



Yukon State of the Environment Interim Report 2004

Environmental Indicators

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Introduction

Why produce an interim State of the Environment Report for Yukon?

Interim State of the Environment reporting is a requirement of the Yukon *Environment Act*. The interim report's purpose is to provide an early warning and analysis of potential problems for the environment; allow the public to monitor progress toward the achievement of the objectives of the *Environment Act* and to provide baseline information for environmental planning, assessment and regulation. The focus of this interim report is to provide an update on Climate Change, Air, Water, Land, and Nature.

Environment Act Interim 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.*

This interim SOE Report answers five basic questions:

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

Indicators are used to evaluate and demonstrate whether environmental changes are positive or negative.

What is an indicator?

Indicators are key measurements used to monitor, describe and interpret change. Indicators cannot provide all information on a particular topic, but can give key information that shows how things in the environment are doing. The indicators featured here are based on key criteria including data availability, data reliability, usefulness, and ease of understanding.

How was this report developed?

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

Highlights

Climate Change

Yukon has consistently produced fewer greenhouse gas emissions (GHGs) per capita than Canada. Transportation is our leading source of emissions.

- Interesting story – The Challenge

Air

In the City of Whitehorse, mean monthly and annual levels of fine particulate matter (PM_{2.5}) levels jumped significantly in the summer due to an exceptional forest fire season.

Water

Samples taken from two river systems were ranked as 'excellent' or 'good'. The Yukon government continued to work towards developing its water quality indicator database.

Land

Land Use and Resource Management Planning

The sustainability of resource use and environmental protection depends on effective land use planning for human activities. The status of six types of land use and resource management planning in Yukon varies from non-existent to current and active. Regional land use planning is underway in several areas of the Yukon.

Information flows in community and issue-based planning: Planning for Integrated Wildlife Management in the Mayo District

Joint management of renewable resources as envisioned in the *Umbrella Final Agreement* has been underway in the Mayo area for almost 10 years. This section examines how planning and decision-making have implications in the community and on the land.

City of Whitehorse Solid Waste Management

The City of Whitehorse continued working towards its goal of 50% diversion from the landfill. In 2004, the City achieved a 29% diversion rate; its highest ever.

- Interesting Story – Compost Carts in Schools

Nature

Contaminants

After 13 years of testing, the Yukon Contaminants program has concluded that cadmium levels do not appear to be changing.

Species at Risk

NatureServe Yukon continued their work to collect baseline data to address critical gaps in our knowledge. NatureServe Canada produced *Our Home and Native Land*, a report looking at species at risk nationwide that includes information about what is happening here.

Ecosystems: Wetlands

Inventory work continued in 2004, and we continued to develop our understanding about the important function wetlands play across the landscape.

Wildlife – Interesting Stories for 2004

- Grizzly bear research on the North Slope
- Chisana Caribou Project

1. Climate Change

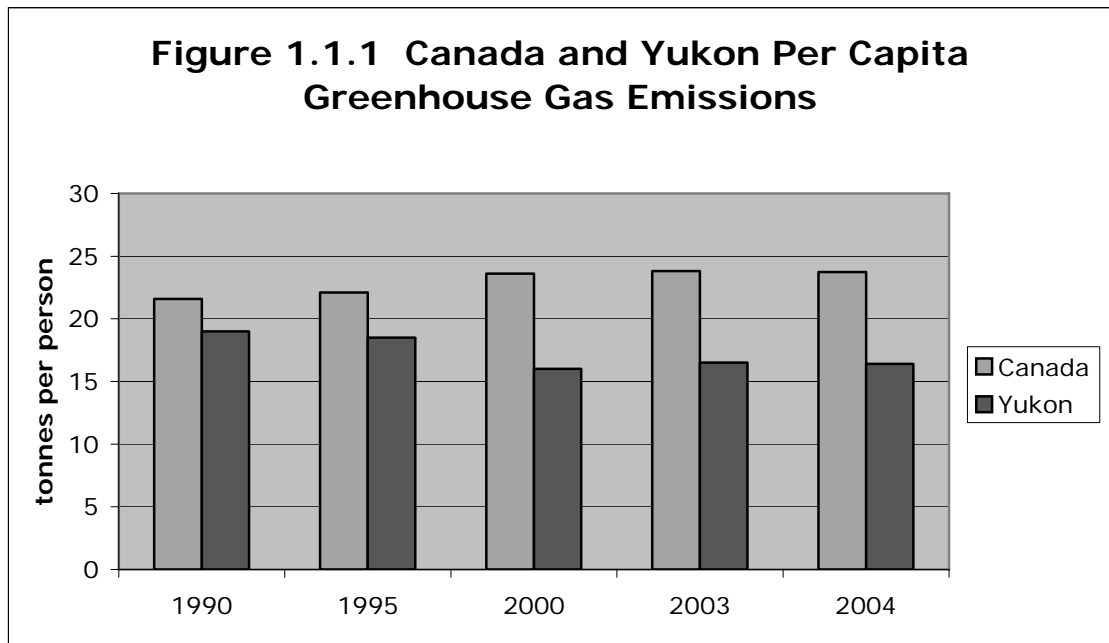
1.1 Climate Change Drivers – Greenhouse Gas Emissions

What is the issue?

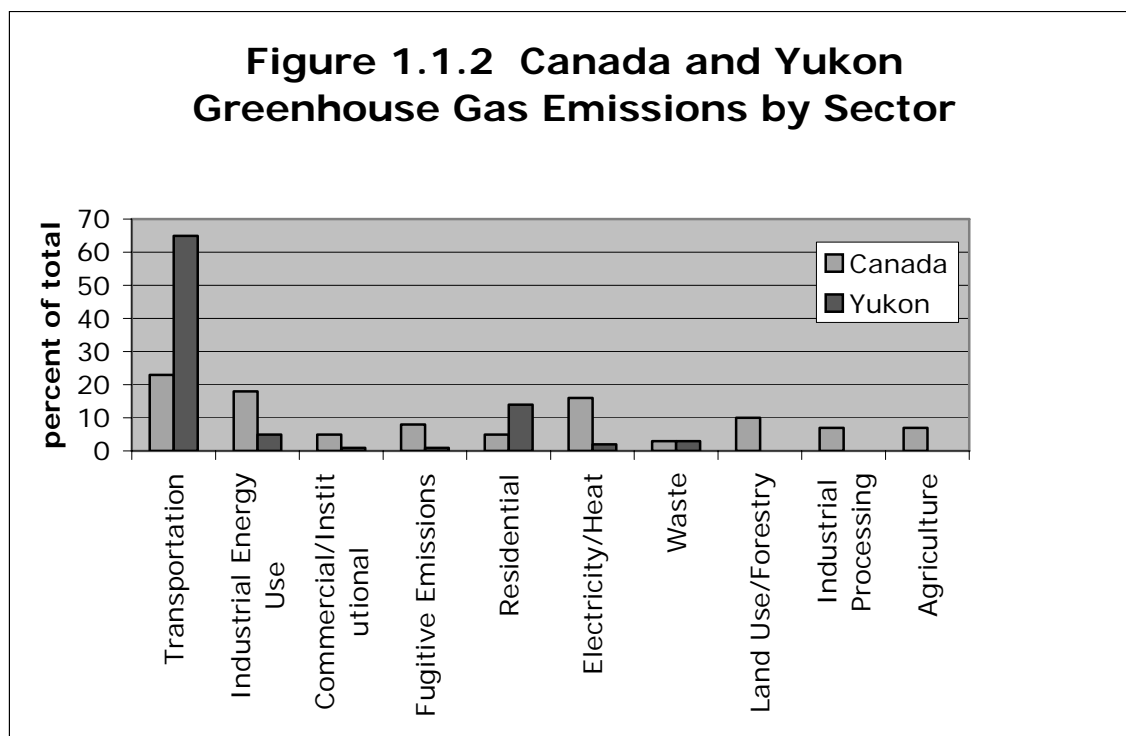
Globally and regionally, climate systems are changing. Most scientists believe these changes are primarily a response to a build-up of human-produced greenhouse gas emissions (GHGs) that trap heat in the atmosphere. Fossil fuel consumption is a major source of human-caused GHGs.

What are the indicators?

1. Yukon per capita (per person) GHGs compared with Canada (Figure 1.1.1).



2. Percentage of GHGs per sector compared with Canada (Figure 1.1.2).



What is happening?

1. Since 1990, Yukon has consistently produced fewer GHGs per capita than Canada.
2. Since 1990, Canada's greenhouse gas emissions have increased by 26%.
3. 73% of our national emissions in 2004 were from the combustion of fossil fuels.
4. Canada contributes approximately 2% of global greenhouse gas emissions. It is one of the world's highest per capita emitters, due largely to its size, climate, and resource-based economy.

Why is it happening?

Fluctuations in Yukon's total and per capita emissions reflect resource sector activity, most notably in mining and, more specifically, energy production for the Faro mine. High transportation emissions result from large distances between population centres, operating inefficiencies related to the northern climate, and the absence of economies of scale.

Why is it significant?

Climate Change is a global, national, regional, local and individual issue. The ratification of the Kyoto Accord has committed Canada to reducing GHG emissions to six percent below 1990 levels by 2008 to 2012.

Taking Action in 2004

Various organizations have promoted innovative and active ways – like using fossil fuel alternatives and cycling to work – for people to help reduce greenhouse gases. Some 2004 highlights include:

- Governments, non-governmental organizations (NGOs), businesses and individuals joined forces again to reduce GHGs and raise awareness of climate change by using active and sustainable forms of transportation during Environment Week's Commuter Challenge.
- The City of Whitehorse built two traffic roundabouts as part of the driving diet started in 2003.

Data Quality

All data is collected and assessed by Environment Canada for Canada's Greenhouse Gas Inventory, 1990-2004. Data and assessment are becoming more accurate over time. The Yukon Government has a different method of calculating fugitive emissions from the Kotaneelee gas plant and believes actual emissions are about 1/10 that of Environment Canada's calculation.

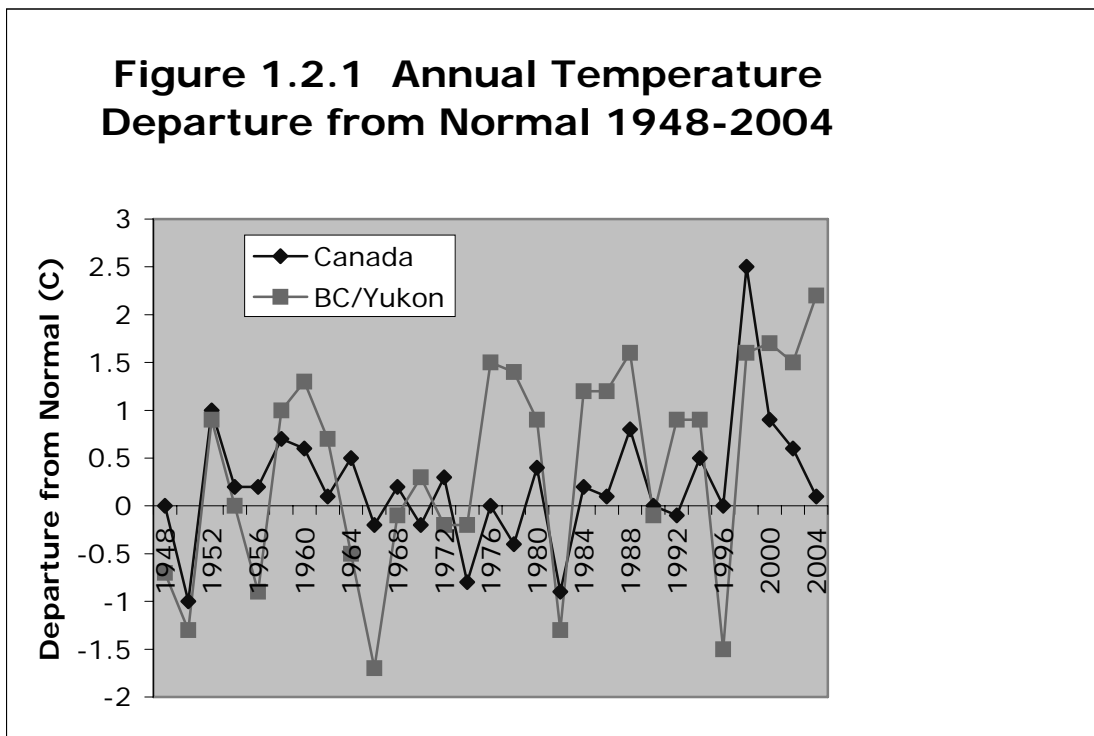
1.2 Primary Indicators of a Changing Climate

What is the Issue?

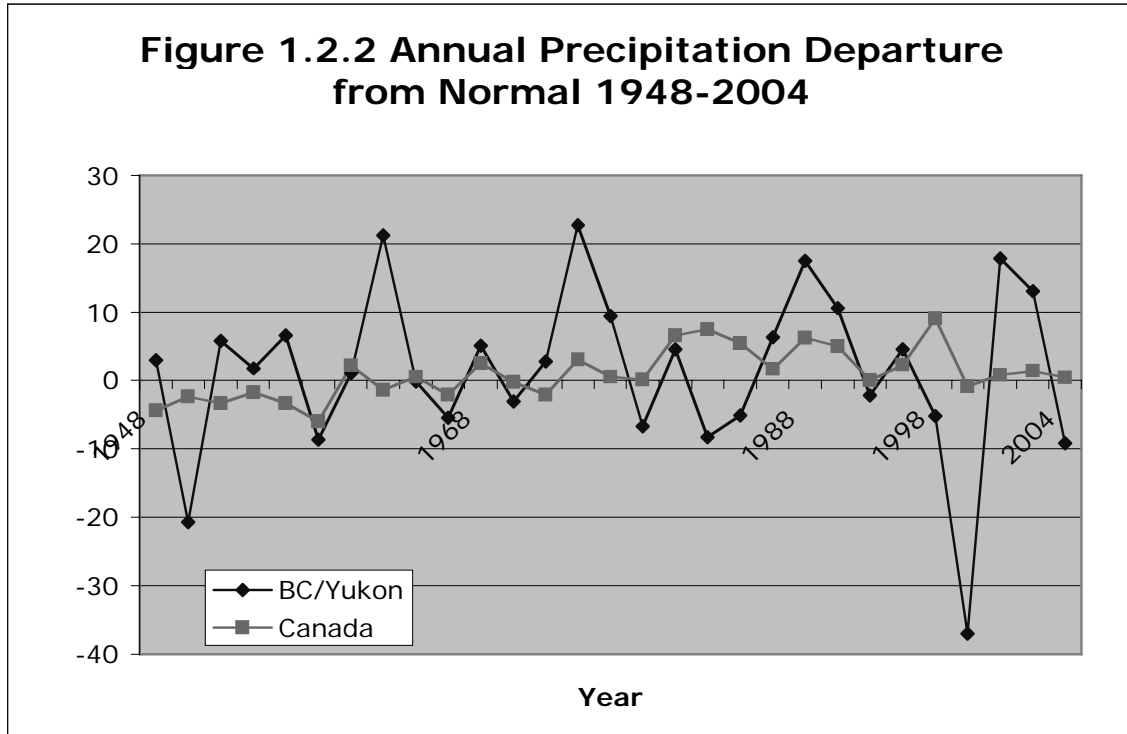
The primary effect of heat trapped in the atmosphere is temperature change at the earth's surface. The study of this change and the resulting physical, biological and human health consequences have spurred new areas of complex, integrated research and science.

What are the Indicators?

1. Departure from normal (the average) annual temperature for Northern British Columbia (BC)/Yukon and Canada during the Period 1948-2004 (Figure 1.2.1).



2. Departure from normal (the average) annual precipitation for Northern BC/Yukon and Canada during the Period 1948-2004 (Figure 1.2.2).



What is Happening?

1. The Northern BC/Yukon region shows the greatest increase in temperatures (2.0°C) since data collection started in 1948, compared to 0.1°C for Canada.
2. Five of the warmest 10 years since 1948 have occurred in the last 10 years.
3. Canada experienced a normal amount of precipitation in 2004, compared to the Northern BC/Yukon region having its 10th driest year on record.
4. Climate change is predicted to manifest itself differently in different regions of the world. In general, temperatures and sea levels are expected to rise, and the frequency of extreme weather events is expected to increase. Canada's temperatures have generally been increasing nationally, with temperatures remaining above normal since 1996 and showing a warming trend of 1.2°C over the period 1948-2004.
5. It should be noted that "normal" precipitation in northern Canada is generally much less than it is in southern Canada, and hence a percent departure in the north represents much less difference in actual precipitation than the same percentage in the south. The national

precipitation rankings are therefore often skewed by the northern departures and do not represent rankings for the volume of water falling on the country.

Why is it Happening?

The limited period of record probably reflects both natural climate variability and climate change arising from elevated levels of human-induced greenhouse gas emissions. Higher temperature extremes in Yukon and across the north have complex causes that are the subjects of climate change science.

Why is it Significant?

Temperature change affects other parts of the climate system including precipitation, evaporation, snow pack, annual climate variability and severe weather events. In turn, these changes can affect physical systems such as watershed hydrology, and water and soil temperatures. These effects are eventually transmitted to biological systems like caribou and salmon migration and survival, as well as to human health.

Most experts agree that global temperatures could rise by 1.4 to 5.8 °C over the next century.

Taking Action in 2004

Interesting Story – The Challenge

In an effort to encourage individuals to increase their awareness and understanding of climate change and take steps to reduce their own GHGs, the Yukon Conservation Society launched The Challenge: five Whitehorse households were pitted against each other during a month-long contest to reduce their greenhouse gas emissions. Data on energy, water, and transportation was collected for the households throughout the month, and CBC-Yukon kept the public abreast of tricks, tips, products, and ideas to reduce emissions.

Data Quality

Temperature and precipitation data is collected at weather stations located in Yukon and Northern B.C. by regional offices of Environment Canada. The Climate Research Branch provides raw data and analysis through the newly established *Climate Trends and Variation Bulletin (CTVB)* on the web <http://www.msc-smc.ec.gc.ca/ccrm/bulletin/national_e.cfm>. The earliest year for which reliable inter-regional comparisons are feasible is 1948.

1.3 Examples of Environmental Impacts

What is the Issue?

A changing climate inevitably affects physical systems that, in turn, influence biological systems and their interaction with human activities. In general, changes to the climate system are most directly and obviously reflected in changes to physical systems. However, changes to biological systems can also provide indicators of how climate change is affecting our world. Northern and Arctic environments are particularly vulnerable to the impacts of temperature change, especially where the survival of traditional lifestyles is concerned.

Overview of Yukon-based Studies of Interest in 2004

A wide variety of research related to climate change is being carried out in Canada's North, some of which is being driven by community-level interests and needs. A few interesting highlights from 2004 are summarized below:

Arctic Borderlands Traditional Knowledge Co-Op

A meeting in Dawson City in the fall of 1994 brought together interested parties to start an ecological monitoring program for the Northern Yukon. Participants identified the three main issues that should be the focus of ecological monitoring: climate change, contaminants and regional development. Participants also decided that an important part of the program should be to bring together science and local and traditional knowledge. Communities and scientists committed to working on this together. The Arctic Borderlands Ecological Knowledge Co-op grew from that meeting. It is run by a non-profit society with the following goals:

- To monitor and assess ecosystem changes in the range of the Porcupine Caribou Herd and adjacent coastal and marine areas;
- To encourage use of both science-based studies and studies based on local and traditional knowledge in ecological monitoring and ecosystem management;
- To improve communications and understanding among governments, aboriginal and non-aboriginal communities and scientists with regard to ecosystem knowledge and management; and
- To foster capacity-building and training opportunities in northern communities in the context of the above-listed goals.

The Co-op has pursued a number of research initiatives relating to climate change since their inception, including undertaking a community-based monitoring project. The purpose of the project is to record, synthesize and communicate local knowledge about the environment.

Community researchers conduct interviews with local experts each year. Observations about fish, berries, caribou, unusual animal sightings, weather conditions, and other aspects of the environment and communities, are pulled together.

Annual results, reports and interview questions are available at the Arctic Borderlands Ecological Knowledge Co-op Website (www.taiga.net/coop). In 2004, people were asked about weather conditions while they were on the land, freeze-up, overflow, general questions about changes on the land and how those changes are affecting their lives, among other things.

Environment Canada used its “Your Yukon” illustrated column, published every Friday in the *Yukon News*, to raise public awareness about environmental issues and research, including climate change.

The hydrology section of the Yukon Government’s Water Resources Branch continued to conduct snow surveys, provide flow forecasting through a series of public bulletins, monitor lake and flow levels, and provide advice and predictions to industry. Ongoing studies at the Wolf Creek Research Basin helped northern flood forecasters calibrate computer models to northern conditions.

The Northern Climate ExChange published three issues of its newsletter *Weathering Change*.

Yukon’s office of C-CIARN (Canadian Climate Impacts and Adaptation Research Network) North continued their work on climate change.

2. Air

2.1 City of Whitehorse Air Quality

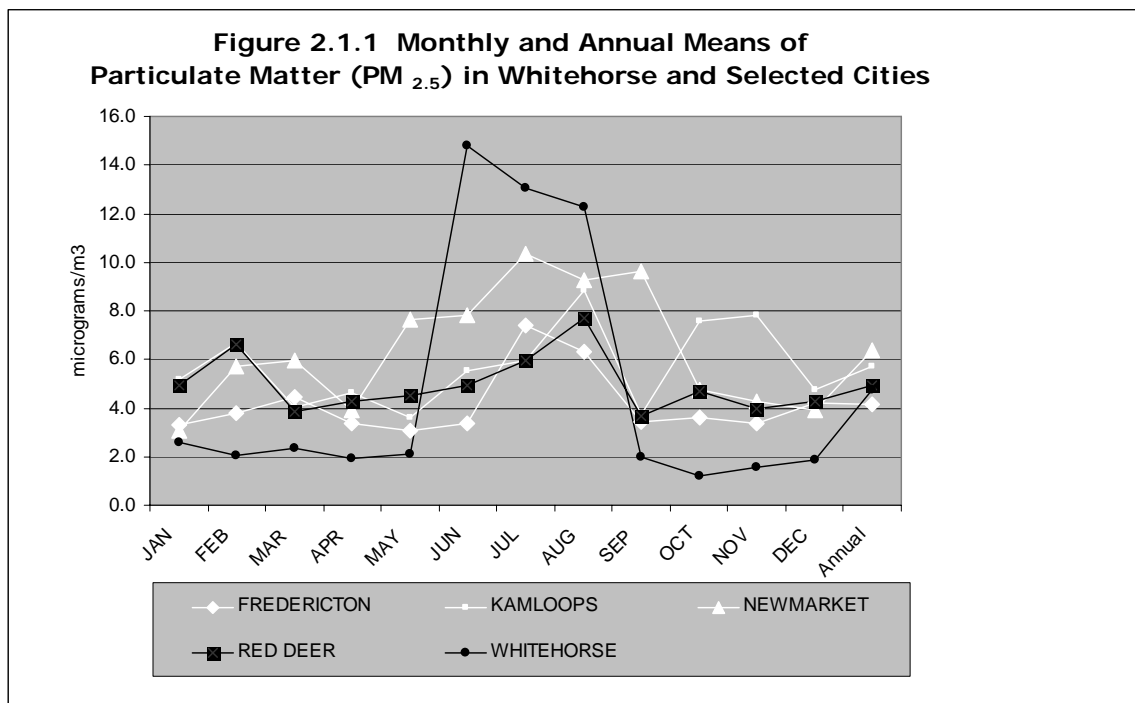
What is the Issue?

Poor air quality related to emissions from activities like fossil fuel consumption, combined with local climate, geography and specific events such as forest fires, can negatively affect human and environmental health.

What are the Indicators?

Fine Particulate Matter (PM_{2.5}), comprised of pollutants in the form of smoke, liquid droplets or dust smaller than 2.5 micrometers in diameter, is a toxic substance that can be inhaled deeply into the lungs. The levels of this pollutant provide a good indicator of air quality. Levels above this standard may cause a health hazard. Specific indicators are:

1. Mean Ambient Annual PM_{2.5} levels in the City of Whitehorse (Figure 2.1.1)
2. Mean monthly and annual PM_{2.5} levels compared with other relevant jurisdictions (Figure 2.1.1).
3. Number of days per year that PM_{2.5} levels (24-hour average) exceeds the Canada-wide standard of 30 micrograms/m³ (levels above this pose a human health risk).



What is Happening?

1. Long term air quality trends based on annual PM_{2.5} levels cannot yet be assessed as data collection only began in July 2001.
2. In 2002 and 2003, mean monthly and annual PM_{2.5} levels in the City of Whitehorse were well below other jurisdictions. Average PM_{2.5} levels in the City of Whitehorse tend to be higher in the spring.

Why is it Happening?

City of Whitehorse air quality tends to be good because of its limited industrial emissions and its relatively low population density. Elevated PM_{2.5} levels often occur as a result of wood smoke from woodstoves or forest fires, from backyard burning and barbeques, from improperly burned fuels for heating or vehicles, and from road dust, particularly in the spring.

However, the PM_{2.5} levels jumped by up to 600% in the summer due to an exceptional forest fire season.

Why is it Significant?

When breathed, fine particulate matter in the air may pose serious risks to human health, especially among the elderly, children and people with chronic respiratory illnesses.

Taking Action in 2004

The National Pollution Surveillance (NAPS) program continued in 2004. The NAPS station is located on First Avenue in downtown Whitehorse. As this is the only NAPS station in the Yukon, the data it collects is not representative of air quality Yukon-wide.

Data Quality

NAPS data is quality controlled, assured and standardized by Environment Canada.

3. Water

3.1 Water Quality Index (Indicator under Development)

What is the Issue?

Yukon's water bodies and watersheds must be publicly monitored in order for decision-makers to take appropriate actions to safeguard water quality. The Water Quality Index (WQI) provides an effective way to compile and communicate important information about the state of water quality, as well as to identify emerging trends.

What will the Future Indicator Measure?

Similar to the UV index, a WQI reduces technical data about the quality of a water body to a rating on a numerical scale where defined ranges correspond to simple, easy-to-report descriptors, for example, Poor, Good or Excellent. Depending on the chosen type of data, an index can evaluate the suitability of a water body for various human uses – drinking, swimming, fishing and irrigation, for example – or for interrelated use by fish, wildlife or livestock. The B.C. WQI, for example, considers six water uses: drinking, recreation, irrigation, livestock watering, aquatic life and wildlife.

The parameters for a particular WQI must consider the natural quality of the water body and, given the nature of the use, the safe limits of contaminants that might potentially enter the water due to factors such as local geology, community runoff, wastewater effluent or water diversions. Safe limits are set using national or regional water quality guidelines or site-specific water quality objectives. When monitoring determines that the safe limits are being met at all times, the WQI rating will be close to zero indicating excellent water quality.

The index is dependent on the choice of contaminants and properties to measure, for example, pH, turbidity, metals, and biological parameters. Naturally, people are more likely to trust the WQI when the main users have been involved in the selection of the water uses, quality objectives and properties to be measured.

Water Quality Data for the Yukon

There were a total of 63 samples collected in 2004 from YT08AA0010 (Dezadeash River at Haines Junction), YT08AB0009 (Alesk River upstream Bates River) and YT10AA0001 (Liard River at Upper Crossing). These sites are managed by both Environment Canada and the Yukon Government. 2004 data from the Liard River and the Dezadeash River were used to compile the *Canadian Environmental Sustainability Indicators 2006* report (not yet released), as part of the Water Quality Monitoring Network program. The ratings given under the Water Quality Index for these two sites was 'excellent' or 'good'. These two River systems are considered to have had no human interference.

In the future, the Yukon Government will collect more water quality data from different systems for the Water Quality Monitoring Network, and will also collect data from river systems that may have been impacted by humans. Four sites were established as part of the pending Canada-Yukon Water Quality Monitoring Network and sampling will commence in mid-2005. However, trend analysis will not be available until 2008 when three years of data are available. As development continues with the Yukon, it is expected that the Network will be expanded to monitor effects on water quality.

Taking Action in 2004

The activities undertaken by the Yukon Government and Environment Canada were complemented in 2004 by the US Geological Survey (USGS), who continued their comprehensive, multiyear study of the Yukon River Basin.

4. Land

4.1 Land Use and Resource Management Planning

What is the Issue?

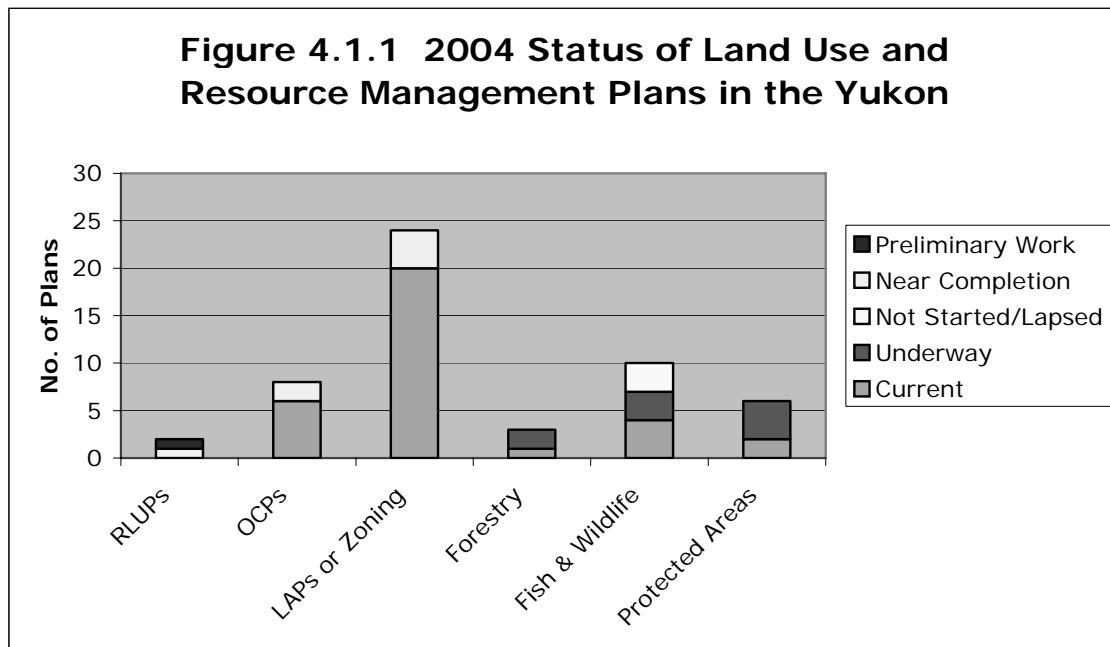
The sustainability of resource use and development depends on effective planning for future human activities and environmental protection. Plans related to land use, resources and protected areas generally include an inventory of values, resources and interests; a set of goals and objectives; and strategies intended to achieve these objectives.

What are the Indicators?

The status of Management Plans for:

- a) Regional Land Use Plans (RLUPs);
- b) Official Community Plans (OCPs);
- c) Local Area Plans (LAPs) or Area Zoning Regulations;
- d) Forestry Management Plans;
- e) Fish and Wildlife Species or Area Plans; and
- f) Protected Area Plans.

The plans are divided into five progress categories, as shown in Figure 4.1.1.



What is Happening – and – Why is it Happening?

1. No regional plans have been completed. Planning for North Yukon is in an advanced stage and planning for the Peel Watershed has begun. The Teslin regional plan process has been suspended pending formation of the greater Dakh Ka planning region.
2. All eight Yukon municipalities have Official Community Plans, as required under the *Municipal Act*.
3. Residents or governments initiate Community or LAPs, often to address conflicts or potential conflicts. The plans can be regulated through zoning bylaws or under the *Municipal Act*. Over time, the number of LAPs outside of municipal boundaries is increasing.
4. Management plans were underway for the Teslin Traditional Territory Strategic Forest Management Plan and Interim Wood Supply Planning was underway in Kaska Territory in the Southeast. In November, the Strategic Forest Management Plan for the Champagne and Aishihik First Nation Traditional Territory was approved.
5. By the end of 2004, four area or species specific Fish and Wildlife Plans were current, three plans were underway, and three had expired. Fish and Wildlife Plans will likely grow in number as more land claims are settled. They are the most practical way to effectively implement Chapter 16 of First Nation Final Agreements, which require management coordination.
6. Protected areas include Habitat Protection Areas (HPAs), and territorial and national parks – most of which were created as Special Management Areas (SMAs) through First Nation Final Agreements. In 2004 there were four plans under development and two completed. The Ni'iinlii Njik (Fishing Branch) Wilderness Preserve & HPA Management Plan was approved, and a review and amendment of the Ni'iinlii Njik (Fishing Branch) Ecological Reserve & Settlement Lands Management Plan was accomplished. In February, the *Kluane First Nation Final Agreement* took effect and identified in it the future establishment of Asi Keyi as a Territorial Park.

Why is it Significant?

The development of long-term plans through responsive public processes is a proactive way to manage competing views about how lands and natural resources within Yukon's regions should be used. Regional planning needs to reflect the traditional knowledge, experience and recommendations of residents as well as science and broad socio-economic and environmental aspects. This ensures that governments and First Nations authorize uses that are consistent with social, cultural, economic and environmental values, including sustainable development. The role of planning has become all the more important as a result of obligations arising from Yukon land claims agreements.

4.2 Information flows in community and issue-based planning: Planning for Integrated Wildlife Management in the Mayo District, 1993, 1998 and 2002.

Background

- The Yukon Fish and Wildlife Branch (YFWB) used to manage wildlife through territory-wide plans that focused on single species at a time. The most attention was paid to game and fur populations and their predators.
- Government had a hard time responding to regional concerns and requests for action in specific areas. It was hard to schedule and fund these activities.
- In the late 1980s and early 1990s, governments negotiated land claim settlement agreements. This prompted a shift to wildlife management by regions.
- In the traditional territory of the First Nation of Na-cho Nyak Dun (NND), the Minister of Renewable Resources set up (“pre-implemented”) the Mayo District Renewable Resources Council (MDRRC) before NND concluded their land claims agreement. It modeled the new structure set out in the Umbrella Final Agreement.
- In 1993, the MDRRC, the NND government, and the Minister of Renewable Resources agreed to develop a regional plan for wildlife in the NND traditional territory.
- The process adopted was one the Porcupine Caribou Herd Management Board used to develop its coordinated action plan.
- It used a workshop format to bring community people, First Nations, elders, stakeholders, and government managers together to discuss concerns. The group, working together, developed action plans by joint agreement or consensus.
- This planning approach was repeated in 1998 and 2002 in the Mayo area and in other regions as well. The process is modified to the situation and is now a little more formal at the outset, as partners agree what can be addressed in the plan. For example, some concerns need to be handled at the Yukon-wide level, rather than in regional plans.
- About 460 people live in the NND Traditional Territory, mostly in Mayo. About 25 of these people attended information and planning workshops in June 2002.

Methods

- The first steps involved agreeing to do a plan, deciding how to do it, and agreeing who would do what. Brian Pelchat (YFWB Chief of Regional Management), Billy Germaine (with the NND negotiating team) and Doug Urquhart (a contract facilitator) all had

- experience with the Porcupine Caribou Management Board planning process. In 1993, they discussed the approach with the MDRRC Chair Dan McDiarmid and MDRRC members and they all decided to try a three-day outdoor workshop that looked at big game species. NND hosted the session and everyone camped out.
- In 1998 the MDRRC drove the process and hosted a two-day planning session in the community. The event was supported by an informal agreement between the partners. Doug Urquhart was hired to partner with the MDRRC Executive Director to facilitate the meetings.
 - In 2002, Karen Clyde (YFWB Fish and Wildlife Planner) and Steve Buyck (NND Resource Officer) developed a 6-page Memorandum of Understanding about the planning. This met everyone's needs for certainty about who would do what, who would pay for what, what issues would and would not be considered, and when everything would happen. A lot of the organizational details for the 2002 plan were worked out in the meeting after the last review of the 1998 plan in February 2002.
 - The next step figured out which issues the plan should look at. In 1993, the MDRRC hired a local person to interview people in their homes to develop a list of concerns. The interviewer may have inadvertently skewed the results by asking questions in a leading manner and no report was released. Wolves and outfitters were big issues. In 1998, the MDRRC reviewed the 1993 survey and established that the results were still consistent with local concerns. Some minor adjustments were made to update it for accuracy.
 - In 2001 the MDRRC distributed 183 questionnaires in the Mayo area. This questionnaire had 3-5 mostly open-ended questions in 10 topic areas. The MDRRC released a report summarizing the responses in the 104 returned questionnaires. Most respondents were concerned about habitat management and protection.
 - Next, background information on these concerns and species was gathered and summarized. Ideally, background information comes from three sources: government wildlife studies, interviews with elders done by the First Nation, and comments made by knowledgeable people at the workshops. In 1993, Dorothy Cooley (then the Regional Biologist for this region) prepared a binder with all the information from airplane surveys and harvest records — all the 'technical' information. A plain language contractor helped to make this more readable, but most of the time people with questions just asked Dorothy. This was an important step for Dorothy to learn all about what had been done and to clarify her thinking on information gaps and issues. Copies of the binders went to the MDRRC and governments. Information from the community came in verbal form during the planning session as participants spoke up.

- In 1998, government representatives and the MDRRC reviewed the 1993 information. They felt that a full-scale community survey would not provide much new or more relevant information. In addition, two workshops were held so that community members could discuss known concerns or to bring forward new ones. This resulted in some adjustments to the 1998 plan. Wolf and forestry issues were dropped from the plan but a number of smaller items, such as butterflies, were added. Trapping issues were important in this plan.
- In 2002, Mark O'Donoghue (YFWB Northern Tutchone Regional Biologist) prepared attractive plain language summaries of what he had been able to find out about each species from the various technical studies and conversations with people in the region over the previous four years. These summaries also noted his concerns and information needs. He outlined these at a two-day information workshop; additional thoughts were offered by Steve Buyck and by elders and others present at the meeting.
- In the three planning iterations information from elders was never formally presented in the form of prior information or a synthesis. Elders were called on to provide perspectives during discussions.
- The actual planning step comes up with solutions then tasks for one issue after another. Independent facilitators Doug Urquhart (1993), John Reid (1998), and Bob Hayes (2002) led two-day workshops that involved stakeholders and residents in the area, MDRRC members, elders, and First Nation and Yukon government staff.
- The physical structure of the planning workshop has changed little since 1993. A schedule of actions to address identified concerns was built on three large display boards (each 130 by 260 cm (4' by 8' sheets of stiff white plastic called coroplast available from building supply centres). On one board, for example, were Harvest Concerns, with vertical columns for Moose, Caribou, Grizzly bears, etc. Horizontal rows began at the top with Concern, Solution, and the planned Year for the actions. Florescent poster board strips 50 by 15 cm with the information were taped to the display board in the right spot as the planning progressed. It was easy to see how much work was scheduled for each year to decide if the total workload was reasonable. In 2002, the process was changed so that the discussion was centred on each species and its population, harvest, or habitat issues rather than looking at population issues for each species before moving on to the next topic.
- Each action identified the planning partner (YFWB, NND, or MDRRC) who was going to do the work. In 1993, the workload was very ambitious because people wanted to address long-standing issues. In many cases they overestimated what could be accomplished. In 1998 and 2002, the list of tasks was still ambitious but challenged

everyone to work hard. In 2002, the responsibility for tracking the progress in each action shifted from MDRRC to the YFWB Fish and Wildlife Planner, and the plan took on a more polished, plain language form that more clearly explained to everyone what was expected in each task. The wording for these tasks shifted from actions to commitments.

- Actions that did not get completed were carried forward from one plan to the subsequent plan.

Notes on how the local information was collected

- In all three planning sessions, NND raised concerns about the cardboard boxes of unorganized interview information they had that needed to be organized. These interviews with ‘old elders’ from the land claim negotiation days contained much wildlife information.
- Much information is often required before addressing concerns. This usually requires actions involving interviews (“ask people about moose calving areas”) that may be followed by, or complemented by, airplane surveys or studies. In this way, the plans guide future interview work.

Notes on using the information and ideas

- Planning partners are still working to ensure appropriate and respectful sharing of information to better guide wildlife management decisions. There is much information sharing and trust between government staff in the region, but people are not willing to see map and other information from interviews in the community go to Whitehorse offices or to widely-shared computer databases.

Other outcomes

- The workshop approach and the plans spurred decisions that shifted the way that the YFWB is structured. Five regional biologists were hired and stationed in the communities between 1991 and 1998.
- The Yukon government chose to support regional planning as the way to integrate wildlife management approaches and coordinate program delivery with new First Nation governments and Renewable Resources Councils.
- The planning process began to build working relationships among the plan partners and planted the seeds of trust, cooperation, and flexibility.
- YFWB use the completed plans to prepare budgets and schedule regulation changes that would carry out plan actions. It is now hard to find money for anything that is not listed as an action in a plan. Biologists now suggest actions they would like to see done, some of which are added to the plan.

- The planning process demonstrated the need for further trust building and the importance of people who are prepared to work to build trust. It also speaks to the importance of trust in the co-management process. As the systems of land and resource management become more complex, they are built and succeed on the willingness of partners to be flexible and accept the values and positions of others.
- It also illustrated the need for flexibility in administrative systems. Administrative systems must accommodate changes in processes and decision-making methods.
- Interest groups based outside the region now recognize the importance of these processes to advance their agendas. Community members may not speak out at sessions when too many 'outsiders' are present. The co-management agenda has developed because community members felt they had no ownership of, and were alienated from, fish and wildlife management. They are quite sensitive to the lobbying role of articulate outsiders who were more influential in fish and wildlife management prior to the settlement of land claims.
- Participation by community members may decline as successive iterations of the plan address fewer controversial items. The workshop style of the third plan did not seem to engage the community.
- Regional biologists are hired through processes that involve Renewable Resources Council members and First Nation representatives from the region. This gives them a role in the selection, and emphasizes communication and interpersonal skills that are important to build and maintain trusting relationships.
- Information from community members is variously interpreted as local or traditional knowledge. Elders usually receive honouraria to attend workshops, and facilitators actively invite their comments.

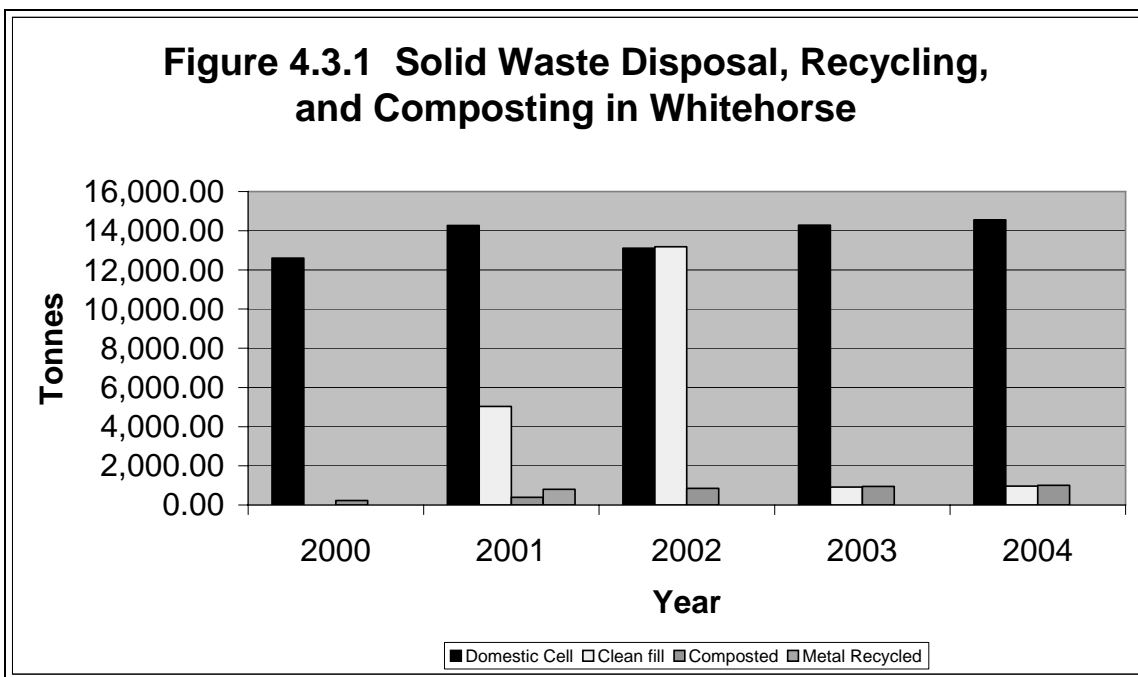
4.3 City of Whitehorse Solid Waste Management

What is the Issue?

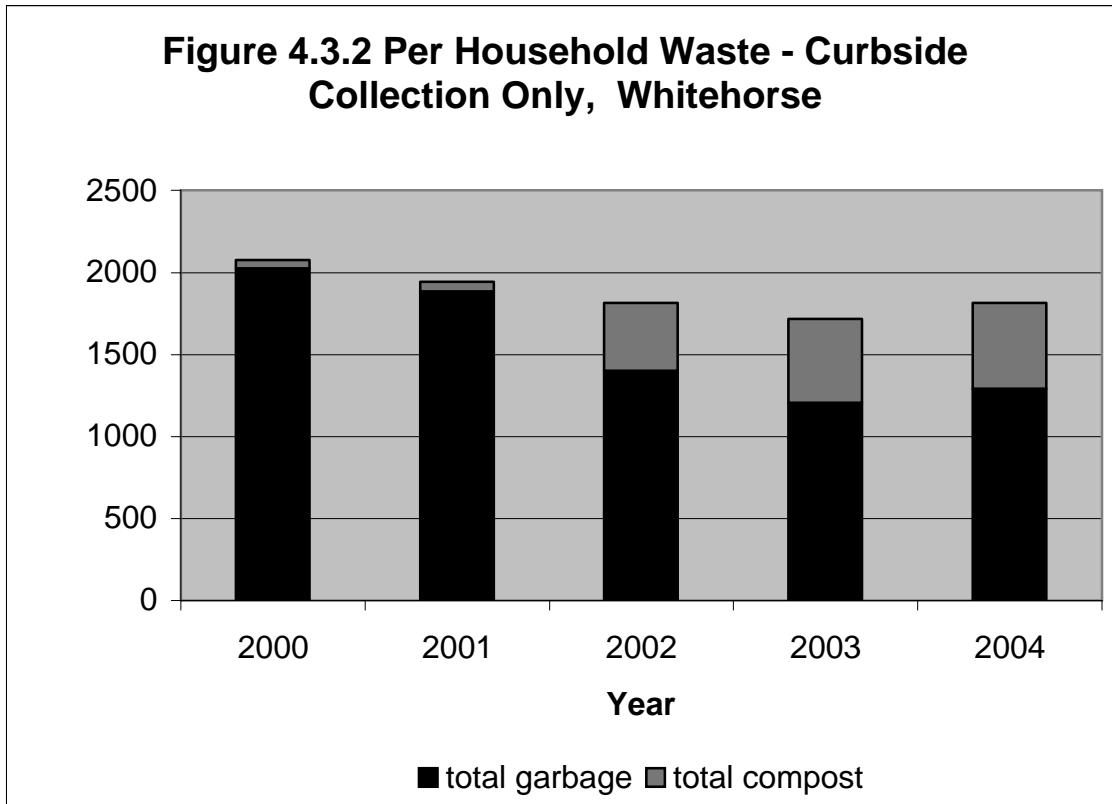
Solid waste produced in Yukon is costly to manage, whether it is sent to landfills, diverted through recycling or composting, or shipped outside for treatment. Solid waste disposal to local landfills can also pose environmental and health risks, as well as land use planning challenges. The best way to limit the negative effects of solid waste is to reduce the reliance on landfills by generating less waste and recycling or composting more of the remaining waste stream.

What are the Indicators?

1. Total annual tonnage of waste arriving at the City of Whitehorse Son of War Eagle Landfill (Figure 4.3.1).



2. Garbage¹ and compostables per household based on curbside collection for 4,950 City of Whitehorse households (Figure 4.3.2).



What is Happening?

1. A higher percentage of waste is being recycled and composted than in the past.
2. Curbside compost collection has meant that a 29% diversion rate has been achieved; this means that Whitehorse is prolonging the life of our landfill by composting. We are more than halfway to our goal of 50% diversion.

Why is it Happening?

3. Commercial waste remains high likely because there are few recycling opportunities for construction waste. Domestic waste remains high due to a lack of participation in composting and recycling. In contrast, the volume of household hazardous waste (HHW) has risen because of improved awareness of its dangers and additional collection days.
4. Households in Whitehorse continue to be limited to 4 bags of garbage for curbside garbage collection. Unlimited bag numbers for curbside compost pickup encourages people to ensure that they are maximizing their composting opportunities.

¹ Garbage means all items that cannot be composted or recycled, and that are not hazardous.

5. Raven Recycling is a non-profit, non-government organization that is committed to offering recycling opportunities to Yukoners. They recycle over 30 kinds of commodities and employ more than 15 people.

Why is it Significant?

Waste generation can negatively affect the quality of land, air and water, especially when it results in disposal to landfills. Individuals can mitigate these impacts by reducing, reusing and recycling their waste as much as possible. At the same time, recycling has the potential to generate income and employment as well as prolonging resource supplies. Raven Recycling Society has over 20 employees.

Taking Action in 2004

The City of Whitehorse continued its citywide curbside compost collection program, which has a goal to divert at least 50 percent of solid waste from the landfill site.

The Yukon Government and City of Whitehorse collaborated to hold three hazardous waste collection days.

Raven Recycling Society continued its PaperSave program that offers a collection service for office paper and cardboard on an “as-needed” or regularly scheduled basis.

Data Quality

The City of Whitehorse is improving its waste stream tracking methods. It has good curbside waste data. Commercial, construction and domestic waste streams are more challenging to track.

Data is for the City of Whitehorse area only and does not represent what is happening in the communities. Community solid waste data is not available on a regular, consistent basis.

Interesting Story – Composting Carts in Schools

The City of Whitehorse and the Yukon Government Department of Education partnered in a program to bring composting carts into Whitehorse schools. The City purchased an automatic lifter for a garbage truck and roll out bins to place in the schools. On the weeks that the City collects compost, trucks visit Whitehorse schools and collect the compost. The majority of schools in Whitehorse participate in this voluntary program.

5. Nature

5.1 Contaminants in the Environment

What is the Issue?

Heavy metals, persistent organic pollutants (POPs) and radionuclides are contaminants that can persist in the environment. These contaminants can become concentrated along the food chain through bioaccumulation and biomagnification causing serious health implications for wildlife as well as people – especially those who depend on traditional foods. Many contaminants found in the north have never been used in the region or, in some cases, 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?

1. Lead levels in Yukon caribou

The levels of lead stored in the teeth of road-killed caribou were compared to the levels found in fossilized jaws of caribou that ranged in the same area between 6,000 and 360 years ago.

2. POP concentrations in lake trout and burbot

Between 1993 and 2003, a study examined organochlorine (OC) concentrations in lake trout and burbot from Lake Laberge, Kusawa Lake and Quiet Lake. The lake studies also looked at mercury in fish.

3. Cadmium levels in Yukon caribou and moose

Through the volunteer hunter donor program, the Yukon Contaminants Committee and Environment Yukon annually collect livers, kidneys and muscle samples from moose and caribou for contaminant analysis. Cadmium was also measured in caribou teeth as part of a different study.

What is Happening?

1. There has been a four to fivefold increase in lead levels in modern Southern Lakes and Aishihik caribou compared with fossilized caribou from the same areas.
2. There is strong evidence that OCs are decreasing to varying degrees in all three lakes. No consistent trends were observed in OC concentrations in burbot.
3. After thirteen years of testing, the Northern Contaminants Program has concluded that cadmium levels are stable and do not appear to be changing. Cadmium concentrations tend to be higher in Yukon moose than barren land caribou, and are variable in woodland caribou due to diet. Cadmium concentrations in teeth from modern Aishihik and Southern Lakes caribou are not significantly different than concentrations in fossilized teeth from caribou

from the same areas, supporting the theory that cadmium in caribou is naturally occurring and stable over time.

Why is it Happening?

1. Caribou feed on lichen that can directly absorb atmospheric contaminants, including lead, whose levels in northern ecosystems are greater today than they were in pre-industrial times. The isotopic signature of the lead in modern caribou reveals its source as North American leaded gas, which Canada officially banned in 1990.
2. The suspected factors affecting contaminant concentrations in burbot and trout are primarily biotic ones, such as fish lipid content and body mass changes caused by fish population variations or lake plankton productivity. Atmospheric levels of some OCs seem to have decreased in the north.
3. Cadmium is present in Yukon's underlying geology, especially in the southeast region, so the relatively high concentrations found in moose and caribou are more likely the result of local sources rather than global transportation. Moose feed primarily on willows, which are hyperaccumulators of cadmium, whereas the diet of woodland caribou also includes lichen, which has no root system to allow the absorption of local cadmium through the soil. This is likely due to the shift in vegetation away from grass and willow after the ice left to the climax boreal forest system Yukon now has. The results of the faecal study to look at diet will confirm this supposition. Barren ground caribou feed almost exclusively on lichen, so their cadmium levels tend to be lower.

Why is it Significant?

1. The transport patterns, persistence and extent of lead in Yukon's ecosystems can be studied further based on these early findings. Fortunately, the amount of lead in modern caribou – a traditional food source for many Yukon First Nations people – is not beyond health limits, nor does the metal bioaccumulate along the food chain.
2. In order to assess OC contaminant levels in fish and overall ecosystem health, biotic factors must be considered along with atmospheric OC levels and geography.
3. Because the high levels of cadmium in our moose and caribou are coming from naturally occurring sources, the only course of action is to be aware of the issue as a potential health concern. Because ingesting too much cadmium can be harmful, Health Canada has recommended limiting the intake of Yukon moose and caribou liver and kidney. The recommendation for moose is one liver or kidney per year, and the recommendation for caribou ranges from seven to 32 kidneys or four to 16 livers depending on the herd.

Taking Action in 2004

In 2003, ancient caribou jaws and other artefacts were collected through the Yukon Ice Patch Research Project from a broader geographical range, including ice patches in the Ruby Range, Aishihik and Carcross. These were under analysis in 2004 for heavy metals and were carbon-dated.

Indian and Northern Affairs Canada (INAC) - Northern Contaminants Program guides and funds contaminants research and monitoring in the Canadian Arctic. The program has prompted a wide range of contaminant studies and is a storehouse of contaminant data and information. In 2003, the program began monitoring the following “emerging contaminants” in Yukon’s lake trout and burbot: Polybrominated Diphenyl Ethers, (for example, flame-retardants) and Perfluorooctane Sulfonate (for example, waterproofing compounds). The program has also committed to monitoring contaminants in the Porcupine caribou herd, and lake trout in Lake Laberge and Kusawa Lake on an annual basis, and in moose and one Yukon woodland caribou herd every five years. The presence of perfluorooctane sulfonate in caribou is also being explored.

5.2 Species at Risk

What is the Issue?

While species extinction can be a natural process, the variety of earth's animal and plant life is threatened when rates of extinction and the number of endangered species increase too much, or are driven by unnatural processes. The protection of species at risk and the reduction of extinction rates require different mechanisms at the local, regional, national and global levels. Since, for example, a species may be locally healthy but globally at risk, coordinated action is also necessary to preserve biodiversity. Currently, a major threat to species at risk, including some that live in Yukon, is habitat loss through modification or outright destruction by human activities. The Yukon government works in coordination with different levels of governments and land claims organizations towards ensuring that we are doing our part in tracking and managing species at risk.

What are the Indicators?

The number of species at risk is used as an indicator of the status of global biodiversity. It can also be used to measure biodiversity on a smaller scale. There are many potential ways to categorize and measure Yukon's species at risk. In future, the Conservation Status Ranks developed by NatureServe will be used for this purpose since they focus on Yukon data that is comparable from year to year. The system ranks species, subspecies, varieties and ecological communities on a scale from 1 (Critically Imperiled) to 5 (Secure) and puts risk levels in geographic context by incorporating global, national and provincial/territorial status ranks.

What Do We Know Now?

As of 2004, the best information about species at risk in the Yukon is arguably contained in *Our Home and Native Land*, a report developed by NatureServe Canada, with input from NatureServe Yukon. For the groups surveyed in that report, Yukon has 64 species ranked GX (extinct) through G3 (globally sensitive): 58 vascular plants, four vertebrates, and two butterflies. Non-vascular plants and most invertebrates were not included in the analysis. The full report is available at www.natureserve.org.

5.3 Ecosystems: Wetlands

What is the Issue?

Bogs, fens, swamps, marshes and shallow open water areas – collectively categorized as wetlands – are productive ecosystems that cover only three percent of Yukon’s land base. While small wetlands are scattered throughout the territory, the largest are concentrated in low-lying permafrost terrain north of the Arctic Circle. Due to their limited scope and isolated locations, these relatively scarce habitats do not generally face the same immediate risks from human development that wetlands in other jurisdictions do. However, because of their scarcity, they are even more important and in need of planning to anticipate any resource development. Ducks Unlimited Canada, for one, is optimistic that important wetland areas can be conserved with timely, and proper planning.

What are the Indicators?

1. The number of wetlands inventoried and designated as critical, sensitive or important depending on habitat values, especially for migratory birds.
2. The conservation status of designated wetlands, as determined by protection under a SMA such as a national wildlife area, national or territorial park, or HPA.

What is Happening?

More than 50 Yukon wetlands have been recognized as important by the Yukon Wetland Technical Committee, based mostly on their value as habitat for migratory birds, including some that are rare or of restricted distribution in Yukon. The majority of important wetlands have been registered as special habitat notations on Federal-Territorial Resource Maps. Wetland inventory is ongoing by various governments and non-government organizations.

Why is it Happening?

1. Inventories, designations and map notations of wetlands are occurring because governments and non-governmental interests recognize the high value of these ecosystems.
2. Land claims agreements with Yukon and other First Nations often include provisions to create or nominate new SMAs that can protect important wetlands. The process for establishing an SMA can take years.

Why is it Significant?

Wetlands are important for plants, animals, migratory birds, fish, and water quality. Some are culturally important for human communities. Inventory data helps us appreciate what is happening in wetlands so that we can ensure their ongoing viability.

5.4 Wildlife – Interesting Stories for 2004

In many cases, wildlife surveys are not conducted every year. So, rather than present data that may not offer an update to the 2003 State of the Environment Report, this section focuses on an interesting wildlife highlight or event.

5.4.1 *Grizzly Bear Research on the North Slope*

In May 2004, the Yukon Government Department of Environment, in partnership with Parks Canada (Western Arctic Field Unit), the Aklavik Hunters and Trappers Committee and Wildlife Management Advisory Committee (North Slope) began a six-year grizzly bear research project on the Yukon North Slope between the Firth and the Blow Rivers. The project is made up of several different studies and activities. Information from the project will give wildlife managers the kind of information they need to know when determining the conservation requirements of this population and in reviewing harvest quotas. All research activities are partly funded through the Inuvialuit Final Agreement.

Specifically, the goals of this study are to gather and use information to help reassess current harvest quotas and help ensure that grizzlies are managed in a sustainable manner. Secondly, the study will identify potential conservation issues for the grizzly population.

Over the course of six years, researchers will meet the following objectives:

- A) Determine parameter estimates for grizzly bear survival and reproduction by age, the number of bears in each age class, the number of males versus females, and the total number of bears. Once these values are found we can estimate the birth rate, the death rate, and the rate at which the population is increasing.
- B) Update information on sex, age, physical characteristics, and location of hunter-killed bears in the study area to understand how harvesting might affect population dynamics and structure.
- C) Gather local expert knowledge on grizzly bear population dynamics, movement, and Inuvialuit harvesting practices. Determine how to integrate local expert knowledge and scientific management frameworks.
- D) Collect and analyze information on the habitat use, the spatial distribution, and the movements of bears throughout the Yukon North Slope.
- E) Develop a program for long-term monitoring of grizzly bears in the Yukon North Slope.

In early June, Yukon Government biologists Ramona Maraj and Al Baer, captured 10 bears in different parts of the study area. Using a helicopter based in Herschel Island, the research team flew approximately 2290km of straight line distance in the study area searching for bears. A total of 16 bears were seen in seven days of flying. A number of these bears were in mating pairs. No

family groups were observed. Most bears were seen on the coastal plain. It's possible that the females with cubs were staying up in the mountains where they are more protected.

The bears were darted from the helicopter with a tranquilizing drug called Telazol. It usually took from 5 to 15 minutes until the bear would stop moving and lie down on the tundra. Researchers then approached cautiously, making sure the bear was fully asleep before beginning their work. All captured bears were blindfolded for their protection. Temperature, breathing, and heart rate were continually monitored to be sure the bear was okay while under the drug's influence.

Researchers measured body fat, length, girth, and head size. Blood and hair samples were collected. Age was estimated by looking at tooth wear. All captured bears were tattooed for identification, and a tooth was pulled as a way to determine exact age later in the laboratory.

The collars put on the bears this summer contained GPS units which record the bears' locations every four hours. The collars are designed to fall off after a number of years in case it is not possible to remove them at the end of the study.

Next Steps

Biologists will do tracking flights in the fall to locate the bears and retrieve the information that was recorded by the collars over the summer. The information is stored in the collar and can only be retrieved by flying over the bear or by recovering the collar itself. This data will be analyzed over the winter to start to put together a picture of annual home ranges. Laboratory work will include determining ages from the teeth that were pulled. Blood samples will be analyzed. The first steps towards compiling local knowledge about bears will start over the winter.

Body Condition of Bears

Biologists rate body fat condition according to the following scale:

Poor – Hip bones, shoulder blades, backbone and ribs can be easily felt. The bear appears to be a skeleton with skin stretched over it and generally looks unhealthy.

Fair- Hip bones, shoulder blades, backbone and ribs can be felt but were not prominent. The bear appears thin but not unhealthy.

Good- Hip bones, shoulder blades, backbone and ribs were difficult to feel. The bear appears healthy but not extremely fat.

Excellent – No bones could be felt. The bear appears extremely fat and healthy.

5.4.2 Chisana Caribou Project Update

The Chisana herd of the western Yukon and Wrangle-St. Elias area of Alaska is the latest threatened woodland caribou (*Rangifer tarandus caribou*) population (Farnell & Gardner 2003). This genetically-distinct population (Zittlau et al. 2000) currently numbers less than 350 animals and annually recruits only 0-14 calves per 100 adult cows. Thus, the population is ageing, has a highly skewed sex-ratio (17-23 m: 100 f), suffers high neonatal predation, and is subject to extirpation. Managers and stakeholders agree the population should be protected.

Management approaches include: encouraging predator control by local people through trapping and hunting, a complete hunting closure on this herd in the Yukon and Alaska, and use of a predator enclosure for captive calving to increase neonatal calf survival.

In March 2003 we enclosed 8 ha of white spruce woodland and open upland tussock tundra using a 1.5 m fence of geocloth as a visible barrier. The enclosure was adjacent to preferred post-calving habitats, close to a lake for transport and water, and situated on a side hill for ease of visibility.

From March 25-27th, 20 cows were net-gunned and individually transported inside a helicopter to the enclosure. They were weighed, ultra-sounded for pregnancy and to measure rump-fat, and examined for overall body condition. Blood was collected to confirm pregnancy status, and a radio-collar with visual band was fitted. Natural forage in the enclosure was supplemented with moistened lichens (*Cladina sp.*) and a commercial pellet reindeer ration (15% CP: Unifeed, Okotoks, Alberta).

Seventeen cows were pregnant and gave birth between May 13 and June 7. Cows and calves were released June 13, when the median age was three weeks. Cows and calves moved 20 km to their typical range in Alaska, and were joined by other caribou. As of August 18, between 10-14 calves were alive. This compares with 23 radio-collared cows in the wild, of which 16 were pregnant and calved during late May. Only 2 of those 16 calves were alive as of August 18.

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Chapter 1 Climate Change

1.1 Climate Change Drivers – Greenhouse Gas Emissions

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Specific:

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1.2 Primary Indicators of a Changing Climate

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<http://www.msc-smc.ec.gc.ca/ccrm/bulletin/national_e.cfm>.

1.3 Examples of Environmental Impacts

General:

Arctic Borderlands Ecological Knowledge Co-op website: www.taiga.net/coop

Northern Climate Exchange website: <http://www.taiga.net/nce/resources/newsletters/index.html>

Your Yukon archive: <http://www.taiga.net/yourYukon/previous.html>

C-CAIRN (Canadian Climate Impacts and Adaptation Research Network): <http://www.taiga.net/c-ciarn-north/index.html>

Chapter 2 Air

2.1 City of Whitehorse Air Quality

General:

Standards and Approvals Section, Environmental Programs Branch, Environment Yukon, Yukon Government Contact: Janine Kostelnik, Janine.kostelnik@gov.yk.ca.

Environment Canada's NAPS Network website. <http://www.etc-cte.ec.gc.ca/naps/index_e.html>.

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Specific:

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Chapter 3 Water

3.1 Water Quality Index (WQI) (Indicator under Development)

General:

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Specific:

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Official Community Plans (OCPs) and Local Area Plans (LAPs)/Area Zoning Regulations—update provided by Community Affairs, Community Development Branch, Department of Community Services, Yukon Government.

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General:

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Specific:

Susan Thompson, Fisheries Biologist, Fisheries Management, Fish and Wildlife Branch,
Environment Yukon, Yukon Government.

5.4.2 *Caribou: The Chisana Caribou Project*

General:

Chisana Caribou website <<http://www.yesnet.yk.ca/schools/stelias/caribou/index.html>>.

Specific:

Farnell, R., Gardner, C.L., Status Report on the Chisana Caribou Herd—2002 (draft). May 2002,
14 pages.

Personal Communication with R. Farnell, September 2004.

Traditional Knowledge Box:

Overview and Rationale, Chisana Caribou Project Website
<<http://www.yesnet.yk.ca/schools/stelias/caribou/>>.

5.4.3 *Birds: A Yukon Bird Book Launch for 2003*

General:

Yukon Bird Club Website <<http://www.yukonweb.com/community/ybc/>>.

Specific:

Eckert, C., Sinclair, P., Nixon, W., Hughes, N. (ed.) *Birds of the Yukon Territory*. University of
British Columbia Press, March 2003, 596 pages.

Eamer, C., Yukon bird book finally hits the shelves. Your Yukon Column, The Yukon News,
Column, p19.

Mail-In Evaluation

Your comments on the State of the Environment 2004 Interim Report would be welcome.

Indicators

Which indicators did you find most useful?

Which indicators not included would you like to see included in a future SOE report?

Format

Is the format helpful?

Yes No

Do you have any suggestions regarding the format?

Website

Have you visited the Yukon State of the Environment Report website
www.environmentyukon.gov.yk.ca/soe ?

Yes No

Did you find it useful?

Yes No

What did you like about it?

How could it be improved?

Other Comments

Do you have anything else to add?

Mailing List

Would you like to be on our mailing list?

Yes No

If so please complete the following contact information.

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Mailing Address: _____

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Please submit your comments to the following:

State of the Environment Reporting

Policy and Planning Branch

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