

Watershed Evaluation of BMPs (WEBs) An Overview of the Stepler Watershed Project

The nutrient enrichment or eutrophication of streams and rivers, particularly from phosphorus, is one of the most important surface water quality issues on the Canadian prairies. Phosphorus originates from many sources, including natural sources and human activities. Nutrient loading from small watersheds can contribute to nutrient loadings downstream.

WEBs, the Watershed Evaluation of Beneficial Management Practices (BMPs), is a four-year national project designed to examine the use of BMPs – individual and combined – to mitigate sediment and runoff issues related to surface water quality. BMPs are farming practices designed to minimize potential impacts of agricultural activities on the environment. The economic impacts of incorporating BMPs are also being measured. To date, the effectiveness of BMPs has been tested primarily on plots or small fields. Through WEBs, the effects of BMPs are being evaluated at a micro-watershed scale on seven small watersheds across Canada. The results will be extrapolated to somewhat larger watersheds using appropriate modelling techniques.

WEBs projects are being undertaken with the participation of the landowners/producers in each watershed. Funding is provided largely through Agriculture and Agri-Food Canada's Greencover Canada program, with Ducks Unlimited Canada a major funding partner.

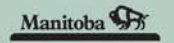
The Stepler Watershed

The 210 ha Stepler watershed is located near Miami, Manitoba, approximately 150 km southwest of Winnipeg. It is situated on the edge of the Manitoba Escarpment such that the elevation drops nearly 60 metres in less than three kilometres. Soils are primarily clay-loams formed on moderately to strongly calcareous glacial till which overlays shale bedrock. Land use within the watershed is agricultural with the majority of the land under annual cropping. Average annual precipitation is about 570 mm, of which approximately one-quarter falls as snow.

Why Study BMPs in the Stepler Watershed?

The Stepler Watershed is well suited for a WEBs project. It is located within the greater South Tobacco Creek Watershed, a site that has been the focus of scientific studies and research projects for more than 20 years. The Stepler Watershed already has an existing runoff/water sampling infrastructure. It is contained within a single farm operation and there is strong local support, including the involvement of an established farmer-run conservation group – the Deerwood Soil and Water Management Association.

The Stepler Watershed drains through South Tobacco Creek and the Morris River into the Red River, which then flows north into Lake Winnipeg. Lake Winnipeg has recently been the focus of concern regarding water quality. As part of a plan to clean up the lake, the Manitoba Government announced in 2003 its intention to reduce the amount of nitrogen and phosphorous entering Lake Winnipeg. Much of this reduction must come from non-point sources upstream in the watershed. Effective BMP validation may have a significant impact on where and how efforts to reduce this loading should be focused.



The Stepler Study Approach

Five BMPs have been incorporated into the Stepler Watershed and surrounding sub-watersheds:

1. The impact on water quantity and quality from **converting cropped land to forage** is being assessed using a twin watershed approach for two sets of sub-watersheds.
2. Selected **riparian areas are being developed or enhanced** so that the forage can be mechanically harvested, eliminating the need for burning and cattle grazing, thus reducing potential nutrient loading.
3. The inflow and releases from **a holding pond constructed to capture runoff from a cattle containment area** are being monitored and water quality analyzed.
4. The effectiveness of using **two small reservoirs to reduce downstream nutrient loading** is being assessed; the runoff and nutrients entering and exiting the pools is being compared.
5. Runoff and nutrient loading from **a zero tillage field vs. a conventionally tilled field** is being assessed using an existing, long-term twin watershed site adjacent to the Stepler Watershed.

Sampling for nutrients is being performed in conjunction with flow measurements at numerous locations. Sampling design is flow-event based, with periodic base flow sampling. Changes in nutrient levels between upstream and downstream locations on each field are being measured and compared directly.

A surface materials (snow, vegetation and soil) testing strategy is also being incorporated to identify and aid in understanding the sources and pathways of nutrients and sediments. For selected fields, limited soil fertility testing is being conducted to help assess the soil nutrient balance within the BMPs.

Who is Involved?

The project is being led by Agriculture and Agri-Food Canada with support from the [Deerwood Soil and Water Management Association](#); [National Water Research Institute](#); [Environment Canada](#); [Manitoba Water Stewardship](#); [Manitoba Agriculture, Food and Rural Initiatives](#); [University of Manitoba](#); [Department of Fisheries and Oceans](#); and [Ducks Unlimited Canada](#). The local landowners, Dale and Caroline Stepler, are supporting the project by incorporating the BMPs and working with the technical experts to assess the BMPs.

Additional Information

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To find out more about the WEBS project, visit the [Greencover Canada Website](#) at: www.agr.gc.ca/env/greencover-verdir, or contact:

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