Alberta Government

Alberta's Irrigation

A Strategy for the Future

2016/17 Strategy Measures

Alberta's Irrigation - a Strategy for the Future
2016/17 Strategy Measures Report

Alberta Agriculture and Forestry's mission is to “provide the framework and services necessary for Alberta's agriculture and food sector to excel, to inspire public confidence in the quality and safety of food, and to lead the collaboration that enables resilient rural communities” (ARD 2014).

Alberta's irrigation industry is a global leader in the efficient, productive, and sustainable use of water resources. The industry is committed to increasing its economic contribution in Alberta, while improving conservation, efficiency, and productivity of water use. The industry is also committed to promoting water supply options that will ensure long-term needs are met while supporting environmental stewardship and contributing to vibrant rural communities.

Five key strategies reflect the department's blueprint for the future of the irrigation industry in Alberta.

1. Productivity – Increase the primary and value-added productivity of the water used by the irrigation industry.

2. Efficiency – Improve the efficiency of water conveyance and on-farm irrigation systems.

3. Conservation – Promote the effective use and management of water to ensure that only the water required for irrigation, and other uses supplied by irrigation infrastructure, is diverted from the rivers.

4. Water Supply – Assess management options for existing reservoirs, and the potential for new reservoirs to enhance water security to meet future needs in the South Saskatchewan Region.

5. Environmental Stewardship – Manage the effects of irrigation on surface and ground water quality, and promote beneficial management practices for irrigation and handling of crops to ensure they are safe for consumption.

In an effort to manage and measure each of these strategies, an annual measurement of results identified in the following strategy targets is reported.

Strategy Targets

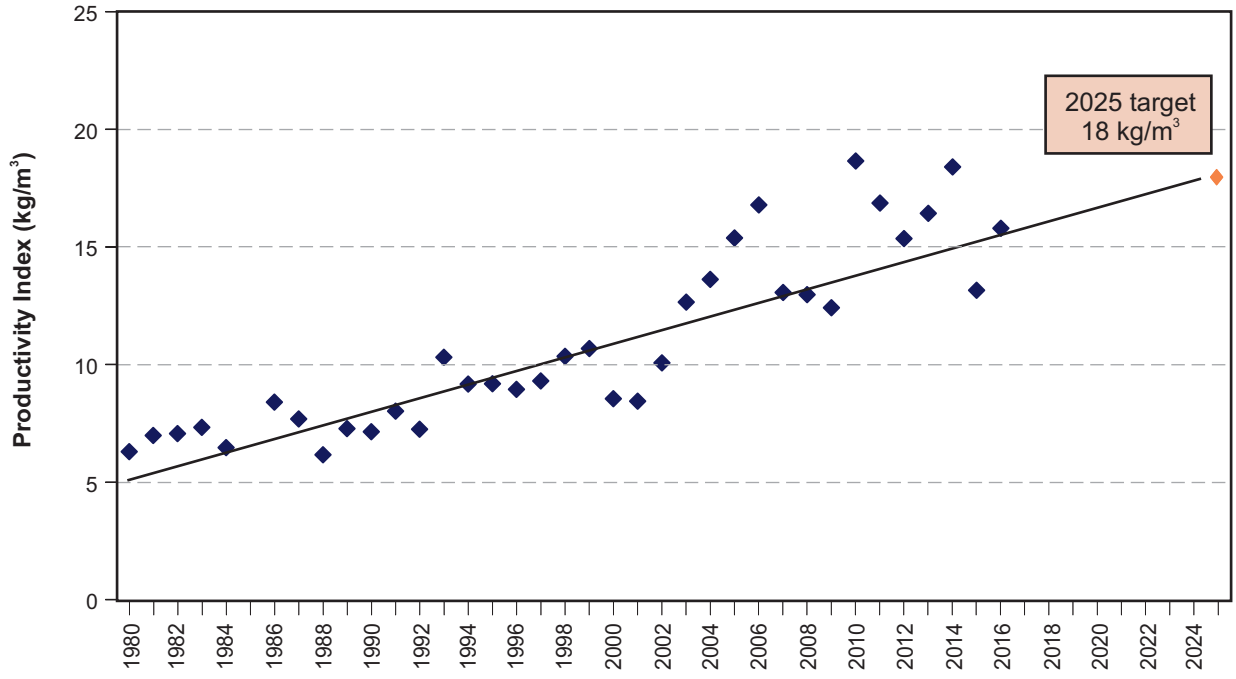
1. Irrigation Productivity

The Water for Life Strategy had a target to improve the 2005 overall efficiency and productivity of water use in Alberta by 30% by 2015. The irrigation sector has exceeded this target and Alberta Agriculture and Forestry continues to work with the sector to promote the growth of a greater diversity of crops that can be processed in Alberta, through a focus on crop research and demonstration, and economic development.

A productivity index target of 18 kg/m^3 for the contracted commodities (potatoes and sugar beets) has been established for 2025. The index calculation is based on data received from commodity boards and estimated water deliveries. The trend line shown below indicates that the productivity index has doubled over the last 25 years. Continued improvement in irrigation water management and agronomic practices will contribute to achieving the 2025 target.

The economic value of development within the irrigated region of Alberta is significant. Based on the 2015 *"Economic Value of Irrigation in Alberta*" report, irrigation-related agriculture generated:

- $1.7 billion to the Alberta Gross Domestic Product,
- an additional $1.7 billion in agricultural processing,
- approximately $1.0 billion in labour income, and
- about 17,000 full-time jobs.

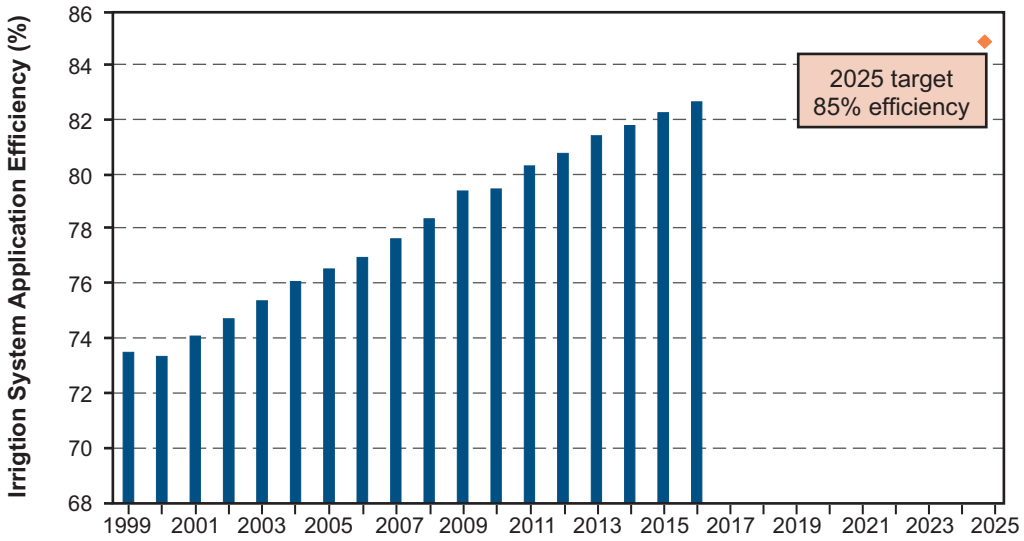


Irrigation Water Use Productivity Index - Gross Diversion (Sugar Beet & Potatoes Only)

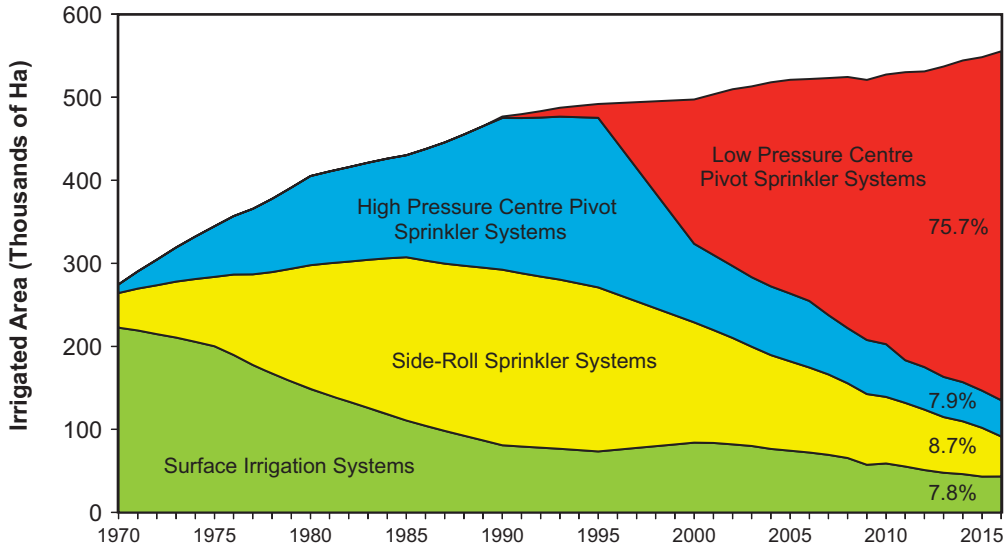
2. Efficiency

The target for irrigation efficiency is to achieve a 7% increase in average on-farm irrigation efficiency from about 81% in 2012 to 85% by 2025. This could be accomplished through improved on-farm irrigation technologies and continued replacement of less efficient irrigation systems with low-pressure drop-tube pivot systems.

Based on reported on-farm infrastructure and the assumed application efficiencies of 89% for low pressure pivots, 73% for high pressure pivots, 70% for wheel lines and 60% for gravity, the weighted-average efficiency in 2016 was 82.7%.



On-farm Irrigation System Efficiency



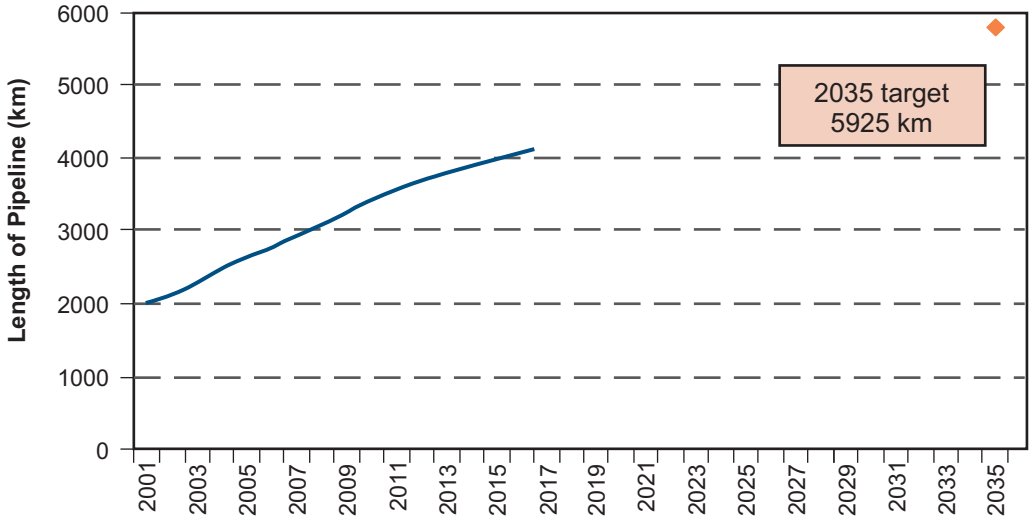
Irrigation Method Summary within the 13 Irrigation Districts in Southern Alberta

3. Conservation

Ongoing rehabilitation of irrigation water conveyance infrastructure with newer technology has facilitated continued improvements in water conservation. Irrigation districts are replacing open channel canals with buried pipelines, reducing water conveyance losses and improving water delivery efficiencies. The Irrigation Strategy target for water conservation is to replace all technically feasible open channel canals in the irrigation districts with pipelines by 2035. As a result, approximately 75% of the 7,900 km of the irrigation network should be in pipelines and an additional 50 million cubic metres of water will be conserved annually.

Closed pipelines eliminate seepage, evaporation, and reduce return flow. Pipelines also contribute to energy savings by providing gravity pressure, often facilitating reduced pumping energy requirements. Finally, each kilometre of buried pipeline adds approximately 1.5 to 2 ha of land for crop production from previous severance due to land occupied by the canals and access roads.

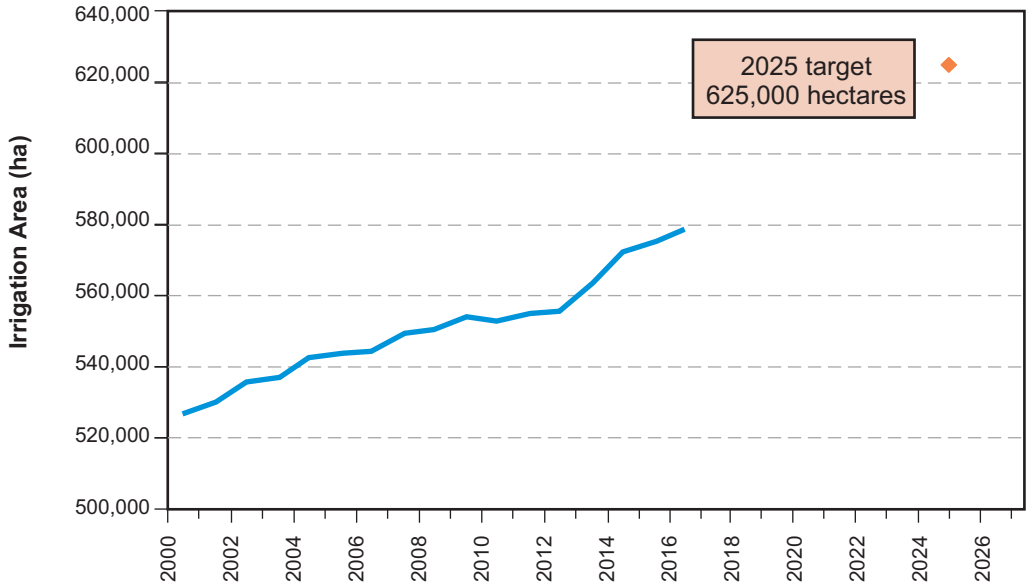
Pipeline installation



Pipelines Installed Within Irrigation Districts

4. Water Supply

Irrigation Expansion – The Irrigation Strategy target for irrigation expansion is to have approximately 12% (70,000 hectares) expansion of the irrigation district assessed area by 2025. This increase from the 2012 assessed hectare should be achieved from the improvements in irrigation water-use efficiencies, including water conservation due to on-farm and conveyance improvements. Irrigation districts compile the number of hectares on their assessment rolls annually and report them in the Alberta Irrigation Information Summary.



Irrigation District Assessment Roll Acres

Water Storage – A comprehensive study to assess potential water storage sites to improve water supply security within the South Saskatchewan River Basin was completed in 2014.

Project Completed 2014

5. Environmental Stewardship

Water Quality and Protection of Aquatic Environment – Strategies to effectively manage nitrogen and phosphorus associated with confined feeding operations will be developed and implemented in select Alberta watersheds by 2020. As a measure of success, annual reporting on the scientific assessment of beneficial management practises (BMPs) will be provided.

Nutrient Beneficial Management Practices Evaluation Project (2007–2012)

The final technical reports and recommendations were completed and publically released. Partners included the Alberta Crop Industry Development Fund, Alberta Environment and Parks, Alberta Conservation Association, Municipal District of Pincher Creek, County of Lacombe, Agriculture and Agri-Food Canada, universities of Lethbridge and Alberta, Rocky Mountain Forage Association, and producers in the study watersheds.

Beneficial management practices (BMPs) were successfully implemented at 16 sites. The BMPs included manure nutrient management (nutrient management plans, manure injection), livestock management (off-stream watering, livestock exclusion, rotational grazing, relocation of facilities), and surface-water management (berming, re-directing run-on, grass channels, irrigation management). The BMPs were found to be effective at improving the water quality leaving the farm.

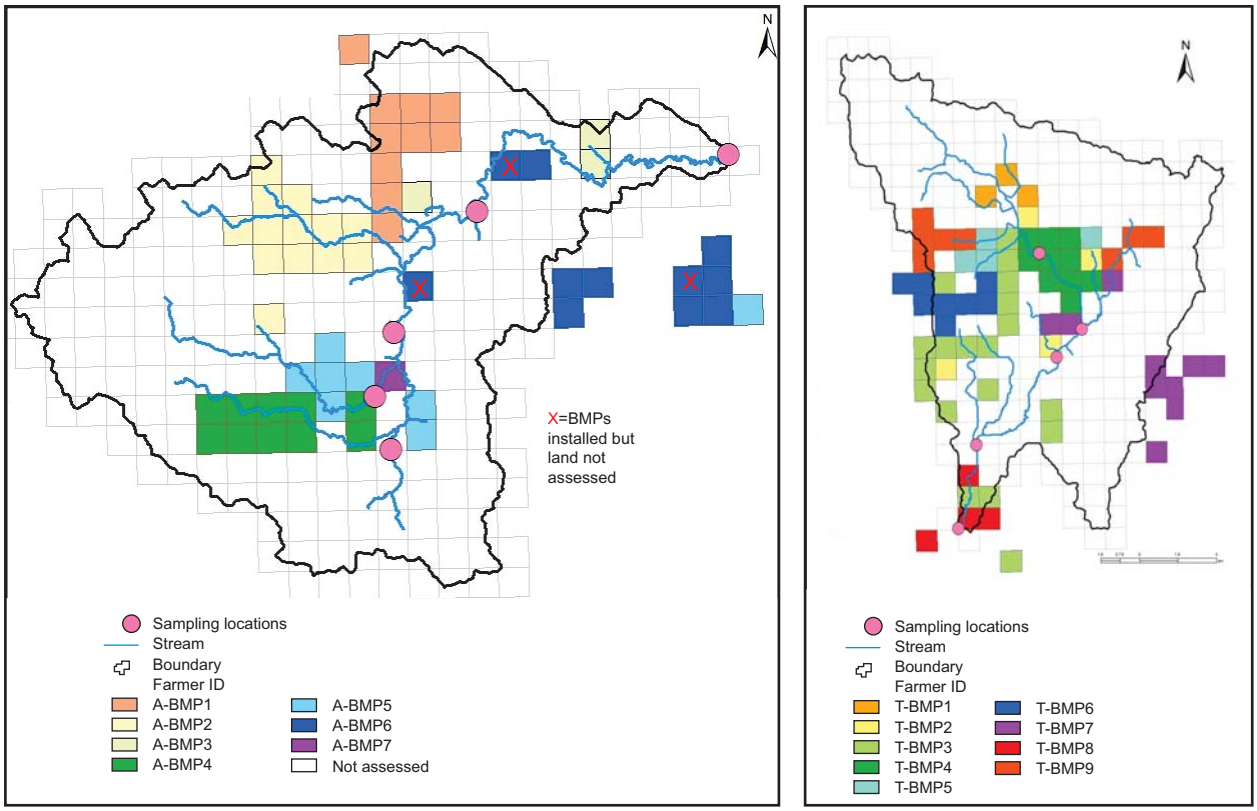
Project Completed 2014

Alberta Phosphorus Watershed Project (2013–2019)

One of the main deliverables of the Alberta Phosphorus Watershed Project was to develop the Alberta Phosphorus Management Tool (APMT) — an electronic tool that will help producers assess and manage phosphorus on their land. The tool identifies and prioritizes potential phosphorus loss risks at the field scale and suggests beneficial management practices (BMPs) to directly address those risks. The APMT has been completed and will be released online late in 2017.

During the development of the tool, about 23% of the land base (16 producers) has been assessed in each of the two study watersheds: Acme Creek and Tindastoll Creek. Based on these assessments, 40 BMPs have been implemented in Acme Creek and 29 BMPs in Tindastoll Creek. Less than 13% of the riparian area has been implemented with BMPs in both watersheds, and less than 7% of the total watershed area has been implemented with BMPs. The BMPs included crop management, livestock management, yard or manure management, and erosion/flood control activities. Land assessments using the APMT and BMP implementation are ongoing, and will continue for another 2 years.

The cumulative effects of the BMPs on water quality has been assessed and will continue to be assessed for the next 2 years. To date, water quality results from Acme and Tindastoll creeks, when compared to nearby control watersheds (i.e., no BMP implementation), show no measureable cumulative BMP effect at the watershed outlets. This is not surprising considering the relatively short period of time BMPs have been implemented (i.e., 1 to 2 years) on a relatively small area of the watersheds.

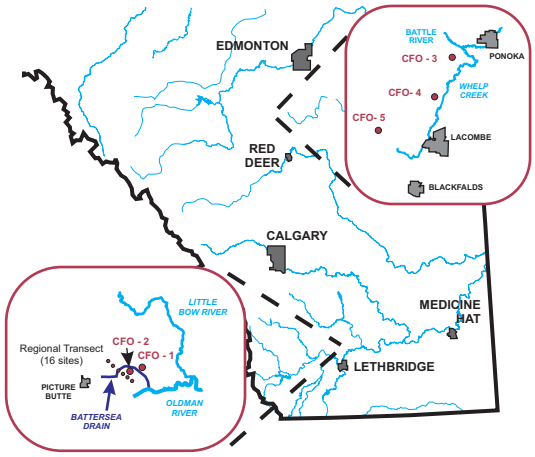


Land assessed (quarter sections) using the Alberta Phosphorus Management Tool in (left) Acme Creek Watershed and (right) Tindastoll Creek Watershed.

Groundwater Quality – An assessment of manure management effects on shallow groundwater quality and mitigation strategies is to be completed by 2018.

Livestock Manure Impacts on Groundwater Quality in Alberta (2008–2015)

The objective of the groundwater research was to improve our understanding of the effects of manure storage and spreading on groundwater quality. The study included four dairies, two beef feedlots, and four quarter section irrigated field sites. A broader aspect of the study also looked at groundwater quality changes with time at sites in Battersea Drain area. Field work ended in 2015 and the data are being analyzed for the final report. Active feedlots appeared to present less risk to groundwater contamination than areas used for temporary or long-term solid manure storage. Results also suggest that shallow groundwater in coarse-textured soils is more vulnerable to contamination than groundwater in till and other fine grained deposits. The study has not found evidence of manure contamination at depths of more than 12 metres. The final technical report is scheduled to be completed in early 2018.



Location of the groundwater study areas, including five confined feeding operations (CFO), are in central and southern Alberta.

Water Quality and Food Safety – A comprehensive assessment of irrigation water quality within the major irrigation districts will be completed.

Water Quality in Alberta's Irrigation Districts

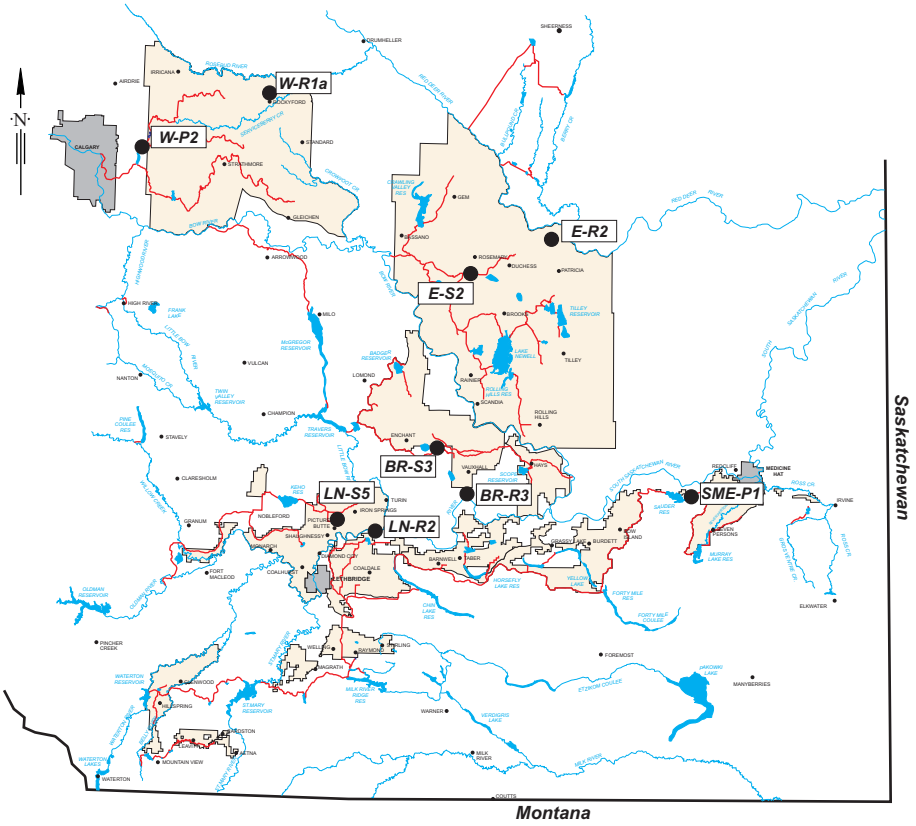
Tthe final report of the 2011-2015 study is expected to be completed in early 2018 and will include irrigation district specific water quality summaries and recommendations of target areas for improvement. Several irrigation districts have already been successful at receiving grants for implementing water quality improvement projects such as constructed wetlands.

With support from AIPA and the irrigation districts, water quality monitoring continued at 78 sites in 2017. In addition to the basic suite of parameters, chlorophyll-a, dissolved oxygen, pH and specific conductivity were added in 2017. The data were collected to support the development of a response plan in the event that invasive mussels are detected in Alberta's irrigation infrastructure. Monitoring for neonicotinoids was also added in 2017, in response to the proposed ban of imidacloprid by Health Canada's Pest Management Regulatory Agency.

In general, irrigation water quality remained consistent with previous years, with the majority of sites rated as “excellent” for irrigated crop production according to the Environmental Quality Guidelines for Alberta Surface Waters (2014). Most irrigation districts have already elected to continue water quality sampling in 2018, and will consider ongoing sampling in subsequent years.

Mitigating risk to market access for Alberta's irrigated agriculture through a Next-Generation approach to water quality (2016 to 2019)

This project was initiated in October of 2016 with support from Alberta Innovates and in partnership with Alberta's Irrigation Districts and Alberta Irrigation Project Association (AIPA). The overall goal of the project is to assess the applicability of Next-Generation microbial source tracking technologies to identify sources of *E. coli* in Alberta's irrigation districts. This information will be used to proactively develop mitigation options that ensure that farmers have access to irrigation water of sufficient quality to comply with food safety standards for crops. This project is a full-scale version of a pilot study that was previously conducted in the Taber Irrigation District with the support of Growing Forward 2, which can be found on-line.



Map of Alberta's irrigation districts depicting the nine water sampling sites where microbial source tracking is being conducted.

Copies of reports for many of the projects in this document can be found on the web.
http://www.agric.gov.ab.ca – enter project title in the search option.

- Alberta Irrigation Information – 2016
- Water Storage Opportunities in the South Saskatchewan River Basin in Alberta
- Nutrient Beneficial Management Practices Evaluation Project
- Alberta Phosphorus Watershed Project
- Livestock Manure Impacts on Groundwater Quality in Alberta
- Water Quality in Alberta's Irrigation Districts
- Economic Value of Irrigation in Alberta
- Microbial Source Tracking of Alberta's Irrigation Water