Yukon State of the Environment INTERIM REPORT

An Update for Environmental Indicators 2012

Yukon
Environment

Yukon State of the Environment

Interim Report

An Update for Environmental Indicators, 2012

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Highlights

Reporting

This interim report provides the best information available on climate change, air, water, land, and fish and wildlife in order to update the previous Yukon State of Environment Full Report, 2008. The base year for comparable trend data is 2009. More recent data and information, up to the end of 2011, was incorporated where ever possible.

Climate Change

In 2009, Yukon produced 0.317 megatonnes of greenhouse gas emissions, a 41 percent decrease from 1990. The Yukon government continues to implement its Climate Change Action Plan, which was finalized in 2009.

Air

In the summer of 2009, air quality in Whitehorse did not meet Environment Canada standards due to wildfires. The National Air Pollution Surveillance Program continues to monitor air pollution at a station in Whitehorse.

Water

In 2009, a total of 108 samples were collected from the ten monitoring stations in Yukon, providing data for the Water Quality Index. The results for the six stations with sufficient data are: two ‘excellent’, one ‘good’, one ‘fair’, and one ‘marginal’ rating. The ‘excellent’ ratings were for the Yukon River sites above and below the City of Whitehorse, and the ‘marginal’ rating was for the South McQuesten River below Flat Creek.

Land

Land use and resource management planning

As of 2011, land use, resource, and protected area plans were in place for 37 areas. There were another 12 plans underway.

Solid waste management

In 2010, overall the City of Whitehorse diverted 21 percent of its solid waste from landfills by recycling and composting. Households with curbside compost collection diverted 43 percent of garbage from the city's landfill.

Fish and Wildlife

Population trends

In 2010, the goal was not met for the number of Chinook salmon returning to spawn in the Canadian portion of the Yukon River drainage. The majority of lake trout fisheries were considered sustainable; harvest levels for four lakes exceeded sustainable limits.

Of the 27 caribou herds in Yukon, six were assessed as stable/increasing, 12 were considered relatively stable, six were unknown and three were thought to be declining. The population of Yukon's largest caribou herd, the Porcupine Caribou, was counted at 169,000, an increase from previous herd counts. The declines in Yukon and other herds across the circumpolar north may be due to environmental changes, natural population cycles, and human influences such as harvest and development.

Contaminants

In 2011, the Yukon Medical Officer lifted a twenty year advisory on limiting the consumption of fish from Lake Laberge, because toxaphene concentrations have substantially declined.

Species at risk

In 2010, Yukon had the second lowest number of species identified at risk (20) in Canada. Recovery and management plans are being developed for three of those species.

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Introduction

Why produce a State of the Environment Report for Yukon?

This report provides insight into whether Yukon is achieving the goal of maintaining and enhancing the quality of Yukon's natural environment for present and future generations. It provides an opportunity to reflect on the status of the environment and to help guide future decision-making.

This interim report presents information on climate change, air, water, land, and fish and wildlife. It supplements information available from the last edition of the *Yukon State of Environment Full Report* in 2008. Yukon's *Environment Act* requires full state of the environment reports every three years along with interim reports in intervening years (*see box text*).

This report includes the best information available at the end of the 2011 calendar year (which includes data from 2009 to December 2011). Therefore the convention for naming the report was changed to reflect the year when the report was published instead of the year when the trend data was collected. The base year for comparing trend data is 2009 because several agencies require up to 24 months to complete the data collection, compilation, analysis and reporting to Environment Yukon.

This report answers five basic questions:

- What is the issue?
- What are the indicators?
- What is happening?
- Why is it happening?
- Why is it significant?

This report tracks environmental indicators, which are key measurements used to monitor, describe and interpret change. Indicators cannot provide all of the information on a particular topic, but they give information that shows how aspects of the environment are doing. The indicators featured here are based on criteria including data availability, data reliability, usefulness and ease of understanding. Indicators are used to evaluate and demonstrate whether environmental conditions are improving, remaining stable or declining.

This report represents a collective effort from scientific experts, government agencies, and non-governmental organizations that have provided information, data and advice.

***Environment Act:* State of Environment Report**

47. *(1) The government of Yukon shall report publicly on the state of the environment pursuant to this Act.*

(2) The purpose of this report under subsection (1) is:

a. to provide early warning and analysis of potential problems for the environment;

b. to allow the public to monitor the progress toward the achievement of the objectives of this Act; and

c. to provide baseline information for environmental planning, assessment and regulation.

48. *(1) The Minister shall prepare and submit to the Legislative Assembly a Yukon State of the Environment Report within three years of the date this section comes into force and thereafter within three years of the date of the previous report.*

50. *(1) Commencing from the date of the first Yukon State of the Environment Report, for every period of twelve consecutive months in which a Yukon State of the Environment Report is not made, the Minister shall prepare an interim report and submit it to the Legislative Assembly.*

(2) An interim report under subsection (1) shall comment on matters contained in the previous Yukon State of the Environment Report.

1. Climate Change

1.1 Greenhouse Gas Emissions

What is the issue?

Climate change is a global issue, presenting a range of challenges in many parts of the world. The Intergovernmental Panel on Climate Change, a scientific body established to collect and synthesize the world's best research on climate change, considers global climate change to be the most significant threat this world's environment faces today. Many jurisdictions, including Yukon, are introducing measures to limit greenhouse gas (GHG) emissions that are produced from human activities, such as the burning of fossil fuels.

What are the indicators?

The levels of GHG emissions, which include carbon dioxide, methane and nitrous oxide, have increased since the industrial revolution. Carbon dioxide (CO_2) is the most common GHG in the atmosphere. Today, the world is experiencing the highest CO_2 levels in over 400,000 years. The CO_2 traps more and more of the energy radiated from the earth into our atmosphere which, in turn, affects our climate.

Yukon is experiencing the effects of a changing climate. The Yukon government is committed to managing GHG emissions. GHG emissions information available for Yukon is from Environment Canada's National Inventory Report. The most recent data from 2009 includes:

- Total Yukon GHG emissions (Table 1.1.1).
- Yukon GHG by sector (Table 1.1.2 and Figure 1.1.1).

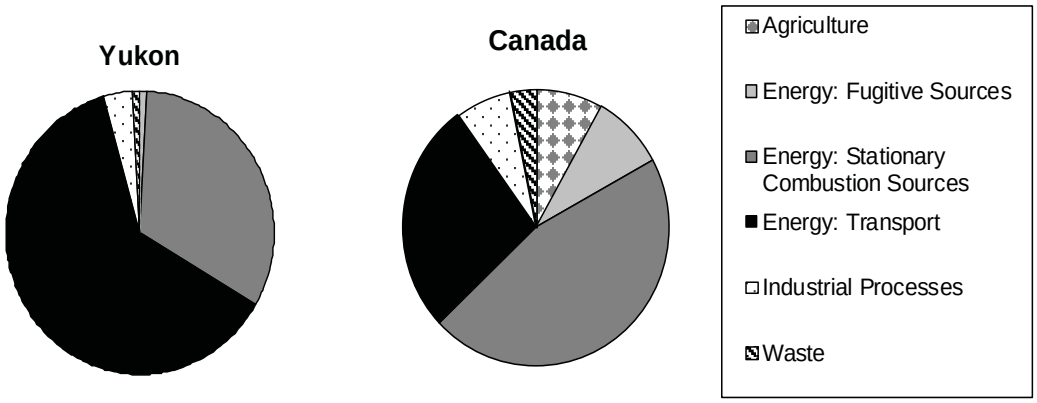
Table 1.1.1 Trends in greenhouse gas (GHG) emissions in Yukon, 1990-2009

	1990	2005	2006	2007	2008	2009
Total GHG Emissions (Mt)[1]	0.540	0.409	0.418	0.415	0.362	0.317
Annual Change (%)	NA	-4.1	2.3	-0.9	-12.7	-12.5
Change since 1990 (%)	NA	-24.2	-22.5	-23.2	-33.0	-41.3

Source: Environment Canada, National Inventory Report 1990–2009, 2011.

Note: (1) Mt: megatonnes.

Figure 1.1.1 2009 greenhouse gas emissions by sector



Source: Environment Canada, National Inventory Report 1990–2009, 2011

What is happening?

- Canadian emissions for 2009 were 690 megatonnes. This is approximately 17 percent above 1990 levels. Canada is ranked among the highest of all countries in the world in terms of per-capita GHG emissions.
- Yukon's total GHG emissions for 2009 were 0.317 megatonnes. This is a 41.3 percent reduction since 1990 (Table 1.1.1).
- Yukon's total GHG emissions (0.317 megatonnes) contributed only 0.05 of one percent of Canada's total emissions (690 megatonnes) in 2009.
- In 2009, Yukon produced fewer GHG emissions per capita (approximately 9.1 tonnes) than the rest of Canada (20.5 tonnes) and has seen a per capita reduction of GHG emissions from 1990 levels by 44 percent (Table 1.1.1).
- Although Yukon's emissions are low compared to the rest of the country, Yukon residents and businesses rely on goods and services produced nationally.

Table 1.1.2 Yukon greenhouse gas (GHG) emissions by sector, 1990-2009

Greenhouse Gas Categories	1990	2004	2005	2006	2007	2008	2009
TOTAL (kt CO_2 equivalent)	531	411	394	408	407	350	317
ENERGY	526	398	380	394	393	335	302
a. Stationary Combustion Sources	226	129	124	140	133	129	103
Electricity and Heat Generation	93.6	7.99	7.53	7.81	10.9	11.7	14.8
Fossil Fuel Production and Refining	2.9	9.8	28	36	30	17	14
Mining & Oil and Gas Extraction	4.12	1.73	3.08	3.26	3.93	5.08	0.25
Manufacturing Industries	8.01	-	-	-	-	-	-
Construction	5.46	1.95	1.07	1.70	2.09	1.67	0.51
Commercial & Institutional	81.9	40.0	39.8	42.5	47.6	49.7	52.4
Residential	29	55	39	42	39	44	21
Agriculture & Forestry	1.24	13.2	6.27	6.02	-	-	-
b. Transport	300	265	252	252	256	203	196
Civil Aviation (Domestic Aviation)	21	22	21	25	29	24	37
Road Transportation	180	161	156	144	133	127	118
Light-Duty Gasoline Vehicles	79.1	39.1	34.1	29.3	23.9	19.1	20.7
Light-Duty Gasoline Trucks	30.4	40.4	37.6	32.3	26.4	21.2	20.4
Heavy-Duty Gasoline Vehicles	10.2	5.83	5.26	4.51	3.67	2.96	3.52
Motorcycles	0.46	0.35	0.32	0.27	0.22	0.18	0.19
Light-Duty Diesel Vehicles	0.55	0.32	0.28	0.24	0.20	0.16	0.23
Light-Duty Diesel Trucks	0.60	2.54	2.64	2.33	1.91	1.56	1.27
Heavy-Duty Diesel Vehicles	57.2	70.3	74.9	73.3	75.0	79.9	70.5
Propane & Natural Gas Vehicles	1.5	2.1	1.1	1.5	1.8	1.8	0.92
Other Transportation	98	82	75	83	94	52	42
Off-Road Gasoline	10	2.7	2.9	2.5	1.9	1.5	1.8
Off-Road Diesel	88	79	72	80	92	50	40
c. Fugitive Sources	-	3.68	3.88	3.32	3.02	3.10	2.77
Oil and Natural Gas	-	3.68	3.88	3.32	3.02	3.10	2.77
INDUSTRIAL PROCESSES	1.43	8.42	9.30	8.92	9.48	9.81	11.6
a. Mineral Products Use	0.06	-	-	-	-	-	
d. Production and Consumption of Halocarbons	-	7.9	8.7	8.4	8.8	9.1	11
e. Other & Undifferentiated Production	1.4	0.48	0.66	0.66	0.71	0.71	0.71
SOLVENT & OTHER PRODUCT USE	0.18	0.21	0.18	0.32	0.32	0.33	0.26
AGRICULTURE	0.0	0.0	0.0	0.0	0.0	0.0	-
WASTE	3.4	4.1	4.2	4.3	4.4	4.5	2.6
a. Solid Waste Disposal on Land	0.55	0.93	0.96	0.99	1.0	1.1	1.9
b. Wastewater Handling	2.9	3.2	3.3	3.3	3.4	3.4	0.67

Source: Environment Canada, National Inventory Report 1990–2009, 2011

Notes: (1) - Indicates no emissions. (2) kt CO_2 equivalent: Kilotonnes of CO_2 equivalent. (3) Emission totals in chart may not add up due to rounding protocol. Categories with 0 or no emissions are not shown.

Why is it happening?

Reductions in Yukon GHG emissions since 1990 are mainly due to changes in the nature and extent of industry (Table 1.1.2). The cyclical nature of Yukon's resource economy significantly affects GHG emission levels. Emissions were high in 1990 and low in 2009 which can be linked to the fact that there was more activity in Yukon's mining industry in the 1990s than in 2009.

Transportation now accounts for the largest share of GHG emissions in Yukon (Table 1.1.2 and Figure 1.1.1). In this energy combustion sub-sector, heavy-duty diesel vehicles are the largest contributors followed by off-road diesel use. Off-road diesel use includes the use of heavy mobile equipment in construction, agriculture and mining, as well diesel that is used to generate electricity in remote locations.

Electricity generation has been a major contributor to GHG emissions in Yukon when energy demands are high. As a result, when the demand for electricity exceeds Yukon's hydro generation capacity, diesel generators are used to make up the shortfall.

Why is it significant?

A variety of conditions unique to Yukon present challenges in addressing climate change and reducing GHG emissions. A high energy input is required to live long distances from production centres and to heat buildings during cold winters. Irregular industrial activity and an isolated electricity grid that is not always able to meet the demand of the developmental activity often results in fluctuations in emission levels.

From a global perspective, Yukon-generated GHG emissions are very low, while the rate and magnitude of temperature change in the region is predicted to be one of the largest. Although Yukon GHG emissions have limited influence over global emission levels, the Yukon government is prepared to demonstrate environmental leadership and responsibility as it communicates the magnitude of northern climate change impacts to the rest of the world.

Taking action

In February 2009, the Yukon government published the *Climate Change Action Plan*, building on the vision and goals set out in its *Climate Change Strategy*. The Action Plan outlines concrete actions the Yukon government is taking to address climate change within its areas of responsibility, based on the following goals:

1. Enhance Yukon's knowledge and understanding of climate change;
2. Adapt to climate change;
3. Reduce Yukon's GHG emissions; and
4. Lead Yukon action in response to climate change.

Climate change activities in 2011 included:

- Completing four adaptation projects focusing on water, forestry, permafrost and infrastructure and climate change scenario development using $585,000 in federal funding from the Federal Department of Aboriginal Affairs and Northern Development Canada.
- Supporting the development of community climate change adaptation plans through the Northern Climate ExChange Community Adaptation Project using $1.2 million from the Northern Strategy Trust.
- Designing and constructing new public buildings to Leadership in Energy Efficiency and Design (LEED) and Super GreenHome standards.
- Enhancing energy management and efficiency in government buildings by the Department of Highways and Public Works.
- Purchasing fleet vehicles with higher fuel efficiency ratings when replacing vehicles.
- Increasing youth engagement on climate change.

In 2009, the Yukon government also published its *Energy Strategy for Yukon*, recognizing that climate change and energy are inextricably linked and common issues should be dealt with in a consistent manner. For example, developing new hydro energy sources will further reduce GHG emissions while increasing energy supply.

The vision of the energy strategy is for a sustainable and secure energy sector that is environmentally, economically and socially responsible. It identified four priorities and 24 actions to achieve them. In 2011, the Yukon government published the *Energy Strategy for Yukon – Progress Report 2010* to highlight progress on the priority actions, such as reducing energy consumption in Yukon buildings and promoting renewable energy sources for transportation.

The Yukon Energy Corporation undertook the $160 million Yukon Green Energy Legacy Project, adding hydro power to the system reduces the need to use diesel generators and the greenhouse gases they create. Recent highlights include:

- The Carmacks-Stewart transmission line was energized in June, 2011. Joining together the Whitehorse-Aishihik-Faro grid and the Mayo-Dawson grid, it enables the Yukon Energy Corporation to manage its assets as one integrated system, creating greater efficiencies and allowing for better use of hydro resources.
- The Aishihik third turbine was in operation by the end of 2011, adding seven megawatts of hydroelectricity to Yukon Energy's system.
- The Mayo B powerhouse started operating in December 2011, providing up to 10 megawatts of hydro-generated electricity to the Yukon grid without the need for a new dam. The project will offset greenhouse gas emissions by approximately 25,000 tonnes a year (*also see 1.3 Interesting Story*).

Data quality

National and territorial GHG emissions data are compiled and published annually by Environment Canada. Environment Canada notes that interpretation of the data must consider the possible presence of estimation, calculation or input errors. The 2009 per capita GHG emissions for Yukon were estimated from a population of 35,000.

1.2 Changing Climate

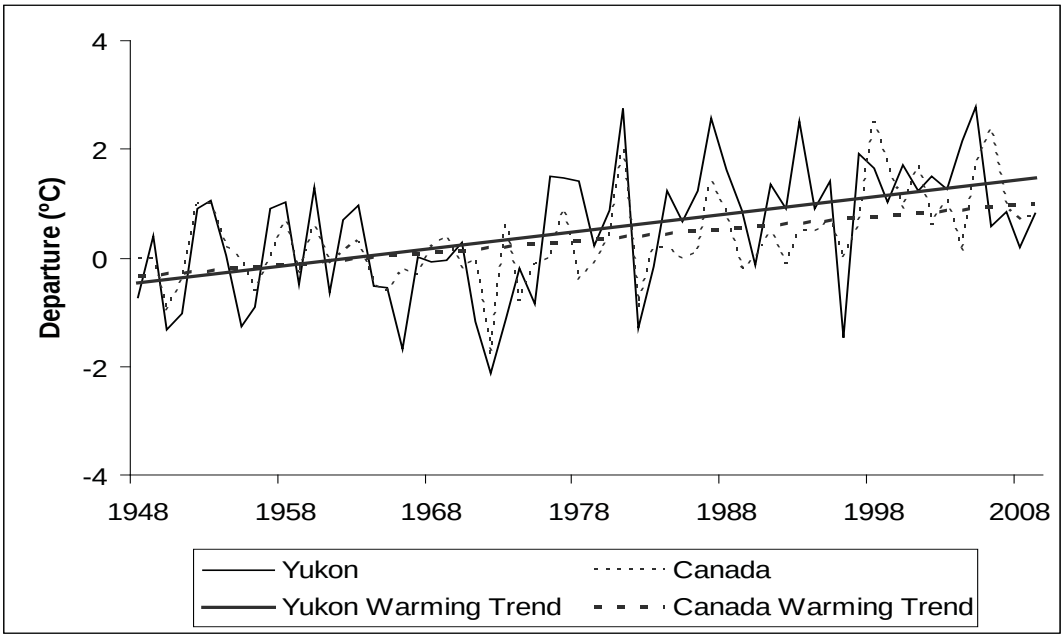
What is the issue?

The annual mean temperature in Yukon has warmed by approximately 0.4 °C per decade in recent decades. Increased winter precipitation and increased variability in precipitation patterns year-round is also expected in Yukon. Essential steps in adapting to climate change include understanding current and future climate change data, as well as what impact this will have on key aspects of our environment.

What are the indicators?

- Long term trend in temperature variation (Figure 1.2.1).
- Amount of precipitation in the winter.
- Number of extreme weather events, e.g. winter storms, heavy rainfall observed.

Figure 1.2.1 Annual temperature departures from normal and long-term trends for Yukon and Canada, 1948-2009 (Yukon data include British Columbia mountains)



Source: Environment Canada, Climate Trends and Variations Bulletin, 2009.

Note: Lines show the temperature difference (positive or negative) from the long-term average annual temperatures. Positive temperatures are warmer than normal and negative temperatures are colder than normal.

What is happening and why is it happening?

- Yukon's average temperature rose approximately 2.0 ºC since 1948 while Canada's average temperature rose 1.3 ºC (Figure 1.2.1). This trend toward higher year-round temperatures is expected to continue in Yukon. Annual temperatures in 2009 and 2010 were slightly warmer than average, which is consistent with the trend shown in Figure 1.2.1.
- In 2009, annual precipitation was approximately 2 percent less than average. In 2010, annual precipitation was 46 percent lower than average.
- Severe storm events are becoming more frequent in Yukon and that trend is expected to continue in the future. The summers of 2009 and 2011 were much wetter than average.

Why is it significant?

The most recent Arctic Climate Impact Assessment (2004) projected that the rate and magnitude of future temperature change will be greatest in the high latitude regions of the northern hemisphere, including Yukon.

With winters warming more than summers and winter warming being greater farther north, summers will warm more in the south and central Yukon than in the north due to the moderating effect of the Beaufort Sea.

There will be little change in average summer precipitation levels. Precipitation patterns will continue to become more variable with greater uncertainty in frequency and amount received during a precipitation event.

Climate change projections indicate that the frequency of heavy summer rainfall events for Yukon is likely to increase.

Yukon residents should use research, innovation, and collaboration to understand and adapt to the impacts of a changing climate.

Taking action

Yukon government is implementing the *Climate Change Action Plan* and the *Energy Strategy for Yukon* which each set out the specific actions and initiatives:

- In 2009, the Yukon government created the Climate Change Secretariat to provide government wide leadership and coordination of action on climate change including projects detailed within *Climate Change Action Plan*.
- In 2009, the Council of Yukon First Nations, Yukon College, and Yukon government, partnered to establish a Yukon Research Centre at Yukon College. The research centre

supports Yukon-based research on climate change adaptation as well as the development of cold climate technologies to address the needs of northerners and their communities

- In 2009, the Yukon government began work to develop Regional Climate Change Scenarios with the Northern Research Institute at the Yukon Research Centre, Yukon College and with the Council of Yukon First Nations. This Aboriginal Affairs and Northern Development Canada funded project responds to a need for local scenarios modeling using Yukon climate change data. This project will enable Yukoners to make informed decisions regarding adaptation and planning in a changing climate based on meaningful pictures of potential future changes.

- The Department of Highways and Public Works, in partnership with the Yukon Geological Survey and Aboriginal Affairs and Northern Development Canada, completed a multi-year project to conduct an infrastructure vulnerability assessment of Yukon government buildings in areas where permafrost is thawing. In addition to identifying infrastructure adaptation strategies, researchers from the Yukon Geological Survey created an inventory of permafrost information to facilitate and encourage cooperative relationships between those active in permafrost related work and research activities.

- The Yukon government has set targets for its internal operations to cap GHG emissions at 2010 levels, reduce GHG emission by 20 percent in 2015 and be carbon neutral by 2020. The Climate Change Secretariat will report annually on emissions from internal government operations and activities to communicate progress on emissions targets.

- The Forest Management Branch is developing measures to adapt to the risk of potential increases in wildfires and threats to communities. Since 2009, a total of 86 hectares of forest in southwest Yukon were treated to reduce forest fuel loads and the risk of forest fires to communities.

- The Yukon government has implemented an Environmental Stewardship Initiative for Yukon schools to help reduce their GHG emissions. This has led a waste diversion pilot project at Whitehorse Elementary and Vanier Schools, the purchase of school bus software to optimize school bus routes and reduce emissions, and the purchase and installation of new energy efficient lighting for three Whitehorse schools.

- The Good Energy program by the Energy Solutions Centre continues to provide information and financial rebates for best-in-class household energy equipment. The Energy Solutions Centre encourages improvements in energy efficiency and the adoption of more forms of renewable energy. The centre is in the advanced stages of developing a draft bio-energy strategy that will be used to develop wood energy opportunities for residential and institutional heating.

- The Yukon Housing Corporation implemented GreenHome energy efficiency standards for its government-funded home ownership programs. All new construction done by the

corporation is now carried out under the new SuperGreen standard which means that home heating costs are much lower than conventionally built Yukon homes. T

Data Quality

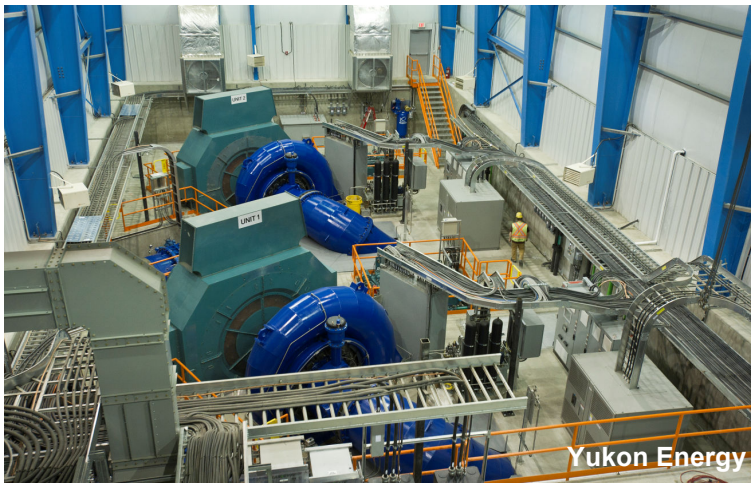
National and territorial greenhouse gas emission data are compiled and published annually by Environment Canada. Environment Canada notes that interpretation of the data must consider the possible presence of estimation, calculation or input errors.

1.3 Interesting Story: Growing Our Hydro Energy Supply in Mayo

Yukon's biggest power project in many years involved expanding the capacity of an existing five megawatt power generation facility and connecting Yukon's two power grids.

The $160 million 'Mayo B' project was partially funded by the Government of Canada's Green Infrastructure Plan (up to $71 million) and the Yukon government, with involvement from the First Nation of Na-cho Nyak Dun. It consists of enhancements to the Mayo hydro generation facility and the construction of the second phase of the Carmacks-Stewart transmission line.

The Mayo B project involved building a new powerhouse downstream from the existing one, without the need for a new dam. The Mayo B powerhouse started operating in December 2011, providing up to 10 megawatts of hydro-generated electricity to the Yukon grid – capacity that is needed given a projected 25 per cent increase in demand over the next few years by residential and commercial users and the expected opening of two new mines. The project will offset greenhouse gas emissions by approximately 25,000 tonnes a year.



Mayo B will offset $10.7 million a year in diesel costs

2. Air

2.1 Air Quality

What is the issue?

Poor air quality can harm human and environmental health. Children, the elderly, and people with respiratory problems are particularly at risk. Air quality is affected by natural events, such as wildfires, and pollution from wood stoves, emissions of fossil fuel burning, and industrial activities.

What are the indicators?

To monitor air quality, scientists measure fine particulate matter, ground level ozone, nitrogen oxides and carbon monoxide. Fine Particulate Matter ($PM_{2.5}$), comprised of airborne pollutants in the form of smoke liquid droplets or dust that are 2.5 microns or less in diameter, is a toxic substance that can be inhaled deeply into the lungs. The concentration of this pollutant in the atmosphere is one indicator of air quality. Specific indicators monitored through a single surveillance station in Whitehorse are:

- Average ambient annual $PM_{2.5}$ levels in the City of Whitehorse (Table 2.1.1).
- Number of days per year that $PM_{2.5}$ levels (24-hour average) exceeds Yukon's Ambient Air Quality Standard of 30 micrograms/m^3 (adopted from the Canada Wide Standard for Particulate Matter) (Table 2.1.1).
- Average monthly $PM_{2.5}$ levels compared with average values for the City of Whitehorse (Figure 2.1.1).
- Average monthly $PM_{2.5}$ levels compared with other relevant jurisdictions (Figure 2.1.2).

Table 2.1.1 Average annual particulate matter ($PM_{2.5}$) and number of days that particulate matter levels exceeded the national standard in Whitehorse, 2002-2009

Year	Mean Annual $PM_{2.5}$ ($\mu g/m^3$)	Number days $PM_{2.5}$ ($\mu g/m^3$) Exceeded National Standard
2001	Began monitoring in August	Began monitoring in August
2002	2.4	0
2003	2.4	0
2004	4.8	12
2005	2.8	4
2006	Not Available	Not Available
2007	1.8	0
2008	1.9	0
2009	Not Available	15

Figure 2.1.1 Monthly averages of particulate matter ($PM_{2.5}$) in Whitehorse for 2009 and an average from 2001-2008

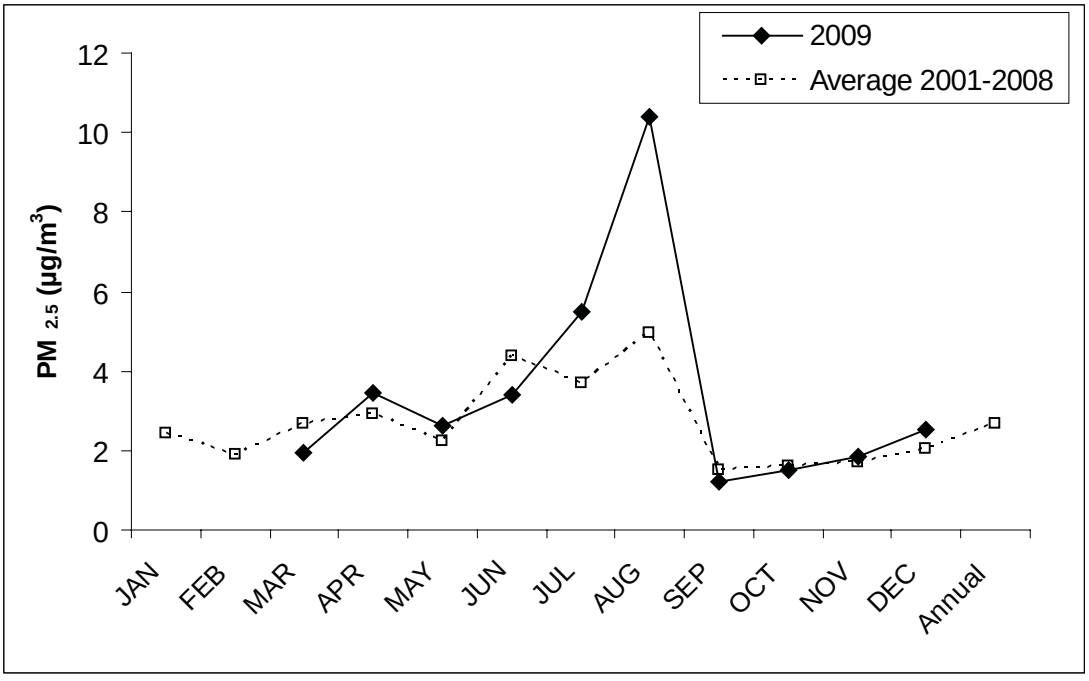
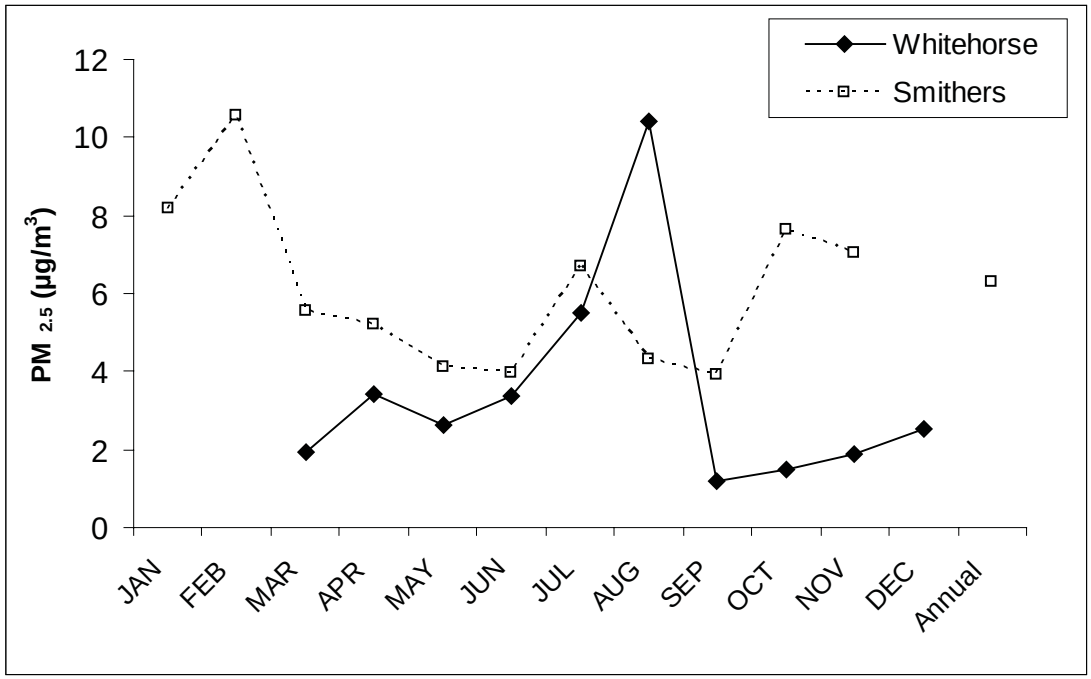


Figure 2.1.2 2009 Monthly averages of particulate matter ($PM_{2.5}$) in Whitehorse and Smithers, British Columbia



Source for both Figures and Table: Environment Canada National Air Pollution Surveillance Network, Environment Yukon.

What is happening?

- The average ambient annual $PM_{2.5}$ concentration for Whitehorse in 2009 is not available due to technical problems in January and February; however monthly levels are generally lower than the Canadian annual average of 7.2 µg/m^3 (Table 2.1.1 and Figure 2.1.1).
- In 2009, Whitehorse exceeded Yukon's Ambient Air Quality Standard for 15 days of the year (Table 2.1.1).
- Monthly $PM_{2.5}$ levels for the summer of 2009 were higher than the Whitehorse average from 2001-2008.
- Monthly $PM_{2.5}$ levels for 2009 were generally lower than Smithers (which has comparable woodstove smoke concerns; Figure 2.1.2).

Why is it happening?

Elevated $PM_{2.5}$ levels often occur as a result of wood smoke from woodstoves or wildfires, from backyard burning and barbeques, from improperly burned fuels for heating or vehicles, and from

road dust, particularly in the spring. Elevated $PM_{2.5}$ levels may also occur as a result of natural causes such as pollen events, dust storms, or volcanic eruptions.

$PM_{2.5}$ levels were markedly higher in the summer of 2009 compared to the 2001-2008 Whitehorse average due to wildfires. The 2009 wildfire season saw 118 fires that burned about 2300 km^2.

Why is it significant?

Fine particulate matter may pose serious risks to human health when inhaled, especially among the elderly, children and people with chronic respiratory illnesses. Health impacts include chronic bronchitis, asthma, and premature death. Reduced visibility as a result of high levels of fine particulate matter may affect aviation, driving and daily life.

Taking action

The National Air Pollution Surveillance station in Whitehorse continues to record ambient air quality data for particulate matter, ozone, nitrous oxide, and carbon monoxide.

The *Clear the Air* campaign continued in 2009. It is a joint educational program between the City of Whitehorse and Environment Yukon to discourage vehicle idling and promote good woodstove burning practices. The program's goal is to improve air quality.

The Yukon government's *Good Energy* program offers rebates for EPA approved woodstoves and CSA approved pellet stoves. These stoves are the most efficient and emit the lowest particulate amounts.

In 2011, the practice of burning domestic waste ceased at 20 Yukon government community solid waste facilities.

Data quality

National Air Pollution Surveillance data are quality controlled, assured and standardized by Environment Canada and Environment Yukon for inclusion into the Canada-wide air quality database. The program is managed by a cooperative agreement between Environment Canada and Environment Yukon. Data from January and February 2009 and all of 2006 are not available due to technical problems. The air quality data for the Whitehorse area is not necessarily representative of air quality throughout Yukon.

3. Water

3.1 Water Quality Index

What is the issue?

Freshwater of sufficient quality and quantity is essential for aquatic life and to support human uses for industry, recreation, agriculture and drinking. Yukon's water bodies and watersheds are monitored to determine ambient water quality.

What is the indicator?

- The Canadian Water Quality Index (Table 3.1.1).

  The Water Quality Index (the Index) comprises important information about the state of water quality and identifies emerging trends. Data about the quality of a water body is reduced to a number scale that corresponds to a rating such as poor, good or excellent. The Index allows evaluation of the suitability of the streams to support aquatic life (Tables 3.1.2 and 3.1.3).

Table 3.1.1 Water Quality Index ratings defined by Canadian Environmental Sustainability Indicators

Excellent (95-100)	Aquatic life is not threatened or impaired. Measurements never or very rarely exceed water quality guidelines.
Good (80-94)	Aquatic life is protected with only a minor degree of threat or impairment. Measurements rarely exceed water quality guidelines and, usually, by a narrow margin.
Fair (65-79)	Aquatic life is protected, but at times may be threatened or impaired. Measurements sometimes exceed water quality guidelines and, possibly, by a wide margin.
Marginal (45-64)	Aquatic life frequently may be threatened or impaired. Measurements often exceed water quality guidelines by a considerable margin.
Poor (0-44)	Aquatic life is threatened, impaired or even lost. Measurements usually exceed water quality guidelines by a considerable margin.

Table 3.1.2 Number of samples collected at Yukon monitoring stations, 2007-2009

River	Station	Ecoregion	2007	2008	2009
Alsek River	Above Bates River	Yukon-Stikine Highlands	6	6	6
Dezadeash River	At Haines Junction	Ruby Range	24	27	23
Klondike River	Above Bonanza	Klondike Plateau	11	7	8
Liard River	At Upper Crossing	Liard Basin	13	15	17
Old Crow River	At mouth	Old Crow Flats	4	6	--
Porcupine River	Above Old Crow River	Old Crow Flats	6	6	--
Rose Creek	Above Anvil Creek	Yukon Plateau – Central	--	20	23
South McQuesten River	Below Flat Creek	Yukon Plateau – North	9	8	11
Yukon River	Above Takhini River	Yukon Southern Lakes	12	12	10
Yukon River	At Marsh Lake Dam	Yukon Southern Lakes	12	19	10
Total samples			*97*	*126*	*108*

Table 3.1.3 Water Quality Index rolling average ratings for Yukon monitoring stations, 2001-2009*

Location	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	Current Rating
Dezadeash River at Haines Junction	89.5	83.8	84.2	84.2	89.5	n/a	89.5	Good
Klondike River above Bonanza Creek	n/a	n/a	n/a	n/a	66.8	66.6	67.4	Fair
Liard River at Upper Crossing	100	93.6	93.6	93.6	93.6	87.2	93.6	Good
South McQuesten River below Flat Creek	n/a	n/a	n/a	n/a	64.4	64.3	64.0	Marginal
Yukon River at Marsh Lake Dam	n/a	n/a	n/a	n/a	100	n/a	100	Excellent
Yukon River above Takhini River	n/a	n/a	n/a	n/a	100	100	100	Excellent

* *The three-year rolling average does not include the Alsek River, Rose Creek and the two Old Crow River sites at this time.*

Sources: Environment Canada and Environment Yukon.

Note: (n/a) Not available.

What is happening?

- In 2009, the most recent year for which data is available, a total of 108 samples were collected from the ten monitoring stations in Yukon operated by Environment Canada and Environment Yukon (Table 3.1.2).
- The Water Quality Index ratings for the Dezadeash, Liard, Klondike, South McQuesten and the two Yukon River stations are stable and ranged from marginal to excellent (Table 3.1.3). Three-year rolling average scoring provides additional confidence in the ratings.

Why is it happening?

The water quality index rating for both Yukon River sites is rated as ‘excellent’. These sites are located above and below the City of Whitehorse. It is encouraging to note that urbanization, which includes an annual discharge of treated sewage from the Livingston Trail Lagoon, has not affected the index score of the Yukon River upstream of Takhini River.

The rating for the Klondike River above Bonanza Creek has remained consistent since 2005. The Klondike River is influenced by historic gold mining, rural development, agriculture, placer mining and recreation. Concentrations of metals exceed aquatic life guidelines during the May-June period and coincide with high flow and turbidity, while phosphorus is occasionally exceeded during the open-water season.

The South McQuesten River is a snowmelt-fed system downstream of tailings piles from the abandoned Keno Hill silver-lead-zinc mine, a naturally mineralized area. Concentrations of metals exceeded guidelines in the May to September period. The water quality index rating for South McQuesten is ‘marginal’. ERDC, a subsidiary of Alexco Resource Corporation, has managed the care and maintenance of the historic liabilities at the Keno Hill mine with funding from the federal government and has made substantial improvements in reducing metal loads from the mine site to the South McQuesten River. Plans for further reduction of metal loads will be part of the historic liabilities closure plan. There has been renewed mining and milling activities near Keno City since 2010.

The Liard River is stable and rated as ‘good’, as one would expect in a natural system with little human impact. Increases in zinc concentrations are associated with spring melt. The Dezedeash River also is rated as ‘good’.

Why is it significant?

Water quality varies throughout the year. Suspended solids and turbidity are higher in spring when increased stream flow from melting snow accelerates bank erosion. Metals can exceed the site-specific objectives during high flow. However, metals primarily associated with suspended solids are not available for uptake by fish and other aquatic organisms and are not a concern. The three-year index score period at each station may have natural variations or human-caused impacts on water quality that can result in changes to the index score.

Concentrations of metals that exceed Canadian Water Quality Guidelines may have negative (toxic) effects on aquatic organisms and some metals can bioaccumulate in invertebrates, fish and eventually impact human health. Excessive nutrients in water can cause aesthetic and nuisance issues in recreational waters.

Taking action

- By next year, the three-year water quality index scoring will be possible for Rose Creek, which is located downstream of the abandoned lead-zinc mine in Faro that is undergoing remediation.
- Since 2010, the Klondike River monitoring station was augmented by real-time sensor equipment that transmits several water quality measurements to a display screen set up for public viewing. In 2010, a trial display was done at the Dänojà Zho Cultural Centre in Dawson, and in 2011, it was placed in the Dawson Visitor's Reception Centre. In addition to water quality information, there is weather and hydrologic data (flow, water level), web cam views and other visuals of the site including surface images and underwater video. These displays and accompanying poster serve to raise the profile of water and promote proper management of this valuable resource.

Data quality

Water quality samples were obtained by locally trained personnel using established protocols for sample collection and transport. Samples were analyzed in Environment Canada laboratories. The data was quality controlled, assured and standardized by Environment Canada and Environment Yukon following the program for the Canadian Environmental Sustainability Indicators. Chronological Index reporting was led by Statistics Canada.

4. Land

4.1 Land Use and Resource Management Planning

What is the issue?

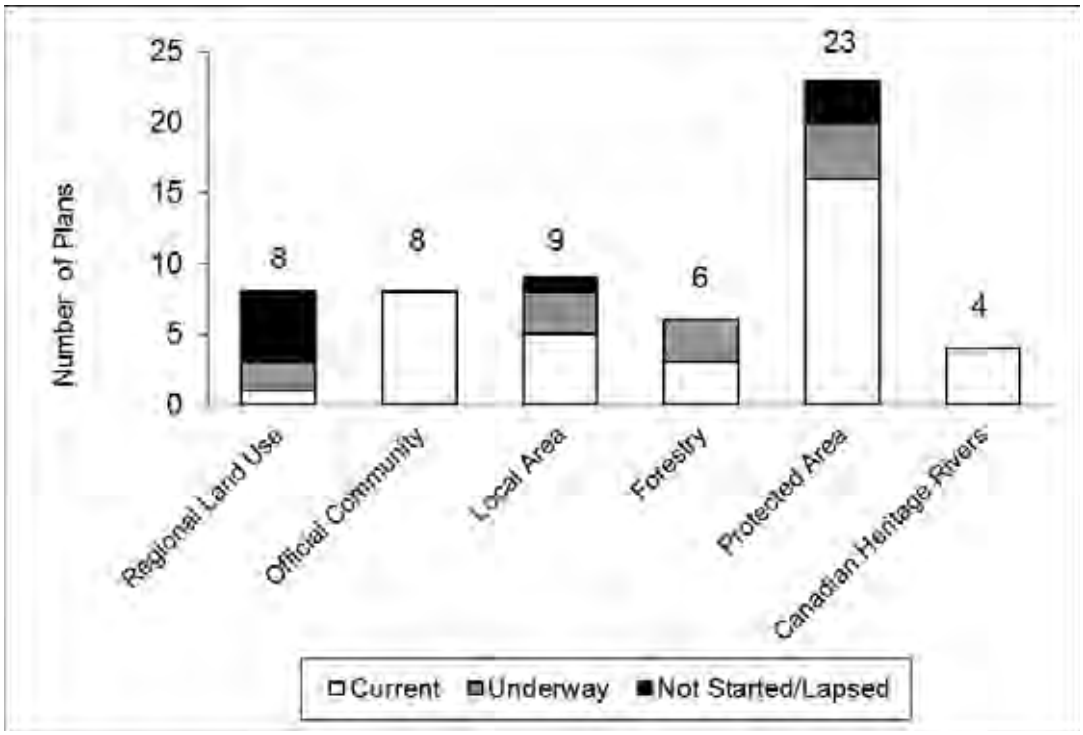
The sustainability of resource use and development depends on effective planning for future human activities and environmental protection.

What are the indicators?

- The status of management plans related to land use, resources and protected areas (Figure 4.1.1).

  These plans generally include an inventory of resources and interests, and strategies to meet a set of management objectives. For this report, 58 plans were tallied, and were divided into three status categories: current (37 plans were finalized and in use), underway (12 plans were in development), or not started/lapsed (nine plans were out of date or awaiting a new planning process) (Figure 4.1.1). The types of plans include regional land use plans, official community plans, local area plans, forest resource management plans, protected area management plans, and other areas (includes Canadian Heritage Rivers).

Figure 4.1.1 2011 Status of land use and resource management plans in Yukon



Source: Updates from resource planners.

What is happening, and why is it happening?

- Regional Land Use Plans (Table 4.1.1)

The regional planning process is set out in Chapter 11 of First Nations Final Agreements.

In 2009, the Vuntut Gwitchin First Nation and the Yukon government approved the North Yukon Regional Plan. The plan provides a sustainable development framework for land management and addressed key issues of oil and gas development in Porcupine caribou habitat and development impacts in wetlands. The plan also recommends protected area status for the Whitefish Wetlands and the Summit Lake-Bell River area. The plan identifies important traditional use and wildlife areas that were mapped from local and traditional knowledge.

In 2011, the Peel Watershed Planning Commission submitted its Final *Recommended Peel Watershed Regional Land Use Plan* to the Na-Cho Nyak Dun, Vuntut Gwitchin, Tr'ondëk Hwëch'in, Gwich'in Tribal Council, and Yukon governments.

In 2010, the Dawson Regional Planning Commission was formed and it has begun early stages of planning. The Teslin Regional Planning Commission was suspended in 2004 at the conclusion of their 3-year mandate without the completion of a plan. Regions identified for future planning include Kluane, Whitehorse, Northern Tutchone and Kaska.

Figure 4.1.2 Yukon planning regions

Source: Environment Yukon

- Forest Resources Management Plans (Table 4.1.1).

Plans were completed for the Teslin Tlingit and Champagne and Aishihik traditional territories under Chapter 17 of First Nations Final Agreements. The Yukon *Forest Resources Act* was passed in 2008 to outline the planning process and purpose and scope of these plans.

Several forest resources management plans were underway in 2011. The Yukon government and the Tr'ondëk Hwëch'in were continuing work on a forest management plan for forests surrounding Dawson City. Terms of references and planning committees are established to finalize a forest management plan in the Whitehorse/Southern Lakes planning area. This includes participation from the Carcross/Tagish First Nation, the Kwanlin Dün First Nation and the Ta'an Kwäch'än Council.

- Official Community Plans (Table 4.1.1).

All eight Yukon municipalities have official community plans in place, as required under the *Municipal Act*.

Table 4.1.1 Status of land use, forest resources, and official community planning processes in Yukon in 2011

Plans	Approved	Status
Regional Land Use Plans		
Dawson Region	No	Underway
North Yukon Region	2009	Current
Peel Watershed Region	No	Final Recommended Plan
Teslin Region	No	Lapsed
Northern Tutchone Region	No	Future
Kluane Region	No	Future
Whitehorse Region	No	Future
Kaska Region	No	Future
Forest Resources Management Plans		
Champagne and Aishihik Traditional Territory Strategic Forest Management Plan	2004	Current
Dawson Forest Resources Management Plan	No	Draft in 2009
Forest Management Plan for the Teslin Tlingit Traditional Territory	2006	Current
Integrated Landscape Plan for Champagne and Aishihik Traditional Territory	2006	Current
Kaska Traditional Territory	No	In Review of Final Draft
Whitehorse/Southern Lakes Planning Area	No	Underway
Official Community Plans		
Carmacks	2005	Current
Dawson	1992	Current
Faro	2003	Current
Haines Junction	2006	Current
Mayo	2006	Current
Teslin	2010	Current
Watson Lake	2010	Current
Whitehorse	2010	Current

- Local Area Plans (Table 4.1.2).

In 2011, five local area plans or community plans were in place, three new plans were under development, and one plan was not started. Local area plans cover settlements outside municipal boundaries. They often address development pressures and are initiated by either residents or governments (Yukon government or First Nations). The plans can be regulated through zoning regulations pursuant to the *Area Development Act*. These regulations define guidelines and standards for the size and use of properties. The regulations divide an area into classes of land use, such as residential, industrial, recreational or environmental protection. Recently three zoning regulations were amended to allow for smaller parcel sizes from six hectares to three hectares to meet the demands of property owners to subdivide their land.

Table 4.1.2 Status of local area plans and zoning regulations in 2011

Development Area	Local Area Plan	Zoning Regulation
Bear Creek	No	1983
Carcross	Underway	1976
Deep Creek	2001	2011
Dempster Highway	No	1979
Destruction Bay	No	1980
Fox Lake	Not started (Underway in 2012)	
Golden Horn	2004	2011
Grizzly Valley	No	1996
Hamlet of Ibex Valley	2001	2005
Hamlet of Mount Lorne	1995	2006
Hot Springs Road	2002	2005
Jackfish Bay	No	2000
Klondike Valley	No	1992
Little Teslin Lake Recreation	No	2010
M'Clintock Place	Part of Marsh Lake Plan	1996
Marsh Lake	Underway	Restricted to M'Clintock
Mayo	No	1976
Mayo Road	No	2005
Mendenhall	No	1990
Pine Lake	No	1990
Ross River	No	1978
Watsíx Eetí	Part of Golden Horn Plan	2011
West Dawson/Sunnydale	Underway	1990
Whitehorse Periphery	No	1978

- Protected area plans (Table 4.1.3 and Figure 4.1.3).

The majority of protected areas are first recognized as Special Management Areas under Chapter 10 of First Nations Final Agreements and then later designated. Protected areas have varying levels of legal protection and include national parks and wildlife areas as well as territorial parks and habitat protection areas.

Management plans are current for the three national parks (Ivvavik, Kluane, and Vuntut) and one national wildlife area (Nisutlin River Delta).

Four territorial park management plans are current, including Herschel Island-Qikiqtaruk, Ni'iinlii Njik (Fishing Branch) Ecological Reserve, Ni'iinlii Njik (Fishing Branch) Wilderness Preserve and Tombstone. Interim management guidelines are in place for Coal River Springs. Planning processes for Asi Keyi have not started and planning processes for Kusawa and Agay

Mene were underway but temporarily suspended in September 2009. Summit Lake-Bell River was identified as a future territorial park in 2009 through the North Yukon Land Use Plan.

In 2011, seven habitat protection area management plans were in place and two more planning processes were underway, and two have not yet been initiated (Figure 4.1.3). Whitefish Wetlands was identified as a future habitat protection area in 2009 through the North Yukon Land Use Plan.

- Other Areas (Table 4.1.1)

Canadian Heritage River designation recognizes rivers or river segments for their natural heritage and recreational values, but does not provide protection. Yukon had four Canadian heritage rivers, all with current management plans or strategies (Alsek – Kluane National Park; Bonnet Plume, Thirty Mile Section of the Yukon River and Upper Tatshenshini). The Kluane Wildlife Sanctuary provides a refuge for wildlife from licensed hunters, with only two permits allowed in most years.

Why is it significant?

The development of long-term management plans through public processes is a proactive way for government to recognize and balance competing views about how lands and natural resources should be used. Regional planning is intended to reflect the traditional knowledge, experience and recommendations of residents as well as incorporate science and broad socio-economic and environmental interests.

Table 4.1.3 Status of park and other area plans in Yukon, 2011

Area Name	Land Withdrawal*	Designated	Management Plan	Size	
				Area (km^2)	% of Yukon
Territorial Park					
Agay Mene	None	No	Underway	725	0.150
Asi Keyi	Permanent	No	Not Started	2,984	0.617
Coal River Springs	Permanent	1991	2009	16	0.003
Herschel Island-Qikiqtaruk	Permanent	1987	2006	113	0.023
Kusawa	Permanent	No	Underway	3,082	0.637
Ni'iinlii Njik (Fishing Branch) Ecological Reserve	Permanent	2003	2004	169	0.035
Ni'iinlii Njik (Fishing Branch) Wilderness Preserve	Permanent	2003	2004	5,355	1.108
Tombstone	Permanent	2004	2009	2,050	0.424
Subtotal				14,494	2.997
Habitat Protection Area					
Ddhaw Ghro	Interim protected	No	Underway (Draft completed)	1,609	0.333
Devil's Elbow & Big Island	Permanent	2011	2011	83	0.016
Horseshoe Slough	Interim protected	2001	2008	77	0.016
Lewes Marsh	Interim protected	No	Not started	20	0.004
Łútsäw Wetlands	Interim protected	2006	2006	32	0.007
Ts'a'wnjik Chu (Nordenskiold Wetlands)	Interim protected	2010	2010	78	0.016
Ni'iinlii Njik (Fishing Branch)	None	2004	2004	978	0.202
Van Tat K'atr'anahtii (Old Crow Flats)	Permanent and interim protected	2007	2006	7,730	1.598
Pickhandle Lake	None	No	Underway	51	0.011
Ta'Tla Mun	None	No	2005	33	0.007
Tagish Narrows (Six Mile)	None	No	Not started	4	0.001
Subtotal				10,698	2.211
National Park					
Ivvavik	Permanent	1984	2007	9,704	2.006
Kluane	Permanent	1972	2010	22,155	4.581
Vuntut	Permanent	1995	2010	4,350	0.899
Subtotal				36,209	7.486
National Wildlife Area					
Nisutlin River Delta	None	1995	2004	55	0.011
Grand Total				57,506	12. 7%**

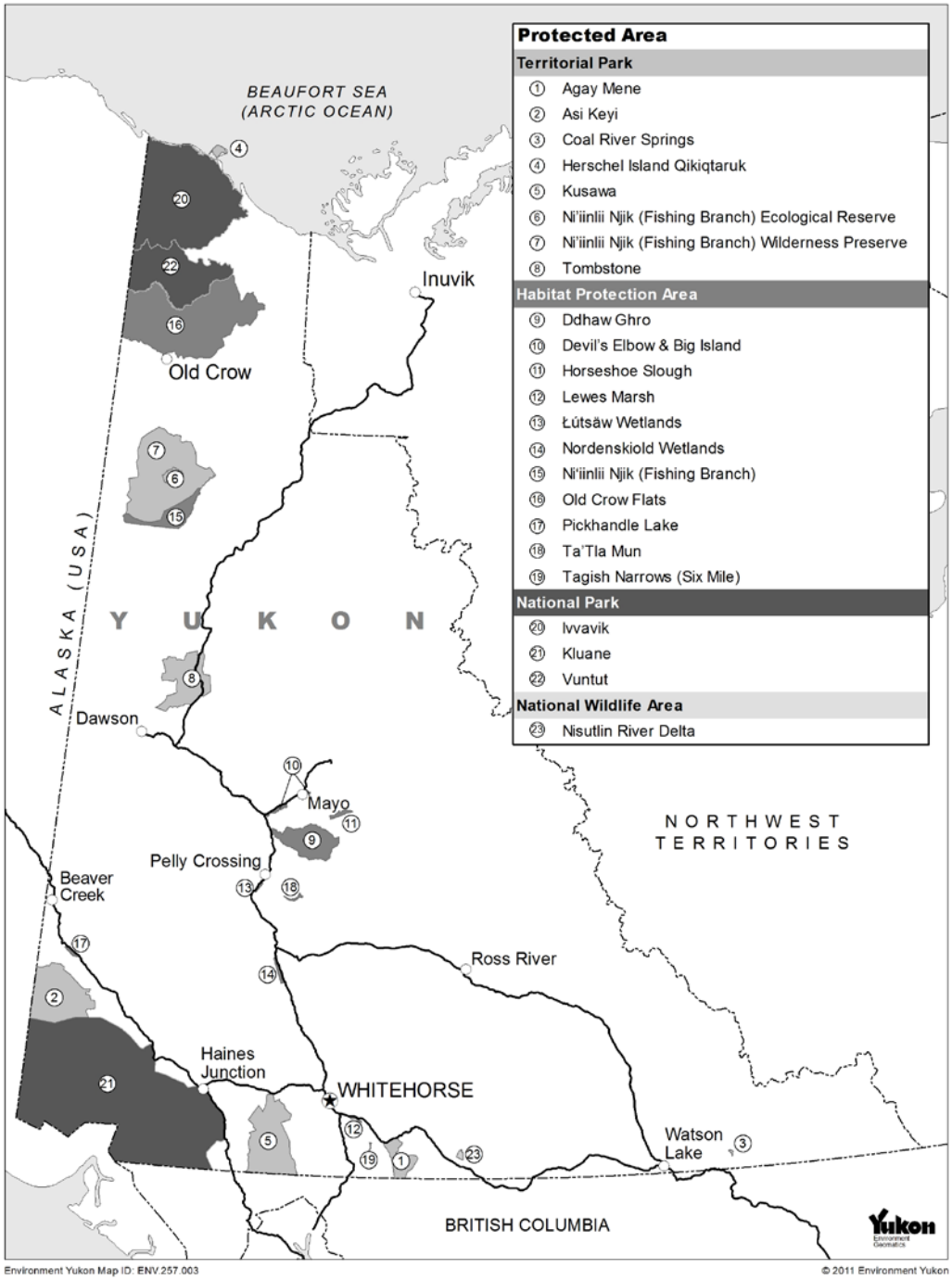
Source: Environment Yukon

Notes: (1) Areas identified for protection in the North Yukon Land Use Plan that have interim withdrawals (Whitefish Wetlands and Summit Lake-Bell River) have yet to be formally established and are not included in this table or Figure 4.1.3. (2) Some protected areas include First Nation Settlement Lands. (3) Subtotals may not add up due to rounding protocols.

(*) Land withdrawal includes withdrawal of surface and/or subsurface from mineral and oil and gas exploration and development and surface disposition.

(**) This percentage includes areas with varying levels of legal protection and land withdrawal (11.3 percent of Yukon is fully protected by virtue of permanent land withdrawals).

Figure 4.1.3 Parks and other areas in Yukon, including those awaiting designation



Source: Environment Yukon

4.2 Interesting Story: Tombstone Park Management Plan

The Tr'ondëk Hwëchin and Yukon government approved the Tombstone Territorial Park Management Plan in 2009. The plan provides certainty and direction for protecting the natural, cultural and recreational values of the park and for providing new employment and economic opportunities for Tr'ondëk citizens. The plan is to be reviewed by the park management committee with public involvement in 2012 and at least every ten years thereafter.

A new Tombstone Interpretive Centre was opened in 2009. The $2 million building was designed using the highest possible standards for environmental sustainability to minimize its environmental footprint. Yukon Parks and the Tr'ondëk Hwëch'in Heritage Department developed the interpretive program, with Holland America Tours providing substantial financial support for the planning and fabrication of displays and exhibits. The centre showcases the park's features through displays, interpretive trails, information boards, special events, and a library.

Darren Bullen was the Tr'ondëk Hwëch'in Interpreter Assistant last year at the Tombstone Interpretive Centre

In 2009 and 2010, a $500,000 Canadian Northern Economic Development Agency (CanNor) grant funded the rehabilitation of the Interpretive Centre site, from a former gravel pit, to a fully accessible parking facility, with toilet and wheelchair ramps. The new Beaver Trail was also developed with interpretative panels.

The Tombstone Park Management Committee, comprised of Yukon Parks and Tr'ondëk Hwëchin representatives meet twice per year to guide operations, planning and development.

The 2,100 km² of Tombstone Park's diverse landscape, cultural history, and spectacular scenery make this a popular destination for hikers and other travelers. The number of visitors to Tombstone increased to over 12,500 in 2011, a 25 per cent increase from 2010.

4.3 Solid Waste Management

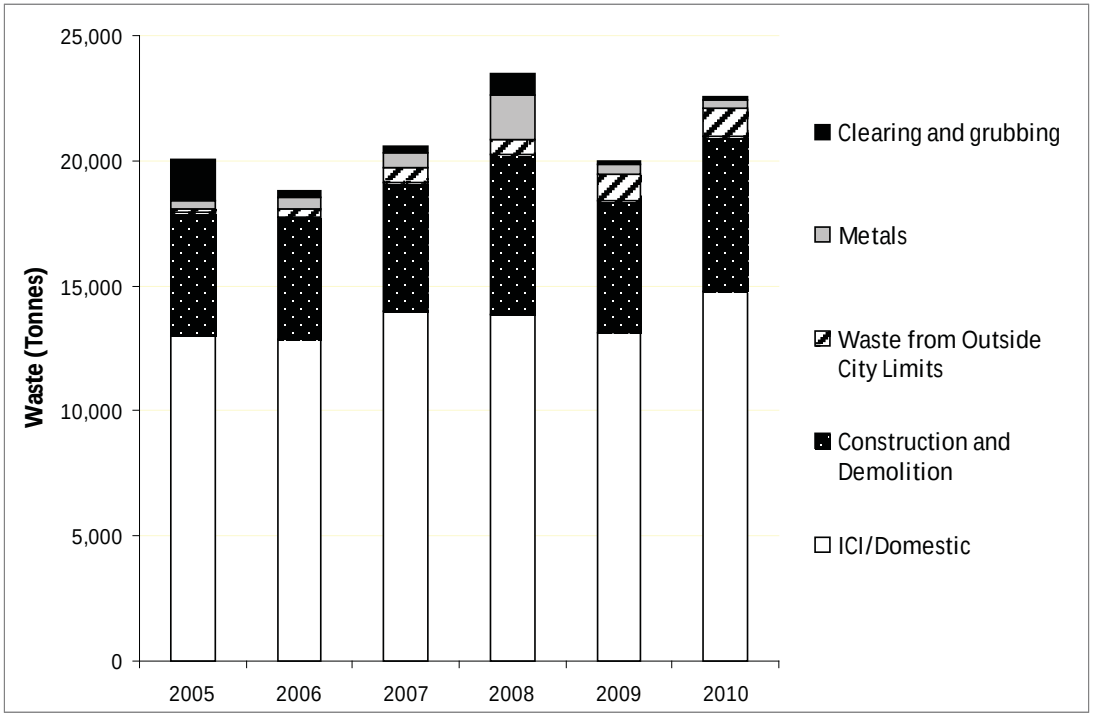
What is the issue?

Solid waste disposal in landfills can pose environmental and health risks as well as land use planning challenges. Waste is costly to manage whether it is sent to landfills, diverted through recycling and composting, or shipped outside the territory for treatment. We reduce our reliance on landfills by generating less waste and by having more recycling and composting.

What are the indicators?

- Total annual tonnage of waste being landfilled at the City of Whitehorse Waste Management Facility (Figure 4.3.1).
- Whitehorse waste diverted through recycling and composting (Figure 4.3.2).
- Whitehorse curbside collection of garbage and organics from approximately 5,000 Whitehorse single family households (Figure 4.3.3).
- Overall diversion rate in Whitehorse based on the total waste landfilled (Figure 4.3.4).

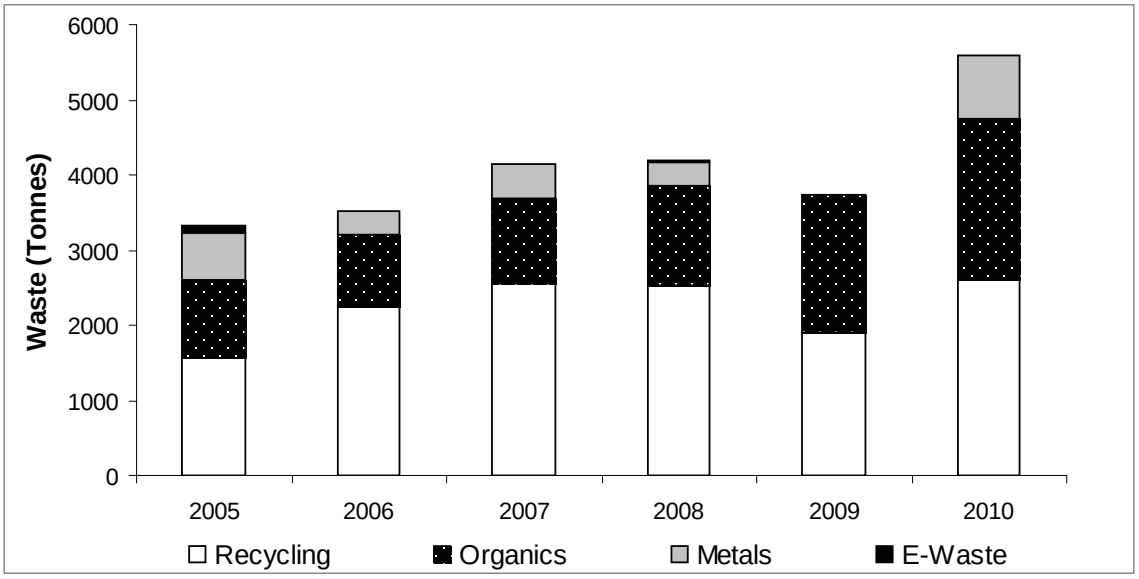
Figure 4.3.1 Waste landfilled at the City of Whitehorse Waste Management Facility, 2005-2010



Source: City of Whitehorse

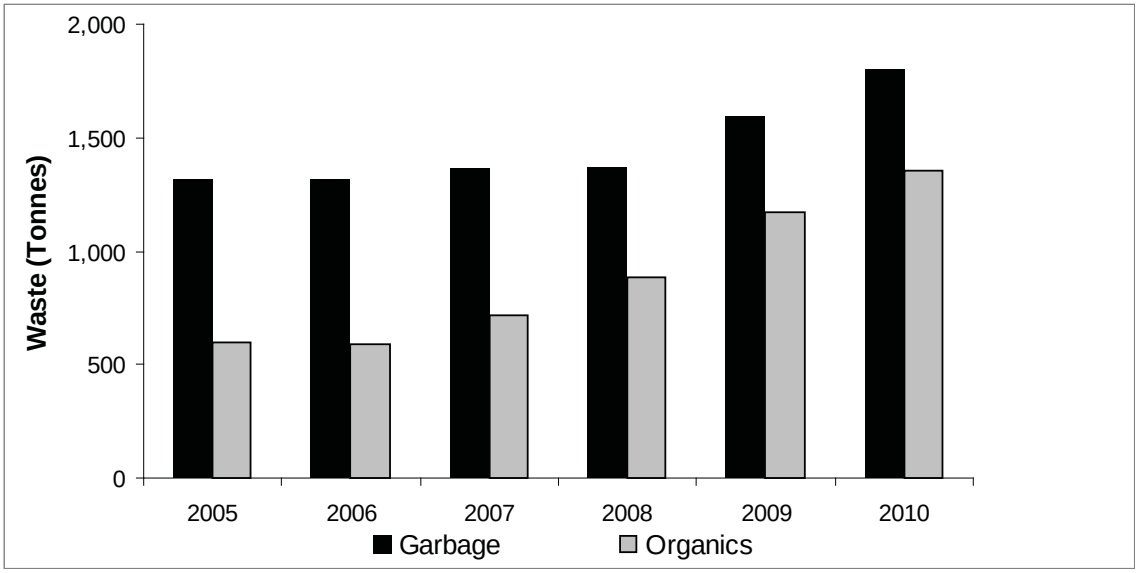
Note: ICI = Industrial, commercial, and institutional waste.

Figure 4.3.2 Whitehorse waste diverted through local composting program or transported outside Yukon for recycling, 2005-2010



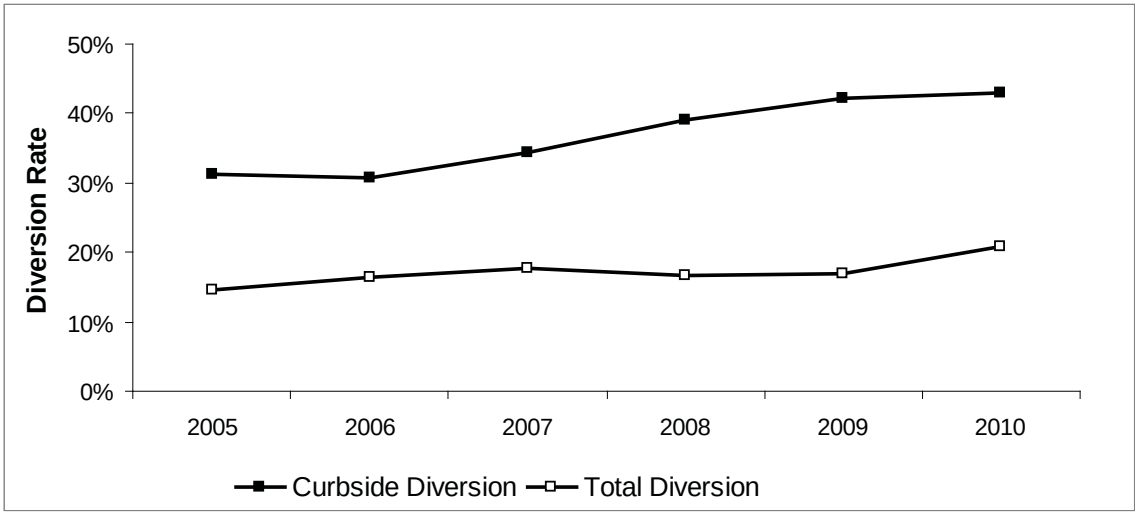
Note: Diverted metals include appliances, car bodies and other metals stockpiled that are shipped and processed south for recycling.

Figure 4.3.3 Curbside waste collected from 5,000 single family homes in Whitehorse, 2005-2010



Note: Organics are processed at the central composting facility; garbage is landfilled at the City Waste Management Facility

Figure 4.3.4 Rates of waste diverted from Whitehorse landfill by curbside collection of organic waste (5,000 households) and all waste diverted in Whitehorse, 2005-2010



What is happening?

- Between 2005 and 2010, the annual tonnage of landfilled waste has risen slightly at the Whitehorse City Waste Management Facility.
- The overall diversion rate in Whitehorse remains stable at 21 percent. This does not include glass, refillable beer bottles, tires, and hazardous waste.
- The amount of organic material composted at the Whitehorse composting facility has increased annually. Families with curbside compost pick up diverted 43 percent of their household waste in 2010. More waste may actually be diverted from households since this figure does not include diverted waste that is not measured such as recycling, backyard/worm composting, or the use of garburators.

Why is it happening and why is it significant?

Total waste being landfilled is affected by Whitehorse's rising population and other communities that transport waste into Whitehorse for disposal. Yearly variations in diversion of recycled materials are affected by market demand for recyclable commodities. When markets were low in 2009, no metal was removed from the facility. Recyclables were stockpiled and shipped in 2010 when the market was more favourable.

Waste disposal can negatively affect the quality of land, air and water. Individuals can mitigate these impacts by reducing, reusing, recycling, refusing, and composting their waste as much as possible. Waste diversion through recycling and composting creates employment opportunities; recycling also prolongs resource supplies.

Taking action

In 2009, the Yukon government developed a Solid Waste Action Plan to modernize existing solid waste facilities and to work with partners across Yukon to develop a coordinated approach to Yukon solid waste management. Also in 2009, Yukon government released a comprehensive solid waste study that recommends strategies and methods to improve Yukon's waste management. In 2010, Yukon government established a Solid Waste Advisory Committee to set priorities for solid waste and recycling options. The committee recommends increased waste diversion as part of a zero waste philosophy for Yukon. The committee is also reviewing funding for recycling facilities and increasing the commodities covered under regulation.

Environment Yukon updated the solid waste permits in 2009 to include effective environmental management and monitoring practices, including the requirement to cease open burning and implementing groundwater monitoring at each facility. By the end of December 2011, the practice of burning domestic waste was ceased at all 20 Yukon government operated unincorporated community solid waste facilities. These former open trench burning sites were transformed into transfer stations, modified transfer stations (domestic waste transfer only), or full service solid waste facilities. In addition, groundwater motoring wells have been installed in seven of these facilities and the remainder will be installed in 2012. The removal of metals and installation of hazardous waste containers in Yukon landfills occurred in 2011.

In 2009, the City of Whitehorse established a city-wide organic compost and garbage curbside cart program, which eliminated the need for compostable bags and made waste diversion easier. In 2010, the City of Whitehorse became a regional landfill site for surrounding communities. The community sites became transfer stations with enhanced recycling and diversion opportunities.

The City of Whitehorse developed a composting facility program with new equipment to increase compost quality and throughput. The compost is tested to meet guidelines and is then sold at the waste management facility. The Yukon agricultural branch has successfully used the compost in growth trials. This local product reduces the need to transport artificial fertilizers and for local soil harvesting. Keeping organics out of the landfill also reduces landfill leachate toxicity and decreases greenhouse gas emissions.

The City of Whitehorse audited its waste in 2010 to help achieve higher diversion rates. This identified a need for programs to improve diversion of construction, demolition, and ICI (Industrial, Commercial, and Institutional) waste from landfills. The City of Whitehorse and Yukon government continue to hold household hazardous waste collection events in Whitehorse.

Data quality

The City of Whitehorse weighs waste at the management facility to ensure valid data is available from the curbside program and waste being landfilled. Interpreting the data can be challenging, as

commercial, construction and domestic waste arrived co-mingled. Data regarding waste diversion are incomplete and difficult to correlate to an annual diversion rate, due to stockpiling and shipping irregularities.

These data do not represent what is happening in Yukon communities, other than the weight of material sent to Whitehorse for landfilling. The monitoring of waste diversion at communities is being partially addressed from the communities sending waste to Whitehorse.

5. Fish and Wildlife

5.1 Population Trends and Planning Initiatives

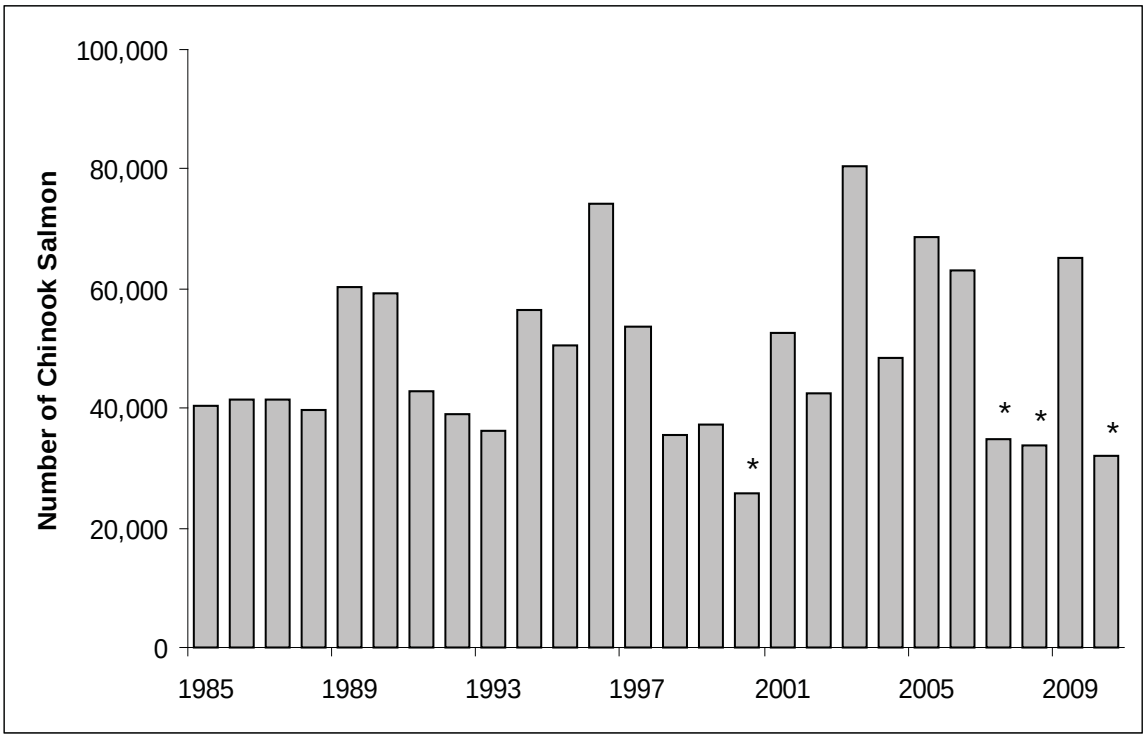
What is the issue?

The health of fish and wildlife populations is important for healthy ecosystems and the well-being of the people who rely on them. Planning processes find long-term and cooperative solutions that ensure healthy fish and wildlife populations.

What are the indicators?

- Returns of spawning Chinook salmon in the Canadian portion of the upper Yukon River drainage (Figure 5.1.1).
- Status of lake trout fisheries in Yukon (Figure 5.1.2).
- Status of caribou herds in Yukon (Figure 5.1.3).
- Status of community-based wildlife plans and species plans (Table 5.1.1).

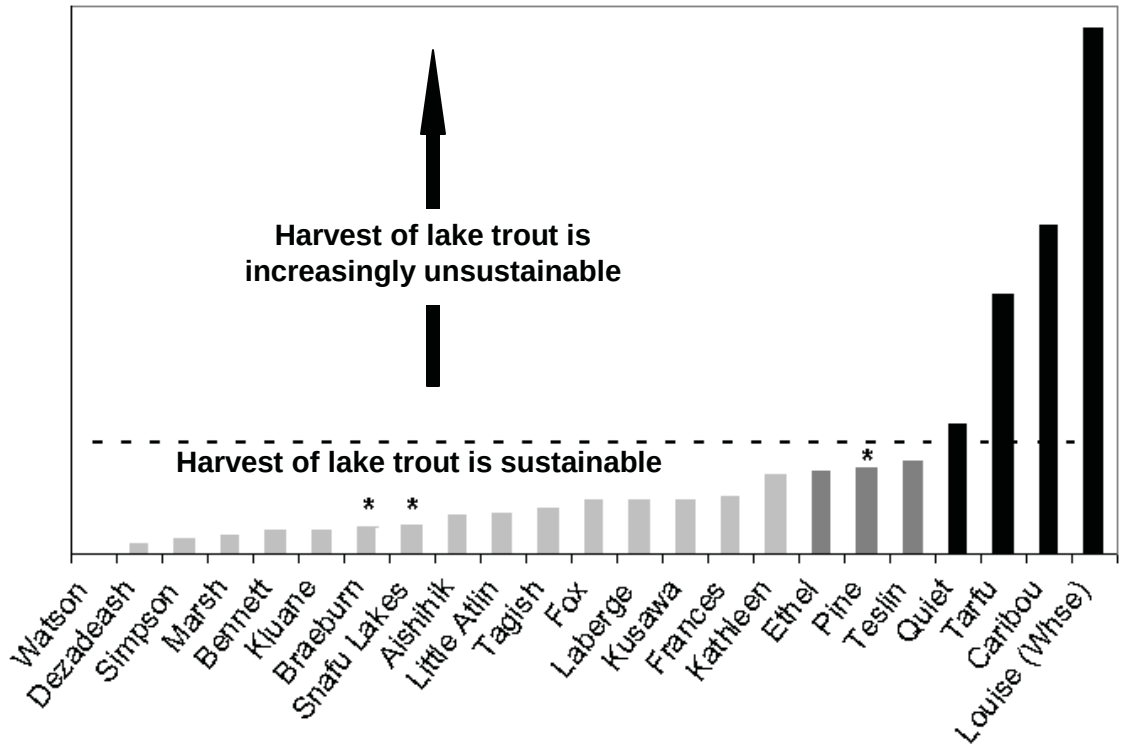
Figure 5.1.1 Number of Chinook salmon spawning in the Canadian portion of the Yukon River, excluding the Porcupine River drainage, 1985-2010



Source: Fisheries and Oceans Canada and JTC Yukon River Salmon 2010 Seasonal Summary.

Note: (*) Spawning escapement (the number of fish that reach the spawning grounds) goals were not met in 2007, 2008, and 2010, and conservation targets for returning spawning salmon were not met in 2000.

Figure 5.1.2 Sustainability of angler harvest on select Yukon lake trout populations based on angler harvest data in 2011

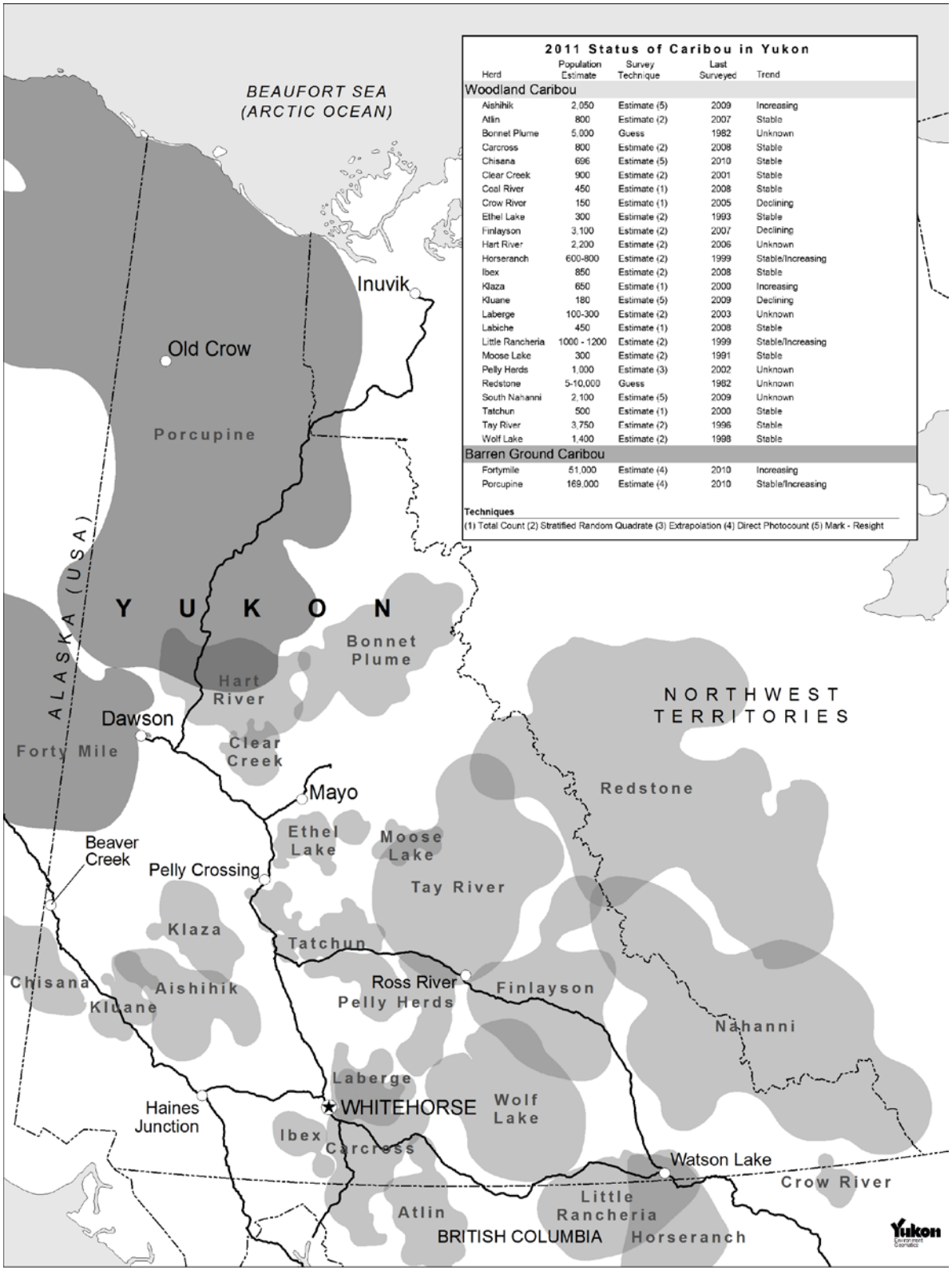


Source: Environment Yukon

Note 1: Harvest is considered to be unsustainable when it exceeds the optimal sustainable yield, which is derived from a model based on physical and chemical parameters of the lake such as temperature and nutrient content.

Note 2: (*) Harvest may appear to be sustainable, when in fact a lake trout population is depressed (Braeburn, Snafu and Pine lakes). Harvest data are available for these lakes because they are where the most intensive fisheries take place. Fisheries on other lakes are expected to be, in most cases, within sustainable levels.

Figure 5.1.3 Status and ranges of caribou in Yukon, 2011



Source: Environment Yukon

Table 5.1.1 Status of community-based wildlife plans and species plans in 2011

Plan	Approved	Status
Community-based fish and wildlife work plans		
Dezadeash Lake	No	Under development
Little Salmon/Carmacks Traditional Territory	2004	Draft recommended plan
Na-Cho Nyäk Dun Traditional Territory	2008	Current
Vuntut Gwitchin Traditional Territory	No	Under development
Species Plans		
Baikal Sedge Recovery Strategy	2011	Current
Management Plan for Dall's Sheep In the Northern Richardson Mountains	No	Draft recommended plan
Management Plan for Elk in Yukon	1998	Current
Management Plan for the Aishihik Wood Bison Herd in Southwestern Yukon	No	Draft recommended plan
Management Plan for the Chisana Caribou Herd	2011	Current
Mandanna Lake	No	Under review
North Slope Muskox Management Plan	No	Under development
Northern Mountain Caribou Management Plan	2011	Current
Porcupine Caribou Harvest Management Plan	2010	Current
Southern Lakes Caribou Recovery Program	1992	Current
Wolf Conservation and Management Plan	1992	Draft recommended plan
Yukon Amphibian Management Plan	No	Under development

Source: Updates from Environment Yukon.

What is happening and why is it happening?

- In 2007, 2008, and 2010, spawning escapement targets were not met for Canadian-origin Chinook salmon in the Yukon River (Figure 5.1.1). These low salmon runs have resulted in harvest restrictions (both voluntary and enforced) and have led to serious hardships for commercial and traditional harvesters in both Alaska and Yukon. Salmon returns vary considerably due to a suite of factors which include the strength of returning age classes and fishing pressure, as well as environmental variables such as climatic events (Pacific decadal oscillation, El Niño, La Niña), predation, water levels and temperature, and disease loads. Salmon by-catch by the Alaskan Pollock fishery has also been a significant factor in low salmon returns to the Yukon River.
- The majority of lake trout harvest in Yukon was sustainable; most water bodies were expected to continue to maintain quality fisheries (Figure 5.1.2). Only four lakes had a harvest that exceeded the sustainable limits: Quiet, Caribou, Tarfu, and Louise lakes. Teslin and Ethel lakes were nearing the point where harvest becomes unsustainable. Lake trout harvest in Braeburn, Snafu and Pine lakes, while low, may be unsustainable, as these lake trout populations appear depleted. Generally, small lakes are more vulnerable to overharvesting because of their smaller lake trout populations and lower sustainable yields.
- Of the 27 caribou herds in Yukon (Figure 5.1.3), six were assessed as stable/increasing, 12 were considered relatively stable, six were unknown and three were thought to be declining. The declines in Yukon and other herds across the circumpolar north may be due to environmental changes, natural population cycles, and human influences such as harvest and development.
- Two community-based fish and wildlife work plans are current and two are under development. Six species plans are current and six planning processes are underway (Table 5.1.1). Many of these plans recognize that science, local, and traditional knowledge must all be considered when managing fish and wildlife.

Why is it significant?

Chinook salmon are an important part of the ecosystem, providing a key food source for bears, eagles and other predators, as well as bringing nutrients from the ocean to freshwater and terrestrial ecosystems. Salmon are important culturally, socially, and economically in Yukon. This was recognized in 2001, when Canada and the United States ratified the Yukon River Salmon Agreement to help rebuild and conserve stocks. Recent declines in salmon productivity and salmon fished as a by-catch of the Alaskan Pollock fishery have led to low returns of Chinook. Escapement targets for spawning salmon were not met in 2007, 2008, or 2010.

Lake trout are considered an indicator species due to their slow growth, position at the top of the aquatic food chain, reliance on healthy and clean habitats, and high value in Yukon fisheries.

Healthy lake trout populations are indicative of the general health of the entire aquatic ecosystem. The status of lake trout fisheries informs decisions made by fishery managers to maintain sustainable fisheries.

Caribou are important ecologically and culturally. Many people also rely on caribou for subsistence and spiritual well-being. Caribou herds that cross jurisdictional boundaries require a coordinated approach to their management. One example is the Porcupine Caribou Herd, with a herd range that covers Yukon, Alaska and the Northwest Territories.

Taking action

Beginning in 2007, the poor Chinook salmon runs have resulted in harvest restrictions in Alaska and Yukon and serious hardships for fishers and communities along the river. Since 2008, managers in Yukon and Alaska have been taking action with the goal of maintaining a healthy number of spawning salmon even in this time of low productivity. Some of the actions that have been taken include: full or partial closures of commercial, domestic, and recreational fisheries, voluntary reductions in fishing by First Nations, decrease in net mesh sizes to allow larger fish to reach the spawning grounds, reducing by-catch quotas for the Alaskan Pollock fishery and reduced fishing times in the subsistence fishery. The Yukon River Panel established by the Yukon River Salmon Agreement recommended spawning goals and allocated funding to program proposals submitted to the $1.2 million Yukon River Salmon Restoration fund.

From 2009 to 2011, Environment Yukon surveyed key fisheries through angler harvest studies (Bennett, Frances, Nares, Pine, Fish, Snafu, Tarfu, Caribou, Louise and Quiet lakes, as well as Lubbock River and the Teslin River at Johnson's Crossing) and fish population assessments (Bennett, Teslin, Fish, Lewes, Pine, Sekulmun, Snafu, Tarfu, Caribou, Ethel, Louise and Tatlamun lakes) to better understand which fish populations are sustainable and which need management action. Environment Yukon is developing new population assessment methods for lake trout, Arctic grayling, and burbot to be able to better understand the state of the resource.

Caribou were monitored by Environment Yukon in order assess overall status and trends. A plan for the boreal caribou population is being developed under the federal Species at Risk Act (see section 5.3).

In 2010, the Environment Yukon's Fish and Wildlife Branch enhanced its reporting initiatives with the completion of the State of Yukon's Fisheries Report and the initiation of annual reporting on the highlights of fish and wildlife management initiatives.

In 2010, Environment Yukon's Fish and Wildlife Branch enhanced its reporting efforts with the introduction of annual reports to highlight management and research initiatives, and the completion of the State of the Yukon Fisheries Report.

Data quality

Data are standardized by the agencies collecting the information. Estimates of returning spawning salmon are based on aerial survey counts (1985-2002), radio tagging studies (2002-2004) and sonar estimates in Eagle, Alaska (2005-2011). The methods used prior to sonar in Eagle, Alaska underestimated returning salmon and therefore salmon returns were corrected to remove the bias.

Caribou herd ranges were based on information current to 2011 and were calculated using 95 percent kernel estimates from radio collared cow caribou.

5.2 Interesting Story: The Community Ecological Monitoring Project

Most human activities and communities in Yukon occur in the boreal forest ecosystem. The boreal food web is characterized by natural cycles and changes in abundance of many of its plant and animal species. Measuring the patterns and variation in abundance of key species in the food web is essential for understanding how the boreal ecosystem functions and predicting how things might change with increased human developments and climate change.

In the mid-1970s, a team of researchers began studying key ecological relationships in the boreal forest near Kluane Lake. These on-going studies provide an invaluable 35-year data set and understanding of the boreal ecosystem. The researchers also use well-tested methods to monitor key species in the boreal forest. In 2004, the monitoring of those boreal species expanded in scope to other regions of Yukon and the collection of local knowledge. This program became known as the Community Ecological Monitoring Project (CEMP).

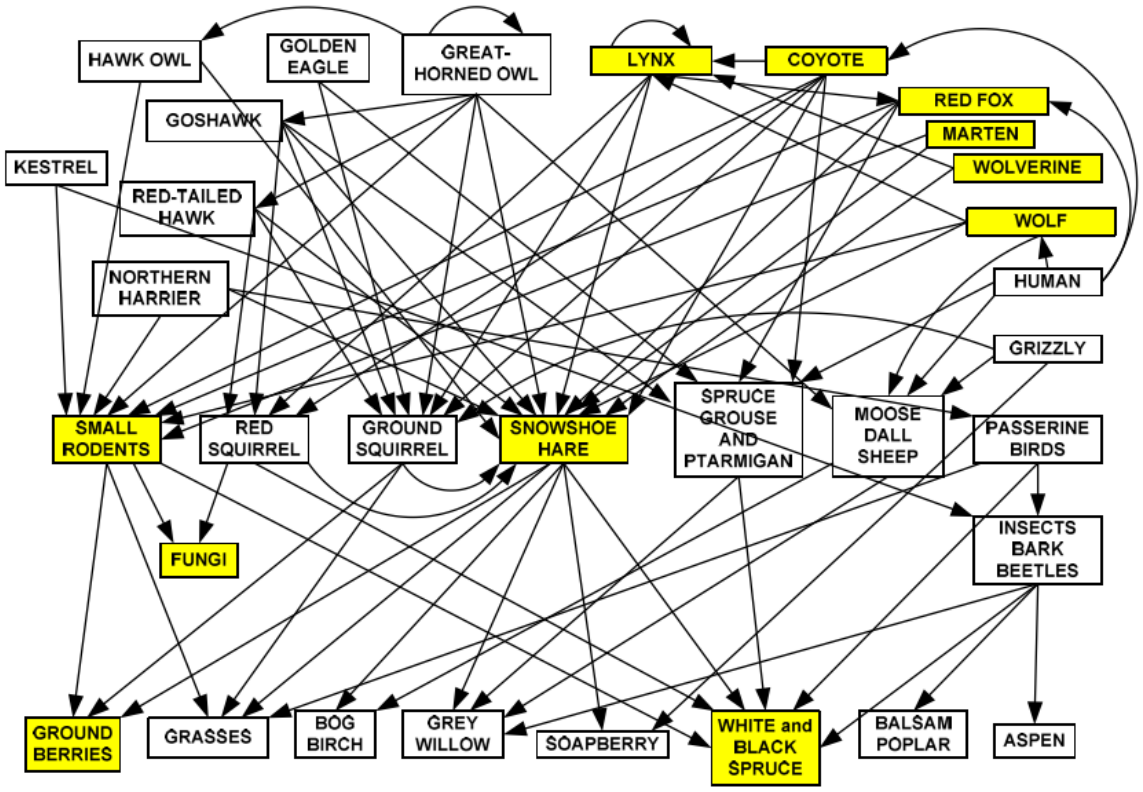
CEMP is a collaborative effort between researchers at the Arctic Institute of North America, Yukon College, several communities, and Environment Yukon. Together they monitor the species and species groups that are key to the functioning of the whole food web in the boreal forest (Figure 5.2.1). Every year, these researchers visit permanent sites and measure the abundance of berries, spruce cones, mushrooms, small mammals, and snowshoe hares. They also monitor the abundance of small and medium-sized carnivores, owls, and songbirds using standard counts along trails and roads. Sites are located in the Kluane-Haines Junction area, Mayo, Whitehorse, Watson Lake, and Faro.

In the Mayo area, community members interview people who spend their time out on the land to gather local knowledge regarding the changes to the land and the effects these changes have on subsistence activities. For example, local residents provide their observations of whether they were able to meet their needs for berries in a given year. These data complement measurements of the abundance of cranberries at monitoring sites near Mayo to provide a more complete understanding of ecological patterns in the boreal forest.

This ecological monitoring program is important because it provides:

- baseline data on the patterns and natural range of abundance of key species in the boreal forest in order to measure ecosystem health;
- Data on key species in undisturbed forest that can used be in comparison with areas where development is occurring (e.g. logged sites); and
- Early warnings of changes in the boreal ecosystem linked to climate change.

Figure 5.2.1 Food web for the boreal forest in southern and central Yukon. CEMP monitors the species in shaded boxes at two or more sites



Source: Community Ecological Monitoring Project Annual Report 2010
Note: Only major feeding linkages are shown.

Figure 5.2.2 Average counts of cranberries (*Vaccinium vitis-idaea*) in Mayo area, 2005-2010 in permanent plots

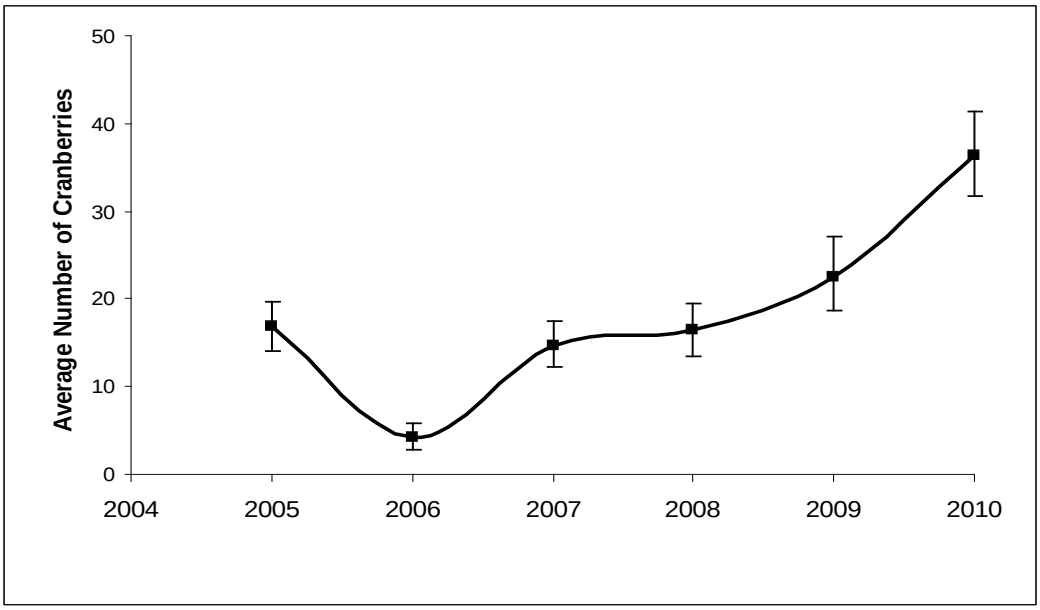
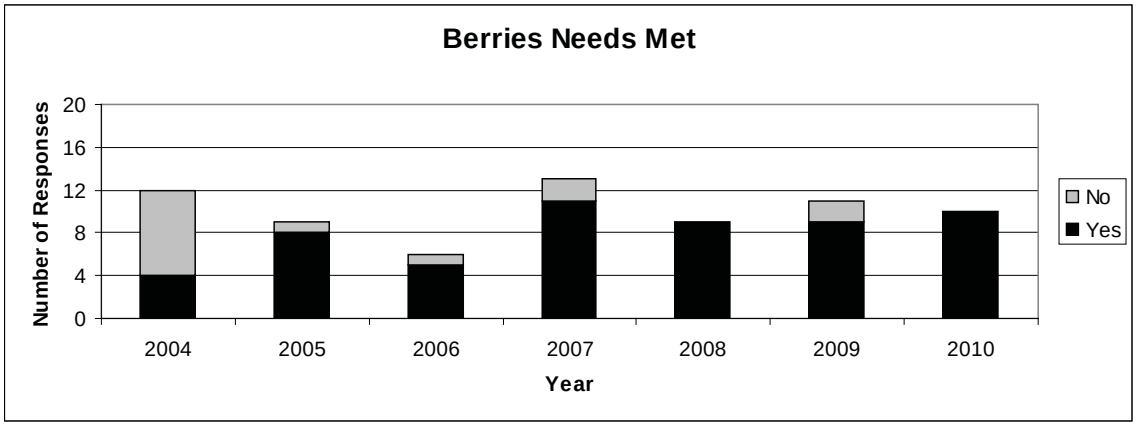


Figure 5.2.3 Number of interview respondents, from local knowledge interview in Mayo area, whose berry needs were met in a given year, 2004-2010



5.3 Contaminants

What is the issue?

Contaminants such as heavy metals, persistent organic pollutants and radionuclides can persist in the environment. Contaminants concentrated along the food chain may have serious health implications for wildlife as well as people who depend on traditional foods. Many contaminants found in the north were never used in the region or have been banned or restricted for many years. Transported here by wind and water, they tend to settle out in colder climates.

What are the indicators?

- Mercury levels in Yukon caribou.

  Mercury levels have been measured in Yukon caribou since 1994, which have allowed a thorough analysis of changes in mercury over time.

- Mercury concentrations in lake trout (Figure 5.3.1).

  Between 1993 and 2010, a study examined mercury in lake trout from Lake Laberge and Kusawa Lake. The monitoring of mercury in lake trout is continuing for Lake Laberge and Kusawa Lake.

- Cadmium levels in Yukon caribou and moose.

  The Yukon Contaminants Committee, Environment Yukon, and the Northern Contaminants Program annually collect liver, kidney and muscle samples from Porcupine caribou for contaminant analysis. In the past, this program has included samples from moose and other caribou herds through the volunteer hunter survey program.

What is happening?

- Caribou meat remains a healthy food choice because mercury levels were very low. Mercury concentrations in Porcupine caribou change from year to year in a cyclic pattern that is likely driven by environmental factors. Over the long term (1994 to 2009) there has been no increasing or decreasing trend in mercury concentration, so that mercury levels are considered to be stable.

- In recent years, average mercury concentrations in lake trout from Kusawa Lake and Lake Laberge have remained at or below the recommended guideline of 0.50 µg/g for mercury in fish sold commercially. The exception was Lake Laberge in 2010.

- In 2011, a 20-year advisory health advisory to limit consumption of fish from Lake Laberge was lifted, as toxaphene concentrations in Lake Laberge fish have substantially declined. For most current information on health benefits and risks to eating Yukon fish, please visit www.env.gov.yk.ca/fishing/eatingfish.php.
- Over the last 15 years, cadmium levels do not appear to be changing. As cadmium concentrates in animals' liver and kidneys, it is recommended that people restrict intake of both organs. Yukon moose tend to have higher cadmium levels than barren-ground caribou. Cadmium levels are more variable in woodland caribou due to diet.

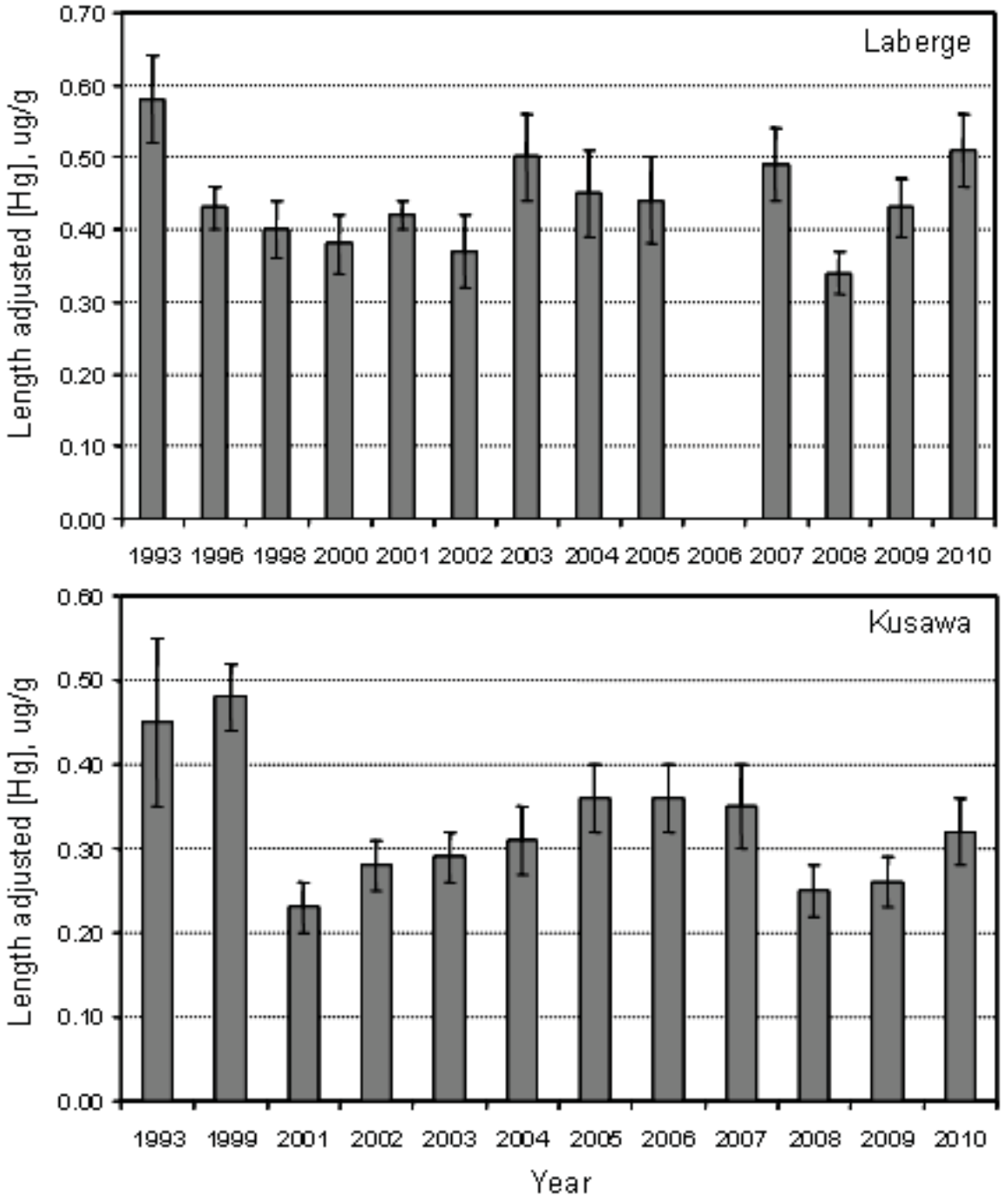
Why is it happening?

Caribou feed on lichen that can directly absorb airborne contaminants, such as mercury. The annual changes in mercury in Porcupine caribou may reflect changes in atmospheric mercury levels or changes in the environment (e.g. temperature, precipitation and wind) that affect how the mercury moves from the air to caribou forage.

Changes in the biology of fish and their habitat can influence persistent organic pollutant patterns. Long-range atmospheric deposition levels of contaminants affect the availability of these contaminants to fish. Concentrations of some organochlorines seem to have decreased in the atmosphere in the North and mercury concentrations appear to have declined in the far North primarily due to the reduction of emissions in Russia and Europe. While most organochlorines are human-made, the mercury that makes its way into fish comes from a combination of naturally occurring sources and industrial activity.

Cadmium is present in Yukon's underlying geology, especially in the southeast region. The concentrations found in moose and woodland caribou are more likely the result of local sources rather than long range transport. Moose feed primarily on willows, which are hyperaccumulators of cadmium from the soil. Lichen, in contrast, has no root system to allow the absorption of local cadmium through the soil. Woodland caribou feed on a combination of willows and lichen. Barren-ground caribou feed almost exclusively on lichen during the winter months, so their cadmium levels tend to be lower.

Figure 5.3.1 Mercury levels (Hg) in lake trout from Lake Laberge and Kusawa Lake, 1993-2010



Source: Northern Contaminants Program, 2011.

Note: The recommended guideline for commercial sale for mercury levels is 0.50µg/g.

Why is it significant?

The concentration of mercury in caribou continues to be very low. Although mercury concentrations do not appear to be increasing over the long term, the Porcupine caribou herd (as well as the Qamanirjuag caribou herd in the eastern Arctic) continues to be monitored so that the Yukon Contaminant Committee will be aware if that situation changes.

Organochlorines and mercury are found in fish across the Arctic (as well as southern areas). Average mercury concentrations in lake trout in Lake Laberge and Kusawa Lake were at or below the recommended limit of 0.50µg/*g* for the commercial sale of fish.

Yukon fish are a healthy food choice even though fish caught in Yukon and store-bought fish may contain small amounts of mercury. In some circumstances, certain people may have to limit their intake to avoid adverse health effects. For more information please visit www.env.gov.yk.ca/fishing/eatingfish.php.

Because the levels of cadmium in Yukon moose and caribou are likely coming from naturally occurring sources, the only course of action is to be aware of the issue as a potential health concern. Health Canada recommends consuming one moose liver or kidney per year, and 7 to 32 caribou kidneys or 4 to 16 caribou livers depending on the herd.

Modern woodland caribou (Aishihik and Southern Lakes herds) actually have lower cadmium levels than fossilized teeth of caribou from the same areas, supporting the theory that cadmium is naturally occurring and stable over time.

Taking action

The federal Northern Contaminants Program guided contaminants research and monitoring in the Canadian Arctic. The program supported a wide range of contaminant studies and was committed to monitoring contaminants in the Porcupine caribou herd, and lake trout in Lake Laberge and Kusawa Lake on an annual basis.

5.4 Interesting Story: Consumption Advisory for Lake Laberge Fish Lifted

Twenty years after issuing a consumption advisory for fish from Lake Laberge, the Yukon Medical Officer of Health has removed the advisory because there is no longer a health concern about toxaphene. The Health Canada advisory was issued in 1991 due to high levels of toxaphene, an agricultural insecticide detected in fish from the lake. Health Canada warned the public against eating burbot livers, advised the public to limit their consumption of lake trout to two meals per month, and closed the commercial fishery.

Toxaphene was widely used as an insecticide on crops and livestock during the 1970s. A persistent organic pollutant, toxaphene can remain in the environment for long periods of time and be transported long distances by air and water. The use of toxaphene was banned in Canada in 1985 and in the United States in 1990. Because of its ability to persist in the environment, however, atmospheric transport and deposition of toxaphene continued long after it was banned.

Large predatory fish, such as burbot and lake trout, tend to accumulate persistent organic pollutants through a process known as biomagnification. Small fish usually contain very low concentrations of persistent organic pollutants. Large predatory fish eat the small fish, incorporating the pollutants contained in them eventually building up harmful concentrations of pollutants in their own bodies.

Fisheries and Oceans Canada, with financial support from the Northern Contaminants Program, continued monitoring toxaphene concentrations annually in Lake Laberge fish after the consumption advisory was introduced. Toxaphene levels showed little change between 1993 and 2003. In 2004, toxaphene levels decreased three-fold and they continued to remain low. These results led the Yukon Medical Officer of Health to lift the consumption advisory on Lake Laberge fish in 2011 because there is no longer a toxaphene risk associated with eating fish from Lake Laberge.

5.5 Species at Risk

What is the issue?

Species around the world are going extinct at an alarming rate and many more species are at risk, including some that live in Yukon. The Yukon government signed the national *Accord for the Protection of Species at Risk* in 1998, which has provided direction for a variety of activities carried out in Yukon.

What are the indicators?

- The number of species at risk in Yukon (Table 5.5.1).

  The Yukon Conservation Data Centre determines the ranking of Yukon's wild species conservation status. These rankings incorporate global, national and territorial status ranks.

Table 5.5.1 2011 Status of national species at risk that occur in Yukon

Taxonomic Group	Common Name / Population	COSEWIC Status	Recovery Strategy or Management Plan
Amphibians	Western Toad	Special Concern	In progress
Birds	Barn Swallow	Threatened	No
	Canada Warbler	Threatened	No
	Common Nighthawk	Threatened	No
	Horned Grebe	Special Concern	No
	Peregrine Falcon	Special Concern	No
	Rusty Blackbird	Special Concern	No
	Short-eared Owl	Special Concern	No
	Olive-sided Flycatcher	Threatened	No
Fish	Bering Cisco	Special Concern	No
	Dolly Varden (Western Arctic population)	Special Concern	No
	Squanga Whitefish	Special Concern	No
Mammals	Wood Bison	Threatened	In progress
	Grizzly Bear (Northwestern population)	Special Concern	No
	Polar Bear	Special Concern	No
	Wolverine (Western population)	Special Concern	No
	Woodland Caribou (Boreal population)	Threatened	In progress
	Woodland Caribou (Mountain population)	Special Concern	Completed
Plants	Baikal Sedge	Threatened	Completed
Insects	Dune Tachnid Fly	Special Concern	No

Source: Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

What is happening?

- In 2010, Yukon had the second lowest number of species at risk, behind Prince Edward Island. The Northwest Territories has almost twice as many species at risk as Yukon. However, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) had yet to assess all of Yukon's rare, and possibly at-risk, species of plants and insects.
- In 2011, COSEWIC identified 615 species at risk in Canada: 278 'endangered,' 158 'threatened,' 176 'special concern,' 23 'extirpated,' and 14 'extinct species.'
- A variety of mechanisms at local, regional, national and global levels can be used to recover species at risk and reduce extinction risks. For example, a species that is locally healthy, but globally at risk would require coordinated efforts across borders to recover its numbers and maintain biodiversity.

Why is it happening?

Habitat loss and changing climate conditions are the major reasons many species are at risk. Other factors are genetic and reproductive isolation, environmental contamination, overharvesting, disease and the presence of invasive species. Different tools are required at territorial, national and international levels for the effective protection of species at risk.

Why is it significant?

Personal health, and the health of the economy and society, depends on various ecological values. Biodiversity is the combination of life and the interactions with each other and with the rest of the environment that sustain our lives.

Canada committed along with other countries to achieve 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, the International Year of Biodiversity.

Taking action

National recovery and management plans are currently being developed for three species found in Yukon: wood bison, woodland caribou (boreal) and western toad. Plans have been completed for Baikal sedge and woodland caribou (mountain population).

The Yukon government recognizes that recovery plans and management strategies should clearly reflect the realities of Yukon's environment and the values of Yukon people. As such, the Yukon government continues to contribute to national species at risk recovery plans in partnership with other governments and groups in this territory.

Environment Yukon developed the Yukon Conservation Data Centre, which tracks and reports on the status of rare species and ecological communities in Yukon and serves as a central source for all rare species data for the territory. A coordinator and a biodiversity information specialist make up the data centre. Partners include Environment Canada, Parks Canada and NatureServe Canada. The Yukon Conservation Data Centre continues to incorporate new partners and increase the available data to support the management of species at risk in Yukon.

Environment Yukon holds workshops annually to update and inform Yukoners and governments on current species at risk matters, new species of conservation concern, and improve communications on species at risk management in Yukon. Environment Yukon participates in COSEWIC and works cooperatively with other jurisdictions on species at risk management initiatives.

Conclusion

The *Yukon State of Environment Interim Report, 2012* called for by the *Environment Act* is intended to help Yukoners better understand what is happening with the environment and to support discussions about what aspects of the environment are healthy and where improvements may be needed.

Yukon has a rich and diverse natural environment. Good information about the current health of our environment allows governments to plan for the future. Yukon has the benefit of being able to learn from the experiences of others, ensuring a sustainable direction underlies all our planning processes.

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2.1 Air Quality

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Figure 2.1.2 Environment Canada National Air Pollution Surveillance Program Network <www.ec.gc.ca/rnspa-naps/> , and National Air Pollution Surveillance Station data from Whitehorse Standards and Approvals, Environmental Programs Branch, Environment Yukon, British Columbia Environment.

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