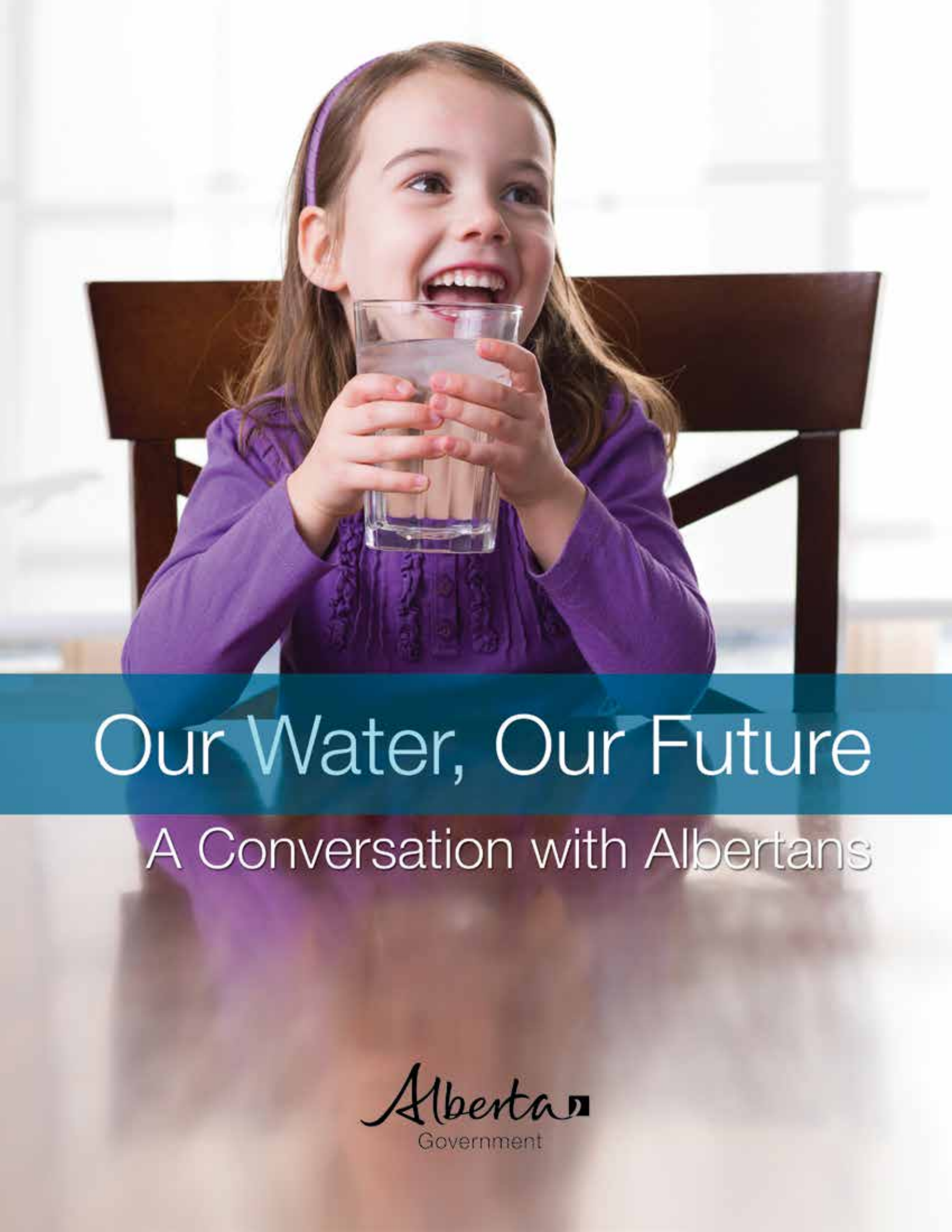

Our Water, Our Future

A Conversation with Albertans

Alberta Government

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INTRODUCTION

Our Water

The Government of Alberta is responsible for ensuring the wise use of the province's water resources on behalf of all Albertans. In entrusting this right to government, Albertans expect water will be managed and conserved to ensure a healthy environment and a high quality of life, now and in the future. In return, there is an expectation that the sustainability of this important resource will be achieved through the efforts of all citizens and their interactions with water at home, at work and at play.

In managing and safeguarding water resources, Alberta is guided by the commitments in *Water for Life: Alberta's Strategy for Sustainability*, which has three main goals:

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

The development of water legislation and policies – including the *Water for Life* strategy – has been informed by stakeholders, aboriginal people, and members of the public. Our province has been successfully managing water for many decades. We have a thriving agricultural sector, strong and growing communities, and responsible energy development – all of which underpin the province's quality of life. Contributing to this success has been our collective efforts to understand what may be required to ensure the continued effectiveness of Alberta's water management system.

Managing Our Water for the Future

Alberta is growing – and will continue to grow. Although we benefit from growth, the reality is that growth places new and changing demands on all our resources. This includes water required for our communities to support their goals; for agricultural production to meet a growing global demand for food; for increased energy development to meet global energy needs; and all supported by healthy aquatic ecosystems. Growth will also vary across the province, with pressures and implications that are more regionally specific.

We expect we will have new water challenges that will require us to be flexible and adaptable. To effectively and appropriately prepare for increased growth, we need to consider what enhancements may be required to ensure our water resources will meet the needs of our environment, our economy, and our people in the decades ahead.

It is estimated that more than 90 per cent of rural Albertans depend on wells for their water supply.

Engaging Albertans About Water

Albertans are passionate about water. They share this passion in many ways and through a variety of informal and formal processes. This includes the more recent consultations for the Lower Athabasca and the South Saskatchewan Regional Plans. Sometimes initiated by government, other times self-initiated, scientists, academics, associations, non-governmental organizations, and advisory committees have submitted reports on various water issues to government. Community-based groups, municipal governments, aboriginal communities, and stakeholders have held many meetings and reported on their local and regional concerns. All of these groups have suggested we need to be thinking about the future to ensure our water is managed today to support Alberta's continued quality of life.

In reviewing this range of input and advice, four areas have emerged as priorities that will be explored with Albertans as part of an engagement process. Part of this effort will be to test with citizens that these are priorities, and, if so, what direction government could consider for moving forward. The hope is that by taking this approach – by testing direction versus going back to a blank page, we are able to leverage the significant amount of work that has been done to-date by Albertans, but also give citizens the opportunity to re-assess and suggest different or revised direction.

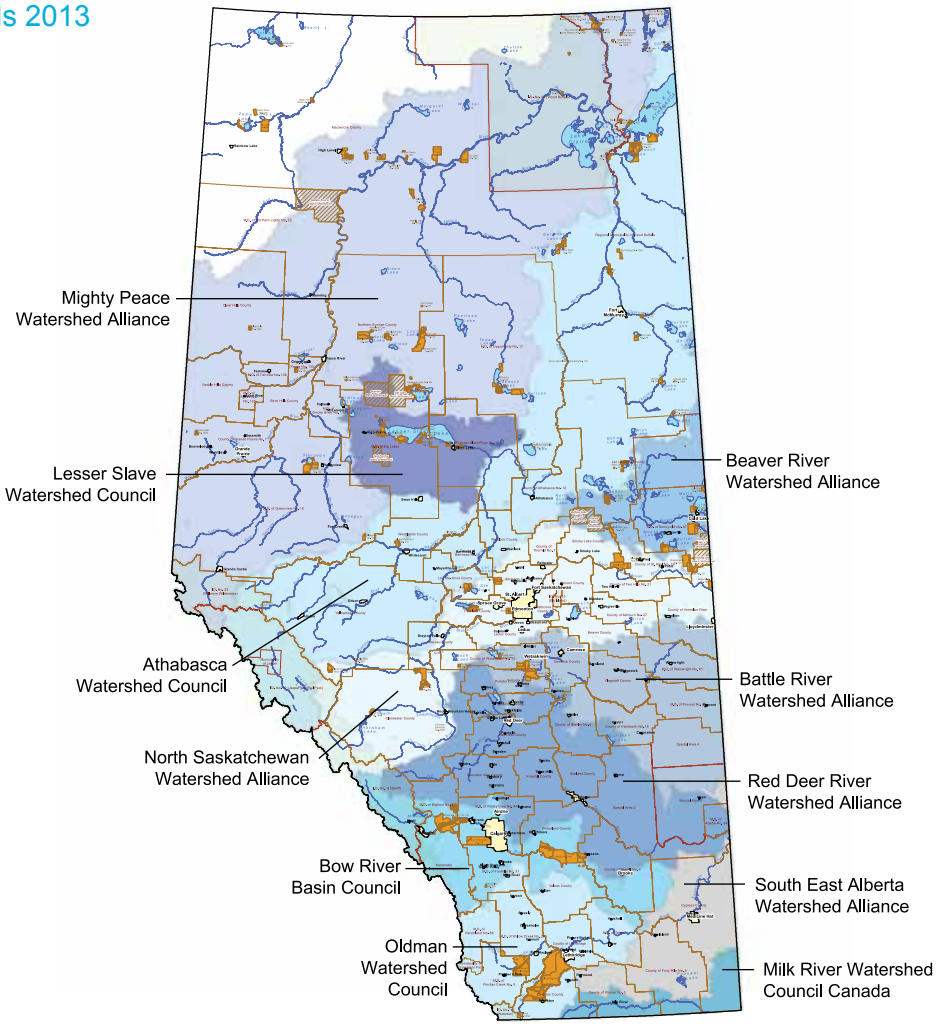
By taking part, Albertans have the opportunity to guide future government direction in these areas:

- Healthy lakes;
- Hydraulic fracturing and water;
- Drinking water and wastewater systems; and
- Water management.

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.

It is expected that Albertans may have other issues they want to discuss. If citizens make a strong case that other topics are a priority, they will become part of the discussion. This is the beginning of a renewed conversation with Albertans about future government direction for water management. Alberta is also working with First Nations and Métis communities to better understand their water issues and develop collaborative processes to specifically address these concerns. The conversation about water provides an opportunity to gain input from aboriginal people on these four topics in addition to the ongoing processes.

Figure 1
Watershed Planning and Advisory Councils 2013



Eleven Watershed Planning and Advisory Councils are in place across the province. These councils help gather, assess and share knowledge about watershed health and provide advice on actions to maintain productive watersheds (Figure 1).

This document identifies key issues and outlines a number of possible directions the Government of Alberta could consider to enhance our stewardship and management of water resources. This direction could involve staying the course in some areas; it could serve to highlight needs for further education and engagement in other areas or require the development of new or enhanced water policies.

Your thoughts about these possible directions will help determine if and how the Government of Alberta will proceed further. No decisions have been made with the exception of maintaining the government's position, as reflected in legislation, that no water will be sold to the United States.

The conversation about water will be ongoing. If and when further work is undertaken, Albertans will again be engaged to help shape particular actions.

Additional Background

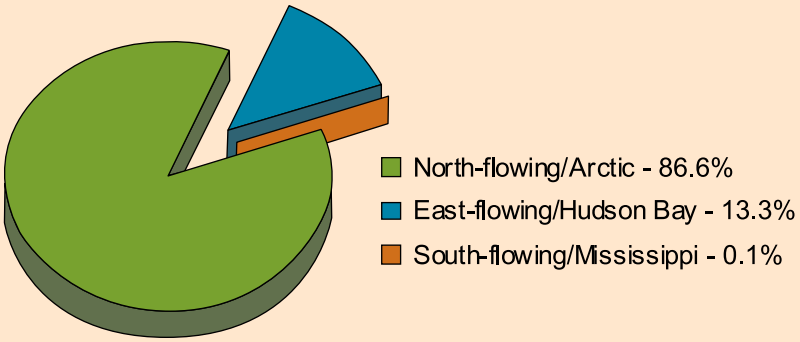
This conversation guide provides general background, outlines the priority issues and puts forward proposed directions in the four areas of: healthy lakes; water use in hydraulic fracturing; drinking water and wastewater systems; and water management.

The following resources provide more information on these facts as well as additional background about Alberta's main water sources, demands, and how the range of water needs are currently managed.

This information will help set the context for the current state of Alberta's water resources, as well provide further insights into the drivers influencing potential government direction. You are encouraged to explore this information in your efforts to contribute to this important conversation.

- Facts About Water in Alberta - environment.gov.ab.ca/info/library/6364.pdf
- Water for Life Strategy: A Renewal - environment.gov.ab.ca/info/library/8035.pdf
- Water for Life Progress Report: December 1, 2008 to March 31, 2011 - environment.gov.ab.ca/info/library/8437.pdf
- Water Conversation website - www.waterconversation.alberta.ca
- Alberta Water Council - www.albertawatercouncil.ca

Figure 2
Distribution of Water in Alberta



Over 80 per cent of Alberta's water flows to the north, while the majority of Albertans live in the southern part of the province (Figure 2).

HEALTHY LAKES

Where We Are Today

Alberta has numerous lakes, whose locations, natural conditions and water levels, vary considerably across the province.

Generally speaking, the majority of Alberta's lakes are naturally rich in nutrients. They are also naturally productive due to soil chemistry and their geographic location. As a result, our lakes tend to be easily impacted when additional nutrients are added from natural or human sources.

Lakes are impacted by human activities (Figure 3), including:

- outputs and runoff from urban settings;
- sewage;
- shoreline development;
- changes in land cover;
- vegetation removal (e.g., removal of trees); and
- the level and intensity of agricultural activity.

Figure 3
What Drains into our Lakes?

The following concepts are helpful in understanding lakes:

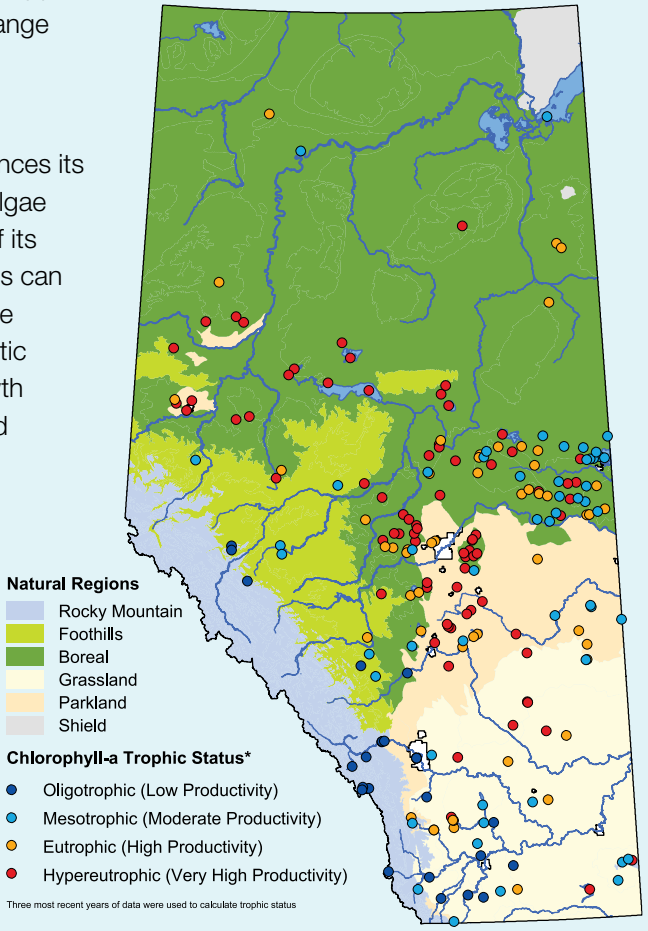
- **Trophic status**
  This is a measure of a lake's productivity, or in other words, a lake's ability to support life. The productivity of a lake can range from very high to low (Figure 4).

- **Nutrients**
  The nutrient content of a lake influences its primary production (the growth of algae and plants) and hence, the clarity of its water. Lakes with high nutrient levels can support increasing densities of algae in the water column and large aquatic plants near the shoreline. This growth can negatively affect aquatic life and other uses, including the public's enjoyment of the lake.

- **Dissolved oxygen**
  The dissolved oxygen in a lake is required by fish and other aquatic organisms. Decomposition of algae and plant material consumes oxygen and may reduce it to levels causing fish kills.

- **Water clarity**
  In addition to making a lake more aesthetically appealing and enjoyable to people, clear water allows the penetration of sunlight, enabling plants to grow. Murky water in a lake is usually related to high nutrient levels and high algae growth, or excessive erosion or disturbance.

Figure 4
Ranking of Annual Lake Levels



* Trophic status of a lake is the degree of biological production within a lake - a key component of water quality. Trophic status is usually based on the total mass of algae in a lake.

- **Water temperature**
  Temperature of a lake changes with the seasons and the lake's depth. It can affect the health of aquatic ecosystems. As the temperature of a lake increases, the ability of the water to retain oxygen decreases.

- **Water levels**
  Alberta's climate has both seasonal and longer-term cycles that affect the amounts of fresh water entering a lake as precipitation runoff. Consequently, lake levels will naturally fluctuate. Longer-term trends in climate can change lake levels from those we are accustomed to (Figure 5).

Figure 5
Ranking of Annual Lake Levels

	Ranking of Annual Lake Levels								
Lake	2001	2002	2003	2004	2005	2006	2007	2008	2009
Baptiste Lake									
Bear Lake									
Calling Lake									
Cardinal Lake									
Chip Lake									
Cooking Lake									
Fawcett Lake									
Gregg Lake									
Gregoire Lake									
Isle Lake									
Lac La Biche									
Lac Ste. Anne									
Lake Athabasca									
Lake Claire									
Lesser Slave Lake									
Little Fish Lake									
Marie Lake									
Miquelon Lake									
Muriel Lake									
Pigeon Lake									
Pine Lake									
Shiningbank Lake									
Sturgeon Lake									
Sylvan Lake									
Utikuma Lake									
Wabamun Lake									
Wolf Lake									

much below normal below normal normal above normal much above normal not enough data

Changes in a lake's productivity can alter the water quality and change aquatic communities. These conditions can cause algal blooms that affect tourism, recreation, aboriginal uses, and quality of life for small business and property owners. The state of Alberta's lakes also affect the sustainability of healthy fish populations and overall ecological well-being.

Some key issues have been identified to ensure the health of Alberta's lakes is maintained and improved over time:

Managing the impacts of growth

Alberta's population and economy are expected to continue to grow in the coming decades, creating the potential for increased pressures on our province's lakes. More people and investment can translate into more recreational, industrial and municipal use of lakes, and more agricultural and industrial activity on the landscape. Lake living has also grown in popularity, and there are higher numbers of people living adjacent to lakes than in the past. It will be important to manage the impacts of growth in order to ensure Alberta's lakes remain healthy and enjoyable - for Albertans and for ecosystems.

Decision-making about lakes

The way we manage lakes is based on a variety of information, including water monitoring data and research. Management decisions are usually made on a lake-by-lake basis. With a general policy of respecting natural variations in lakes, there is no clear, overarching framework to guide decisions should they be deemed necessary or warranted. This makes it difficult to know whether a particular decision or management action is effective. This also results in varied and potentially inconsistent approaches to lake management across the province.

Ensuring coherent authority for lake management

There are concerns that legislative authorities for lake management are not as coordinated as they could be. This could lead to confusion, inconsistency and conflict in lake management decisions and actions. Clear management authority would help to avoid and mitigate conflict and inconsistencies.

Sustaining local stewardship

A number of lake stewardship groups exist across the province. Local lake stewardship groups are non-profit organizations whose membership can include local residents and governments, industries, lake users and interested citizens. Lake stewardship groups work to enhance the quality of lakes, undertaking various activities that can include: education and awareness; habitat restoration; and developing and implementing water management plans. However, the current approach to water management may result in inconsistencies in funding for these groups, making it difficult for them to sustain their operations.

Connecting local stewardship with provincial planning

Local lake stewardship groups are valuable partners in helping keep our lakes healthy. Some groups may feel disconnected from provincial processes that impact the future management of lakes, such as regional planning under the Land-use Framework and the work of Watershed Planning and Advisory Councils. Keeping our lakes healthy requires everyone working together as partners. Going forward, it is important to meaningfully connect lake stewardship groups with planning processes, so that they can contribute their advice and energy.

Options for Tomorrow

We need to ensure that Alberta's management approach places appropriate attention on all lakes. Albertans want to know that no matter where they are located, our province's lakes are being managed effectively.

One proposed direction is to develop a provincial framework to guide lake management decisions:

- The framework could be designed to support consistent, fair and transparent management and funding decisions for lakes;
- The framework could articulate provincial outcomes for lakes, while allowing for local flexibility and decision-making. This would enable management actions to be tailored to suit local needs and priorities, while ensuring those actions are aligned with our province's social, economic and environmental objectives;
- The framework could be developed in consultation with key water management stakeholders, including the Alberta Water Council, Watershed Planning and Advisory Councils, aboriginal communities, and lake stewardship groups; and
- Lake management authorities and roles could also be clarified in the framework, thereby resolving confusion and preventing conflict on the ground.

A provincial framework could include guideposts for lake management across Alberta. It could support consistent funding and decision-making approaches. This could help bring about greater equity in lake management so that no matter where they are located, Alberta's lakes are receiving the attention they require to keep them healthy.

Moving in the direction of a provincial framework could have some implications. These could include:

- **Work to manage impacts**
  To mitigate the additional pressures placed on our lakes by population and economic growth, we would need to enhance our management approaches. For example, we would need to look closely at how we manage nutrient input, sewage, and other things that can impact the health of our lakes.

- **Legislative changes**
  Possible legislative changes (such as improved septic system regulations and land development regulations) could be necessary to help keep our lakes healthy and manage impacts. Amendments to legislation might also be necessary to ensure that authority for lake management is clear and assigned appropriately.

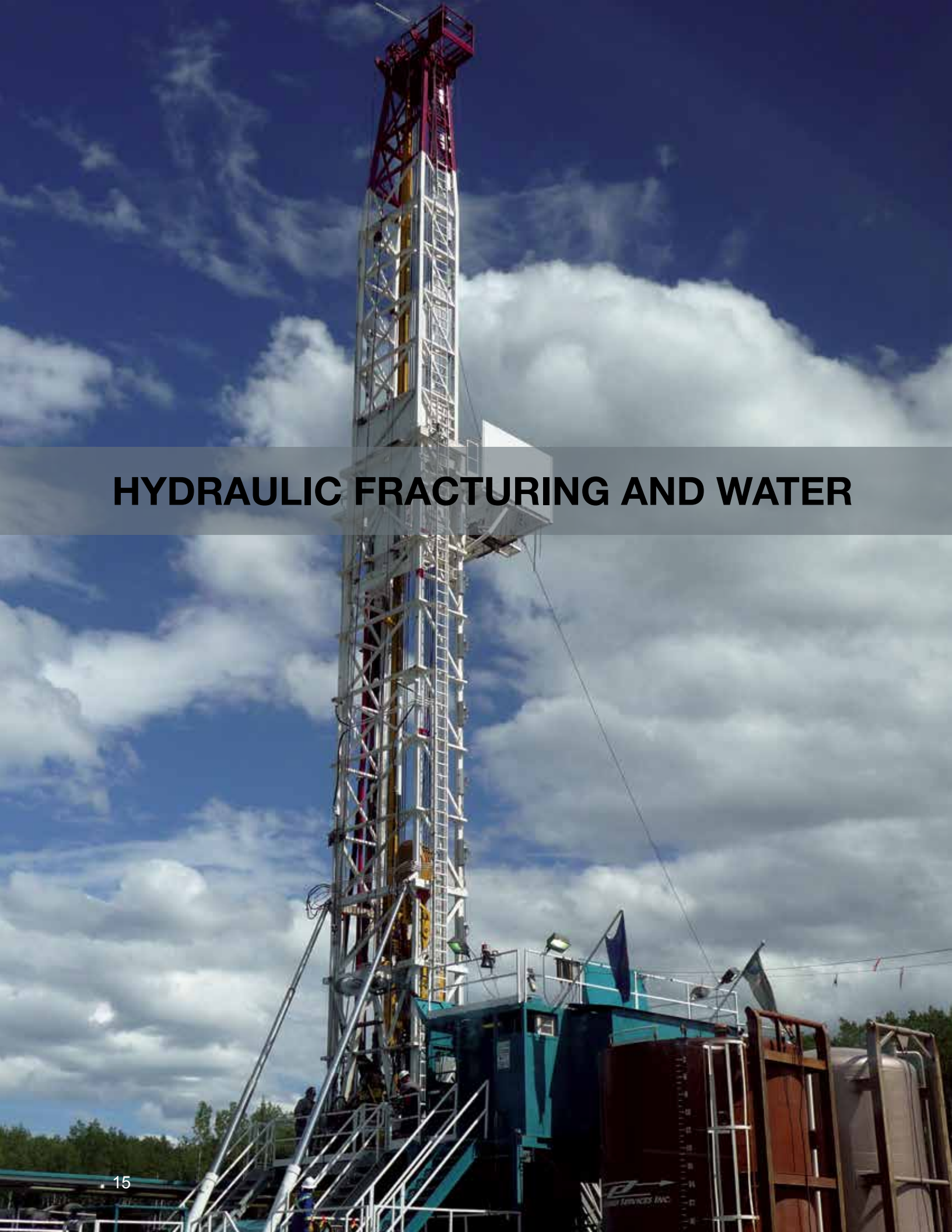
- **Resources for lake management**
  Additional resources may need to be dedicated to lake management in order to implement a provincial framework approach. This would mean examining various options such as:

  - partnerships with the private sector;
  - government spending from general revenues; and/or
  - other sources.

We Need Your Input

We invite you to think about why lakes are important to you and the pressures they face now and in the future. Consider what principles you might want included in a provincial framework to guide lake management decisions. What lake-related issues are priorities for you?

What are your thoughts?



HYDRAULIC FRACTURING AND WATER

Where We Are Today

The use of hydraulic fracturing is not new in Alberta. Since the technology was first introduced in the 1950s, approximately 171,000 wells (primarily vertical) in Alberta have been stimulated using hydraulic fracturing.

In recent years, advances in hydraulic fracturing technology have made it economical to produce oil and natural gas resources from formations which were previously unsuitable for development. Alberta has significant oil and natural gas resources suitable for modern hydraulic fracturing, including shale gas, tight gas, and shale oil. Since 2008, approximately 5,400 horizontal wells have been drilled in Alberta using multi-stage hydraulic fracturing to enhance oil and gas recovery (Figure 6).

Currently, oil and natural gas developments using hydraulic fracturing are regulated under the same regulatory framework as other oil and gas projects in the province. They must comply with Alberta's environmental standards and be approved and licensed by all applicable regulatory bodies.

In addition, the Energy Resources Conservation Board (ERCB), Alberta's energy regulator, places restrictions on hydraulic fracturing operations. Key current regulations include:

- Strict rules are in place to ensure wellbore integrity through cemented steel casing requirements. This provides an impermeable barrier between fluids in the wellbore and adjacent aquifers (Figure 7);
- The use of fracture fluids that could deteriorate groundwater quality is prohibited within and near useable non-saline (fresh) aquifers; and
- There needs to be at least 50 vertical metres between any fracturing and the depth of any water wells located within a 200 metre radius of the energy well that will be fractured.

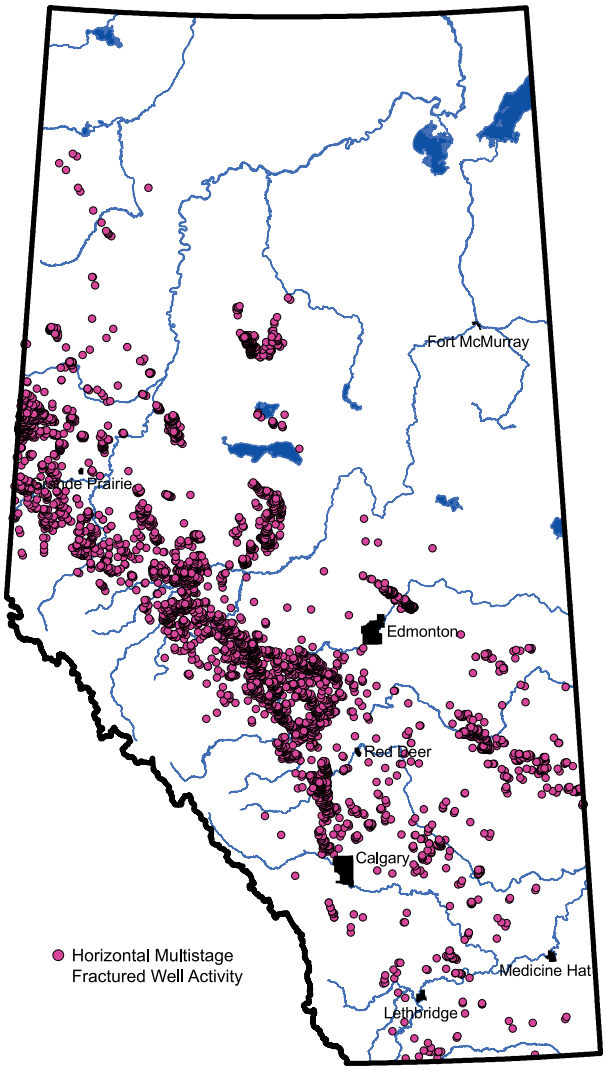
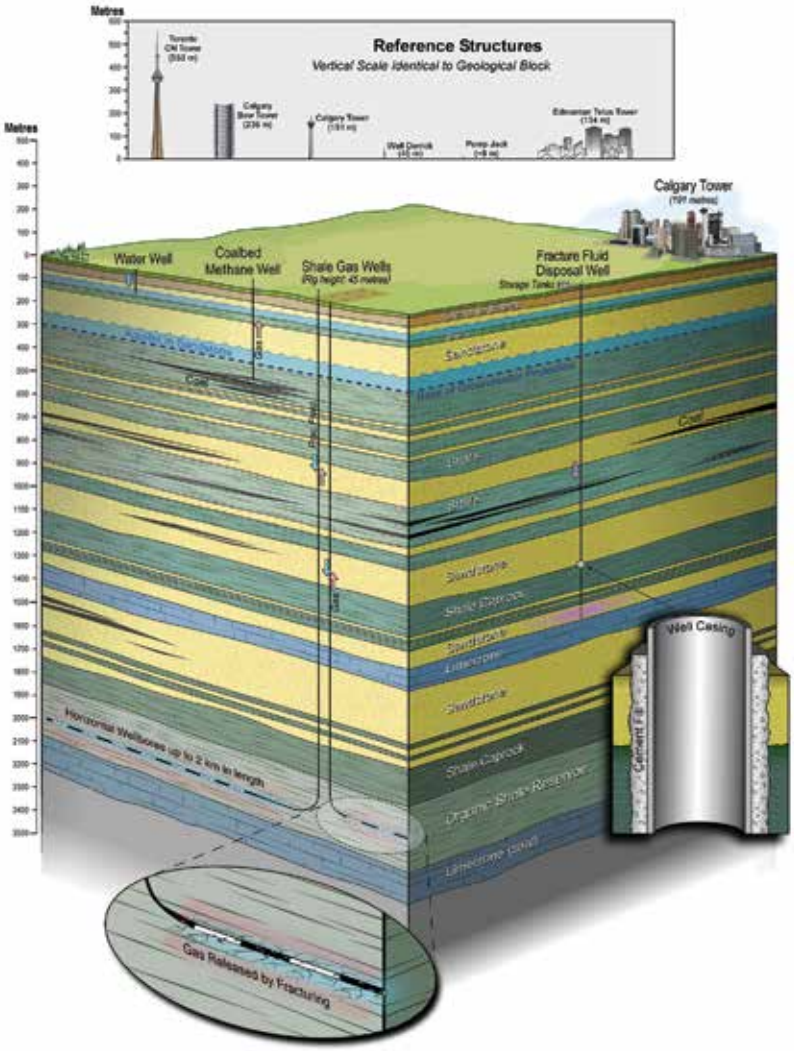


Figure 6
Horizontal Multistage Fractured Well Activity
Image provided by the Energy Resources Conservation Board

Photo on Page 15 courtesy of Encana Corporation

Figure 7
Typical Geological Setting for Hydraulic Fracturing Operations in Alberta

Image provided by the Energy Resources Conservation Board



Hydraulic fracturing involves drilling a well down to the area where the oil and gas is trapped and injecting fracture fluid (usually a mixture of water, chemicals and proppant materials such as sand to hold open the fractures) at high pressure in order to create cracks (fractures) in the rock. The oil and gas can then flow through these cracks toward the well, and be brought to the surface.

Given advancements in technology, and Alberta's oil and natural gas potential, it is expected that our province will see greater use of modern hydraulic fracturing in the years ahead. This raises some water-related issues:

- **Water use**
  The greater use of hydraulic fracturing stands to increase the oil and gas industry's demand for water supplies in the province. It will be necessary to manage the level of water used to protect the interests of other water users while still enabling resource development.

- **Fracturing fluid**
  Hydraulic fracturing involves the use of fracturing fluid. After fracturing, between 10 and 75 percent of the fracturing fluid flows back the surface. There have been concerns that members of the public do not know the chemical composition of this fluid and worry that improper storage and use of these chemicals could contaminate groundwater supplies. Reporting the chemicals used to drill and complete energy wells has been a requirement for some time in Alberta. The information has been collected but not always provided in a way that was easily accessible to the public as the focus was on reporting for regulatory requirements. The ERCB now requires disclosure of the ingredients in fracture fluids on a well by well basis. This information is to be publicly available on the website FracFocus.ca.

- **Wastewater**
  Hydraulic fracturing operations can also produce water. Water can be returned from the fracturing process itself (flowback), and reservoir water can be produced along with the oil or gas. In other jurisdictions, these fluids have been stored in open unlined pits or treated and reintroduced into waterways. There is a need to continue to ensure that water produced from fracturing operations is dealt with appropriately and strictly, so that Alberta's water sources are not contaminated.

- **Public assurance**
  Members of the public want to be assured that the use of hydraulic fracturing does not damage water sources or make water supplies unhealthy. Alberta's regulatory framework for oil and gas development needs to provide effective oversight of the technology's use, to avoid the impacts to surface water or groundwater sources.

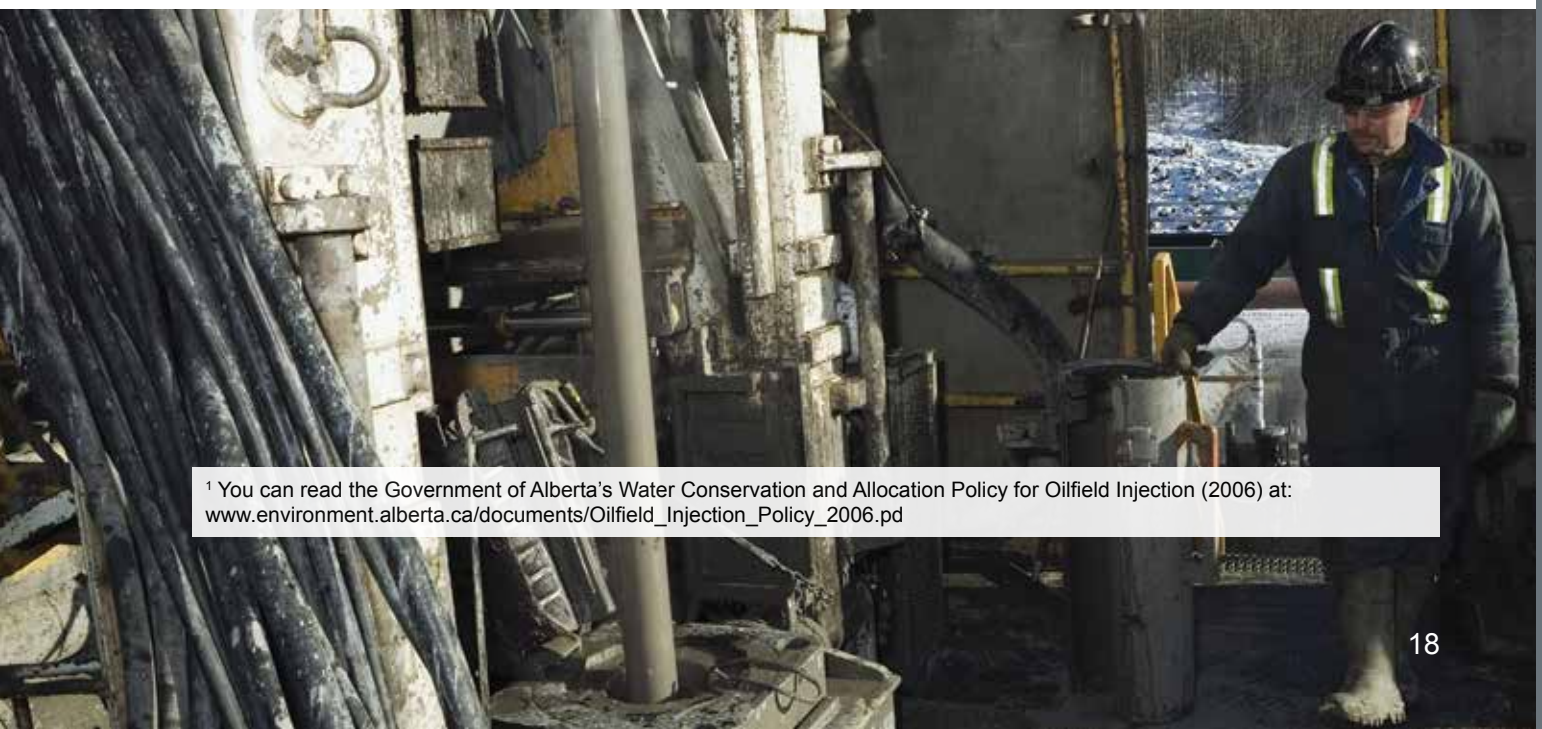
Options for Tomorrow

Advances in technology will lead to increased development of the province's oil and gas resources. The government is committed to the responsible development of these resources.

Albertans want assurance that there is proper regulatory oversight when it comes to the use of modern hydraulic fracturing. Water sourcing, transportation, recycling, storage and disposal must all be managed effectively to mitigate risks to surface water and non-saline groundwater sources.

Enhancing our province's current regulatory approach can help provide this assurance. Options include:

- **Promoting water conservation**
  Government is updating Alberta's existing water conservation policy for oilfield injection purposes.[1] The updated policy could apply to all major water users in the upstream oil and gas industry, including operations using hydraulic fracturing. The policy would aim to conserve the use of fresh water in hydraulic fracturing operations.



[1] You can read the Government of Alberta's Water Conservation and Allocation Policy for Oilfield Injection (2006) at: www.environment.alberta.ca/documents/Oilfield_Injection_Policy_2006.pd

- **Safeguarding water quality**
  Alberta's Baseline Water Well Testing for Coalbed Methane (2006) program captures baseline conditions for water wells, prior to the drilling of nearby coal-bed methane wells. Government is evaluating the merits of expanding this program to include baseline groundwater testing in proximity of hydraulic fracturing operations. This would potentially augment our province's ability to safeguard the quality of groundwater sources.

- **Monitoring and knowledge building**
  Alberta's Groundwater Observation Well Network consists of over 250 monitoring wells across the province. Government plans to add new wells to this network in areas with oil and gas developments, including those using hydraulic fracturing. This will provide more extensive coverage of groundwater monitoring and enable us to build greater knowledge about the potential impacts of hydraulic fracturing on groundwater (Figure 8).

- **Providing transparency**
  Albertans want to be able to access clear, easily understood information about hydraulic fracturing operations. It is important there is transparency about these operations and related water information. Alberta has already joined British Columbia in requiring the disclosure of hydraulic fracturing fluid composition. Going forward, information about water quantity will also be provided in a transparent manner so that Albertans can be assured of the safety and health of water supplies.

- **Ensuring policies keep pace**
  Alberta's policies must keep up with advances in energy development technology. The Energy Resource Conservation Board is examining a new approach to regulating oil and gas development, which:

  - encourages early and meaningful stakeholder engagement;
  - minimizes surface impacts;
  - protects water; and
  - maximizes resource recovery.

This new approach is intended to address cumulative effects on water resources and the landscape occurring from oil and gas development.

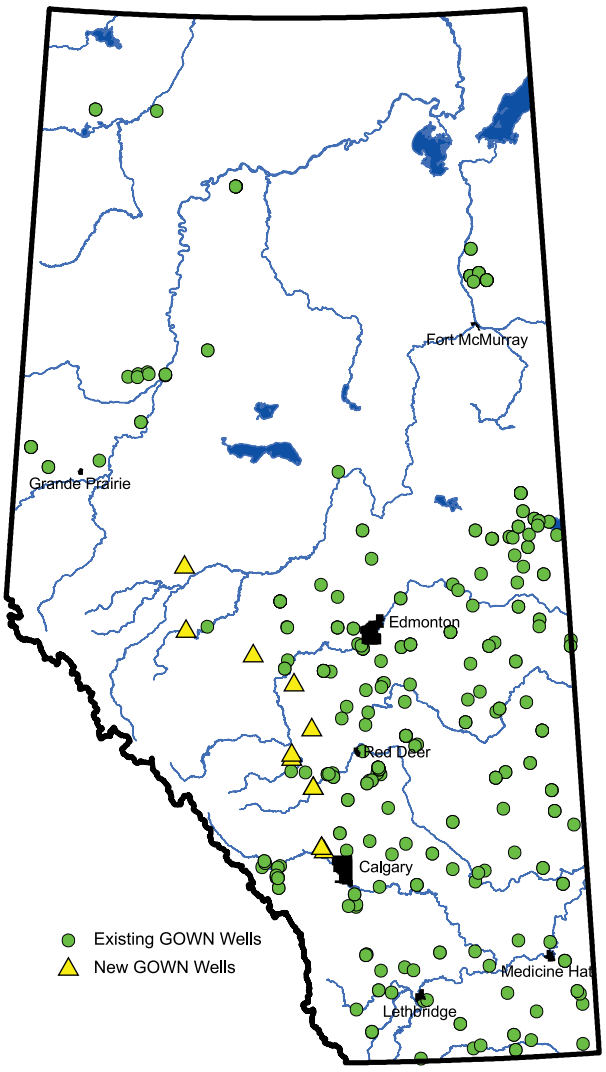


Figure 8
Groundwater Observation Well Network

We Need Your Input

Energy development has played a significant role in Alberta's history, and it will continue to be an important part of Alberta's future. We invite you to consider the plans outlined above.

How else can we strengthen Alberta's regulatory approach to enable hydraulic fracturing while safeguarding our water supplies?

DRINKING WATER AND WASTEWATER

Where We Are Today

Today, government-approved municipal systems provide drinking water and treat wastewater for approximately 90 per cent of Albertans. The remainder, including many First Nations, Métis settlements, and rural communities, obtain water from private systems such as wells, water co-ops, or by hauling water.

Municipal systems must meet a variety of standards and requirements, set out by the *Environmental Protection and Enhancement Act* and related regulations, codes, and approvals. The Alberta government regulates municipal systems in many ways, including:

- design standards for facilities;
- drinking water and wastewater treatment requirements;
- certification of operators;
- performance standards;
- monitoring requirements; and
- reporting requirements.

Municipal water is treated to ensure it meets Alberta's drinking water quality standards, which are stricter than those outlined in the Guidelines for Canadian Drinking Water Quality. Alberta's standards and requirements for the treatment and management of wastewater are also among the most stringent in Canada.

Over time, as knowledge and experience grow, standards change in order to maintain and improve drinking water and wastewater treatment. Municipal systems need to adapt to these evolving standards, through operational changes, maintenance, and facility upgrades.

In the decades ahead, adaptability will be of utmost importance to most effectively address a number of emerging issues, such as:

- **Financial sustainability of water systems**
  The ability of communities to finance drinking water and wastewater systems that must adapt to meet evolving standards is challenging. Many water systems in the province each serve a relatively small number of residents. Consequently, it can be difficult for municipalities to pay for necessary system upgrades and maintenance through utility charges alone, since this would make water service prohibitively expensive for the system's users. To ensure water systems can continue to serve their communities, it may be necessary to find ways of minimizing and sharing costs.

Approximately 80 per cent of water used for municipal purposes is returned in some form to our water systems.

- **Capacity to manage water systems**
  There are approximately 600 drinking water systems and 590 wastewater systems across the province that have government approval. Resources and expertise are fragmented across these systems. While some municipalities have very strong capacity in the management of their water systems, others have gaps in staffing, knowledge and skills. Going forward, these inequities in capacity may need to be addressed, so that Albertans benefit from strongly managed water systems no matter where they live.

- **Aging infrastructure**
  Some estimates indicate that across Canada, more than 50 per cent of water supply lines are currently in need of some repair. In addition to meeting future needs, financial sustainability also needs to consider how current investment requirements can most effectively be made.

- **Governance of water systems**
  Several provincial government departments currently have accountabilities for drinking and wastewater services, creating potential inefficiencies (timing of knowledge transfers, decision making, etc.). In addition, the way water systems are currently governed and regulated may not be as effective as it needs to be. A more robust governance and regulatory approach may be required if our water systems are to remain high-quality, financially sustainable and capable of meeting evolving standards and changing demands.

Options for Tomorrow

The Government of Alberta, along with municipalities, have worked in several ways to help enhance the dependability and sustainability of drinking water and wastewater systems.

One way has been to promote the use of “full-cost” accounting in the planning and development of water systems. This means considering the full costs of facilities over their entire lifespan, including anticipated operating, maintenance and renewal costs, and putting plans in place to address these costs in sustainable ways.

A grant program is also offered by government (administered by Alberta Transportation) to help municipalities finance water systems upgrades so they can continue to meet provincial standards. However, without the ability to fund all programs, the use of grants results in funding inequities across the province, since some systems will receive grants while others will not.

The program is funded from government's general revenues. Consequently, the amount of money available is not always predictable, and can be impacted by changes in tax revenues and budget priorities.

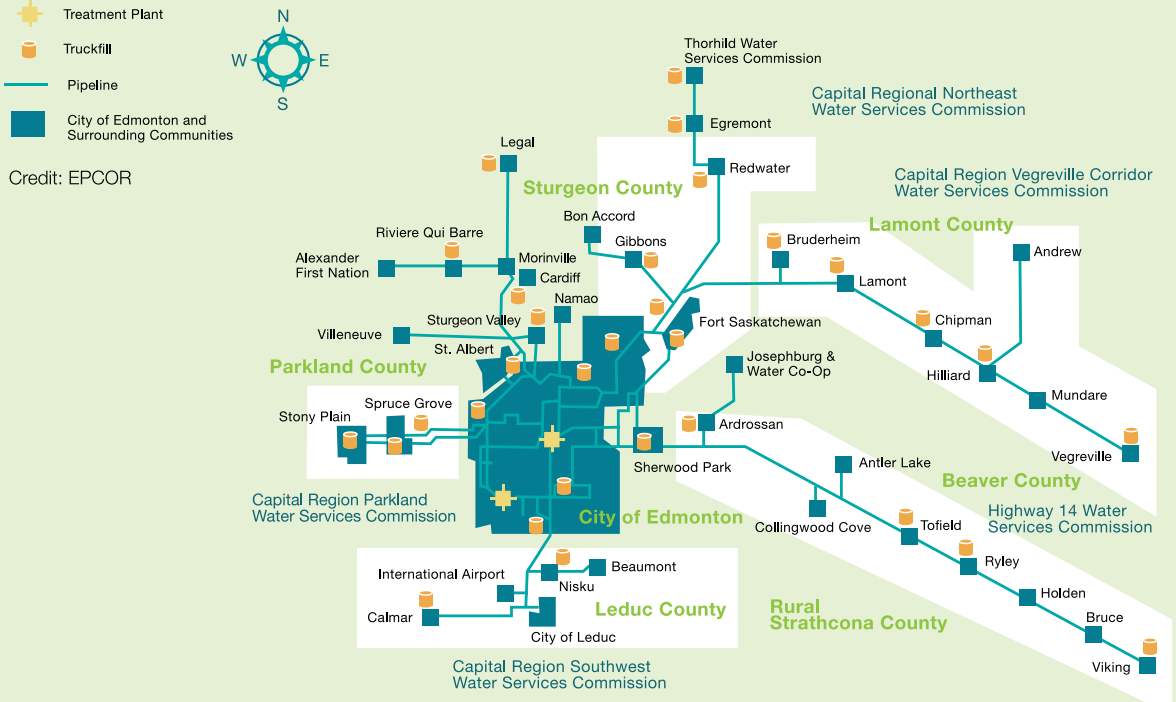
In addition, the government has also encouraged communities to work together to regionalize their water systems. Some of Alberta's major municipalities supply drinking water to smaller surrounding communities. For instance, Edmonton has the largest regional supply system in the province, providing drinking water to other urban and rural communities, some more than 100 kilometres away (Figure 9).

Consistent with this path of efforts, our province may need to consider new and innovative approaches for improving the integrity, dependability and sustainability of drinking water and wastewater systems. We need to ensure water systems can continue to meet evolving, appropriate, standards and demands, while minimizing the costs to users.

One proposal is to shift toward geographic management of water systems. This would entail the following:

- **Shared management of water systems**
  Presently, hundreds of drinking water and wastewater systems are independently managed. The management capacity of these systems varies and there are few economies of scale. A shift to geographic water management could see multiple systems in an area managed by a single, integrated entity, while still under government authority. This would not necessarily mean reducing the number of physical water systems. Rather, it could mean integrating the management of those systems in order to realize efficiencies. The water systems managed by an entity could be physically connected to each other, or be unconnected, or a combination of both.

Figure 9
Capital Region Service Area



- **Enhanced public oversight**
  Entities involved in the geographic management of water systems could be public sector agencies, municipally-owned firms, nonprofit organizations, or other types of entities. All of them would be subject to strong public oversight. A new regulatory entity could be created by the Government of Alberta, to ensure geographic management entities comply with standards and requirements. It could also handle the regulation of rates. This structure could provide a clear line of accountability from water management authorities, through government, to taxpayers.

Although the focus of this geographic approach is to enable improvements in management efficiencies and address financial sustainability, it could also provide opportunities for added protection at a watershed level.

This approach would have some implications, such as:

- **Investment in water systems**
  Over time, investments in water systems will need to be made, to ensure they can keep pace with changes in standards and demand, and to address their deterioration with age. These investments will not be required overnight, but they will be required in the coming decades. The question is how to make these investments in ways that are fair, sustainable and manageable. Utility fees will likely be part of the answer, and incremental increases in utility fees might be necessary in the future. Moving to geographic area management of water systems could help minimize the costs that users face, since it would enable us to realize economies of scale in the management of these systems.

- **Legislative changes**
  Changes in legislation would likely be needed to facilitate the shift to geographic water management.

- **Role of municipalities**
  The shift to geographic water management could mean a change in the role of municipalities when it comes to water systems. It may mean that municipalities no longer need to directly manage water systems. Instead, it could mean municipalities work through new governance structures to set priorities and directions for the geographic management entity, which could be responsible for day-to-day management of the area's water systems.

We Need Your Input

Based on the status of drinking water and wastewater systems, and future issues regarding these systems, we invite you to assess the proposed approach that has been outlined. Consider the implications that the approach would have.

What are your thoughts?

WATER MANAGEMENT

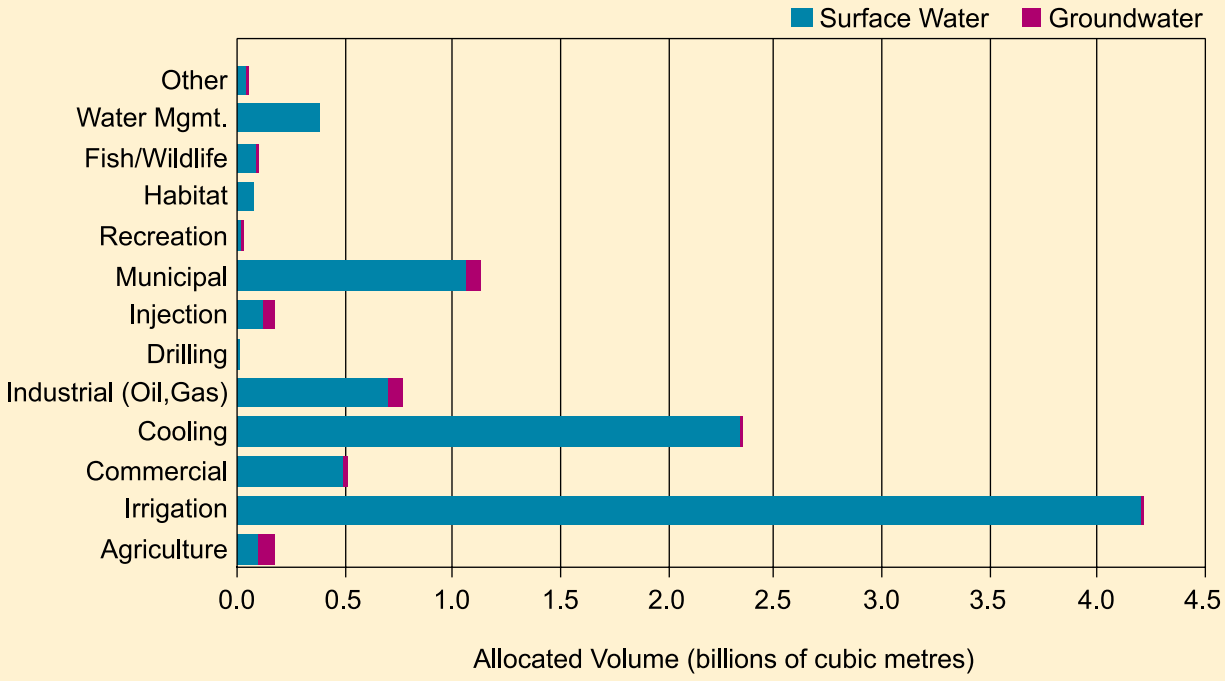
Where We Are Today

Albertans take water from Alberta's rivers, lakes, and aquifers for a variety of human purposes, including: household use, industrial activity, agricultural activity, municipal water systems, commercial use (e.g., golf courses, gravel pit operations), and power generation.

Water diversions in Alberta are managed primarily through a system of water licences issued by government under the *Water Act*. A water licence specifies the amount of water that a licence holder is permitted to withdraw from a water source in one year, usually expressed as an "allocation". This amount may not be exceeded.

Surface water and groundwater allocations vary by sector or industry. Water allocations also vary from watershed to watershed (Figure 10).

Figure 10
Water Allocations in Alberta by Specified Purpose



The vast majority of the water licenced in Alberta is from surface water sources (approximately 97 percent). The remainder is from groundwater sources.

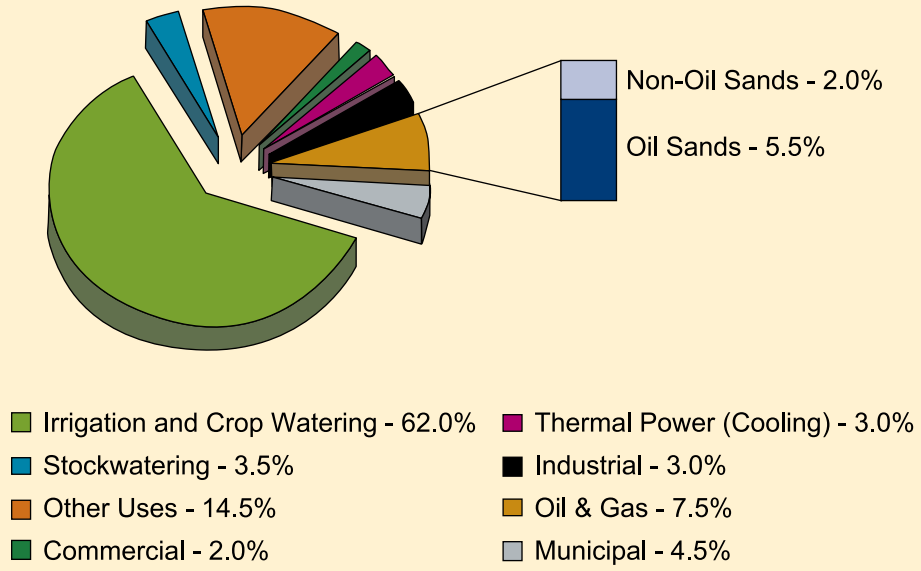
The amount of water a licence holder actually diverts and uses can vary from year to year. For example, irrigation's use of water is typically lower during wet years because of higher-than-expected rainfall and surface runoff.

Many licence holders will also return a portion of diverted water back to the water source. For example, thermal power plans will divert large volumes of water for cooling purposes, but much of this water is cycled through their operations and returned to the source. Similarly, municipalities tend to return upwards of 80 to 90 per cent of their original water diversion after use and treatment.

The amount of water used and returned, as well as requirements for treatment of any wastewater, also impacts quality. Water quality is managed through broad water quality guidelines under Alberta's *Water Act* as well as water quality requirements put in place for activities that have a significant release of wastewater (managed under Alberta's *Environmental Protection and Enhancement Act*).

The current water allocation management system establishes priority based on 'first in time, first in right'. During times of water scarcity, senior (older) water licence holders are entitled to their allocation of water before more junior (more recent) water licence holders, regardless of the purpose for which the water is diverted. The entitled portion may not necessarily be for the full allotted amount, depending on other system requirements, particularly during times of water shortage. The provincial government's ability to make these adjustments is outlined in legislation, and conditions are often included in a water licence.

Figure 11
Estimated Water Consumption by Sector as a Proportion of Total Consumption in Alberta



The amount of water actually used by oil sands operations represents only 5.5 percent of the total water consumed in the province each year, making the industry one of the lowest consuming sectors in the province (Figure 11).

Under the current water allocation management system, licences are issued with consideration of a range of circumstances beyond just the specific activity, including the amount of return flow that may be expected on a river upstream, and the implications of any additional diversion on downstream users and the aquatic ecosystem.

In addition to the water licensing system, other tools are used to manage water in the province:

- **Conservation, Efficiency and Productivity (CEP) Sector Plans**
  To encourage water conservation, CEP plans have been developed by major water-using sectors (chemical and petrochemical, forestry, irrigation, mining/oil sands, municipal, oil and gas, power generation). They outline overall goals and strategies for how these sectors will use water productively and efficiently.

- **Water Conservation Objectives**
  The *Water Act enables the use of water conservation objectives (WCOs). WCOs are used by g*overnment to set the quantity and quality of water to remain in a body of water for: protection of the water body or its aquatic environment; protection of tourism, recreational, transportation, or waste assimilation uses of water; and management of fish or wildlife.

- **Water Management Plans**
  Water management plans provide broad guidance for water management. They set out clear directions regarding how water should be managed, or result in specific actions. The planning process addresses multiple issues, involves stakeholders, First Nations and Métis communities, and produces resource management recommendations.

While these and other strategies are helpful in managing Alberta's water supplies today, several realities make it necessary to consider further action.

- **Water scarcity**
  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. The reality of continued water scarcity risks, coupled with increasing water demands, make it imperative that all Albertans, and all Alberta municipalities, businesses and industries, conserve water and use it as efficiently and productively as possible.

- **Long-term growth**
  Alberta's water supplies need to be able to accommodate not only our current needs, but also our province's population and economic growth over the long term. We must also consider factors such as pollution, drought and climate change, which can affect the amount and quality of water available for use. Access to water will be essential to support the province's social, economic and environmental objectives.

- **River basin diversity**
  Some river basins (and sub-basins) have very large amounts of water relative to water demand, while others have very high levels of demand compared to the amount of water available.

- **Allocation realities**
  Under Alberta's *Water Act* there is an allowance for an existing licence holder to transfer all or part of an existing allocation of water to another person or corporation for use in a new location. Transfers enable water users to manage their own risk in times of scarcity, allow new users to access water allocations in a closed basin and provide incentives for water conservation among existing water users. The Bow, Oldman and South Saskatchewan sub-basins are closed to new water allocations. This means that new demands for water in these sub-basins must be met through sharing of existing water allocations. Across the province, some licence holders have allocations that have factored in future needs, and as such, currently exceed their requirements and typical levels of use, while other licence holders (such as certain municipalities) do not have a sufficient allocation to accommodate their growth.

Managing water effectively among current and future water users will be an ongoing need and a challenge, while remaining consistent with the principle of 'first in time, first in right'.

Options for Tomorrow

Alberta's current system for allocating and managing water has generally met Albertans' needs. However, in the face of growing water demand and a changing climate, Alberta may need to adapt and prepare to effectively address future challenges.

Advice and input received to-date indicates that overall, these challenges do not signal a need to abandon or completely change the existing water allocation management system. Indeed, it is important to note the government is committed to some fundamental principles that underlie Alberta's current approach:

- The principle of 'first in time, first in right' as the basis of prioritizing water licences;
- Alberta will not sell water beyond the province's boundaries (such as to the United States);
- Alberta will respect its water obligations under existing transboundary agreements; and
- Inter-basin transfers of water between major river basins are not allowed, unless authorized under a special Act of the Legislature.

Instead, working within our current system, more could be done to optimize the management and use of Alberta's water supplies. This means managing water from a system perspective, not solely from an individual allocation perspective.

Across the province many efforts are underway - by industries, organizations and individuals - to conserve water and to use it productively and effectively. By building upon these collective efforts, we can respect the principles of our water allocation management system while better matching our total water supplies with current and future water demand.

Work by stakeholder initiatives and groups such as the Minister's Advisory Group, the Alberta Water Council, the Alberta Urban Municipalities Association and Alberta Innovates (formerly the Alberta Water Research Institute) have suggested various mechanisms for achieving water management optimization in Alberta.

In line with these suggestions, the Government of Alberta could pursue several enhanced management strategies, such as the following, to promote and facilitate water optimization:

- **Establishing protected water**
  Through the use of WCOs under the *Water Act*, Alberta could establish protected water in all river basins. (WCOs are already in place in the South Saskatchewan River basin.) This would be water protected specifically by government to ensure our rivers have the base flows necessary to prevent significant harm to the viability of environmental systems. These amounts would be distinct from water available for allocation for other uses. They would be science-based and community-informed, providing confidence they would meet aquatic ecosystems needs and be consistent with the public interest.

- **Enhanced water storage**
  Water storage offers potential for optimizing our water supplies, especially in the southern part of the province (although potential on all major river systems exists). The vast majority of water in the South Saskatchewan River basin comes from snowmelt in the Rocky Mountains, which happens seasonally. This means that during a certain time of year, water volumes in the basin are high relative to demand, but during the remainder of the year, volumes drop off while water demand is strong. Water storage can help mitigate this challenge, since it would enable capture of excess seasonal volumes that could be managed throughout the rest of the year.

- **Facilitating water allocation transfers**
  The *Water Act* allows for transfers of water allocations between licence holders. However, challenges have been identified by stakeholders around certain details, which may be hampering the ability of the transfer system to be as effective as it could be. Although the legislation may be clear in most areas, observations provided by stakeholders include:

  - Perceptions that the *Water Act* is not clear about the amount of allocation that can be transferred by a licensee;

  - Lack of clarity and consistency around treatment of returned flows (following use), including the ability of licence holders to consider re-use opportunities;

  - Inconsistency in dealing with water that has been allocated but which goes routinely unused; and

  - Lack of understanding as to why the *Water Act* requires an amendment to a license, rather than a licence transfer, to change the purpose for which the water will be used.

While several of these issues may have clarity in legislation, practice has demonstrated the need for strengthened guidance and management frameworks to support local decisions. Regardless of what changes may be required, resolving these issues would better enable licence holders to share water with other users, including new demands brought on by population and economic growth. This would, in turn, encourage existing license holders to improve their water conservation and efficiency, so they can participate in the transfer system.

- **Strengthening water conservation**
  The current allocation system tells licence holders how much water they are allowed to divert and use, and it establishes their priority. However, it does little to encourage licence holders to use water wisely or to conserve water. Within the framework of the current system, incentives and rewards could be developed to strengthen water conservation and to encourage efficient and productive use of water.

- **Leveraging regional planning**
  Regional planning under Alberta's Land-use Framework creates opportunities to better integrate water management with air, land-use, and biodiversity management. The province's seven land-use planning regions align with the province's water basins. Working at the regional scale to undertake water management therefore makes a lot of sense. This approach would enable the development of water management strategies that are tailored to meet the unique needs of a region, and which consider the unique characteristics of that region's river basin and aquatic ecosystems.

- **Expanding transparency and open data**
  Improving access to water information can help support proactive water management. Making more water data publicly accessible would enable users to engage in individual water management planning and strategies. Open data and transparency supports collaborative decision-making among many users and stakeholders, which can improve opportunities for water optimization. It also enhances Albertans' confidence that Alberta's water resources are being well monitored and thoughtfully managed. There is already good information on certain elements of the water management system – for example, surface water availability, the amount of water allocated across Alberta, and surface water quality. However for other elements of the system, new investments in monitoring, validation and reporting systems could be necessary. This could improve both the amount and accessibility of data (e.g., actual water use, consumption and return flow quantities; and groundwater inventories.)

The enhanced management strategies proposed above offer a variety of conceptual ideas. Pursuing many of these in combination offers the best potential for ensuring the total amount of water we have can be effectively optimized to meet our current and future water demands, including the needs of the environment. The intent would not be to set formal plans with these actions, but instead, assess the opportunities of various actions and plan the coordinated implementation of them as efficiently and effectively as possible. In this regard, the role of government may be more to focus on enabling the opportunities.

Implementing these strategies will require collaboration, coordination and shared management. It could require water users to make decisions based not only on their individual considerations, but potentially the requirements of other water users, in ways that provide the same individual benefits, but as a system, serve to meet a broader range of water opportunities into the future.

Pursuing water use optimization approaches could have some implications, such as:

- **Changing the way we use water**
  There would need to be stronger focus on making sure we all use water appropriately. For example:

  - using water at different times so that supplies can be balanced with demands;
  - taking steps to use less water to do the same or similar things; and
  - making business and industrial investments to achieve better water efficiency.

  Current water users would be expected to further enhance their water conservation. Future water users would be expected to use strategies and technologies so that their water demands are as low as possible.

- **New investments**
  Pursuing some of these strategies, such as water storage, would have cost implications. It could require the construction of new facilities or upgrading of existing facilities. Individuals, businesses and industry would need to make investments in new technologies to improve their water efficiency. While these investments would yield economic and environmental benefits, they would entail some upfront and ongoing costs.

- **Addressing unused water**
  Optimizing our province's water management system could include bringing unused water back into the system, while respecting the principles on which our water management allocation system is based. This would mean working collaboratively with licence holders who have allocations that have gone regularly unused, to find ways of optimizing the use of currently unused water while making sure the licence holder's future water needs can be met.

- **Legislative changes and policy enhancements**
  Some changes to legislation and policies would likely be required. For instance, making improvements to the allocation transfer system could entail legislative amendments. The relationships between stored water and water allocations would also need to be better clarified and well understood, which could have policy and legislative implications.

We Need Your Input

Consider the current and future water demands that Alberta will face, and the proposed approach of optimizing our water supplies to meet these demands. Think about the implications for you, and for other water users, if Alberta was to move forward with these plans to optimize the use of water.

What are your thoughts?

MOVING FORWARD

Water is vital for Alberta's future. All of our social, economic and environmental goals depend upon water in some way, from welcoming new residents and businesses to maintaining our ecosystems and scenic landscapes. Preparing today to most effectively address water challenges on the horizon will help ensure our province remains prosperous in the decades ahead.

This represents the beginning of a renewed conversation with Albertans about water. The views and perspectives gathered from Albertans will determine how the Government of Alberta will approach water actions in the four priority areas outlined in this document. As work continues in these and other policy areas, Albertans will be engaged to provide further input and feedback on the results.

Thank you for taking part in the conversation. Please go to www.waterconversation.alberta.ca to fill out a survey and find out more about other ways you can become involved. Your feedback will be compiled and shared in a report outlining what we heard from Albertans.