



Yukon State of the Environment

Highlights – 2014



Introduction



Montana Mountain. Photo: © 2013 Richard Legner

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Yukon's *Environment Act* requires a full state of the environment report every three years, along with interim reports in intervening years. The first full report was published in 1995. This 2014 report is another full report, describing what is happening in the environment and why, and what management actions have been taken to maintain or improve the quality of the Yukon environment.

The report focuses on five important areas:

- Climate change
- Air
- Water
- Land
- Fish and wildlife

For each area, key indicators serve as a basis for monitoring, describing, and interpreting changes in the condition of the environment.

The *State of the Environment Report* is a collective effort, based on contributions from scientific experts and specialists in government agencies and non-governmental organizations. The 2014 report uses the best information available. Trend data is from 2011 because it can take up to two years for agencies to complete data collection, compilation, analysis, and reporting.

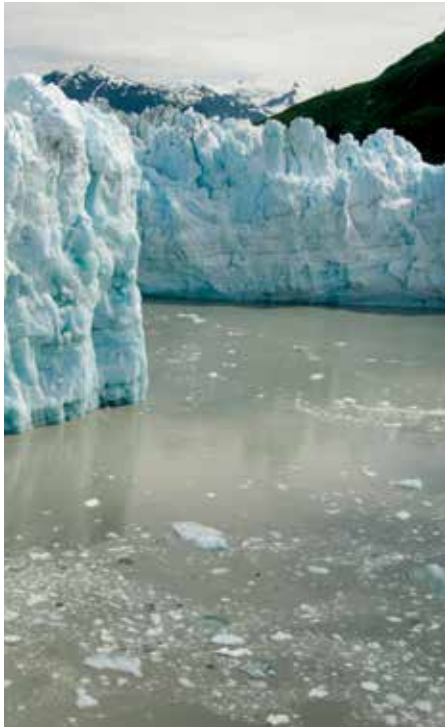
The full report is available at

www.env.gov.yk.ca/publications-maps/stateenvironment.php

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Cover photo: Yukon North Slope

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Global climate change is widely considered the most significant current threat to the environment. The major climate change culprits are greenhouse gases (GHGs) produced through human activity. They trap energy radiated from Earth, warming the atmosphere, the land, and the oceans. The principal greenhouse gas, carbon dioxide, has now reached its highest atmospheric level in over 400,000 years.

What do the indicators show?

Environment Canada's National Inventory Report says 374 kilotonnes of greenhouse gas emissions – 0.05 percent of the Canadian total – were generated in Yukon in 2011. That's down 30 percent from 1990, but up 10 percent from 2010 due to increased industrial activities during this period.

In 2013, Yukon's average temperature was 1.6°C higher than the average annual temperature from 1948-2013. Average winter temperatures have increased 5.4°C since 1948. The result is permafrost degradation and increased glacial melt. Between 1958 and 2008, the total ice area in Yukon dwindled by 22 percent.

What does it mean?

Yukon GHG emissions are down since 1990 mainly because of changes in the territory's industrial activity. The biggest current contributor is the transportation sector. Another major greenhouse gas contributor is diesel generation to supply heat and electricity when demand exceeds the hydroelectric supply. Reducing the emissions from either of these sources is challenging because of the high energy input required to live long distances from production centres and to heat buildings during cold winters.

Continued warming, changes in precipitation, and changes to water quality and quantity have already started to affect the distribution and abundance of Yukon vegetation, fish, and wildlife. These changes will also affect Yukon's infrastructure, economy, and communities.

What's being done?

- The Yukon government has introduced measures to limit GHG emissions and develop approaches to adaptation. The government is working with the governments of the Northwest Territories and Nunavut through the Pan-Territorial Adaptation Partnership, as well as partnering with organizations like the Yukon Research Centre and the Northern Climate Exchange.
- The Yukon Research Centre has provided digital access to weather data from the White Pass and Yukon Route log books from 1902-1957 at <http://yukonresearch.yukoncollege.yk.ca/wpyr>.
- The Compendium of Yukon Climate Change Science 2003-2011, provides a useful overview of research. It is available at <http://www.yukoncollege.yk.ca/downloads/Compendium-of-Yukon-Climate-Change-Science.pdf>.
- The Climate Change Secretariat's recent analysis of Yukon transportation sector emissions suggests that emission levels could be much higher than reported by Environment Canada. Environment Canada and the Yukon government are collaborating on a new approach to collecting emissions information.
- A Pan-Territorial Permafrost Workshop in 2013 looked at how the thawing of permafrost will affect the North's landscapes, infrastructure, transportation, and resource development. Information is at <http://northernadaptation.ca/permafrost-workshop>.

INDICATORS

Greenhouse gas emission levels

- Trends in Yukon greenhouse gas levels
- Yukon vs Canada greenhouse gas emissions by sector

Environmental changes

- Long-term trend in temperature variation
- Changes in hydrology patterns



Photo: © 2013 Richard Legner

INDICATORS

Level of airborne particulate matter

- Average ambient annual PM_{2.5} levels in the City of Whitehorse
- Number of days per year that PM_{2.5} levels exceed the standard
- Average monthly PM_{2.5} levels for 2012 compared with 2001-12
- City of Whitehorse average monthly PM_{2.5} levels compared with a similar community

The Canadian Environmental Protection Act classifies particulate matter as a toxic substance because of the damage it can cause when breathed in. Airborne particles can come from natural sources, such as forest fires, dust, pollen, and volcanoes, or from human-generated sources, such as burning fossil fuels and wood, waste disposal, and dust from vehicles or construction.

The fraction of particles classified as “fine” – less than 2.5 microns in diameter (PM_{2.5}) – is an effective indicator of air quality. As part of the National Air Pollution Surveillance Program, the Yukon government measures PM_{2.5} levels in downtown Whitehorse.

What do the indicators show?

Whitehorse air quality is typically better than the national average on an annual basis. In 2012, Whitehorse particulate matter levels were unusually high, although still below the Canadian annual average. However, the city exceeded Yukon’s Ambient Air Quality Standard for 19 days of that year.

What does it mean?

This unusual pattern might be the result of a particularly cold winter or due in part to new, more sensitive sampling equipment, combined with changing the sampling location from a relatively windy site near the Yukon River to downtown Whitehorse.

What’s being done?

- The Whitehorse monitoring station continues to record data on particulate matter, ground-level ozone, nitrogen oxides, and carbon monoxide.
- Yukon’s Good Energy program offers rebates to encourage a switch to efficient woodstoves and pellet stoves that emit low amounts of particulate matter.
- Old Crow has replaced open burning of domestic garbage with a solid waste incinerator, which reduces the impact on human health and the environment.





Photo: © 2013 Richard Legner

Changes in the water quantity indicators are predominantly related to climate change. Warming air temperatures are causing increased permafrost thawing, changes in the magnitude and timing of glacier melt, earlier ice break-up with higher water levels, earlier snowmelt, and a greater frequency of ice jams. River ice break-up now tends to happen earlier on the Yukon and Porcupine rivers. Break-up at Dawson has moved, on average, five days earlier between 1896 and 1998, and the water level during break-up has been increasing since the 1970s.

What's being done?

- The Klondike River monitoring station has real-time sensor equipment that transmits water quality measurements to a computer screen in the Dawson Visitor Reception Centre. The display shows water quality, weather, and hydrologic data, webcam views, and other visuals. The display and accompanying poster promote good water management.
- In 2011, the Yukon government released a report, *Yukon Water: Assessment of Climate Change Vulnerabilities*. The report gives recommendations for adaptation, monitoring, and addressing the vulnerabilities of Yukon's water resources.
- In 2013, the YukonWater website (<http://yukonwater.ca/>) was updated to provide greater access to information on Yukon water resources, adding content related to water licence triggers, flood forecasting, and the draft Yukon Water Strategy.
- In 2013, the Yukon government began a water monitoring project in North Yukon. The data will assist in the assessment of current and future activities in the Eagle Plains basin, particularly related to oil and gas development. The information collected will be available on the YukonWater website.



Photo: © 2013 Richard Legner

INDICATORS

Water Quality

- The Canadian Water Quality Index
- Samples collected at Yukon monitoring stations
- Water Quality Index rolling average ratings

Water Quantity

- Trends in Yukon River ice break-up
- Magnitude and timing of peak flow in comparison to historic trends
- Changes in snow depth, snow water equivalent, snowmelt, and snow-cover

Freshwater of sufficient quality and quantity is essential for aquatic life and to support human uses for industry, recreation, agriculture, and drinking. Many factors can affect the quality and quantity of water, from industrial development to climate change.

What do the indicators show?

The Water Quality Index (WQI) provides public information about water quality in Canada. In 2011, the most recent year for which data are evaluated, water quality results from eight monitoring stations in Yukon were stable, ranging from Fair to Excellent.

Water quantity indicators show stronger and more consistent signs of change. Yukon stream flow characteristics are changing. In mountainous streams, there are increased winter low flows and earlier spring freshets. In the Yukon River basin, there are increased winter low flows and reduced summer flows. In the three permafrost zones, there are reduced peak flows and increased winter flows. In the glacierized basins in southwest Yukon, there are increased annual and peak flows.

What does it mean?

While water quality was broadly stable across the territory, it fluctuates over the year, and a few short-term fluctuations show up in the records. For example, the WQI for the Yukon River above the Takhini River dropped from Excellent to Good for the first time since monitoring began in 2005, due to a reading in 2010. On the other hand, the WQI for the South McQuesten River improved from Marginal to Fair and has maintained this rating.



INDICATORS

Land use planning

- Management plans related to land use, resources, and protected areas

Land use activities

- Environmental and socio-economic assessments
- Use of Yukon government campgrounds

Solid waste management

- Status of waste generated and waste diverted in Whitehorse
- Status of waste management in communities

What do the indicators show?

As of 2014, land-use, resource-based, and protection-based plans were in place for 43 areas, with 12 more planning processes underway.

In 2013, the Yukon Environmental and Socio-economic Assessment Board assessed 197 projects, down substantially from the previous two years. In addition, 47 placer mining and 32 land development applications were assessed in 2012-13.

The number of campsite nights at campgrounds increased in the six years leading up to 2012. Non-resident nights peaked at 32,077 in 2010. Resident nights continued to climb, reaching 14,274 in 2012.

In 2013, the City of Whitehorse diverted 19 percent of its solid waste from landfills by recycling and composting. Since 2000, however, waste in Whitehorse has increased by 88 percent, reducing the capacity of the City's landfill from 78 years to 41 years.

What does it mean?

As a percentage of its land base, Yukon has more of its lands protected than any other province or territory in Canada.

The total amount of waste going to the Whitehorse landfill has increased due to a growing population, more construction and demolition projects, and accepting waste from communities. If

diversion rates do not increase, the Whitehorse landfill will be full in 41 years. It will cost about \$13.5 million to close the facility and an additional \$13.7 million to open a new landfill.

What's being done?

- The Yukon government is developing a uniform approach to ecosystem classification and mapping for land and resource assessments.
- The practice of burning domestic garbage has ended in all Yukon-government-operated unincorporated community solid-waste facilities, except for Eagle Plains. All non-Yukon-government facilities have also stopped burning garbage. Old Crow is now burning its garbage in an approved solid waste incinerator, which emits less pollution.
- The City of Whitehorse has adopted an action plan with the goal of 50 percent less waste by 2015 and zero waste by 2040.





INDICATORS

Population trends and planning initiatives

- Trends for select species and the development of plans to manage fish and wildlife populations

Contaminants

- Contaminant levels in key wildlife populations

Species at Risk

- Species at risk found in Yukon

Invasive Species

- Presence of alien and invasive species

What do the indicators show?

The conservation goal for returning Chinook salmon in the Canadian portion of the Yukon River drainage was not met in 2013, the fifth such occasion in the last seven years. Most lake trout fisheries were sustainable. Yukon's caribou herds continue to be strong, with 2 of 26 herds showing some decline in population size.

The low levels of cadmium found in some Yukon moose and caribou organs are now believed to be the result of local natural sources, rather than long-range transport. Over the last 15 years, cadmium levels do not appear to have changed.

In 2014, Yukon had the second lowest number of species at risk in Canada.

In 2013, estimates placed the number of alien plant taxa in Yukon at 86, of which 20 are considered invasive with a potential impact. The 13 known alien animal species are not considered invasive.

What does it mean?

Chinook salmon are a key food source for bears, eagles, and other predators, as well as being instrumental in moving nutrients from the ocean to freshwater and terrestrial ecosystems. They are also important culturally, socially, and economically in Yukon. Despite work under the Yukon River Salmon Agreement to rebuild and conserve stocks, Chinook salmon returns continue to fall.

Lake trout populations reflect the general health of an aquatic ecosystem and inform management decisions affecting sustainable fisheries.

Caribou and moose meat remain a healthy food choice because cadmium levels are low.

What's being done?

- Since 2008, fisheries managers in Yukon and Alaska have undertaken a range of actions to increase salmon returns, including full or partial closures of commercial, domestic, and recreational fisheries, decreased mesh sizes, and reduced fishing times in the subsistence fishery. As well, First Nations have put voluntary restrictions in place.
- Rules are being proposed for four lakes where the lake trout harvest exceeds sustainable levels.
- National recovery strategies are currently being developed for six species at risk found in Yukon. The Yukon government is monitoring the territory's Little Brown Bat population as part of a Canada-wide effort to understand the spread of White-nose Syndrome that is affecting this endangered species.
- In 2013, the Yukon Invasive Species Council developed a Spotters Network to support early detection of and rapid response to invasive species, along with a top-10 list of invasive plants.

The State of the Environment Report fulfills an important requirement of the *Environment Act*. Environment Yukon is hopeful this report will help Yukoners better understand what is happening with the environment and to engage in discussions about what actions are working well and where improvements may be needed.

