ALBERTA INNOVATES

CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

WATER INNOVATION PROGRAM

FUNDING DETAILS

Defining effluent cycling and impacts in an economically important watershed in southern Alberta

Stakeholders in the Upper Little Bow (ULB) watershed are concerned that the Frank Lake wetland may be experiencing habitat degradation due to its long history of effluent processing and may contribute to water quality loss in downstream Twin Valley Reservoir (TVR). We have already conducted baseline monitoring, analyses, and identified existing datasets. To enhance water management, we will 1) map and quantify sediment phosphorus retention in Frank Lake; 2) build a nutrient budget to identify drivers of eutrophication in the TVR; 3) build a greenhouse gas emissions budget for the aquatic network; and 4) evaluate wetland carbon sequestration potential from distinct land-use regimes.

RECIPIENT:
University of Lethbridge

PARTNERS:
Ducks Unlimited Canada, Alberta Conservation Association

TOTAL BUDGET:
$594,055

AI FUNDING:
$180,000

PROJECT DATES:
DEC 2022 – SEP 2025

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 Twin Valley Reservoir. We will help to identify whether nutrient reduction, hydrologic management, and changing land use practices in the Upper Little Bow 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) contrast the net carbon budget of the Frank Lake wetland with ecosystems from other land use categories (protected areas, watershed cropping, and rangeland).

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 Frank Lake and the TVR to enhance the quality of water provided to communities for drinking, irrigation, recreation as well as will support improved ecosystem management to reduce GHG emissions.

4 Publications

2 Students Trained

2 Project Jobs

CURRENT STATUS

JAN 2024

The project has thus far delivered new insights into nutrient retention and carbon cycling in one of Alberta's largest restored wetlands used for the treatment of multiple effluent sources. We are beginning to define the broader watershed implications and downstream impacts of wetland effluent processing. Multiple presentations have been delivered to scientific and stakeholder groups highlighting our discoveries thus far. Manuscripts and dataset are in preparation for publication and public access.