostiu First Nation

Wilfred Laurier University

World Wildlife Fund-Arctic Program

X

Xstrata Nickel

Y

Yukon College

Yukon Government

Yukon River Inter-Tribal Watershed Council

Individual listings of NEI Projects

Yukon Projects 2003 to 2008			
NEI Priority Table	NEI Funding Duration in Years	Page	Title
Capacity-Building	1	62	Yukon Community Stewardship Program (Kluane Steward)
Capacity-Building	1	63	Through Arctic Eyes: Athabaskan Observations of Climate Change DVD
Climate Change	1	63	Effects of Climate Change on the Caribou Herds Located on Ross River Dena Lands
Climate Change	1	64	Improving Yukon Climate Change Research - Community Communications
Climate Change	1	65	CYFN Elders Panel on Climate Change Information Pamphlet "Helping the Environment"
Climate Change	2	66	Managing in the Face of Climate Change: Building the Environmental Information Base in Southwest Yukon
Contaminants	2	67	Waste Management Sites/Community Consultation and Planning
Monitoring	4	68	Yukon Boreal Forest Monitoring Project
Resource Use	1	69	The Kaska Applied Traditional Knowledge Project
Resource Use	1	70	Southern Lakes Caribou – A Case Study for the Implementation of Thresholds Based Community Decision Making in Managing Resource Use and Development on a Caribou Winter Range
Resource Use	1	71	*Working Landscapes: Cumulative Effects Integrated Ecosystem Thresholds Project Coordinator
Resource Use	1	72	Working Landscapes: Human Activity Thresholds Based on Maintenance of Woodland Caribou
Resource Use	1	73	Working Landscapes: Cumulative Effects Thresholds Implementation in Yukon and NT: Practical and Realistic Strategies
Resource Use	1	74	Working Landscapes: Development of an Integrated Landuse Simulation Model ("ALCES North") for the Purpose of Defining Landscape and Landuse Thresholds in a NEI Landscape
Resource Use	1	75	Working Landscapes: ALCES Model Customization, and Technical Support for Yukon Land Use Planning Region
Resource Use	3	76	*Working Landscapes: Application of Dose-Response Curves and Thresholds to a Landscape Scale for Northern Waters
Resource Use	3	77	*Working Landscapes: Social/Economic and Integrated Landscape Modeling Components
Total: 17 projects			

*: project occurs in more than one geographic area (territory/province)

Yukon Community Stewardship Program (Kluane Steward)

Lead: Yukon Fish & Wildlife Management Board (YFWMB)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Yukon River Restoration and Enhancement Panel, Duck's Unlimited (DU), Walter and Duncan Gordon Foundation, Nacho Nyak Dun First Nation, Tr'on dek Hwetch'in, Champagne and Aishihik First Nations (CAFN), Kluane First Nation (KFN) and White River First Nation (WRFN), Mayo District Renewable Resource Council, Dawson District Renewable Resource Council, Alsek Renewable Resource Council (ARRC), Yukon Territorial Government (YTG)

Location: Haines Junction, Yukon

Total Project Funding (not including NEI): \$207,401.00

NEI Funding: \$10,000.00 in 2003/04

Funding Table: Capacity-Building

Program Priority Areas: Monitoring, Capacity-Building

Purpose: to achieve conservation and stewardship of fish, wildlife and habitat through community participation in locally driven projects.

Identified Results:

With direction from the program partners the Steward has:

- Developed a proposal for a Habitat Protection Area for the Jarvis-Kloo Lake wetlands in response to recommendation in the Aishihik integrated wildlife plan;
- Supported the Alsek River Integrated Fisheries Management Plan;
- Assisted Champagne-Aishihik First Nations with ongoing implementation of their Community Salmon Management Plan as required;
- Assisted with the implementation of the Dezadeash Management Plan;
- Supported the input of community priorities to the Yukon River Canadian Sub-basin Salmon Plan and the Yukon River Restoration and Enhancement Plan.

Through Arctic Eyes

Athabaskan Observations of Climate Change DVD

Lead: Council of Yukon First Nations (CYFN)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Yukon and Alaska

NEI Funding: \$33,000.00 in 2005/06

Funding Table: Capacity-Building

Program Priority Areas: Climate Change, Monitoring, Capacity-Building

Purpose: to create two, twenty-two minute mini-series documentaries for presentations or commercial television that depict the Athabaskan culture through time and their approach to meeting/adapting to the challenges of global warming.

Identified Results:

- A 27 minute DVD on regional climate change observations was created and highlights observations on climate change by the Athabaskan people;
- This DVD showcased northern observations of local climate change and was launched at the United Nations Climate Change Conference in Montreal in November 2005.

Effects of Climate Change on the Caribou Herds Located on Ross River Dena Lands

Lead: Ross River Dena Council

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Yukon Territorial Government

Location: Yukon

Total Project Funding (not including NEI): \$38,050.00

NEI Funding: \$35,610.00 in 2004/05

Funding Table: Climate Change

Program Priority Areas: Climate Change, Capacity-Building

Purpose: to identify local concerns, summarize available traditional and scientific data, and identify knowledge gaps to improve the understanding of climate change on the health and distribution of the Finlayson caribou herd (woodland caribou) located on Ross River Dena Lands (part of the Kaska Traditional Territory).

Identified Results:

- Used scientific publications, traditional knowledge interviews and information published by the Ross River Dena Council to establish a database for collecting and comparing existing data on caribou and climate change;
- Identified contradictions and knowledge gaps about caribou and climate change in relation to scientific and traditional knowledge.

Through
Arctic Eyes

Athabaskan
Observations
of Climate
Change DVD

Effects of
Climate
Change on
the Caribou
Herds

Improving Yukon Climate Change Research

Community Communications

Lead: Council of Yukon First Nations (CYFN)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Council of Yukon First Nations Elders Panel, Arctic Athabaskan Council

Location: Yukon

Total Project Funding (not including NEI): \$9,450.00

NEI Funding: \$30,250.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to develop better communications and involvement between Yukon First Nations and northern climate change research and researchers by bringing scientists and Yukon First Nation community representatives/Elders together at a workshop to share information and knowledge.

Identified Results:

- Forty-three participants including researchers, coordinators, government officials, and independent consultants attended the workshop;
- Shared ideas on how to build on existing projects and develop new initiatives;
- Recommended that similar workshops be held in other Yukon First Nation communities;
- Improved awareness and communications helped build local and research capacity for climate change research in the North;
- Identified the need to develop regional or community action on climate change action plans to facilitate the active engagement of First Nation communities in climate change related decision-making.

CYFN Elders Panel on Climate Change Information Pamphlet

“Helping the Environment”

Lead: Council of Yukon First Nations (CYFN)

Partners: Environment Canada’s Northern Ecosystem Initiative (NEI),
CYFN Elders Panel

Location: Yukon

Total Project Funding (not including NEI): \$13,050.00

NEI Funding: \$7,500.00 in 2004/05

Funding Table: Climate Change

Program Priority Areas: Capacity-Building, Climate Change, Monitoring

Purpose: to develop a pamphlet by Yukon First Nation elders that describes the changes to their lands, offers practical ways of reducing climate change impacts to the North, and incorporates results from the Arctic Climate Impact Assessment to show linkages between traditional knowledge and scientific findings.

Identified Results:

- Two pamphlets were created: Elders Panel on Climate Change;
- Elders Panel for the Arctic Athabaskan Council;
- Pamphlets describe some of the environmental changes being seen;
- The pamphlet was distributed to all First Nation communities in the Yukon as well as at local and international climate change meetings e.g. at the Arctic Council and United Nations.

CYFN
Elders
Panel on
Climate
Change
Information
Pamphlet

Managing in the Face of Climate Change

Building the Environmental Information Base in Southwest Yukon

Lead: Northern Climate Exchange

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Carleton University (National Science and Engineering Research Council post-doctorate grant), Champagne - Aishihik First Nation, Alsek Renewable Resource Council, Yukon Government Forestry Management Branch, Canadian Climate Impacts and Adaptation Research Network (C-CIARN) North, Parks Canada, Social Sciences and Humanities Research Council.

Location: southwestern Yukon including communities of Haines Junction, Champagne and Aishihik, and the surrounding forests

Total Funding (not including NEI): \$32,000.00 in 2004/05; \$8,250.00 in 2005/06

NEI Funding: \$10,100.00 in 2004/05; \$10,500.00 in 2005/06

Funding Table: Climate Change

Program Priority Areas: Climate Change, Resource Use

Purpose: to develop baseline information needed to support informed management decisions in the face of climate change in the southwest Yukon. As well, to improve access to existing scientific information and local knowledge, and to facilitate the communication between scientists, government, and local communities to assess potential climate change impacts within the study region.

Identified Results:

- The results of this project are available on the website in a database/ compendium which includes scientific, traditional, and local knowledge, data and information, and compilation of information sources;
- The web-based searchable database includes bibliographic descriptions of all relevant and publicly accessible information sources relevant to this project <http://yukon.taiga.net/swyukon/compendium/index.cfm>;
- An overview report describes results to date, assesses gaps in knowledge base, and identifies issues and implications for forest management;
- Produced a workshop outcomes report which may become the basis for the development of a preliminary research framework.

Waste Management Sites Community Consultation Planning

Waste Management Sites Community Consultation Planning

Lead: Yukon River Inter-Tribal Watershed Council (YRITWC)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Environmental Dynamics (Through the workshops, the staff of the Lands and Resources departments of each of the First Nations have helped the project team coordinate the community visits, and Indian and Northern Affairs Canada (INAC) and the Yukon Territorial Government (YTG) have provided the project team with existing data on sites in existence), Alaska Office of the YRITWC provided in-kind funds.

Location: Yukon

Total Project Funding (not including NEI): \$14,625.00

NEI Funding: \$20,320.00 in 2005/06

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to enable communities and individuals to participate and help set priorities on waste management/contaminated sites in the Yukon.

Identified Results:

- Eleven of 14 First Nation communities in the Yukon participated in information exchanges/open houses on contaminated sites;
- Twenty two "new" contaminated sites were identified throughout the Yukon Territory by nine of the First Nations;
- Maps identifying participating First Nations' traditional territories, new water management/contaminated sites location were produced and are posted on the Yukon River Inter-Tribal Watershed Council's website: www.yritwc.com;
- Identified water quality monitoring, site assessment and remediation, and youth involvement as important and determined some necessary follow-up steps;
- Relationships between agencies, communities, and First Nations were built/strengthened;
- Many individuals and communities are concerned about sites that do not meet the Federal or Yukon Government priorities for restoration or remediation;
- There may be opportunities for First Nations of the YRITWC to spearhead clean-up on these sites (i.e. access other funding sources and use local resources to address the issue at these sites).

Yukon Boreal Forest Monitoring Project

Lead: University of British Columbia (Vancouver)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Parks Canada, Arctic Institute of Northern America Research Station at Kluane Lake, University of Alberta (Edmonton), University of Toronto, Yukon Department of the Environment, Yukon College, First Nation of Nacho Nyak Dun (NND), Mayo District Renewable Resources Council (MDRRC), local community members, Kaska Tribal Council (Watson Lake 2005/2006 onwards), National Science and Engineering Research Council (NSERC) 2005/06 onwards

Location: Yukon

Total Project Funding (not including NEI): \$202,000.00 in 2004/05; \$148,150.00 in 2005/06; \$135,100.00 in 2006/07; \$197,000.00 in 2007/08

NEI Funding: \$55,000.00 in 2004/05; \$55,000.00 in 2005/06; \$54,500.00 in 2006/07; \$52,750.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change, Capacity-Building

Purpose: to continue to monitor and expand the *Kluane Ecological Monitoring Project (KEMP)* in the Yukon boreal forest ecosystems focusing on the boreal forest food web and addressing two specific issues – climate change and the large spruce bark beetle outbreak.

Identified Results:

- Historical site conditions and traditional information from First Nation elders and other long-time residents was used to create a broad baseline to measure the impacts of climate change in Yukon forests;
- Developed a new Community Ecological Monitoring Project (CEMP) to gather traditional and local knowledge and environmental conditions and involve local residents in ecological monitoring;
- Established new monitoring sites near Mayo, Whitehorse and Watson Lake;
- Carried out technical monitoring on all Yukon sites, and conducted local ecological knowledge (LEK) interviews annually;
- Continued to annually monitor 12 key physical and biotic parameters of the boreal ecosystem throughout 2003 to 2008;
- Held workshops and interviewed Elders and community members who noted more extreme or variable weather conditions and events - temperature, rain and snow, fires, thunderstorms;
- Gathered support for hypothesis that up-slope advancement or thickening of trees and shrubs on mountain slopes is reducing dall sheep habitat;
- Produced a standardized monitoring manual;
- Results obtained to date for the entire project are available from the website at: <http://www.zoology.ubc.ca/~krebs/kluane.html>.

The Kaska Applied Traditional Knowledge Project

Lead: Kaska Tribal Council, Yukon Conservation Society

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Kaska Traditional Territory, Yukon

Total Project Funding (not including NEI): \$43,075.00

NEI Funding: \$7,150.00 in 2003/04

Funding Table: Resource Use

Program Priority Areas: Resource Use, Capacity-Building

Purpose: to ensure that Traditional Knowledge (TK) is fully incorporated into planning and policy development in Kaska traditional territory as required under the Kaska Memorandum of Understanding (MOU) on Forest Stewardship and the Kaska-Yukon Bilateral Agreement.

Identified Results:

- Developed traditional knowledge template to organize and document information;
- Hired three researchers to retrieve, consolidate, and organize the traditional knowledge information collected to date in the Kaska traditional territory;
- More than 350 entries were made into TK research data summary forms;
- Information will be used in forest management and resource planning initiatives currently underway;
- The well-organized database of TK information is now readily and easily available.

The Kaska
Applied
Traditional
Knowledge
Project

Southern Lakes Caribou

A Case Study for the Implementation of Thresholds Based Community Decision Making in Managing Resource Use and Development on a Caribou Winter Range

Lead: Yukon Department of Environment

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Southern Lakes Caribou Steering Committee, Kwanlin Dun First Nation, Carcross Tagish First Nation, Ta'an Kwach'an Council, Yukon Community Services, Yukon Energy Mines and Resources, NatureServe Yukon, Parks Canada

Location: Yukon

Total Project Funding (not including NEI): \$66,400.00

NEI Funding: \$12,000.00 in 2003/04

Funding Table: Resource Use

Program Priority Areas: Resource Use, Monitoring

Purpose: to develop a clear picture of human impacts on the Carcross caribou winter range using existing threshold data (habitat quality, animal use) and GIS and GPS radio-collar technologies to develop strategies to reduce the human footprint on the land and redirect local activity into less sensitive areas.

Identified Results:

Most conclusions are interim, pending the completion of the GIS/image analysis work.

- 5627 GPS caribou radio collar locations analyzed;
- Eleven new radio collars purchased and six were placed on caribou;
- Key selected caribou winter habitats cover approximately 27 percent of the winter range of which the two pine forest communities make up half of the winter habitats (15 percent of the winter range);
- One type of forest (closed conifer) is avoided by caribou. However a relatively large proportion of the caribou locations (25 percent of the total) occur in this forest type due to its abundance on the winter range. This association between caribou and this and other winter habitats require further evaluation;
- Habitat specific zone of influence (ZOI) mapping captured a significant portion of linear features and is available in digital versions;
- Consideration of a caribou winter range as a finite entity, with a limited pool of resources, is an essential concept to convey if cumulative effects are to be addressed. Further, that each effect exerts an influence beyond the physical extent of the activity (ZOI) is also an essential message.

Cumulative Effects Integrated Ecosystem Thresholds Project Coordinator

*Working Landscapes

Lead: Salmo Consulting

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Yukon, Northwest Territories

NEI Funding: \$24,999.00 in 2004/05; built in as a sub-component of other Working Landscapes projects in following years

Funding Table: Resource use

Program Priority Areas: Resource Use

Purpose: to ensure various studies defined appropriate indicators, consolidated data, modified available modeling tools, developed communications material and met with stakeholders thereby contributing to a threshold implementation framework that could be readily applied by territorial land use planners and resource managers.

Identified Results:

- Confirmed a case study with the Kaska Forest Resources Stewardship Council (KFRSC) for the Kaska traditional territory in the southeast Yukon in 2004 and 2005;
- Confirmed a case study with the North Yukon Land Planning Commission (NYPC) for a short-term (nine month) north Yukon pilot project to test various the computer model: A Landscape Cumulative Effects Simulator (ALCES) North model using several key indicators – moose, caribou, economic values;
- Ensured that several research studies were fast-tracked: fisheries, woodland caribou, ALCES North, implementation framework to meet the timelines of the Kaska Regional Forest Resources Management plan;
- Participated in three workshops and ten meetings, made ten presentations, facilitated one workshop in Whitehorse attended by over 100 territorial, federal, First Nations, non-government organizations, and public representatives, and participated in two teleconferences;
- Prepared and distributed an initial project overview to team members and NEI Resource Use Table and a detailed project overview to potentially interested land use planning groups in the Yukon and the NT.

The partners for the following Working Landscapes projects are listed individually for each component. The collaborators on the overall Working Landscapes Project include:

University of Alberta (Edmonton)
Alberta Research Council
Alberta Sustainable Resource Development
AXYS Environmental
Canadian Institute of Resources Law
Environment Canada's Canadian Wildlife Service and National Water Research Institute
Forem Technologies
Salmo Consulting
University of Saskatchewan (Saskatoon)

Human Activity Thresholds Based on Maintenance of Woodland Caribou

Lead: University of Alberta (Edmonton)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Yukon

NEI Funding: \$24,500.00 in 2004/05

Funding Table: Resource Use

Program Priority Areas: Resource Use

Purpose: to evaluate and extend cumulative effects thresholds developed for caribou in northeastern Alberta into the Yukon case study areas and incorporate the information into an integrated landscape management model to evaluate ecological, social, and economic impacts of applying these thresholds in Canada's North.

Identified Results:

- Prepared information on existing documented caribou population change for the second phase of amassing GIS layers for human activities in caribou range;
- Compiled population inventory and land use data for woodland caribou herds in Alberta, British Columbia, and Yukon;
- Held workshops in Whitehorse that confirmed appropriate approach for the development of thresholds of human activity in caribou range;
- Incorporated caribou targets/relationships into A Landscape Cumulative Effects Simulator (ALCES) North;
- Preliminary analyses suggested that both linear features such as roads and cut lines and the amount of young forest (created by forest harvesting) are likely to affect caribou population growth.

Cumulative Effects Thresholds Implementation in Yukon and NT: Practical and Realistic Strategies

Working Landscapes

Lead: AXYS Environmental Consulting Ltd.

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Yukon

NEI Funding: \$16,000.00 in 2004/05

Funding Table: Resource Use

Program Priority Areas: Resource Use

Purpose: to investigate the challenges, opportunities and options for including and implementing thresholds in land use decision- making.

Identified Results:

- Generated awareness of the benefits of implementing thresholds in land use decision-making through the attendance and presentation by AXYS Consulting at the workshop *Integrated Cumulative Effects Thresholds Project* in Whitehorse March 2, 2005;
- Identified the benefits of implementation tools:
 - Reduces uncertainty for industry;
 - Provides transparent and defensible information;
 - Reduces (not increases) development costs;
 - Supports community/aboriginal communications;
 - Provides higher certainty;
 - Encourages collaboration.

Development of an Integrated Landuse Simulation Model (“ALCES North”) for the Purpose of Defining Landscape and Landuse Thresholds in a NEI Landscape

Lead: Forem Technologies

Partners: Environment Canada’s Northern Ecosystem Initiative (NEI)

Location: Yukon

Total Project Funding (not including NEI): \$15,600.00

NEI Funding: \$23,300.00 in 2004/05; built in as a sub-component of other Working Landscapes projects in later years

Funding Table: Resource Use

Program Priority Areas: Resource Use

Purpose: to develop a customized land use simulation model that enables stakeholders to explore the consequences of defined land use and natural disturbance regimes on selected social, economic, and ecological indicators.

Identified Results:

- Modified A Landscape Cumulative Effects Simulator (ALCES) North model for the Kaska Forest Resource Stewardship Council Case Study to include aquatic health pathways and indicators, preliminary climate change pathways, index of mammalian integrity relationships, and appropriate landscape and land use canisters;
- Modified ALCES North model for the North Yukon Planning Commission pilot project and;
- Trained land use planners to use the ALCES North;
- Model used during regional land use planning process in the north Yukon;
- Completed initial modification of the ALCES North model to accommodate proposed “climate change” scenarios and effects;
- Upgraded functionality of ALCES North model to permit more community specific simulation scenarios;
- Customized various land use engines within ALCES North to reflect relevant Yukon landscape types and land impact types.

ALCES Model Customization, and Technical Support for Yukon Land Use Planning Region

Working Landscapes

Lead: Environment Canada, Yukon Region

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Forem Technologies, North Yukon Planning Commission

Location: north Yukon

Total Project Funding (not including NEI): \$10,000.00

NEI Funding: \$10,000.00 in 2005/06

Funding Table: Resource Use

Program Priority Areas: Resource Use, Capacity-Building, Climate Change, Monitoring

Purpose: to customize the ALCES model for the north Yukon planning region, provide the technical assistance to populate the customized ALCES model, and run the ALCES model for stakeholder-generated scenarios.

Identified Results:

- Trained Northerners to populate and use ALCES and ALCES North;
- Customized the ALCES model to run modeling plan scenarios for the North Yukon Land Use Planning Councils land use planning process;
- Enhanced the relationship between NEI/Environment Canada, the North Yukon Planning Commission and Yukon Government;
- The NYPC released the Draft North Yukon Land Use Plan in October 2007.

Application of Aquatic Dose-Response Curves and Thresholds to a Landscape Scale for Northern Waters

Lead: Environment Canada's National Water Research Institute in 2004/05 but became the University of Saskatchewan's Toxicology Centre in subsequent years

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Alberta Sustainable Resource Development, University of Western Ontario (London, Ontario), Acadia University (Wolfville, Nova Scotia), Salmo Consulting, Can Tung and Canadian Zinc mines, Indian and Northern Affairs Canada (INAC), Parks Canada, Aurora College Environmental Monitor Training Program

Location: Yukon, Northwest Territories

Total Project Funding (not including NEI): \$180,500.00 in 2004/05; \$85,000.00 in 2005/06; \$270,000.00 in 2006/07

NEI Funding: \$18,000.00 in 2004/05; \$50,250.00 in 2005/06 ; \$65,550.00 in 2006/07

Funding Table: Resource Use

Program Priority Areas: Resource Use, Climate Change, Contaminants, Monitoring, and Capacity-Building

Purpose: to use a common approach to understand how different land uses (e.g. construction of roads, mineral, oil and gas exploration, etc.) have a cumulative effect on water, wildlife, and people and to produce tools for resource managers to develop a vision of the future.

Identified Results:

- Demonstrated through data from Environment Canada (BISY dataset) that aquatic communities (bottom-dwelling insects) were similar between the Fraser (BC) and Yukon rivers. This was the first step to demonstrate that the process defined for the south could work for the north and the aquatic animal communities were similar;
Developed a "first-time" set of predictive relationships to show how changes in land use affected indicators of aquatic ecosystem health so that aquatic ecosystem health can be detected at an earlier stage;
- Established reference conditions for aquatics in the South Nahanni River basin for water quality, bottom-dwelling insects and fish community structure which added to the data collected in the Yukon River Basin;
- Intensive sampling around Prairie Creek mine and Flat River mine sites in the Northwest Territories provided information to help develop dose-response relationships (the point at which exposure to a dose (a contaminant) creates a poison for the aquatic environment for northern mining activities;
- Sampling results formed the basis of the EEM (Environmental Effects Monitoring) program for Tungsten Mine and foundations for a cumulative effects assessment for Canadian Zinc on Prairie Creek;

- The reference conditions for aquatic communities and aquatic monitoring will form the basis for Parks Canada monitoring in Northern Parks;
- Results show that a larger scale model for evaluating relationships between land uses and indicators of aquatic health in Northern Canada west of the continental divide is possible.

Social/Economic and Integrated Landscape Modeling Components

***Working Landscapes**

Lead: Alberta Research Council

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), University of Alberta (Edmonton), Salmo Consulting, Forem Technologies, Kaska Forest Resources Stewardship Council, Champagne-Aishihik First Nations

Location: Yukon, Northwest Territories

Total Project Funding (not including NEI): \$15,000.00 in 2004/05; \$50,000.00 in 2005/06; \$51,251.00 in 2006/07

NEI Funding: \$21,000.00 in 2004/05; \$74,250.00 in 2005/06; \$74,610.00 in 2006/07

Funding Table: Resource Use

Program Priority Areas: Resource Use, Capacity-Building, Monitoring, and Climate Change

Purpose: to identify relevant social-economic indicators for land use planning, and to determine preferences for different land use alternatives based on these indicators, and use the results to develop modeling tools that enable stakeholders to understand the impacts of future development plans on their communities.

Identified Results:

- A socio-economic workshop determined that social indicators could be applied to land use changes but further work is required to identify which community indicators and preferences are suitable across the North;
- Revised the internal structures of the A Landscape Cumulative Effects Simulator (ALCES) North model to incorporate either social or economic response frameworks assembled from northern knowledge studies;
- Developed a list of indicators of concern that can be tracked in ALCES to measure the impacts of landscape change on community well-being;
- Created a research agreement template that the Champagne-Aishihik First Nation can use for future research projects;
- Identified economic instruments, particularly cap and trade approaches for implementing land use thresholds and linking land use planning tools to policy in the NT.

Northwest Territories Projects 2003 to 2008

NEI Priority Table	NEI Funding Duration in Years	Page	Title
Climate Change	1	79	Third Workshop of the Denendeh Environmental Working Group: Climate Change and Water
Climate Change	3	80	Impacts of Changes to Northern Lakes' Water and Energy Budgets
Climate Change	3	81	Sensitivities of High-Latitude Lakes to Climatic and Development Disturbances
Climate Change	4	82	*Understanding Sea Ice and Snow Variability and Climate Change through Scientists and Community Partnerships.
Monitoring	1	83	*Upgrading the NT/NU Bird Checklist Survey Website: Add Data Input and Dissemination Functions
Capacity-Building	1	84	Environmental Community Action Workshop
Resource Use	1	85	Great Bear Lake Information System Project
Resource Use	1	86	*Working Landscapes: Cumulative Effects Integrated Ecosystem Thresholds Project Coordinator
Resource Use	3	87	Working Landscapes: Development, Integration, and Utilization of Avian and Mammalian Dose-Response Curves: New Tools for Setting Thresholds in the NT and Yukon
Resource Use	3	88	*Working Landscapes: Application of Dose-Response Curves and Thresholds to a Landscape Scale for Northern Waters
Resource Use	3	90	*Working Landscapes: Social/Economic and Integrated Landscape Modeling Components
Contaminants	1	91	Local Contaminants Concern Communication Strategy Northwest Territories
Contaminants	1	92	Local Contaminants Concern Inventory Proposal - Tlicho Communities
Contaminants	1	93	Metal Levels in Fish from Lakes in the Tlicho Region Surrounding Gameti (Gameti, NT)
Contaminants	1	94	Colville Lake Tree Sampling - Local Contaminant Concern
Contaminants	1	95	Traditional Berry Contaminants Analysis (Fort Resolution, NT)
Contaminants	1	96	Inuvik Solid Waste Disposal
Contaminants	1	97	Labrador Tea
Contaminants	1	98	Coal and Sediment as a Mercury Source to the Mackenzie River and the Beaufort Sea
Contaminants	1	99	Investigation into the Occurrence of Abnormal Loche Livers in the Gwich'in Settlement Area, Northwest Territories
Contaminants	1	100	Contaminated/Waste Site Information Summary Report
Contaminants	2	101	Martin House: Waste Sites and Oil/Gas Wells Phase II Environmental Site Assessment
Total: 22 projects			

*: project occurs in more than one geographic area (Territory/Province)

Third Workshop of the Denendeh Environmental Working Group

Climate Change and Water

Lead: Dene Nation

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Gwich'in Tribal Council, Sahtu Dene Council, Deh Cho First Nations, Tlicho Government, Akaitcho Territory Government

Location: Denendeh (Northwest Territories) actual meeting held in Wekweti on March 27-29, 2004

Total Project Funding (not including NEI): \$22,950.00

NEI Funding: \$30,250.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to bring together traditional knowledge and science at a workshop where water related issues will be discussed including the extent of change being experienced by Dene and the anticipated changes.

Identified Results:

- Dene participants from the five regions of Denendeh gathered and documented their concerns, observations and traditional knowledge and regional views on climate change and water;
- Added Dene knowledge about water to existing information from the two previous workshops to determine the extent of change being experienced by Dene as well as any anticipated change;
- Youth included in workshop;
- An abstract was produced to update on the findings of the workshop at the Arctic Climate Impact Assessment Symposium, Reykjavik, Iceland, November 2004 and contributed case study information on Indigenous Perspectives of the Changing Arctic in the final report of the Arctic Climate Impact Assessment.

Third
Workshop
of the
Denendeh
Environmental
Working
Group

Impacts of Changes to Northern Lakes' Water and Energy Budgets

Lead: Environment Canada

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Meteorological Service of Canada, McMaster University (Hamilton, Ontario), McGill University (Montreal), National Water Research Institute, University of Alaska (Fairbanks), Deline Renewable Resource Council, Natural Science and Engineering Research Council, Mackenzie Global Energy and Water Cycle Experiment Study (MAGS), Natural Resources Canada's Polar Continental Shelf Project, University of Colorado (Boulder)

Location: Great Bear Lake, NT

Total Project Funding (not including NEI): \$200,990.00 in 2004/05; \$119,560.00 in 2005/06; \$8,000.00 in 2006/07

NEI Funding: \$33,332.00 in 2004/05; \$34,500.00 in 2005/06; \$43,000.00 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Capacity-Building, Monitoring, Resource Use

Purpose: to develop and test innovative lake-atmospheric models on Great Bear Lake that define baseline characteristics and that could be used in the future to predict and evaluate climate change and meteorological impacts on lakes across the Canadian North.

Identified Results:

- Three-day project workshop in Deline allowed scientists and community members to exchange information on climate and water and expanded the scope of the research to include weather and weather awareness, stars, animals and fish, wind, legends, precipitation, ice/snow and water, and fire;
- Local traditional knowledge was used to validate regional results;
- Regional knowledge of the fluxes of heat and air and the flow of water enhanced the understanding of the local patterns of wind, ice, snow, and stream discharge;
- Investigators learned that Great Bear Lake is dimictic – it freezes and goes through two stratifications and two temperature mixing cycles a year.

Sensitivities of High-Latitude Lakes to Climatic and Development Disturbances

Lead: National Water Research Institute - Climate Impacts Research Centre at the University of Victoria

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), National Water Research Institute – integration of scientists, Indian and Northern Affairs Canada (INAC) - Water Resources, National Sciences and Engineering Research Council (NSERC), Natural Resources Canada's Polar Continental Shelf Project (PCSP), University of Wilfred Laurier (Waterloo, Ontario), University of Waterloo in Ontario, University of Calgary, Inuvialuit Joint Secretariat (IJS) Program of Energy Research and Development (PERD), National Science Foundation (NSF), Canadian Foundation for Climate and Atmospheric Sciences (CFCAS), Global Energy and Water Cycle Experiment (GEWEX), International Atomic Energy Agency (IAEA), Canadian Network for Isotopes in Precipitation, Inuvialuit Renewable Resources Committees

Location: Mackenzie Delta region of the Northwest Territories

Total Project Funding (not including NEI): \$515,000.00 in 2004/05; \$472,000.00 in 2005/06; \$598,000.00 in 2006/07

NEI Funding: \$58,000.00 in 2004/05; \$58,000.00 in 2005/06; \$58,500.00 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring, Resource Use

Purpose: to develop a hydro-ecological model for small Arctic lakes that can be used to research and monitor the effects of climate change on Arctic aquatic ecosystems.

Identified Results:

- First comprehensive multi-disciplinary study (with international linkages) addressing climate-change impacts on Arctic upland lakes in the Mackenzie basin;
- Detailed bathymetry maps for 10 lake sites were created;
- Completed extensive survey of 60 lakes, half of which are affected by permafrost slumping;
- Water and plankton samples provided a data set of unprecedented size and detail for these tundra lakes which was used to establish proper monitoring sites and to provided an accurate 'baseline' from which to infer and interpret system changes;
- Isotopic analyses of lake water indicate that permafrost degradation is introducing a significant and distinct supply of carbon to these lakes and is altering the functioning of these lake systems.

Sensitivities of
High-Latitude
Lakes to
Climatic and
Development
Disturbances

*Understanding Sea Ice and Snow Variability and Climate Change through Scientists and Community Partnerships

Lead: Fisheries and Oceans Canada (Winnipeg)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Canadian Ice Service and Climate Change Action Fund, University of Manitoba (Winnipeg), University of Laval (Québec City), Aurora Research Institute, Inuvialuit Joint Secretariat, Hunters and Trappers Committee of Tuktoyaktuk, Sachs Harbor, Ulukhaktok (formerly Holman Island), Paulatuk, Hunters and Trappers Organizations of Arviat and Resolute, Community of Sanikiluaq Nunavut Department of Environment, University of British Columbia (Vancouver), ArcticNet, Schools on Board (with Inuvialuit and southern schools participating), Canadian Arctic Shelf Exchange Study (CASES), Department of Fisheries and Oceans – Newfoundland.

Location: Western Arctic, western Arctic and Nunavut in year 2

Total Project Funding (not including NEI): \$75,000.00 in 2003/04; \$152,000.00 in 2004/05; \$235,800.00 in 2005/06; \$152,000.00 in 2006/07

NEI Funding: \$35,000.00 in 2003/04; \$50,000.00 in 2004/05; \$50,000.00 in 2005/06; \$43,300.00 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Capacity-Building, Monitoring

Purpose: to build on the current knowledge of near-shore ice dynamics by establishing a community-based sea ice monitoring program.

Identified Results:

- Successful establishment of community based monitoring stations in four Western Arctic communities: Tuktoyaktuk, Sachs Harbor, Ulukhaktok, Paulatuk and one in Hudson Bay: Sanikiluaq;
- Data from the 2003 to 2006 field seasons have been compiled and graphed;
- Project website completed - www.umanitoba.ca/ceos;
- Data from the community-based sea ice monitoring program will be integrated with IPY studies being conducted aboard the ice breaker *Amundsen* and on fast ice site close to Banks Island;
Data on sea ice and snow thickness, temperature, and other physical parameters will contribute to the development of regional models for the Beaufort Sea;
- Project information is linked to the ArcticNet study on changing climate in the western and eastern Arctic and Hudson Bay.

***Upgrading the NT/NU Bird Checklist Survey Website**

Add Data Input and Dissemination Functions

Lead: Environment Canada's Canadian Wildlife Service

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), GeoArctic International Ltd., Parks Canada

Location: Northwest Territories, Nunavut

Total Project Funding (not including NEI): \$14,000.00

NEI Funding: \$49,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Monitoring

Purpose: to make results of Northwest Territories/Nunavut bird surveys available to everyone on the Internet.

Identified Results:

- Upgraded website to enable any member of the public to enter or retrieve data on-line or map products on species distribution for their use: <http://www.mb.ec.gc.ca/nature/migratorybirds/nwtbcs/index.en.html>;
- Merged approximately 400 map sheets to create electronic topographic maps;
- Updated over 200 electronic maps of bird ranges for the NT and Nunavut;
- Made existing historical northern bird monitoring information easily accessible to planners, policy and decision-makers, and northerners.

***Upgrading
the
Northwest
Territories
and Nunavut
Bird
Checklist**

Environmental Community Action Workshop

Lead: Pauktuutit – Inuit Women's Association

Partners/ Community participants: Environment Canada's Northern Ecosystem Initiative (NEI), Pauktuutit Board and Executive President including representatives from Ottawa, Inukjuak, Nunavik, Goose Bay, Labrador, Ualiniq, Western Arctic, Tuktoyaktuk, Kitikmeot Taloyoak, Qikiqtani - North Baffin, Igloolik, Qikiqtani, South Baffin, Cape Dorset Nunavik, Ungava Coast, Kangiqsujuaq, Nunavik, Hudson Coast, Nowrakudluk, Inukjuak, Kangiqsujuaq, Kivalliq, Coral Harbour

Location: Yellowknife, Northwest Territories

Total Project Funding (not including NEI): \$20,000.00

NEI Funding: \$37,654.00 in 2003/04

Funding Table: Capacity-Building

Program Priority Areas: Monitoring

Purpose: to coordinate and sponsor Pauktuutit's 19th Annual General Assembly and provide Inuit women from across Canada with a forum to address emerging environmental and related health issues. To work with Environment Canada to learn how to access information and funding programs to support community and individual initiatives, and to develop an action plan for participants to follow upon their return home.

Identified Results:

- 30 women participated in the workshop from all Inuit regions of Canada;
- Shared information about various initiatives underway and identified issues related to environment and health;
- Participants have the knowledge and training to support community-based initiatives that have positive impacts on the environment.

Great Bear Lake Information System Project

Lead: Indian and Northern Affairs Canada's Environment and Conservation and Cumulative Effects Assessment and Management Secretariat, Environment Canada

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Great Bear Lake Working Group, community of Deline, Sahtu Land Use Planning Board, Government of the Northwest Territories

Location: Sahtu region of the Northwest Territories

NEI Funding: \$18,000.00 in 2003/04

Funding Table: Resource Use

Program Priority Areas: Monitoring

Purpose: to design a mapping strategy for the Great Bear Lake Management Plan to support the development of a state-of-the-art information management approach that may be used as a model for developing similar strategies elsewhere in the Northwest Territories. This project is one component of the development of a community-based watershed management plan for the Great Bear Lake Watershed.

Identified Results:

- A GIS database of information on the Great Bear Lake Watershed was compiled and a preliminary gap analysis done;
- A process for using maps and GIS in developing the management plan was presented and will be implemented by the working group;
- Benefits of using maps and GIS in the development of a management plan that is applicable across the North;
- Identification of several software tools for tracking and managing cumulative effects of land uses in addition to tracking changes in land use over time (Globio, ALCES, SELES).

Great
Bear Lake
Information
System
Project



Development, Integration, and Utilization of Avian and Mammalian Dose-Response Curves

New Tools for Setting Thresholds in the NT and Yukon

Lead: University of Alberta (Edmonton)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service – Prairie and Northern Region (piggybacks on another larger project involving Liidlii Kue First Nation, Government of the Northwest Territories Department of Environment and Natural Resources);

Location: Northwest Territories, northern Alberta research for application in the Yukon study area

Total Project Funding (not including NEI): \$118,334.00 in 2004/05; \$172,659.00 in 2005/06; \$239,159.00 in 2006/07

NEI Funding: \$25,000.00 in 2004/05; \$31,500.00 in 2005/06; \$40,000.00 in 2006/07

Funding Table: Resource Use

Program Priority Areas: Resource Use, Climate Change, Monitoring, Capacity-Building

Purpose: to develop, integrate, and utilize avian (bird) and mammalian dose-response curves as tools for evaluating the ecological, social and economic impacts of setting thresholds in Cumulative Effects Assessment. Specifically, these tools are being developed for use in forested systems north of 60°.

Identified Results:

- Provided quantified statistical relationships between the level of human footprint and changes in all biodiversity elements (bird and mammal indicators as well as plants, mosses, and lichen);
- Developed a network of experienced trackers from local communities in northern Alberta and the southern NT to conduct surveys - this approach is intended to become the standard by which monitoring of furbearers will occur in the Alberta Biodiversity Monitoring Program;
- Developed, generated, and integrated dose-response curves into a simulation modeling framework to evaluate the ecological, social, and economic impacts of setting thresholds for communities in forested systems;
- Identified the zone-of-impact of most energy sector activities and developed rigorous and defensible zone of impact criteria for these types of oil and gas development;
- Data for birds was collected at 95 sites in the NT that ranged from pristine to heavily impacted;

Working Landscapes

The partners for the following Working Landscapes projects are listed individually for each component. The collaborators on the overall Working Landscapes Project include:

University of Alberta (Edmonton)
Alberta Research Council
Alberta Sustainable Resource Development
AXYS Environmental
Canadian Institute of Resources Law
Environment Canada's Canadian Wildlife Service and National Water Research Institute
Forem Technologies
Salmo Consulting
University of Saskatchewan (Saskatoon)

CONTINUATION

Development, Integration, and Utilization of Avian and Mammalian Dose-Response Curves

- Analysis of these data suggest that compressor stations reduce the quality of habitat for various boreal songbirds due to the increased noise created by these facilities;
- Zone of impact for compressor stations was determined to be approximately 300 metres;
- A statistical relationship that predicts the zone of impact area affected by compressor stations now exists;
- There is sufficient data along a continuum of human impacts to parametrize ALCES models for a wide variety of human disturbances for a large number of mammal and bird species;
- Lack of information in the ALCES model no longer represents a limitation; there is a need to use the model more actively in decision-making.

*Working Landscapes

Application of Aquatic Dose-Response Curves and Thresholds to a Landscape Scale for Northern Waters

Lead: Environment Canada's National Water Research Institute in 2004/05 but became the University of Saskatchewan's Toxicology Centre in subsequent years

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Alberta Sustainable Resource Development, University of Western Ontario (London, Ontario), Acadia University (Wolfville, Nova Scotia), Salmo Consulting, Can Tung and Canadian Zinc mines, Indian and Northern Affairs Canada (INAC), Parks Canada, Aurora College Environmental Monitor Training Program

Location: Yukon, Northwest Territories

Total Project Funding (not including NEI): \$180,500.00 in 2004/05; \$85,000.00 in 2005/06; \$270,000.00 in 2006/07

NEI Funding: \$18,000.00 in 2004/05 and \$50,250.00 in 2005/06 and \$65,550.00 in 2006/07

Funding Table: Resource Use

Program Priority Areas: Resource Use, Climate Change, Contaminants, Monitoring, and Capacity-Building

Purpose: to use a common approach to understand how different land uses (e.g. construction of roads, mineral, oil and gas exploration, etc.) have a cumulative effect on water, wildlife, and people and to produce tools for resource managers to develop a vision of the future.

Identified Results:

- Demonstrated through data from Environment Canada (BISY dataset) that aquatic communities (bottom-dwelling insects) were similar between the Fraser (BC) and Yukon rivers. This was the first step to demonstrate that the process defined for the south could work for the north and the aquatic animal communities were similar;
- Developed a “first-time” set of predictive relationships to show how changes in land use affected indicators of aquatic ecosystem health so that aquatic ecosystem health can be detected at an earlier stage;
- Established reference conditions for aquatics in the South Nahanni River basin for water quality, bottom-dwelling insects and fish community structure which added to the data collected in the Yukon River Basin;
- Intensive sampling around Prairie Creek mine and Flat River mine sites in the Northwest Territories provided information to help develop dose-response relationships (the point at which exposure to a dose (a contaminant) creates a poison for the aquatic environment for northern mining activities;
- Sampling results formed the basis of the EEM (Environmental Effects Monitoring) program for Tungsten Mine and foundations for a cumulative effects assessment for Canadian Zinc on Prairie Creek;
- The reference conditions for aquatic communities and aquatic monitoring will form the basis for Parks Canada monitoring in Northern Parks;
- Results show that a larger scale model for evaluating relationships between land uses and indicators of aquatic health in Northern Canada west of the continental divide is possible.

***Working Landscapes**

Social/Economic and Integrated Landscape Modeling Components

Lead: Alberta Research Council

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), University of Alberta (Edmonton), Salmo Consulting, Forem Technologies, Kaska Forest Resources Stewardship Council, Champagne-Aishihik First Nations

Location: Yukon, Northwest Territories

Total Project Funding (not including NEI): \$15,000.00 in 2004/05; \$50,000.00 in 2005/06; \$51,251.00 in 2006/07

NEI Funding: \$21,000.00 in 2004/05; \$74,250.00 in 2005/06; \$74,610.00 in 2006/07

Funding Table: Resource Use

Program Priority Areas: Resource Use, Capacity-Building, Monitoring, and Climate Change

Purpose: to identify relevant social-economic indicators for land use planning, and to determine preferences for different land use alternatives based on these indicators, and use the results to develop modeling tools that enable stakeholders to understand the impacts of future development plans on their communities.

Identified Results:

- A socio-economic workshop determined that social indicators could be applied to land use changes but further work is required to identify which community indicators and preferences are suitable across the North;
- Revised the internal structures of the A Landscape Cumulative Effects Simulator (ALCES) North model to incorporate either social or economic response frameworks assembled from northern knowledge studies;
- Developed a list of indicators of concern that can be tracked in ALCES to measure the impacts of landscape change on community well-being;
- Created a research agreement template that the Champagne-Aishihik First Nation can use for future research projects;
- Identified economic instruments, particularly cap and trade approaches for implementing land use thresholds and linking land use planning tools to policy in the Northwest Territories.

Local Contaminants Concern Communication Strategy Northwest Territories

Lead: Dene Nation

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Indian and Northern Affairs Canada's Northwest Territories Environmental Contaminants Committee (NWTECC), Native Communications Society

Location: Northwest Territories

Total Project Funding (not including NEI): \$14,625.00

NEI Funding: \$20,320.00 in 2004/05

Funding Table: Northwest Territories Environmental Contaminants Committee

Program Priority Areas: Contaminants, Capacity-Building

Purpose: to develop and deliver Local Contaminant Concern (LCC) communications outreach material regarding program changes.

Identified Results:

- A full double-page insert/flyer/ad was placed in the territorial newspaper to create awareness across the North about the shift in LCC funding and opportunities for funding;
- Radio Public Service Announcements (PSA's) promoted the newspaper inserts in five Dene languages, English and French;
- Rolling cable TV announcements were also developed in each of the Dene languages.

Local
Contaminants
Concern
Communication
Strategy
Northwest
Territories

Local Contaminants Concern Inventory Proposal Tlicho Communities

Lead: Tlicho Logistics/Indian and Northern Affairs Canada (INAC)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), selected Elders from the four Tlicho Communities: Behchoko, Gameti, Wha Ti, Wekweti, Indian and Northern Affairs Canada's Northwest Territories Environmental Contaminants Committee (NWTECC)

Location: 20-30 mile radius of the four Tlicho communities: Behchoko, Gameti, Wha Ti, Wekweti

NEI Funding: \$22,584.00 in 2004/05 amongst two local contaminants projects (Inventory Proposal – Tlicho Communities, Colville Lake Drying Trees)

Funding Table: Northwest Territories Environmental Contaminants Committee

Program Priority Areas: Contaminants

Purpose: to address local contaminant concerns around the Tlicho communities regarding contaminants in fish and wildlife within traditional hunting, fishing and trapping locations.

Identified Results:

- Met with Band Council community selected Tlicho elders in four regions within three week period;
- Each Tlicho Elder or hunter expressed his concerns regarding specific traditional hunting and trapping area;
- Local contaminant concerns were identified using maps and notebooks;
- Created community-based priorities list to determine future work;
- The local contaminants concern inventory collected is available for use in Indian and Northern Affairs Canada's contaminated sites database.

Metal Levels in Fish from Lakes in the Tlicho Region Surrounding Gameti (Gameti, NT)

Lead: Tlicho Government (formerly the Dogrib Rae Band)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Indian and Northern Affairs Canada's Northwest Territories Environmental Contaminants Committee (NWTECC), Gameti fishermen, Department of Fisheries and Ocean, Department of Health and Social Services (Government of the Northwest Territories)

Location: Lakes in the Tlicho Region surrounding Gameti (Gameti, NT)

Total Project Funding (not including NEI): \$8,000.00

NEI Funding: \$15,384.00 in 2004/05

Funding Table: Northwest Territories Environmental Contaminants Committee through Indian and Northern Affairs

Program Priority Areas: Contaminants, Monitoring

Purpose: to follow up on a study done in 2000 to determine if there is any significant increase or decrease in particular contaminants in fish from lakes in the Tlicho Region surrounding Gameti.

Identified Results:

- Gameti fishermen collected 18 lake trout and 10 whitefish from both Rae Lake and Faber Lake;
- Mercury levels low in the 10 whitefish collected in both Rae Lake and Faber Lake;
- All smaller trout collected were below Health Canada subsistence consumption guideline;
- Some smaller size trout have mercury levels within the Health Canada subsistence consumption guideline;
- Regardless of the size of fish collected – mercury levels were lower in Faber Lake with some below the Health Canada subsistence consumption guideline;
- Mercury levels have declined in both lakes since 2000.

Metal Levels
in Fish from
Lakes in the
Tlicho Region
Surrounding
Gameti
(Gameti, NT)

Colville Lake Tree Sampling Local Contaminant Concern

Lead: Sahtu Dene Council, Dene Nation,
Northwest Territories Environmental Contaminants Committee (NWTECC)

Partners: Environment Canada's Northern Ecosystem Initiative
(NEI), National Aboriginal Forestry Association, Government of the
Northwest Territories

Location: Colville Lake, NT

NEI Funding: \$22,584.00 in 2004/05

Funding Table: Northwest Territories Environmental Contaminants Committee

Program Priority Areas: Contaminants

Purpose: to understand if any significant contaminants load may have
caused the trees to dry at a specific site near Island Lake, about 25 km west of
Colville Lake.

Identified Results:

- Visual evidence indicates that an airborne contamination could be the cause of tree death;
- Chemical evidence concludes there is an increase in elements such as phosphorous, potassium;
- Sodium and zinc may have been absorbed through the air, however, there is no evidence that links these elements to tree death;
- The physical structure of the stressed tree rings further strengthens the visual conclusion that the trees experienced a localized drought that caused death.

Traditional Berry Contaminants Analysis (Fort Resolution, NT)

Lead: Deninu Kue First Nation

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Fort Resolution Environmental Working Committee (FREWC), Indian and Northern Affairs Canada's Northwest Territories Environmental Contaminants Committee (NWTECC), Centre for Indigenous Nutrition and Health (CINE)

Location: Within a 3 to 5 km radius in and around Fort Resolution, NT, 20 kms along the highway outside of Fort Resolution, within the Slave River Delta, and along the Jean Marie River

Total Project Funding (not including NEI): \$4,000.00

NEI Funding: \$7,200.00 in 2004/05

Funding Table: Northwest Territories Environmental Contaminants Committee

Program Priority Areas: Contaminants, Monitoring

Purpose: to determine if contaminants in the berries and soil have contributed to a recent decline in wild berries in and around Fort Resolution.

Identified Results:

- 10 soil samples and 30 berry samples were collected between September 1 to 15, 2004 and sampled for four different metals: mercury, cadmium, lead, and arsenic;
- A basic plant inventory of all species within a few meters of the harvested plant has been recorded along with general weather conditions at the time of harvesting;
- Soil samples from the Mission Island site showed elevated lead concentrations that were 10 times higher than the rest of samples;
- Overall no detectable levels of arsenic, cadmium, and mercury were found in the berries samples and only trace amounts of lead were found;
- Data did not show that berries concentrations reflect concentrations of heavy metals in the corresponding soil samples;
- Conclusion: it was a bad year for berries.

Traditional
Berry
Contaminants
Analysis
(Ft. Resolution,
NT)

Inuvik Solid Waste Disposal

Lead: Aurora Research Institute

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Department of Fisheries and Oceans; University of Manitoba (Winnipeg)

Location: Inuvik, Northwest Territories

Total Project Funding (not including NEI): \$97,000.00

NEI Funding: \$28,300.00 in 2006/07

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building,

Purpose: to monitor the potential release of contaminants (organochlorines, organofluorines, and brominated flame retardants (BFR's) in four waterways that drain the area of the Inuvik Solid Waste Disposal facility following a fire in the winter of 2005 to 2006 at facility. These waterways include Finto Stream that drains into Boot Lake, and Finnings Stream which drains into Finnings Lake.

Identified Results:

- Demonstrated that more volatile organofluorines and lighter weight BFRs were found in higher concentrations down wind of the solid waste facility, this is consistent with the facility being a point source for these contaminants;
- Level of organochlorines observed in this study were comparable to levels observed in another Arctic lake (Lake Peter), and generally lower than values in the Great Lakes;
- Levels of BFR's varied between comparable to about ten times higher than levels in Lake Winnipeg in 2004;
- Levels of organofluorines were detected at concentrations much higher than organochlorines and BFR's, by a factor of 100 to 1,000. Their concentrations are comparable to concentrations in arctic lakes near Resolute Bay;
- The observed concentrations do not raise concern as Boot Lake is the only waterway of the ones tested where some recreation activity occurs, it is flooded by the nearby river channel every spring, so water is exchanged, and the level of fishing and swimming on Boot Lake is low.

Labrador Tea

Lead: Aurora Research Institute

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), South Slave Research Centre, Deninu Kue First Nation, Fort Smith Senior Citizens Society

Location: Pine Point Mine between Hay River and Fort Resolution, Inuvik control site

Total Project Funding (not including NEI): \$27,355.00

NEI Funding: \$21,821.25 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to determine the levels of lead (Pb), zinc (Zn), iron (Fe), and other metals in Labrador Tea plants in the area between Pine Point mine, (an open pit lead-zinc mine that operated between 1964 and 1987) and Fort Resolution and Pine Point mine and Hay River. Labrador tea is used by humans and has been shown to accumulate lead (Pb) as well as copper and iron. A control site around Inuvik was used for comparison. Sampling occurred at the end of September whereas July is the best time to collect leaves.

Identified Results:

- Labrador tea leaves collected in triplicates from eight sites between Hay River and Buffalo Junction and eight sites between Fort Resolution and Buffalo Junction;
- Inuvik control site was as polluted as the high contaminant site near Fort Resolution;
- Copper, nickel and zinc were higher in the steeped samples than in the boiled while manganese showed the opposite trend;
- Solubility charts show a trend of higher concentrations of these metals as pH decreases, alkalinity (which was not measured) may be the process which is controlling these results;
- The Inuvik control site which is less than five kilometres from town has concentrations of manganese and nickel which are higher than acceptable limits of drinking water.

Labrador
Tea

Coal and Sediment as a Mercury Source to the Mackenzie River and the Beaufort Sea

Lead: University of Manitoba (Winnipeg)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), ArcticNet, Indian and Northern Affairs Canada's Northern Scientific Training Program, Natural Resources Canada's Polar Continental Shelf Project, Department of Fisheries and Oceans

Location: Mackenzie River and its tributaries, primarily Fort Simpson, Tulita, Norman Wells, Inuvik, and Tuktoyaktuk.

Total Project Funding (not including NEI): 46,000.00

NEI Funding: \$43,375.00 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building,

Purpose: to determine the concentration and form of mercury in coal deposits along the Mackenzie River, and in sediments from and around the Liard River, and evaluate the contribution to impact of on the ecosystem.

Identified Results:

- Established a solid baseline from which to continue long-term monitoring of the ecosystem;
- Most of the mercury in the Mackenzie River originates from the lead, zinc, copper, and iron mineral deposits in the Mackenzie Mountains. The mercury exists in the inorganic form and is associated with suspended sediment;
- Lake-fed streams have shown significant organic matter-mercury correlation, which suggests that these systems have absorbed more mercury;
- Fort Good Hope burbot show an increasing mercury burden which may be linked with the increased availability of mercury in organic matter such as algae and other plants and animals which the fish feed on;
- Environmental impacts from the petroleum processing in Norman Wells is not evident from the results for organic matter and mercury;
- Some of the samples collected from the coal bed near Tulita far exceed the levels of mercury found in world average coals by up to 25 times and due to these high levels they should not be mined for combustion processes;
- Naturally occurring acid-mine drainage-like springs present throughout the Mackenzie Mountains may minimize the impact of base metals mining (lead, zinc, copper, and iron).

Investigation into the Occurrence of Abnormal Loche Livers in the Gwich'in Settlement Area, Northwest Territories

Lead: Gwich'in Renewable Resource Board

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Environment Canada, Aurora Research Institute, University of Manitoba (Winnipeg), Community members from Aklavik, Fort McPherson, Tsiigehtchic and Inuvik

Location: Gwich'in Settlement Area

Total Project Funding (not including NEI): \$21,000.00

NEI Funding: \$9,000.00 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building,

Purpose: to address local concerns about the discoloured and abnormal-looking loche (burbot) livers through field collection and laboratory analysis.

Identified Results:

- Between October and December 2007 136 fish were collected, sampled and analyzed for aging and stable isotopes;
- Livers were classified into three categories based on recommendations from Gwich'in fish monitors: healthy livers were classified as Type I; Type II had some level of atrophy apparent but were not fully deteriorated; Type III livers were considered to be unhealthy ;
- Data revealed that burbot with Type III livers weigh less, have smaller livers, and less in their stomachs than similar sized fish with Type I and Type II livers;
- Without a statistical analysis, the results suggest that fish with Type III livers, that appeared unhealthy, were found to indeed appear less healthy than liver I and liver II fish. There were no strong apparent correlations to liver appearance and age;
- The mean mercury concentrations of the livers were all well below Health Canada standards indicating that they are safe to eat;
- The low sample size made it difficult to derive community or site specific correlations to liver type.

Investigation into
the Occurrence
of Abnormal
Loche Livers
in the Gwich'in
Settlement Area

Contaminated/Waste Site Information Summary Report

Lead: Indian and Northern Affairs Canada's (INAC) Contaminants and Remediation Directorate (CARD)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Jacques Whitford Environment Limited (JWEL)

NEI Funding: \$50,000.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Contaminants, Monitoring

Purpose: to review and report on the information available from the following contaminated and waste site information sources:

- Local Contaminant Concern (LCC) files held at CARD;
- The NT Contaminated/Waste Sites Inventory Database;
- The NORMIN Database; and
- The federal Treasury Board's Contaminated Site Database.

Identified Results:

- The NORMIN Database and the federal Treasury Board's Contaminated Site Database are available on-line on public websites; the NT Contaminated/Waste Sites Inventory Database and the Local Contaminant Concern files held at CARD were only available within the Contaminants Division in Yellowknife, Northwest Territories;
- All of the information sources were easy to use;
- The LCC files and the NT Contaminated Site/Waste Site Inventory database provided the most comprehensive information about contaminants. Records reviewed in the NORMIN database did not contain any specific contaminant information while the Federal Contaminated Site and Landfill Wastes Inventory provided only summary information about contaminants at the sites included;
- Only the NT Contaminated/Waste Site Inventory included a specific reference indicating when the record had last been updated. Most material within the LCC files included the date on which they were produced;
- Some LCC files contained reference to associated documents; however, this did not occur in a systematic manner. The NT Contaminated/Waste Site Inventory includes reference to supporting documents but they are not available on-line. The link to site maps and photographs within the spatial component of the database did not function during the review. The NORMIN Database included references to associated documents; however, they were neither available on-line, nor their location specified. Records in the federal Contaminated Site and Landfill Wastes Inventory database did not contain reference to associated documents.

Martin House Waste Sites and Oil/Gas Wells Phase II Environmental Site Assessment

Lead: Gwich'in Tribal Council

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Indian and Northern Affairs Canada's Contaminants and Remediation Directorate (CARD), Gwich'in, Tsiigehtchic, and Fort McPherson Elders and Harvesters

Location: Northwest Territories: Martin House Waste Site #NM109 – INAC fuel cache and Arctic Red West, Well #G-55 (Shell 1971)

Total Project Funding (not including NEI): unknown in 2003/04; \$5,500.00 in 2005/06

NEI Funding: unknown in 2003/04; \$13,750.00 in 2005/06

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to conduct a Phase II environmental assessment in two areas to ensure they meet the Northwest Territories Environmental Protection Service, Environmental Guideline for Contaminant Site Remediation in response to local concerns about contamination.

Identified Results:

- The samples indicated there is no evidence to indicate the Martin House fuel cache site has been significantly impacted by hydrocarbons;
- Based on the 2004 and 2005 sampling programs, there is no evidence to indicate that the soil and surface water has been significantly impacted by hydrocarbons in the areas sampled at the Martin House fuel cache site.

Martin House
Waste Sites
and Oil/Gas
Wells Phase II
Environmental
Site
Assessment

Nunavut Projects 2003 to 2008			
NEI Priority Table	NEI Funding Duration in Years	Page	Title
Contaminants	1	103	Effects of Climate Change on the Condition and Productivity of Polar Bears in Western Hudson Bay
Contaminants	1	104	Assessment of Organochlorines and Possible Biochemical Effects in Northern Fulmars: A Pilot Project
Contaminants	1	105	Creating an Arctic Awareness Campaign on Community and Traditional Campsite Waste
Contaminants	1	106	Assessment of Variation in Contaminant Concentrations between First and Re-Laid Eggs in a Single-Egg Clutch Breeder, the Thick-Billed Murre
Contaminants	1	107	Data Analysis and Manuscript Preparation for Spatial Assessment of Contaminants in Arctic Populations of Common Eiders
Contaminants	2	108	Role of Contaminants in Population Decline of Ivory Gulls
Contaminants	3	109	Contaminant Effects on Nestling Glaucous Gulls in the Arctic
Contaminants/ Climate Change	3	110	Investigating the Linkage of Climate Warming and Increasing Mercury in Landlocked Char in the High Arctic
Climate Change	1	111	Climate Change, Marine Birds and Polar Marine Ecosystems: Literature, Local Knowledge and Linkages
Climate Change	1	112	Inuit Concerns of Changing Aquatic Ecosystems in Arctic Communities
Climate Change	2	113	Inuit Observations on Climate and Environmental Change Perspectives from the Nunavut Region
Climate Change	4	115	Bridging Inuit and Scientific Perspectives on Sea Ice Importance, Observation, and Change
Climate Change	4	116	*Understanding Sea Ice and Snow Variability and Climate Change through Scientists and Community Partnerships
Monitoring	1	117	Community-Based Sea Ice and Weather Forecasting
Monitoring	1	118	Aboriginal Input into Community Based Environmental Monitoring in the Hudson Bay Bioregion (HUBB)
Monitoring	1	119	*Upgrading the NT/NU Bird Checklist Survey Website; Add Data Input and Dissemination Functions
Monitoring/Climate Change	3	120	Modeling the Role of Sea Ice on High Arctic Marine Birds and Communities: Application of Scientific and Local Ecological Knowledge
Monitoring	5	121	Monitoring the Environmental and Ecological Impacts of Climate Change on Bylot Island, Sirmilik National Park
Total: 18 projects			

*: project occurs in more than one geographic area (Territory/Province)

Effects of Climate Change on the Condition and Productivity of Polar Bears in Western Hudson Bay

Lead: Environment Canada's National Wildlife Research Centre (Ottawa)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), University of Alberta (Edmonton), Dalhousie University (Halifax), Parks Canada, Manitoba Conservation, Nunavut Wildlife Management Board, World Wildlife Fund – Arctic Programme (Oslo), Indian and Northern Affairs' Northern Science and Training Program

Location: Western Hudson Bay, Nunavut

Total Project Funding (not including NEI): \$117,900.00

NEI Funding: \$35,000.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to determine whether the declining trends in the condition of adult polar bears and cub production documented over the past two decades had continued or stabilized. This was done by using the findings to assess the long-term viability of the population and inform polar bear conservation and management in this region.

Identified Results:

- The break-up of sea ice is still advancing, occurring at earlier dates, and the condition of adult polar bears has continued to decline;
- If these trends continue, this population will not be able to sustain itself.

Effects of
Climate
Change on the
Condition and
Productivity of
Polar Bears

Assessment of Organochlorines and Possible Biochemical Effects in Northern Fulmars

A Pilot Project

Lead: Environment Canada's National Wildlife Research Centre (Ottawa)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service – Prairie and Northern Region, Norwegian Polar Institute, Food and Environmental Agency (Faroe Local Government, Faroe Islands), Natural Resources Canada's Polar Continental Shelf Project, Great Lakes Institute for Environmental Research (GLIER) at the University of Windsor

Location: Prince Leopold Island and Cape Vera in the Canadian Arctic, Nolsoy/Nolsoyarfjord in the Faroe Islands, and Bear Island, Norway.

Total Project Funding (not including NEI): \$259,750.00

NEI Funding: \$50,350.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to investigate whether enzyme activity in the liver, or concentrations of other biomarkers in the liver and blood plasma of free-ranging northern fulmars are related to their higher levels of contaminants relative to other seabirds species feeding at the same level in the food chain in the Canadian Arctic.

Identified Results:

- An Inuit training program was developed as part of the overall northern fulmar work at Cape Vera;
- Biomarker analysis of both liver and plasma samples from a total of 64 birds from the four colonies was completed;
- Differences among colonies as well as an adequate range of values within each colony allow for meaningful analysis of biochemical markers in relation to contaminant concentrations;
- Fifteen liver samples from fulmars collected from Prince Leopold Island were analyzed for total mercury, organochlorines, polychlorinated dibenzo-p-dioxin (PCDDs) and other contaminants;
- Fifteen Cape Vera fulmars were analyzed for organochlorines;
- The toxicological significance of the biochemical markers measured has yet to be determined;
- Validated the use of biochemical markers as a measure of contaminant levels for northern fulmars as well as for other Arctic marine bird species.

Creating an Arctic Awareness Campaign on Community and Traditional Campsite Waste

Lead: Pauktuutit Inuit Women of Canada

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Regional Inuit Organizations/Hunter and Trapper Organizations (HTO)

Location: Nunavut

Total Project Funding (not including NEI): \$3,600.00

NEI Funding: \$80,370.00 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building

Purpose: to design and implement an awareness campaign that highlighted the detrimental effects of common waste and contaminants on communities and campsites. The campaign is to give viewers/listeners eco-friendly options for disposing of contaminants and waste.

Identified Results:

- National Advisory Committee of key stakeholders was struck to provide input into the design of the awareness campaign and key messages in a culturally appropriate manner;
- Produced five radio ads in English and Inuktitut for Public Service Announcements (PSA) informing the public about the effects of contamination and waste on the environment which aired on CBC North Radio;
- Produced posters in Inuktitut and English which were distributed to schools, Inuit organizations, Hunters and Trappers offices and Municipal offices in the 53 Inuit communities;
- Provided information to all 53 Inuit communities across Canada on concrete ways of dealing with and disposing of waste and contaminants;
- Public Service Announcements mailed out to every local radio station in the 53 Inuit communities with contact information on how to get more information on contaminants and waste;
- The posters and the PSAs are available through the Pauktuutit website www.pauktuutit.ca and Qikitani Inuit Association website www.qia.ca.

Creating
an Arctic
Awareness
Campaign
on Community
and Traditional
Campsite
Waste

Assessment of Variation in Contaminant Concentrations between First and Re-Laid Eggs in a Single-Egg Clutch Breeder, the Thick-Billed Murre

Lead: Environment Canada's Canadian Wildlife Service - Ontario

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and National Wildlife Research Centre (Ottawa), University of Ottawa, Natural Resources Canada's Polar Continental Shelf Project

Location: Coats Island, Nunavut

NEI Funding: \$16,200.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Monitoring, Contaminants

Purpose: to determine whether or not there is a difference in contaminant concentrations between first and re-laid eggs in seabird species such as the thick-billed murre which lay multi-egg clutches. This information is applied to the interpretation of contaminant concentrations in monitoring programs.

Identified Results:

- Analyzed 13 pairs of eggs plus four third re-laid eggs (30 eggs in total) for organochlorines, PCBs, and total mercury;
- Analyzed five pairs of eggs (ten eggs in total) for methylmercury as well as fatty acid composition to determine differences in the dietary source profiles at the time of egg production;
- Preliminary results from the fatty acid work show that fatty acid composition of eggs changes between first and replacement eggs;
- Replacement eggs contained a lower proportion of lipids, a significantly higher proportion of phospholipids and a lower proportion of neutral lipids than first eggs;
- Differences between first and re-laid eggs may relate to intrinsic versus extrinsic sources of origin for the egg lipids;
- Findings may have implications for subsequent embryo development;
- Findings provide insights into the sources of lipid-soluble contaminants found in the eggs.

Data Analysis and Manuscript Preparation for Spatial Assessment of Contaminants in Arctic Populations of Common Eiders

Data
Analysis and
Manuscript
Preparation
for Spatial
Assessment

Lead: Environment Canada's National Wildlife Research Centre (Ottawa)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service - Prairie and Northern Region, National Capital, Great Lakes Institute for Environmental Research (GLIER) at the University of Windsor

Location: Canadian Arctic

Total Project Funding (not including NEI): \$20,000.00

NEI Funding: \$5,000.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Monitoring, Contaminants

Purpose: to evaluate the spatial pattern of contaminants in Arctic populations of common eider ducks to better understand and manage these populations as a sustainable resource.

Identified Results:

- Completed a literature review of contaminants in Arctic eiders as well as a compilation and preliminary analysis of a variety of contaminants data sets for eiders;
- The collective data from Canadian eiders suggests that all contaminants (trace elements, persistent organic pollutants) are typically found at low levels in this species, with the exception of copper, which seems to be high in eiders across the circumpolar world;
- Regionally, birds in the High Arctic and Southampton Island have higher contaminant burdens than birds along Nunavik or the western Arctic;
- Local ecological knowledge (LEK) was used to interpret some information on affiliated projects in Sanikiluaq and southern Baffin Island;
- There is an identified need to update traditional ecological knowledge of eider ducks.

Role of Contaminants in Population Decline of Ivory Gulls

Lead: Environment Canada's National Wildlife Research Centre (Ottawa)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service - Prairie and Northern Region, National Capital, KJW Environmental and Biological Consulting (Ottawa), Great Lakes Institute for Environmental Research (GLIER) at the University of Windsor, Ottawa University, Natural Resources Canada's Polar Continental Shelf Project

Location: Canadian Arctic

NEI Funding: \$5,000.00 in 2003/04; \$15,000.00 in 2004/05

Funding Table: Contaminants

Program Priority Areas: Monitoring, Contaminants

Purpose: to assess the possible role of contaminants in the population decline of ivory gulls using a variety of research methods including compilation of all available contaminants data for ivory gulls; contaminant analyses of ivory gull carcasses; literature review; and traditional knowledge interviews.

Identified Results:

- Information from this project contributed to the status of ivory gulls being changed from "species of concern" to "endangered" in the Canadian Arctic;
- A metadatabase of sample holdings in international museums and the CWS specimen bank was created;
- An inventory of published literature on life history and contaminant issues in ivory gulls was developed;
- Coupled the archived samples of ivory gull carcasses with the sparse information available on contaminants data to create a broader understanding of the link to the population decline of the ivory gulls;
- Proposals developed to analyze available ivory gulls samples for a wide variety of contaminants as well as to continue population surveys of this species in the Canadian Arctic;
- In 2004, additional eggs were collected from Seymour Island which, in conjunction with the archived egg samples from 1976 and 1987, will allow the examination of temporal trends of historical as well as new contaminants in this species using modern analytical methodologies.

Contaminant Effects on Nestling Glaucous Gulls in the Arctic

Contaminant Effects on Nestling Glaucous Gulls in the Arctic

Lead: Environment Canada – Prairie and Northern Region

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and National Wildlife Research Centre (Ottawa), University of Saskatchewan (Saskatoon), Patuxent Wildlife Research Centre, Nunavut Research Centre, Natural Resources Canada's Polar Continental Shelf Project

Location: Nunavut: Cape Vera, Devon Island and Karrak Lake in the Queen Maud Bird Sanctuary

Total Project Funding (not including NEI): \$49,450.00 in 2004/05; \$83,850.00 in 2005/06; \$112,850.00 in 2006/07

NEI Funding: \$40,000.00 in 2004/05; \$40,000.00 in 2005/06; \$32,100.00 in 2006/07

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to determine whether or not the health and fitness of glaucous gulls in the Canadian Arctic are being affected by exposure to contaminants and use this to examine the effects that contaminants may have on health and fitness of other Arctic-dwelling wildlife and by extension human health.

Identified Results:

- Hamagglutination titers were quite variable and unexpectedly weak in about half the birds sampled at Karrak Lake but were moderate or strong in the other half. Titers were slightly stronger in birds collected at Devil's Island in 2005;
- Corticosterone levels increased markedly in about one-half of the chicks following adrenocorticotrophic hormone (ACTH) administration and corticosterone levels increased only slightly, or decreased, in the other half;
- Contaminants levels in gulls are higher at Cape Vera than at Karrak Lake: (Cape Vera is a marine site and studies show that contaminants levels in marine-breeding glaucous gulls can average up to ten times higher than levels in gulls breeding inland at goose colonies - Karrak Lake is the site of a large snow and Ross goose colony. This is mainly attributable to differences in the types of foods eaten at each site);
- Demonstrated that several of the biomarker tools developed to examine the effects of contaminants in ecosystems in the south can be effectively used in the North as well;
- Currently contaminant levels in nestling glaucous gulls are low at both freshwater and marine nesting areas.

Investigating the Linkage of Climate Warming and Increasing Mercury in Landlocked Char in the High Arctic

Lead: Environment Canada's National Water Research Institute

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Water Science and Technology Directorate, Fisheries and Oceans Canada, University of Guelph, University of Manitoba (Winnipeg), University of Innsbruck (Austria), Austrian Academic of Sciences (Vienna), ArcticNet

Location: Nunavut

Total Project Funding (not including NEI): \$47,500.00 in 2004/05; \$97,500.00 in 2005/06; \$123,728.00 in 2006/07

NEI Funding: \$33,000.00 in 2004/05; \$31,500.00 in 2005/06; \$23,006.00 in 2006/07

Funding Table: Climate Change, Contaminants

Program Priority Areas: Climate Change, Contaminants

Purpose: to examine trends of mercury accumulation in the muscle and earbones (otoliths) of archived and newly collected landlocked Arctic char and compare to data from other mercury monitoring studies to determine if there is a link between climate warming and increased mercury, and other toxic metals.

Identified Results:

- Study results created a useful baseline for future work;
- Mercury concentrations were found to be highest in lakes with the longest food webs and were not related to concentrations of mercury in the water;
- Average mercury concentrations slightly exceeded the Health Canada guidelines for subsistence use of fish in five of 12 lakes; however, it is important to note that sea run char constitute a greater part of people's diets than landlocked char;
- Concentrations of mercury were too low in the otoliths (earbones) to allow determination of yearly accumulation;
- High correlation between mercury concentration and fish weight with high amounts of in larger fish;
- Laser ablation inductively coupled plasma-mass spectrometry (LA-ICP-MS) is not suitable for the analysis of mercury in archived otoliths because of apparent contamination problems and evidence of low concentrations in freshly collected otoliths;
- Involvement in ArcticNet and International Polar Year projects is a direct result of the research conducted under this study.

Climate Change, Marine Birds and Polar Marine Ecosystems Literature, Local Knowledge and Linkages

Climate
Change,
Marine
Birds and
Polar Marine
Ecosystems

Lead: Environment Canada's Canadian Wildlife Service

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Environmental Damages Fund and Major Capital Revitalizations Project and National Wildlife Research Centre, Kakivak Corporation, Indian and Northern Affairs Canada's Environmental Capacity Development Initiative and Northern Science Training Program, Natural Resources Canada's Continental Shelf Project, Nunavut Wildlife Research Trust (Nunavut Wildlife Management Board), Qikiqtaaluk Wildlife Board

Location: Cape Vera, Nunavut

Total Project Funding (not including NEI): \$196,750.00

NEI Funding: \$25,000.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to examine potential effects of climate on local birds and gain a thorough understanding of the ecology of these species in their breeding and feeding grounds in order to model potential effects of climate change on Arctic marine birds.

Identified Results:

- Regional weather patterns can be addressed using data from community weather stations, but local data are needed to reliably examine the proximate weather to which birds may be responding (e.g. strong wind shears at the cliffs, water flow due to melting, rain or fog, local snow cover) and how this affects reproductive success;
- Conducted a literature review on climate change and marine birds and discovered it is dominated by results from Antarctic studies which show different effects on various bird species depending on their niche;
- Information from the literature review will focus future research projects on Arctic marine birds;
- Established a relationship with the Umimmak School in Grise Fiord to provide baseline information on the typical timing of migration of marine birds species into this region as well as daily monitoring of weather, number of local birds (and their location and behavior in the community) and the appearance of new birds to the community region from February to June;
- Built community research capacity through training three Inuit Beneficiary students in aspects of field work focused on marine ecosystems;
- Added to the growing body of evidence in the scientific literature that polar marine birds are affected by climate change, through changes to sea surface temperatures or ice cover.

Inuit Concerns of Changing Aquatic Ecosystems in Arctic Communities

Lead: Inuit Tapiriit Kanatami

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Nunavut, Northwest Territories, Labrador, Northern Quebec

Total Project Funding (not including NEI): \$22,846.00

NEI Funding: \$23,600.00 in 2004/05

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring, Capacity-Building

Purpose: to identify key freshwater issues in Inuit communities based on local perceptions and scientific knowledge, improve communication among stakeholder and set the foundation for more in-depth research.

Identified Results:

- Developed an initial network of individuals involved in freshwater issues necessary to facilitate Inuit involvement and directive in further research on Arctic freshwater;
- Completed a review of published and documented Inuit observations of changes in the environment which revealed that changes in freshwater are drastic in areas such as precipitation and glacier melt;
- An English glossary of freshwater terms was developed and translated into Inuktitut and a list of Inuktitut terms on freshwater was created with explanations in English;
- Findings demonstrate that the issue of freshwater in the Arctic needs to be taken seriously. Climate change impacts freshwater quantity and quality directly and only local knowledge can, at this point, describe the changes that have occurred;
- Determined that further studies are needed on the issue of changes in aquatic ecosystems and impacts on humans to provide information related to adaptation and to understand the point at which freshwater is altered in the various regions.

Inuit Observations on Climate and Environmental Change

Perspectives from the Nunavut Region

Lead: Inuit Tapiriit Kanatami (ITK)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Nunavut Tungavvik Incorporated, Nasivvik – Centre for Inuit Health and Changing Environments, University of Guelph, National Aboriginal Health Organization (NAHO), Oikitaaluk Inuit Association, Kitikmeot Inuit Association, Kivalliq Inuit Association, University of Laval's Centre for Inuit Health and Changing Environments, Nunavut Research Institute, McGill University's Centre for Indigenous Peoples' Nutrition and Environment (CINE), Hamlets of Arctic Bay, Kugaaruk and Repulse Bay, Nunavut

Location: Arctic Bay, Kugaaruk, and Repulse Bay, Nunavut

Total Project Funding (not including NEI): \$20,758.00 in 2003/04; \$54,598.00 in 2004/05

NEI Funding: \$50,000.00 in 2003/04; \$53,800.00 in 2004/05

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to document Inuit observations of climate and environmental change. The workshops represent a starting point for the development of regional and local processes and capacity-building to address the concerns and questions raised by the participants on behalf of their communities.

Identified Results:

- Community workshops held in three Nunavut communities to discuss and document peoples' observations of and concerns about climate and other environmental change in the region;
- Collected information from the workshops on climate change impacts and adaptations among communities in Nunavut and made this information available for local, regional, national and international processes on climate change;
- Observations translated into measurements/indicators to monitor environmental changes in and around Nunavut communities;
- Information from these workshops will be used by Inuit Tapiriit Kanatami in the development of an Inuit specific strategy in response to climate change in Inuit regions throughout the North;
- Information gathered from these workshops contributed to the Arctic Climate Impact Assessment report on climate related changes and impacts in the circumpolar Arctic regions;

Inuit
Observations
on Climate
and
Environmental
Change

CONTINUATION

Inuit Concerns of Changing Aquatic Ecosystems in Arctic Communities

- Participants discussed things people are already doing to adapt to climate change. For example, in Kugaaruk, hunters are changing times of travel and adapting hunting seasons in the face of unpredictable weather and changes in temperature;
- In Repulse Bay, hunters are using satellite phones and GPS technology to better assess the weather and reduce the need for search and rescue operations;
- Validated the importance of elders knowledge of what has changed, and how to adapt as a crucial source of wisdom towards how to survive;
- Communications and networking among partners organizations improved.

Bridging Inuit and Scientific Perspectives on Sea Ice Importance, Observation, and Change

Bridging
Inuit and
Scientific
Perspectives
on
Sea Ice

Lead: University of Toronto

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Ice Service, Inuit Tapiriit Kanatami (ITK), University of Laval (Montreal), Nunavut Tunngavik Incorporated (NTI), Department of Fisheries and Oceans, Canadian Climate Impacts and Adaptation Research Network (C-CIARN) North, Nunavut Research Institute, ArcticNet, Indian and Northern Affairs' Northern Scientific Training Program, Cryosphere System in Canada, the communities of Pangnirtung, Cape Dorset and Igloolik

Location: Pangnirtung, Cape Dorset, and Igloolik, Nunavut

Total Project Funding (not including NEI): \$10,700.00 in 2003/04; \$74,230.00 in 2004/05; \$11,400.00 in 2005/06; \$6,150.00 in 2006/07

NEI Funding: \$4,500.00 in 2003/04; \$5,500.00 in 2004/05; \$10,925.00 in 2005/06; \$5,462.00 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to better understand communities' knowledge and use of sea ice and incorporate this (*Inuit Qaujimajatuqangit* - Inuit knowledge) and scientific knowledge of sea ice into a common research framework that will form the basis of a more comprehensive comparative regional analyses.

Identified Results:

- Discovered that many of the common concerns expressed in all three Inuit communities (i.e. travel routes, predictability of sea ice of weather changes, health and condition of wildlife, position of the floe edge, freeze-up and break-up timing, ice thickness and safety, and access to information) are also prominent topics of scientific interest;
- Effectively communicated interim project progress through summary trip reports and posters. See website: <http://eratos.erin.utoronto.ca/grad/laidler>;
- Described and explained approximately 18 Inuktitut words relating to sea ice;
- Synthesized maps depicting the spatial nature of local sea ice use and evaluations of change around each community;
- Results will feed into larger IPY project: Inuit Sea Ice Use and Occupancy Project led by Claudio Aporto;
- Verified that Inuit can provide local scale expertise, and ongoing sea ice use, that contributes to change assessments in a way that complements scientific observations and modeling exercises.

*Understanding Sea Ice and Snow Variability and Climate Change through Scientists and Community Partnerships

Lead: Fisheries and Oceans Canada (Winnipeg)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Canadian Ice Service and Climate Change Action Fund, University of Manitoba (Winnipeg), University of Laval (Québec City), Aurora Research Institute, Inuvialuit Joint Secretariat, Hunters and Trappers Committee of Tuktoyaktuk, Sachs Harbor, Ulukhaktok (formerly Holman Island), Paulatuk, Hunters and Trappers Organizations of Arviat and Resolute, Community of Sanikiluaq Nunavut Department of Environment, University of British Columbia (Vancouver), ArcticNet, Schools on Board (with Inuvialuit and southern schools participating), Canadian Arctic Shelf Exchange Study (CASES), Department of Fisheries and Oceans – Newfoundland.

Location: Western Arctic, western Arctic and Nunavut in year 2

Total Project Funding (not including NEI): \$75,000.00 in 2003/04; \$152,000.00 in 2004/05; \$235,800.00 in 2005/06; \$152,000.00 in 2006/07

NEI Funding: \$35,000.00 in 2003/04; \$50,000.00 in 2004/05; \$50,000.00 in 2005/06; \$43,300.00 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Capacity-Building, Monitoring

Purpose: to build on the current knowledge of near-shore ice dynamics by establishing a community-based sea ice monitoring program.

Identified Results:

- Successful establishment of community based monitoring stations in four Western Arctic communities: Tuktoyaktuk, Sachs Harbor, Ulukhaktok, Paulatuk and one in Hudson Bay: Sanikiluaq;
- Data from the 2003 to 2006 field seasons have been compiled and graphed;
- Project website completed - www.umanitoba.ca/ceos;
- Data from the community-based sea ice monitoring program will be integrated with IPY studies being conducted aboard the ice breaker Amundsen and on fast ice site close to Banks Island;
- Data on sea ice and snow thickness, temperature, and other physical parameters will contribute to the development of regional models for the Beaufort Sea;
- Project information is linked to the ArcticNet study on changing climate in the western and eastern Arctic and Hudson Bay.

Community-Based Sea Ice and Weather Forecasting

Lead: Trent University (Peterborough)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Ice Service, University of Toronto, Noetix Research, Hamlets of Cape Dorset, Igloolik, Pangnirtung

Location: Cape Dorset, Igloolik, and Pangnirtung, Nunavut

Total Project Funding (not including NEI): \$52,100.00

NEI Funding: \$79,293.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring

Purpose: to better understand the details of sea ice conditions, indicators of ice safety, and the influences of weather on travel hazards and navigation. This information will be used to create a cohesive depiction of user-needs as well as practical recommendations for improving the delivery of Environment Canada (EC) weather forecasting products and refining sea ice satellite imagery for community use.

Identified Results:

- Compiled Inuit observed community-based indicators of sea ice trends for three Nunavut communities: Cape Dorset, Igloolik and Pangnirtung;
- In the process of compiling instrumental trends which will then be linked with the community-based trends to develop a cohesive depiction of user-needs;
- Made specific practical recommendations for new weather variables (locally-important indicators, characteristics) such as cloud types, snowfall on new ice and frequent tide table information to consider incorporating into existing Environment Canada weather forecasting services;
- Established preliminary Floe Edge Service imagery access in each community (i.e. printable, interpreted images available on-line);
- Ongoing local initial evaluations of the preliminary imagery service which will contribute to an evaluation of the service after one year;
- Enhanced community travel safety over land/sea ice in the eastern Arctic by updating the Floe Edge Service with new sub-regions with Inuktitut names (www.noetix.ca/floeedge);
- Expanded networks of collaboration and enhanced local capacity to conduct research independently through involvement in three projects that are looking at sea ice and which are mutually enhancing each other: International Polar Year, ArcticNet and the Northern Ecosystem Initiative.

Community-
Based
Sea Ice
and Weather
Forecasting

Aboriginal Input into Community-Based Environmental Monitoring in the Hudson Bay Bioregion (HUBB)

Lead: Municipality of Sanikiluaq

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Nasivvik Centre for Inuit Health and Changing Environments, Fisheries and Oceans Canada, Makivik Corporation, Exchange for Local Observations and Knowledge in the Arctic (ELOKA) Project, Grand Council of the Crees (Eeyou Istchee), Walter and Duncan Gordon Foundation

Note: ELOKA is an IPY-US project and Hudson Bay Bioregion (HUBB) is a pilot project of ELOKA; <http://eloka-arctic.org/>.

Location: Sanikiluaq, Nunavut and the Hudson Bay Bioregion including Hudson Bay, James Bay and the interconnecting channels of Foxe Basin and Hudson Strait in the Arctic Basin ecozone.

Total Project Funding (not including NEI): \$78,700.00

NEI Funding: \$29,069.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring

Purpose: to incorporate Inuit and Cree hunters, gatherers, fishers and processors knowledge into the development of a conceptual framework for community-based monitoring of near shore marine and coastal ecosystems of the Hudson Bay bioregion

Identified Results:

- Began collaboration with several agencies in the development of a blueprint and policy document for a community-based monitoring protocol and system for the Hudson Bay Bioregion;
- Confirmed a set of ecosystem health indicators and measurements for monitoring status and trends in the James Bay Marine Ecoregion;
- Identified a preliminary model for community-based monitoring that may be adapted to other ecoregions in the Hudson Bay Bioregion and Arctic Basin;
- Generated awareness and understanding amongst science and data management project advisors on the contribution Inuit and Aboriginal elders, hunters, trappers and processors can make to developing and implementing a community-based environmental monitoring and reporting system for Hudson Bay;
- More environmental changes have occurred than anticipated in the key indicators for the eastern James Bay marine region since the mid-1990s.

***Upgrading the NT/NU Bird Checklist Survey Website; Add Data Input and Dissemination Functions**

Lead: Environment Canada's Canadian Wildlife Service

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), GeoArctic International Ltd., Parks Canada

Location: Northwest Territories, Nunavut

Total Project Funding (not including NEI): \$14,000.00

NEI Funding: \$49,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Monitoring

Purpose: to make results of Northwest Territories/Nunavut bird surveys available to everyone on the Internet.

Identified Results:

- Upgraded website to enable any member of the public to enter or retrieve data on-line or map products on species distribution for their use;
<http://www.mb.ec.gc.ca/nature/migratorybirds/nwtbcs/index.en.html>;
- Merged approximately 400 map sheets to create electronic topographic maps;
- Updated over 200 electronic maps of bird ranges for the NT and Nunavut;
- Made existing historical northern bird monitoring information easily accessible to planners, policy and decision-makers, and northerners.

***Upgrading
the Northwest
Territories and
Nunavut
Bird Checklist
Survey
Website**

Modeling the Role of Sea Ice on High Arctic Marine Birds and Communities

Application of Scientific and Local Ecological Knowledge

Lead: Environment Canada's Canadian Wildlife Service

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Major Capital Revitalization Project, Natural Resources Canada's Polar Continental Shelf Project, Nunavut Wildlife Management Board, Carleton University (Ottawa), Kakivak Corporation, Indian and Northern Affairs Canada's (INAC) Environmental Capacity Development Initiative and its Northern Science Training Program and its Northern Contaminants Program

Location: Nunavut

Total Project Funding (not including NEI): \$377,000.00 in 2004/05, \$178,000.00 in 2005/06

NEI Funding: \$65,000.00 in 2004/05; \$30,000.00 in 2005/06

Funding Table: Climate Change, Monitoring

Program Priority Areas: Climate Change, Monitoring, Contaminants

Purpose: to link existing climate, sea ice and marine bird movement and travel routes data with sea ice distribution maps to develop spatial and temporal models for the use and importance of ice use to marine birds.

Identified Results:

- Acquired datasets on weather and sea ice for the eastern Canadian Arctic, as well as data from marine bird monitoring locations at various locations across this region;
- Embarked on a local knowledge study to gather information on Inuit knowledge of marine birds, status of sea ice and community travel routes near High Arctic communities;
- 19 local ecological knowledge interviews conducted in total between two Nunavut communities: Pond Inlet and Resolute Bay;
- Majority interviewed indicated changes to sea ice such as it thinning, forming later in the season, and that the floe edge formed closer than in the past;
- Statistical results showed that most seabirds in the High Arctic either a) arrive at the colony later or few arrive overall, and b) lay fewer or smaller eggs, and/or c) experience higher levels of reproductive failure in years when sea ice is more extensive;
- Continued data collection with satellite transmitters confirmed the results from 2004, showing that the North Water Polynya, the mouth of Lancaster Sound, and areas near Greenland are critical feeding areas of High Arctic fulmar.

Monitoring the Environmental and Ecological Impacts of Climate Change on Bylot Island, Sirmilik National Park

Monitoring the
Environmental
and
Ecological
Impacts of
Climate
Change

Lead: University Laval's (Québec City) Centre of Northern Studies and Department of biology

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Université du Québec à Trois-Rivières department of chemical biology, Université du Québec à Rimouski's department of biology, Université du Québec à Montréal department of biology, Parks Canada – Nunavut Field Unit, community of Pond Inlet, Natural Sciences and Engineering Council of Canada, Indian and Northern Affairs Canada's Northern Student Training Program, ArcticNet, Natural Resources Canada's Polar Continental Shelf Project

Location: Bylot Island, Sirmilik National Park.

Total Project Funding (not including NEI): \$930,400.00 in 2003/04; \$210,400.00 in 2004/05; \$177,000.00 in 2005/06; \$171,400.00 in 2006/07; \$279,975.00 in 2007/08

NEI Funding: \$38,250.00 in 2003/04; \$68,000.00 in 2004/05; \$50,000.00 in 2005/06; \$50,000.00 in 2006/07; \$50,000.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change

Purpose: to summarize all the climatic and ecological data collected on Bylot Island over 15 years and investigate potential relationships between ecological variables and climatic parameters to understand how climate change is impacting the animal and plant communities of the tundra.

Identified Results:

- Confirmed empirically that the region surrounding Bylot Island has been experiencing a strong warming trend over the past three decades;
- Climate trends on Bylot Island contradict Global Climatic Models (GCMs) that forecast changes to be more intense during winter months. Instead, these trends are mostly detectable during the spring, summer, and fall (from 2.1 to 4.5 degrees Celsius warmer for that period);
- Plant production in wetlands has increased by 84% over the last 18 years;
- Documented a very close association between warmer spring temperatures advancing the breeding phenology (i.e. laying date) and increasing the breeding effort (i.e. nest density) of Greater Snow Geese;
- Identified two lemming species (brown and collared) as playing a key role in the food web as they are the primary prey of most predators;

CONTINUATION

Monitoring the Environmental and Ecological Impacts of Climate Change

- Lemming cycles have dampened in recent years and their abundance during peak years of the cycle is much lower than in the past;
- The proportion of fox dens with reproductive activity has decreased over the years;
- Traditional knowledge on foxes expanded the spatial and temporal scales of current scientific knowledge;
- Included a traditional ecological knowledge component to the program which expanded the spatial and temporal scales of current scientific knowledge particularly with regard to foxes;
- Ongoing biological data collection through standardized field protocols which have been developed and tested in the field and which are freely available at the following website: www.en.ulaval.ca/arcticwolves;
- New web pages translated into Inuktitut:- www.cen.ulaval.ca/bylot;
- Project being expanded/extended into a circumpolar research program through International Polar Year;
- Twenty-five northerners hired to work on various aspects of the project such as field assistant in data collection and translators as well as 21 elders hired for a traditional ecological knowledge project.

Hudson Bay Lowlands Projects 2003 to 2008

NEI Priority Table	NEI Funding Duration in Years	Page	Title
Climate Change	1	123	*Plantwatch North Indicators Report: Phenological Assessment of Plantwatch North Data from Churchill, Manitoba and Northern Labrador
Monitoring	2	124	Ontario Breeding Bird Atlas Field Surveys 2004
Capacity	3	125	James Bay Waterfowl Harvest Study
Total: 3 projects			

*: project occurs in more than one geographic area (Territory/Province)

*Plantwatch North Indicators Report Phenological Assessment of Plantwatch North Data from Churchill, Manitoba and Northern Labrador

*Plantwatch
North
Indicators
Report

Lead: University of Manitoba (Winnipeg)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Ecological Monitoring and Assessment Network (EMAN) and Plantwatch North volunteers, Churchill Northern Studies Centre

Location: northern Manitoba and Labrador

NEI Funding: \$6,352.50 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to combine relevant phenology (first bloom) data collected in Manitoba and Labrador to create graphs of the data and to provide a written assessment of the analysis.

Identified Results:

- Trend to an earlier bloom time for all species in the Hudson Plain ecozone indicating that at least in this ecozone, spring is arriving earlier than in 2001;
- Little change in the bloom time in the Taiga Shield ecozone;
- Analysis results are preliminary only and caution must be taken when using these results to interpret climatic or environmental change.

Ontario Breeding Bird Atlas Field Surveys 2004

Lead: Environment Canada's Canadian Wildlife Service

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Ontario Ministry of Natural Resources, 70 field volunteers in the Hudson Bay Lowlands and 1500 volunteers working throughout the rest of Ontario

Location: Hudson Bay Lowlands, Ontario

Total Project Funding (not including NEI): \$40,000.00 in 2003/04; \$137,811.00 in 2004/05

NEI Funding: \$40,000.00 in 2003/04; \$44,000.00 in 2004/05

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change, Resource Use

Purpose: to establish a baseline series of point count surveys that will allow mapping of the abundance of species throughout the Hudson Bay Lowland area.

Identified Results:

- Historical and new information and data posted on a broad range of species on the atlas website: www.birdsontario.org
- Documented 485 records of rare breeding species in the Hudson Bay Lowland - ten 100 km blocks were monitored;
- Better understanding of the status and breeding sites of a variety of species;
- Extensive data collected on the distribution and relative abundance of birds in remote areas by volunteers;
- Data will be useful in tracking change in bird communities over time;
- Provided a model for potential use in other areas of northern Canada.

James Bay Waterfowl Harvest Study

Lead: Environment Canada's Northern Ecosystem Initiative (NEI) and Environment Canada - Ontario

Partners: Ontario Ministry of Natural Resources, Wildlife Research and Development Section, Mushkegowuk Lands and Resources

Location: Ontario's Hudson Bay Lowland

Total Project Funding (not including NEI): \$9,000.00

NEI Funding: \$10,000.00 in 2005/06

Funding Table: Capacity

Program Priority Areas: Monitoring, Resource Use (waterfowl for eating)

Purpose: to update current knowledge of waterfowl as key food source in Ontario's Hudson Bay Lowland and to determine the current extent, timing and distribution of harvest of waterfowl in the James Bay coastal communities of northern Ontario (Moose Factory, Moosonee, Fort Albany, Kashechewan, and Attawapiskat).

Identified Results:

- Fewer surveys were completed in 2005/06 than anticipated; 500 completed hunter surveys were anticipated but only 165 were completed; in 2004/05, 385 hunter surveys were completed;
- The harvest data collected in 2005 corroborated data collected in 2004: General harvest patterns do not seem to be greatly different from those reported in previous decades. Geese made up the majority of the waterfowl harvested in all of the communities surveyed;
- Distribution of snow geese during the fall hunting season has changed dramatically in the James Bay area; southern James Bay communities no longer have good access to this abundant population;
- The population of temperate nesting Canada geese has increased to record levels, and thousands migrate to the Hudson Bay Lowland to undergo flight feather moult in mid-summer;
- Researchers need to provide better supervision of the primary data collectors (interviewers) and to put more effort into getting buy-in from community leaders and members to ensure survey success.

James Bay
Waterfowl
Harvest
Study

Northern Québec Projects 2003 to 2008

NEI Priority Table	NEI Funding Duration in Years	Page	Title
Monitoring	1	127	Northern Québec Environmental Monitoring and Follow-up Networks Directory
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Monitoring	1	129	A Proposal for the Creation of an Atlas for the Identification and Monitoring of Plants and Vegetation in the Surrounding Region of Each of the Fourteen Northern Villages of Nunavik
Monitoring	2	130	Identification and Inventory of Plants and Vegetation in Nunavik
Monitoring	3	131	Physicochemical and Ecological Bases of Plant Restoration on Northern Villages' Perturbed Sites
Monitoring	4	132	Development and Implementation of a Communication Strategy for the Use and Dynamic Transmission of Naskapis' Ecological Knowledge
Resource Use	1	133	A Proposal for an Environmental Action Plan of the Innu of Matimekush - Lac John
Resource Use	4	134	Ecology, Population Dynamic, and Traditional Use of the Common Eider in Nunavik
Resource Use	5	135	Protocol and Pilot Project on Migratory Birds Data Collection in Northern Cree Communities
Climate Change	5	136	Climate Change in Nunavik: Land and Resource Access Issues
Contaminants	1	137	Registry of Inventories of Contaminated Sites and Local Contaminants in Northern Quebec
Contaminants	1	138	Feasibility Study for the Development of an Information System on Local Contaminants North of the 55th Parallel
Contaminants	2	139	Assessment of the Spatial and Temporal Trends of Mercury Levels of Lake Trout in Nunavik Lakes
Contaminants	2	140	Identification of Former Mining Exploration Sites on the Traplins of the Cree First Nations of James Bay (Québec)
Contaminants	4	141	Assessment and Remediation of Abandoned Mining Sites in Nunavik
Total: 15 projects			

*: project occurs in more than one geographic area (Territory/Province)

Northern Québec Environmental Monitoring and Follow-up Networks Directory

Lead: Environment Canada – Québec

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Contract Consultants: John Haemmerli and Karine Roberge

Location: Territories of the James Bay and Northern Québec Agreement (JBNQA), Northeastern Québec Agreement (NQA) and Schefferville area

Total Project Funding (not including NEI): \$0

NEI Funding: \$20,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change

Purpose: to develop a directory of the environmental components and parameters being measured by environmental monitoring and follow-up networks operating in northern Quebec.

Identified Results:

- Created a printed and electronic directory of the various monitoring and environmental networks in place in northern Quebec;
- Compiled networks of weather, hydrological, hydrometric, biological, pedology and so forth;
- The directory focused on the following aspects: coverage, settings, history, frequency, users, results, accessibility, etc.;
- Each datasheet in the directory referred to a monitoring network and included the following information:
 1. Contact information on managing agency and contact person
 2. Network's objective(s)
 3. Measured parameters
 4. Stations identification and location
 5. Access to data
 6. Data format
 7. A map of the area covered by the network
- The directory included 32 datasheets, each one representing a northern environmental monitoring network. The term "network" refers either to a system measuring one type of parameter only (e.g.: Environment Canada Weather Network) or a system measuring several families of parameters (e.g. SILA Network of the Centre of Northern Studies);
- The directory included only those environmental monitoring networks that were active in 2004.

Northern
Québec
Environmental
Monitoring
and Follow-
up Networks
Directory

Program to Monitor the Body Condition of Caribou from the George River and Leaf River Herds

Lead: Naskapi Nation of Kawawachikamach, Québec and
Consultant Natalie D'Astous

Partners: Regional Steering Committee of Environment Canada's Northern
Ecosystem Initiative (NEI), Hydro-Quebec, Québec Ministry of Natural
Resources, Wildlife and Parks (FAPAQ)

Location: Northern Québec and Labrador

Total Project Funding (not including NEI): \$5,000.00 in 2004/05

NEI Funding: \$6,000.00 in 2004/05

Funding Table: Monitoring

Program Priority Areas: Climate Change, Monitoring, Resource Use

Purpose: to develop a simple questionnaire to be completed by hunting guides
who gut caribou killed during fall hunting season and use the information to
establish a long-term, multi-herd body condition caribou monitoring program.

Identified Results:

- Developed questionnaire that will give wildlife managers information on the physical condition of migratory caribou herds;
- Targeted only the female segment of the George River and Leaf River herds as they can provide information on the herds' reproductive status;
- Ensured that the variables selected for the questionnaire generated quantifiable results: (statistical analyses could be applied to the data).

A Proposal for the Creation of an Atlas for the Identification and Monitoring of Plants and Vegetation in the Surrounding Region of Each of the Fourteen Northern Villages of Nunavik

Lead: Naskapi Development Corporation

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Noat Einish, Translator (Kawawachikamach), Elders (Kawawachikamach): Sandra Guanish, Kathleen Tooma, Pete Guanish, Sandy Nattawappio, Denise Geoffroy, Resource-person, Montréal, Carole Lévesque, Coordinator, Montréal

Location: Northern Quebec

Total Project Funding (not including NEI): \$0

NEI Funding: \$15,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change

Purpose: to create and publish a brochure that shares Naskapi knowledge and know-how of plants and vegetation with young people.

Identified results:

- Tri-lingual (Naskapi, English and French) illustrated brochure written on medicinal plants, including the characteristics, uses and importance of each;
- Proposal work served as the exploratory phase of what became: *Development and Implementation of a Communication Strategy for the Use and Dynamic Transmission of Naskapis' Ecological* under which the brochure will be produced in 2009.

A Proposal for the Creation of an Atlas for the Identification and Monitoring of Plants and Vegetation

Identification and Inventory of Plants and Vegetation in Nunavik

Lead: University Laval's Centre of Northern Studies (Québec City)

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Kativik Regional Government, Kativik Environmental Advisory Committee, Louis Marie Herbarium

Location: Northern Québec and Labrador

Total Project Funding (not including NEI): \$93,000.00 in 2004/05; \$93,000.00 in 2005/06

NEI Funding: \$7,500.00 in 2004/05; \$7,500.00 in 2005/06

Funding Table: Monitoring

Program Priority Areas: Capacity-Building, Monitoring

Purpose: to develop additional tools to help local communities conduct monitoring activities to identify the presence or absence of plant species, as well as any changes to the vegetation and ecosystems surrounding the Inuit villages.

Identified Results:

- Developed an intranet site for the Flore du Québec-Labrador nordique (FQLN) project to study the botanical, ecological and geographic characteristics of each herbarium specimen used in the project;
- Included a procedure outlining the steps for using the database;
- Kativik Regional Government team and the Environment Canada team given access to the electronic database on the FQLN intranet site;
- Wrote the *Flore*, which included a description of each family, genus and species as well as a description of their geographic and ecological distribution;
- Acquired information, photographs and identified characteristic traits of each species;
- Wrote the text; graphically designed and formatted the document - which became the *Atlas of Plants of the Nunavik Villages*.

Physicochemical and Ecological Bases of Plant Restoration on Northern Villages' Perturbed Sites

Physico-chemical and Ecological Bases of Plant Restoration

Lead: Cree Regional Authority

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Cree Community of Whapmagoostui, University Laval (Québec City)

Location: Cree Community of Whapmagoostui, Northern Quebec

Total Project Funding (not including NEI): \$225,000.00 (\$75,000.00 per year)

NEI Funding: \$25,000.00 in 2005/06; \$25,000.00 in 2006/07; \$25,000.00 in 2007/08

Funding Table: Resource Use

Program Priority Areas: Resource Use, Monitoring, Capacity-Building

Purpose: to use local and scientific knowledge to identify appropriate solutions to address the dust problem in the community that is a result of devegetation. Use of this information will assist other Northern communities in developing their own program for restoring similarly disturbed areas.

Identified Results:

- Tested and evaluated the response of three indigenous species (*L. mollis*, *L. jaccpinicus*, and *T. spicatum*) to drought, trampling and sand burial;
- Results suggest that *L. mollis* (sea-lyme grass) should be used in restoration projects as it is a species that once it is established is resistant to trampling and sand burial and can be used to facilitate colonization by other species;
- *T. spicatum* should only be used in sites where sand movement (and accumulation) is low;
- Restoration guidelines developed and concerns identified.

Development and Implementation of a Communication Strategy for the Use and Dynamic Transmission of Ecological Knowledge

Lead: Naskapi Nation of Kawawachikamach, Kativik Regional Government/Kativik Environmental Advisory Committee, Naskapi Development Corporation (NDC), DIALOG (Le réseau québécois d'échange sur les questions autochtones/le réseau de recherche et de connaissances relatives aux peuples autochtones), Social Sciences and Humanities Research Council of Canada (SSHRC)

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Avataq Cultural Institute, Makivik Corporation and Institut national de la recherche scientifique (INRS), University Laval's Centre of Northern Studies (Québec City), local community members

Location: Kawawachikamach, Northern Quebec

Total Project Funding (not including NEI): \$112,500.00 for the four years

NEI Funding: \$15,000.00 in 2003/04; \$27,500.00 in 2004/05;
\$22,500.00 in 2005/06; \$30,000.00 in 2006/07; \$30,000.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring, Resource Use, Contaminants

Purpose: to reconstruct the ecological (flora and fauna) knowledge of the Naskapis and transfer this knowledge across generations to ensure biodiversity protection and increase understanding of the affects of development on ancestral lands.

Identified Results:

- Naskapi ecological knowledge regarding wildlife has been documented and categorized;
- Updated and new information repositioned to meet the traditional needs/ interpretation of the Naskapi;
- Established collective, instead of individual, knowledge;
- The project is considered a textbook case of knowledge mobilization in two three-credit courses in an innovative masters program entitled *Pratiques de recherche et Action publique (research practices and public action)* www.inrs.ca;
- Project being used as a training example in international training programs focused on the environment (part of a Canadian International Development Agency (CIDA) project emphasizing Aboriginal knowledge and its integration into environmental management;
- Project also being used as a textbook case in distance training for Aboriginal leaders and trainers throughout the Americas (including Canada);
- Clarified the similarities and differences between scientific and Aboriginal knowledge, and identified the parameters where these two knowledge systems meet;
- Completed the information collected from Naskapi elders at previous workshops in 2004, 2005, and 2006.

A Proposal for the Environmental Action Plan of the Innu of Matimekush – Lac John

Lead: Ashini Goupil

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Consultants: Foramec Inc., LB Gespion

Location: Northern Quebec

Total Project Funding (not including NEI): \$0

NEI Funding: \$15,000.00 in 2003/04

Funding Table: Resource Use

Program Priority Areas: Resource Use

Purpose: to develop a proposal that will enable the Council of the Matimekush - Lac John Innu Nation to produce a comprehensive environmental action plan.

Identified Results:

- Developed a proposal for the Council of the Matimekush - Lac John Innu Nation so they can produce an environmental action plan;
- The document presented the initiative's objectives, work methodology, schedule, and work team that will enable the Matimekush-Lac John Innu Nation to carry out such a project;
- Funding from this project was also reallocated to create a poster related to the *Protocol and Pilot Project on Migratory Bird Data Collection in Northern Cree Communities* which was for use in all northern Québec communities.

A Proposal
for the
Environmental
Action Plan
of the Innu of
Matimekush
– Lac John

Ecology, Population Dynamic, and Traditional Use of the Common Eider in Nunavik

Lead: Environment Canada's Science and Technology Branch

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI) and Environment Canada's Canadian Wildlife Service – Atlantic and Quebec, Société Duvetnor, Makivik, Fédération des Coopératives du Nouveau-Québec (FCNQ)

Location: Nunavik: Ungava Bay and the southern portion of Hudson Strait

Total Project Funding (not including NEI): \$10,000 in 2004/05; \$133,000 in 2005/06; \$133,000.00 in 2006/07; \$21,000.00 in 2007/08

NEI Funding: \$10,000.00 in 2004/05; \$15,000.00 in 2005/06; \$15,050.00 in 2006/07; \$15,000.00 in 2007/08

Funding Table: Resource Use

Program Priority Areas: Resource Use, Monitoring

Purpose: to better define relationships between breeding, moulting, and wintering areas of eider ducks and document the patterns and intensity of eider duck use by local Inuit communities especially eiderdown harvesting with a perspective of ensuring the sustainability of this traditional and now likely commercial activity.

Identified Results:

- Completed a French and English brochure on eiderdown harvesting which included proposed field procedures that minimize impact on breeding eiders;
- Brochure will be the basis for a publication focused on communities farther north;
- Completed a first draft of a technical report on the seasonal movements of eiders breeding in the Gyr Falcon Archipelago in Ungava Bay;
- Information gathered with the satellite telemetry will be incorporated to similar studies done in Nunavut and Greenland and help build a comprehensive picture of movements of northern common eiders;
- Workshop in Nuuk, Greenland contributed to the implementation of a reduction in the commercial hunting of northern common eiders in Greenland;
- Urgent to devise an efficient monitoring technique for the eiders of Ungava Bay given the increased frequency of avian cholera in northern colonies and the intense use of eiders by several communities and countries;
- Potential for eiderdown harvesting to be an efficient way of monitoring the northern eider population as there is currently a transition between traditional down harvesting and a more commercialized activity.

Protocol and Pilot Project on Migratory Bird Data Collection in Northern Cree Communities

Lead: Cree Regional Authority

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Cree Trapper Association, Carleton University (Ottawa)

Location: Cree communities in Northern Quebec: Mistissini, Waskaganish, Wemindji

Total Project Funding (not including NEI): \$15,000.00 2003/04; \$37,000.00 in 2004/05; \$35,000.00 in 2005/06; \$17,500.00 in 2006/07; \$24,000.00 in 2007/08; \$30,000.00 in 2008/09

NEI Funding: \$32,450.00 in 2004/05; \$28,500.00 in 2005/06; \$30,000.00 in 2006/07; \$30,000.00 in 2007/08

Funding Table: Resource Use

Program Priority Areas: Resource Use, Monitoring, Capacity-Building

Purpose: to implement a protocol and pilot project on migratory bird data collection in Cree communities that will meet community needs and objectives. Also, to build community capacity by having community members participate in the project research design, implementation, and interpretation of data.

Identified Project Results:

- First data on migratory bird harvest collected in 25 years (1972 to 1979);
- Protected hunter anonymity through the establishment of a protocol on data collection, exchange and dissemination (Information Sharing Agreement) with the Canadian Wildlife Service: the protocol was signed by the Cree Regional Authority, Cree Trappers Association and Canadian Wildlife Service in July 2005;
- Established and upgraded a data bank on Cree migratory bird harvest which was transmitted to the Canadian Wildlife Service in February 2007 for the government to access for research and population monitoring;
- Data interpreted by the Canadian Wildlife Service is presented back to Cree stakeholders;
- Two years of survey results for Wemindji and Waskaganish (2005 and 2006) and one-year of results for Mistissini (2006) were calculated to find the estimated harvest of all nine Cree communities;
- Approximately a third of hunters/households of the three communities were interviewed;
- Community involvement at all stages of the project: design, data survey, implementation, and interpretation.



Protocol and
Pilot Project
on Migratory
Bird Data
Collection

Climate Change in Nunavik

Land and Resource Access Issues

Lead: Kativik Regional Government, Public Health Research Unit -
Centre hospitalier universitaire de Québec (CHUQ)

Partners : Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Makivik Corporation, Naskapi Nation of Kawawachikamach, University Laval's Centre of Northern Studies (Québec City), Consortium *OURANOS*, Natural Resources Canada's Climate Change Impacts and Adaptation (CCIAD), Transport Québec, ArcticNet, Nassivik

Location: Nunavik communities of Kangiqsuaq, Kanigsualujjaq, Umiujaq and Kawawachikamach

Total Project Funding (not including NEI): \$663,610.00 over 4 years

NEI Funding: \$50,000.00 in 2003/04; \$30,000.00 in 2004/05;
\$35,000.00 in 2005/06; \$35,000.00 in 2006/07; \$35,000.00 in 2007/08

Funding Table Climate Change

Program Priority Areas: Climate Change, Resource Use, Monitoring

Purpose: to provide a detailed cartographic and qualitative analysis of climate change impacts on trail networks in four northern Québec communities representative of the region. The analysis will help communities develop a set of adaptation strategies and tools to help them address climate related changes to trails.

Identified Results:

- An integrated community-based monitoring (ICBM) program was developed in Nunavik to generate adaptation tools to support safe access to land and resources and to enhance local capacity through participation in community-based monitoring activities;
- Identification and documentation of increasingly 'risky areas' in local ice or land trails because of recognized changes in climate and weather variables;
- Developed a 'safe practices guide' for land and ice travel using traditional knowledge;
- Documented the process of designing a project through and with community involvement at all stages of the project;
- Contributed to the development of a community-based research project at Sanikilujaq, in Nunavut;
- Involved with two International Polar Year projects: *Variability and Change in the Canadian Cryosphere - a Canadian contribution to the "State and Fate of the Polar Cryosphere;"* and another project on the study and the use and occupation of sea ice by the Inuit;
- Results from the study suggested that weather unpredictability cannot be captured precisely using temperature values. Climatic indicators relevant to this issue must take into account instrumental data other than temperature;
- Fieldwork and interviews conducted in the local communities provided the data to determine new and appropriate indicators to help measure this.

Registry of Inventories of Contaminated Sites and Local Contaminants in Northern Quebec

Lead: Environment Canada

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), consulting consortium of Dessau-Soprin and MacLean Environmental Studies (ÉEM)

Location: Northern Quebec

Total Project Funding (not including NEI): \$0

NEI Funding: \$50,000.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Contaminants, Monitoring

Purpose: to gather contaminated sites information and local contaminants concern (LCC) issues to identify common interests on a national scale. This will better coordinate future activities and effectively allocate federal funds such as NEI financing with respect to contaminants.

Identified Results:

- Information received on 23 existing inventories relating directly or indirectly to contaminated sites and/or LCC;
- Data was compiled as a registry of standardized descriptive datasheets;
- More than half (56%) of the inventories related directly to the contaminated sites and the majority (74%) are managed and used by government entities;
- More than half (61%) of the inventories present information in a structured form (databases or databanks), whereas the rest exist as bibliographical lists or paper documents;
- Most of the information compiled in the inventories was recent, having been collected during the past 15 years and most of the information technology used to integrate and disseminate this data was developed in the last five years;
- With the exception of the Cree Regional Authority, no Aboriginal organization had a structured inventory that allowed the integrated management of contaminated sites and mechanisms for easy uptake of the data.

Registry of
Inventories of
Contaminated
Sites
and Local
Contaminants

Feasibility Study for the Development of an Information System on Local Contaminants North of the 55th Parallel

Lead: Makivik Corporation

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Dessau Soprin Consulting Firm contracted

Location: Nunavik

Total Project Funding (not including NEI): \$0

NEI Funding: \$25,000.00 in 2004/05

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to identify the organizations associated with the management or ownership of contaminated sites or materials. Develop an inventory so that the Inuit can manage and access data on contaminated sites and sources of contamination present on their territory.

Identified Results:

- Contractor recommended the development of a web based GIS system to access all contaminated sites information be developed and linked to existing inventories and further consultation be conducted.

Assessment of the Spatial and Temporal Trends of Mercury Levels of Lake Trout in Nunavik Lakes

Lead: Makivik Corporation, Nunavik Research Centre

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Local Hunting, Fishing and Trapping Associations (HFTA) of seven selected Nunavik communities; Nunavik Regional Board of Health and Social Services (NRBHSS)

Location: Lakes near the Northern Québec communities of Kangisujuaq, Kangisualujuaq, Kujjuaq, Puvirnituaq, Quaqtaq, Salluit, Tasuijaq, Umiujaq

Total Project Funding (not including NEI): \$8,000.00 in 2005/06

NEI Funding: \$15,000.00 in 2004/05, \$10,000.00 in 2005/06

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building, Monitoring

Purpose: to improve knowledge on the spatial variation of mercury levels in lake trout from different parts of Nunavik and use it as the basis for future temporal trend studies; to promote capacity-building training Inuit from these communities to carry out field sampling and biological data recording.

Identified Results:

- Collected a total of 122 lake trout from lakes near seven Nunavik communities in the spring of 2005 and 2006 for mercury analysis;
- Established a community-based monitoring framework;
- Inuit have an active role in scientific research;
- Mercury levels in the muscles of all the lake trout collected were found to be above Health Canada's mercury guidelines for subsistent fishery consumption;
- In general, the older and larger the lake trout, the higher the mercury level (overall median age of all the fish collected was 13.9 years);
- Pregnant women, women of child-bearing age, infants and young children may consider eating less lake trout and consume fish species that are very low in mercury such as arctic char, brook trout, and whitefish. If eating lake trout, they should select smaller and younger fish for consumption.

Assessment
of the Spatial
and Temporal
Trends of
Mercury
Levels

Identification of Former Mining Exploration Sites on the Traplines of the Cree First Nations of James Bay (Québec)

Lead: Cree Regional Authority contracted MacLean Environmental Studies (ÉEM)

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Hydro Quebec, Local Environmental Administrators from the Cree Communities of James Bay: Chisasibi, Eastmain, Mistissini, Nemaska, Ouje-Bougoumou, Waskaganish, Waswanipi, Wemindji, Whapmagoostui

Location: Traditional Cree Territory of Northern Québec

Total Project Funding (not including NEI): \$9,000.00 in 2004/05; \$28,000.00 in 2005/06

NEI Funding: \$17,000.00 in 2004/05; \$31,000.00 in 2005/06

Funding Table: Contaminants

Program Priority Areas: Contaminants

Purpose: to identify and characterize abandoned mining exploration and excavation sites.

Identified Results:

- Map identifying the known mining exploration and excavation sites was created;
- Map and site data cross-referenced with trappers, hunters, outfitters and community members information;
- Traditional knowledge and community information improved the maps;
- List of all the former mining exploration sites was put together (3367 exploration projects listed since 1979 within the Cree Territory);
- Gained a more complete understanding of the extent and magnitude of mining sites and camps in the traditional lands of the Cree through the integrated participation of the Kativik Regional Government, Innu Nation of Matimekush Lac-John and Naskapi Nation of Kawawachikamach;
- Compiled information on actual, former, or potential mining and mining exploration sites on the traplines of the Cree First Nations of James Bay from a number of different sources including federal, provincial, and regional government bodies and private organizations.

Assessment and Remediation of Abandoned Mining Sites in Nunavik

Lead: Kativik Regional Government

Partners: Regional Steering Committee of Environment Canada's Northern Ecosystem Initiative (NEI), Makivik Corporation, Workers from the Naskapi Nation of Kawawachikamach, Innu Nation of Matimekush - Lac John, Northern Village of Tasiujaq, Northern Village of Aupaluk, Northern Village of Kangiqsujuaq, Kativik Environmental Advisory Committee, Community of Salluit, NORPAQ Adventures and Services Air Charters, Naskapis Adoschaouna, Cruise North Expeditions (staff, corporate sponsor volunteers), mining exploration companies: Anglo American Exploration Canada and Canadian Royalties Inc, Falconbridge-Noranda Ltd., Environmental Services of Raglan, Xstrata Nickel, Novawest Resources Inc., Natural Resources Canada, Ministère des Ressources naturelles et de la Faune et des Parcs (MRNFP) du Québec, Nunavik Rotors and Canadian Helicopters, Cree Regional Authority, Cygnus Consulting, Qekeirriaq, Akulivik Landholding Corporation

Location: Northern Québec

Total Project Funding (not including NEI): \$505, 000.00 for 2004 to 2008

NEI Funding: \$33,000.00 in 2004/05; \$19,000.00 in 2005/06; \$50,000.00 in 2006/07; \$50,000.00 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants, Monitoring, Resource Use

Purpose: to complete the assessment of abandoned mining sites begun in 2001 to 2002 and prioritize the sites for remediation.

Identified Results:

- Completed initial stage of a proposed Nunavik-wide clean up of abandoned mining sites through comprehensive involvement of community members, private corporations, the mining industry, governments, and non-profit organizations;
- Applied the criteria adapted from the National Classification System for Contaminated Sites to assess and prioritize major, intermediate and minor sites;
- In August 2003, the KRG and Makivik Corporation proposed a funding mechanism for assessing and remediating abandoned mineral exploration sites based on partnerships between northern Québec communities, the mining industry and different levels of government;
- In 2005 and 2006, the Kativik Regional Government (KRG) implemented two rehabilitation pilot projects of "major" abandoned mineral exploration sites, KAW-35 (2005-06) and PJ-1 (2006);

Assessment
and
Remediation
of Abandoned
Mining Sites

CONTINUATION

Assessment and Remediation of Abandoned Mining Sites

- Voluntary participation in the clean up of a third “major” abandoned mineral exploration site PJ-17 since 2005 by Cruise North Expeditions – the crew and corporate-sponsor volunteers;
- In March 2007, the mineral industry created the Fonds Restor-Action Nunavik (FRAN) to rehabilitate abandoned mineral exploration sites in Nunavik dating as far back as several decades;
- In November 2007 a formal contribution agreement was signed between the KRG, the Makivik Corporation, the Government of Québec and the FRAN. The agreement will make it possible to proceed with the clean-up of all the 18 “major” sites using the expertise developed during the above-mentioned pilot projects.

Labrador Projects 2003 to 2008

NEI Priority Table	NEI Funding Duration in Years	Page	Title
Climate Change/ Resource Use	1	144	Capacity-Building to Address Resource Use Impacts on the Labrador Ecosystems: Innu Environmental Guardians Program and Caribou Crossing Interception Area (CCIA) Projects
Climate Change	1	145	*Plantwatch North Indicators Report: Phenological Assessment of Plantwatch North Data from Churchill, Manitoba and Northern Labrador
Climate Change	5	146	Understanding the Impacts of Climate Change on Arctic Sea Ice Conditions: A Community-Based Research Initiative – Landfast Ice and Ringed Seal Productivity
Capacity	1	147	Capacity-Building and Inuit Youth Science Training using Real Life Marine Coastal Ecosystem Data to Understand the Factors Influencing Marine Bird Distributions, Abundance, and Community Structure
Resource Use	1	148	Labrador Ecosystem Thresholds Project
Resource Use	1	149	Eagle River Plateau Waterfowl Cumulative Effects Study
Monitoring/ Capacity-Building	3	150	Eagle and Kenamu Wetland Project
Monitoring	1	151	Cross-Cultural Dialogue on Climate Change and Intellectual Hybridization: A Unique "Pedagogy of Monitoring" is Created Through the Application of Aboriginal and Western Knowledge Systems
Monitoring	2	153	Monitoring Common Eider Population Trends and Ecosystem Interactions in Labrador
Monitoring	3	154	Drinking Water Quality and Climate Change in Labrador: A Pilot Project for Two Inuit Communities
Monitoring/Climate Change	5	155	Monitoring for Ecosystem Change in the Labrador Highlands Using Integrated Multivariate Field and Geospatial Techniques
Contaminants	1	156	Developing a Metadata Inventory for Environmental Contaminant Projects in Labrador
Contaminants	4	157	Addressing Community Concerns about Contaminants at Hopedale, Labrador through Environmental Sampling
Total: 13 projects			

*: project occurs in more than one geographic area (Territory/Province)

Capacity-Building to Address Resource Use Impacts on the Labrador Ecosystems

Innu Environmental Guardians Program and Caribou Crossing Interception Area (CCIA) Projects

Lead: Gorsebrook Research Institute of Saint Mary's University (Halifax)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Environment Canada - Atlantic, Innu Nation

Location: Labrador

Total Project Funding (not including NEI): \$172,015.00

NEI Funding: \$50,000.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Climate Change, Contaminants, Monitoring, Resource Use, Capacity-Building

Purpose: to respond to the Innu Nation's request for assistance to train local guardians to protect and manage their ancestral lands in preparation for self-government. This project was developed based on meetings with Innu representative and elders, community consultations and input from over 20 organizations attending the *Innu Environmental Guardians Conference and Strategy Session for Building Capacity* in 2003.

Identified Results:

- Offered university accreditation courses through Saint Mary's University to Guardians wishing to pursue a university path;
- Eleven Guardians completed the two-module half credit course, *Innu Studies: Introduction to Ecosystems and Ethnography* which was offered, delivered and evaluated in 2003/04, with a vision toward the development of a five-year program;
- Fourteen Innu registered in the module – *Understanding Ecosystems* – the first component of the Innu Studies *Introduction to Ecosystems and Ethnography* curriculum;
- Integrated training into ongoing environmental research and co-management projects;
- Documented a second valued cultural landscape – caribou crossing interception areas – through in-community interviewing and compiling a sample lichen collection;
- Program strength derived from being delivered in-community and related to “real life” of the people and issues that community faces;
- Recognized that a balance is needed between social sciences and bio-physical sciences for a comprehensive product, as well as to ensure buy-in from the community;
- Demonstrated that mandated science projects offer a good model for building capacity and developing long-term partnerships and economic opportunities.

***Plantwatch North Indicators Report**

Phenological Assessment of Plantwatch North Data from Churchill, Manitoba and Northern Labrador

Lead: University of Manitoba (Winnipeg)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Ecological Monitoring and Assessment Network (EMAN) and Plantwatch North volunteers, Churchill Northern Studies Centre

Location: northern Manitoba and Labrador

NEI Funding: \$6,352.50 in 2006/07

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring

Purpose: to combine relevant phenology (first bloom) data collected in Manitoba and Labrador to create graphs of the data and to provide a written assessment of the analysis.

Identified Results:

- Trend to an earlier bloom time for all species in the Hudson Plain ecozone indicating that at least in this ecozone, spring is arriving earlier than in 2001;
- Little change in the bloom time in the Taiga Shield ecozone;
- Analysis results are preliminary only and caution must be taken when using these results to interpret climatic or environmental change.

*Plantwatch
North
Indicators
Report

Understanding the Impacts of Climate Change on Arctic Sea Ice Conditions

A Community-Based Research Initiative – Landfast Ice and Ringed Seal Productivity

Lead: Department of Fisheries and Oceans - Newfoundland and Labrador

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Ice Service, Department of Fisheries and Oceans - Central and Arctic, University of Manitoba (Winnipeg), Memorial University (St. John's, Newfoundland), Nunatsiavut Government (previously called Labrador Innu Association Ecological Research Unit and Guardian Program), Canadian Space Agency, community members from Nain, Hopedale, and Rigolet

Location: coastal Labrador

Total Project Funding (not including NEI): \$123,000.00 in 2003/04; \$100,000.00 in 2004/05; \$100,000.00 in 2005/06; \$113,000.00 in 2006/07; \$113,000.00 in 2007/08

NEI Funding: \$40,000.00 in 2003/04; \$45,000.00 in 2004/05; \$40,000.00 in 2005/06; \$25,000.00 in 2006/07; \$15,000.00 in 2007/08

Funding Table: Climate Change

Program Priority Areas: Climate Change, Monitoring, Resource Use, Capacity-Building

Purpose: to develop a community-based sea ice research program to document the impacts of changing ice conditions on key components of the marine ecosystem in northern coastal Labrador. And to establish a quantitative basis to investigate the reproductive ecology of ringed seals to their habitat; to evaluate the adaptive capacity of the species to both climate variability and man-made changes.

Identified Results:

- Established a landfast ice research network (a core of community members and Nunatsiavut research personnel) and a ringed seal biological sampling program in Rigolet, Hopedale and Nain, Labrador;
- Developed landfast ice, snow, and ringed seal monitoring protocols and satellite image analysis techniques to integrate the Labrador project with ongoing and future climate change studies in other Arctic regions;
- Between 2001 to 2007, six ecological factors were identified as impacting the availability of quality overwintering and pupping habitat in landfast ice;
- Traditional knowledge, observations and data collected indicated that late winter and spring landfast ice conditions negatively impacted the availability of and access to seals along the central and north Labrador coast and on Lake Melville;

- Changes to the distribution, availability and access of ringed seals effected the time, safety, and cost of travel to hunt;
- Results suggest there may be an increased need for monitoring the status of the harvest population (including habitat, use, reproduction, body condition and predation), to modify hunting practices and improve community resource sharing during bad years when seal availability is low;
- Users have been affected by changing patterns of abundance/availability/distribution of ringed seals;
- Results from this study provided an important 'snapshot' for future conditions in other parts of the Arctic.

Capacity-Building and Inuit Youth Science Training using Real Life Marine Coastal Ecosystem Data to Understand the Factors Influencing Marine Bird Distributions, Abundance, and Community Structure

Lead: Nunatsiavut Government (formerly Labrador Inuit Association)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), INCO

Location: Inuit communities of Nain, Hopedale and Rigolet, Labrador

Total Project Funding (not including NEI): \$22,500.00

NEI Funding: \$10,000.00 in 2003/04

Funding Table: Capacity-Building

Program Priority Areas: Capacity-Building, Resource Use

Purpose: to train and hire local Aboriginal youth interested in careers in science and natural resources to assist with field work; to establish baseline data on common eider populations that will complement similar investigations examining the decline of eider populations in the eastern and central Arctic.

Identified Results:

- Trained and hired two Inuit students;
- Students' work allowed field data to be processed for further evaluation;
- Report on eider and marine bird distribution and abundance completed;
- Geo-referenced locations of breeding islands;
- Produced database of communities of bottom-dwelling marine organisms of coastal Labrador;
- Information gathered will support implementation of co-management agreements between the Canadian Wildlife Service and the Labrador Inuit Association, and used for future impact assessments from coastal development.

Capacity-
Building
and
Inuit Youth
Science
Training

Labrador Ecosystem Thresholds Project

Lead: Environment Canada - Atlantic

Partners: Environment Canada's Northern Ecosystem Initiative (NEI)

Location: Labrador

Total Project Funding (not including NEI): N/A

NEI Funding: \$10,000.00 in 2005/06

Funding Table: Resource Use

Program Priority Areas: Capacity-Building, Climate Change, Monitoring, and Resource Use

Purpose: to introduce A Landscape Cumulative Effects on Simulator (ALCES), a computer modeling tool, to local federal, provincial, and Aboriginal resource managers in Labrador and to determine the sufficiency of available data and suitability of ALCES to Labrador

Identified Results:

- ALCES modeling would be suitable for Labrador as it has sufficient landmass and landscape data;
- ALCES is available for implementation throughout Labrador and could be used to extend the spatial scope of modeling into coastal waters.

Eagle River Plateau Waterfowl Cumulative Effects Study

(linkages to Eagle and Kenamu Wetland Project)

Lead: Environment Canada – Atlantic

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Mealy Mountain National Park Feasibility Study, Innu Nation, Parks Canada, Newfoundland and Labrador Departments of Tourism, Environment and Conservation, Forestry, Transportation

Location: Labrador

Total Project Funding (not including NEI): \$148,000.00 in 2004/05

NEI Funding: \$5,000.00 in 2004/05

Funding Table: Resource Use

Program Priority Areas: Resource Use, Monitoring

Purpose: to determine if changes occurred in the number and types of breeding waterfowl on both sides of a new highway being constructed across Labrador and use the information to improve resource managers' ability to predict effects potential access to other remote areas.

Identified Results:

- Selected sites on either side of the proposed Trans-Labrador highway for experimental site monitoring: the north side of the highway is being considered for a National Park whereas the south side will be regulated under the Migratory Birds Convention;
- Completed a literature and unpublished survey results review to understand waterfowl populations and to analyze the selected sites of the experimental design;
- Finalized study design and number of survey plots – 21 blocks (five by five km square);
- Conducted aerial photography and mapping of the sites.

Eagle River
Plateau
Waterfowl
Cumulative
Effects Study

Eagle and Kenamu Wetland Project

Lead: Environment Canada – Atlantic

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Innu Nation, Saint Mary's University (Halifax), Parks Canada

Location: Labrador

Total Project Funding (not including NEI): \$135,000.00 in 2004/05; \$99,000.00 in 2005/06; \$47,000.00 in 2006/07

NEI Funding: \$80,000.00 in 2004/05; \$80,000.00 in 2005/06; \$9,299.00 in 2006/07

Funding Table: Monitoring, Capacity-Building

Program Priority Areas: Monitoring, Capacity-Building, Resource Use, Climate Change

Purpose: to use a variety of methods and sources to investigate the short and long-term impacts that the proposed Trans-Labrador highway will have on the bio-physical systems of wetlands in the Eagle River Plateau and Kenamu River.

Identified Results:

- Developed a migratory bird survey training module in collaboration with the Innu Nation and Saint Mary's University to provide Innu Guardians with required skills to undertake aerial migratory bird surveys;
- Surveyed 21 five kilometre by five kilometre survey blocks for migratory birds, vegetation type and area of water;
- Purchased high resolution IKONOS satellite imagery for selected blocks;
- Conducted traditional knowledge interviews in cooperation with the Innu Nation to provide an historical indication of waterfowl species, harvest information, traditional hunting areas, and vegetation types;
- Baseline information for the study area provided through background information on historical waterfowl population data combined with remote sensing;
- Field trained two Innu Guardians to undertake aerial surveys for migratory birds;
- Completed three sets of data for water quality and migratory birds for future management and use projects within the area;
- This area contains a high density of migratory bird species, and the water chemistry shows clear waters [conductivity (8-13 usie/cm), low turbidity], and pH of between (5.6-6.8 units).

Cross-Cultural Dialogue on Climate Change and Intellectual Hybridization

A Unique “Pedagogy of Monitoring” is Created Through the Application of Aboriginal and Western Knowledge Systems

Lead: Gorsebrook Research Institute of Saint Mary’s University (Halifax)

Partners: Environment Canada’s Northern Ecosystem Initiative (NEI) and Environment Canada - Atlantic, Innu Nation, Innu Band Councils, Human Resources and Skills Development Canada’s Aboriginal Human Resource Development Strategy (AHRDA), Tshikapisk Foundation, John Jacobs (Memorial University, St. John’s Newfoundland)

Location: Labrador

Total Project Funding (not including NEI): \$169,364.00 in 2007/08

NEI Funding: \$77,000.00 in 2007/08

Funding Table: Monitoring

Program Priority Areas: Monitoring, Capacity-Building

Purpose: to shape and define the development and delivery of an Innu and western training approach to climate change and ecosystem monitoring and outline the structure of a university accredited program based on previous training modules for the Innu Environmental Guardian Program curriculum.

Identified Results:

- Collaborated with Memorial University on the development and delivery of a Saint Mary’s University accredited Climate Change Module;
- Identified components of a unique indigenous/science educational model and the enhancement of the capacity of the Innu Environmental Guardians to undertake this climate change research;
- Met with Innu Tshishennuat (elders) and other Innu knowledge holders regarding indicators of climate change from an Innu perspective;
- Installation of a miniature automatic climate monitoring module;
- The status and trends of key ecosystem indicators shared with community members and decision-makers through meetings, consultations and local networking events;
- Ongoing climate change research between the Gorsebrook Research Institute/Saint Mary’s University, Memorial University Labrador Highlands Research Group, the Smithsonian Institutes’ Arctic Studies Centre, the Innu Nation Environment Office, the University of the Arctic, and the University of Alaska;

Cross-Cultural
Dialogue on
Climate
Change and
Intellectual
Hybridization

CONTINUATION

Cross-Cultural
Dialogue on
Climate Change
and Intellectual
Hybridization

- Tshishennuat noted specific changes in their environment:
 - Reddening of the trees along the Churchill River and the increase of insects in the water (this is part of the hemlock Luper infestation that is killing off trees in Québec and Labrador – new to area);
 - An increase in the heat emanating from the ground possibly affecting the lichen ground cover;
 - Smaller fetuses in caribou;
 - New species of salamander sited along the Churchill River;
 - First siting in Labrador of a butterfly species – possibly the tiger swallowtail butterfly;
 - Cross-linkages with Monitoring for Ecosystem Change project in the Labrador Highlands project.

Monitoring Common Eider Population Trends and Ecosystem Interactions in Labrador

Lead: Nunatsiavut Government (formerly the Labrador Inuit Association)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, Memorial University of Newfoundland

Location: Labrador

Total Project Funding (not including NEI): \$44,750.00 in 2004/05; \$20,500.00 in 2005/06

NEI Funding: \$9,000.00 in 2004/05; \$9,000.00 in 2005/06

Funding Table: Monitoring

Program Priority Areas: Monitoring, Capacity-Building (This is a science based project led by a regional organization (Labrador Inuit Association))

Purpose: to review variety of data collected between 1998 to 2003, and to help address common eider population trends and ecosystem interactions

Identified Results:

- Overall, eider populations were increasing in the Labrador study area;
- Current project information represents the first scientific work on this species in this region and has filled a significant knowledge gaps in eider ecology and population dynamics;
- Eiders show a north south-clinal variation in nest initiation with birds in the south laying earlier than birds in the north;
- Significant interaction between annual and regional variation in life history parameters (nest initiation, clutch size, egg volume) and regional differences in nest abundance and nest density, with the lowest densities in Hopedale, while Nain and Rigolet were comparably high;
- Study helped researchers to understand the factors that influence northern marine ecosystems and to develop plans that will assist in the conservation of eider duck populations and maintain the integrity of the communities they occupy.

Monitoring
Common Eider
Population
Trends
and Ecosystem
Interactions
in Labrador

Drinking Water Quality and Climate Change in Labrador

A Pilot Project for Two Inuit Communities

Lead: Inuit Tapiriit Kanatami (ITK), Centre Hospitalier Universitaire de Québec (CHUQ), Ajunnginiq Centre, National Aboriginal Health Organization (NAHO)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Nunatsiavut Government (formerly Labrador Inuit Association), community of Rigolet, Institut National de Santé Publique du Québec, Nasivvik, ArcticNet 4.5, ArcticNet 2.2.2.

Location: Labrador (Inuit communities of Rigolet and Nain)

Total Project Funding (not including NEI): \$65,000.00 in 2005/06; \$28,500.00 in 2006/07; \$90,897.00 in 2007/08

NEI Funding: \$30,000.00 in 2005/06; \$30,000.00 in 2006/07; \$30,000.00 in 2007/08

Funding Table: Climate Change, Monitoring

Program Priority Areas: Climate Change, Monitoring

Purpose: to conduct research in Nunatsiavut to gain a better understanding of the current status of water systems in this region's Inuit communities and the impact of climate change on drinking water.

Identified Results:

- The quality and quantity of fresh water in both Nunavik and Nunatsiavut is affected by climate change thereby impacting drinking water from both natural and municipally supplied sources;
- Feedback from community members indicated more algae and insects due to increasingly still water, and a general increase in the overall temperature of the water which encourages bacterial growth;
- Over 50 years of historical data revealed an increase in air temperature and fluctuations in precipitation levels.
- Tap water had good microbiological quality and was safe to drink: although it tasted and smelled unpleasant. In all cases, the water is chlorinated;
- Water collected in winter or drinking water made from ice was of better quality than water collected in fall or summer;
- Water taken from the land (snow), lakes and streams and stored in plastic containers is often contaminated. The containers should be cleaned on a regular basis and water should always be boiled before drinking.

Monitoring for Ecosystem Change in the Labrador Highlands Using Integrated Multivariate Field and Geospatial Techniques

Monitoring for
Ecosystem
Change in
the Labrador
Highlands

Lead: Memorial University (St. John's, Newfoundland)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Meteorological Services of Canada - Atlantic and Science Horizons, Innu Nation, Newfoundland's Department of Environment, Department of Tourism, Culture and Recreation (Inland Fish and Wildlife Division), Parks Canada, Labrador Institute, Institute for Environmental Monitoring and Research, Indian and Northern Affairs Canada's Northern Scientific Training Program, Natural Resources Canada's Climate Change Impacts and Adaptation Division, International Polar Year (IPY), Natural Sciences and Engineering Research Council of Canada

Location: Labrador

Total Project Funding (not including NEI): \$119,372.00 in 2003/04; \$209,450.00 in 2004/05; \$185,300.00 in 2005/06; \$306,510.00 in 2006/07; \$185,200.00 in 2007/08

NEI Funding: \$40,000.00 in 2003/04; \$30,000.00 in 2004/05; \$30,000.00 in 2005/06; \$30,000.00 in 2006/07; \$49,632.00 in 2007/08

Funding Table: Climate Change, Monitoring

Program Priority Areas: Climate Change, Monitoring, Resource Use

Purpose: to monitor ecosystem health of highland areas in central Labrador using selected indicators of tundra biodiversity, rare ecosystems stability, and tree-line dynamics; to understand how vegetation and animals have responded to past climate change and make scientifically based predictions about how they will respond to the future climate.

Identified Results:

- Contributed to Canadian (EMAN-North, CANTTEX) and international (ITEX) monitoring programs;
- Expanded climate and ecosystem monitoring and research activities in the Mealy Mountains of Labrador as well as central and western Labrador;
- Evidence that trees grew at higher elevations in the past and indications are that this may occur again as a result of current climate warming;
- Broader sharing of knowledge and concerns about climate and ecosystem change with communities and at conferences;
- Established a new research project in the Torngat Mountains of northern Labrador through separate International Polar Year (IPY) and Parks Canada funding;
- Contributed specific IPY protocols for measurements and procedures related to environmental change in treeline and tundra ecosystems;
- Links created with the scientific research through the application of Aboriginal and western knowledge systems.

Developing a Metadata Inventory for Environmental Contaminant Projects in Labrador

Lead: Nunatsiavut Government (formerly Labrador Inuit Association), Environment Canada – Atlantic, Environmental Sciences Group

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Institute for Environmental Monitoring and Research, Labrador Contaminants Working Group

Location: Labrador

Total Project Funding (not including NEI): \$50,000.00

NEI Funding: \$5,000.00 in 2003/04

Funding Table: Contaminants

Program Priority Areas: Monitoring, Contaminants

Purpose: to deliver on 2003/04 priorities established through the Labrador Contaminants Working Group (LCWG) and share information on past and current contaminants projects in Labrador using a web-based *Metadata Inventory*. Additionally, through this project, organizations will begin developing a cooperative approach to setting priorities for contaminants research, monitoring and assessment in Labrador.

Identified Results:

- A forty-one page user manual was developed for the *Metadata Inventory* information management system;
- The *Metadata Inventory* is publicly available on the website www.lcwg.ca and information on the contaminants project can be queried using several approaches;
- *Initial Review of Local Contaminant Concerns (LCCs) in Labrador* report was completed;
- *Existing Inventories and Databases of Contaminants-related Information for Labrador* report was completed;
- The Labrador Contaminants Working Group developed a contaminant research and monitoring agenda for Labrador.

Ecological and Human Health Risk Assessment to Address Community Concerns about Contaminants at the Former Military Site in Hopedale, Labrador

Ecological
and Human
Health Risk
Assessment
to Address
Community
Concerns

Lead: Nunatsiavut Government (formerly Labrador Inuit Association)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Environment Canada – Atlantic, Environmental Sciences Group, Town of Hopedale, RCMP, Province of Newfoundland and Labrador, Health Canada, Nasivvik Centre for Inuit Health and Changing Environments

Location: Labrador

Total Project Funding (not including NEI): \$57,300.00 in 2004/05; \$24,290.00 in 2005/06; \$ 52,761.00 in 2006/2007; \$30,230.00 in 2007/2008

NEI Funding: \$55,000.00 in 2004/05; \$25,000.00 in 2005/06; \$30,300.00 in 2006/07; \$30,235.00 in 2007/08

Funding Table: Contaminants

Program Priority Areas: Contaminants, Capacity-Building

Purpose: to determine the type and location of possible contamination at a former military site near the town of Hopedale, Labrador.

Identified Results:

- PCB contamination was found at the Hopedale former military site and remedial action should be implemented promptly;
- Site specific target levels (SSTLs) were developed for each Contaminants of Potential Concerns (CoPCs) and will be used to determine the appropriate criteria for the cleanup of the site;
- A community survey was developed to assess the site's human health risk and determine potential uses;
- Training on environmental sampling methods was provided to Hopedale community members who continued the sampling program and collected the majority of samples for the terrestrial food chain study in 2005, 2006, 2007;
- New skills may be used in future projects.

Pan-Northern Projects 2003 to 2008

NEI Priority Table	NEI Funding Duration in Years	Page	Title
Monitoring	1	159	Report on the Canadian Tundra and Taiga Experiment (CANTTEX) Vegetation Monitoring Workshop
Monitoring	1	160	Indicators Report for Canadian North
Monitoring	1	161	Long-term Monitoring of Marine Bird Populations in the Canadian Arctic
Monitoring	2	162	PlantWatch North: Monitoring Climatic Trends and Changes in the Ecoregions of Canada's North
Monitoring, Capacity-Building	2	164	EMAN North: Northern Ecological Monitoring Community of Practice & Provision of Ecosystem Status and Trends Information
Monitoring/ Resource Use	4	166	A Circumpolar Rangifer (Reindeer/Caribou) Monitoring Network
Climate Change/ Resource Use	3	167	Caribou and Climate Change
Climate Change	1	169	Climate Change and Northern Aquatic Ecosystems and Monitoring of Climate Change Effects on Northern Aquatic Ecosystems (in subsequent years, this project continued in the Northwest Territories)
Climate Change	1	170	Investigating Linkages between Climate Warming and Increasing Mercury in Arctic Lakes
Total: 9 projects			

*: project occurs in more than one geographic area (Territory/Province)

Report on the Canadian Tundra and Taiga Experiment (CANTTEX) Vegetation Monitoring Workshop

Lead: University of British Columbia (Vancouver)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), ten participants representing nearly all Canadian Tundra and Taiga Experiment (CANTTEX) sites across the North

Location: Arctic Canada

NEI Funding: \$28,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Climate Change, Monitoring

Purpose: To bring together scientists from across the country involved in monitoring the effects of climate variation and change on tundra and treeline ecosystems. To share and compare results from various monitoring sites and to determine how northern plants and soils respond to changes in climate.

Identified Results:

- vegetation monitoring workshop provided instruction on how to conduct flower density and vegetation monitoring and analyze the data;
- Site findings revealed that the western Arctic sites are already showing changes in vegetation that are likely the results of climate warming;
- Draft manuscript describing the first synthesis of results from the Canadian Tundra and Taiga Experiment (CANTTEX) network was prepared but required further data;
- Updated web-based material and email list for Canadian Tundra and Taiga Experiment (CANTTEX) participants;
- Verified methods in the Canadian Tundra and Taiga Experiment (CANTTEX) Manual used to measure species diversity and abundance for use across the Arctic.

Report on
the Canadian
Tundra
and Taiga
Experiment
Vegetation
Monitoring
Workshop

Indicators Report for the Canadian North

Lead: Environment Canada's Northern Ecosystem Initiative (NEI) and Knowledge Integration Directorate

Partners/collaborators: Government of Nunavut, Government of the Northwest Territories, Innu Nation, Inuit Tapiriit Kanatami, Council of Yukon First Nations, Health Canada, Indian and Northern Affairs Canada's Northern Contaminants Program, Yukon Government

Location: Pan-northern

Total Project Funding (not including NEI): \$58,154.00 in 2006/07

NEI Funding: \$12,500.00 in 2006/07

Funding Table: Monitoring

Program Priority Areas: Monitoring

Purpose: To provide a more comprehensive understanding of current state of trends in northern ecosystems.

Identified Results:

- First phase of report completed; however, regional meetings to gather key information through traditional and local ecological knowledge were put on hold;
- Consensus reached at NEI's National Steering Committee in October 2008 not to proceed with Indicators Report as information on status and trends in the Canadian North will be reflected in the Canadian Ecosystem Status and Trend Report being co-led by another department within Environment Canada and which will be released in 2009 and 2010;
- Northern Fact sheets created from Indicators Report with regional information linked to Steering Committee priorities;
- Process of gathering information for the Indicators Report documented for use by the Northern Ecosystem Initiative and northern organizations.

Long-term Monitoring of Marine Bird Populations in the Canadian Arctic

Lead: Environment Canada's National Wildlife Research Centre (Ottawa)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service - Prairie and Northern Region, Atlantic, and Ontario

Location: Arctic Canada

NEI Funding: \$50,000.00 in 2003/04

Funding Table: Monitoring

Program Priority Areas: Climate Change, Contaminants, Capacity-Building, Monitoring

Purpose: To data archive (digitally format) and enter marine bird monitoring information from Arctic Canada which will be used to identify changes to climate and contaminant levels in the circumpolar Arctic seabirds.

Long-term
Monitoring
of Marine Bird
Populations
in the
Canadian
Arctic

Identified Results:

- Contributed to determining the status and trends of several seabird species breeding in the Canadian Arctic using long-term data sets;
- Existing monitoring data was analyzed statistically, summarized, and reported as written documents and archived in a computerized Seabird Colony Registry;
- These documents and the registry itself were prepared for Internet access as part of an international North Atlantic Seabird Colony Database, so that results are more easily accessible to the general public and the circumpolar scientific community. Information is anticipated to be available in 2010;
- All existing colony survey photographs and negatives were catalogued and 70 percent of these images were scanned digitally and archived;
- Annual plain language summaries of the work, including photos and contact information, were produced, translated into Inuktitut, and distributed to northern communities as *Coastlines: Recent Activities of the Canadian Wildlife Marine Birds Program*;
- Occasional Paper on the status of Northern Fulmar colonies in the Canadian Arctic was produced and this data summary was modified and submitted as a peer-reviewed manuscript and accepted in the journal *Arctic*;
- Digitally archived information made it possible to produce reports and survey manuals for each colony;
- Field manuals, which include photos of nesting studies plots, greatly enhance the ability for future researchers to repeat surveys at a given site in a standardized way;
- A first draft report and field manual has been completed for the Cape Hay seabird colony on Bylot Island and the Cape Vera fulmar colony on Devon Island.

PlantWatch North: Monitoring Climatic Trends and Changes in the Ecoregions of Canada's North

Lead: Yukon Conservation Society

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Canadian Wildlife Service, PlantWatch North, Ecological Monitoring and Assessment Network for Northern Canada (EMAN-North), and Canadian Tundra and Taiga Experiment (CANTTEX), Botanical Gardens Conservation International

Location: Yukon, Northwest Territories, Nunavut, Northern Manitoba, and Labrador

Total Project Funding (not including NEI): \$67,610.00 in 2004/05; \$63,800.00 in 2005/06

NEI Funding: \$10,450.00 in 2004/05; \$27,800.00 in 2005/06

Funding Table: Monitoring

Program Priority Areas: Monitoring, Climate Change, Capacity-Building

Purpose: To maintain and expand an effective community-based volunteer monitoring network in the North. This network of volunteers studied the timing of first and full bloom dates of early flowering indicator plants to produce high quality scientific results and make them accessible to a wide variety of stakeholders.

Identified Results:

- Groundwork laid for an effective long-term monitoring program to track climate change in the North through the development of an award program, community posters and observation guides specific to the North;
- Developed a five-year PlantWatch North strategic plan focused on capacity-building, program enhancement, and data analysis and distribution;
- Maintained and expanded the PlantWatch North monitoring network across the North through the distribution of PlantWatch North guides, observer forms (relevant sections translated into Inuktitut for Nunavut), and presentations to schools and community groups in Labrador.
- In all five regions, 2004 data was checked, cleaned and entered into both regional databases (where applicable) and the national EMAN database and the majority of 2005 data was checked;

Regional results:

Newfoundland/Labrador: 88 observations submitted by fall 2005 identified first bloom dates from three sites: North West River, Portugal Cove, and Salmonier Nature Park. Bluebead lily, starflower, and lilacs all had later flowering dates in 2004 than in the 2002 or 2003. This was consistent with the delayed spring/summer experienced in many parts of the province. However, the data set is small and not large enough to carry out reliable statistical analysis;

Manitoba: 50 people registered as PlantWatch observers in 2005 and 85 observations were reported from northern Manitoba. Crocus data from 1979, 1981 (pre-PlantWatch data) and 1999 to 2004 was analyzed from three sites: Winnipeg, Shilo, and Cowan. First bloom dates vary considerably year to year and area to area;

Nunavut: five volunteers participated in Nunavut PlantWatch in 2004 and provided bloom dates for two key plants: mountain avens and purple saxifaga from the following locations: south and west Baffin, western Hudson Bay coast, and Southampton Island;

Northwest Territories: 2005 observations around Yellowknife: first bloom of prickly saxifrage was on June 16th with full bloom on June 19th; bearberry first bloom was observed on June 15th with full bloom on June 20th;

Yukon: fall 2004: 55 observations of 14 different species from Teslin, Whitehorse, Dawson and Haines Junction. Four years of data compiled – in general, first bloom dates for common bearberry in Whitehorse and Dawson were getting earlier: in Dawson, the first bloom dates were 12 days earlier in 2004 than they were in 2001. In the Whitehorse area, PlantWatch North volunteers in 2004 observed that spring was two-and-a-half to three weeks earlier than normal for both wild plants and domestic gardens;

- 5 -10 years of bloom dates are needed for an area to get an idea of the range of bloom times;
- PlantWatch Manitoba developed a Basic Guide to Regression Analysis of PlantWatch Data in 2005 which standardized analysis techniques;
- Created standard protocols for database structure, format, analysis, and production of graphs and maps.

EMAN North: Northern Ecological Monitoring Community of Practice and Provision of Ecosystem Status and Trends Information

Lead: Ecological Monitoring and Assessment Network for Northern Canada (EMAN-North)

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) - Prairie and Northern Region, Pacific and Yukon, Parks Canada, University of Alberta (Edmonton), Fisheries and Oceans Canada, Indian and Northern Affairs Canada (INAC), Natural Resources Canada (NRCan)

Steering Committee: Aurora Research Institute, Fisheries and Oceans Canada, Environment Canada- Prairie and Northern Region, Pacific and Yukon, University of British Columbia (Vancouver), Parks Canada's Western and Northern Service Centre, Yukon Territorial Government, Government of the Northwest Territories, Indian and Northern Affairs' Mackenzie Valley Cumulative Impact Monitoring Program, Government of Nunavut, Nunavut Research Institute, Geological Survey of Canada

Location: Yukon, Northwest Territories, Nunavut, northern Manitoba, and Labrador.

Total Project Funding (not including NEI): \$86,700.00 in 2004/05; \$72,500.00 in 2005/06

NEI Funding: \$50,000.00 in 2004/05; \$25,000.00 in 2005/06

Funding Table: Monitoring, Capacity-Building

Program Priority Areas: Monitoring, Climate Change

Purpose: To improve the understanding of ecological change in northern Canada by promoting, coordinating, and communicating the results of long-term ecological monitoring done by the Ecological Monitoring and Assessment Network for Northern Canada (EMAN-North).

Identified Results:

- Printed 200 English and 25 French Northern Water Quality manuals for distribution among government agencies, research institutes, and northern community organizations;
- Canadian Tundra and Taiga Experiment (CANTTEX) manuals created to guide and standardize the approach to tundra plant community monitoring and for collecting data at International Tundra Experiment (ITEX) sites in Canada's North;
- Created an organized database for Canadian Tundra and Taiga Experiment (CANTTEX) data files;
- Produced a case study poster to illustrate the potential use of bioclimatic indices;
- Expanded and reorganized the EMAN-North web site to include PlantWatch North, the Canadian Tundra and Taiga Experiment (CANTTEX) site, and new datasets;
 - Products and website improved the quality of ecological monitoring in Northern Canada and helped foster ongoing partnerships and collaboration.

A Circumpolar Rangifer (Reindeer/Caribou) Monitoring Network

(This project was linked with the Caribou and Climate Change Project in year one, in subsequent years they were funded separately)

Lead: Environment Canada - Pacific and Yukon

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Meteorological Services of Canada, Climate Change Action Fund, Institute of Arctic Biology, United States Geological Services, Government of the Northwest Territories, International Arctic Science Committee (IASC), National Science Foundation, Gordon Foundation, Arctic Council, Arctic Conservation of Flora and Fauna, Porcupine Caribou Management Board, Beverly/Qamanirjuaq Caribou Management Board, Western Arctic Caribou Herd Working Group, Arctic Borderlands Ecological Knowledge Co-operative, University of Alaska (Fairbanks), Arctic Program at GRID-Arendal in Norway (2005-06, 2006/07)

Location: Across the circumpolar North

Total Project Funding (not including NEI): \$250,000.00 in 2003/04; unknown in 2004/05; \$107,000.00 in 2005/06; \$34,000.00 in 2006/07

NEI Funding: \$45,000.00 in 2003/04; \$30,000.00 in 2004/05; \$30,000.00 in 2005/06; \$10,000.00 in 2006/07

Funding Table: Monitoring, Resource Use in 2003/04

Program Priority Areas: Monitoring, Climate Change, Resource Use

Purpose: To establish and implement an integrated North American monitoring network that will track the impacts of climate change and development on caribou populations across the circumpolar North and the impact on northern ecosystems.

Identified Results:

- Launched Circum Arctic Rangifer Monitoring and Assessment (CARMA) network: www.carmanetwork.com
- Developed protocols for monitoring indicators of individual fitness and health (i.e. sampling protocols for disease and parasites);
- Drafted a manual for field researchers;
- Identified key indicators to monitor for tracking habitat and population parameters for the network;
- Network is circumpolar responsive to local and regional *Rangifer* monitoring programs through partnerships with local co-management groups, regional, and national governments;
- The network fulfills Canada's international obligations to monitor *Rangifer*, a keystone species consistently identified by a number of international monitoring initiatives.

Caribou and Climate Change

(This project was linked with A Circumpolar Rangifer (Reindeer/Caribou) Monitoring Network project in year one, in subsequent years they were funded separately)

Lead: Environment Canada - Pacific and Yukon

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and Meteorological Service of Canada, Climate Change Action Fund, Institute of Arctic Biology, United States Geological Services, Government of the Northwest Territories, International Arctic Science Committee (IASC), National Science Foundation, Gordon Foundation, Arctic Council, Conservation of Flora and Fauna, Porcupine Caribou Management Board, Beverly/Qamanirjuaq Caribou Management Board, Western Arctic Herd Working Group, Arctic Borderlands Ecological Knowledge Co-operative, University of Alaska (Fairbanks), National Science Foundation's Human Dimensions of the Arctic System (HARC)

Location: Alaska, Northern Canada

Total Project Funding (not including NEI): \$250,000.00 in 2003/04; \$250,000.00 in 2004/05; \$215,000.00 in 2005/06

NEI Funding: \$45,000.00 in 2003/04; \$45,000 in 2004/05; \$50,000.00 in 2005/06

Funding Table: Climate Change, Resource Use in 2003/04

Program Priority Areas: Climate Change, Monitoring

Purpose: To assess the vulnerability of specific caribou/reindeer herds to climate change through a comprehensive analysis of ongoing monitoring information, herd data, habitat and climate retrospective analysis over 30 years. To model the impacts of climate projections and assess management approaches to address expected impacts.

Identified Results:

- Developed the protocol to combine climate and caribou movements to assess impacts of climate change on availability of caribou for harvest and exposure to development;
- Compiled seasonal distribution data for most of the North American herds and created an animation of seasonal movements of these herds from winter range to calving grounds. This also involved development of data-sharing/data exchange agreements;
- Drafted a protocol standardizing body condition collections, reflecting the best methodology to use when assessing health and body condition of caribou;
- Assembled climate data and initial efforts have been made to develop climate derivatives;

Caribou
and
Climate
Change

CONTINUATION

Caribou and Climate Change

- Identified a need to verify snow water equivalent data with standardized snow surveys over a broad area, and at each stage of snow accumulation and snow melt;
 - Identified a need for retrospective analysis of winter snow conditions using the patterns of spring snow melt to reflect depth and density of the winter snow pack;
 - Applied eight kilometre resolution NDVI (Normalized Difference Vegetation Index) products and assessed the applicability to circumpolar monitoring of green-up and senescence in tundra ranges;
 - Defined ways to measure remote sensing indicators.

Climate Change and Northern Aquatic Ecosystems and Monitoring of Climate Change Effects on Northern Aquatic Ecosystems

Climate
Change and
Northern
Aquatic
Ecosystems

Lead: National Water Research Institute

Partners: Environment Canada's Northern Ecosystem Initiative (NEI) and National Water Research Institute at Water-Climate Impacts Research Centre (W-CIRC) integration of scientists, Indian and Northern Affairs Canada's Water Resources Department, Inuvialuit Renewable Resources Committee, National Science Foundation, Program of Energy Research and Development, Canadian Foundation for Climate and Atmospheric Sciences, Global Energy and Water Cycling Experiment (GEWEX), Natural Sciences and Engineering Research Council, International Atomic Energy Agency (IAEA), Canadian Network for Isotopes in Precipitation

Location: Mackenzie Delta Region of the Northwest Territories

Total Project Funding (not including NEI): \$188,000.00

NEI Funding: \$60,000.00 in 2003/04

Funding Table: Climate Change

Program Priority Areas: Monitoring, Resource Use, Climate Change

Purpose: To improve the understanding of climate-driven processes in freshwater aquatic ecosystems in the Mackenzie Delta region near Inuvik, NT through a field, process- and modeling-based research program.

Identified Results:

- An analysis of available freshwater aquatic information revealed that the Mackenzie Delta region was a hotspot for future climate change and development stress on freshwater aquatic systems;
- A comparison of simulations for seven Global Climate Models (GCMs) was performed for the Mackenzie Delta region and was the basis for proposed studies to assess the range of possible future impacts on freshwater aquatic ecosystems within the Mackenzie Delta region.

Investigating Linkages between Climate Warming and Increasing Mercury in Arctic Lakes

Lead: National Water Research Institute

Partners: Environment Canada's Northern Ecosystem Initiative (NEI), Meteorological Service of Canada and National Water Research Institute – Prairie and Northern Region, Ontario, consultant: Algal Taxonomy and Ecology

Location: Pan-northern

Total Project Funding (not including NEI): \$34,000.00

NEI Funding: \$15,000.00 in 2003/04

Funding Table: Climate Change

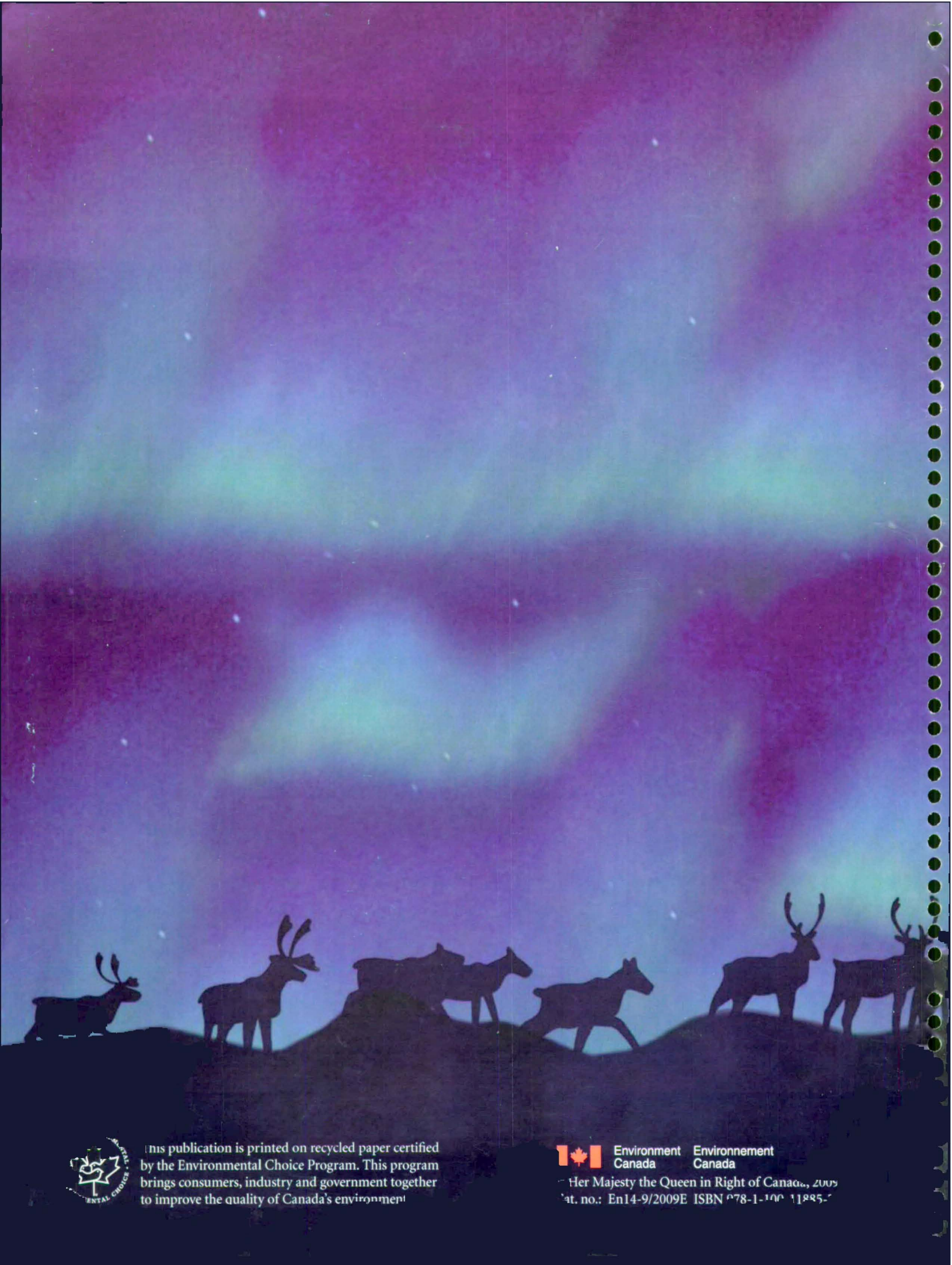
Program Priority Areas: Monitoring, Contaminants,

Purpose: To examine microfossil records and mercury isotope composition and ratios in selected Arctic and sub-Arctic lakes to investigate links between climate warming and increased exposure of organisms to mercury (Hg).

Identified Results:

- Selected sediment from five lakes for analysis. The lakes were Cli Lake (near Ft. Simpson NT), Mista Lake (N. Manitoba near Gillam), DV-E (Devon Island), MB-AC (near Mould Bay, NU) and Char Lake (near Resolute NU);
- Preliminary results suggest that recent increases in total mercury concentrations recorded in Arctic lake sediments are not directly related to increased biological activity;
- Stable isotope ratios of mercury were found to vary with charcoal and plant inputs and therefore examination of these records in lake sediments may be useful for understanding mercury input pathways;
- Analysis of diatom (single-celled algae) records from Canadian Arctic lakes has demonstrated that dramatic changes in climate have occurred in the last 50 years; however there was no strong relationship between the mercury record and the diatom record in the same lakes. This indicates that there is no strong link between mercury and climate.





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