Watershed Evaluation of BMPs (WEBs)
An Overview of the Black Brook Watershed Project

Potato is the most important horticultural cash crop in Canada, and the very cornerstone of agricultural activity in the Atlantic region. However, there are concerns about the environmental impacts of this intensive practice, particularly in areas of rolling topography and high precipitation. Soil erosion from these areas may contribute excessive amounts of sediments and nutrients (nitrogen, phosphorus, potassium) to surface waters if appropriate soil and water conservation practices are not applied.

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 Black Brook Watershed

The 1450 ha Black Brook Watershed is located north of Grand Falls, New Brunswick. It is part of the larger (340 km^2) Little River Watershed. The landscapes in the Black Brook Watershed are dominated by soils that have developed on coarse- to fine-textured dense, compact glacial till. Topography is rolling with slopes generally ranging from two to nine per cent, but with some slope segments in excess of 15 per cent. Agricultural land constitutes approximately 65 per cent of the land base, with the remainder either forested or under urban and residential development. The major crop is potato in rotation with grain, peas and hay for forage. Half of the agricultural land is annually under potato production. Average annual precipitation is 1134 mm, of which slightly more than one-quarter falls as snow.

Why Study BMPs in the Black Brook Watershed?

The Potato Belt of New Brunswick, located along the Upper Saint John River Valley in the north-western portion of the province, has some of the most serious water erosion problems in Eastern Canada. Deteriorated surface water quality associated with sediment and nutrient loading from eroded soil is a major environmental concern.

The Black Brook Watershed is well suited to the implementation of a WEBs project. The Black Brook Experimental Watershed was established in 1990-91 to investigate the impacts of intensive potato production on surface water quality. The physical resources of the watershed have been characterized in detail, including information on the soils, topography, climate, land use, and surface water flow and quality. A climate monitoring network was established. In addition, a detailed, 1:10,000-scale soils inventory has been completed for the watershed.

An existing network of permanent gauging and sampling stations will allow for continuous monitoring of stream discharge and water quality in the Black Brook Watershed. Eight sub-watersheds with varying intensities of agricultural land use have been selected to monitor the impact of agriculture on water yield and quality. Historical data sets at the micro-watershed level are available.

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Nunavut
Canada

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The Black Brook Study Approach

The Black Brook project addresses surface water contamination by sediment and agro-chemicals under intensive potato production. The study site contains rolling topography within an area of high-intensity rain storms. Two BMPs in particular are being evaluated for their effectiveness at reducing the impacts of agriculture on water resources:

1. **Diversion and grassed waterway systems,** established in the 1994-2003 period for upland erosion control, and being upgraded as required.

2. **Vegetated riparian zones,** under establishment towards sediment and nutrient filtering.

Using existing infrastructures and historical data sets for the Black Brook Experimental Watershed, surface water quality (discharge, sediment and nutrient loading) for pre-soil conservation system adoption years (1992-1994) will be compared with post-soil conservation system adoption years (2005-2007). The composite effect of all BMPs applied throughout the Black Brook Watershed will also be quantified by monitoring at the watershed outlet.

Research has demonstrated the localized effectiveness of diversion terraces/grassed waterway soil and water conservation systems in reducing runoff volume and sediment yield, and improving runoff characteristics. And there is general consensus that buffer zones are an essential element of all non-point source pollution reduction initiatives. Yet demonstration of the environmental benefits of improved riparian zone management and quantifying the impacts on the water resource within agricultural landscapes is still required to enhance the uptake of this technology.

The WEBs research is also of interest to the U.S. Department of Agriculture, as similar conditions exist in the potato-producing area of north-eastern Maine.

Who is Involved?

The multidisciplinary study team consists of scientists and staff from Agriculture and Agri-Food Canada; the U.S. Department of Agriculture; Eastern Canada Soil and Water Conservation Centre; New Brunswick Department of Agriculture, Fisheries and Aquaculture; New Brunswick Department of Environment and Local Government; University of New Brunswick; Fisheries and Oceans Canada; Ducks Unlimited Canada; and Potatoes NB. Local producers will also participate in the project. Project implementation is led by Agriculture and Agri-Food Canada in partnership with the Eastern Canada Soil and Water Conservation Centre and the University of New Brunswick.

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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