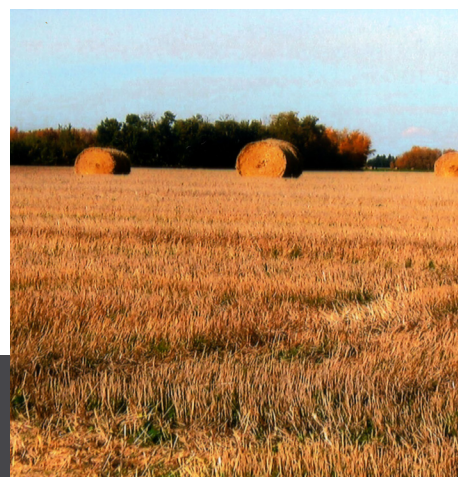
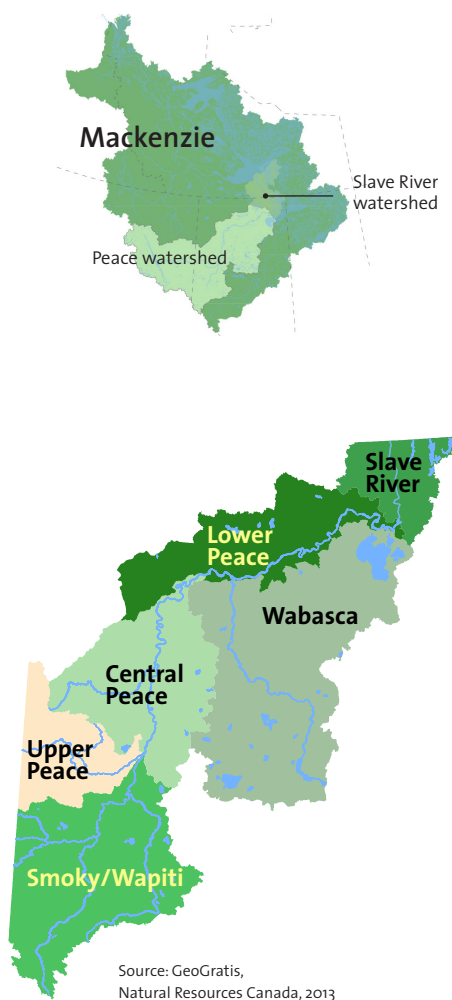




MIGHTY PEACE WATERSHED ALLIANCE

State of the Watershed





The Mighty Peace Watershed

Everyone lives within a watershed, even those far from a major waterway. Watersheds exert tremendous influence on the character of the landscape, and in turn are affected by the land and human activities. All of our endeavours — from daily living to leisurely pursuits to natural resource industries — have an impact on the environment, not only the local watershed but far downstream.

The Mighty Peace is the largest watershed in Alberta, spanning one-third of the province. The Peace River begins in the Rocky Mountains of BC, flows to Alberta and northeast across the province, and empties into the Slave River. The river basin includes inflows from the Wapiti, Smoky, Little Smoky and Wabasca rivers, among many others. Grande Prairie is the watershed's largest urban community.

This brochure is a condensed version of a full *State of the Watershed* report produced by the Mighty Peace Watershed Alliance (MPWA). Like the full report, the brochure describes the health of the watershed according to six key indicators: **landscapes**, **biological community**, **surface water quantity and quality**, and **groundwater quantity and quality**. For an overview of the watershed's health, see the Summary on page 7. The full report is available at www.mightypeacewatershedalliance.org.

The Mighty Peace Watershed Alliance (MPWA) is committed to a healthy, sustainable watershed. The Alliance was formed in 2011 and designated by the Government of Alberta as the official Watershed Planning and Advisory Council for the Peace/Slave River Water Basin under Alberta's Water for Life Strategy. The provincial government adopted the strategy in 2003 to address the challenges involved in preserving water resources.

The MPWA is working to increase public understanding of natural trends and human activities affecting the basin, and is dedicated to promoting the best possible watershed stewardship of the Mighty Peace.



Landscapes

Land Use

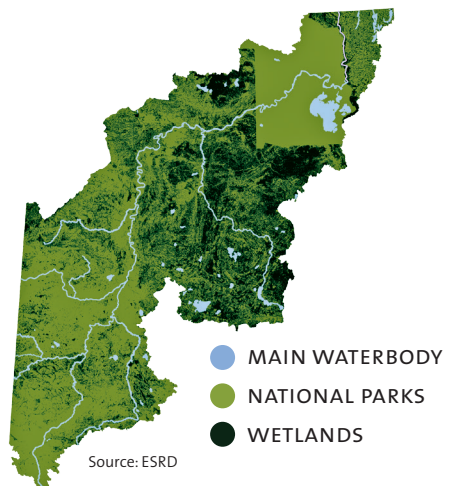
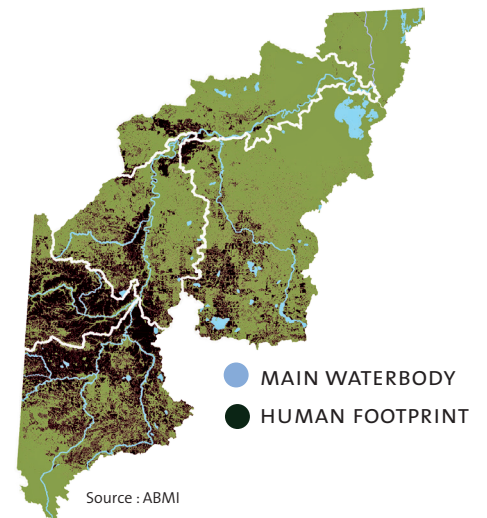
The Mighty Peace is largely undisturbed, with human activities affecting only about 15% of the entire watershed. The Alberta Biodiversity Monitoring Institute has developed a “Human Footprint” index to measure our impact. Most human influence occurs in the Upper Peace and Smoky/Wapiti watersheds.

Agriculture is the leading contributor to the Human Footprint. It plays a major role in the watershed’s economy and is expected to grow along with populations. Farmers and watershed planners can ensure agriculture and ecosystem sustainability by using best practices consistent with the Water for Life goals. Other activities include forestry, mining, and oil and gas extraction. Development and recreational activities also play a role.

Land Cover

Wetlands and riparian areas are two of the key variables influencing changes in land cover. They are essential to water filtration and purification, erosion mitigation, biodiversity and wildlife. In the Mighty Peace, the health and change in cover of wetland and riparian areas provide a sound measure of watershed integrity. Wetlands cover nearly 30% of the watershed (not including national parks, for which information was unavailable). The regions with highest coverage of wetlands correspond with extensive boreal forest and little human activity.

The health of riparian areas is determined largely by human disturbance. Based on computer mapping and a combination of data sets, the natural land cover in riparian areas associated with streams and rivers varies, ranging from just over 50% to 100% natural. Areas with the greatest natural cover, such as the Slave River, show low levels of disturbance and high forest cover. In the Smoky/Wapiti and Upper Peace sub-watersheds, where both agriculture and development are widespread, riparian areas have much less natural cover.





Biological Community

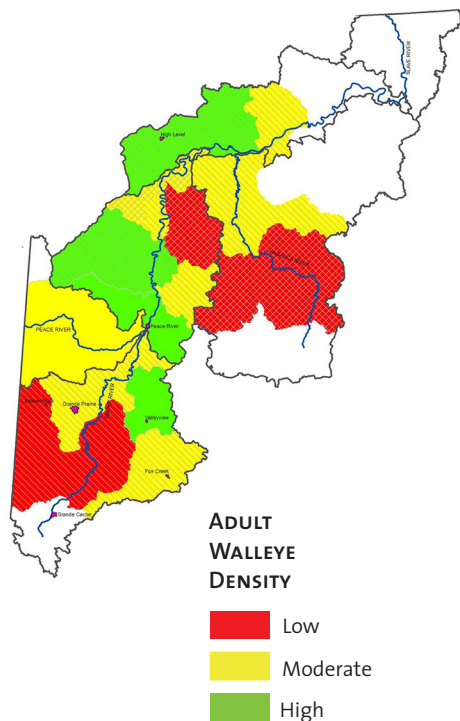
Wildlife

Wildlife can reveal much about the health of a watershed. While a complete inventory of the Mighty Peace is unfeasible, fish can act as useful indicators of aquatic ecosystem health. The watershed has a variety of native fishes. The presence or absence of sensitive species serves as an indicator of the quality of overall fish habitat. Comparing the density of sensitive fish species between sub-watersheds can help managers prioritize conservation activities.

The densities of two species sensitive to human activities, arctic grayling and walleye, suggest fish populations in the Peace River, and in the larger mainstem tributaries, such as the Smoky, Little Smoky, and Wabasca, are relatively healthy. Densities in smaller tributaries – where fish are strongly affected by land use – are moderate to low. Abundant populations of arctic grayling are found only in the Rocky Mountains and the foothills in the southern part of the watershed, and the remote areas of the northern part of the watershed. Fish populations in some lakes are under stress from fishing pressure and loss or alteration of habitat. Fish population status in lakes is typically correlated with proximity to urban development and surrounding land use.

Invasives

Invasive species are another useful indicator. Invasives are plants and animals that evolve elsewhere but thrive in their new environment. They can feed on native species, or take over their habitat and cause local extirpations. Wetland surveys have found no invasive plants. An invasive aquatic macrophyte, the Eurasian milfoil, has been reported at just one location, the Wapiti River watershed. Zebra and quagga mussels, invasives that pose problems in many areas in Canada, have not been detected in any Alberta lakes to date. The spiny water flea has not been reported in the watershed, nor has the invasive algae *Didymosphenia geminata*. Although provincial and municipal governments and stewardship organizations monitor and control invasives, it is a challenging task, and useful data are sparse.



Peace River Watershed: A Few Key Points in Time

1788-1880s | Fort Vermilion established and over 20 trading posts throughout the Peace watershed established, serving as centres of trade, missionary influence and agricultural experimentation.



1922 | Wood Buffalo National Park established, and in 1982/83 granted World Heritage status by UNESCO and named a Ramsar site (wetland of international importance).



1899-1919 | Oil and gas discovered downstream of the town of Peace River. First oil well drilled in the region and by 1919 big oil strikes attract speculators/workers to the area.

1945 | Wave of development begins. Exploration/production of oil and gas, road and rail construction ensues. By 1958, Grande Prairie becomes a city.

Surface Water

Surface Water Quantity

Each year, nearly 50 billion cubic metres of water flow into Alberta via the Peace River, or roughly three times the combined amount of all rivers in southern Alberta. The river’s largest tributary in Alberta, the Smoky River, contributes an additional 11 billion m³ annually. Several other rivers and creeks add to the flow, helping the Peace contribute 65% of the average flow of the Slave River.

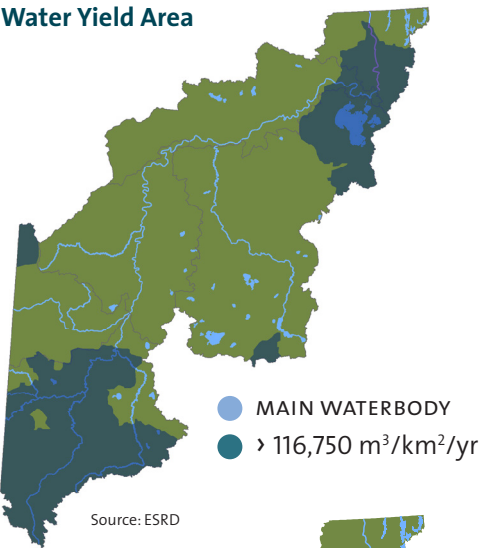
Much of the water feeding the Peace River originates in the mountains and foothills, where the Smoky and Wapiti tributaries begin. Given their freshwater supply, these areas should be carefully managed. The sidebar map shows high water yield areas for the Mighty Peace watershed. These areas generally have a surplus of water, which benefits downstream rivers and lakes. Less than 1% of the natural flow of the Peace is allocated for use because the river is large and the population relatively small.

Surface Water Quality

Surface water is all the water in rivers, streams and lakes. In the Mighty Peace, the source and quantity of flow are the biggest factors influencing surface water quality. As flow volumes change, as they do seasonally, the water quality also usually changes. The watershed has five water quality monitoring sites. From 1996 to 2010, all sites reported good to excellent water quality. The results are based on measurements taken regularly throughout the year of metals, nutrients, bacteria and pesticides. But this is a broad overview of the major rivers, and does not represent conditions in smaller tributaries.

Point sources of pollution from the Aquatera and Weyerhaeuser wastewater streams and non-point sources of pollution from the City of Grande Prairie have caused a slight reduction in water quality. Although the combined treated effluent discharge from Aquatera (which collects wastewater from the City of Grande Prairie and its surroundings) and Weyerhaeuser have measurable effects, both facilities are well regulated. They have adopted advanced treatment technologies and greatly improved treatment efficiencies over the years. The other pulp mill in the watershed, the Daishowa-Marubeni mill near the town of Peace River, has made similar improvements.

Water Yield Area



1967 | Bennett Dam completed at Hudson Hope, creating Williston Lake. Peace River becomes a regulated river.

1972 | First major coal development begins, mostly near Grande Cache.



2011 | Population of the Peace/Slave watershed reaches 165,000. Grande Prairie has over 55,000 people.

2015



Groundwater

Groundwater Quantity

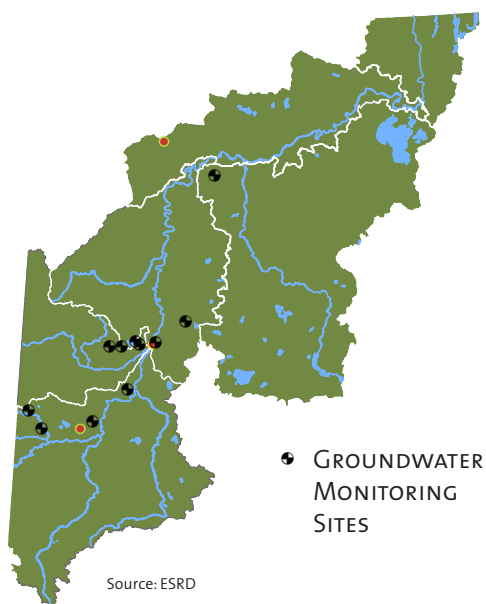
Groundwater is all the water below the surface of the Earth. Groundwater cannot be described by sub-watershed boundaries, as it does not respect topographically defined watersheds. In the Mighty Peace, groundwater is instead placed in eastern and western groupings of sub-watersheds. Groundwater resources in the eastern grouping appear to be abundant, although mapping in this area has not been extensive. Generally, the western grouping has a shortage of high-yield freshwater aquifers, which are typically associated with the permeable sand and gravel deposits needed for groundwater to flow at significant rates.

The watershed has less groundwater monitoring information available compared with the province's southern watersheds. But the water resource issues are also less urgent. Twelve groundwater observation wells are active within the watershed, mostly near Grand Prairie and the town of Peace River. Groundwater allocations in the watershed increased by 10% between 2011 and 2013. Groundwater use is greatest in the Wabasca and Smoky/Wapiti sub-watersheds, which together account for more than 80% of groundwater allocations in the entire watershed.

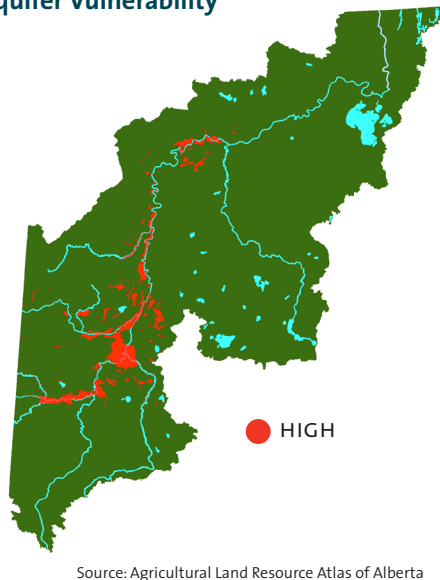
Groundwater Quality

Little monitoring data are available on groundwater quality. Most information exists in baseline data that describe aquifers in their natural state between the late 1960s and early 1980s. Data are unavailable on the impacts of climate change and various land uses on groundwater quality and aquifers. Municipal growth, along with agricultural, industrial and commercial activities could all have an effect. In some areas, groundwater quality faces stress due to development pressures associated with mining. Two regions face particular stress on groundwater quality: the southern Smoky/Wapiti basin around Grande Cache and the area north of Wapiti River from Grande Prairie to Beaverlodge.

Much variability exists in the depth, extent and quality of surficial aquifers. They tend to have the best water quality, but are also the most vulnerable to contamination because they are near the surface and often covered by material that has high infiltration rates. Groundwater in shallow aquifers retains many of the characteristics of the infiltrating surface water, and can become a pathway for contaminants to reach groundwater after rainfall. To date, only the areas where most of the watershed's population and human development are located have been mapped for aquifer vulnerability. This type of mapping should be expanded to the rest of the watershed.



Aquifer Vulnerability





Summary

Overall, the Peace and Slave rivers, as well as their larger tributaries (Smoky, Wabasca) are relatively healthy. They have reasonably good water quality and strong fish populations. Less than 1% of the natural flow of the Peace is allocated for use. Most riparian areas show good health, as they are largely untouched in the Wabasca, Lower Peace, and Slave River sub-watersheds, and to a lesser extent in the Central Peace.

However, some of the aquifers that are monitored regularly show signs of overuse. Certain areas that are highly valued by the watershed's stakeholders are under threat. The critical riparian areas of the Smoky/Wapiti and Upper Peace are highly disturbed. Small tributaries are in poor health because of human activities. In many cases, fish populations in lakes and smaller tributaries are under stress, affected by fishing pressure and loss or alteration of habitat. Pollution from industry and urban activity have caused a slight reduction in water quality in some areas.

Many data gaps exist, posing challenges for water management planning. But watersheds, and our understanding of them, are continually evolving, which makes a state of the watershed report part of a process, rather than an endpoint. The health of watersheds and the impact, sustainability and interaction of the activities within them should all be considered and updated regularly. This strategy can help managers plan for and adjust to changes in the health and sustainability of a watershed. It will also help the watershed fulfill the goals of the Water for Life strategy, balancing the social and economic needs of the people of Alberta with the need for long-term environmental protection. For the people, wildlife, and wild spaces of the Mighty Peace, the future depends on it.

Become Involved

One of the objectives of the MPWA is to give people an opportunity to participate in watershed management. This participation occurs through organizations coordinated by the Alberta Water Council.

Learn more by visiting the Mighty Peace Watershed Alliance website at:

mightypeacewatershedalliance.org

Local stewardship groups are encouraged to address water issues at a local scale, and groups such as West County Watershed Society, Clearhills Watershed Initiative, Heart River Watershed Advisory Council and Grimshaw Gravels Aquifer Management Advisory Association provide opportunities for people to be involved. Many others, including researchers, environmental groups and other organizations are doing water-related work in the Mighty Peace watershed.

Water and the Mighty Peace

- Over 96% of the world's water is saltwater, and the rest is freshwater.
- Canada has about 20% of the world's freshwater, and 2.2% of Canada's freshwater is found in Alberta.
- Over 80% of Alberta's water supply is found in the north, but 80% of the demand is in the south.
- A majority of Alberta's population and industries draw their water from the surface.
- Alberta has enough groundwater to cover the province with 60 metres of water. But only 0.01% of it is thought to be recoverable.
- A watershed is an area that catches precipitation and drains into a body of water such as a wetland, river or lake. It is often made up of sub-watersheds. The Mighty Peace has six main sub-watersheds: the Smoky-Wapiti, Upper, Central and Lower Peace, Wabasca, and Slave River.

Mighty Peace Watershed Alliance

Vision

The Peace is a healthy, sustainable watershed that supports our social, environmental and economic objectives.

Mission

To promote watershed excellence, the Mighty Peace Watershed Alliance will monitor cumulative effects from land use practices, industry and other activities in the watershed and work to address issues through science, education, communication, policy and by supporting watershed stewardship.

mightypeacewatershedalliance.org

Writing and Design: West Hawk Associates

Research: CPP Environmental

Produced with support from Alberta ESRD

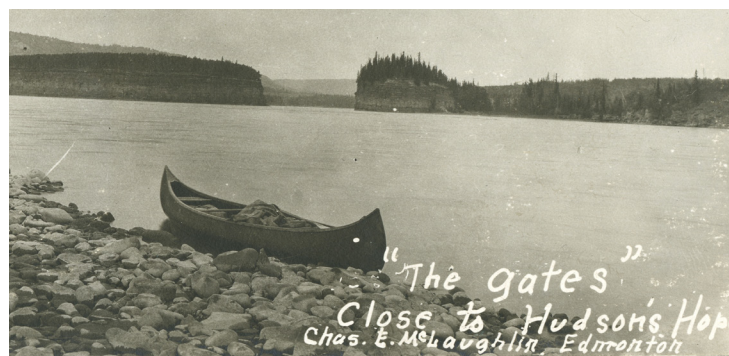
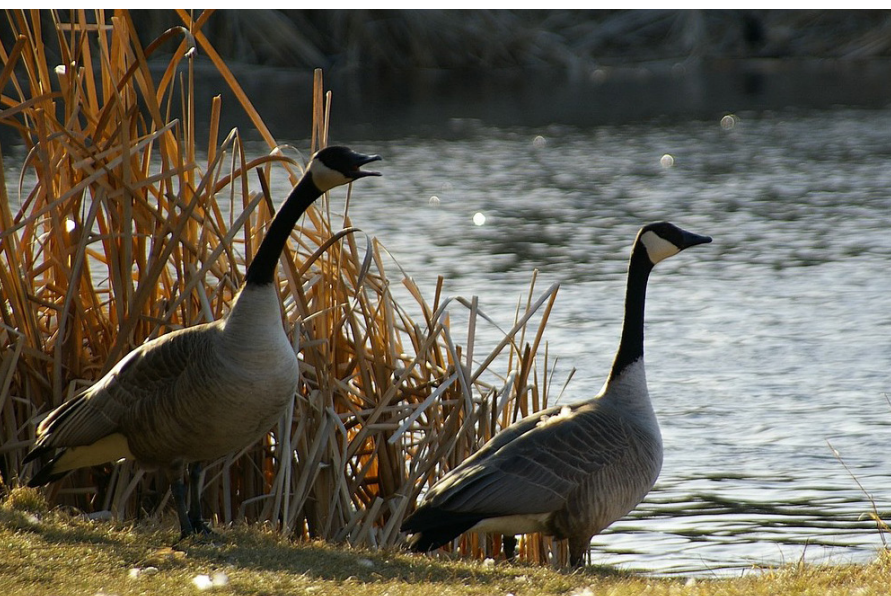


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