NORTHWEST TERRITORIES

State of the Environment Report

HIGHLIGHTS 2009

Northwest Territories Environment and Natural Resources

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State of the Environment Report

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Northwest Territories Environment and Natural Resources

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Cover Photos:
Landscape-Kyle Kelly,
Ptarmigans-Bonnie Fournier,
Drummond's Bluebells -
Jo Overholt

Message from the Minister

Monitoring the state of our environment is essential to understanding how we, as people of the Northwest Territories, can continue to live in a sustainable manner and adapt to a changing climate.

The NWT State of the Environment Report, developed by the Department of Environment and Natural Resources with input from various agencies and many knowledgeable people from the NWT, uses a set of indicators to describe the current status and trends of some aspects of our environment that are important to the people of the NWT. Additional indicators will be developed and incorporated into future NWT State of the Environment reports.

For the most part, the NWT has clean air and water, and productive forests, land and wildlife. This report provides us with important insights into our changing environment and sounds an early warning about changes we may see over the next 20 years. These insights are essential to making informed and effective decisions to protect our environment for future generations.

I invite you to review the insights and highlight indicators in this Northwest Territories State of the Environment Report - Highlights 2009 and to consult the full version of the NWT State of the Environment Report on our website. Your comments and input are welcome.

Thank you

J. Michael Miltenberger
Minister
Environment and Natural Resources

Provide your input

Contact NWTSOER@gov.nt.ca

Copies of the *NWT State of the Environment Report – Highlights 2009* are available from:

Environment and Natural Resources,
Government of the Northwest Territories,
Box 1320,
Yellowknife, NT X1A 2L9

Or on the website at www.enr.gov.nt.ca

The full *NWT State of the Environment Report* is available at www.enr.gov.nt.ca


D. DOWNING/GNWT

Why describe the state of the NWT environment?

It is important to the people of the Northwest Territories to have a healthy environment to live in and to form the basis for a healthy economy. A state of the environment report can tell us if our environment is changing and where action may be needed to address problems.

The *NWT State of the Environment – Highlights 2009* report you are reading summarizes key findings of the web-based *NWT State of the Environment Report*.

To see the full *NWT State of the Environment Report* go to www.enr.gov.nt.ca

The web-based report will be updated as new information becomes available.

Many indicators selected for this report are already used in the Northwest Territories, Canada, and around the world to share information and measure progress toward a sustainable future. The indicators provided in the next pages and in the full report at www.enr.gov.nt.ca are also used for the following environmental monitoring programs and organizations:

- NWT Environmental Audits
- NWT Cumulative Impact Monitoring Program (Indian and Northern Affairs)
- Canada's Ecosystem Status and Trends Report
- Canada's national reports on the implementation of the Convention on Biological Diversity

Understanding our world is key to making informed decisions now and in the future. The goal of the *NWT State of the Environment Report* is to provide information about our changing environment to identify trends and help make decisions so NWT residents can continue to enjoy clean air and productive forests, land, waters and wildlife.

The specific objectives of the *NWT State of the Environment Report* are to:

- Assess environmental **status and trends** in the NWT
- Provide **data and information** for territorial, national, and international state of the environment initiatives
- Provide an **early-warning system** of possible impacts (e.g. climate change)

Everything in our environment is interconnected. There is no single measure that tells us how the environment is doing. We need to look at a wide range of different environmental components and how they relate to each other to make sense of the whole picture. The *NWT State of the Environment Report* provides detailed information on our environment to help us understand what is happening in our changing world.

The report provides information on the state of specific indicators of our environment and, where possible, looks at what changes have occurred over time and what changes we might expect in the future. Currently, most of the indicators in the report are science based. In some cases, the report provides information on how the NWT compares to other parts of Canada or other parts of the world. Data and information included in the *NWT State of the Environment Report* comes from a wide range of agencies and published sources. The report provides links to the original sources of information and contact information so you can find more information on each topic.

How is the information organized?

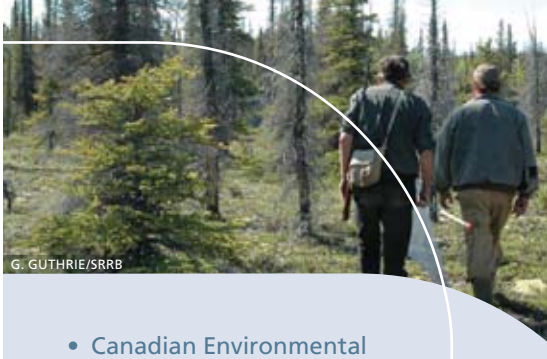
The *NWT State of the Environment Report* is organized into four sections:

Driving Forces

This section deals with global phenomena that influence human activities. The focal points look at changes in global climate and weather patterns, energy use, greenhouse gas emissions, populations and economies.


RUTH DELORME-ROY


D. DOWNING/GNWT


G. GUTHRIE/SRRB

Pressures

This section describes specific human activities that act as pressures on our environment. Focal points included in this section analyse trends in human travel, industrial development, human-caused landscape changes, and levels of solid waste and contaminants.

State

This section describes measurable impacts on the environment from driving forces and pressures. Focal points look at the state of our air, water, vegetation, wildlife, species at risk and genetic resources.

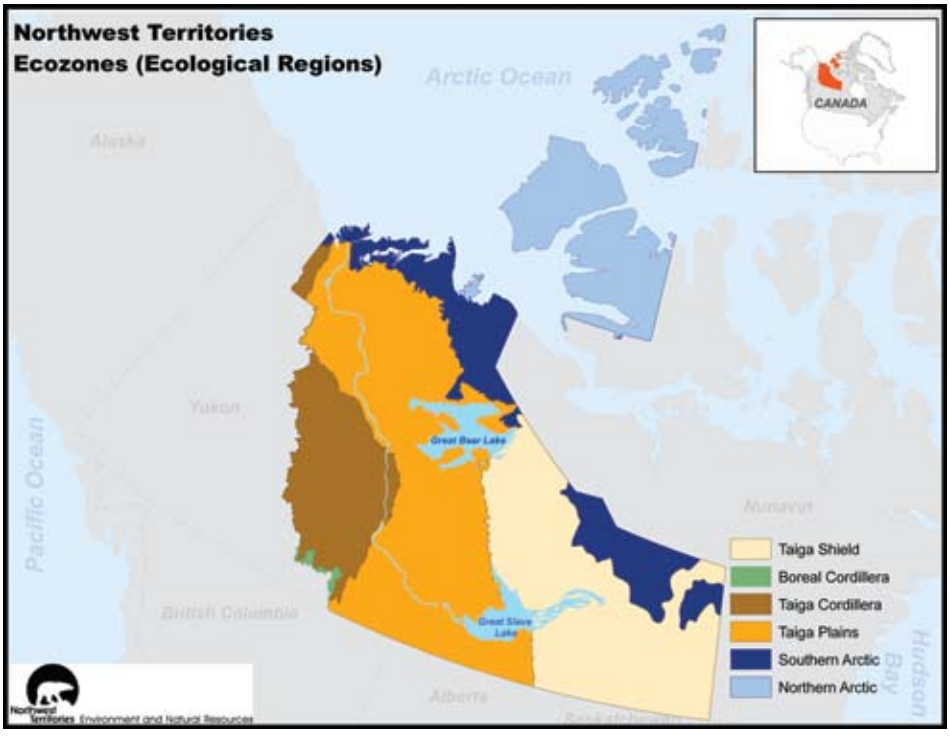
Stewardship

The final section identifies stewardship actions that can reduce the impact of driving forces and pressures and thus improve the state of our environment. Gathering country foods and participating in traditional economies that provide healthier lifestyles and reduce import of goods, environmental education programs that create awareness, and land conservation are all stewardship activities.

Indicators

Each focal point in the *NWT State of the Environment Report* includes one or more indicators. Indicators were chosen to communicate key information on the NWT environment in a way that is relevant to the people of the NWT. Indicators can be used to show trends over time, allow comparisons between different regions, help judge the sustainability of current practices, and define and publicize new standards and measures for assessing progress toward a sustainable future.

Future reports will expand to include additional indicators on the state of the NWT environment.



- Canadian Environmental Sustainability Indicators Reports
- Canada Forest Accord and the Criteria and Indicator Reports on Sustainable Forests
- Canadian Protected Areas Status Reports
- The United Nations 2010 Biodiversity Target
- Global Biodiversity Outlook

The NWT is developing a new ecologically-based landscape classification to help organize our environmental assessments, monitoring and decision making. This new ecological classification is presented within a framework for continental North America that divides the NWT into six 'ecological regions' (see the six Ecozones Plus in the map on this page). The names and boundaries of the NWT ecozones are currently under revision and will change as more information becomes available. The *NWT State of the Environment Report* uses this new classification to report information on each indicator. Find more at www.enr.gov.nt.ca


D. DOWNING/GNWT

Key Insights

For the most part, we are fortunate that the NWT has clean air and productive waters, land, forests and wildlife. However, there are some trends and changes that may be impacting our environment.

The NWT is home to some of the largest remaining portions of two important global ecological areas: the boreal-taiga forest and the Arctic tundra.

Driving Forces

- Climate change is occurring and natural climate and weather cycles will enhance the effects of climate change, causing changes in the environment that may be rapid and unpredictable.
- The NWT population is not increasing at a rapid rate, but use of petroleum-based energy is. The proportion of NWT people living in large-medium communities is increasing.
- The NWT economy is less diverse than 10 years ago.
- Use of Aboriginal languages is declining throughout the NWT. These languages are important for the preservation and transfer of Aboriginal traditional knowledge to future generations and to pass on traditional knowledge about the land.

Pressures

- During the past decade, human activities have increased everywhere in the NWT, including along the Northwest Passage, because of world demand for diamonds, other minerals, and oil and gas. The type and level of these activities change with the world economy.
- Forest fires are the main sources of landscape change in the NWT. Winter roads for exploration and development activities, and seismic lines have increased. Human access has increased in the Mackenzie Valley and north of Great Slave Lake.


CASES


D. DOWNING/GNWT


F. NALES

State

- Only 1% of all tracked species in the NWT are at risk of becoming extirpated or extinct in the next 100 years. This risk has increased in the past decade, but remains very low. For example, some migratory bird species that were once common are now in decline and at risk. The endangered Peary caribou are particularly susceptible to climate change due to their low numbers and the effects of warm rainy winters on food availability in the normally dry high Arctic.
- The effects of climate change, especially those due to warmer and snowier winters, are being observed on many aspects of the NWT's environment: melting sea ice and permafrost, changing thermokarst, and changing distribution of some species, including the introduction of some alien species. We do not have enough monitoring information to know whether other effects of climate change observed elsewhere in northern North America, such as changes in the timing of insect emergence or increases in shrubs at the treeline, are occurring in the NWT. To date, no increases in forest fires have been observed.
- Most barren-ground caribou herds in the NWT are declining. This is also occurring elsewhere in North America and the caribou cycle may be linked to long-term natural environmental fluctuations related to climate.

Stewardship

- Use of environmental resources in the NWT is changing. Hunting and fishing remain important, but are declining slowly. Trapping has declined, but recent participation has been stable. The use of country food by NWT residents living in large-medium communities is slowly declining.
- Participation in tourism activities related to the environment is low and variable, there are some declines in park visits, but some increases in touring and adventure tourism.
- More northern programs on environmental awareness and more protected areas are being developed.

By learning about the state of the NWT environment, residents can learn what actions are needed to improve the environment and pass on our heritage of clean air and productive waters, land, forests and wildlife to our children.

More information on each of these findings can be found under the highlight indicators in the following pages and in the *NWT State of the Environment Report* at www.enr.gov.nt.ca

1 Driving Forces
The Big Picture – A Changing Planet

This focal point tracks important global driving forces that influence long-term changes at the global and Arctic scale. These changes can have significant direct and indirect effects on the NWT environment.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are **in bold**:

1.1 Trends in global CO2 concentrations

1.2 Trends in average global temperature, sea levels and snow cover

1.3 Projected trends in temperatures and precipitation in the Arctic

1.4 Projected trends in Arctic sea ice

1.5 Trends in global population numbers

1.6 Trends in global supply and demand for northern natural resources

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

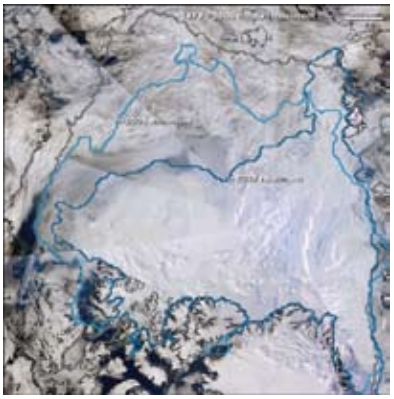
Highlight Indicators

Projected trends in temperatures and precipitation in the Arctic

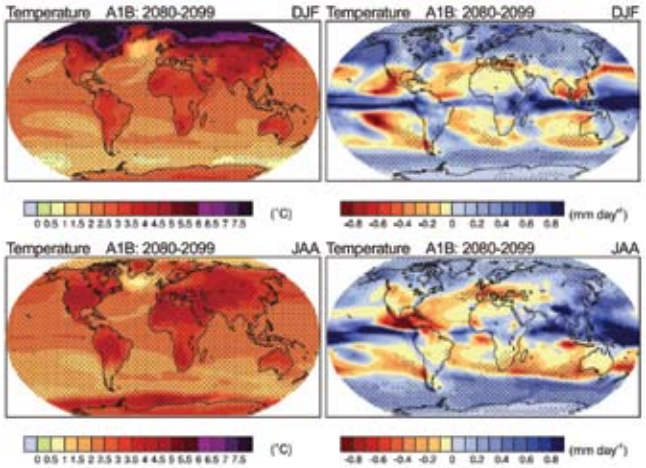
Winters will be warmer, particularly in the High Arctic. Regional climate models predict that snow depth will increase in the High Arctic, but may actually decrease in the forested areas of the NWT.

Projected trends in Arctic sea ice

Arctic sea ice is declining but climate change models do not provide accurate predictions on the rate of future decline.



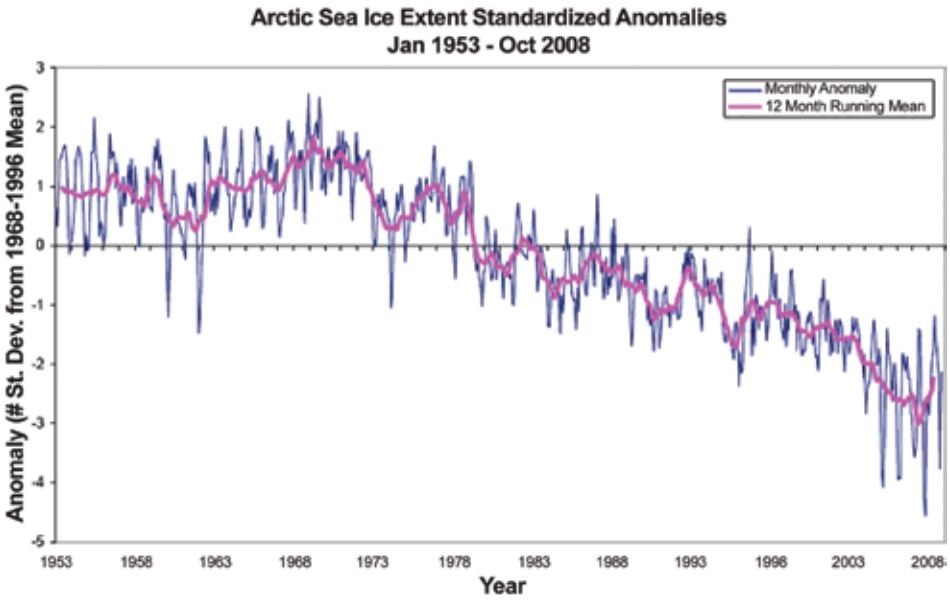
Extent of Arctic sea ice in September 2007. Image by Walt Meier and Julienne Stroeve, National Snow and Ice Data Center, University of Colorado, Boulder. http://nsidc.org/sotc/sea_ice.html



Changes in air temperature (°C, left), precipitation (mm day–1, right) for winter (DJF, top) and summer (JJA, bottom) based on climate models for years 2080-2099 compared to 1980-1999. Graph and text modified from IPCCWG1 AR4 report.

Trends in global supply and demand for northern natural resources

When prices for natural resources increase, businesses not only boost production but also invest more in exploration and drilling activities. This may result in the discovery of new deposits. Also, with increased prices, previously known but unprofitable resources may become profitable to extract, which in turn increases the size of the economically recoverable reserve. Ups and downs in resource prices result in rapid changes in NWT economic drivers, which have an impact on human activities and land use in the NWT. Declines in the global economy trigger slowdowns in the NWT economy. Between 2002 and 2006, the price index of natural resources increased rapidly. Demand for industrial raw materials during that time pushed up world energy and metal prices and there was increasing demand for NWT's natural resources, despite rises in development costs. However, demand for natural resources is highly variable. As the NWT's economy is based mostly on natural resource extraction, pressures on the NWT environment, such as human activities related to resource extraction, also fluctuate with the global economy.



Mean sea ice anomalies, 1953-2007: Passive microwave-derived (SMMR / SSM/I) sea ice extent departures from monthly means for the Northern Hemisphere, January 1953 to October 2008.

Key Insights

- Climate models are predicting warmer winters, more snow in the Arctic but less snow in forested areas of the NWT.
- Climate models and experts are predicting ice-free Arctic waters in summer by 2020 or earlier.
- Demand for NWT resources will remain variable, leading to a typical boom and bust economy. This will result in changing pressures on the NWT environment from changes in human activities and land use patterns.

Find More

For more information on climate changes see:

Fourth Assessment Report of the International Panel on Climate Change: www.ipcc.ch/ipccreports/ar4-wg1.htm

State of the Canadian Cryosphere: www.socc.ca/index_intro_e.cfm

US National Snow and Ice Data Center – daily update on sea ice: http://nsidc.org/data/seaice_index/daily.html

EnvironStats reports: www.statcan.ca

2 Driving Forces
Natural Climate Fluctuations

This focal point tracks large-scale natural annual and decadal fluctuations in climate and weather that are caused by changes in patterns of ocean circulation and atmospheric pressure.

Indicators

Indicators included in the full report for this focal point.

2.1 Arctic Oscillation Index

2.2 Pacific Decadal Oscillation Index and El Niño/La Niña

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Decadal: Approximately every 10 years

In the NWT, the Arctic Oscillation (AO), Pacific Decadal Oscillation (PDO) and El Niño/La Niña are particularly important to understanding large fluctuations in weather from year to year and decade to decade. These large weather fluctuations are natural and began long before human-caused climate change. Natural weather fluctuations directly impact drivers of ecosystem change such as drought, forest fire, flooding, permafrost melt, forest pest outbreaks, and spring green-up and plant growth. Natural fluctuations need to be taken into account if we want to track the effects of human-caused climate change on NWT ecosystems.

Highlight Indicator

Arctic Oscillation Index

The Arctic Oscillation (AO) is a pattern of variability in atmospheric pressure over the Arctic and North Atlantic oceans resulting in large weather changes from year to year and decade to decade. The Arctic climate is highly variable. The AO index gives information on the natural phases of this variation.

The AO can reduce or amplify the effects of increased greenhouse gas emissions on Arctic climate. In decades when the AO is in a positive phase, its effects are similar to those predicted for human-caused climate change and it is difficult to distinguish between the two. A positive AO is linked to changes in Arctic Ocean currents and a decrease in old thicker sea ice at the pole. A positive AO is also linked to warmer average winter temperatures north of 60.

Over most of the past century, the AO alternated rapidly between positive and negative phases. However, in the 1970s and again in the late 1980s to late 1990s, the AO remained "stuck" in a strong positive phase with a record high in 1990. A clearer understanding of the effects of AO on NWT climate is important to better predict the effects of human-caused climate change on the NWT environment.


A VEITCH

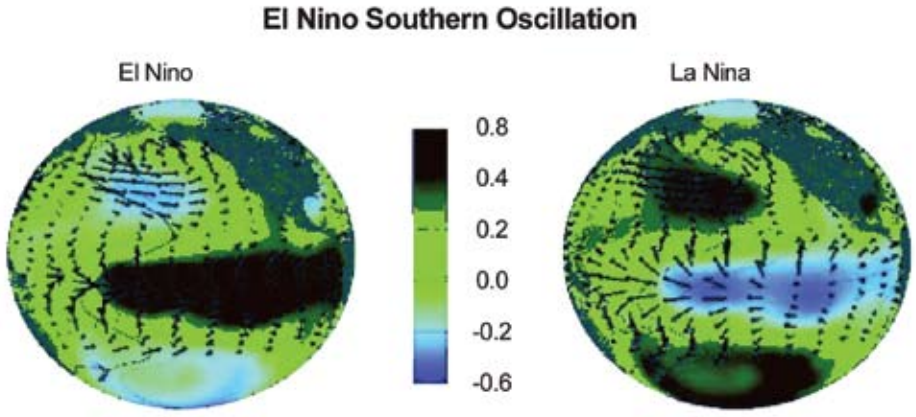

S. CARRIÈRE/GNWT


M. OLDHAM/GNWT

Pacific Decadal Oscillation Index and El Niño / La Niña

The Pacific Decadal Oscillation (PDO) and El Niño/La Niña, are patterns of Pacific ocean and climate variability. Both phenomena are important to understanding changes in northern ecosystems occurring over decades (PDO) and from year to year (El Niño / La Niña). Why changes in PDO phases and El Niño occur is not clearly understood, but simply knowing when they change helps us better understand the climate in northwest North America, including the climate in mainland NWT. El Niño events result in warmer winter weather, slightly higher than normal snow fall in the southern NWT, and increased spring water discharges in rivers. During the past 60 years, there have been eight strong El Niño events, in 1957-59, 1965-67, 1972-74, 1982-84, 1986-88, 1991-93, 1997-99, and 2002-04. La Niña conditions result in colder winters and less snowfall. La Niña conditions have been in place since about August 2007, but show signs of weakening.

The effects of shifts in the PDO and El Niño events on NWT ecosystems are not well understood. A few studies have looked at weather patterns in relation to long-term fluctuations in NWT ecosystems, such as forest fire regimes and droughts. Long-term datasets for these patterns exist for the NWT and more studies can be expected in the future. This will greatly help our efforts to plan for and adapt to a changing climate.



El Nino/La Nina, © Image from the NASA Jet Propulsion Laboratory web page. Courtesy of Stepen Hare and Nathan Mantua, University of Washington. Surface Temperature units are degrees Celsius. Arrows are wind stress patterns.

Key Insights

- Natural fluctuations, like the Arctic Oscillation and El Niño/La Niña events can reduce or amplify the effects of climate change in the NWT.
- More studies are needed to increase our understanding of the effects of these phenomena on NWT's environment.

Find More

For information on El Niño go to Environment Canada at www.msc-smc.ec.gc.ca/education/elnino/

El Niño/La Niña can be tracked monthly on US National Oceanic and Atmospheric Administration (NOAA) web pages at www.noaa.gov


S. CARRIÈRE/GNWT

3 Driving Forces
Climate and Weather

Weather and climate are driving forces for northern ecosystems, resulting in changes to wildlife habitat, species composition and forest fire patterns.

Indicators

Indicators included in the full report for this focal point.

3.1 Trends in observed seasonal weather compared to normal

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

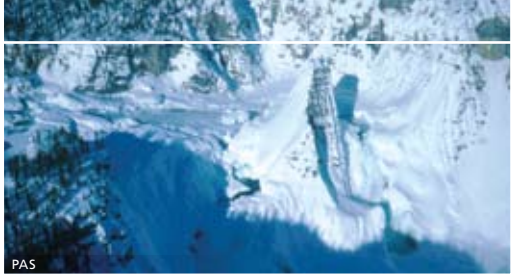
Highlight Indicator

Trends in observed seasonal weather compared to normal

This indicator tracks differences in temperature and precipitation each season from "normal" values measured between 1950-1980. Temperature departures from normal vary greatly between years in the NWT (see **Natural Climate Fluctuations**). Temperatures in the past 15 years have generally been warmer in all seasons than temperatures measured between 1950-1980. This is most notable in winter in both the Mackenzie District and the Arctic Tundra regions. During the past year, the Beaufort Sea area and some of the High Arctic islands experienced warmer weather every season by 1 to 2 degrees Celsius. The warmest winter ever recorded in both the Mackenzie District and the Arctic Tundra was 2005/2006.

Precipitation varies greatly between years across the NWT. The greatest departures from normal are occurring in winters in the Arctic Tundra, where snowfall has increased by about 20-40% over 1950-80s averages. Precipitation in the Mackenzie District is highly variable but, in contrast to the Arctic Tundra, winter snowfall in the Mackenzie District appears to be declining. This fits with what climate change models have predicted (see **The Big Picture – A Changing Planet**).


M. STACEY/GNWT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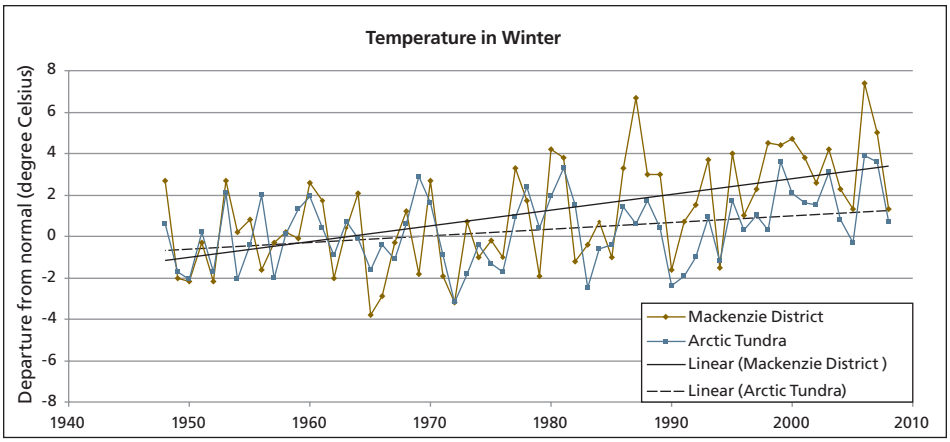
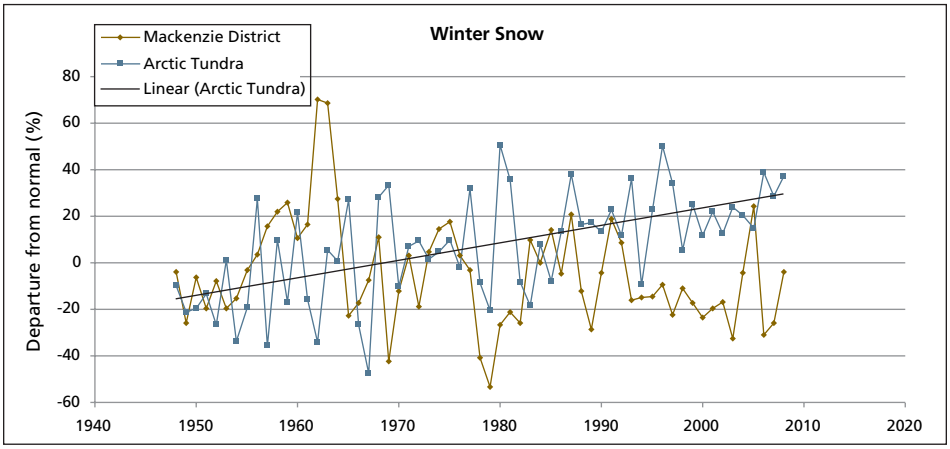




Winter temperature and snow cover departures (%) from normal (values measured in 1950-1980) in the Mackenzie District and Arctic Tundra regions. Source: Climate Trends and Variations Bulletin. The Bulletin is published every season by the Climate Research Division of Environment Canada.

Key Insights

- Exceptionally warm and snowy winters can be expected in the future.
- As predicted by the climate change models, the greatest changes in weather are occurring in the High Arctic.
- Precipitation in the Mackenzie Valley is highly variable and does not yet show any trends.

Find More

Canadian Climatic Regions:

Forested NWT makes up the Mackenzie District

NWT's arctic regions are included in the larger Arctic Tundra Region

"Normal" values are the average observed temperatures and precipitation recorded between 1951-1980.

For more information go to Climate Trends and Variations Bulletin at www.msc-smc.ec.gc.ca/ccrm/bulletin/

4

Driving Forces

Demography – Humans in the Northwest Territories

Human population density in the NWT is one of the lowest in the world. Dene and Inuit have lived on the land in the NWT for thousands of years. Europeans arrived in the late 1700s. Today there are about 40,000 residents in the NWT and over half are Aboriginal.

Indicators

Indicators included in the full report for this focal point.

4.1 Trends in demography in NWT ecozones

4.2 Trends in the use of Aboriginal languages in NWT ecozones

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Humans are one of the main driving forces influencing the environment. Indicators on human-related changes are helpful in analyzing and predicting how humans will drive future changes in our environment.

Highlight Indicators

Trends in demography in NWT ecozones

NWT's population is getter older, on average, but it is still younger than the rest of the Canadian population. Recent population growth in the NWT has been modest. For most of the past 20 years, the NWT has been a net exporter of people, mostly to Alberta. About 75% of NWT residents live in one of the NWT's five regional centres and there is a trend to move to NWT's only city - Yellowknife (Taiga Shield ecozone). Since 1999, the proportion of NWT residents living in Yellowknife has slightly increased from 43% to 45%. Most immigrants to the NWT come from other Canadian jurisdictions – Alberta (32%), British Columbia (18%), Ontario (15%), and Nunavut (8%). About 2% of immigrants come from outside Canada.

Trends in the use of Aboriginal languages in NWT ecozones

Aboriginal languages reflect stories and places in a specific environment. NWT animals, plants, rivers, lakes, land – NWT's environment - is richly described and understood in NWT's nine Aboriginal languages. Each language can best transmit stories, expressions, and knowledge about specific ecozones in the NWT. Loss of these languages, or loss of fluency from one generation to the next, can result in loss of environmental traditional knowledge. Preserving languages is one way to help to preserve traditional knowledge, which has been recognized as an important component of the Convention on Biological Diversity.

In the Northern and Southern Arctic, the Aboriginal language most spoken is Inuvialuktun. In these Arctic ecozones, less than 60% of Inuvialuit can speak that language.


K. KELLY

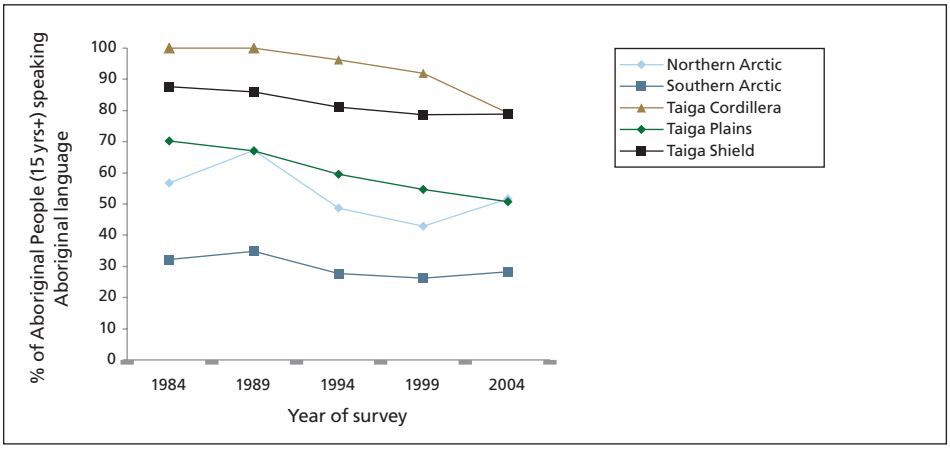

GNWT


D. MOSES

In the Taiga ecozones, over the past 20 years, the percentage of Dene and Metis who can speak an Aboriginal language has declined by 10-20%. Languages most spoken in these ecozones are, from north to south: Gwich'in, North Slavey, Tłı̨cho, South Slavey, Chipewyan, and Cree. By 2004, between 60 and 80% of Aboriginal people in these Taiga ecozones indicated that they could speak an Aboriginal language.

NWT's Aboriginal Languages
Chipewyan, Cree, Gwich'in, Inuinnaqtun, Inuktitut, Inuvialuktun, North Slavey, South Slavey, Tłı̨cho

Aboriginal people have noted with great concern the decline of Aboriginal languages in most NWT communities. Future trends in the use of Aboriginal languages in the NWT will provide insights into the challenges of maintaining traditional environmental knowledge in each NWT ecozone.



Source : NWT Bureau of Stats. NWT Labour Force Surveys and NWT Community Survey. The next survey is scheduled for 2009.

Key Insights

- The NWT population is aging.
- The NWT population is slowly concentrating in larger communities.
- The NWT is a net exporter of people to elsewhere in Canada, mostly to Alberta.
- Use of Aboriginal languages is declining in the NWT.
- The human density in the NWT is 0.03 people/km^2.

Find More

For current data on NWT population go to NWT Bureau of Statistics (2008) Statistics Quarterly at www.stats.gov.nt.ca


R. GAU/GNWT

5 Driving Force
Economy

The economy and the environment are linked in complex ways. Choices in how economic activities are carried out influence how those activities will affect the environment.

Indicators

Indicators included in the full report for this focal point.

5.1 Trends in Gross Domestic Product

5.2 Trends in oil-gas and mineral production by ecozone

Other indicators are being developed for future reports, including an indicator on NWT's natural capital.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Lessons learned from around the world demonstrate that a healthy and sustainable environment is key to a healthy, sustainable economy. The economy can be a driving force for changes in the environment. These economic indicators provide information about overall changes in the NWT economy, and specific changes in the oil and gas and mineral sectors, sectors that can have direct impacts on the NWT environment. They can be compared to similar indicators in other jurisdictions. These comparisons can provide new perspectives and data to analyze links between economic decisions and the present and future state of the NWT environment.

Highlight Indicators

Trends in Gross Domestic Product

GDP is a measure of the total market value of all goods and services produced in the NWT in a given year. This includes total consumer, investment and government spending, plus exports, minus imports.

The NWT's economy is expected to remain largely based on non-renewable resources and as such will continue to be influenced by the global economy. Current and future global economic uncertainties are directly reflected in short-term financial decisions made by resource industries, which in turn result in an NWT economy that follows a "boom and bust" pattern. Large-scale resource development uses energy for power, and more exploration results in increased access to previously remote areas.

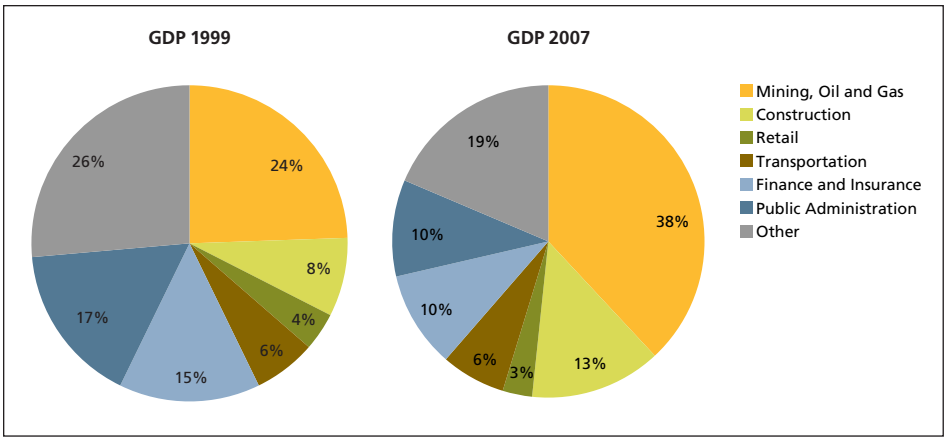
Trends in oil-gas and mineral production by ecozone

The production of oil and gas and minerals (such as gold, silver, tungsten, uranium, lead/zinc and diamonds) are two of the main drivers of the NWT economy, past and present. Tracking production of these non-renewable resources provides insight into the overall direction of these economic drivers, and helps our understanding of present and future pressures on the environment.


R. MULDERS


GNWT


R. GAU/GNWT



Gross Domestic Product by industry in the NWT – 1999 and 2007. "Other" includes health, service industry, wholesale trade, and renewable resource industries (0.4% of GDP in 2007); Source: NWT Economic Review and Outlook 2007 and NWT Bureau of Statistics, Statistic Quarterly – September 2008.

"While GDP has increased by 67% since 1999, mining, and oil and gas accounted for almost 50%. Other sectors have not kept pace."
NWT Economic Review and Outlook 2007

Oil and Gas

Most oil and gas production has been in decline for 6-7 years. The number of oil-gas wells drilled in the NWT increased to 36 in 2003, and has rapidly declined since then. This is a low level of activity compared to other areas. The number of new gas wells drilled in Alberta also declined from 7,000 in 2003 to about 4,000 per year in the past two years.

Minerals

In the past, NWT mines produced gold, silver, and uranium in the Taiga Shield ecozone, and tungsten in the Taiga Cordillera. Lead/zinc was produced in the southern part of the Taiga Plains. Mines in remote sites tend to close or shut down temporarily when prices are low. Nineteen mines have been abandoned resulting in contaminated sites. Diamonds are now the main minerals produced in the Southern Arctic ecozone and the Taiga Shield ecozone. Diamond production has been increasing rapidly for the past 10 years. Exploration for oil and gas and for minerals continues. All-season roads and better infrastructure will reduce the costs to transport NWT's oil, gas and minerals to market.

Key Insights

- NWT's economy is less diverse than it was 10 years ago.
- A resource economy, like the NWT's, is affected by uncertainties in the global economy.
- Pressures on NWT's environment are linked to fluctuations in commodity prices on the world's market.

Find More

More details on oil-gas and mineral production in the NWT and on future projects related to the industry can be found on the GNWT Industry, Tourism and Investment web page at www.iti.gov.nt.ca/ and on the Natural Resources Canada web page at www.nrcan-rncan.gc.ca/


M. OLDHAM/GNWT

6 Driving Forces
Energy Use

Energy use in the NWT, and elsewhere, is a driving force that affects our environment in many ways by increasing pressures such as air pollution, human activity, and landscape change.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

6.1 Trends in energy derived from petroleum products

6.2 Trends in electrical generation

6.3 Trends in NWT Greenhouse Gas Emissions

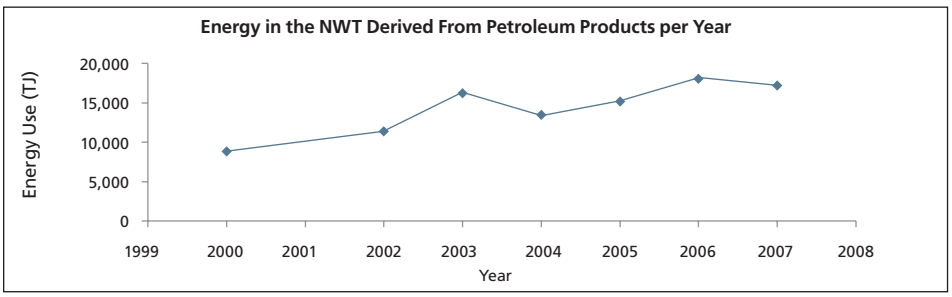
Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

The type and amount of energy used affects the impact energy use has on the environment. Use of fossil fuels (petroleum products) contributes to greenhouse gas emissions, which in turn contribute to climate change. Currently most energy used in the NWT is from non-renewable sources. However, with the fluctuating price of non-renewable energy, obtaining a higher proportion of our energy from alternative renewable energy sources such as hydro-electric power is becoming more economically feasible.

Highlight Indicators

Trends in energy derived from petroleum products

In the NWT, the use of petroleum products as an energy source for transportation, power and heat is increasing every year. This can largely be attributed to an increase in industrial development. More than half the fuel used in the NWT is for transportation. If the current trend continues, use of petroleum products for energy generation will double by the year 2020. Large mega-projects, such as a Mackenzie Gas Pipeline, will increase petroleum product use even more rapidly to produce energy for pipeline related activities. Increases in the price of petroleum products may lead to substitutions and reduction of use.



Energy, in terajoules (TJ), derived from the petroleum products diesel, gasoline, aviation gasoline, aviation turbo, natural gas and propane in the NWT. Source: GNWT Department of Finance.


M. OLDHAM/GNWT

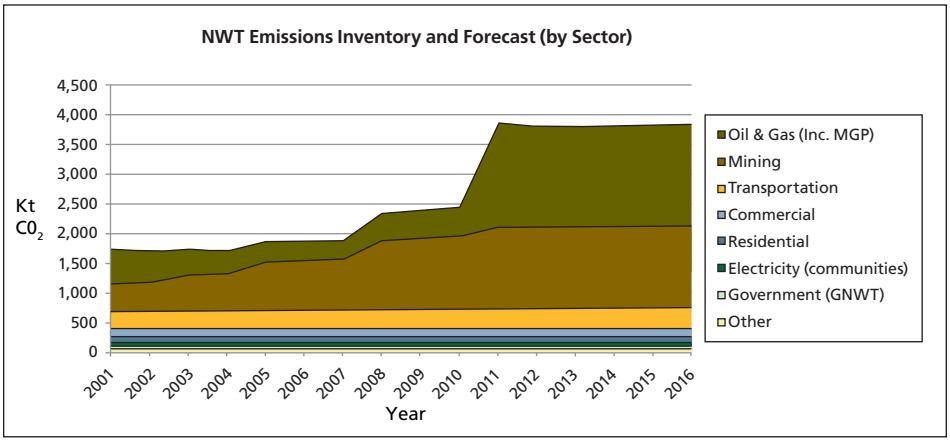

GNWT


S. CARRIÈRE

Trends in NWT Greenhouse Gas (GHG) Emissions

Greenhouse gas (GHG) emissions are measured in carbon dioxide equivalents (CO2e) to allow all GHG types to be included. Currently the NWT produces about 2300 kilotonnes (kt) of CO2e/year. This represents less than 0.2% of GHG emissions in Canada and is similar to emission levels in the Yukon. GHG emissions in the NWT are increasing by about 10% per year. The increase is related to development in the oil and gas and mining sectors.

The mining sector currently dominates as the major GHG emitter but a Mackenzie Gas Pipieline would make the oil and gas sector the major GHG producer in the NWT. By 2020 it is projected that the NWT will be emitting about 3800 Kt of CO2e/year, a 65% increase in emissions from current levels. Numerous new technologies are being developed to reduce GHG emissions. It is difficult to predict how large an impact these technologies will have on reducing emissions in the future.



GHG emissions in the NWT measured in kilotonnes (kt). Source: NWT Greenhouse Gas Strategy.

Key Insights

- Use of petroleum products is increasing by 10% per year.
- Demand for petroleum products in the NWT has not decreased in response to increases in price.
- GHG emissions are predicted to increase.
- NWT electricity production from diesel has increased, while hydro and natural gas production have not.

Find More

GNWT Industry Tourism and Investment: Energy Page, go to www.iti.gov.nt.ca/energy/

Stats Canada: Report on Energy Supply and Demand in Canada and Stats Canada CANSIM Database, go to http://www.statcan.gc.ca/


J. NAGY

7 Pressures
Human Activities

Although population density in the NWT is very low, some community residents have reported increasing disturbance in their region as a result of greater human activity.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

7.1 Trends in air traffic

7.2 Trends in road traffic

7.3 Trends in shipping in the Northwest Passage

7.4 Trends in development activities requiring a permit

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

This focal point provides indicators on human activities, including human travel, that may cause short term disturbances to the environment.

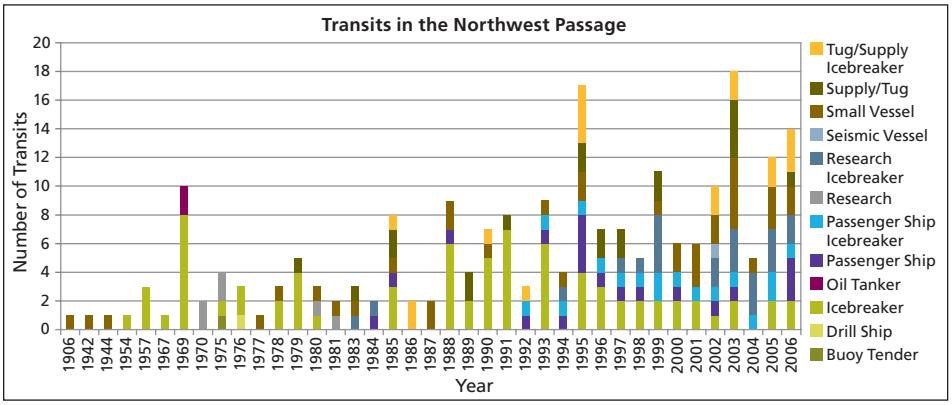
Highlight Indicators

Trends in air traffic

Local air traffic at two regional airports in the NWT, Inuvik and Norman Wells, increased over the past 10 years. A peak in traffic occurred in 2001 in Inuvik (50 traffic per day, traffic is take-off or landing) and Tuktoyaktuk (17 traffic per day). Yellowknife, the only major airport in the NWT, has seen an increase of 50% since 1996 (from 80 to 120 traffic per day). NWT airports serve as transportation hubs for a wide range of human activities including exploration, mining and oil-gas development, tourism, hunting, fishing, and other activities. Most aircraft used for these activities are helicopters, turboprops and piston aircraft. Helicopter traffic in Yellowknife is twice the traffic observed in Whitehorse, Yukon, making Yellowknife the fourth busiest area for helicopter traffic in western Canada.

Trends in shipping in the Northwest Passage

The number of complete transits through the Northwest Passage increased in the late 1970s, mostly due to the availability of



Number of transits per year. More than one transit can be done by the same ship in any given year. Transits can be from east to west or vice versa. Year not shown had no transit . Source: NORDREG.


CASES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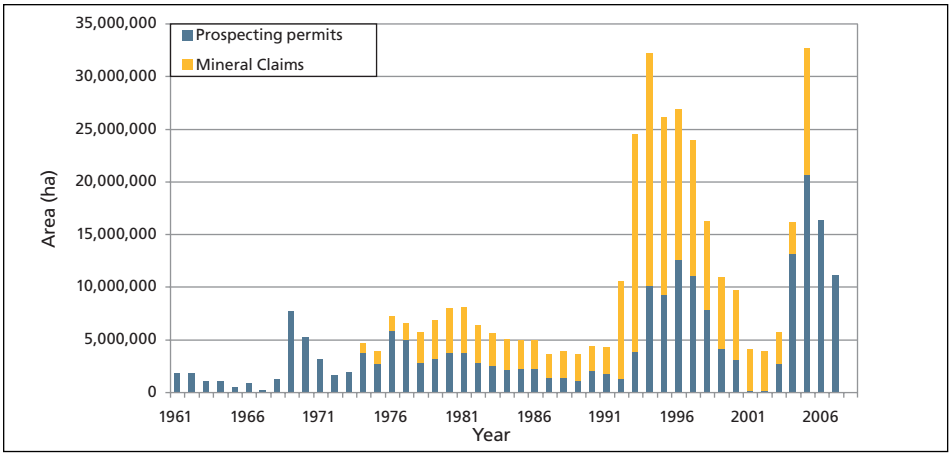
icebreakers and other ships capable of navigating in difficult northern waters; this is the case for Arctic tourism. From the 1980s on, voyages through the Passage have become an annual event. The number of transits remains low, but increased from four per year in the 1980s to 10 per year in 2000-2006. These transits are mostly completed by icebreakers on coast guard and research duties, passenger ships offering Arctic tourism opportunities, and tug and supply vessels, some with barges.

A further increase in shipping, especially for commercial use, is predicted as the open water season extends and Arctic sea ice shrinks. How this may occur is still uncertain. Even if relatively ice-free in late summer, the Northwest Passage and the Beaufort Sea remain difficult to navigate with their unmarked shallow areas, shifting sand-gravel bars, fog, and dangerous weather. Increased shipping in the region would require a high preparedness for potential environmental incidents.

Trends in development activities requiring a permit in the NWT

In 2005, the total land under prospecting and mineral claims exceeded the size of the United Kingdom. These, and the number of land use permit applications for industrial activities, are the highest on record. The recent rush for minerals is related to renewed exploration for diamonds and other minerals such as gold, base metals, rare earth elements, and uranium. In 2005, exploration expanded to all NWT ecozones, with some focus on the Thelon Basin and lands northeast of Great Bear Lake. Transportation for most exploration is by helicopter and fixed wing aircraft. Most camps are used seasonally in late winter and summer.

Reduced commodity prices will decrease human activities related to mineral and oil-gas development.



Area of land (ha) allotted to active Prospectors permits and claims per year for the Northwest Territories from 1961-2007. Source: Original data from INAC; Chart from GNWT, ITI. Analysis by ENR. Includes Nunavut prior to 2001. Data up to October 2007. 1,000,000 ha = 10,000 km²

Key Insights

- Road traffic in the NWT is very low and is increasing only on the road leading to diamond mines in the Southern Arctic.
- Air traffic has increased by 50% over the last 10 years in Yellowknife.
- The number of complete ship transits of the Northwest Passage has increased from 4/year in the 1980s to 10/year in 2000-2006.
- Land under mineral and prospecting claims and oil-gas exploration permits increased in 2005 to new records in some ecozones.

Find More

Find out more about road traffic statistics at www.dot.gov.nt.ca/

For more information on industrial development in the NWT go to: www.iti.gov.nt.ca/miningoilgas/

On the Northwest Passage: Wilson,K.J. et al. (2008) Shipping in the Canadian Arctic Other Possible Climate Change Scenarios. Geoscience and Remote Sensing Symposium Proceedings. 2004 IEEE International Volume 3, Issue , 20-24 Sept. 2004, 1853-1856


D. DOWNING/GNWT

8 Pressures
Landscape Changes

Human activities can leave landscape features that are present for a long time and can impact the natural environment in many ways. Linear features such as roads, power transmission lines, seismic lines and pipelines create new corridors that influence human and animal movement patterns.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

- **8.1 Road density and other maintained linear features**
- **8.2 Seismic line density**
- 8.3 Area of Commercial Forest Harvest

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Compared to jurisdictions in southern Canada, human-caused landscape changes in the Northwest Territories have been small, but are still measurable. As more infrastructure and renewable and non-renewable resources are developed in the NWT, assessing and monitoring cumulative impacts is critical. Many organizations, including government, First Nations and industry, are working together to develop coordinated mechanisms for tracking and reporting on landscape changes. Landscape changes that are not due to human activities, such as changes caused by climate and natural forest fires, are found in the focal points on **Climate and Weather**, **Vegetation**, and **Permafrost**.

Highlight Indicators

Road density and other maintained linear features

This indicator measures the total length and density of linear landscape features that are maintained by humans, such as transmission lines, winter roads, all-season roads, and small local roads. Trails are not included.

The average road density in the NWT, including all-season roads, is very low at 0.22 km/100 km^2. The Taiga Plains ecozone, which contains the most NWT communities, has a slightly higher road density (0.5 km/100 km^2). Changes in the density of roads and other linear features can be tracked against these values in the future. The extent of linear disturbance in the NWT is much less than in other areas in Canada. For example, road density in the BC portion of the Taiga Plains is 52 km/100km^2. The average road density in Alaska is 1.5 km/100km^2.

Seismic line density

Seismic lines are the single largest human-caused landscape disturbance in the NWT. In many parts of the NWT, they are the only indication of human-caused changes in large areas of otherwise undisturbed forest land. In western Canada, seismic line and road density estimates are used as an indicator of habitat fragmentation for some forest-dwelling species.

This indicator is based on a dataset of seismic lines created between 1958 and 1999. Since 1999, an unknown number of additional seismic lines have been created in the NWT. As a result, the density estimates presented in this report should be considered as minimum baseline numbers.

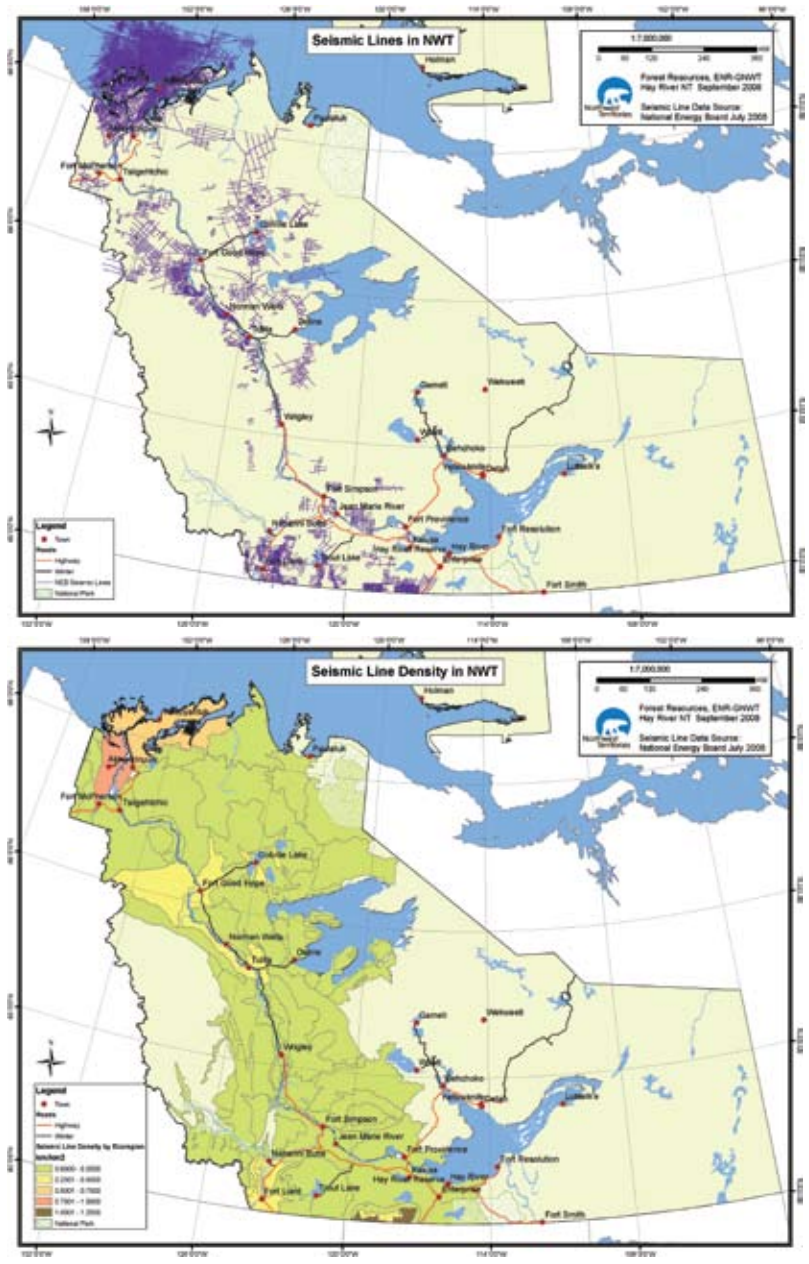

M. STACEY/GNWT


M. STACEY/GNWT


M. OLDHAM/GNWT

The Cameron Hills in the southern Taiga Plains has the highest seismic line density in the NWT at 1.16 km/ km^2. Other higher density areas are the Mackenzie Delta in the northern Taiga Plains at 0.79 km/ km^2 and the adjacent Tuktoyuktuk Coastal Plains at 0.70 km/km^2. These higher levels of seismic line density are associated with active drilling programs.

In future reports, this indicator will track changes in the seismic line "footprint" using information provided by oil-gas companies. The actual effects of increasing seismic line densities on wildlife and other components of NWT's environment are being studied and will be reported in this indicator in the future.



Key Insights

- Average road density in the NWT is very low at 0.22 km/100 km^2, less than in any other jurisdiction in North America, except Nunavut.
- Seismic lines are the single largest landscape disturbance caused by humans in the NWT.
- The highest seismic line densities in the NWT are in the Cameron Hills (1.16 km/km^2), the Mackenzie Delta in the Taiga Plains (0.79 km/km^2), and on the Tuktoyuktuk Coastal Plains in the Southern Arctic (0.70 km/km^2).
- NWT has small-scale commercial timber harvesting. Total area harvested ranges from 0 to 1075 ha per year. This represents less than 0.003% of the forested area of the NWT.

Find More

For more information on road densities in Canada, go to the Atlas of Canada, by Natural Resources Canada, at http://atlas.nrcan.gc.ca/site/english/index.html

Find more on NWT's forest resources at: http://forestmanagement.enr.gov.nt.ca

9

Pressures
Solid Waste

Solid waste can create significant pressure on the environment. For most materials thrown away, a replacement is produced using fresh raw materials and more energy. If waste material is incinerated, air pollution, water pollution and GHG emissions are increased.

Indicators

Indicators included in the full report for this focal point.

9.1 Trends in percentage of beverage containers recycled

Other indicators will be developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Key Insights

- There is little information on the amount of solid waste produced in the NWT.
- About 80% of the 30 million ready-to-serve beverage containers sold in the NWT are recycled.

Find More

For more on solid waste and recycling see the *Waste Reduction and Recovery Act* (2003) and the NWT's Beverage Container Program at: www.enr.gov.nt.ca/

Improper solid waste disposal attracts wildlife and often leads to increased wildlife mortality. Waste reduction and reusing or recycling materials can reduce some of the negative impacts associated with solid waste in the environment.

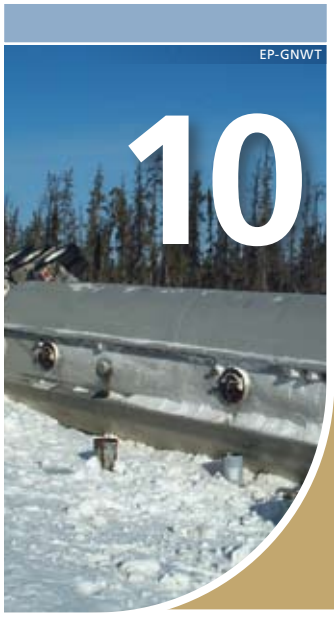
There is little information on the amount of solid waste produced in the NWT. Information on some types of solid waste is now collected as part of new programs aimed at redirecting waste into recycling processes.

Highlight Indicator

Trends in percentage of beverage containers recycled

Every year, almost 30 million ready-to-serve beverage containers are sold in the NWT. During the first six months of the Beverage Container Program (2005/06), 62% of beverage containers sold were recycled. During 2006/2007, 86% of containers sold were recycled, in 2007/2008, 81% were recycled.

An approximate return rate of 80% in the NWT is comparable to other deposit-refund programs for beverage containers across Canada. The GNWT hopes to implement other waste reduction and recycling initiatives and programs in the near future.



10 Pressures
Contaminants

It is important to people in the NWT to know that their environment and their food are safe and healthy. Contaminants are substances in the environment that can cause harm to humans and other living things. The NWT has very low levels of contaminants and pollution compared to many parts of the world.

Highlight Indicator

Trends in cadmium and mercury in barren-ground caribou kidneys

The level of mercury measured in the kidneys of barren-ground caribou in the NWT is very low and does not pose a health risk to either caribou or people who eat caribou. Both the meat and organs of NWT caribou are safe to eat. As well, the levels of cadmium in barren-ground caribou in the NWT are not of concern and caribou remain a safe and healthy food choice for northern people. Cadmium and mercury in the NWT environment come from both natural and industrial sources. They are absorbed by vegetation and move up the food chain when the vegetation is eaten by herbivores, such as caribou. Ongoing monitoring of levels and changes in contaminants in caribou is an important part of a national program monitoring contaminants in arctic wildlife and the environment to ensure that caribou remains a safe and healthy food source.

It is expected that the level of contaminants in terrestrial mammals will remain low, although the global trend of increasing mercury levels in the environment warrants ongoing long-term monitoring.

Trends in spills of hazardous material

This indicator tracks the number of hazardous material spills in each ecozone in the NWT. In terms of volume, the vast majority (92%) of spills in the NWT are wastewater spills including sewage, salty ground water brought to the surface by oil-gas extraction, and mine tailings. The remainder are spills of fuel oil, various chemicals such as antifreeze and glycol-based products for vehicles, lube oil and other carbohydrates. The number of spills increased rapidly from 2000 onward. Most of the increase in spills larger than 100 litres during the past decade is linked to increasing mining development in the Southern Arctic and the Taiga Shield north of Yellowknife. Efforts to reduce the number of potential spills through more efficient prevention and education programs are under way. Developing clean-up technologies in extremely cold and remote environments remains a challenge.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

10.1 Trends in cadmium and mercury in barren-ground caribou kidneys

10.2 Trends in environmental remediation of contaminated sites

10.3 Trends in spills of hazardous material

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Key Insights

- Mercury and cadmium in the kidneys of barren-ground caribou in the NWT remain very low and do not pose a health risk to either caribou or people who eat caribou.
- The number of spills of hazardous material has increased in the last decade.

Find More

For more information on The Northern Contaminants Program go to www.ainc-inac.gc.ca/nth/ct/ncp


M. OLDHAM/GNWT

11 State Water

The NWT is renowned for its clean and abundant water resources. These water resources are made up of lakes, rivers and their deltas, wetlands, permafrost, groundwater, and glaciers.

The GNWT is developing an NWT Water Resources Management Strategy with Aboriginal and federal partners. The strategy will provide guidance for the effective management of territorial water resources. Indicators for reporting on the state of water resources will be examined as part of the strategy development process.


M. STACEY/GNWT

All ecosystems and humans depend on water; therefore, there is a direct connection between ecosystem health and the state of water resources. Water resources are not limitless; there are increasing pressures on these resources through climate change and human actions. Aquatic ecosystems are made up of water, sediments, living organisms and their interactions. If one of these components is impaired, the overall health of the aquatic ecosystem is compromised. To track the integrity of the ecosystem, it is useful to establish indicators for each of the components. In this highlight report, we review the current work related to the development of indicators relating to water quality and quantity.

The vast majority of the NWT lies within the Mackenzie River Basin, land that is drained by river systems that eventually drain into the Mackenzie River and into the Beaufort Sea. This is Canada's largest river basin and the second largest river basin in North America, with river systems draining parts of BC, Alberta, Saskatchewan, the Yukon, Nunavut and the NWT. In 2003, the Mackenzie River Basin Board, a cooperative forum for sharing information on the Mackenzie River Basin, released a State of the Aquatic Ecosystem Report on the Mackenzie River Basin that looked at a wide range of water indicators. They reported the need for improved knowledge including both scientific monitoring and research, and traditional ecological knowledge. It was recognized that community based knowledge about land and water is critical for future state of the aquatic ecosystem assessments. The report concluded that the Mackenzie River Basin is generally healthy, while urging action on key issues and information gaps.


A. VEITCH


S. CARRIÈRE


A. KORPACH

It is important to NWT residents that the quantity and quality of water resources within the territory are maintained. Residents of the NWT have repeatedly declared the significance of water in various water-related meetings and in reference to specific development activities within the borders of the NWT and beyond. The GNWT is developing an NWT Water Resources Management Strategy with Aboriginal and federal partners to provide guidance for the effective management of territorial water resources. Indicators for reporting on the state of water resources will be examined as part of the strategy development process.

Mackenzie River basin.
SOURCE: MRBB

Scientific indicators of ecosystem integrity can include physical and chemical parameters of water and sediments, as well as parameters measuring the health of the biological community. For example, some of the physical and chemical measurements in a water quality monitoring program may include pH, temperature, and concentration of dissolved oxygen, metals or contaminants in the water or sediments. A water quantity program measures hydrological indicators such as stream flows and lake levels. Ultimately, if ecosystem health is compromised, it will be reflected in the biological community. Biomonitoring enhances water quality and quantity monitoring assessments by measuring the health of the biological community, reflecting the combined effects of water chemistry, sediment chemistry, physical habitat characteristics, hydrology, nutrient levels, and food availability.

Find More

Various agencies monitor aspects of the aquatic ecosystem. For more information see:

Indian and Northern Affairs Canada (INAC) – Water Resources go to www.ainc-inac.gc.ca/enr/wtr/

Environment Canada and INAC: Hydrometric network go to www.wsc.ec.gc.ca/hydrometric/main_e.cfm?cname=hydrometric_e.cfm

For data on drinking water quality go to GNWT Municipal and Community Affairs www.maca.gov.nt.ca/operations/water/homepage.asp

The Mackenzie River Basin Board's State of the Aquatic Environment Report Summary can be found at www.mrbb.ca/, or for the full version at www.swa.ca/Publications/AquaticEcosystem.asp

The summary of ENR's "Northern Voices, Northern Waters" can be found at www.enr.gov.nt.ca/library/pdf/Northern_Voices_Northern_Waters-Summary.pdf

For the Canadian Water Quality Guidelines go to www.ec.gc.ca/ceqg-rcqe/English/ceqg/water/default.cfm

12 State Air

The air surrounding us on the land and in our communities is called "ambient" air. It contains mostly nitrogen and oxygen, with a small amount of carbon dioxide and water vapour. It also contains trace amounts of particles ('dust') and other gaseous chemicals.

Indicators

Indicators included in the full report for this focal point.

12.1 Criteria Air Contaminants Indicator

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Research has linked the presence of air contaminants to human health issues such as breathing and heart problems, as well as to negative effects on property, vegetation, land and water.

Naturally occurring levels of particles and chemicals in the air are called "background levels". Human activities and natural events such as forest fires can raise the levels of particles and chemicals above these background levels and cause pollution. Tracking levels of the most common air pollutants provides an indication of air quality and the impacts of emissions from both industrial and community development.

Highlight Indicator

Criteria Air Contaminants Indicator

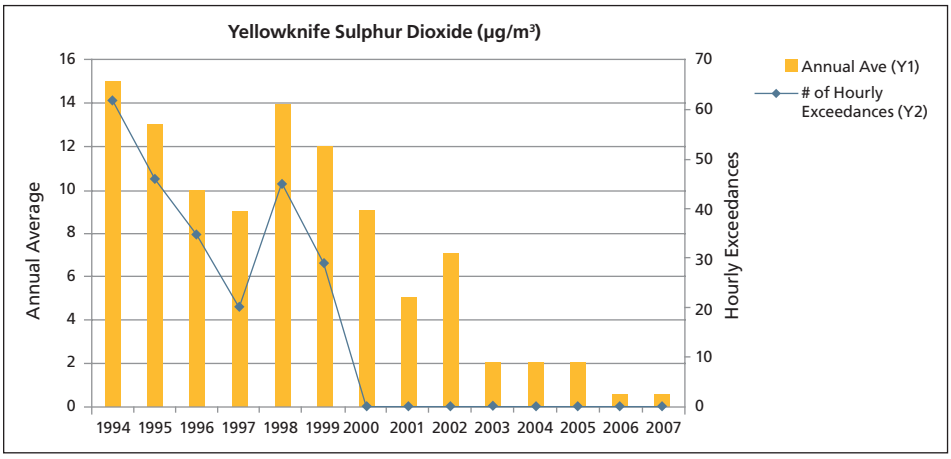
Criteria Air Contaminants (CACs) are the common trace particles and gases found in ambient air that monitoring programs target most often. National and territorial standards establish limits for the maximum amount of particles and gases that can be in ambient air. Measured concentrations are compared to these standards to determine the quality of air. Information for this indicator is obtained from the NWT Air Quality Monitoring Network, at four monitoring stations: Yellowknife – Taiga Shield, Inuvik – Northern edge of Taiga Plains, Fort Liard – southern Taiga Plains, Norman Wells – central Taiga Plains. In addition, fine particulate data is collected at the Daring Lake Tundra Ecosystem Research Station during the summer to establish typical background concentrations in the NWT.


S. CARRIÈRE/GNWT


GRRB


S. CARRIÈRE

Levels of most air contaminants measured at the four monitoring stations are very low, with concentrations well below established air quality standards. Notable exceptions include the influence of summer forest fire smoke and spring-summer dust events producing the occasional very high concentrations of small particulates in the air. Operations at Giant Mine resulted in high sulphur dioxide readings in Yellowknife - hourly readings exceeded established air quality standards on occasion in the late 1990s. Air quality in Yellowknife rapidly improved after 1999 when the mine was closed. Since then, only background levels of sulphur dioxide have been recorded. This emphasizes the need to appropriately manage such industrial sources.



Average annual emission and number of hourly exceedances of sulphur dioxide in Yellowknife, 1994-2007. Source: Figure 7 in annual NWT Air Quality Report 2007 at www.enr.gov.nt.ca/eps/environ.htm

Key Insights

- Air quality is generally good in the NWT.
- Poor air quality readings occur during forest fires and during spring-summer when dust levels are high.
- Sulphur dioxide readings in Yellowknife quickly returned to normal (low) after the closure of Giant Mine.

Find More

Information from all air monitoring activities, along with some historical perspective and trend analysis, is presented annually in an NWT Air Quality Report at www.enr.gov.nt.ca/eps/environ.htm under 'Air Quality Program'.


D. DOWNING/GNWT

13 State Permafrost

Permafrost is an important ecosystem component in the NWT as it affects water, landforms, and the ecology of northern environments.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

13.1 Ground temperature in permafrost zones

13.2 Trends in active layer thickness in the NWT

13.3 Trends in thermokarst in the NWT

Other indicators will be developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

In the northern NWT, permafrost can be 100-m thick. Permafrost is also present under the Beaufort Sea. The amount of ice within permafrost influences what happens to the environment or any structures built on permafrost if it thaws. The melting of ice-rich permafrost can cause land to move, and develop into a landscape where lakes enlarge, peatlands collapse, and land slides or slumps. These changes result in a thermokarst landscape. The effects of melting permafrost must be considered when constructing roads and buildings.

Year to year variation in active layer thickness (the depth of soil that freezes and thaws each year) is related to air temperature. In tundra soils, maximum thaw depths are generally less than 80 cm, while in the southern NWT thaw depths commonly exceed 100 cm. In boreal forests of the southern NWT, thicker organic ground cover inhibits frost penetration such that a greater number of thawing degree days are required to achieve active layer thicknesses similar to those on the tundra.

Tracking ground temperatures and active layer monitoring can give an early-warning about the melting of permafrost. Trends in the aerial extent of thermokarst provide information on how permafrost is changing in response to changes in climate in the NWT.

Highlight Indicators

Ground temperature in permafrost zones

Permafrost temperatures across the NWT are increasing in response to climate warming. In the Mackenzie Delta region, permafrost ground temperatures have warmed by as much as 2°C since the early 1970s.

Mean annual ground temperatures in tundra environments of the northern NWT are below -8°C. As you move further south, the mean annual ground temperature increases and permafrost thickness and aerial extent decrease. The transition from continuous to discontinuous permafrost roughly coincides with the position of taiga forest - tundra transition.


D. DOWNING/GNWT


D. DOWNING/GNWT


D. DOWNING/GNWT

It is anticipated that ground temperatures will continue to increase with future warming, but regional changes in vegetation or snow cover, or proximity of sites to water may either enhance or slow ground warming. The rate of ground warming typically slows as temperatures approach 0°C because of the large amounts of heat that must be removed from the ground as ice in the soil turns to water.

Monitoring snow cover, vegetation and soil cover, and air temperatures are all an important part of monitoring changes in permafrost conditions.

Trends in thermokarst in the NWT

This indicator tracks changes in the amount of land affected by thermokarst (thawed permafrost). Increases in thermokarst area can be detected using high resolution satellite images and aerial photographs and should be complemented by actual observations.

The rates and extent of some types of thermokarst - collapsed peatlands and slumping - has increased over the last half of the 20th century. Disturbances such as forest fires can have a dominant impact on thermokarst processes at a local scale.

It is reasonable to predict continued and larger scale changes in terrestrial and aquatic ecosystems as the result of melting permafrost due to climate warming. Melting permafrost can change water quality and soil conditions which, in turn, can affect the structure and functioning of both terrestrial and aquatic ecosystems in the NWT.

Key Insights

- NWT permafrost has been getting warmer (up to 2°C) since the 1970s and areas of permafrost melting - thermokarst- have increased.
- Forest fires, vegetation type, and soil have an effect on ground temperature and thickness of the active layer over permafrost.
- Permafrost warming and melting is predicted to increase due to climate change.
- Monitoring permafrost in the NWT is essential to understanding how its melting may affect NWT's water, ecosystems and infrastructure.

Find More

- Protocols on permafrost are being adapted for community-based monitoring and will be published by the NWT Cumulative Impact Monitoring Program for future guidance at www.nwtcimp.ca/
- For more information on permafrost monitoring go to www.GTNP.org
- Aquatic impacts of slumping are described in this scientific presentation: www.nwtgeoscience.ca/forum/2005Talks/enviro/840_Kokelj.pps 6


J. CHARLWOOD-DUC

14 State Vegetation

Vegetation provides habitat for wildlife, and food and fuel to humans. Vegetation is an essential component of any biome or environment. NWT has large sections of two biomes: the taiga and the tundra.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

- **14.1 Land cover type by ecozones**
- 14.2 Position of treeline
- **14.3 Annual area burned and number of fires**
- 14.4 Trends in alien plant species
- **14.5 Status of species harmful to forests in the NWT**

Other indicators will be developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Key Insights

- About one third of the NWT is forested.
- More fires are predicted by climate change models. However, in the NWT fire frequency and total area burned have declined in the past 20 years. This is different from what is observed in other regions of the boreal forest.
- Mountain pine beetle is not yet in the NWT.

Indicators on vegetation and factors that affect vegetation, such as fire and insect disturbances, can help track changes in the health and integrity of taiga and tundra ecosystems. Indicators on vegetation responses to stresses, like pollution, and to some land uses, provide early warning of changes in northern ecosystems.

Highlight Indicators

Land cover type by ecozones

This indicator shows the distribution of 17 primary land cover types over five ecozones of the NWT. Vegetation information is important baseline information that may be used to examine forest health and changes to vegetation patterns at the landscape level.

Annual area burned and number of fires

This indicator measures the annual number of wildland fires and area impacted by wildland fires greater than 200ha. Fire renews boreal and taiga forests in the NWT and changes vegetation. Fires in the NWT often occur naturally and have the potential to spread quickly, covering large areas. An accurate understanding of the number of wildland fires, fire intensity and area affected is necessary to effectively monitor the state of the environment and manage forest resources.

NWT Land Cover by Ecozone – Baseline 2000 (Area %*)

Class	Taiga Plains	Taiga Shield	Taiga Cordillera	Southern Arctic	Northern Arctic	Total
Lakes, rivers, wetlands	32%	36%	2%	1%	1%	24%
Barren lands	6%	12%	31%	3%	35%	12%
Grasslands and Shrublands	17%	23%	30%	72%	62%	30%
Forests	45%	28%	38%	23%	2%	34%
Percent Classified	98%	99%	89%	69%	27%	81%

*Percent of area where there is data.
Boreal Cordillera is included in the Taiga Cordillera.


GNWT


M. OLDHAM/GNWT


C. O'BRIEN

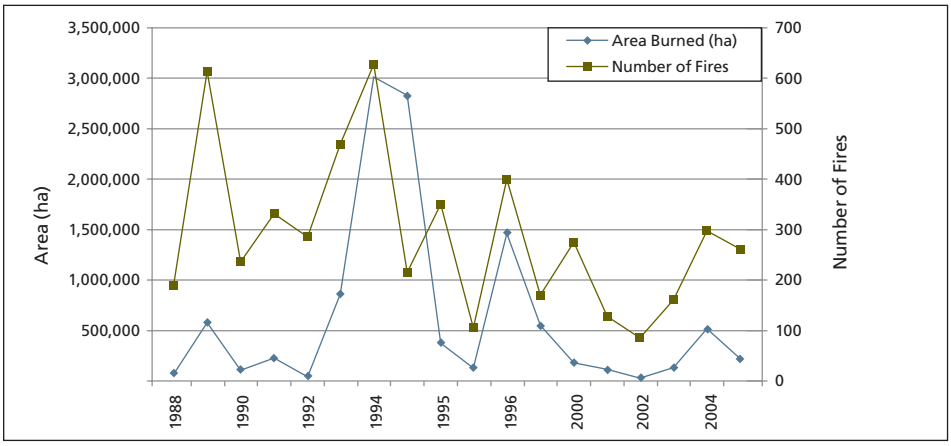
The area burned and the number of fires varies greatly from year to year. Unlike more southern regions, there has been no clear trend towards more or larger wildland fires in the NWT. The frequency and intensity of fires may change as climate changes, reinforcing the importance of monitoring this indicator.

Status of species harmful to forests in the NWT

This indicator tracks insect and spider species present in the NWT that are considered alien, invasive, or pests, and that can be harmful to our plant communities, including our forests.

Eleven alien species of insects are present in NWT forests. Most of these species have been noted in the NWT for more than 50 years, but the extent of their distribution is still unclear. Two of these alien species, the larch sawfly and the amber-marked birch leafminer, are subject to monitoring programs. In addition to alien species, some native insects, such as the spruce budworm, can significantly damage NWT forests. Spruce budworm infestation is monitored in the NWT.

The mountain pine beetle (*Dendroctonus ponderosae*) has not yet been observed in the NWT. This species is one of the more intensely monitored forest pest insects in western North America and is creating unprecedented damage to lodgepole pine forests in British Columbia and Alberta. The advances of that species are tracked by ENR.



Area burned and number of fires greater than 200ha in the NWT.
SOURCE: GNWT, ENR, Forest Management.

Key Insights (con't)

- About 9% of vascular plants in the NWT are alien. This is expected from what is observed in other jurisdictions in western and northern Canada.
- White and yellow sweet clovers are the most common plant species considered alien and invasive in the NWT.

Find More

Earth Observation for Sustainable Development land cover product http://cfs.nrcan.gc.ca/subsite/eosd/mapping

Find more on Forest Carbon Accounting and the Kyoto treeline definition at www.carbon.cfs.nrcan.gc.ca/

Please visit Forest Management Division's website for more information; http://forestmanagement.enr.gov.nt.ca/

A complete list of all alien plant species known to occur in the NWT can be found in the NWT Species Infobase at www.enr.gov.nt.ca


A. VEITCH

15 State Wildlife

The Northwest Territories is one of the few remaining regions in the world with large herds of wild migratory caribou, muskoxen, healthy populations of top predators, and rich northern biodiversity. Wildlife is one of the main links between people and the environment.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

15.1 Trends in willow ptarmigan and grouse in tundra-taiga ecosystems

15.2 Trends in small mammals and hares in NWT ecosystems

15.3 Trends in Dall's Sheep in mountain ecosystems

15.4 Trends in barren-ground caribou population size in tundra-taiga ecosystems

15.5 Trends in range expansions of mammals

15.6 Trends in number of introduced and alien mammals, birds and fish

15.7 Trends in winter tick in moose

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Highlight Indicators

Trends in small mammals and hares in NWT ecosystems

Small mammals (mice) and hares, along with some other northern species, experience large natural fluctuations in population numbers over time. These population cycles are the "heartbeat" of NWT ecosystems. A change or decline in these cycles could indicate a major change in the environment that should be examined. Peaks in small mammal (mice) numbers occur in different years in different regions. The last peak in numbers occurred in 2002 at Daring Lake (Southern Arctic), in 2005-2006 in Norman Wells and Fort Simpson (Taiga Plains), and 2007 in Yellowknife (Taiga Shield).

Snowshoe hare can reach very high densities every 10 years or so. The last peak in hare numbers was recorded in 1998-99 in the northern part of the Taiga Plains (sites near Inuvik), in 2000 in the central portion of the Taiga Plains and Taiga Shield (sites in North Slave and Sahtu), and in 2001 in the southern NWT (sites in South Slave). The next peak in numbers is predicted to occur in 2009-2010.

Trends in barren-ground caribou population size in tundra-taiga ecosystems

Caribou have traditionally been an important source of food, clothing, and cultural identity for Aboriginal people in the NWT. They are still one of the NWT's most important wildlife resources. This indicator group tracks the size and growth of NWT barren-ground caribou herds.

Barren-ground caribou surveys conducted since 2000 indicate that five NWT barren-ground caribou herds are declining (Porcupine, Cape Bathurst, Bluenose-West, Bluenose-East and Bathurst). The status of three herds is unknown (Beverly, Qamanirjuaq, Ahiak) because surveys have not been completed since the early 1990s. Calving ground distribution surveys in 2007 and 2008 suggest that the Ahiak and Qamanirjuaq herds are substantial but the Beverly herd has declined to very low numbers.

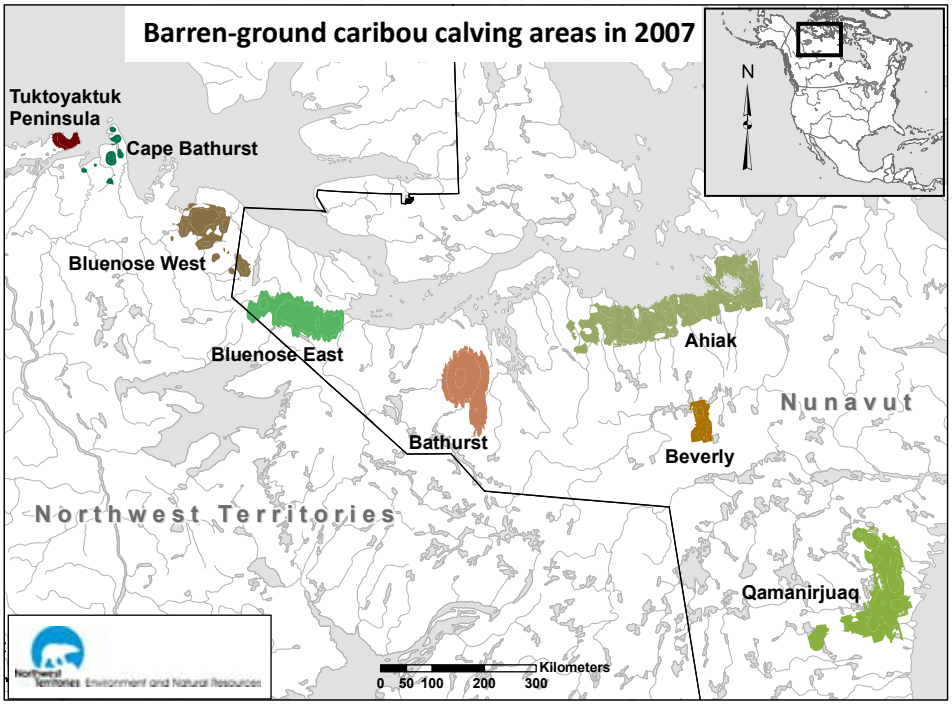
Trends in winter tick in moose

Winter tick is a parasite that can have negative effects on moose. The most obvious signs of winter tick are hair loss and poor, thin body condition. Affected moose are sometimes called "ghost moose" because hair loss results in white or grey patches.

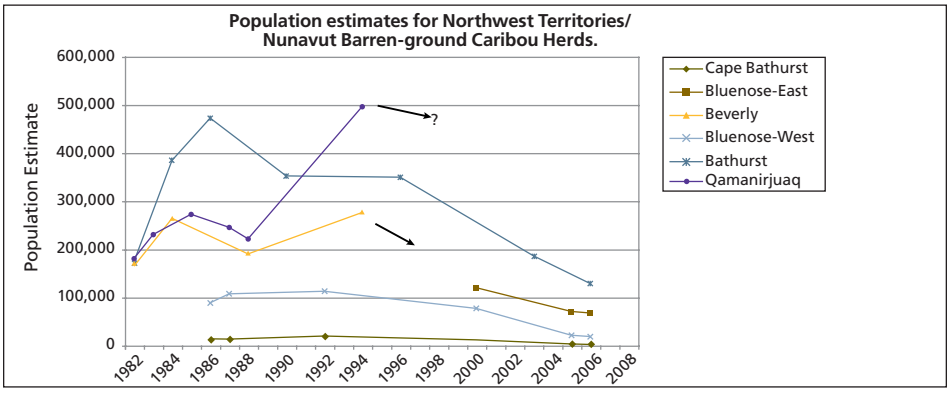

A. GUNN/GNWT


A. GUNN


M. STACEY/GNWT



Map: Barren-ground caribou herds are defined by their fidelity to distinct calving grounds. Source: GNWT, ENR.



Population survey estimates for barren-ground caribou herds in the NWT, 1970-2008. Note: The markers on this graph show years with population estimates derived from photographic survey or censuses. Although caribou population trends are represented by a line, herd populations may have fluctuated between survey years. Source: GNWT, ENR.

Winter tick is common on moose in southern Canada, but its range is thought to be limited by climate. Traditional knowledge in the NWT suggests that moose affected by winter tick were not observed until the last several decades. Overall, incidences of winter ticks in the NWT remain very low and mostly confined to the southern NWT, though sightings as far north as the Sahtu region have been increasing. Hunters across the NWT are encouraged to report any diseases or abnormalities seen in wildlife.

Key Insights

- Large population fluctuations are normal phenomena for many species in the NWT and form the "heartbeat" of NWT's environment.
- Barren-ground caribou herds in the NWT and elsewhere in North America are declining. This may be due to natural fluctuations related to normal climate cycles.
- Some wildlife diseases and parasites are changing and moving northward.
- Changes in distribution of mammals and birds are being tracked as climate is changing.
- The number of alien or introduced mammals (0), birds (3), and fish (3) in the NWT is very small compared to jurisdictions in the south.

Find More

For other indicators on wildlife see the **Species at Risk** Focal Point.

More information on Winter Tick can be found on the Canadian Cooperative Wildlife Health Centre web site at www.ccwhc.ca/wildlife_health_topics/winter_tick/wintertick.php

For more information on the NWT General Status Ranking Program, small mammal and hare surveys, and caribou monitoring and management go to www.enr.gov.nt.ca


A.GUNN/ GNWT

16

State
Species at Risk

Loss of biodiversity is a global concern. The international community has committed to achieving "a significant reduction of the current rate of biodiversity loss at the global and national level as a contribution to poverty alleviation and to the benefit of all life on earth by 2010".*

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

16.1 Species At Risk Index

16.2 Trends in populations of NWT species at risk

16.3 Status of Peary caribou in a changing climate

16.4 Status of peregrine falcon in a less contaminated world

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Key Insights

- Less than 1% of NWT species are known to be at risk of extinction.
- Recent assessments show the risk of extinction of migratory species is slowly increasing, mostly due to climate change and threats to habitats further south.
- Previously common species of insect-feeding birds, such as the common nighthawk, olive-sided flycatcher, and rusty blackbird, are becoming less common.
- A warmer climate is decreasing the possibility that Peary caribou will recover from past declines.


G. GOURT

The 2010 Target was formally endorsed by Canada at the World Summit on Sustainable Development in 2002. Species at risk indicators are one way to measure progress towards this target for 2010 and beyond.

Highlight Indicator

Species at Risk Index

The Species at Risk Index predicts the rate of future biodiversity loss based on the number and status of species at risk in the NWT. This allows us to track the likelihood of overall survival of a set of species over the next 100 years. When the likelihood of overall species survival improves, the index goes up.

The current Species at Risk Index is 0.99 which means that, based on current threats, less than 1% of all tracked species in the NWT are at risk of becoming extinct in the next 100 years. The risk of biodiversity loss for the NWT is extremely low, but recent assessments of species status indicate that potential extinction risk may be slowly increasing.

** 2010 Biodiversity Target at www.cbd.net.int*

17

State
Genetic Resources

The NWT is home to a number of rare species and "endemic" species that exist nowhere else in the world. Tracking the status of rare and endemic species in the NWT provides information on how well we are conserving genetic resources that may be important for future use in medicine or agriculture or to human general well-being.

Arctic species have adaptations to harsh climates that are important to conserve as part of the NWT's contribution to the world's biodiversity.

Indicators on genetic resources are tracked at national and international levels.

Highlight Indicator

Status of endemic and rare species in the NWT

The number of species present in the NWT is surprisingly high considering our harsh northern climate. Much of the NWT was covered by ice during the last Ice Age, which ended about 8,000 years ago. This means NWT ecosystems are quite young in an evolutionary time scale. However, large tracts of land in the northern and western part of the NWT remained free of ice during that time. These special places are called glacial refugia. In northern North America, these areas are part of a region called Beringia, and are home to many species that survived during the last glaciation. Some of these species are rare today, and form a special component of our genetic resources.

The NWT is home to one species of bird, the whooping crane (*Grus americana*), that is endemic to North America. The NWT is home to about 90% of its wild breeding population. The NWT is also home to 40-60% of two subspecies of mammals that are rare in the world, the Peary caribou (*Rangifer tarandus pearyi*) and wood bison (*Bison bison athabascae*).

So far, there are two known species of vascular plants that are thought to be endemic to the NWT: the hairy rockcress (*Braya pilosa*) and Nahanni aster (*Symphyotrichum nahanniense*). An additional two species are known in only 2-3 sites in the NWT, and in very few sites in adjacent jurisdictions. These plant species all have rare genetic resources.

One insect species that is rare in the world has been found in the NWT: the berigian caddisfly (*Limnephilus algosus*). One new species of dragonfly that is of global conservation concern was found in 2003.

Indicators

List of all indicators included in the full report for this focal point.

17.1 Status of endemic and rare species in the NWT

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates

Key Insights

- NWT is home to seven species and two subspecies that are endemic or rare in the world.
- Many rare species in the NWT are found in glacial refugia in northwestern NWT.

Find More

For more information on the NWT General Status Ranking Program go to www.enr.gov.nt.ca

For more information on ranking the status of rare and endemic species in the world go to Nature Serve Canada's web page at www.natureserve-canada.ca/

18

Stewardship
Use of Renewable Resources

The use of renewable resources such as wildlife, fish, and plants has always been important to the people of the NWT.

Indicators

Indicators included in the full report for this focal point. Indicators summarized in this highlight report are in **bold**:

18.1 Trend in volume of commercial timber harvest

18.2 Trends in hunting and fishing

18.3 Country food use in NWT ecozones

18.4 Trends in trapping

18.5 Trend in eco-tourism

18.6 Trend in visitors to NWT territorial and national parks

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Resources from the land are closely linked to Aboriginal social, cultural and spiritual values and provide job opportunities. Similarly, our rich renewable resources are valued by non-Aboriginal residents and draw visitors from outside the NWT, which helps diversify the NWT economy.

Sustainable access to renewable resources is important to current and future generations in the NWT. These indicators give information on various types of renewable resource uses in the NWT. They can provide an early warning of over-use and other factors that might impact the availability of these resources.

Highlight Indicators

Trends in hunting and fishing

This indicator tracks changes in the number of people who hunt and fish recreationally or for subsistence in NWT ecozones. Reporting on hunting and fishing in the NWT helps track changes in an important stewardship activity that links the environment to the health, well-being, and culture of NWT residents.

According to NWT Labour Surveys, about 37-45% of NWT residents went hunting or fishing in 2002. This has changed little since the first survey in 1983, and is high compared to southern Canada. According to the licencing system, the number of non-Aboriginal hunters who live in the NWT declined by about 3% per year between 1990 and 2004, and stabilized at about 1,200-1,300 hunters a year in recent years.

Country food use in NWT ecozones

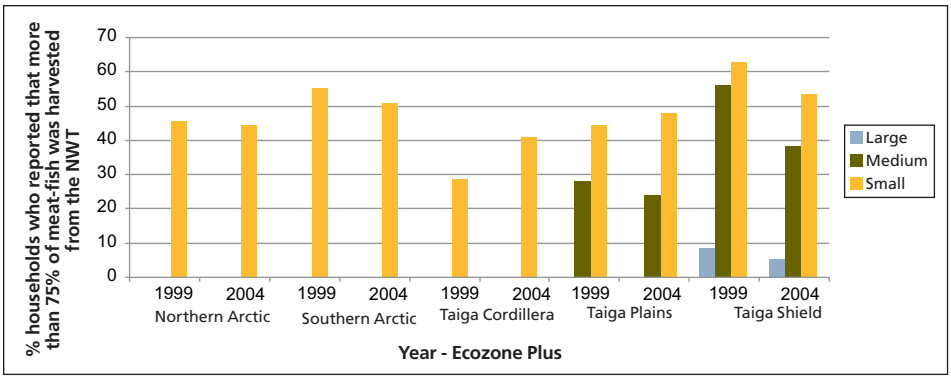
This indicator tracks the percentage of NWT residents who reported that more than 75% of meat and fish they consumed was harvested in the NWT.

For about half the people living in small communities, 75% of all meat and fish eaten is harvested locally. This was reported for all ecozones and has not changed over the past 10 years. NWT residents living in medium and large communities are less likely to consume country food and country food consumption has declined during the past 10 years. The lowest percentage (less than 10%) of people who eat country food (meat and fish) live in Yellowknife, the only large-sized community in the NWT (Taiga Shield ecozone).


GNWT


K. HICKLING


S. CARRIÈRE/GNWT



Percent of households who reported that more than 75% of meat-fish was harvested from the NWT. NWT Bureau of Stats. Source: 1999 - NWT Labour Force Survey; 2004 - NWT Community Survey.

Trends in trapping

Although trapping continues to be part of the annual cycle of activities that generate food and income, it is now rarely a full-time occupation for most people who participate. The number of people trapping in the NWT has decreased since the early 1980s, but has remained relatively constant in all NWT ecozones for the last decade. Increased availability of wage employment as an alternative to trapping may present a greater challenge to maintaining this traditional lifestyle in ecozones with more economic opportunities.

Trend in eco-tourism

This indicator tracks the number of tourists that visit the NWT each year and their primary reason for visiting. Interest in visiting the NWT is based on a healthy, functioning natural environment, as most visitors come to the NWT to experience its natural environment or to enjoy experiences that can only be enjoyed in outdoor settings.

Non-consumptive tourism is the tourism category that has increased the most in the NWT. Interest in outdoor adventure is growing internationally. As intact natural environments become less common in other locations, the NWT may become an even more attractive eco-tourism destination. Many factors, such as the economy, fuel prices and international events, influence holiday travel, making it difficult to predict future trends. However, NWT's appeal as a tourist destination will continue to depend on its vast, natural environment that showcases clean air and water, healthy wildlife, vibrant cultures and unique natural features.

Key Insights

- About half of NWT residents go hunting or fishing.
- Non-Aboriginal hunters who live in the NWT declined by about 3% per year between 1990 and 2004, then stabilized at about 1200-1300 hunters a year in recent years.
- About 40-60% of NWT residents living in small communities in every ecozone rely on country food for at least 75% of their meat and fish.
- The percentage of NWT residents from medium-large communities that consume country food has declined during the past 10 years.
- The number of people trapping in the NWT has decreased.
- People visit the NWT mostly for general touring and because of NWT's natural environment and wildlife.
- Park visitors from outside the NWT have been declining over the past decade.

Find More

- For more information on NWT's social indicators go to the NWT Bureau of Statistics at www.stats.gov.nt.ca
- More information on the Mackenzie Valley Fur Program can be found at www.iti.gov.nt.ca/fursagriculturefisheries/genuinefurs.shtml
- More information on parks can be found at www.iti.gov.nt.ca/tourismparks/ and www.pc.gc.ca/

19

Stewardship

Environmental Awareness

Northern people tend to be very respectful of the land and water, and aware of the environment. However, this could change as more people move from smaller to larger communities and whole generations spend less time on the land. This focal point looks at efforts to retain and increase environmental awareness in the NWT.

Indicators

Indicators included in the full report for this focal point.

19.1 Trends in field environmental education opportunities for youth

19.2 Trends in participation in environmental programs

Other indicators are being developed for future reports.

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

An environmentally aware population makes better-informed decisions and choices on complex environmental issues. Ecologically sustainable development requires an informed society that can make balanced decisions based on the economic, social and environmental welfare of current and future generations. Retaining and sharing the environmental knowledge, culture and traditional lifestyles of Aboriginal peoples and NWT residents is important to the state of our present and future environment.

Traditional on-the-land skills are an important part of our heritage. Northern Canada is unique because of the proportion of residents still involved in traditional activities (see **Use of Renewable Resources**).

Measuring the level of environmental awareness in a population can be difficult. However, direct exposure to the natural environment is a strong factor in determining concern for that environment. The level of exposure or opportunities for increased environmental awareness can be measured by a series of indicators. Similarly, participation in environmental programs and energy efficiency programs that reduce the impacts of human actions on the environment can also be measured as an indicator of changes in environmental awareness.

Highlight Indicator

Trends in field environmental education opportunities for youth

As stewards of our environment, Northerners have a responsibility to educate themselves about the importance of environmental sustainability and pass that knowledge on to current and future generations. Parents and communities have an important role to play in transferring knowledge about the environment, in particular traditional knowledge (TK). Involving youth in activities that help them become aware of natural processes, and acquire and enhance bush skills are important in ensuring current and future generations maintain a strong connection to the land. Formal environmental education opportunities can also increase people's knowledge about the environment and actively engage them in the decision-making process.


S. CUMMINGS


GNWT


D. ALLAIRE

This indicator tracks the number and types of formal environmental education opportunities offered in a natural setting, on the land, to youth in the NWT. Formal education opportunities, as measured here, can complement important family and community-based learning opportunities. These opportunities may involve formal cooperative planning amongst organizations, communities, schools and others who are actively engaged in the promotion of environmental education. Increasing formal environmental education opportunities for youth should result in enhanced knowledge about current and future environmental issues.

Formal environmental education field opportunities offered in the NWT are designed for primary through college-level students. Current programs include camps that introduce students to science and TK based field skills, on-the-land trapping and land skills programs for youth, experiential science programming in high school curricula, and college level programs in natural resources technology and environmental monitoring.

Trends in Participation in Environmental Programs

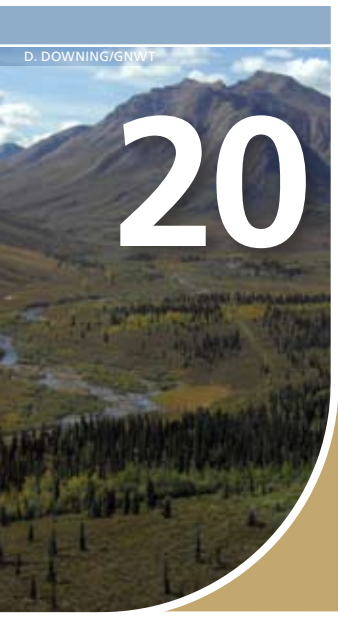
One way that environmental awareness is reflected is in how people change their personal practices to help reduce negative pressures on the environment. This indicator tracks changes in personal practices as measured by participation in environmental programs targeted at reducing energy use. In 2008, there were at least nine different energy conservation programs available to homeowners, businesses, non-profit organizations and communities in the NWT. Support provided by the programs include subsidized energy audits, rebates on the purchase of energy efficient products and alternative energy technologies, support for projects that reduce energy use, and advice on community and homeowner energy planning and use.

Key Insights

- Formal environmental education field opportunities are offered in all NWT ecozones and regions.
- Northern-built initiatives are essential to help bridge formal school-based curricula with family/community efforts in sharing environmental and traditional knowledge.
- Northern interest in energy saving programs is expected to increase.

Find More

- Take A Kid Trapping program: www.iti.gov.nt.ca/fursagriculturefisheries/kidtrapping.shtml
- Information on the University of the Arctic can be found at: www.uarctic.org
- For more information on the Arctic Energy Alliance go to www.aea.nt.ca


D. DOWNING/GNWT

20

Stewardship

Protected Areas and Land Use Planning

Legislated protected areas and conservation zones in land use plans are key components in an overall network of protected areas that serves the long-term interests of NWT residents and all Canadians.

The World Conservation Union defines a protected area as **"an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means"**. This definition is applied in selecting protected areas to report on.

Indicators

Indicators included in the full report for this focal point.

20.1 Trends in protected areas and land use planning

Go to www.enr.gov.nt.ca for more information on all the indicators, and for annual updates.

Protected areas and land use plans are key tools for conserving biodiversity, ecological processes, and special natural and cultural values. Reporting on protected areas and land use plans reflects actions society has taken to maintain a healthy and productive environment.

Through its Sustainable Development Policy, in place since 1990, the Government of the Northwest Territories recognizes the need for conservation areas to maintain special values related to wildlife and wildlife habitat, unique or representative ecosystems, prime forests, productive agricultural soils, and heritage, recreational, tourism, scientific, and aesthetic resources. Since 1999, the NWT has had a Protected Areas Strategy. It is a partnership among communities, governments, environmental non-governmental organizations and industry. The partners work together to establish protected areas across the NWT.

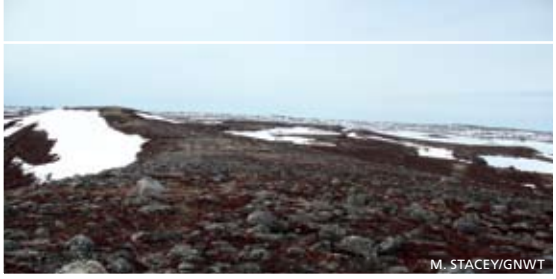
Highlight Indicator

Trends in protected areas and land use planning

The NWT has several protected areas including lands administered by federal, territorial, and Aboriginal governments. They differ in their level of protection. For some, both surface and subsurface rights are withdrawn so that no development is allowed. For others only surface rights are withdrawn and development compatible with values being protected may be permitted.

There are currently 99,100 km^2 of land (including fresh water) in the NWT in established protected areas and conservation zones (7.3% of the NWT). This includes the Thelon Wildlife Sanctuary, National Parks, National Park Reserves, Pingo Canadian Landmark, Gwich'in Conservation Zones and Heritage Conservation Zones, Migratory Bird Sanctuaries, Territorial Parks, Territorial Park Reserves, and areas protected under land claim agreements.

Additional areas in the NWT are currently being considered for protection. These study areas are at various stages of the process


M. STACEY/GNWT

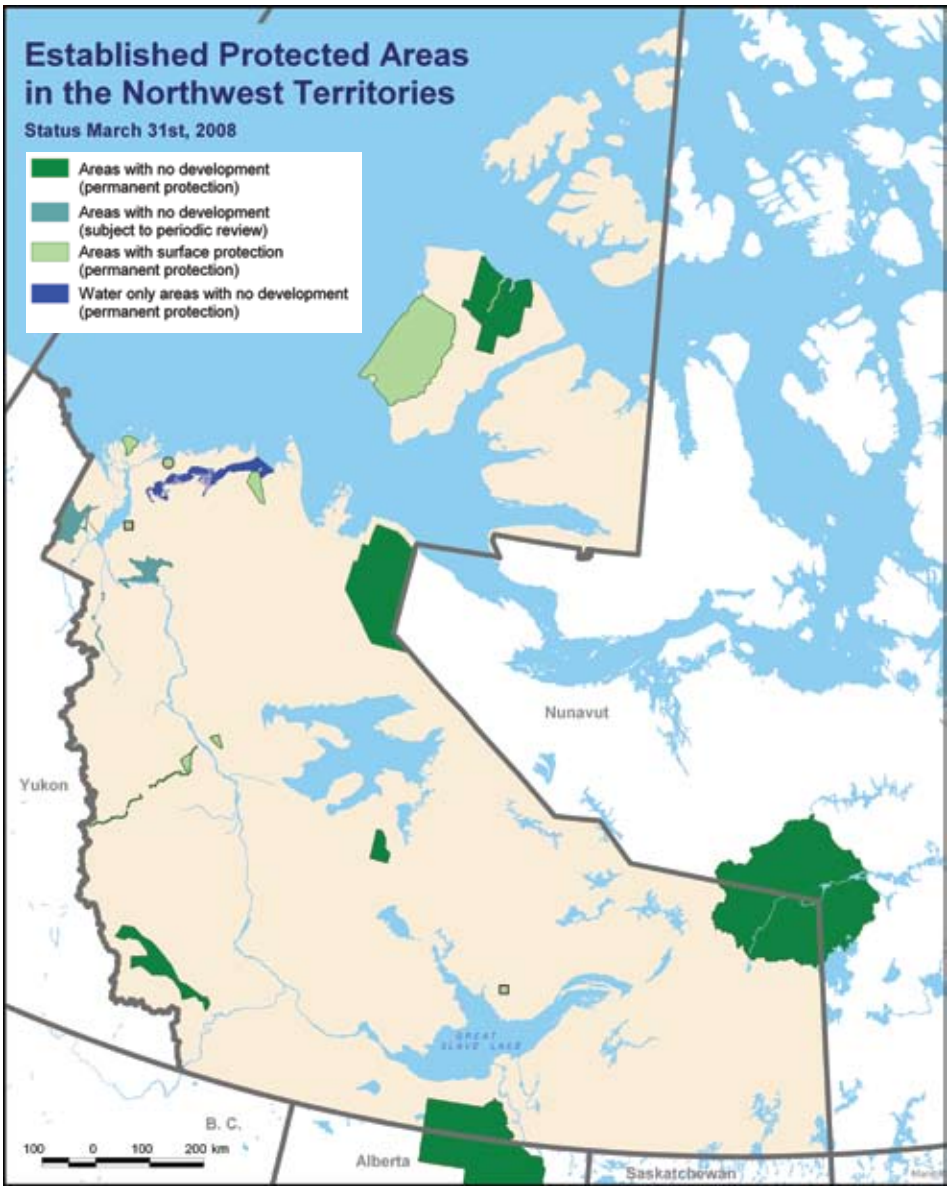

D. MULDERS/PAS


M. OLDHAM/GNWT

established through the NWT PAS and some are under interim protection. The boundaries are subject to change and not all may become areas protected by legislation or conservation zones under land use plans. New areas may also be identified.

The amount of existing land with protection in NWT ecozones varies from 0.4% to 20.4%.

Ecozone	Amount of land protected	
	Size (km²)	% of NWT portion of ecozone
Northern Arctic	31,480	14.9
Southern Arctic	33,780	20.4
Taiga Shield	9,800	3.0
Taiga Plains	13,740	2.9
Taiga Cordillera	8,680	5.4
Boreal Cordillera	17	0.4



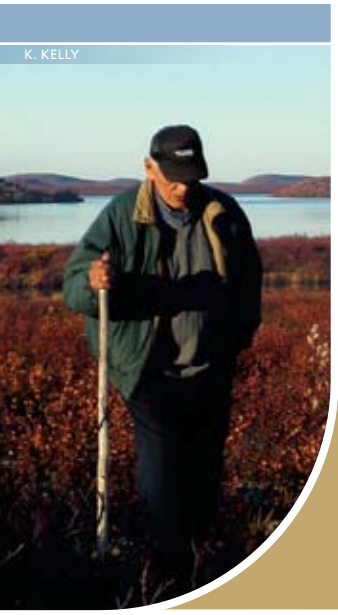
Established protected areas and Conservation Zones larger than 10 km² in the NWT (as of March 2008).

Key Insights

- Since 2003 the amount of land in the NWT in established protected areas and conservation zones has increased by 8,980 km², or from 6.7% to 7.3% of the NWT.
- A National Protected Areas Status Report published in 2006 ranked the NWT 5th of the 13 provinces and territories in Canada in terms of the percentage of land protected.
- Protected areas planning and land use planning are underway and will increase land protected to conserve biodiversity and representative samples of ecosystems.

Find More

- For more information on the NWT Protected Areas Strategy visit www.nwtpas.ca


K. KELLY

Next Steps

You have an important role to play in monitoring our environment.

Your Input

Please contact us for more information on the *NWT State of the Environment Report*. Your input is important. Your suggestions on additional indicators and your insights on how the NWT's environment is changing are appreciated.

Contact us at NWTSOER@gov.nt.ca

Find More

For more information on the *Environment and Natural Resources Traditional Knowledge Implementation Plan*, follow Traditional Knowledge link in www.enr.gov.nt.ca.

The full *NWT State of the Environment Report*, including more indicators and more detailed analysis is published on-line at www.enr.gov.nt.ca. Indicators will be updated on the website annually or when new information becomes available. A highlight report will be published in 2010 and then every four years.

The indicators for each focal point will be reviewed regularly. More indicators are being developed and additional information will be available each year. Some indicators were not included in the 2009 report due to lack of available information. Some indicators in the 2009 report relied on old or incomplete information. Many of the indicators were based solely on scientific information. Next steps include updating and expanding this information, including information based on traditional knowledge, for future reports.

The 2009 report resulted in a series of suggested topics for future studies and analyses. Future reports will provide the results of these studies.

The Role of Traditional Knowledge in Monitoring the Environment

The GNWT recognizes that Aboriginal traditional knowledge (TK) is a valid and essential source of information about the environment and the relationship of people to the land and to each other. GNWT incorporates TK into decisions and actions where appropriate.

The Department of Environment and Natural Resources (ENR) has created a *Traditional Knowledge Implementation Plan* that will help expand and strengthen the application of TK within the Department and guide TK initiatives. As an essential component of *Traditional Knowledge Policy* implementation, ENR will ensure that strong working relationships are maintained with Aboriginal governments, cultural agencies, and resource management agencies that represent the holders of TK. Out of this relationship building may flow more opportunities to establish collaborative monitoring and planning initiatives that address environmental issues affecting all northerners. Additional TK indicators will be developed for future *NWT State of the Environment* reports.

Sources and Acknowledgements

The 2009 NWT State of the Environment Report was prepared by a team with members from each Division of the Department of Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT).

Team Members were:

Wildlife: Dr. Suzanne Carrière (Chair), Allicia Kelly, Lynda Yonge (Editor)

Environmental Protection: Ken Hall, Graham Veale, Jim Sparling

Forest Management: Tom Lakusta, Lisa Smith

Policy and Strategic Planning: Jennifer Skelton, Aiyana Lajeunesse, Jane McMullen, Cathy Lewis

Directorate - Communications: Judy McLinton, Ella Stinson

NWT Protected Areas Strategy Secretariat: Joanna Wilson.

The Team would like to acknowledge the help of many reviewers and experts who provided substantial information, data and analysis. These contributions are acknowledged in the following section.

Traditional Knowledge content was reviewed by Bea Lepine. Kim Ullyot provided librarian services. Maps were created by Terrianne Berens, Adrian D'Hont, Evelyn Gah, Kathleen Groenewegen, and Cathie Harper.

1.The Big Picture – A Changing Planet

Information on trends in Arctic temperature and precipitation is summarized from the Fourth Assessment Report of the International Panel on Climate Change – Climate Change 2007 – The Physical Science Basis published by the World Meteorological Organization and the United Nations Environment Programme. Information on Arctic sea ice is based on satellite data compiled by the US National Snow and Ice Data Centre, and analyses from the "State of the Canadian Cryosphere".

2. Natural Climate Fluctuations

Information and analysis for this focal point is from the US National Oceanic and Atmospheric Administration (NOAA) web pages.

3. Climate and Weather

Data for this focal point is from Climate Trends and Variations Bulletin published every season by the Climate Research Division of Environment Canada (EC). Interpretation of the data is quoted directly from the Bulletin with additional interpretation specific to NWT provided by ENR.

4. Demography - Humans in the NWT

Information is summarized from NWT Bureau of Statistics – Quarterly Reports, NWT Labour Force Surveys and NWT Community Survey.

5. Economy

Gross Domestic Product values for the NWT were obtained from the GNWT Bureau of Statistics. Jacqueline Paquette, Natural Resources Canada (NRCAN) provided information on mineral production. Irene Vasa provided information and comments on the economy indicators.

6. Energy Use

The data were obtained from the NWT Taxation database, Department of Finance, GNWT. Interpretation of the information is provided by ENR and Industry, Tourism and Investment (ITI). Nelson Debogorski compiled the information and analysis on energy use. Data on greenhouse gases is obtained from the NWT Emissions Inventory.


S. CARRIÈRE/GNWT

Sources and Acknowledgements (con't)

7. Human Activities

Air traffic information is summarized from annual reports published by Statistics Canada, compiled from NAV Canada, Transport Canada, and regional airport personnel reporting to the Aviation Statistics Centre. Data and analysis on ship transits in the Northwest Passage were provided by Jean-Pierre Lehnert, NORDREG, Iqaluit, Capt. Narendra Mathur, Transport Canada - Marine Safety, Winnipeg, and David Tilden, Environment Canada, Yellowknife. Information on development activities was obtained from Indian and Northern Affairs Canada. Other land use permit data was obtained from the Online Registry – Land and Water Boards of the Mackenzie Valley and the Inuvialuit Impact Screening Committee, Online Registry. Chandra Venables compiled the information on land use.

8. Landscape Changes

Information on linear development was obtained from national data sets produced by NRCAN and the NWT Centre for Geomatics, GNWT. GNWT was an active partner in the creation of this dataset. Data on seismic lines was obtained from the National Energy Board. Future reports will provide information on non-linear features as it becomes available.

9. Solid Waste

Information was obtained from the Beverage Container Program, implemented in November 2005. Alicia Korpach, ENR compiled the information. Other programs contribute to recycling in the NWT. These programs operated prior to 2005, and some continue today, but there is no reporting mechanism on the amounts recycled, so the indicator does not include this information.

10. Contaminants

Harvey Gaukel and Lisette Self, ENR compiled the information on spills. Dr. Brett Elkin, ENR and Dr. Mary Gamberg provided information and analysis on wildlife diseases and contaminants.

11. Water

Preliminary information on water indictors can be found in ENR's "*Northern Voices, Northern Waters*" at www.enr.gov.nt.ca/library/pdf/Northern_Voices_Northern_Waters-Summary.pdf. Information on the Mackenzie River Basin was summarized from the Mackenzie River Basin State of the Aquatic Ecosystem Report 2003 available online at www.swa.ca/Publications/AquaticEcosystem.asp.

12. Air

Diep Duong, Environmental Protection, ENR, GNWT compiled the information on air quality.

13. Permafrost

All text and indicator analysis on permafrost were provided by Dr. Steve Kokelj, Indian and Northern Affairs Canada (INAC). Researchers in NRCAN, INAC, and others are contributing significant data and information to increase understanding of ground thermal regimes in the NWT. NRCAN compiles ground temperature data from across northern Canada.

14. Vegetation

Land cover dataset used is from the Northern Canada Land Cover Product and the Earth Observation for Sustainable Development of Forests, a joint program of the Canadian Forest Service and the Canadian Space Agency. Kris Johnson, ENR, Forest Management Division, compiled and analysed the information on forest fires. Comments and information on vegetation and climate were provided by Dave Downing, Timberline Natural Resource Group, and by Dr. David Sauchyn, and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Dr. Jeannine St. Jacques, University of Regina. The indicator on insects harmful to forests uses information collected for the NWT General Status Ranking Program and from a project called Risk Analysis and Management of Alien Plant and Insects in the Northwest Territories, funded by EC, INAC, ENR, GNWT, Parks Canada, and Agriculture Canada. Additional information on forest pest insects was obtained from forest experts in ENR Forest Management, and NRCAN's webpage: Forest Invasive Alien Species in Canada.

15. Wildlife

Information on caribou was obtained from surveys conducted by GNWT biologists, usually with involvement of community members and in partnership with neighbouring wildlife agencies. Indicators on wildlife were reviewed and additional information provided by Susan Fleck, Alasdair Veitch, Dr. Anne Gunn, Bas Oosenbrug, Bob Decker, Boyan Tracz, Bruno Croft, Dean Cluff, Jan Adamczewski, John Nagy, Marsha Branigan, Dr. Nic Larter, Rob Gau, Dr. Susan Kutz, Dr. Ray Case, Tom Chowns, Patricia Handley, Richard Popko, and Danny Allaire. Data and information, as well as comments on some wildlife indicators on natural fluctuations were provided by Catherine Lambert, Gwich'in Renewable Resource Board and Karin Clark, Wek´èezhìi Renewable Resources Board.

16. Species at Risk

Dr. Stuart Butchart, Birdlife International, provided comments on the Species at Risk Index. Information and analysis performed by ENR, with data from the NWT General Status Ranking Program and COSEWIC.

17. Genetic Resources

This indicator uses the information collated for the NWT General Status Ranking Program, and additional information from NatureServe. Updates on new species are possible only with the contribution of visiting specialists, entomologists and botanists, tourists, and NWT residents interested in NWT biodiversity. New discoveries are the result of increased monitoring and studies on lesser-known species in the NWT.

18. Use of Renewable Resources

Indicator on hunting and fishing is based on data from the GNWT licencing system, outfitter report forms and NWT Labour Surveys. Information for the indicator on country food use is summarized from NWT Bureau of Statistics – Quarterly Reports, and the 2002 NWT Regional Employment and Harvesting Survey. Richard Zieba, Francois Rossouw, Guy Erasmus, Mark Patrick and Lloyd Thiessen from ITI provided information on trapping, hunting, fishing, and tourism. Ann Ronald, Nahanni National Park Reserve, Janna Jaque, Wood Buffalo National Park, Adriana Bacheschi, National Parks Agency, Inuvik and Sarah Marsh, ITI provided information on park visits.

19. Environmental Awareness

Tasha Stephenson and Brenda Hans, ENR compiled the information on field camp opportunities. Ella Stintson compiled the information on environmental programs.

20. Protected Areas and Land Use Planning

Analysis for this indicator was compiled by the NWT Protected Area Secretariat and ENR with information from NRCAN, the Canada Centre for Remote Sensing, The Atlas of Canada, the Centre for Geomatics, GNWT, the Gwich'in Land Use Planning Board, INAC Comprehensive Claims Branch, Sahtu GIS Project, and Sahtu Land Use Planning Board.


GNWT

Notes

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