

Alberta Phosphorus Watershed Project

Janna P. Casson¹, Jennifer L. Kerr², Trevor D. Wallace³, Ron Axelson⁴, and Barry M. Olson¹

¹Alberta Agriculture and Rural Development, Lethbridge, Alberta

²Alberta Agriculture and Rural Development, Edmonton, Alberta

³Alberta Agriculture and Rural Development, Leduc, Alberta

⁴Intensive Livestock Working Group, Camrose, Alberta

Corresponding author: janna.casson@gov.ab.ca; 403-381-5893

Key Points

- Two agricultural watersheds were chosen to evaluate the Alberta Phosphorus Management Tool, implement BMPs, and monitor environmental effectiveness.
- In addition to water quality monitoring, land cover, winter livestock management, and soil information are being collected.
- Riparian health inventories will be conducted in the treatment watersheds in 2015.

Introduction

Phosphorus (P) from manure or inorganic fertilizers is essential for crop production. Though, if not managed effectively, excess P can be transported to water bodies via surface runoff. Beneficial management practices (BMPs) have been developed to manage nutrient losses from crop and livestock production. However, there is no provincial assessment tool to evaluate the risk of P loss from agricultural operations. Alberta Agriculture and Rural Development, the Alberta Livestock and Meat Agency, and the Intensive Livestock Working Group initiated a 3-yr study to develop and evaluate a P risk assessment tool. In partnership with Red Deer, Kneehill, and Mountain View counties, two watersheds were selected in which to test and evaluate the tool. The Alberta Phosphorus Management Tool (APMT) assesses the risk of phosphorus loss based on environmental, landscape, and management factors, and identifies potential BMPs to address those risks.

Methods

Four agricultural watersheds (Figure 1) were selected: two treatment watersheds (Tindastoll Creek, 14,113 ha; Acme Creek, 13,735 ha) and two control watersheds (Threehills Creek, 19,919 ha; Lonepine Creek, 17,342 ha). Water quality and flows are being monitored to determine if the APMT and the adopted BMPs will affect water quality in the treatment watersheds. Sampling of the treatment watersheds commenced in 2013 and sampling in the control watersheds started in 2014. Surface water samples were collected during snowmelt and rainfall runoff and analyzed for nutrient, sediment, and bacteria concentrations. Land cover, winter livestock management information, and soil nutrient data were also collected. Riparian health inventories and rangeland assessments will be carried out in 2015.

Results and Discussion

Water quality analysis, to date, indicated high levels of nutrients particularly during snowmelt in Tindastoll Creek and during snowmelt and rainfall in Acme Creek, although concentrations fell within ranges expected for the Parkland and Grassland natural regions of the province, respectively (Lorenz et al, 2008). The majority of water quality parameters increased in concentration as water flowed towards the outlet in Tindastoll Creek, especially during April and May in 2013 and 2014; whereas, water quality parameters in Acme Creek did not have as strong of an upstream-to-downstream increase in either year. Changes in water quality with time, identified through the monitoring study, will help develop and evaluate the APMT's effectiveness in reducing P loss from agricultural watersheds through the adoption of BMPs, particularly in critical source areas of P loss.

For more information on the Alberta Phosphorus Watershed Project, please refer to the project website:
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/irr14541](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/irr14541)

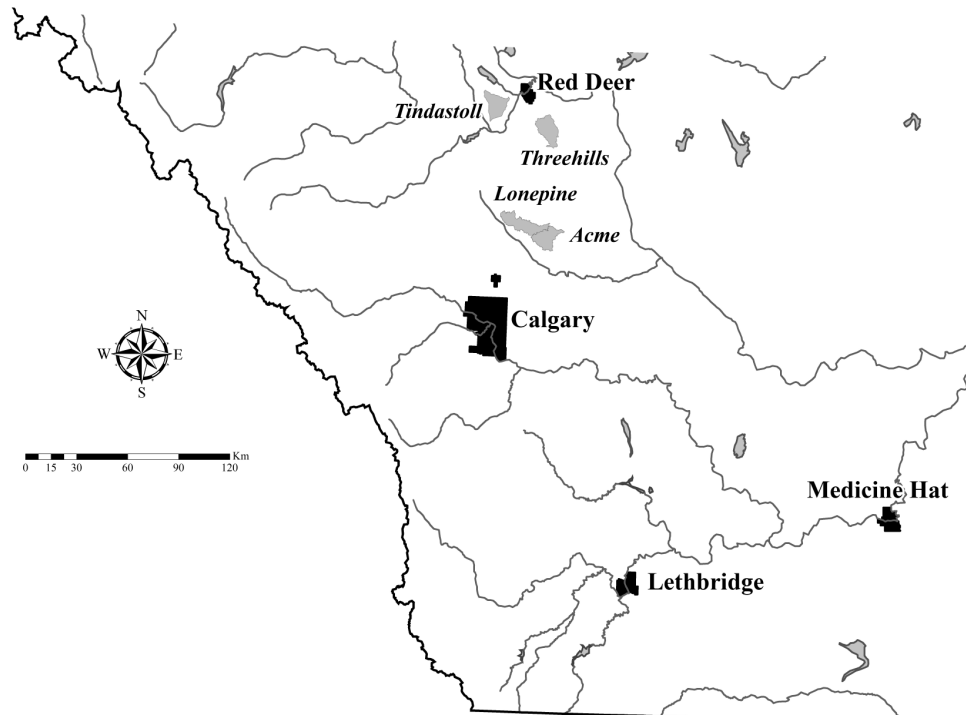


Figure 1. Location of the Tindastoll Creek, Threehills Creek, Acme Creek, and Lonepine Creek watersheds. Based on a map adapted from Alberta Agriculture, Food and Rural Development (AAFRD 2005).

References

Alberta Agriculture, Food and Rural Development. 2005. Agricultural land resources atlas of Alberta, 2nd edn. Agdex 009-1. Conservation and Development Branch, Alberta Agriculture, Food and Rural Development, Edmonton, Alberta, Canada. 53 pp.

Lorenz, K.M., Depoe, S.L., and Phelan, C.A. 2008. Assessment of Environmental Sustainability in Alberta's Agricultural Watersheds Project. Volume 3. AESA Water Quality Monitoring Project. A summary of surface water quality in Alberta's agricultural watersheds: 1995-2006. Alberta Agriculture and Rural Development, Edmonton, Alberta, Canada. 487 pp.