

**Alberta's Agency Report  
To the  
Mackenzie River Basin Board  
Fall 2019**



*Peace River*

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# 1. Alberta River Forecast Centre

## Background

### *River Conditions*

Flows in the Athabasca and Peace River basins at mid-October are generally average to above average for this time of year. The Peace River at Peace Point gauge shows flow to be above the upper quartile, however this has varied from below the lower quartile to above the upper quartile on a few occasions since spring breakup. On the Athabasca River below Fort McMurray, flows have been above the upper quartile since late June and higher than average flows are expected into the winter.

Detailed, but preliminary, flow information for rivers in Alberta can be obtained from the River Forecast Centre's webapp at: <https://rivers.alberta.ca/>.

### *River Forecast Centre Upgrades*

Alberta's River Forecast Centre is continuing with a program to review and update its forecasting processes, and implementation of the Deltares Delft-FEWS (Flood Early Warning System) has begun. In addition, the ongoing review of hydrological modelling tools had completed the following test builds by the end of March 2019.

- MIKE Hydro
- MESH
- HEC-HMS
- RAVEN
- NWS Suite
- HFAM

## Status

Implementation of the Delft-FEWS platform has been ongoing since March 2019 and Forecast Centre staff have participated in a number of workshops with Deltares staff and internal stakeholders. The fourth and final workshop was held in early September and platform implementation is expected to be complete by March 2020.

Three hydrological model test builds (MIKE-SHE, UBC Watershed Model and WaSim) planned for 2019-20 are delayed and the project has been scaled back to two test builds in this fiscal year. The project will move to the next phase in 2020-21, an in-house comparison of the already completed test builds against the current SSARR models.

## Further Information

Further information can be provided by Bernard Trevor and will also be made available to the Committee on Flow Forecasting.

## Contact

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## 2. Groundwater Initiatives between Alberta and Northwest Territories

### **Background:**

A Bilateral Water Management Agreement (BWMA) between Alberta and NWT was signed on March, 2015 that lays the foundation for long term cooperative management of the water shared between two provinces. The agreement describes how groundwater may be shared reasonably and equitably.

There is limited knowledge available about the quality, quantity and location of groundwater shared between Alberta and the NWT. Under the BWMA work plan for 2019-20, Alberta and NWT agreed to first collect the groundwater information of the shared groundwater areas and then delineate the transboundary aquifers.

### **Status:**

Alberta Environment and Parks and NWT met with the Alberta Geological Survey to initiate work for collecting information on groundwater for the shared groundwater areas and based on the information /data collected, move forward to delineate transboundary aquifers along the AB-NWT boundary (priority to Hay river basin).

This work is occurring under the Memorandum of Understanding signed between Alberta Environment and Parks and Alberta Geological Survey.

### **Further Information:**

We are at the initial stage of the work, more information about these initiatives can be obtained by contacting:

### **Contact:**

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## 3. Water regulations for Alberta's energy industry

### **Background**

- The AER is responsible for administering the Alberta [Water Act](#), and issuing water licences and temporary diversion licences (TDLs) for energy development activities. Water licences for all other activities, including for municipal, agriculture and forestry use, are issued by Alberta Environment and Parks.

- The AER works hard to ensure that companies use water safely and responsibly. The AER does this by:
  - reviewing all energy development applications under the *Water Act* to ensure oil and gas operations comply with requirements;
  - ensuring companies have our approval before they use water to develop energy resources; and
  - conducting inspections, audits, and performance reviews to ensure that the rules are followed at all times.
- Companies must [apply for a licence](#) from the AER before using nonsaline (i.e., fresh) water in their operations. They do not have to apply to use alternative water (e.g., wastewater, saline groundwater, etc.), but they must report how much they are using.
- Companies applying to use water must specify the water bodies they propose taking water from, the amount of water they need and why, the rate at which they will take the water, how long they need to use the water, and what they need the water for.
- The AER considers several factors when reviewing water licence applications, including the amount of water available, water management frameworks under provincial land-use regional plans, and the impact the activity or project might have on fish, wildlife, aquatic habitat, and water users.
- The AER shares all *Water Act* applications for 30 days on its [Public Notice of Application](#) tool on aer.ca and encourages public participation in the review process.
  - Anyone with concerns about an application can submit a [statement of concern](#) to the AER, which we will consider during our review of the application.
- The AER can suspend a water licence or temporary diversion licence if there is a risk to public safety or an emergency is declared, or in dry weather and low flow conditions.
- Once a project becomes operational, its water use often declines. This happens for a number of reasons, such as the company gaining a better understanding of the site's geology or securing alternative sources of water. It might also be that a company is recycling water previously used in their operation.
- In 2018, only 12 per cent of nonsaline water allocated to all industries in the province was allocated for oil and gas extraction; of this, the industry used only one quarter of their allocation.
- Twenty-one per cent of the water used by industry in 2018 was nonsaline or alternative make-up water. The remaining 79 per cent of the total amount of water used for energy development was [recycled](#).
  - Make-up water refers to nonsaline or alternative water sources (i.e., saline groundwater, wastewater, recycled water) to make up for water that is lost during the resource extraction process.

### **Further Information**

Additional information about how the AER [regulates water use](#) is available at aer.ca.

Additional information about how the oil and gas industry used water in 2018 is available in the AER's [Alberta Water Use Performance Report](#) on aer.ca.

### **Contact**

Contact the AER at [inquiries@aer.ca](mailto:inquiries@aer.ca)

## **4. Tailings Management Framework**

### **Background**

- The Alberta Energy Regulator (AER) works to ensure that the oil sands are developed within government policy and in an environmentally responsible way. We are committed to protecting what matters to Albertans—public safety and the environment—all while ensuring the rules are followed at every stage of energy development.

- Under the Government of Alberta's [Tailings Management Framework](#) (TMF), companies must progressively treat and reclaim their tailings so that they are ready to reclaim within 10 years after mining has stopped.
- Under the TMF and the AER's [Directive 085: Fluid Tailings Management for Oil Sands Mining Projects](#), companies were required to submit tailings management plans to the AER. These plans list the actions that companies will take over the next several decades to ensure their tailings are progressively reclaimed when the life of the mine ends.
- To ensure a company's tailings management activities remain on track, the AER has set thresholds for fluid tailings volumes that companies must maintain (i.e., limits and triggers). These thresholds will remain in place for the approved life of a mine.
- The TMF and *Directive 085* do not address waterfowl protection, dam safety, or air emissions from tailings ponds. These issues are addressed through other AER requirements.

### **Status**

- The AER has approved tailings management plans for all eight of Alberta's oil sands mines. Decision reports are posted to the [Tailings Notices and Decisions](#) page on aer.ca.
- In September 2018, the AER published [2017 State of Fluid Tailings Management for Mineable Oil Sands](#), which reported on companies' compliance with their approved tailings management plans under *Directive 085*.
  - An updated report with 2018 data will be released in fall 2019.

### **Further Information**

Additional information about the AER's approach to [tailings management](#) is available at aer.ca

### **Contact**

Contact the AER at [inquiries@aer.ca](mailto:inquiries@aer.ca)

## **5. Tailings Management Framework for the Mineable Athabasca Oil Sands**

### **Background**

As a commitment under the Lower Athabasca Regional Plan, the Tailings Management Framework (TMF) for the Mineable Athabasca Oil Sands was released in March 2015.

This framework provides direction to manage fluid tailings volumes during and after mine operations to manage and decrease liability and environmental risk resulting from the accumulation of fluid tailings on the landscape.

To ensure tailings management is aligned with the intent of the TMF the Alberta Energy Regulator (AER) developed *Directive 85: Fluid Tailings Management for Oil Sands Mining Projects (2017)*. *Directive 085* provides application and performance monitoring and reporting requirements for fluid tailings volume, and management plans.

### **Status**

As of summer 2019, decisions on all tailings management plans for existing oil sands mines have been made. All have been approved with conditions, except for one that requires additional information to be provided by 2020.



Additional work to implement the TMF is currently underway. Stakeholders and Indigenous communities will continue to be engaged as this work advances.

### **Further Information**

Government of Alberta's [Lower Athabasca Region: Tailings Management Framework for Mineable Athabasca Oil Sands \(TMF\)](#).

Alberta Energy Regulator's [Directive 085: Fluid Tailings Management for Oil Sands Mining Projects](#)

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## **6. Incident Response in Alberta's Energy Industry**

### **Background**

- The Alberta Energy Regulator (AER) ensures the safe, efficient, orderly, and environmentally responsible development of energy resources. The AER regulates all aspects of energy development including: exploration, construction, operation (including incident response), closure and reclamation. This includes ensuring operators are ready and able to appropriately respond to [energy incidents](#).
- The AER responds to energy-related incidents 24 hours a day, 7 days a week to protect the public and the environment.
- Companies are required to immediately report incidents to the AER's 24-hour emergency telephone number.
- The AER regularly monitors, inspects, and audits energy sites to ensure companies are meeting requirements.
- The AER requires licensees to have comprehensive emergency response plans in place for all potential energy development risks, as outlined in [Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry](#). This includes requirements to train emergency response personnel and regularly test these plans through exercises or tabletop simulations.
- If an incident occurs, companies are required to respond immediately to limit impacts to public safety, property, and the environment.
- Incident information is posted to the AER's [Compliance Dashboard](#). Incidents posted to the Compliance Dashboard meet the following criteria:
  - a [reportable release](#) that involves hydrogen sulphide (H<sub>2</sub>S),
  - a [reportable release](#) that affects a water body, whether on-or-off lease,
  - a [reportable release](#) of hydrocarbon or produced water that migrates off lease or onto pipeline right-of-ways; or
  - a seismic event of [local magnitude](#) (M<sub>L</sub>) 4.0 or greater in [the Duvernay Zone](#) (subject to [Subsurface Order No. 2](#)) or 2.5 M<sub>L</sub> or greater in [the Brazeau area](#) (subject to [Subsurface Order No. 6](#)).
- In the event of an energy-related incident, AER staff are deployed to ensure appropriate response is being undertaken by the responsible party, that necessary emergency response protocols are in-place, and to ensure that impacts to the public or environment are minimized.

- During an incident, the AER works with the company, local authorities, and other provincial agencies including Alberta Environment and Parks and the Alberta Emergency Management Association to coordinate an efficient and effective response.
- The AER reviews the cause and circumstances of all incidents to determine if any of its requirements were not met.
- When a company does not follow the rules, the AER takes steps to stop the noncompliant activity, ensure public safety, restore the environment, and if necessary, apply enforcement action against the responsible party.
- The AER has a number of [enforcement tools](#) that it can take against a company if it fails to follow our rules in reporting or responding to an incident.

### **Further Information**

- Additional information about how the AER manages [energy incident response](#) and [frequently asked questions](#) are available at aer.ca.

### **Contact**

Contact the AER at [inquiries@aer.ca](mailto:inquiries@aer.ca)

## **7. Protecting Source Drinking water**

### **Background**

Ensuring the safety and security of our drinking water sources is critical to public health, economic prosperity and environmental sustainability in Alberta. Source water protection (SWP) is the proactive mitigation of risks and impacts to drinking water supplies. It is the first barrier in a multi-barrier, risk management approach to protect drinking water from contamination and other risks. SWP can be one of the most cost-effective methods to maintain and improve source water quality and quantity in Alberta.

### **Status**

In 2018, the Alberta Water Council (AWC) formed a project team to provide guidance on “Protecting Sources of Drinking Water in Alberta”. The project included surveys of water systems and an assessment of the SWP practices, processes, risks and initiatives in Alberta. A consultant was hired to complete a jurisdictional scan to examine SWP approaches in selected areas of Canada, the United States and Australia.

The results of this project include a draft guidance document and summary report to support source water protection in Alberta. The initial results of this project indicate that SWP is being done voluntarily by some water providers in Alberta, but that there is a lack of awareness, data, tools, training, funding and expertise to support this work. There is also a need for a more collaborative approach between drinking water providers and stakeholders to support SWP in Alberta. Concerns over potential risks to drinking water sources were identified including risks from extreme weather (e.g. floods, drought), development pressures, stormwater, algal blooms, industry, recreation and livestock. The guidance document provides direction and references to tools, resources, practices and case studies for addressing SWP issues in Alberta. The project is scheduled to be completed by the end of this year. Additionally, a project proposal will be submitted for consideration by the AWC Board this fall to develop a SWP toolkit (e.g. templates, mapping tools, technical support).

### **Further Information**



The Alberta Water Council's website includes a link to the project team's terms of reference and other information: <https://www.awchome.ca/projects/protecting-sources-drinking-water-alberta-2/>

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## **8. Advancing Denitrifying Bioreactors as a Beneficial Management Practice for Agricultural Drainage Waters in Alberta**

### **Background**

Tile drainage is a widely adopted agricultural water management practice for removing excess water from the soil profile to improve soil moisture conditions for seeding and crop growth. However, tile drainage systems provide direct conduits that can transport nutrients from agricultural fields to surrounding irrigation canals, reservoirs and natural water bodies. Elevated concentrations of dissolved nutrients, such as nitrogen (N) and phosphorus (P), in tile drainage water can lead to water quality impairments including eutrophication in rivers and lakes and potential damage of irrigation infrastructure from weed and algae blooms. Low cost and simple technologies are needed to reduce nutrient export from agricultural tile drainage to sensitive aquatic ecosystems. Denitrifying bioreactors are a passive treatment approach where drainage water is routed through solid carbon substrates to remove dissolved nutrients through physicochemical and biological processes. This edge-of-field water treatment technology is gaining popularity in the mid-western United States and eastern Canada, but has not gained widespread acceptance in the Western Canadian Prairies. Consequently, there remains uncertainty in whether these technologies are appropriate for the Western Canadian Prairies considering agricultural drainage is highest during spring snowmelt and the bioreactors are driven by biological processes.

This research project will evaluate the performance of pilot-scale denitrifying bioreactors for removing dissolved nutrients under Alberta agricultural field conditions at two representative geographic locations in Taber and Edmonton. Local waste biomass materials (i.e., wood chips, hemp and barley straw) will be tested under varying retention times and ambient temperatures during year round operation for nutrient removal potential. This information can be used to optimize bioreactor design parameters including dimension, retention time, and carbon feedstock selection. The outcomes will be shared and recommended to drainage contractors, Alberta Environment and Parks, and Alberta Irrigation Districts to inform the suitability of using this technology for mitigating nutrient export in tile-drained cropping systems in Alberta.

### **Status**

Funding for this project was approved and provided by Alberta Innovates (led by Alberta Agriculture and Forestry) and Canadian Agricultural Partnership (led by Taber Irrigation District) for three years (2019-2022). A set of nine replicate pilot-scale bioreactors were installed in Taber and at CDC North, Edmonton. The performance of these bioreactors for removing nutrients at two sites will be evaluated over the coming two years (2020-2022). Final report will be available in spring 2022.

### **Further Information**

Further information of this project can be provided by Drs. Shanwei Xu or Greg Piorkowski.

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## **9. Nutrient Objectives for Small Streams in Agricultural Watersheds of Alberta**

### **Background**

Water quality objectives are being set for mainstem rivers in Alberta as part of Water Management Frameworks (WMF) in regional land-use plans. All land users in a basin will be expected to help meet the WMF objectives, including the agricultural industry by reducing non-point source pollution (NPSP) through the use of beneficial management practices (BMPs). NPSP management programs are generally designed and monitored in catchments drained by smaller-order streams. However, there is a lack of water quality objectives that can assist in prioritizing, planning, and evaluating watershed management programs at this scale. This lack of information leaves watershed and agricultural management programmers with limited capacity for contextualizing water quality data with respect to aquatic ecosystem impairment, gauging water quality improvements realized through BMP implementation from an aquatic ecosystem perspective, or determining whether a successful endpoint has been reached in an NPSP management program.

Alberta Agriculture and Forestry (AF) has been leading a five-year study (2016 – 2021) intended to define numeric nutrient objectives applicable to smaller order streams in Alberta's agricultural region. Here, threshold responses of aquatic ecosystem structural and functional components to nitrogen and phosphorus are being integrated in a unique weight-of-evidence approach for setting risk-based nutrient objectives. The outcome of this process is four risk levels, bound by numeric ranges of nutrient concentrations, which represent low, moderate, high and very high risk of aquatic ecosystem impairments. The upper and lower bounds of the risk categories can be used as management triggers and targets, respectively, depending on the current nutrient status of the waterbody.

Previous water quality monitoring in agricultural watersheds across Alberta revealed differences in in-stream nutrient concentrations on a natural region basis. Separate nutrient objectives for each of the major natural regions that encompass agricultural activity in Alberta (i.e., Grassland,

Parkland, and Boreal) will be defined to recognize this inherent difference. However, stream characteristics have been found to differ within, and be common across, natural regions presumably as a result of watershed morphology, geology and land-use properties. A secondary objective is to define nutrient objectives for distinct watershed categories that are based on natural and anthropogenic factors. The definition of nutrient objectives on a watershed-basis will facilitate planning and prioritization of watershed management according to the regional land-use planning process in Alberta.

### **Status**

The first phase of this project (2016 – 2019) is complete and provisional nutrient objectives have been defined for the Grassland and Parkland natural regions of Alberta. A second project phase (2019 – 2021) is ongoing, and includes the monitoring of 30 streams in agricultural areas of the Boreal natural region. Upon conclusion of the second project phase, nutrient objectives will be defined for small streams on a natural region and watershed category basis.

### **Contact for Further Information**

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## **10. Alberta Water Research Innovation Strategy**

### **Background**

The *Alberta's Water Research and Innovation Strategy 2014: A Renewal* (AWRIS) was released in 2014 and supports the *Water for Life (WFL)* knowledge and technology gaps, and *Alberta's Our Water, Our Future: A Plan for Action*. The strategy guides the water research and innovation system, enables a higher level of collaboration, and demonstrates the relationship between policy and innovation agendas. It also directly guides the six-year, \$28.3 million provincial investment in research and innovation through the Water Innovation Program (WIP).

AWRIS has three key outcomes:

- **Innovation Focus**: Investments in water research and innovation generate relevant, credible, and reliable knowledge that supports the strategic needs of Alberta's water resource system.
- **Innovation Platforms**: Technological and organizational environments are conducive to discovery and application, fueling innovation in Alberta's water resource system.
- **Innovation Capacity**: Water knowledge is effectively mobilized to create innovative solutions to Alberta's water resource system.

The provincial investment in WIP has been a key implementation tool to achieve the AWRIS outcomes and this, alongside other provincial investments and collaborative actions, have recorded success in the last four years. The three previous AWRIS annual reports have highlighted how the Government of Alberta (GoA) investments have achieved tangible impacts on the water research and innovation system. These reports highlight how the government strategic investments, platforms, synergies and partnership are making a difference in the province's water research and innovation system. The achievements identified in these reports reflect the collective efforts of researchers, service providers and various private and public organizations.

The Water Innovation Program (WIP) is managed by Alberta Innovates (AI) to achieve the outcomes of AWRIS and the knowledge needs for the goals of the Water for Life Strategy: (1) safe, secure drinking water; (2) healthy aquatic ecosystems; and (3) reliable, quality water supplies for a sustainable economy. The priority is to make certain Alberta has the quality and quantity of water, when and where it's needed into the future.

The WIP research portfolio supports investments that advance knowledge and innovation in four key themes: (1) future water supply and watershed management, (2) healthy aquatic ecosystems; (3) water use conservation, efficiency, and productivity; and (4) water quality protection.

The WIP grant offers funding through continuous intake and competitive, time-limited calls to support the creation and application of relevant scientific knowledge and innovative technology solutions needed to address the goals of WFL/AWRIS strategies. Recipients include post-secondary institutions, government organizations, private sector companies, and not-for-profit organizations

High level results from 2018 WIP grant activity include:

- 35 ongoing and new projects.
- 154 HQPs involved in projects with 58 jobs created and 110 collaborations.
- 167 attendees at the 2019 WIP Forum.
- Program leverage of 2:1 with other funding sources.

### **Status**

The WIP grant is currently in effect and the current phase will end in 2022. To date, Alberta Innovates (and the former corporate entity Alberta Innovates – Energy and Environmental Solutions (AI-EES)) have held three WIP calls: one in October 2015, a joint Water Technologies call in partnership with Sustainable Development Technologies Canada (SDTC) in 2016, and a third call in August 2018. Applicants were informed of the third call results in March 2019, but execution of agreements for grants over \$200,000 is on hold pending confirmation of remaining funds by GoA.

More than 100 projects in the WIP portfolio have been completed or are ongoing, including 48 completed or ongoing in the 2018/2019 fiscal year. Projects are distributed across the four key themes of the *WIP*. Updates for ongoing projects are presented to a stakeholder group at the WIP Forum held in May each year. Public slide decks can be found at:

<https://albertainnovates.ca/funding/water-and-land/>

**Four ongoing or recently completed projects are highlighted below:**

### **The Castle Watershed - A Sentinel System at the Crown of the Continent (University of Lethbridge)**

The Rocky Mountain headwaters such as those of the Oldman River Basin (ORB) provide approximately 80% of Alberta's water supply, making it a necessity to protect these source waters for downstream municipal, irrigation, recreational uses, and a wide range ecosystem services. During the last century, a period of rapid population growth and increasing exploitation of our shared water resource, the montane and alpine headwaters have undergone significant land cover changes due to climatic forces and anthropogenic pressures. The project is evaluating historical, contemporary and possible future land cover and climatic changes within the Castle Watershed headwaters of the Oldman River Basin (ORB), and quantifying the impacts of these changes to river runoff and water supply. Synergistic field, remote sensing and modeling studies are being conducted to understand terrain and land cover properties in this Rocky Mountain

watershed and how they influence hydrology at a scale suitable for operational water resource planning. In particular, some of the challenges to the implementation of accurate runoff simulations are being addressed.

### **Adaptation to Changing Water in Alberta (University of Alberta)**

Alberta's economy depends on an adequate and predictable supply of water. Water-intensive industries including irrigated agriculture, industries reliant on hydroelectric power, and the oil and gas sector, all require predictable water for a healthy future. However, climate change and climate variability will alter the spatial and temporal water supplies for the province of Alberta. This project will: (i) advance the knowledge of water availability forecasting for Alberta and (ii) engage stakeholders through interactive workshops to identify imbalances in water availability/water demand scenarios.

Bringing together future water availability scenarios based on science, and future projected water demand scenarios informed by stakeholder engagements is necessary to gain consensus to implement adaptation strategies to mitigate potential economic, environmental and social consequences. This project leverages and integrates two projects supported by Alberta Innovates: process-based hydrology and economic models from the previous 'Predicting Alberta's Water Future' project and the operational participatory-based model developed by Alberta WaterSMART. Understanding the different water flow dynamics and endowments in space and time will allow timely policy decisions and better targeted investments in efficient water infrastructure and facilities.

### **Nutrient Objectives for Small Streams in Agricultural Watersheds of Alberta (Alberta Agriculture and Forestry)**

The project is addressing the lack of suitable nutrient objectives for small streams in Alberta's agricultural zone. Regionally applicable nutrient objectives will be set for the Aspen Parkland and Grassland natural regions of Alberta through bioassessment procedures which evaluate the structure and functional components of small streams. In collaboration with the University of Alberta and other stakeholders, modeling tools are being used to develop a framework for site-specific nutrient targets for streams, and to evaluate the achievability of nutrient objectives through Beneficial Management Practices (BMPs). Applying the framework for site-specific nutrient targets to actively managed watersheds may result in more appropriate targets than regionally applied nutrient thresholds. The project will also simulate agricultural BMP scenarios to assess achievability of structural, functional and site-specific nutrient objectives.

### **Drinking Water Supply After Severe Wildfire in Alberta: Assessing Initial Risks and Treatment Technology Resilience (University of Waterloo)**

Wildfires are the most catastrophic agent of landscape disturbance in northern and western source water regions which provide the vast majority of surface water supplies in Alberta. Recent increases in the magnitude/severity of wildfires along with increased provincial water demand are resulting in a pressing need to evaluate the risk of wildfire impacts on downstream drinking water supply and treatment. Very few wildfire impact studies have specifically focused on drinking water treatability, and none have focussed on the boreal forest. In collaboration with the University of Alberta, this project will build our understanding of the key differences in wildfire-impacted source waters and in drinking water treatability following wildfire by developing mitigation strategies that can meaningfully help to safeguard drinking water for Albertans.

While the May 2016 Horse River wildfire was catastrophic for the Regional Municipality of Wood Buffalo, it presented unique and critical learning opportunities for this research. This project will characterize water quality and drinking water treatability immediately after and within 3 years after

severe wildfire in the Boreal Plains ecoregion. The study will evaluate the resilience of the presumed Best Available Technology (BAT) for treating worst-case scenario, highly deteriorated, and rapidly changing source water quality. A potential outcome is real-time operational control tools for rapid optimization of drinking water treatment performance during extreme challenge periods.

### **Further Information**

Previous AWRIS report can be found at <https://open.alberta.ca/publications/2371-2317>  
Water Innovation Program (WIP). <https://albertainnovates.ca/funding/water-and-land/> or

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## **11. Alberta's Land-use Framework**

### **Background**

The Government of Alberta's Land-use Framework (LUF) sets out an approach to managing our province's land and natural resources to achieve Alberta's long-term economic, environmental and social goals. The LUF established seven land-use regions and calls for the development of a regional plan for each. The Alberta Land Stewardship Act supports the LUF and establishes the legal basis for the development of regional plans and makes regional plans binding on all provincial government departments, decision-making boards and agencies, municipalities, industry and Albertans. Under the LUF, regional plans are designed to integrate and achieve those Government of Alberta long-term goals by helping guide future development in a region through setting regional level thresholds to manage the cumulative effects of development.

The Government of Alberta approved the Lower Athabasca Regional Plan in 2012 and the South Saskatchewan Regional Plan in 2014. Both regional plans contain direction for management of water quality and quantity, which includes new regulations established through the development of surface water quality management frameworks. Work on the North Saskatchewan Regional Plan has been initiated and is continuing.

### **Status**

#### ***Lower Athabasca Regional Plan***

The Lower Athabasca Region covers approximately 93,212 km<sup>2</sup> and is located in the northeast corner of Alberta. The region, known for its abundant oil sands deposits, spans the catchment areas of three major river basins—the Athabasca River, the Beaver River and the Peace/Slave River basins—with the Athabasca River being the main source of water for oil sands mining



activities. The Lower Athabasca Regional Plan (LARP) sets resource and environmental management outcomes for air, land, water and biodiversity, and will guide future resource decisions while considering social and economic impacts to the region.

The LARP was established on September 15, 2012, and was the first regional plan to be developed under the LUF. The plan contains regulations to enforce the associated environmental management frameworks (EMF) for air quality, surface water quality and groundwater. These three EMFs were approved with the regional plan, while a Surface Water Quantity Management Framework and a Tailings Management Framework were approved in 2015; all are currently being implemented. A draft Biodiversity Management Framework for the LARP was completed and released for public review. Work is continuing to complete development of this framework.

Reporting on the LARP and associated EMFs is available at <https://www.alberta.ca/lower-athabasca-regional-planning.aspx>

Amendments to the LARP are anticipated in the future. These amendments will be based on the addition of the Kitaskino Nuwenëné Wildland, administrative boundary changes, updates to environmental management frameworks, and concerns and recommendations raised in the 2015 LARP Panel Report process. Many of the potential amendments are based on engagement and consultation with Indigenous communities. Further, under the Wood Buffalo National Park Action Plan (2019) the Government of Alberta committed to continue work with Indigenous communities and stakeholders on Lower Athabasca Region environmental management frameworks, including the surface water quantity and surface water quality frameworks.

### ***South Saskatchewan Regional Plan***

The South Saskatchewan Region is the most populated of the seven land-use regions and has comparatively fewer water resources. The region includes the Bow, Oldman, South Saskatchewan and Milk rivers basins. Implemented September 1, 2014, the South Saskatchewan Regional Plan (SSRP) addresses current conditions in that region, and anticipates and plans for all relevant development-related activities, opportunities, and challenges in the region over the long term. In early 2017, the SSRP was amended to accommodate the creation of the Castle Wildland and Provincial Parks. A second amendment was done in May 2018 to include the recently completed Porcupine Hills-Livingstone Land Footprint Management Plan that manages recreational activity for those areas.

The SSRP supports the Approved Water Management Plan for the South Saskatchewan River Basin that manages for water quantity, but not water quality. The regional plan did not establish new thresholds or objectives for water quantity, however, strategic direction is provided on enhanced watershed management, headwaters protection (including a review and potential update of water conservation objectives), wetland and riparian management, and flood and drought mitigation.

In addition to the strategic direction provided in the plan, the SSRP contains regulations to enforce the environmental management frameworks (under cumulative effects management) for air quality and surface water quality, which were approved with the regional plan. The Surface Water Quality Framework will monitor and manage long-term, cumulative changes in water quality within the main stem Bow, Oldman, South Saskatchewan, and Milk rivers. It builds on, but does not replace, existing provincial environmental policy, legislation and regulation, as well as identifies and manages for desired regional objectives. Water quality indicators and

thresholds (triggers and limits) will protect surface water quality from unacceptable impacts and protect it for current and future water uses. The framework has been developed to support and manage for transboundary commitments, including the Master Agreement on Apportionment.

In addition to air and water quality frameworks, a draft Biodiversity Management Framework was completed and released for public review. Work is continuing to complete development of this framework. A groundwater management system is being developed which could in time lead to a groundwater management framework.

Reporting on the SSRP and associated EMFs is available at <https://www.alberta.ca/south-saskatchewan-regional-planning.aspx>.

### ***North Saskatchewan Regional Plan***

The North Saskatchewan Region contains approximately 35 per cent of Alberta's population, the majority of whom live in the Capital Region, including the City of Edmonton. The region is home to both the North Saskatchewan and Battle rivers watersheds.

The Government of Alberta will be returning to regional and sub-regional planning processes for the North Saskatchewan Region. This planning will focus on goals and objectives for Alberta's economy, environment and communities. A key aspect of regional planning is working collaboratively with stakeholders, Indigenous communities, municipalities, and the public on future land use discussions. Through regional planning, the Government of Alberta will be listening closely to understand how to best manage the area in support of the goals. Comments and perspectives that Albertans have already shared will be considered when we move forward with renewed engagement and conversations.

The development of the North Saskatchewan Regional Plan (NSRP) will include development of environmental management frameworks. The plan is also expected to provide strategies and direction for water quality and quantity, enhanced watershed management (including headwaters protection), wetland and riparian management, and lakes, flood and drought mitigation. The NSRP will also provide support for the Approved Water Management Plan for the Battle River Basin. Regional plan strategies will be developed to support and manage for transboundary commitments, including the Master Agreement on Apportionment.

### ***Other Regional Plans***

The remaining regions for development of regional plans are the following: Lower Peace, Upper Peace, Upper Athabasca and the Red Deer regions.

### **Further Information**

More information about the Land-use Framework and regional planning can be found at [www.landuse.alberta.ca](http://www.landuse.alberta.ca).

### **Contact**

Regarding Regional Plans

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## 12. Watershed Planning and Advisory Councils

### Background

Watershed Planning and Advisory Councils (WPAC) are non-government, multi-stakeholder organizations designated by the province under Water for Life - Alberta's Strategy for Sustainability (2003), renewed in 2008. Their precise membership varies, but they generally include regional industries, environmental non-government organizations, provincial government departments, municipal and federal government representatives, First Nations, and Métis. Their roles include watershed assessment and state of the watershed reporting, integrated watershed management planning and education. They bring interested parties together to address watershed issues and encourage collaboration.

There are eleven WPACs in Alberta with one designated for each of Alberta's major river basins. Three WPACs are found in the Mackenzie River basin;

- Mighty Peace Watershed Alliance
  - Athabasca Watershed Council
  - Lesser Slave Watershed Council
- (This is the only lake-based WPAC. Lesser Slave Lake is in the Athabasca River basin.)

The Alberta Government provides funding for the 11 Councils' core operations (\$3.2 million in 2018 -19) and has representatives on their boards of directors. The government also provides funding, staff resources and information to support specific WPAC projects. There is considerable collaboration between the government and its WPAC partners and there is ongoing communication to encourage alignment with current government objectives.

### Status

#### Mighty Peace Watershed Alliance (MPWA)

Highlights from this year:

- The MPWA is leading Source Water Protection Plans for the Grimshaw Gravel Aquifer (completion 2019) and for the Wapiti Watershed (expected completion 2020)
- Through Alberta Environment and Parks' Watershed Resiliency and Restoration Program, MPWA has accessed funds to lead a group of partners in restoring watersheds through the Streambank Stabilization and Extension Project and Improved Livestock Crossing Project. Another project, the Wapiti Watershed Bank Stabilization Project, has been approved. The Streambank Stabilization and Extension Project is addressing erosion, flooding and drought issues through use of induced meandering and the re-establishment of a functioning riparian zone. The Improved Livestock Crossing project is improving water quality, flood and drought resiliency by developing affordable, place-based crossing solutions for producers in the Peace watershed.
- Mapping efforts in the Lower Peace are part of the Wabasca Wetlands Project. Both remote sensing and Traditional Knowledge are being used to corroborate a historical wetland distribution and use in this area. Once a validated wetland distribution historical is complete,

hydraulic modelling of the Peace River will be undertaken to assess the discharge needed to increase the likelihood of overbank flooding to recharge the wetland ecosystem in the Lower Peace. The last component will be to consider management options for obtaining the required discharge.

- MPWA is part of a Steering Committee that submitted a report that will form the basis of the Water Management Plan for the Wapiti River.
- Ongoing education and outreach includes wetland and water stewardship education for children and adults, water well and acreage care for landowners, remediation and restoration training, and water quality instruction.
- In partnership with Alberta Lake Management Society, MPWA coordinates LakeKeepers in the Peace watershed, which is a community-based lake monitoring program. Lakes monitored include Haig, Figure 8, Snipe, Graham and Swan Lakes.
- MPWA participates in forest management planning processes and other industry initiatives like “Enabling the Use of Alternatives to High-quality Non-saline Water by the Oil and Gas Sector in the MD of Greenview”.
- MPWA is part of the Parks Canada Environmental Flows and Hydrology Working Group for the Peace-Athabasca Delta struck in response to the UNESCO Reactive Monitoring Mission.
- In 2018, the Integrated Watershed Management Plan for the Peace and Slave watersheds was released by MPWA. The four primary issues of concern addressed in the plan and by ongoing MPWA work are 1) Water quality, availability away from the mainstem and consumptive use; 2) Peace River flow regime; 3) Wetlands and wetlands loss; and 4) Non-saline groundwater.

#### Athabasca Watershed Council

Highlights from this year:

- Approved for a Watershed Resiliency and Restoration Program grant from the Alberta Environment and Parks. Building on the data gaps identified in the Athabasca State of the Watershed (SOW) reports, this project will generate new knowledge about riparian health on a watershed level that will facilitate watershed planning and management. Project outcomes will also include the initiation of up to four restoration projects in partnership with landowners, which will be used as success stories for outreach and education initiatives. The focus area of this project is in the Central Pembina River sub-watershed, which has been identified as a high priority area in the SOW reports and the Watershed Resiliency and Restoration Program maps.
- Implemented a full and robust social media strategy and monthly e-newsletter
- Hosted a municipal forum with various educational presentations and stakeholder information gatherings
- Presented to the Farm Women’s Conference in Athabasca with over 100 attendees
- Hosted a photo exhibit– Moonlight Madness and attended various community trade shows throughout the watershed
- Delivered numerous presentations to Athabasca watershed municipalities throughout the basin for collaborative work towards the Alberta Government’s ‘Water for Life’ strategy.
- Delivered numerous youth education programs in partnership with Cows & Fish, Town of Whitecourt, Woodlands County and Municipal District of Wood Buffalo Grade 5 program
- Supported Science Outreach in partnership with Athabasca University and Athabasca River Basin Institute with two water-related Science Outreach Evenings.
- The draft Integrated Watershed Management Plan for the Athabasca Watershed, “Coming Together” will ready for acceptance this fall. It was developed from the State of the Watershed Reports and Traditional Knowledge Report as well as numerous other reports and input from stakeholders. It identifies the many strategies, the many partners, the science and resources needed to achieve ten goals. Preliminary work that supports the

plan has started in the identification of the following potential projects: a documentary; support, resources and partnerships for the Athabasca River Basin Institute (This is a library & resource centre on all data relating to the watershed); Economic Value of the Basin Study; State of the McLeod River; traveling interactive education and outreach program; forums for municipal and Indigenous leaders; Formation of new stewardship groups for the sub-watersheds; Continued new and innovative ways to promote better practices and more.

### Lesser Slave Watershed Council

Highlights from this year:

- Completed the Integrated Watershed Management Plan (IWMP) for the Lesser Slave Watershed after three years of work with stakeholders, the project steering committee, the technical advisory committee and partners at Alberta Environment and Parks.
  - IWMP is a guidance document and includes recommendations that when implemented by partners in the watershed, will lead to the long-term health and sustainability of the watershed.
  - LSWC has moved into the implementation phase of planning, establishing an Implementation Committee from local and provincial governments, Indigenous partners, the forest sector, the oil and gas sector, and NGO's who work in the watershed.
  - Implementation projects underway include: tributary water quality monitoring, mapping priority wetlands and sharing the maps with stakeholders, stream crossing remediation in the Upper Swan watershed, and providing flood hazard maps to our stakeholders and communities.
- LSWC completed its second year of the tributary monitoring program, which includes 15 sites on five major tributaries of Lesser Slave Lake.
  - Data is publicly available here: <https://mackenziedatastream.ca/#/>
  - LSWC has partnered with Swan River First Nation to collect additional water quality parameters on the Swan River sites and we are working with Big Lakes County to conduct fecal source tracking on sites along the West Prairie River.
- LSWC attended trade shows and local events to promote the organization and share the popular Lesser Slave Lake Stewardship Handbook.
- LSWC delivered 32 classroom presentations and field trips for school kids in the watershed, participated in Swan River First Nation's Culture camp and engaged families in discussions about the watershed.
- The LSWC and local partners hosted a watering system and beaver management field tour that was attended by 22 local producers interested in watershed stewardship.
- In February 2019, the second annual Kids Can Catch ice fishing event in Jousard saw over 100 anglers participate, despite the cold temperatures.
- The LSWC has received Watershed Resiliency and Restoration Program grant support, and financial support from Big Lakes County Agricultural Service Board, to deliver on-the-ground watershed enhancement projects with landowners.
  - The overall goal is to improve watershed resiliency to floods and droughts by creating healthy wetlands and riparian areas.
  - In 2018/19, LSWC wrapped up five different projects with local landowners, Cows and Fish, and the Town of High Prairie, to implement best management practices such as off-stream watering, riparian fencing, livestock crossings, and improving the health of riparian areas by reducing bare ground cover and erosion potential.

### **Further Information**

For a map of the watersheds associated with Alberta's Watershed Planning and Advisory Councils and other information, please follow the link below:



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## 13. Water North Coalition

### Background

- Upon conclusion of the 2014 Closer to Home initiative (C2H), northern stakeholders anticipated that a water and wastewater forum would be valuable and resulted in the formation of the Water North Coalition (WNC).
- The WNC is inclusive of the northern Alberta municipalities, First Nations, and Metis Settlements within the boundaries of the Northern Alberta Development Council (NADC).
- The Coalition seeks to ensure that sustainable water systems are available to every northern Alberta community and to find and implement northern solutions to water sourcing and water challenges.
- The Coalition meets four times annually in rotating locations across the north to exchange information, hear from experts, discuss common challenges, and collaborate on solutions for water and wastewater management.
- The actions of the Coalition are advanced through its general membership and three subcommittees, each of which have a work plan linked to the Coalition's three year Strategic Plan:
  - Advocacy;
  - Education and Awareness; and
  - Recruitment, Training, and Retention.

### Analysis

- At the end of fiscal year 2019, the WNC was comprised of 44 members, 31 voting and 13 non-voting.
- WNC voting members are elected officials and water operators from municipalities across northern Alberta.
- Non-voting members include water and wastewater commissions, professionals and rural water co-ops.
- The Coalition comes together to share information on water and wastewater regulations and responsibilities, work collaboratively with members and partners, identify emergent workforce needs and advocate for “made in the north” solutions and funding for training, education, recruitment and retention, succession planning for municipal water/wastewater personnel.
- To date the Coalition has produced reports such as;
  - Training in the North document: a reference guide on training available from a variety of providers for all four Water and Wastewater Operator categories in Alberta's North.
  - Grants Brochure: outlining funding opportunities for water and wastewater professionals and organizations.
  - Water Resource Library: a collection of web-based resources for improved public water literacy in northern Alberta.
  - Mutual Aid Documents: short and long term templates for municipalities sharing operator resources.



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## **14. Land Use, Climate Change and Ecological Responses in the Upper North Saskatchewan and Red Deer River Basins: A Scientific Assessment**

### **Background**

The Eastern Slopes of Canada's Rocky Mountains have been managed for headwater protection, natural resource production, recreation, and other land uses for over a century. To inform future land use planning in the Eastern Slopes of west-central Alberta, a scientific review and evaluation of key land use stressors and expected ecological responses was released by the Environmental Monitoring and Science Division in 2018.

Altered fire regimes, forest harvesting, and linear disturbances are key stressors that, along with climate, and other environmental drivers, affect wildlife, hydrology, and other valued ecosystem attributes. The current status of each stressor in the study area was characterized from geospatial and other environmental datasets, expected ecological responses were summarized from reviews of the published literature, and future research and monitoring priorities were identified.

### **Status**

Key water-related findings include:

- Regional climate variability and change are expected to have far-reaching effects on wildlife and other ecosystem attributes in the Eastern Slopes. Changes in the basins' climate since 1951 include higher air temperatures, especially during the winter, and reduced snowfall. Projected future changes include higher mean annual air temperature, increased total annual precipitation, and decreased snowfall. Potential ecological responses to these climatic changes include:
  - Shifting and altered vegetation communities (e.g., upslope movement of treeline, expansion of montane grasslands, transition from coniferous to deciduous forest, changes in vegetation community composition)
  - Altered streamflow and increased water temperature
- Analysis of open water season streamflow records in the study area indicate that June streamflow has increased over the past few decades. Changes in the timing of peak flow has implications for the structure and function of aquatic ecosystems and downstream communities. Projected increases in stream and river water temperature and changing river ice conditions would also affect cold-water fish species such as bull trout and their associated food webs.

### **Further Information**

Farr, D., Mortimer, C., Wyatt, F., Braid, A., Loewen, C., Emmerton, C., and Slater, S. 2018. [Land use, climate change and ecological responses in the Upper North Saskatchewan and Red Deer River Basins: A scientific assessment](#). Government of Alberta, Ministry of Environment

and Parks. ISBN 978-1-4601-4069-7. Available at:  
[open.alberta.ca/publications/9781460140697](http://open.alberta.ca/publications/9781460140697).

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