ALBERTA INNOVATES

AGRICULTURE & ENVIRONMENT

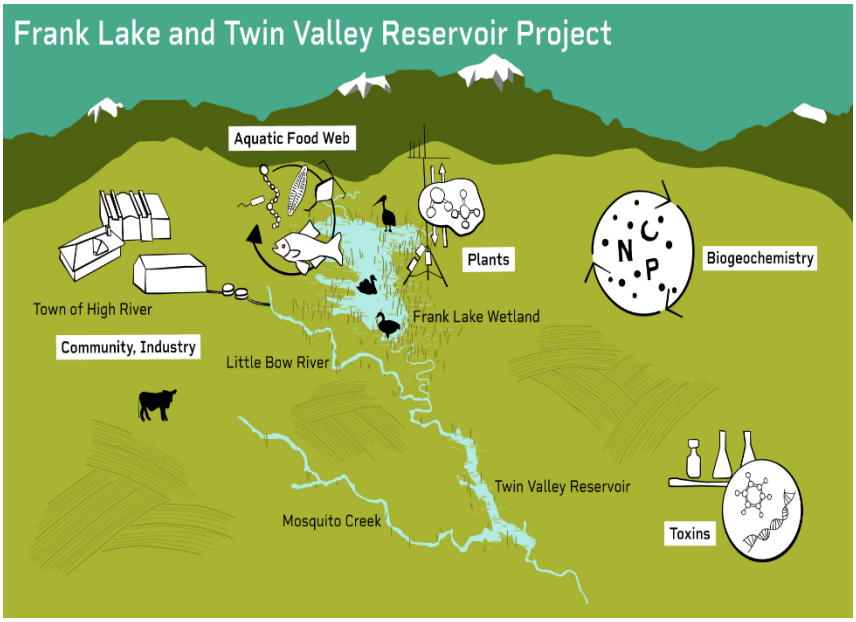
ENVIRONMENTAL INNOVATION

WATER INNOVATION

FUNDING DETAILS

Defining Effluent Cycling and Impacts in an Economically Important Watershed in Southern Alberta

Stakeholders in the Upper Little Bow watershed are concerned that the Frank Lake wetland may be experiencing habitat degradation due to effluent processing and may contribute to water quality loss in downstream Twin Valley Reservoir (TVR). To enhance water management, the project will 1) quantify sediment phosphorus retention in Frank Lake; 2) pinpoint nutrient inputs to the TVR; 3) build a greenhouse gas emissions budget for the river network; 4) link it to a carbon budget for Frank Lake; and 5) apply genomics techniques to define microbial controls on wetland emissions, nutrient cycling, and other ecosystem services.



RECIPIENT:
University of Lethbridge

PARTNERS:
Ducks Unlimited Canada, Alberta Conservation Association

TOTAL BUDGET:
$708,055

AI FUNDING:
$270,000

PROJECT DATES:
DEC 2022 – DEC 2027

APPLICATION

Knowledge will be mobilized through routine meetings with stakeholders, publication of open access articles and data, and broader public discussions. Project data will be delivered to a water resource modelling team at AEP, to develop a watershed scale process model of the drivers of water quality in the TVR. We will help to identify whether nutrient reduction, hydrologic management, and changing land use practices in the ULB could have added benefits of emissions reduction.

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PROJECT GOALS

The overarching project goal is to help define the role that wetland effluent processing plays within the broader Little Bow River watershed and impacts on water quality loss in the downstream reservoir habitat. Specifically, the project will:

1) define controls of wetland P retention capacity and whether the areal extent of sediment P saturation has expanded (relative to a similar study in the 1990s);
2) model nutrient fluxes and identify the primary causes of eutrophication in the TVR;
3) combine data on the three major GHGs (CO_2, CH_4, N_2O) to estimate the watershed-scale aquatic emissions budget;
4) build a carbon budget for Frank Lake to identify its carbon sequestration potential relative to other wetlands; and,
5) characterize the microbial communities mediating the removal of nutrients and pollutants in the Frank Lake wetland.

BENEFITS TO ALBERTA

By helping to protect water quality in Alberta's reservoirs, the project provides major economic, social, and environmental benefits. Clear and actionable project findings will guide remediation efforts in the watershed aimed at protecting fish and waterfowl habitat and ensuring that the major investments already made in aquatic infrastructure are protected. The project will provide key information to help guide the management of TVR and enhance the quality of water provided to communities for drinking, irrigation, recreation as well as will support improved ecosystem management to reduce GHG emissions.

5 Publications

3 Students Trained

3 Project Jobs

CURRENT STATUS

JAN 2025

The project has continued to deliver new insights into the functioning of one of Alberta's largest restored wetlands used for the treatment of multiple effluent sources. The team has published the first paper on wetland phosphorus retention, advanced the remaining three projects to near-complete draft manuscripts, and have expanded the project to include a microbial genomics component. Multiple presentations have been delivered to scientific and stakeholder groups highlighting their discoveries.