



# FACTS ABOUT **WATER** IN ALBERTA

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## 1.0 BACKGROUND

Alberta Environment developed this book to help inform Albertans about the province's water, and some of the current challenges facing our water resources. *Facts about Water in Alberta* outlines where our water comes from, who uses water in the province, and how water quality and quantity is managed. Through increased awareness and understanding, Albertans can act as stewards to protect and conserve our water resources ensuring the goals of *Water for Life: Alberta's Strategy for Sustainability* are realized.

### 1.1 Water for Life

Water is not only a resource, it is a life source. We all share the responsibility to ensure a healthy, secure, and sustainable water supply for our communities, environment, and economy – our quality of life depends on it.

In November 2009 The Government of Alberta released the *Water for Life* action plan, the roadmap that the government and its partners will follow over the next 10 years. The action plan supports the goals and directions in Alberta's renewed *Water for Life* strategy.

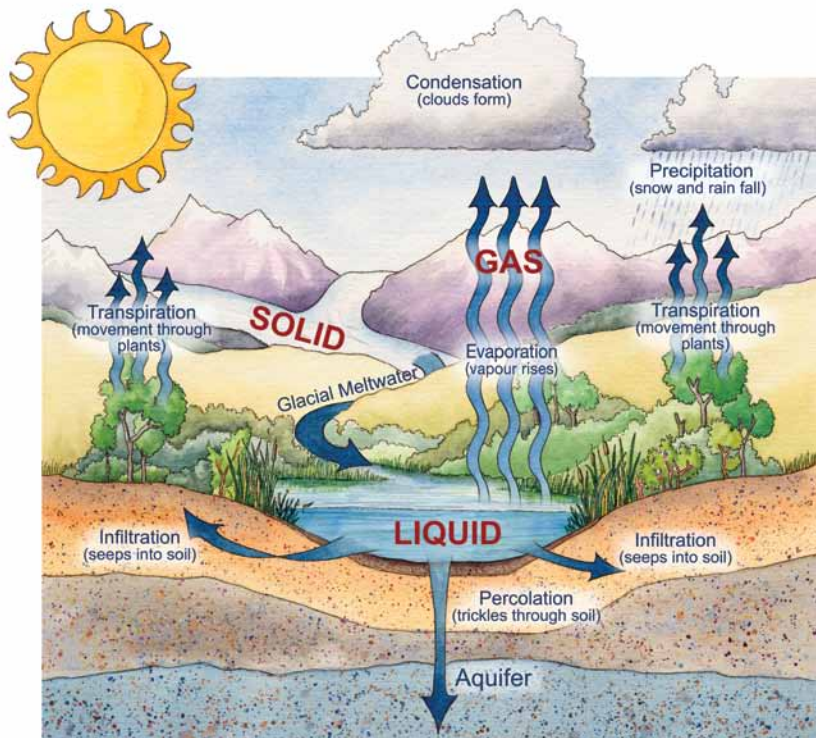
The renewed strategy reflects the population increase and economic growth Alberta has seen over recent years, and Albertans' changing water needs. Like the original, the renewed *Water for Life* strategy has three main goals:

- ▶ safe, secure drinking water;
- ▶ healthy aquatic ecosystems; and
- ▶ reliable, quality water supplies for a sustainable economy.

These goals will be met through knowledge and research, partnerships, and water conservation. The renewed strategy and corresponding action plan reaffirms Alberta's commitment to the *Water for Life* approach: the wise management of our province's water resources for the benefit of all Albertans.

#### Did you know?

More than 80 per cent of Alberta's water supply is found in the northern part of the province, while 80 per cent of the demand is in the south.



Credit: Bow Habitat Station

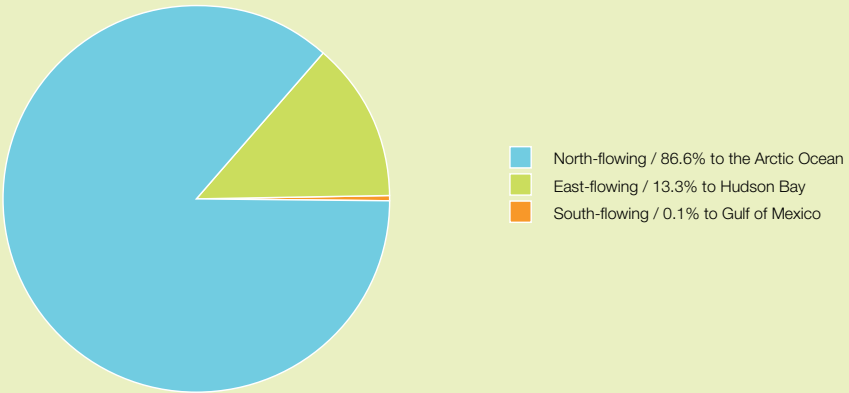
Water Cycle

## 2.0 WATER SOURCES

Despite the water cycle's ability to replenish water sources, the quantity of water available for human use is finite. As Alberta's population and economy grows, the demands we put on our limited water resources increase.

Canada is considered to be a water-rich country and is estimated to have 20 per cent of the world's freshwater. Alberta in turn, holds approximately 2.2 per cent of Canada's freshwater. Although Alberta has a good supply of water, variations in geography, climate, and the hydrologic cycle create regions and periods of water scarcity. In northern Alberta there are large rivers and numerous lakes while southern Alberta has rivers with lower volumes and fewer natural lakes. Large quantities of groundwater also exist in many different aquifers and buried channels within Alberta. Environmental events such as droughts and flooding add to the variability of water quantity throughout Alberta.

## Distribution of Water in Alberta



### 2.1 Surface Water

Surface water refers to water found on the surface of the earth. Water collecting on the ground or in a river, lake, or wetland, are all examples of surface water. This water is “renewed” each year by precipitation (rain and snow) and naturally lost through evapotranspiration (moisture loss by plants) and sub-surface recharge into the groundwater. Groundwater seepage returning back to the surface is also a supply for wetlands and base flow in streams.

The majority of Alberta’s population and industries get their water from surface water sources. This valuable resource provides us with drinking water, and supports industry, agriculture, and recreational activities. A clean abundant supply of surface water supports the health of humans, our economy, and the aquatic ecosystem.

Water in rivers, lakes, and wetlands is known as surface water.

## 2.1a Rivers

Most of the major rivers in Western Canada originate from glaciers and high elevation snowpacks in the Rocky Mountains. In Alberta, there are several major rivers that start from glaciers in Banff and Jasper National Parks. Snow melt is the largest contributor to the annual flows in these rivers, followed by rainfall.

The amount of runoff contributing to river flow varies both seasonally and from year to year. As snowpacks dwindle in the summer, rivers become more dependent on rainfall, and groundwater base flow. Glacial melt water peaks in late summer, and becomes particularly important in dry years when rainfall is minimal. In winter, most of the water observed in streams can be attributed to groundwater base flow, as most surface water is frozen and not contributing much to river flows.

Situations of water scarcity can arise at times during the year, or in lower flow years, when water demand accounts for a larger percentage of the supply. During times of water scarcity, it is particularly important for Albertans to conserve water and use it as efficiently and productively as possible.

There are seven major river basins or watersheds, in Alberta: Hay, Peace/Slave, Athabasca, Beaver, North Saskatchewan, South Saskatchewan, and Milk.





# Alberta's Major River Basins

Hay River Basin  
Plus Great Slave Basins

Peace / Slave River Basin

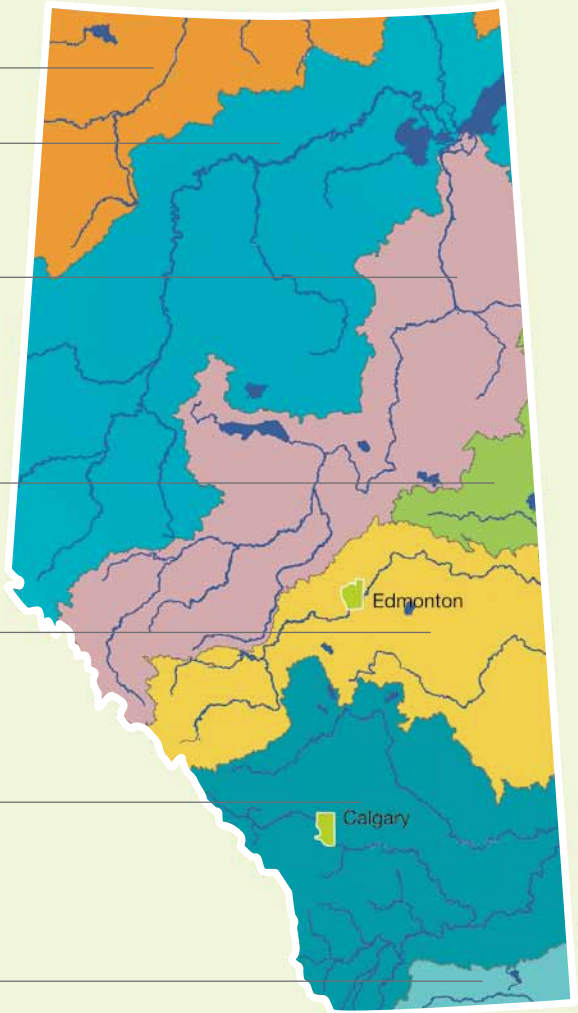
Athabasca River Basin

Beaver River Basin

North Saskatchewan River Basin

South Saskatchewan River Basin

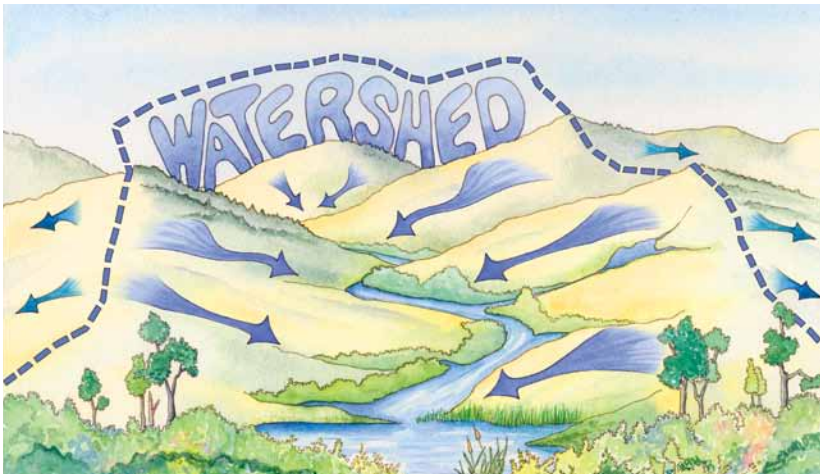
Milk River Basin





## 2.1b River Basins

A basin or watershed is an area of land that catches precipitation and drains it to a water body such as a marsh, lake, stream, or river. Healthy, functioning watersheds can provide clean and abundant water resources to agricultural, municipal, industrial, and recreational users; help maintain healthy crops and crop yields; support wildlife habitat; and regulate natural processes such as soil erosion and sedimentation. Healthy watersheds contribute greatly to the overall health of the environment and to the quality of life of Albertans. Watersheds can range in size from a few hectares to many thousands of square kilometres.



Credit: Bow Habitat Station

Watershed

**Hay River Basin** • The Hay River Basin is located in the northwest portion of the province. The Hay River originates in British Columbia's Rocky Mountains, flows through the Hay River basin, and eventually makes its way to the Arctic Ocean. The basin has a drainage area of 47,900 square kilometres (km<sup>2</sup>) and a mean annual discharge of 3,630,000,000 cubic metres (m<sup>3</sup>) at the Alberta-Northwest Territories border. The sub-basins within the Hay River Basin include the Chinchaga and the Little Hay. Zama Lake and Hay Lake are two lakes in the basin that are recognized for their importance to wildlife.

**Peace / Slave River Basin** • The Peace River begins in the mountains of British Columbia and is Alberta's largest river with the highest flow volume. Influenced by the W.A.C. Bennett Dam in British Columbia, the river flows northeast across Alberta through the town of Peace River, empties into the Slave River, and eventually flows into the Arctic Ocean through the Mackenzie River. At Peace Point (in Wood Buffalo National Park), the Peace River has a mean annual discharge of 68,200,000,000 m<sup>3</sup> and a drainage area of 293,000 km<sup>2</sup>. The Peace/Slave River Basin includes the Wapiti, Smoky, Little Smoky, and Wabasca Rivers. Major urban centres within the basin include: Grande Prairie, Peace River, High Level, and Grand Cache.

**Athabasca River Basin** • The Athabasca River originates in the Rocky Mountains of Alberta. The river flows northeast through the province, past the urban centres of Jasper, Hinton, Whitecourt, Athabasca, and Fort McMurray prior to emptying into Lake Athabasca. The flows from the Athabasca and Peace Rivers combine to form the Slave River and eventually make their way to the Arctic Ocean. At Jasper, Athabasca, and Fort McMurray the mean annual discharge is 2,790,000,000 m<sup>3</sup>, 13,600,000,000 m<sup>3</sup>, and 20,860,000,000 m<sup>3</sup>, respectively. The coinciding drainage areas are 3,880 km<sup>2</sup>, 74,600 km<sup>2</sup>, and 133,000 km<sup>2</sup> respectively. The Athabasca River Basin includes the McLeod, Pembina, Lesser Slave, and Clearwater Rivers and covers an area of approximately 159,000 km<sup>2</sup>. The Peace River and Athabasca River merge to form the Peace Athabasca Delta. This delta is one of the world's largest inland freshwater deltas and is a wetland of international significance. It includes some of the largest undisturbed grass and sedge meadows in North America, providing habitat for large populations of waterfowl, muskrat, beaver, and wood bison.

### Did you know?

The mean annual discharge, (the average total volume of water flowing in a river in one year) of the Athabasca River at Fort McMurray is enough to fill Sylvan Lake (43 km<sup>2</sup>) about 50 times in one year.



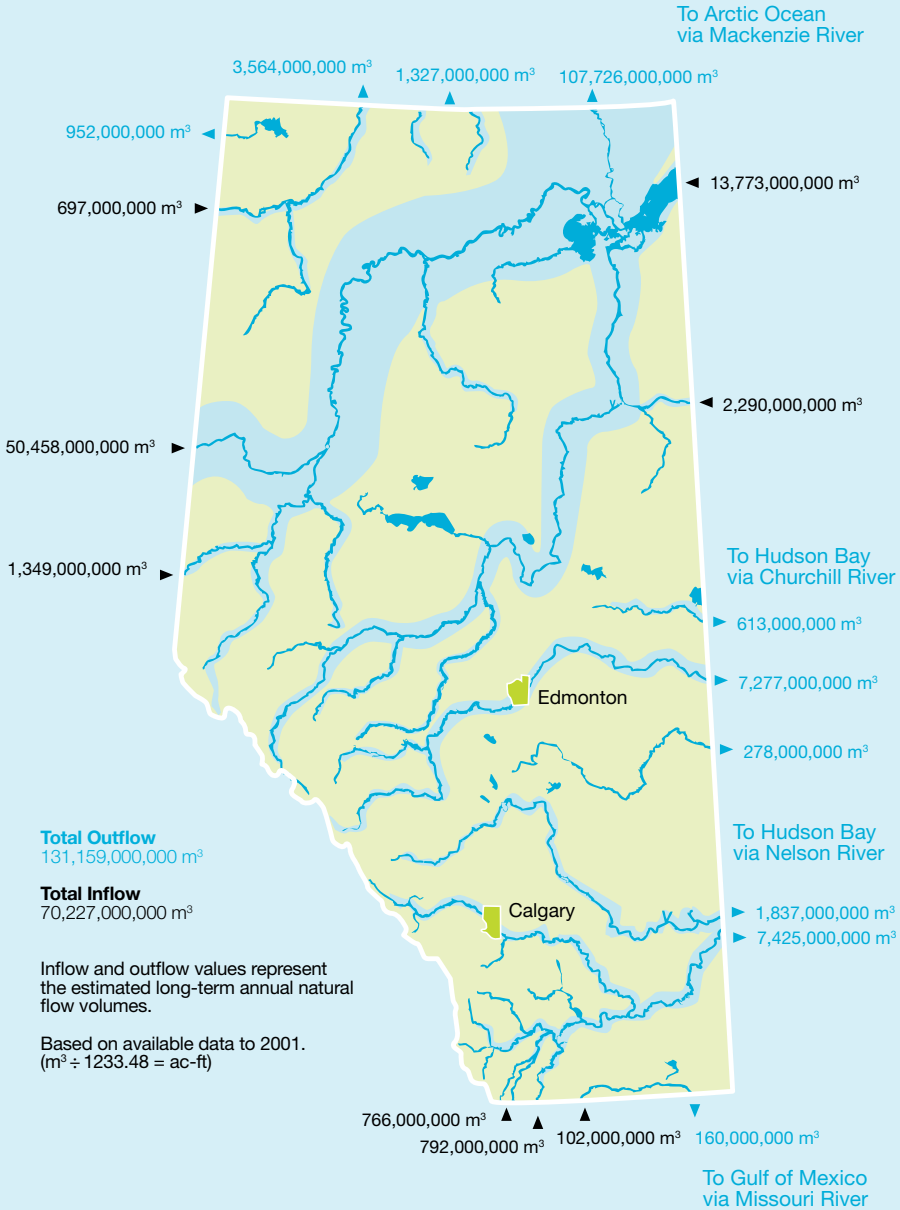
**Beaver River Basin** • The Beaver River Basin is one of the smaller basins in the province with a catchment area of about 14,500 km<sup>2</sup>. The basin and river extend east, across the provinces of Saskatchewan and Manitoba, emptying into Hudson Bay as the Churchill River. The Beaver River begins at Beaver Lake, and then flows through the urban centres of Bonnyville, Cold Lake, and Grand Centre. The mean annual discharge of the Beaver River at the Alberta-Saskatchewan border is 653,000,000 m<sup>3</sup>. The Cold Lake Area Weapons Range comprises the majority of the northern part of the basin. The basin is characterized by many meandering streams and rivers that flow through lakes such as: Cold, Moose, Muriel, Ethel, and Wolf Lake.

**North Saskatchewan River Basin** • The North Saskatchewan River Basin covers about 80,000 km<sup>2</sup> of the province. The basin begins in the icefields of Banff and Jasper National Parks and generally flows in an eastward direction to the Alberta-Saskatchewan border. The Brazeau, Nordegg, Ram, Clearwater, Sturgeon, and Vermilion rivers flow into the North Saskatchewan River within Alberta. The Battle River also forms part of the North Saskatchewan basin and joins with the North Saskatchewan River in Saskatchewan. There are two large dams located in the basin. The Bighorn Dam on the North Saskatchewan River creates Lake Abraham. The Brazeau Reservoir is created by the Brazeau Dam, located on the Brazeau River. Major centres within the basin include Rocky Mountain House, Drayton Valley, Edmonton, Fort Saskatchewan, and Lloydminster. The mean annual discharge from the basin in Alberta into Saskatchewan is 7,160,000,000 m<sup>3</sup>.

**South Saskatchewan River Basin** • The South Saskatchewan River Basin includes the sub-basins of the Bow, Red Deer, Oldman, and South Saskatchewan River basins. All of the sub-basins begin in the Rocky Mountains, generally flowing eastward through the foothills and prairie. The combined area of the sub-basins is 121,095 km<sup>2</sup>, of which 41 per cent comes from the Red Deer, 22 per cent the Oldman, 21 per cent the Bow, and 16 per cent the South Saskatchewan. Major urban centres in the basin include Calgary, Lethbridge, Red Deer, and Medicine Hat. All of the province's thirteen irrigation districts are found in the South Saskatchewan River Basin. The mean annual discharge from the basin into Saskatchewan is 9,280,000,000 m<sup>3</sup>.

**Milk River Basin** • The Milk River Basin is the smallest of the province's major river basins encompassing an area of about 6,500 km<sup>2</sup>. The river is a northern tributary of the Missouri-Mississippi River Basin. The Milk River enters Alberta from Montana, flows eastward through the southern portion of the province prior to looping back to Montana. Mean annual flows entering Alberta is 106,000,000 m<sup>3</sup> and leaving Alberta is 167,000,000 m<sup>3</sup>. Milk River is one of the few towns in the basin.

# Mean Annual Natural River Discharges



## 2.1c Lakes

Alberta's lakes are numerous and varied. They are important natural features that reflect Alberta's physical setting and climate. Most of the lakes formed approximately 10,000-12,000 years ago when the glaciers retreated, and left a number of depressions where water pooled.

Lakes are relatively abundant in the northern half of the province. In southern Alberta there are few natural lakes. Where nature has not provided lakes, reservoirs have been built to support irrigation, municipalities, and industries in addition to hydropower production. In most cases, reservoirs are used for other purposes such as recreation, sport fishing, and maintaining environmental flows.

Water levels in lakes and rivers throughout the province fluctuate in response to the local weather and overall climate. Lake levels across the province have been affected by drought conditions in some years.

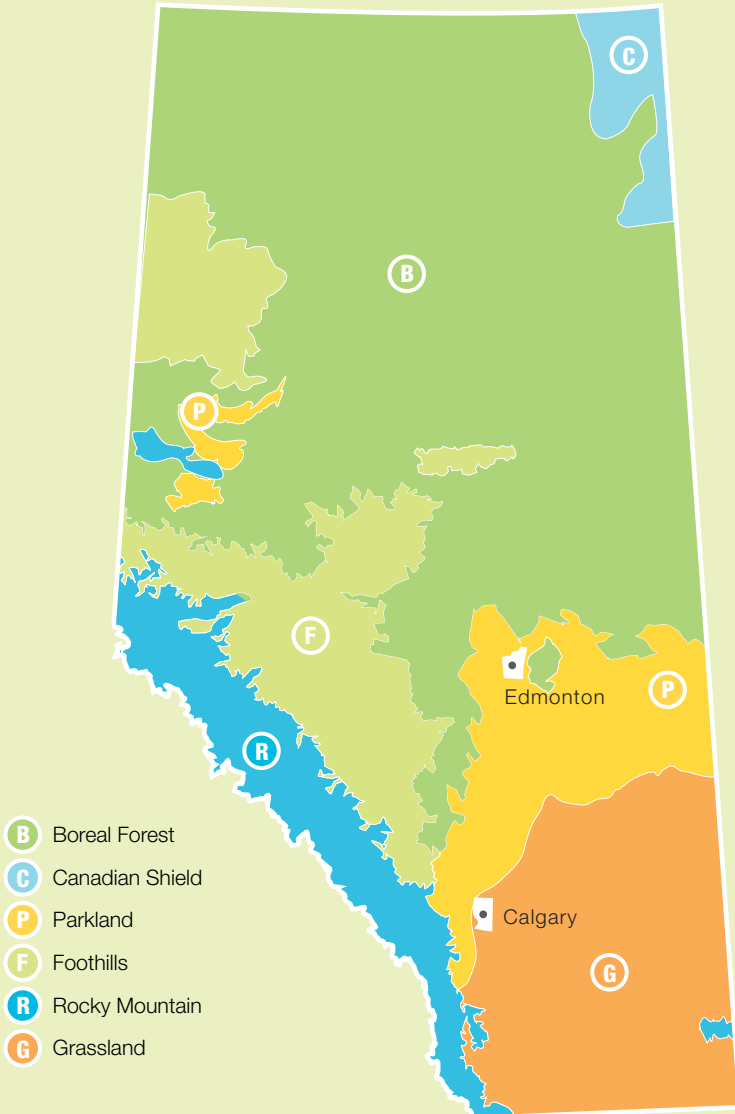
### Alberta's Biggest Lakes

Lake Athabasca	7,770 km <sup>2</sup>
Lake Claire	1,436 km <sup>2</sup>
Lesser Slave Lake	1,160 km <sup>2</sup>
Bistcho Lake	413 km <sup>2</sup>
Cold Lake	373 km <sup>2</sup>
Utikuma Lake	288 km <sup>2</sup>
Lac La Biche	234 km <sup>2</sup>
Beaverhill Lake	139 km <sup>2</sup>
Calling Lake	138 km <sup>2</sup>
Pigeon Lake	98 km <sup>2</sup>
Buffalo Lake	94 km <sup>2</sup>
Wabamun Lake	83 km <sup>2</sup>



## Lakes by Natural Region

Lake water quality, nutrient levels and colour vary across the province. The following map and general descriptions of Alberta's lakes illustrate and describe the different regions in Alberta and where they are found.



## **B** Boreal forest

The boreal forest has higher precipitation and lower evaporation rates compared to grasslands and parkland. Lakes here are influenced by vast peatlands. The dark brown color of many boreal rivers and lakes is often caused by dissolved organic carbon from peatlands. These lakes tend to be less alkaline (lower pH) than lakes in other regions of the province and can be susceptible to acidification from acid deposition (rain and snow).

## **C** Canadian Shield

Water colour and quality is influenced by the underlying rock. Shield lakes often appear dark because of the colour of the granite. Underlying granite bedrock is not easily dissolved and is naturally low in nutrients. Shield lakes are often neutral to slightly alkaline and low in dissolved nutrients (oligotrophic, meaning nutrient poor) and hence, support little biological productivity or growth.

## **P** Parkland

Parkland lakes are numerous, shallow, and warm. Due to surrounding fertile lands, these lakes are rich in nutrients (eutrophic) and minerals. This can cause frequent natural blooms of algae and large aquatic plants. Lake levels fluctuate due to their position between the moist boreal (northern) forest and the dry grasslands in the south.

Some lakes, especially in east central Alberta, are experiencing a net loss of water through evaporation and thus have become highly saline (salty). These lakes are unable to support freshwater aquatic life but may contain a few salt tolerant species. A good example of this is Oliva Lake near Viking. It is two to three times more saline than seawater.

## **R** Rocky Mountains

Due to the lack of deep, rich soils surrounding them, lakes in the Rocky Mountains are oligotrophic (nutrient-poor). These lakes have very low concentrations of nutrients and low algal abundance, so the water is clear. Lower average water temperatures also limit the growth of aquatic organisms in these surface waters.

## **G** Grasslands

There are few natural lakes in the grasslands. Constructed reservoirs are used for irrigation. These water bodies are warm and can be eutrophic from nutrient-rich agricultural runoff. Though precipitation is lower and evaporation is higher in this region, water levels are usually augmented via diversions from larger rivers.



## 2.1d Wetlands

Wetlands are natural areas where water and land meet. They provide food, habitat, and shelter for nearly 300 species of wildlife in Alberta. Wetlands are a critical part of much larger systems known as watersheds that move water across the land.

### Types of Wetlands

There are five major wetland types in Alberta. These wetlands differ in terms of water saturation and permanence (hydrology), and the types of plant and animal communities that they support. Alberta's five wetland types can be divided into two main categories: peatlands (also known as muskeg) and non-peatlands (sloughs).

#### **Peatlands:** Central & Northern Alberta



**Bogs** form in cool wet areas where drainage is poor. Precipitation supplies most of the water to a bog, which is why bogs are low in nutrients. They are strongly acidic (pH around 4.5) and are dominated by spongy carpets of moss species like Sphagnum. Bogs can be open or forested. Low shrubs and trees like larch and black spruce can often be found in bogs. Bogs are characterized by a high accumulation of peat (greater than 40 centimetres).

## Bogs and Fens: What is the difference?

Precipitation (rain and snow) are the primary sources of water for bogs. Fens receive water from drainage and groundwater. Fens are less acidic and more nutrient-rich than bogs.



**Fens** receive most of their water from groundwater. The water is less acidic and contains more nutrients than bogs. Like bogs, fens also have a high accumulation of peat (greater than 40 centimetres), but because they are less acidic, they can accommodate different vegetation, like sedges, grasses, and wildflowers. Fens can look like open, grassy fields or can be wooded.

## Non-Peatlands



**Marshes**, often called sloughs, form in depressions in the landscape where water collects as standing pools. Emergent plants such as cattails, rushes, and sedges are the dominant vegetation cover. Small marshes between the rolling hills of the prairies are known as potholes.

## Non-Peatlands



**Shallow Water Wetlands** are wide, flat basins of standing water that receive water from rain, snow, and groundwater sources. Water is two metres deep or less. In mid-summer there is often open water in these wetlands, but they may dry out in late summer.



**Swamps** are forests that are flooded seasonally by standing or slow-moving water, and are dominated by trees and shrubs. Swamps are not common in Alberta and are usually confined to the transition zone between peatlands and upland forests. Swamps have a dense cover of both deciduous (leafy) and coniferous (needle) trees and are sometimes called forested wetlands.



## Benefits of Wetlands

Wetlands are among the most fertile, complex, and productive ecosystems on earth. They play an important role in improving the quality and quantity of our water supplies in addition to providing valuable wildlife habitat. Wetlands are recognized and appreciated for their contribution to the health and wellness of Alberta's environment because they:

### Filter surface water

Wetlands improve water quality through filtration. Often called "nature's kidneys", wetlands trap sediment, absorb nutrients, and remove chemical residues. As water passes through a wetland, impurities are removed.

### Recharge groundwater

Wetlands recharge groundwater supplies by soaking up surface water and letting some of it seep back into the ground where it is filtered even further.

### Moderate climate change

Wetland plants take carbon dioxide from the air and "sequester" the carbon in the soil, removing a potentially harmful greenhouse gas from the atmosphere, and replacing it with life-giving oxygen.

### Reduce the effects of drought

Wetlands can provide a valuable source of water for wildlife during times of drought.

### Reduce the effects of flooding

Wetlands help reduce the effects of flooding and soil erosion by storing runoff water and releasing it slowly downstream.

### Are important to the economy

Wetlands provide opportunities for tourism, canoeing, bird watching, nature photography, hunting, fishing, and other activities.

### Support biodiversity

Wetlands support biodiversity and provide food, water, and habitat for plants, birds, mammals, and fish.





## Wetland Issues

Alberta's wetlands are under pressure from land development. Industrial development and human settlement have altered local ecosystems where wetlands have been drained, paved over, or farmed. Although we are more aware than ever of the importance of wetlands, their loss continues in Alberta. Approximately 64 per cent of the wetlands in the settled area of Alberta no longer exist.

Public education, improved stewardship, and careful land management are required to ensure protection of our wetlands. It is important that landowners and land users are knowledgeable and involved in making decisions regarding wetlands to benefit both people and nature. For more information on wetlands in Alberta visit: [www.wetlandsalberta.ca](http://www.wetlandsalberta.ca)

### Did you know?

All water in Alberta is owned by the Crown and managed by the province, regardless of whether it occurs on public or private land. Activities impacting water in wetlands are regulated under the *Water Act*. Before any activity within a wetland is initiated, such as the creation of drainage ditches, infilling or alteration, Alberta Environment must be contacted for approval.



## 2.1e Springs

A spring is any natural occurrence where water discharges on to the surface of the earth from below the surface. Springs are frequently found at break points in slopes. Some springs flow from pools like the “Ink Pots” of Banff National Park. Other springs flow from the bottom of lakes, such as the Blue-hole spring of Maligne Lake. The most common type of spring in Alberta is the contact spring, which is found mainly in the interior plains. They are found at the contact between two layers of material with sharply contrasting permeability. The consistently cool water of a spring may harbor species such as certain types of trout and frogs that are otherwise ill-suited to large temperature fluctuations. Other types of springs are:

- ▶ Seepage or filtration springs (a variety of contact spring). The term seepage refers to springs with small flow rates.
- ▶ Fracture springs discharge from faults, joints, or fissures in the earth where springs have followed a natural course of voids or weaknesses in the bedrock. These types of springs are mainly found in the Rocky Mountain and Foothills Natural Regions of Alberta.
- ▶ Karst springs are landforms produced as a result of solution removal of mineral rocks, which could lead to underground channels or cave systems.

In Alberta, many small springs are used by farmers for their own water supply. Medium to large-size springs are used for commercial purposes. Many businesses, such as Miette Hot Springs and Banff Sulfur Hot Springs feature mineral springs as key tourism attractions around which commercial assets have been developed.



## 2.2 GROUNDWATER

The expression “out of sight - out of mind” is often accurate when considering groundwater. Until water reaches the surface or a well is drilled, we do not see groundwater. It is estimated that more than 90 per cent of rural Albertans depend on wells for their water supply. Water wells are used to supply groundwater to domestic, agricultural, municipal, industrial, and other users in the province. Water wells were first drilled in Alberta in the late 1800's. Of the 400,000 reported wells drilled, approximately 215,000 wells are presently active, and about 4,000 are added each year.

Of all the water licensed for use in Alberta in 2009, approximately 3.0 per cent of the volume is from groundwater sources. Groundwater licences make up 26 per cent of all licences issued. This does not include the domestic water wells used by Albertans for which licences are not required under the *Water Act*.

Generally, a licence is required under the *Water Act* to divert and use groundwater (or surface water) for non-household purposes. Drillers must obtain appropriate approvals from Alberta Environment before they can drill water wells.

### *What is groundwater?*

Contrary to common perception, groundwater in Alberta is not found in underground rivers or massive open spaces. Groundwater is found beneath the earth's surface in gaps and pore spaces between material that may be unconsolidated (loose) such as sand and gravel, or consolidated (hardened) such as sandstone and conglomerate. These underground water bearing materials are called aquifers. Aquifers are recharged when water from the surface percolates into the ground.

### **Did you know?**

Alberta is estimated to have more groundwater than surface water. However, only 0.01 per cent of this groundwater is thought to be recoverable.





## *Where does it come from?*

Groundwater begins as precipitation (rain, snow, sleet, or hail). Precipitation soaks into, or infiltrates, the layers of soil just below ground. In this unsaturated zone, water and air share the spaces between soil and rock creating moist soil conditions for plants.

Some water continues to percolate downward, sometimes hundreds of metres below the surface. Eventually, the small spaces in these areas become saturated with groundwater. This is known as the saturated zone. The upper level of the saturated zone is referred to as the water table. The level of the water table will rise and fall depending on the amount of precipitation occurring in an area.

## *Where is it located?*

Groundwater is found in nearly every area of the province. However, for groundwater to be a recoverable resource, it must exist in an aquifer. An aquifer is a geological formation that can provide sufficient water to support a specified use, such as a household well. Aquifers differ in size; some can support only a single home while others provide water for an entire town.

Like surface water, groundwater supplies are not evenly distributed across the province. Aquifer depths, volume, and water quality also vary. If groundwater is withdrawn faster than it can be recharged, or quality is impacted, the aquifer may cease to be a reliable source.

Generally speaking:

- ▶ In the southern half of Alberta, the Paskapoo aquifer is the most used aquifer system. Of the 200,000 water wells drilled in it, approximately 70,000 are presently active, making this an important aquifer in western Canada. Water quality is variable within the Paskapoo Formation. While it may be more alkaline in the west, it tends to be fresher than groundwater supplies to the east which are more mineralized (i.e., more saline) and not as aesthetically pleasing (e.g., rotten egg smell).

## *Did you know?*

In general, only groundwater within 150 metres of the surface is potable (suitable for household consumption). Although there are exceptions, wells drilled at greater depths run the risk of encountering saline groundwater. Whenever possible, industrial water users look for alternatives to potable water, such as deeper saline groundwater.

- ▶ In central Alberta, shallow sand and gravel aquifers are able to yield up to 100 cubic metres/day ( $\text{m}^3/\text{d}$ ). Most notable are aquifers such as the Buried Red Deer Valley where yields of more than 654  $\text{m}^3/\text{day}$  (100 imperial gallons per minute (igpm)) are expected. Water quality in these aquifers is generally good.
- ▶ In the Peace River area, the main groundwater source is the Grimshaw Gravels aquifer, capable of yields in excess of 655  $\text{m}^3/\text{day}$  (100 igpm) and sandstone lenses of the Dunvegan Formation, capable of yields ranging from approximately 165 - 655  $\text{m}^3/\text{day}$  (25 - 100 igpm). Water quality is generally good within the Grimshaw Gravels and more variable within the Dunvegan Formation.

### *What are some of the issues surrounding groundwater wells?*

#### Quantity Issues

- ▶ Competition amongst users and the number of wells drawing water from an aquifer put an increased demand on our groundwater resources.
- ▶ Unsustainable pumping rates will cause groundwater levels to decline over time as aquifers are depleted.

#### Quality Issues

- ▶ Wells that draw water from multiple aquifers can cause groundwater to drain from one aquifer to another, even when these wells are not in use. Cross-contamination can occur if the draining aquifer has groundwater of a different or lesser quality.
- ▶ Water wells that have not been properly constructed or maintained, or wells that are inactive or abandoned, pose a significant threat to groundwater resources as they provide a direct channel for surface contamination to reach aquifers.



## 2.3 FLUCTUATIONS IN WATER RESOURCES

Variability in water resources is a natural phenomenon. Groundwater levels in aquifers undergo natural fluctuations in response to the rate of recharge (speed at which water moves downward from surface water to groundwater). These natural changes in groundwater levels have repercussions at discharge areas, such as groundwater-fed lakes, rivers, or springs. It is not uncommon to see high discharge springs go dry during certain periods of the year. Similarly, fluctuations in surface water levels and discharge occur naturally. Some ecosystems are even dependent on these fluctuations. Floods wash over flood plains, covering them with mineral and nutrient-rich sediment, providing nourishment for vegetation and other organisms. Minor to moderate droughts are also part of normal cyclical conditions. Vegetation, wildlife, and aquatic ecosystems can adapt to both floods and droughts.

### Floods

A flood occurs when water accumulates at a greater rate than it is drained. The accumulated water can spill over the banks of the river, lake, or wetland, flooding the surrounding land. Different factors may cause flooding including rainfall exceeding the water basin's drainage capacity, or a blockage in the flow of a river caused by ice or logs. Floods can vary in severity, and can result in damage ranging from the loss of vegetation to the loss of animal or human life. Damage can be very costly, and it can take communities years to recover from flooding.

In most cases flooding is a regular and natural event; however, it becomes a greater concern when development or communities occupy a flood plain. A flood plain is low-lying dry land next to a water body. As they are adjacent to water, flood plains are the first to be affected by overflowing waters.

Sixty-six communities in Alberta have development within a flood plain. Some of those communities have built structures to help protect them from flooding, such as the diversion canals in Slave Lake or the dykes in Drumheller and Peace River.

Alberta Environment works with communities across the province to improve flood mapping in high risk communities. Mapping helps us better understand possible impacts of flooding on these communities. It can also assist communities with land use planning.

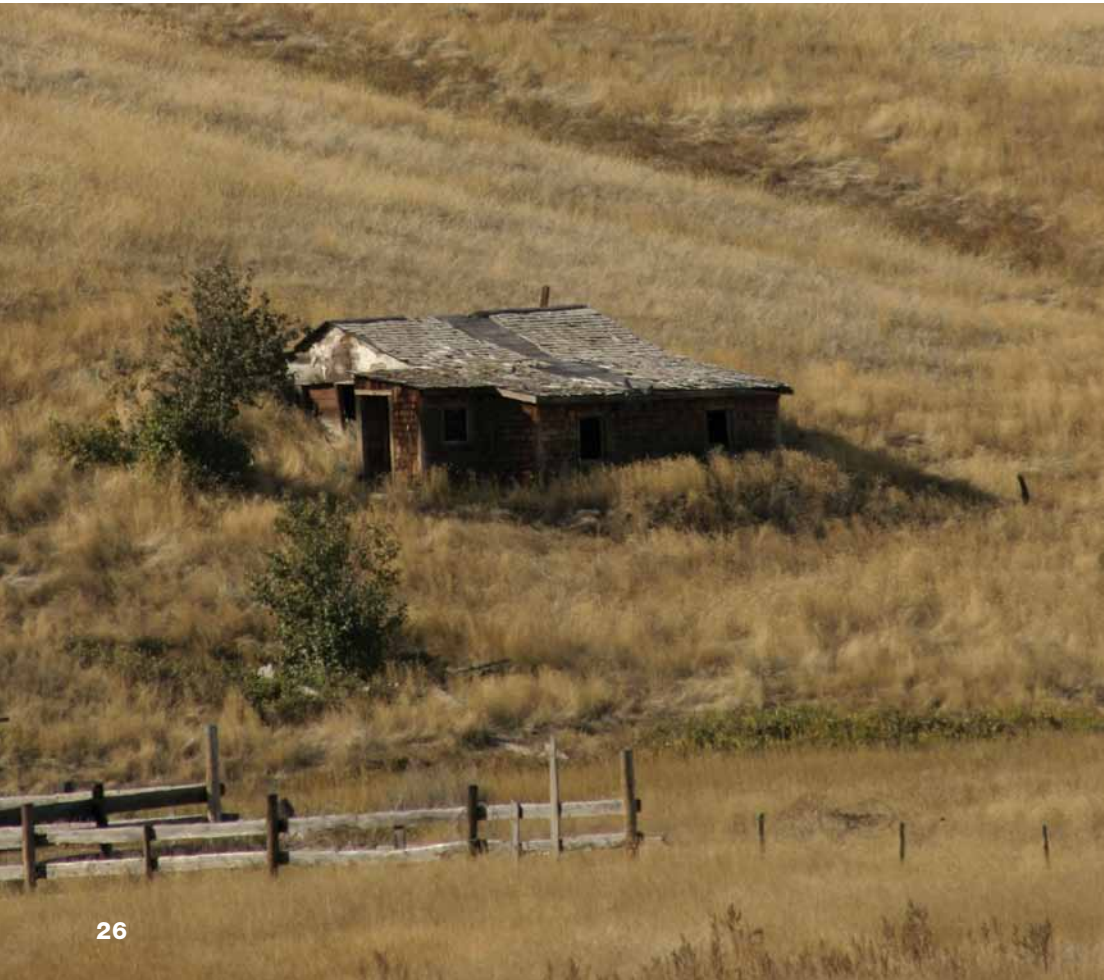
### Did you know?

The cottonwood tree species is dependent on flooding for regeneration. Common in river valleys, the seed of this tree will only sprout in flood-like conditions.

## Droughts

Droughts are a natural event in many areas of Alberta, and occur because of a prolonged lack of precipitation in a region. Water scarcity can result in the degradation or death of vegetation and wildlife. It can also lead to economic losses in agriculture and associated industries. Farmers in Alberta face drought conditions from time to time. Drought occurs frequently in southern Alberta, leading farmers to rely on irrigation works, instead of rain, to deliver water to their crops.

During a drought, there may be insufficient water available to meet the total demand from all users. In some cases, water users may not be able to withdraw water without increasing the risk of impacting the aquatic environment. In times of drought where supply is unable to meet all demands, water diversion priority is given to the users with the longest standing water licences.



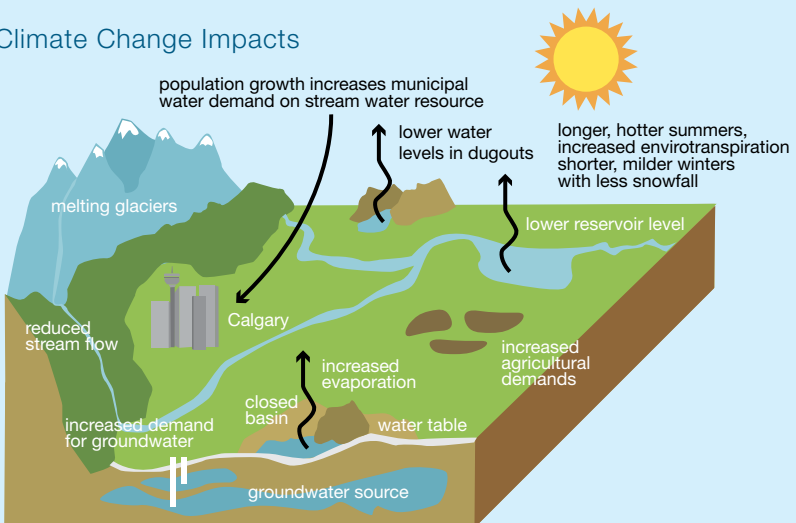
## Climate change

The impact of climate change on water supply is becoming an important issue for Alberta. While potential impacts are uncertain, there is agreement that climate change will cause the water cycle to become more dynamic, leading to an increase of extreme events like floods, droughts, and blizzards. Extreme events are also unfavorable for groundwater recharge conditions. For example, when rainfall intensity increases, it generates bigger, wetter storms, which quickly translate into runoff and a loss for recharge. Some of the impacts that may be seen in Alberta are:

- ▶ changes in location, duration, and intensity of precipitation;
- ▶ decreases in snow accumulation and shorter, warmer winters;
- ▶ increases in evapotranspiration (moisture loss by plants) due to a longer growing season;
- ▶ increases in glacier melt;
- ▶ overall decreases in river flows; and
- ▶ changes in the timing of peak river flows.

The potential for scarcity of water, especially in southern Alberta, is an ongoing issue. Climate change may make this a more pressing issue. As the climate changes, there will be a need to adjust how we manage water and increase conservation. The Government of Alberta is addressing climate change through a long-term strategy that focuses on carbon capture and storage, energy efficiency and conservation, and greener energy production. To learn more about Alberta's Climate Change Strategy visit: [www.environment.alberta.ca](http://www.environment.alberta.ca)

## Climate Change Impacts



## 3.0 WATER QUALITY

Surface water quality varies naturally throughout Alberta according to local conditions such as climate, geology, and vegetation, and is also subject to human influence. There are three major factors that affect water quality:

**Water Quantity** • The amount of water available affects its quality. Major rains and high-flow events typically wash sediment, nutrients, pesticides, bacteria, and other substances off the land and into rivers, thereby lowering water quality. Conversely, the less water there is, the lower the capacity of a water body to dilute and assimilate wastes. Climate change, fluctuating groundwater supply, and increased consumptive demands may therefore affect water quality in the future. These factors could also influence the timing of river flows, which could impact the suitability of habitat for aquatic life.

**Point Source Contamination** • “End-of-pipe” sources of contaminants known as effluents are a result of human activities. Because these sources are easily identified, they are fairly easy to monitor and regulate. The greatest impacts are usually from point sources associated with the discharge of treated wastewater from municipalities and industries. In recent decades, significant and ongoing improvements to wastewater treatment technology have reduced the impact of point source pollution in Alberta rivers.

**Non-point Source Contamination** • These are sources of contaminants that cannot be easily traced. For example, rain and snowmelt can move materials from the land surface into nearby watercourses. Therefore, extensive land-use activities like logging, agriculture, mining, and urban development can impact water quality. This non-point source pollution can include sediment, nutrients, and toxic contaminants. In an urban environment, non-point source pollutants enter waterbodies through storm-drain networks. These pollutants typically include sediment and hydrocarbons from paved areas and pesticides and fertilizers from lawns and parks.

### Did you know?

In many cities, storm drains flow directly to a local water body. This means water running off lawns, driveways, sidewalks, and streets into storm drains is not treated at a sewage treatment plant. Rain can wash fertilizers, oil, salt, and soap directly into local rivers and streams. These wastes can impact aquatic ecosystems and water quality.

Certain pollutants originating from urban, industrial, and agricultural activities can also be transported long distances by atmospheric processes, and deposited directly onto land and waterbodies. Acid rain is one example of this type of impact. This long-range transport can include soil minerals, nutrients, and numerous manmade chemicals. One example is the discovery of persistent pesticides and polychlorinated biphenyls (PCBs) in water and aquatic life of mountain lakes in Alberta.

Each of the above factors represents an opportunity for water quality management. In Alberta, surface water quality guidelines have been established to protect:

- ▶ aquatic life;
- ▶ agricultural uses (stock watering and irrigation); and
- ▶ recreational and aesthetic purposes.

Water quality is usually deemed to be acceptable when the values are within the guidelines. These guidelines are not intended to be used as a “pollute up to” limit.

### Did you know?

The water in lakes and rivers within the oil sands regions will continue to be protected throughout oil sands development. The Alberta government has a zero discharge policy for all process-affected water, it must be contained on site. The provincial and federal governments, industry, and community groups collect thousands of samples every year in the Athabasca region to monitor water quality and to identify effects related to oil sands development.





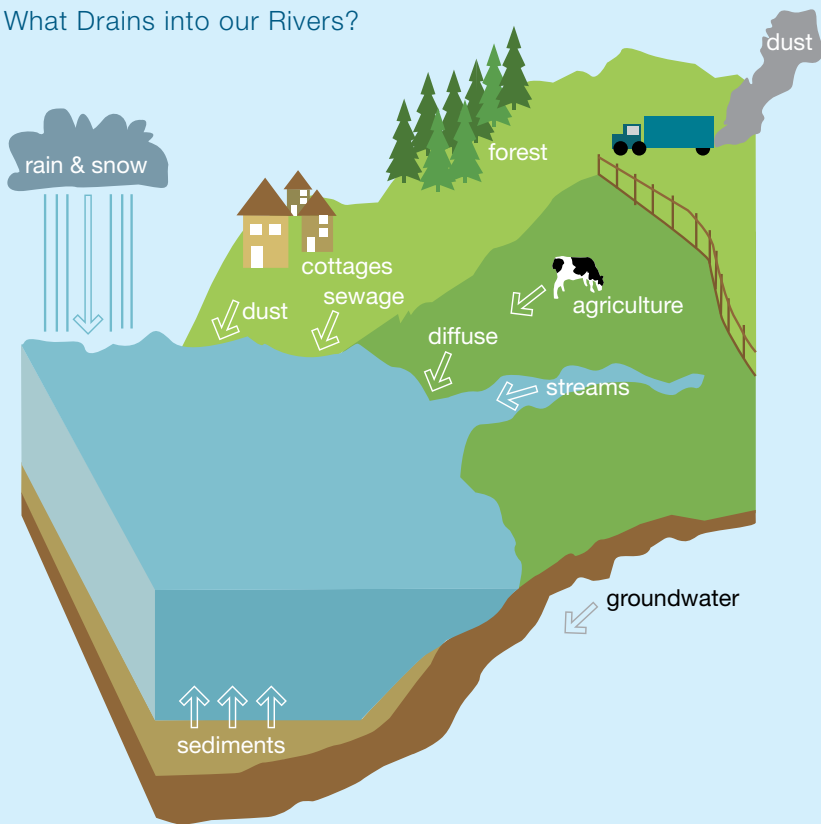
## Phosphorus: friend and foe

Over 40 years ago, phosphorus was big news. Phosphorus, then a common ingredient in household laundry detergents, was identified as the culprit responsible for the excessive growth of algae and aquatic plants in lakes and rivers. Too much phosphorus can fuel the excessive growth of algae and weeds. Not only is the resulting green scum an unpleasant sight, but as the algae blooms die-off, their decomposition uses up dissolved oxygen in the water. Low levels of dissolved oxygen in water can lead to the death of fish and other aquatic animals. Some types of algae can also produce deadly toxins.

When this problem was recognized, most manufacturers reduced the phosphorus (phosphate) content in their detergents. However, phosphorus is also a naturally occurring element. It is abundant in Alberta soils, and small amounts are a necessary part of the aquatic food chain supporting algae consumed by small animals.

In Alberta, the amount of phosphorus that municipalities and industries discharge into water bodies is regulated under the Alberta *Environmental Protection and Enhancement Act*. Through pollution prevention strategies, and by applying the latest technologies, municipalities and industries can significantly reduce the amount of phosphorus in wastewater. Some municipalities in Alberta have implemented a phosphorus reduction program that has greatly reduced phosphorus discharged to water bodies. Limiting phosphorus-laden runoff from lawns and agricultural land continues to require careful management of fertilizers, as well as the adoption of beneficial management practices.

## What Drains into our Rivers?



## Tips for Reducing Phosphorus Pollution from your Home

- ▶ Use appropriate fertilizers and apply to areas according to product instructions. Prior to fertilizing, test lawns and gardens to ensure you are applying what your soil needs.
- ▶ Do not over fertilize. Excess fertilizer can run off and pollute nearby water bodies.
- ▶ Pick up pet waste and dispose of it properly.
- ▶ Protect riverbanks and shorelines. Keep soil covered with vegetation to minimize erosion.
- ▶ Compost kitchen scraps rather than use a garbage disposal. Some types of food are high in phosphorus and may be great for your garden, but need to be kept out of the wastewater system.

## 3.1 Monitoring

As Alberta's population increases, the impacts of municipal, domestic, industrial, and agricultural water use on water quality also increase. Continued monitoring and an increased understanding of water quality is essential if we are going to manage water resources in an adaptive and sustainable manner. Scientists use data, collected in extensive monitoring and research programs to assess the condition of surface water. Alberta Environment uses this information to establish policy and legislation that protects water quality for aquatic ecosystems and provides sufficient water resources for a sustainable economy.

Water quality measurements fall into three broad categories and can be used together to describe the overall quality or "health" of aquatic ecosystems:

- ▶ **Physical characteristics** such as temperature, colour, suspended solids, and turbidity.
- ▶ **Chemical characteristics** such as nutrients, minerals, metals, dissolved oxygen, organic compounds, and a wide range of pollutants (e.g., pesticides, hydrocarbons, pharmaceuticals, PCBs).
- ▶ **Biological characteristics** such as the types and quantities of bacteria, protozoan parasites, algae, invertebrates, plants, and other animals in water.

An important indicator of water quality is its ability to support different types of life. Many aquatic organisms need specific conditions to live, such as a high concentration of dissolved oxygen or cool temperatures. The number and type of aquatic invertebrates and fish within a stream or lake can be a good indicator of water quality in the system. Generally, a high dissolved oxygen level indicates good water quality.

## Monitoring Programs - Groundwater

Alberta Environment oversees a network of over 250 wells spread across the province known as the Groundwater Observation Well Network (GOWN). Approximately 200 of these wells are used to measure groundwater levels, and 160 are used for water quality sampling purposes. These wells vary in depth from a few metres to over 100 metres, and are completed over a wide range of aquifer types (e.g., bedrock, surficial, buried valleys, confined, unconfined). Groundwater monitoring results can be found on AENV's website at [www.environment.alberta.ca/apps/GOWN/Default.aspx](http://www.environment.alberta.ca/apps/GOWN/Default.aspx) and on the State of the Environment webpage at [www.environment.alberta.ca/3716.html](http://www.environment.alberta.ca/3716.html)

## Monitoring Programs - Surface Water

Surface waters in Alberta are monitored by several government, industry, and stakeholder groups. Monitoring generates the data required to evaluate water quality and aquatic ecosystem conditions over a broad area of the province. Monitoring also supports the shared responsibility to manage cumulative effects and protect water quality and aquatic ecosystems.

To support these efforts, Alberta Environment conducts extensive water quality monitoring, reporting, and evaluation. Surface water quality data collected by the Alberta government and its partners are stored in an electronic database. For example, the Long-Term River Network (LTRN) generates information to calculate the River Watch Quality Index (RWQI). This information provides a general assessment of water quality at the 24 LTRN sites on the province's major river systems. In most cases, the sites represent the conditions upstream and downstream of areas of significant human activity.

Visit: [www.environment.alberta.ca/01275.html](http://www.environment.alberta.ca/01275.html)

Index ratings reflect the volume of river flow, climatic conditions, local geology, the degree of development along rivers, non-point sources of runoff (such as livestock grazing), and point sources of effluent that discharge into rivers. A number of natural and human factors can influence these index values. Alberta's *Water for Life* strategy, intends that all these factors will be considered in the protection of water quality and aquatic ecosystems. In keeping with this approach, continuous improvements to river water quality are being made, through upgrades to municipal wastewater treatment facilities and infrastructure, and enhanced land use practices.

Lakes are also monitored with support from partnerships with Alberta Tourism Parks and Recreation, Alberta Lake Management Society, and the Regional Aquatics Monitoring Program. In north-east Alberta water stewardship groups use information generated by lake monitoring when developing watershed and lake management plans.

## 4.0 WATER ALLOCATION & WATER USERS

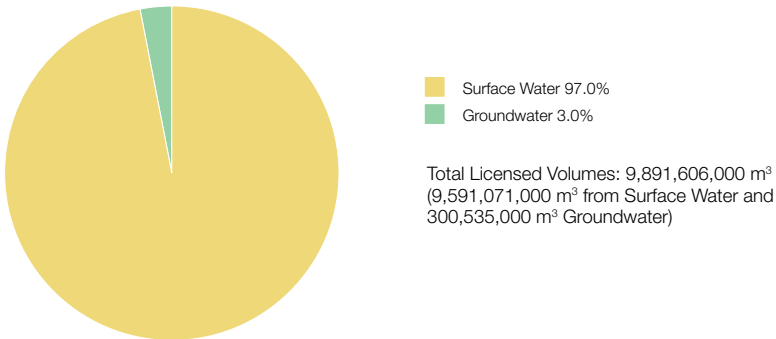
In Alberta, water diversions are managed primarily through a system of water licences issued by Alberta Environment under the *Water Act*. Municipalities, private companies, individuals, and others can apply for a licence to divert water. Diverted water is the amount of water a licence holder is permitted to withdraw from a water source in one year. It is usually expressed as an “allocation” consisting of a volume (e.g., cubic metres, acre-feet), a maximum pump rate, and timing when a licensee is allowed to pump. The total withdrawal over the year cannot exceed the volume of water specified in a licence.

Examples of diverted water uses include:

- ▶ agriculture;
- ▶ industry;
- ▶ commercial (e.g., golf courses, gravel pit operations); and
- ▶ municipal.

### Total Water Allocations in Alberta\*

by Source (2009)



Of all the water licensed in Alberta in 2009 (9.89 billion m<sup>3</sup>):

- ▶ 97 per cent (9.59 billion m<sup>3</sup>) of the volume is from surface water sources; and
- ▶ 3 per cent (301 million m<sup>3</sup>) of the volume is from groundwater sources.

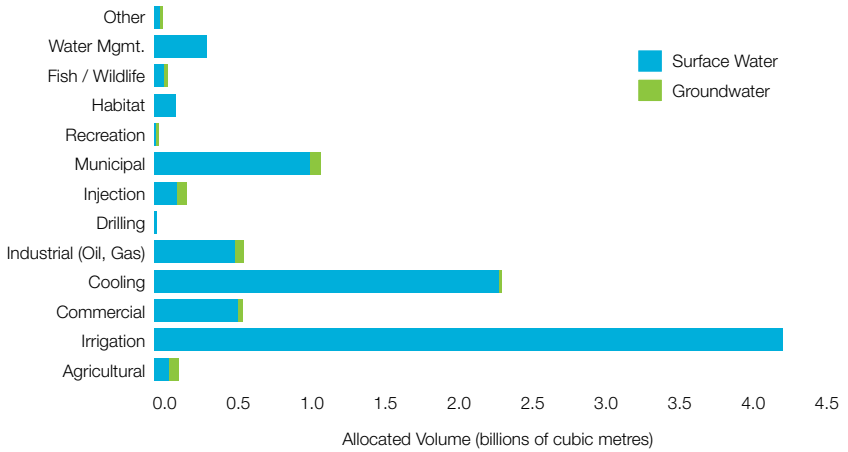
Water is allocated to 187,551 licence holders:

- ▶ 49,376 (~26 per cent) are groundwater licence holders; and
- ▶ 138,175 (~74 per cent) are surface water licence holders.

\* Based on allocations, users are legally entitled to divert these amounts annually, but the actual amounts used each year may vary. Depending on the purpose, some or all of the water originally diverted may be returned to the source.

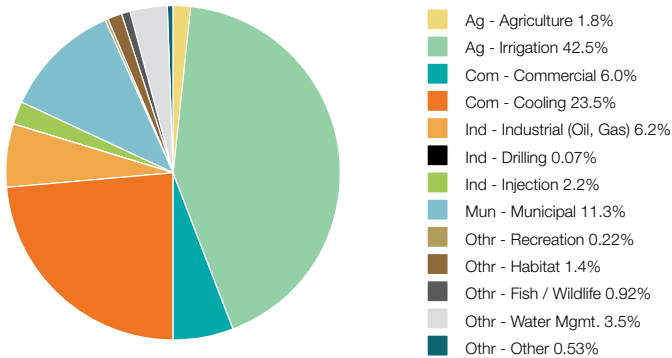
## Water Allocations in Alberta\*

by Specific Purpose (2009)



## Water Allocations in Alberta\*

by Specific Purpose (2009)

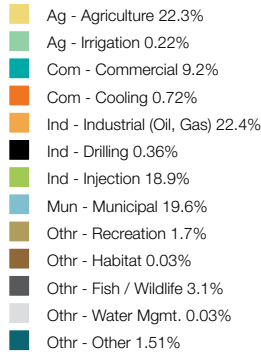
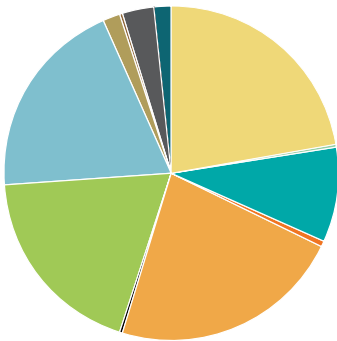


Total Licensed Volumes: 9,891,606,000 m<sup>3</sup>  
 (9,591,071,000 m<sup>3</sup> Surface Water;  
 300,535,000 m<sup>3</sup> Groundwater)

\* Based on allocations, users are legally entitled to divert these amounts annually, but the actual amounts used each year may vary. Depending on the purpose, some or all of the water originally diverted may be returned to the source.

## Groundwater Allocations in Alberta\*

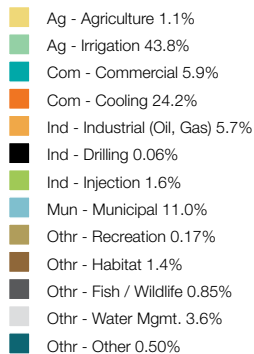
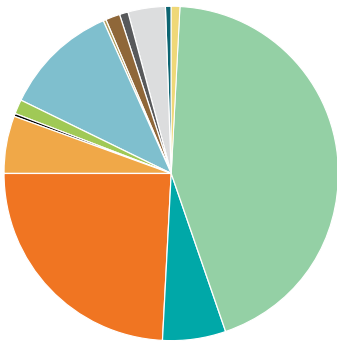
by Specific Use (2009)



Total Licensed Groundwater Volumes: 300,535,000 m<sup>3</sup>

## Surface Water Allocations in Alberta\*

by Specific Use (2009)



Total Licensed Surface Water Volumes: 9,591,071,000 m<sup>3</sup>

\* Based on allocations, users are legally entitled to divert these amounts annually, but the actual amounts used each year may vary. Depending on the purpose, some or all of the water originally diverted may be returned to the source.



Surface water and groundwater allocations vary by sector or industry. The sectors with the largest allocations of surface water are irrigation, cooling uses for thermal power generation, and municipal water supply. In contrast, the sectors with the largest allocations of groundwater are oil and gas (enhanced oil recovery and processing), agricultural use (non-irrigation), and municipal water supply.

Water allocations also vary from watershed to watershed. In 2009 Alberta Environment allocated from the Bow River Basin a total of 2.74 billion m<sup>3</sup> of water.

- ▶ 73 per cent was used for irrigation; and
- ▶ 17 per cent was for municipal water use in the City of Calgary.

In 2009 Alberta Environment allocated from the North Saskatchewan River Basin a total of 2.01 billion m<sup>3</sup> of water.

- ▶ 79 per cent was for thermal power plants; and
- ▶ 7 per cent was for municipal water use in the City of Edmonton.



Water allocations do not directly reflect actual use or consumption of water. Rather, an allocation volume represents the maximum amount of water granted for use on an annual basis. The allocation volume (or maximum annual diversion) is made up of three components in a license:

- ▶ consumption;
- ▶ losses; and
- ▶ return flow.

Actual water diversion information is important to determine how much water Albertans are using overall. Large water users are generally required to report how much water they have diverted, consumed, and returned each year. The reason being, the majority of water volume used and consumed can be accounted for by a relatively small number of large licences. This is particularly the case in the south, where the irrigation districts account for a major portion of the allocated water. However there are years when an entire allocation is not required. For example, irrigation's use of water is typically lower during wet years because of higher than expected rainfall and surface runoff.

Many water users will return some or most of their diverted water back to the source following its use. For instance, thermal power plants withdraw large volumes of water for cooling purposes, however much of that diverted water is cycled through the operation and returned back to the source. Similarly, municipalities tend to return upwards of 80 to 90 per cent of their original water diversion after use and treatment. Water license applications are carefully reviewed to ensure that the amount of water allocated is reasonable for the intended use.

To properly manage our water resources, Alberta Environment must have as clear a picture as possible of how much water is allocated, diverted, consumed, and returned.



**Water Allocation:** The maximum amount of water that a user can legally take from a water source on an annual basis.

**Water Licence:** The legal document issued under the *Water Act* giving a user the right to divert at a maximum rate, and for a specific maximum quantity of water per year, at a specific location, for a particular purpose.

**Water Diversion:** The amount of water a user actually takes from a water source, usually expressed as a volume (e.g., cubic metres, acre-feet) over time (e.g., per week, per year etc.).

**Water Use (consumptive use):** Water use is equal to water diverted minus return flow component. Consumptive uses also include water lost through evaporation or through leakage.

### Did you know?

Alberta Environment's Water Use Reporting System allows water licencees to report their water diversions online. Licencees may enter the data on a daily, monthly, or annual basis depending on the reporting requirement of their licence. Visit: [www.environment.alberta.ca/01301.html](http://www.environment.alberta.ca/01301.html)



## 4.1 Agriculture

Whether managing a livestock operation, growing grain or supporting a farmhouse, water is a necessary component of any agricultural operation. Water allocations for the agricultural sector include licences issued for non-irrigation uses such as stock watering and feedlots, and irrigation uses.

Depending on the location in the province and type of use, a farm may need surface water, groundwater, or both. As of 2009:

- ▶ Non-irrigation agricultural use accounted for 22.3 per cent of the province's total allocation from groundwater sources.
- ▶ Irrigation accounted for 43.8 per cent of the province's total allocation from surface water sources. However in the South Saskatchewan River basin where irrigation is most prevalent, irrigation accounted for 72 per cent of the total allocation.

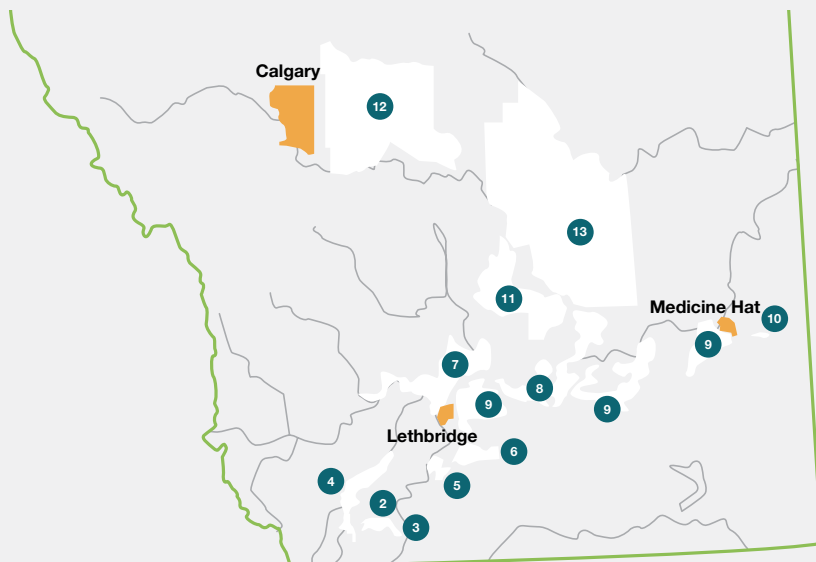
Irrigation is one of the primary methods for improving agricultural productivity and crop diversification in the warm, semi-arid regions of the province. In southern Alberta, more than 505,000 hectares of land are serviced by 13 irrigation districts. The irrigation districts have networks of reservoirs and water delivery infrastructure that are used to support agricultural production. Additionally, water is supplied by the districts to nearly 50 communities for municipal use.

### Where do the irrigation districts get their water?

The majority of the water used by irrigation districts in Alberta comes from rivers in the South Saskatchewan River Basin including the St. Mary, Bow, Oldman, and their major tributaries. A relatively smaller supply comes from the Milk River, a tributary of the Missouri-Mississippi River system.



## Alberta's Irrigation Districts



- |                  |            |                        |                |
|------------------|------------|------------------------|----------------|
| 1. Mountain View | 4. United  | 7. Lethbridge Northern | 10. Ross Creek |
| 2. Leavitt       | 5. Magrath | 8. Taber               | 11. Bow River  |
| 3. Aetna         | 6. Raymond | 9. St. Mary River      | 12. Western    |
|                  |            |                        | 13. Eastern    |

Irrigation district: An organization that owns and manages a water delivery system for a given region, usually for agricultural purposes.

The Government of Alberta owns and operates more than 200 water management systems. For example, the Carseland Weir southeast of Calgary diverts water from the Bow River mainly for irrigation.

## 4.2 Industrial (Oil and Gas)

Water is essential to recover and process Alberta's extensive petroleum and natural gas reserves. For example:

- ▶ Drilling rigs are used to reach the oil and gas, heavy oil, or in situ oil sands. Rigs use water to make a special fluid called “mud.” The mud helps bring rock chips to the surface and keeps the drill bit cool from friction against the rock. Surface water is usually used for drilling, but groundwater may also be used.
- ▶ Enhanced recovery of conventional oil reserves requires water (or another fluid, like carbon dioxide) to displace oil in a formation for extraction. This requirement is to maintain pressure in the oil reservoir. Surface water or fresh groundwater is normally used but industry has been steadily increasing its use of saline groundwater (under the *Water Conservation and Allocation Guidelines for Oilfield Injection*), which is not normally usable for other purposes.
- ▶ In situ oil sand areas are normally too deep to mine; therefore water is used to make steam that is injected into the oil formation. The injected steam heats the oil sands and allows crude oil to flow to the surface. The average in situ project uses roughly half a barrel of freshwater to produce a barrel of oil. In situ projects must investigate use of deep-well salt water as an alternative to freshwater under the *Water Conservation and Allocation Guideline for Oilfield Injection*. Freshwater that is used usually comes from groundwater sources.
- ▶ Oil sands mining operations use water as part of the process to separate oil from sand. The average oil sands surface mine uses between two and five barrels of freshwater to produce a barrel of oil. These mines get most of their water from the Athabasca River, with strict limits on how much water they can remove. All current and approved oil sand mines are restricted to 15 per cent or less of the available river flow on a weekly basis and to less than three per cent of the average annual river flow. This ensures that the allowable withdrawal is smaller when flows are naturally lower. Oil sands producers are committed to further reducing water use and continuing to increase the use of recycled and non-potable water.





- ▶ Oil sands upgraders, oil refineries, and petrochemical plants use water for heating and cooling purposes. Oil and gas refineries also use water to convert fossil fuels into a useable form. Much of the water can be treated and reused, while the rest may eventually be discharged as effluent. Water is also broken down to its elemental constituents of oxygen and hydrogen with each constituent being used in specific industrial processes. For example, hydrogen is used to “strip” sulfur in the diesel refining process to make low sulfur diesel fuel.

Alberta Environment regulates the amount and release of industrial effluent to protect the environment and human health. This is mainly achieved by issuing approvals, and through the use of codes of practice that limit effluent releases from industrial activities. The department works with other government agencies, industry, and the public to develop standards, guidelines, and policies for the protection of Alberta’s aquatic systems.





### Did you know?

In 2009 industrial and commercial activities held about 52 per cent of the groundwater allocations in the province and about 37 per cent of the surface water allocations.

## 4.2a Power Generation (non-hydro)

Electricity (or power) is produced by generating plants using a variety of fuels such as coal, natural gas, wind, and water. Next to fuels, water is the most important resource used in large-scale thermal power production. The primary use of this water is for condensing steam (cooling steam back into water). Water is also used to make up high pressure steam for rotating turbines to generate electricity, clean pipes and other equipment, and remove sludges from the water purification process.



### 4.3 Hydroelectric Dams and Reservoirs

A typical hydroelectric or water power development consists of three main parts: a human-made dam across a river, a water storage reservoir created by the dam, and a hydroelectric generating plant. During operations, water is passed from the reservoir through large tunnels in the dam, and through turbines located in the power generating plant. The force of the water flow turns the turbines, which rotates the power generating units to create electricity. Hydroelectric power generation is an example of non-consumptive use; all of the water used is released back into the river. Dams alter seasonal river flows, typically reducing natural higher spring flows and increasing winter flow.

There are 22 hydro power developments in Alberta. Together, Alberta's hydroelectric generating facilities are capable of producing approximately seven per cent (871 megawatts) of Alberta's total electrical generation capacity. The Bighorn plant located on the North Saskatchewan River near Nordegg produces the most electricity annually, generating enough electricity to power approximately 58,300 Alberta households. These generating plants are important for supplying power during periods of sudden increased demand. The plants can begin producing electricity within a matter of minutes.

When the Bighorn Water Power Development was built, it created Abraham Lake, Alberta's largest constructed reservoir. Many such reservoirs are popular places for recreational activities. Albertans enjoy using these reservoirs and surrounding areas for boating, windsurfing, sailing, fishing, and camping. As with many reservoirs, these lakes were built as part of a power project; therefore, their levels are always changing.

Reservoir: A constructed water body that collects and stores water for future uses.



## What is the Government of Alberta's role in approving and regulating dams, weirs, and other water management infrastructure?

Alberta Environment administers the *Water Act*, which provides the authority to divert water for things like hydro developments. Dams are often controversial projects, and the debate over the economic benefits versus the environmental impacts continues. Dams and reservoirs alter the amount of water flowing in a river and when it will flow. Before a dam is built, all aspects of the nearby terrestrial and aquatic ecosystems are analyzed to assess potential and cumulative impacts of the proposed development.



## 4.4 Municipal Water Supply – Drinking Water

In Alberta, the majority of people (approximately 90 per cent) get their drinking water from municipal systems approved by Alberta Environment. The remaining Albertans, including many First Nations and rural communities, obtain water from private systems such as wells, water co-ops, or by hauling water. Municipal water is treated (to drinking water quality standards) for use within the municipality or the service area and is used for a combination of residential (household), industrial, and commercial use.

Municipal water systems, their operator certification, water source protection, and compliance are covered under the *Environmental Protection and Enhancement Act* and various related regulations, codes, and approvals. By law in Alberta, these systems must be constructed to Alberta Environment design standards and operated according to provincial facility approvals.

Effective treatment is paramount to ensure water is safe to drink. Water treatment facility operators, Alberta Environment, and Alberta Health Services each have a responsibility to ensure safe drinking water for Albertans. Facility operators are responsible for the day-to-day operation of treatment plants, and must operate in accordance with the standards set out by Alberta Environment. Facility owners are required to report to Alberta Environment anytime they cannot meet their specified terms and conditions.

The Provincial Laboratory of Public Health (Microbiology) performs microbiological testing of drinking water samples taken by the system owner. Drinking water quality concerns are reported to and addressed by Alberta Health Services.

Alberta Environment requires compliance monitoring at water treatment facilities, which includes a minimum of one or more tests for bacteria each week. The samples are submitted to the provincial health laboratories in Edmonton and Calgary for analysis.

## Drinking Water

All surface water must be treated for human consumption. Guidelines that apply to treated water have been developed for drinking water. Once surface water is treated, it can be evaluated against the *Guidelines for Canadian Drinking Water Quality*. Of course, the cleaner the raw water is to begin with, the easier and less costly it is to treat.

### *Q. Where does our drinking water come from?*

Alberta's drinking water comes from surface water sources such as rivers, lakes or reservoirs, or from groundwater. Groundwater is further divided into two distinct types:

- ▶ shallow groundwater – water that can be impacted by a surface water source; and
- ▶ high quality groundwater.

Shallow groundwater that can be impacted by surface water is also referred to as groundwater under the influence or *groundwater under the influence of surface water* (GUI). To ensure the health of Albertans is protected, GUI is treated in the same manner as surface water because it may contain the same pathogens, microbiological organisms, or organic contaminants. High quality groundwater is not subject to the same health related concerns and therefore does not require the same level of treatment.

### **What is source protection?**

Source water is untreated water from rivers, lakes, streams, and groundwater that is ultimately treated and used for drinking water. Source protection is about protecting the quality and quantity of these water sources. Source protection is integrated into a water management plan to ensure a good quality water supply is maintained.

### Q. *How can we be sure Alberta's drinking water is safe?*

Drinking water safety depends on a number of key elements:

- ▶ good water supply, including source protection;
- ▶ effective treatment systems;
- ▶ proper operation and maintenance of waterworks systems, including mandatory training and certification of operators;
- ▶ comprehensive monitoring of drinking water quality; and
- ▶ appropriate steps for correction and enforcement.

Alberta Environment's drinking water program addresses all of these elements.

### Q. *Why does drinking water need to be treated?*

It should always be assumed that surface waters are unsafe to drink unless treated. The main reason for treating or disinfecting public water supplies is to kill pathogens. Pathogens are disease-causing micro-organisms that can be transmitted by water. Some examples of water-borne diseases and disease-causing organisms are: *cholera*, *typhoid*, *E. coli*, *Giardia* and *Cryptosporidium*. Even a mountain stream not disturbed by human activities could contain naturally occurring parasites, such as those from wildlife feces.

### Q. *How is Alberta's water treated?*

In Alberta, the minimum level of treatment for surface water sources and shallow groundwater that can be impacted by surface water is either chemically assisted filtration and disinfection, or slow sand filtration and disinfection. Occasionally additional treatment is required, depending on the nature of the water source. Deep groundwater sources usually don't require treatment such as filtration, but do require continuous and effective disinfection. Water found in aquifers is generally of good quality because the earth's underground formations act as a filter removing many impurities.

For information on public water supplies, contact your local municipality or visit: [www.environment.alberta.ca/apps/RegulatedDWQ](http://www.environment.alberta.ca/apps/RegulatedDWQ)



*Q. What if I don't get my water from a public drinking water system?*

Albertans who get their drinking water from sources such as groundwater wells, dugouts, or cisterns are responsible for making sure their water is safe. Individuals are responsible for having their water tested regularly, and treating it based on water quality reports. Public health laboratories provide Albertans with bacteriological water analysis services for public health purposes. Alberta Health and Wellness funds these facilities and access is provided through Alberta Health Services. A handling fee may be required. Private laboratories can perform testing for routine chemistry and trace metals.

For information on maintaining private water wells visit:  
[www.environment.alberta.ca/01317.html](http://www.environment.alberta.ca/01317.html)

*Q. What kind of testing should I do on the water in my private well?*

Water from private wells should be tested at least once a year for potentially harmful bacteria. A routine chemical analysis should be done every three to five years to monitor the chemicals in the water and identify changes if they occur. Non-routine, specialized testing can be done for chemical contaminants such as pesticides or hydrocarbons when unusual situations occur that cause concern about the safety of the drinking water. For information on how to have water from private systems tested, contact your local Alberta Health Services office.

**One of the best drinking water programs in Canada**

Alberta was the first province and remains one of only a few that requires stricter rules for drinking water quality than those outlined in the *Guidelines for Canadian Drinking Water Quality*. Alberta requires all waterworks, regardless of size, to meet the same treatment design and performance standards for drinking water quality. In contrast, the United States Environmental Protection Agency's requirements are based on the size of the population served by a waterworks system.

Alberta has comprehensive and stringent operating, monitoring, and reporting requirements, including a regulatory requirement that all operators of municipal drinking water systems are certified by Alberta Environment.



*Q: What is the difference between hard water and soft water? Is one safer to drink than the other?*

The hardness of water relates to the amount of calcium, magnesium, and/or iron in the water. The more minerals present, the “harder” the water. Soft water may contain sodium and other minerals or chemicals; however, it contains very little calcium, magnesium, or iron. Very soft water may not be as palatable as water that contains some hardness, but you can drink either soft or hard water. The most “acceptable” drinking water is moderately soft to slightly hard.

*Q. What is the Government of Alberta’s role in ensuring the safety of drinking water?*

Alberta Environment regulates public waterworks systems in the province in accordance with Alberta’s *Environmental Protection and Enhancement Act*. The department works closely with Alberta Health and Wellness, Alberta Health Services and drinking water facilities to ensure Albertans receive high quality drinking water.

Alberta Environment issues approvals to municipalities for operating waterworks in the province. These approvals clearly outline the responsibility of municipalities for:

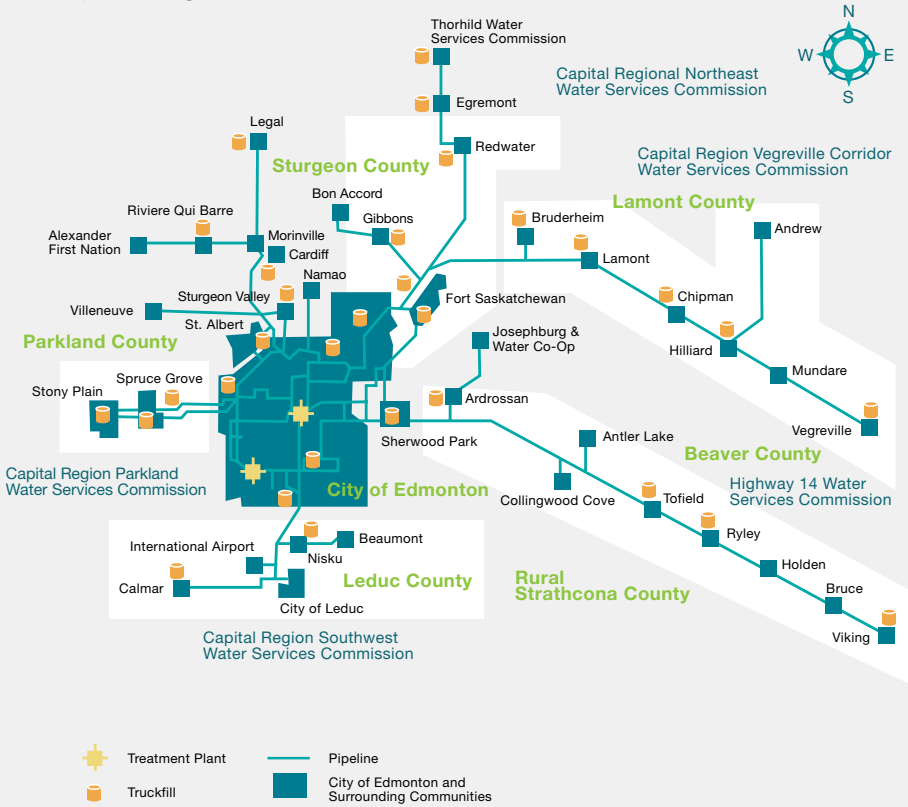
- ▶ treatment requirements;
- ▶ performance standards;
- ▶ compliance sampling;
- ▶ monitoring; and
- ▶ reporting requirements.

By law, treatment facilities in Alberta must meet standards based on Health Canada’s stringent *Guidelines for Canadian Drinking Water Quality*. Alberta Environment works cooperatively with owners and operators of municipal water treatment systems to prevent the occurrence of drinking water problems. In addition, the department has an active enforcement and communications program to deal effectively with emergency situations, such as failed bacteriological tests.

**Did you know?**

Albertans living adjacent to a water body or above a source of groundwater have the statutory right to use up to 1250 m<sup>3</sup> of water per year for human consumption, sanitation, and other smaller household uses.

# Capital Region Service Area



Credit: EPCOR

## Did you know?

Some of Alberta's major municipalities supply drinking water to the smaller surrounding communities. Edmonton has the largest regional supply system in the province, providing drinking water to other urban and rural communities, some more than 100 kilometres away.

Regionalization of drinking water systems holds great promise for addressing many of the challenges being faced by communities. Alberta Environment is seeking to expand the role of regional water delivery in the province, with a resulting reduction in the number of "stand-alone" water facilities. The intent being, that a reduction in the total number of water treatment facilities would correspondingly reduce the number of systems at risk, and through economies of scale, improve the level of service to the public.

## 5.0 WATER MANAGEMENT

For over 100 years, Albertans have withdrawn water from Alberta's rivers, lakes, and aquifers for a variety of human purposes. The province has had the responsibility for allocating water resources since the *Natural Resources Transfer Agreement* was passed in 1930, transferring federal control to provincial control. The *Water Resources Act* governed water management for close to 70 years (1931-1999) although several amendments were made over that time. In 1991, Alberta Environment reviewed the existing water policy and legislation in Alberta. Water legislation in other jurisdictions (e.g., Australia, United States) was also reviewed to identify alternative tools that might be applied in the Alberta context. Following this comprehensive review and input from Albertans, the *Water Act* was proclaimed in January, 1999.

The *Water Act* supports and promotes the conservation and management of water, including the wise allocation and use of water. It also recognizes the need for planning and enforcement components to achieve those desired outcomes expressed by Albertans. Albertan's views, and the corresponding legislation, have shifted from being mostly focused on allocation of water, to a planning approach with a goal of living within our means. Within each watershed, a limited amount of water can be withdrawn while still maintaining a healthy aquatic ecosystem. Growth pressures coupled with our increased knowledge of what is needed to maintain healthy aquatic ecosystems, has created the need to renew how we use and allocate this renewable, but scarce resource.

The current water allocation management system establishes priority based on 'first in time, first in right,' providing some certainty for users that invested in water licences in the past. During times of shortage, senior water licence holders are entitled to their allocation of water before more junior water licence holders, regardless of purpose. However, there are provisions in the *Water Act* that allow the Minister of Environment to address issues in an emergency. The *Water Act* also provides a statutory top priority right to water use for household purposes that meet certain criteria, over all other water uses.



Before a water licence is issued to divert and use surface or groundwater, Alberta Environment considers:

- ▶ the water source;
- ▶ location of the diversion site;
- ▶ volume, rate, and timing of the water to be diverted;
- ▶ priority of the water right established by the licence;
- ▶ purpose (specified use) of the water;
- ▶ any conditions the diversion must adhere to;
- ▶ natural water supply;
- ▶ needs of the environment;
- ▶ existing licences; and
- ▶ apportionment agreements.

If the water licence application is approved, the applicant is granted a licence for a specific water allocation (amount, time of diversion, rate, and location).

**Note:** Licences to divert water are not required for statutory household use, traditional agriculture use, fire-fighting, wells equipped with hand pumps, alternate watering systems that use surface water for grazing livestock, and some types of dugouts.

The *Water Act* allows agricultural water users who used water prior to January 1, 1999 and filed a registration prior to 2003 (to raise animals and to apply pesticides to crops), to register their water use, and to receive a priority number dating back to the time of first use. This registration process provided a fair mechanism of protecting traditional agriculture water uses while at the same time minimizing the impact on existing licensed users.



## Water Management Plans

Water management plans provide broad guidance for water management, set out clear directions regarding how water should be managed, or result in specific actions. The planning process addresses multiple issues, involves stakeholders, and produces resource management recommendations. The results of planning must be consistent with the *Water Act* and other legislation, regulations, and policies. The *Water Act* includes provisions for:

A Director under the *Water Act* to:

- ▶ create, authorize, and approve water management plans;
- ▶ issue or deny approvals and licences; and
- ▶ conduct monitoring and enforcement activities and numerous other responsibilities.

The Minister of Environment to:

- ▶ create Crown Reservations (a tool under the *Water Act*) that allows the Minister of Environment to specify the purpose and priority of use for that water; and
- ▶ request that a water management plan be developed by the Director.

The Lieutenant Governor in Council (Cabinet) to:

- ▶ approve a water management plan; and
- ▶ approve an individual application for a transfer of allocation, or approve transfers for areas that have a cabinet level approved water management plan.

### **South Saskatchewan River Basin Water Management Plan**

In August 2006, the Government of Alberta approved the water management plan for the South Saskatchewan River Basin. This plan sets water conservation objectives for the major rivers within the basin and provides a long-term vision for water management in southern Alberta. Approval of the plan was a monumental decision, as the Government of Alberta no longer accepts applications for new surface water licences for the Bow, Oldman, or South Saskatchewan sub-basins. This decision balances the needs of the environment with the needs of existing licence holders and obligations to downstream jurisdictions. In the South Saskatchewan River Basin, a new era of water management has begun in which water must be managed more carefully, given the significant pressures within the basin.

To learn more visit: [www.environment.alberta.ca/01233.html](http://www.environment.alberta.ca/01233.html)

## Inter-basin Transfers

An inter-basin transfer refers to the physical transfer of water between the major river basins as defined in the *Water Act*. Inter-basin transfers draw debate, especially from those concerned that the natural flow of rivers could be upset, and the environment and aquatic ecosystem could be harmed. Since each water source has specific biological, chemical, and physical properties, mixing water from one source with another can have varying, even drastic effects to the aquatic environment. Tremendous costs associated with water diversion and related infrastructure has also caused many people to question the merits of inter-basin water transfers. The subject of inter-basin water transfers was debated extensively in Alberta in the 1960s and 1970s.

Currently, inter-basin transfers between major river basins are not allowed under the *Water Act*, unless authorized by a special Act of the Legislature. Further, the *Water for Life* strategy includes the principle that Alberta's water resources must be managed within the capacity of an individual watershed.

## Transboundary Agreements

The purpose of a transboundary agreement is to manage water resources with neighbouring jurisdictions and to establish clear objectives, rights, and obligations at the border. In cases where rivers flow from one province to the next, or between the United States and Canada, transboundary agreements are in place to ensure that agreed upon standards for water quality and quantity are maintained. Alberta currently has two formal trans-boundary agreements:

### 1. Master Agreement on Apportionment (1969)

The governments of Alberta, Saskatchewan, Manitoba, and Canada entered into a Master Agreement on Apportionment, for sharing the waters of eastward flowing interprovincial streams.

The sharing of waters of eastward flowing streams (such as Cold River, Beaver River, North Saskatchewan River, and Battle River) between Alberta and Saskatchewan is governed by Schedule A of the agreement, which states that Alberta must pass 50 per cent of annual flow to Saskatchewan, on each and every stream flowing from Alberta to Saskatchewan. For more information visit: [www.environment.alberta.ca/01706.html](http://www.environment.alberta.ca/01706.html)

### 2. Boundary Waters Treaty (1909)

This treaty governs the sharing of waters of international streams between Canada and the United States and established an International Joint Commission to monitor compliance and resolve disputes. For more information visit: [www.environment.alberta.ca/01359.html](http://www.environment.alberta.ca/01359.html)

## 5.1 Who is Responsible?

In Alberta, all water is owned by the Crown. The Crown issues licences that grant a right to divert and use water and also specifies any conditions that govern how the licenced right can be exercised. While the provincial government carries the primary responsibility for managing water resources, the Government of Canada and municipal governments are involved in regulating the use of water and protecting our water bodies.

### Municipal

Municipalities are primarily responsible for drinking water distribution, wastewater collection, and wastewater treatment. Municipalities operate and maintain drinking water and wastewater treatment facilities to meet the requirements under provincial legislation. Some municipalities also develop bylaws to help regulate water use. For example, during dry conditions, a municipality may order residents to reduce consumption by not watering lawns or washing vehicles. Municipalities may also develop water shortage response plans in order to more effectively manage water in drier years.

### Provincial

Since 1930, the provincial government has been responsible for water management in Alberta. Through legislation, the Alberta government regulates all developments and activities that may impact rivers, lakes, wetlands, and groundwater. In Alberta, the *Water Act* is used to manage and protect the quantity and quality of water. To do this, regulators must ensure that industrial, commercial, and public developments do not negatively impact aquatic ecosystems. This includes maintaining a suitable habitat for healthy aquatic ecosystems. The *Environmental Protection and Enhancement Act* protects the aquatic environment by regulating point-source pollution from places like water treatment plants, refineries, and regulated water distribution systems.

### Federal

Federal laws apply to Alberta's waterways. Canada's *Navigable Waters Protection Act* ensures the protection of any waterway that is passable by any type of watercraft from large boats to canoes. The federal *Fisheries Act* plays a role in managing fisheries in the province and developments that could affect fish habitat. The federal government is also responsible for the *Canadian Environmental Protection Act*, which provides protection to water bodies through provisions that include: limiting the release of toxic substances, regulating waste disposal sites, and requiring the clean-up of pollutant spills. Some projects that affect water may also be subject to an environmental assessment under the *Canadian Environmental Assessment Act* in order to identify potential negative impacts.



## 5.2 Protection – Water Conservation Objectives

The aquatic environment, as defined by the *Water Act*, includes all living and non-living components of the environment in or adjacent to water bodies. This includes fish, aquatic plants, invertebrates, soils, and other plants and animals that depend on water.

A healthy aquatic environment requires a share of the water that would naturally occur in a river at any particular point in time. Water supplies are naturally variable from season to season, year to year, and place to place. Natural variability must be retained for optimal aquatic health. When considering protecting water for the environment, it is essential to focus on maintaining natural flow variability. This means the volume of water being protected would vary as a proportion of the natural flow.

### Water Conservation Objectives

Alberta's *Water Act* provides a tool to protect the aquatic environment through the use of a water conservation objective (WCO). A WCO is defined as the quantity and quality of water to remain in a river or other body of water for the:

- ▶ protection of a natural water body or its aquatic environment, or any part of them;
- ▶ protection of tourism, recreational, transportation, or waste assimilation uses of water; and
- ▶ management of fish or wildlife.

WCOs are established by the designated Director under the *Water Act*. The Director must engage in public consultation prior to establishing a WCO, and that is most often done through a planning process. Water or watershed management planning processes can be initiated by anyone in the province; however, most often these are led by a Watershed Planning and Advisory Council (WPAC) designated by Alberta Environment. A water management plan approved by the Lieutenant Governor in Council may contain recommendations for a WCO. These recommendations provide strong direction to the Director. Currently only the South Saskatchewan River basin has a WCO established in an approved water management plan.

## *How much water is needed to protect the aquatic environment?*

Alberta Environment currently uses instream flow needs and base flow calculations to help determine how much water is required to meet the needs of the aquatic environment:

**Instream Flow Need:** Instream flow needs are science-based calculations that determine the quantity of water required to remain in a river in order for there to be no or minimal impact to the life cycle of aquatic species or the established ecosystem.

**Base flow:** Fish habitat and riparian instream flow need determinations identify a base flow, below which no further reduction in flow is recommended to minimize loss of aquatic species. These are the uncommon low flow events that naturally stress a population and may limit overall population size.

An instream flow need study is based on five components of the aquatic environment:

- ▶ **Hydrology:** stream flow and water movement, including quantity, timing, duration, and frequency of flows.
- ▶ **Geomorphology:** river and stream channels and their associated landforms, shaped through the interaction of water, rock, soil, and vegetation.
- ▶ **Biology:** fish species and other species that are sensitive to (or indicative of) changes in flow regimes.
- ▶ **Water quality:** temperature, dissolved oxygen, and chemical composition.
- ▶ **Connectivity:** considers streams as pathways; upstream is connected with downstream; surface water is connected with groundwater; stream channels and flood plains are connected; and events are connected in time.



## 5.3 Conservation, Efficiency, and Productivity

Many Albertans believe this province has an abundant supply of freshwater, but water scarcity is already a reality in southern Alberta. During certain times of the year, rivers and streams may not be able to supply the quantities of water demanded by the region's economy and population. There is already a need to share our water among current and future users. We must consider not only the growing demand for our water, but also factors such as pollution and drought, which can affect the amount and quality of water available for use. Warmer winters and less precipitation may impact our future water supply, and we need to be prepared to cope with longer, more extended periods of water shortage, and adopt measures that maximize water use. Rain and snow patterns are unpredictable, and building more infrastructure will not solve the problem if no water is available.

Not only do we need to use our existing supplies wisely, we must also consider costs. It costs money to treat, transport, and dispose of water, as well as maintain water infrastructure. These economic costs often make up the price that agricultural, industrial, and municipal users pay for water services. However, this price does not include the environmental costs associated with withdrawing the water.

In addition to mechanisms put in place by the Government of Alberta to manage and conserve water, individual water users have the capacity to and an interest in protecting Alberta's water supply. In these days of increasing water scarcity, it is more important than ever for Albertans to conserve water, and use it as efficiently, and productively as possible.

### Water conservation:

- ▶ Any beneficial reduction in water use, loss, or waste.
- ▶ Water management practices that improve the use of water resources to benefit people or the environment.

### Did you know?

Using water meters is an effective way for municipalities to reduce water consumption. Cities that have implemented a water meter system and charge according to the amount of water used are proven to consume less water than those cities that charge a flat rate for water.

### Water efficiency:

- ▶ Accomplishment of a function, task, process, or result using the least amount of water feasible.
- ▶ An indicator of the relationship between the amount of water needed for a particular purpose, and the quantity of water used or diverted.

### Water productivity:

- ▶ The amount of water that is required to produce a unit of any good, service, or societal value.

### Water conservation, efficiency and productivity will be achieved when:

- ▶ demand for water is reduced;
- ▶ water use productivity is increased;
- ▶ resources are conserved to maintain healthy aquatic ecosystems; and
- ▶ water quality is maintained or enhanced.

The solution to emerging water challenges comes through a combination of improving our ability to capture and store water during high flow periods and improving water use practices through significant conservation, efficiency, and productivity efforts. Water conservation, combined with a focus on getting the most production possible from the water already allocated, is a fundamental component of Alberta's *Water for Life* strategy. Examples of conserving water are as follows:

### Municipal/Industrial Water Reuse

An innovative public-private partnership between Epcor and Suncor is using advanced ultrafiltration and membrane technology to turn municipal wastewater effluent from the Gold Bar treatment plant into high quality water for industrial reuse. At the same time water quality, aquatic life, and aquatic habitat in the North Saskatchewan River is being preserved.

The Gold Bar Industrial Water Reuse Facility provides Suncor with the process water it needs without having to draw water from the North Saskatchewan River. The \$14 million facility (the largest water reuse facility to employ membrane technology in Canada) was completed on budget and on schedule, without impacting plant operations or adjacent construction. Transmission of five million litres per day of recycled water to Suncor began in May 2006 with an ultimate capacity of 40 million litres per day. In addition to supplying water to Suncor, the Gold Bar Water Reuse Facility also supplies recycled water to Edmonton's Parks and Recreation Department to service a nearby park and ski hill as well as neighbouring Strathcona County.

## Reclaimed Water

The Government of Alberta has established a Reclaimed Water Working Group to develop a management framework to facilitate the safe use of reclaimed water for residential applications in Alberta. This framework will maximize the benefits of using reclaimed water and establish new standards and guidelines to mitigate potential health and environmental risks. This initiative supports Alberta's *Water for Life* strategy, which commits the province to improving the overall efficiency and productivity of water use by 30 per cent from 2005 levels by 2015. Using reclaimed water for various purposes both inside and outside buildings will contribute to meeting this goal.

## Oilfield Injection

The majority of water in Alberta is allocated to agricultural uses (such as irrigation) or industrial uses (such as thermal power generation and oil and gas). Many sectors are working to conserve water, and have made gains in recent years. For example, a multi-stakeholder committee on water use practice and policy was established in 2003 to examine the practices regarding the underground injection of freshwater to enhance oil or bitumen recovery. The resulting *Water Conservation and Allocation Policy for Oilfield Injection* aims to reduce or eliminate allocation of freshwater for oilfield injection, based on a case-by-case evaluation of all of the feasible options for each project. For more information on the policy visit: [www.environment.gov.ab.ca/info/library/7700.pdf](http://www.environment.gov.ab.ca/info/library/7700.pdf)

## Conservation, Efficiency and Productivity (CEP) Sector Plans

The major water using sectors (chemical and petrochemical, forestry, irrigation, mining/oil sands, municipal, oil and gas, power generation) are committed to developing water CEP plans. Sector plans will contain targets or benchmarks, and will provide direction on management practices that individual water users can take to help achieve the sector's overall goals. Individual members are expected to take direction from their sector's overarching plan, and develop CEP measures for their own operations. See [www.albertawatercouncil.ca](http://www.albertawatercouncil.ca) for more information.

## Personal Action

All Albertans should strive to conserve water. Water conservation in the home can include activities such as reducing water use on lawns and gardens, fixing leaky faucets, and switching to water efficient plumbing fixtures and appliances (e.g., low-flow showerheads, high efficiency toilets (6.0 litres or less)). For more ideas on water conservation at home visit [www.onesimpleact.alberta.ca](http://www.onesimpleact.alberta.ca)

Major improvements in infrastructure and technological advances in the irrigation sector have led to significant water efficiency improvements over the past 40 years.

## 5.4 Partnerships

A watershed approach focuses on water and land use within the physical boundaries of a watershed. The focus shifts from managing just water, to managing a watershed as an entire unit that recognizes and plans for the interaction of surface water and groundwater, land, plants, animals, and people.

To effectively manage watersheds, the Government of Alberta has joined with other stakeholders to collaborate in three types of partnerships: Watershed Stewardship Groups, Watershed Planning and Advisory Councils, and the Alberta Water Council. These partnerships will share the responsibility for identifying solutions to watershed management challenges in Alberta.

**Watershed Stewardship Groups** take community-level action to help safeguard our water sources. These groups are volunteer-based partnerships actively engaged in environmental stewardship of their watershed. They include individuals, organizations, agriculture, industry, municipalities, and other forms of local government and set common goals to achieve shared outcomes.

**Watershed Planning and Advisory Councils (WPACs)** are multi-stakeholder non-profit organizations that assess the conditions of their watershed and develop plans and activities to address watershed issues. WPACs produce state of the watershed reports; provide recommendations to watershed management plans; collaborate with land managers; provide “on-the-ground” actions; advise and support watershed stewardship groups; and present issues to the Alberta Water Council. Currently ten watersheds have organizations formally recognized as WPACs:

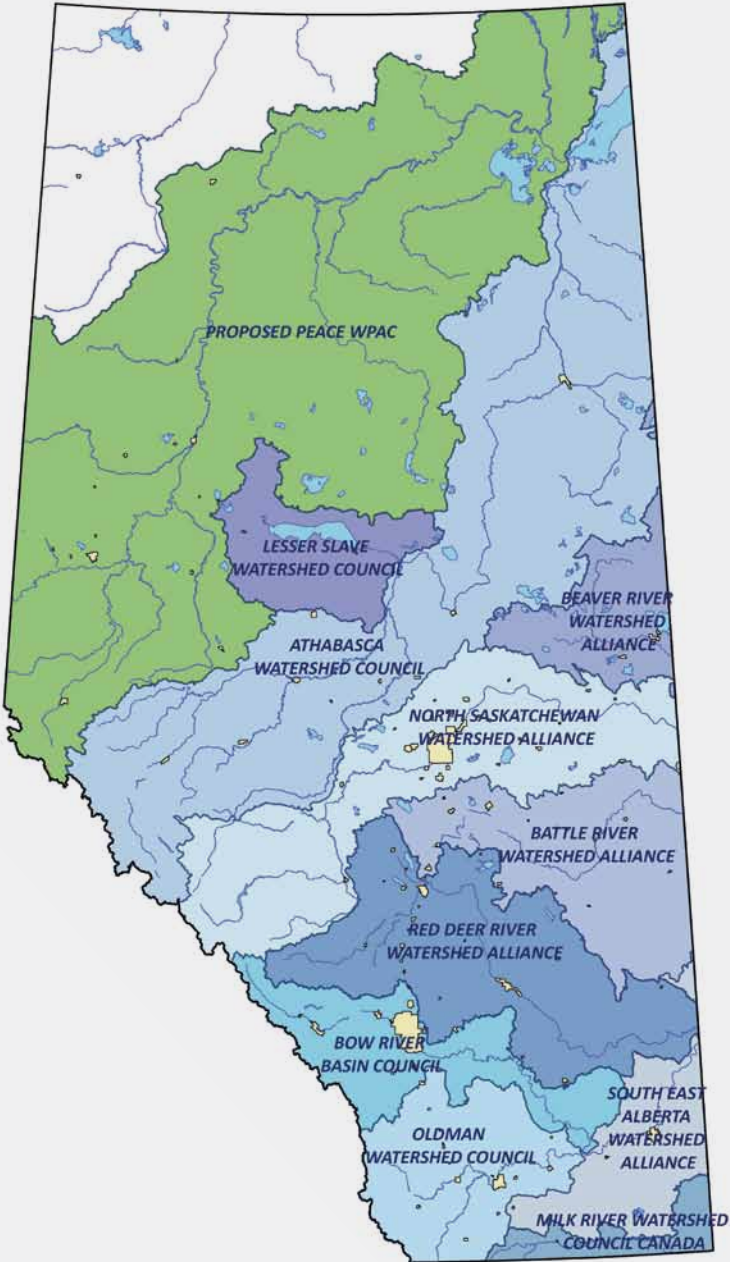
- ▶ Athabasca Watershed Council;
- ▶ Battle River Watershed Alliance;
- ▶ Beaver River Watershed Alliance;
- ▶ Bow River Basin Council;
- ▶ Lesser Slave Watershed Council;
- ▶ Milk River Watershed Council Canada;
- ▶ North Saskatchewan Watershed Alliance;
- ▶ Oldman Watershed Council;
- ▶ Red Deer River Watershed Alliance; and
- ▶ South East Alberta Watershed Alliance.

WPACs currently under development include:

- ▶ Peace River Watershed.

**The Alberta Water Council** is a consensus-based multi-stakeholder partnership that provides timely and strategic advice to governments, industry, and non-government organizations towards achieving *Water for Life* goals and outcomes.

Alberta Watershed Planning & Advisory Councils 2010





## 6.0 CURRENT AND FUTURE CHALLENGES

Natural water supplies and water delivered through manmade infrastructure (reservoirs) provide water to our communities, farms and industries for drinking, recreation, crops, industrial processes, and electricity generation. Alberta's well-established system for allocating and managing water has served the province well as it has evolved over the last 100 years. This is reflected in the *Water Act*, a progressive piece of legislation that provides for environmental flows to be recognized as legitimate water users, and enables licence transfers in order to allow for water reallocation in closed basins.

However, Alberta's growing population and economy have increased the demand for water, while a changing climate has highlighted the need to adapt and plan for future challenges. While some jurisdictions have undertaken major water allocation reform as a reaction to extreme water shortages, Alberta is in a position to proactively design and implement a renewed water allocation management system. This new system will continue to evolve and change to meet the province's needs for the next one hundred years.

The water allocation management system review will allow government, communities, industry, and the public to explore options to better meet future water needs. In addition, it will support the regional outcomes developed across Alberta as part of the implementation of the Land-use Framework under the *Alberta Land Stewardship Act*.



Alberta's renewed *Water for Life* strategy provides the starting point, by calling for the management and allocation of Alberta's water in a manner that:

- ▶ sustains aquatic ecosystems;
- ▶ supports sustainable economic development and the priorities of the province; and
- ▶ ensures Albertans' quality of life is maintained.

Specifically, Alberta needs a water allocation management system that:

- ▶ allows government and others to manage the environment;
- ▶ allows flexibility so water can be moved to different uses when needs and values change;
- ▶ allows licencees to manage in times of scarcity;
- ▶ provides for a competitive economy and high quality of life;
- ▶ supports regional outcomes;
- ▶ adapts to managing extremes (e.g., floods, drought); and
- ▶ supports and encourages water conservation.

Alberta Environment's review of the water allocation management system will create a diverse suite of policy options and tools that address these provincial requirements. Responsible decision-making by Albertans, including government, industry and individuals, will ensure Alberta has the water necessary to sustain the needs of the people, the environment, and the economy.





Government  
of Alberta ■

Alberta ■

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