

The Peace–Athabasca Delta is a homeland for the Indigenous people of the region and is the largest freshwater inland river delta in North America.

- Located in northeast Alberta, within the Mackenzie River Basin (southwest of Fort Chipewyan), it is formed where the Peace and Athabasca rivers converge with the Slave River and Lake Athabasca.
- Encompassing approximately 3900 square kilometres, it is a complex ecosystem of rivers, lakes, channels, marshes and grasslands.
- Eighty percent of the delta is within Wood Buffalo National Park, which is a UNESCO World Heritage Site and Canada’s largest national park.
- The marshes, lakes and mud flats of this area are an important habitat for 45 species of mammals, 214 species of birds and 20 species of fish.
- It is one of the most important places in North America for migrating waterbirds to rest, feed and breed. In the fall, the number reaches one million, including the endangered whooping crane, which has its natural nesting place in the delta.
- The delta contains some of the largest undisturbed grass and sedge meadows in North America providing habitat for several thousand wood and plains bison.



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The Delta and Climate Change

- Climate change can be described as a shift in the average weather experienced by a region over a long period of time.
- Current changes are happening more rapidly and to a greater extent than before due to human activities releasing greenhouse gases into the atmosphere, which leads to abnormal warming. (See Fact Sheets about Climate Change, Greenhouse Effect, and Greenhouse Gases.)
- Rising temperatures and changes in weather are expected to affect ecosystems and human society around the world.

**...one of the
largest inland
freshwater
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Peace–Athabasca Delta
*the largest freshwater inland river delta
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World Heritage Site*



The Delta and Climate Change (cont.)

- Climate studies agree that warming will be greater in the northern and Arctic regions than in equatorial areas. This can include:
 - Melting of arctic ice sheets
 - Melting of permafrost, affecting habitats and community buildings/transportation
 - Increased flooding in coastal areas as sea levels rise due to the melting
 - Increased frequency of forest fires and drought due to higher temperatures and drier climates
 - Increased frequency and strength of severe weather events
 - Changes in location, quantity and overall health of wildlife, forests, plants and crops
 - Changes in river flow, especially spring runoff, due to lower snowpack and earlier warm temperatures which can also increase the frequency and height of flooding
 - Decreases in surface and groundwater levels
 - Retreating glaciers



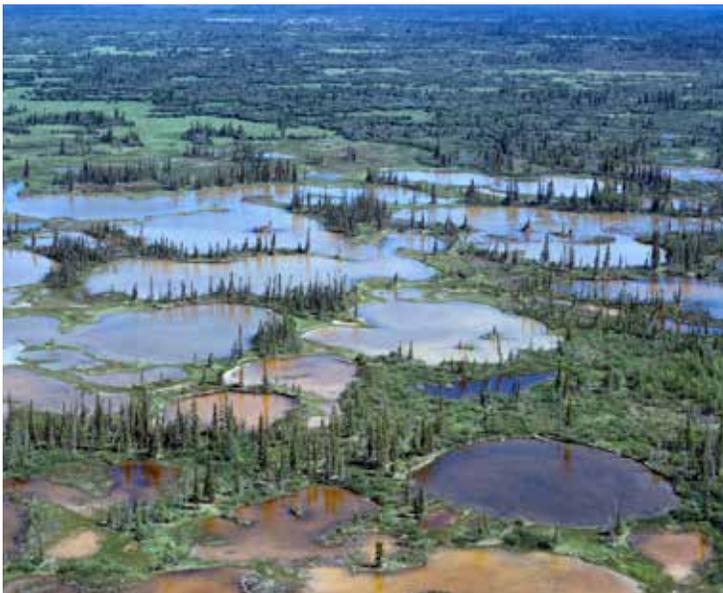
Wikipedia

Climate change may impact communities that rely on the Athabasca River.

The Athabasca Glacier, one of six large outlet glaciers from the Columbia Icefield, is one of the main sources of the Athabasca River. Historical records show that the Athabasca Glacier has retreated by about 1.5 km over the last 125 years and research indicates that over the last 40 years, the rate of melting has increased to 5 m per year. Should the glacier disappear altogether, as predicted by some scientists, the flow of the Athabasca River will be dramatically affected.

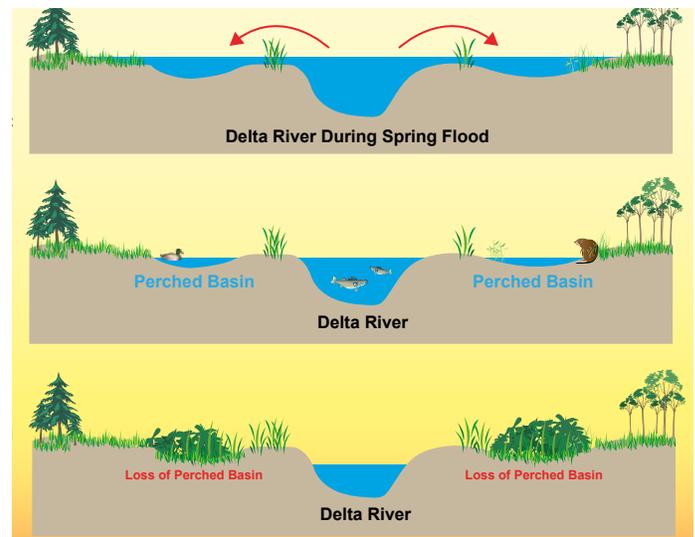
The Delta – It's All About Water

- Since the landscape is relatively flat, many of its waterways can flow in two directions depending on relative water levels in various reaches of the delta.
- Water levels on the Peace and Athabasca rivers peak during spring break-up and in the summer during sustained high flows produced by runoff from mountain snowmelt and upstream rainfall events.
- The rivers reach their highest levels when spring break-ups coincide with significant ice jam events.
- A major ice jam can constrict the river channel, causing a significant flow reversal and backwater effect which can also cause water to feed into the adjacent landscape and fill the shallow wetlands.



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Flooding & Drying of Perched Basins



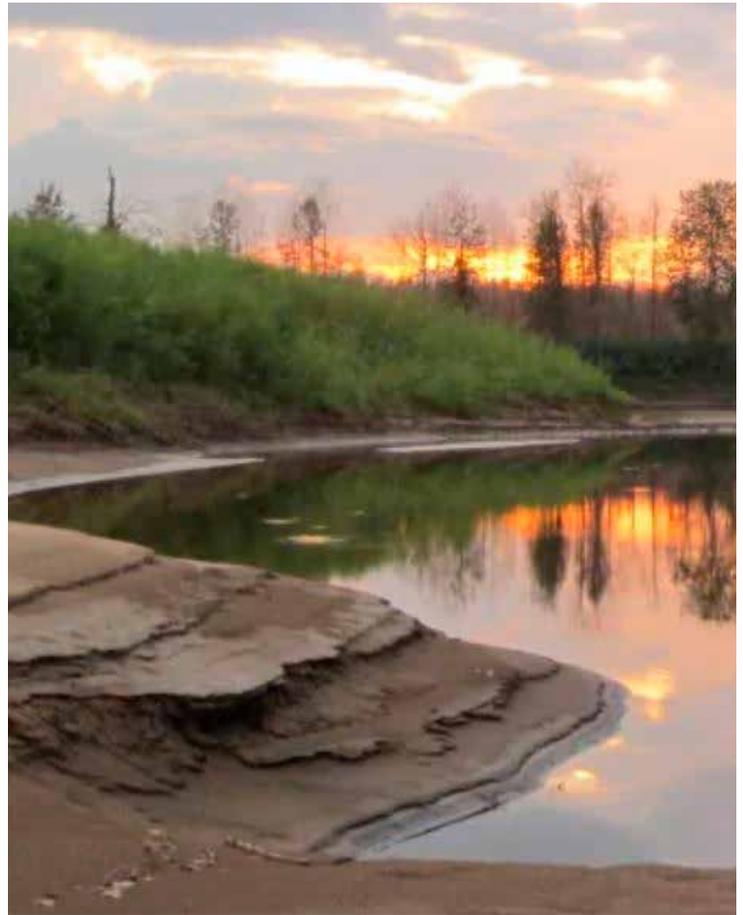
Periodic Spring Floods

- Many of the small lakes of the delta exist as “perched basins.”
 - They are isolated at a higher elevation than the nearby rivers. (See diagram on the right.)
 - Perched basins are separated from groundwater by impermeable surfaces.
 - They can only be replenished by overland flooding.
 - Because of the flat topography, they are very sensitive to small changes in water level.
- When all of the perched basins are filled with water, they contribute an estimated 19,000 km of additional shoreline, providing prime habitat for muskrats, waterfowl, and other wildlife.

- Periodic flooding of these perched basins (about once per decade) is essential for their survival.
- In recent decades, the effects of flow regulation on the Peace River, combined with climatic drying trends, have reduced the frequency of major spring floods and subsequent flooding of perched basins.
- This has caused many of the delta's perched basins to dry up, with water and wetland plants replaced over time by dry ground plants such as grasses and willows.

Significance Of Flooding

- The most productive areas of the delta are those areas that are frequently flooded.
- Periodic flooding maintains early successional forms of vegetation (such as aquatic species, emergent species, sedges and wet grasses) within the wetlands and perched basins. This in turn creates favourable habitat for a rich diversity of wildlife such as muskrats, waterfowl, moose and bison.
- Muskrats, for example, survive best in relatively shallow marshes with an abundance of aquatic and emergent vegetation.
- The delta's shorelines and perched basins provide an important summer refuge for ducks from all four North American flyways. This is especially critical during years of prairie drought.
- Bison frequent the delta to graze on the sedges and grasses that are common to these flooded marsh environments.
- Many other animals, such as beavers, weasels, otters, mink, fox, moose, and bears, are also attracted to these productive habitats.



Courtesy of Mikisew Cree First Nation

Environmental Stress In Delta

Despite its remote location, the Peace-Athabasca Delta is vulnerable to ecological impacts from human and industrial activities (environmental stressors), some of which originate upstream. Ecosystem components that may be affected include:

- Water quality & quantity
- Sediment
- Aquatic life
- Vegetation
- Wildlife
- Air quality

The Peace-Athabasca Delta Ecological Monitoring Program (PADEMP) Vulnerability Assessment has identified water quality and water quantity as the ecosystem components most vulnerable to environmental stressors. The environmental stressors identified as having the most impact are flow regulation, industrial and municipal discharges, and climate change.

However, because all of the ecosystem components in the delta are interconnected, any stressor impacting the water (either water quality or water quantity) will also have a potential effect on the other components (sediments, aquatic life, vegetation, and wildlife). This increases the potential for cumulative impacts that may cause damage to the ecosystem over time.



Wikimedia



Unsplash

Traditional Use Of The Delta

The Peace-Athabasca Delta is a traditional homeland for the Cree, Chipewyan, and Métis peoples of the region. People use the land for lifestyle, practical and traditional healing purposes and land-use remains a key mechanism for passing on the principals of family and community, their traditional value systems and very culture.

Water

- plays a critical role in transportation routes - many places can only be accessed by water including campsites, spiritual and historical sites and hunting/gathering areas.
- is also important in the renewal of the land that provides the resources needed for a traditional lifestyle.

Wildlife

- is a resource that the people depended on in the past and continue to utilize today for food, clothing and shelter material.

Hunting, trapping and fishing

These skills are important to retaining a traditional lifestyle in this area and they still provide extra food and income for many families.

- Muskrat
 - important as a local diet staple but are in sharp decline, due to the loss of habitat from perched basins drying out
- Moose
 - also an important food source
 - hides are still tanned locally in the traditional way, creating clothing and traditional tools
- Waterfowl
 - highly-valued as a local food source
 - feathers/down would be used for pillows and quilts
- Fish
 - an important diet staple of local people and an important food source for dog teams
- Vegetation
 - berries and other edible plants have long been gathered by local people for food or medicine
 - trees and shrubs are used for practical purposes - flooring in tents, structures (teepees, lean-to shelters, stages for smoking fish or drying meat), and for making snowshoes and baskets

Traditional Knowledge Observations

Traditional knowledge refers to the knowledge base acquired by indigenous and local peoples over many hundreds of years through direct contact with the environment. The following observations have been made:

- Floods, important for replenishing vegetation and wildlife habitat, occur far less often (previously they occur every 2-3 years and now occur rarely or not at all).
- Many perched basins (sloughs) have dried up, their waters replaced by encroaching vegetation.
- Lower water levels and disappearing water bodies (Egg Lake, Pushup Lake) inhibit travel to areas important for traditional land uses, like access to resources for food, medicines and spiritual well-being.
- Muskrats, an important traditional food as well as a source of income from trapping, were once plentiful but are now in sharp decline.
- Waterfowl are less abundant in the delta now as compared to the past.
- People used to drink directly from the delta's waterways, but many no longer will do so.
- Fish have long been a diet staple, but today people are concerned about the safety of the fish for eating, as lesions and deformities are being observed in netted fish more frequently than in the past.



katdaned - Pike, CC BY 2.0, Wikimedia.



theyee.ca/News/2017/06/06/UN-Site-C-Call/

Climate change is contributing to reduced water levels and drying of perched basins.

Traditional Knowledge (cont.)

- Changes in species distribution have been observed.
- Ice formation, consistency and break-up patterns have changed – the ice is thinner and weaker and as it crumbles at break-up no longer has the scouring effect important to maintaining river banks suitable for some wildlife habitat and for docking boats – ice is darker and dirtier
- Water bodies have more weeds and algae, the color has changed and they smell and taste different
- The amount of insects has increased.

What are the Causes

PADEMP's Traditional Knowledge Working Group attributes these and other observed changes to a combination of factors:

- The Bennett Dam and upstream industrial development.
- Climate change (hotter and drier weather trends have been documented over the last several decades) is contributing to reduced water levels and drying of perched basins. It is also contributing to changes in species distribution within the region.
- There is concern that if these changes continue unchecked, the ecological health of the delta will continue to deteriorate and the Indigenous traditional way of life will be threatened for the future.

More Information

Peace-Athabasca Delta Ecological Monitoring Program (PADEMP) - a group of stakeholders working together for long-term monitoring and reporting on the health of the Peace-Athabasca Delta through western science and traditional knowledge.

<http://www.pademp.com/>

The Peace-Athabasca Delta – Alberta Regional Aquatics Monitoring Program

<http://www.ramp-alberta.org/RAMP.aspx>

Peace–Athabasca Delta – Wikipedia

https://en.wikipedia.org/wiki/Peace%E2%80%93Athabasca_Delta

Canadian biodiversity: ecosystem status and trends 2010 (pdf) - Canada Biodiversity Working Group

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The Incredible Shrinking Glacier August 10, 2018 - Earth Science Picture of the Day

<https://epod.usra.edu/blog/2018/08/the-incredible-shrinking-glacier.html>

'No water, no birds': Wood Buffalo National Park among most threatened, warn international scientists - CBC

<https://www.cbc.ca/news/canada/edmonton/wood-buffalo-national-park-threatened-report-1.4404850>