

# Watershed Evaluation of BMPs (WEBs) An Overview of the South Nation Watershed Project

Eastern Ontario's South Nation Watershed is a highly productive agricultural region of the province. However, in some cases, nutrient and bacterial contamination of the South Nation River and its tributaries has been linked to agricultural activities. Understanding the origins of these pollutants is critical to determining the agricultural management practices required to improve water quality in the watershed.

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, nutrient, and bacterial loading issues related to 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 South Nation Watershed

Ontario's South Nation River drains 3810 km<sup>2</sup>, from its headwaters just north of the St. Lawrence River near the city of Brockville, northward to its confluence with the Ottawa River near the community of Plantagenet. Approximately 60 per cent of the watershed is farmed – with a mix of livestock and cash crop production, mostly on flat, tile-drained fields. The South Nation River has its highest discharges in spring with much lower stream flow in summer.

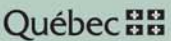
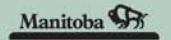
Two micro-watersheds within the South Nation Watershed, each about 450 ha, have been chosen to evaluate the effectiveness of two BMPs designed to alleviate pollutant loads to surface drainage systems. One of these watersheds drains into the Little Castor River, and the other directly into the South Nation River.

The two micro-watersheds feature the kind of agricultural-based activities found throughout Eastern Ontario. A local organization – the South Nation Conservation Authority – has had a long-standing presence in the area and is a partner in the project.

## Why Study BMPs in the South Nation Watershed?

Water quality in the South Nation Watershed is already reduced in many areas, while agricultural and urban pressures continue to increase. Problems include direct cattle access to creeks and brooks, and manure runoff from fields which can lead to fecal contamination of water resources.

In addition, uncontrolled tile drainage outlets can contribute high levels of nutrients (nitrogen in particular) to streams and municipal drains. Specific research in this watershed has shown that such tile drains enable nutrients, chemicals, and bacteria to move quickly into surface water.



## The South Nation Study Approach

The WEBs study will focus on evaluating the impact of two BMPs:

- 1. Restricted Cattle Access** - At two sites, the impact on water quality of restricting cattle access to the stream will be assessed through comparison with the water quality of an adjacent, downstream area where cattle have direct access to the stream. Stream access will be restricted by fencing, allowing for only one controlled cattle crossing. Fencing is designed to ensure a minimum 3 m buffer strip between the stream and adjacent pasture areas. Measurements will include stream input and output water quality, and other microbiological and nutrient markers for each site. Additional methods will be used to verify fecal sources.
- 2. Controlled Tile Drainage** – Within the two micro-watersheds, the effects of controlled vs. uncontrolled tile (subsurface) drainage outlets will be evaluated to determine whether controlled drainage effectively reduces pollutant inputs (primarily nitrogen) to streams – while at the same time improving crop performance. Tile drainage will be controlled by installing small dam structures with water overflow systems at header drain outlets to seasonally restrict the water in these drains from discharging into watercourses – thereby retaining soil water and nutrients in the field for crop growth. Studies have shown that such drainage management can improve crop yields.

In early spring, control structures on the tile headers will remain open to permit free drainage and allow for improved soil aeration until after field operations or, in some cases, until after crops are adequately established. The structures will then be closed to restrict drainage. The effects of controlled drainage will be studied through assessment of nitrogen balances, crop performance, and soil/groundwater hydrology.

## Who is Involved?

The WEBs multidisciplinary study team consists primarily of scientists and staff from Agriculture and Agri-Food Canada; the [South Nation Conservation Authority](#); [University of Ottawa](#); [Ducks Unlimited Canada](#); and the [Ontario Ministry of Agriculture, Food and Rural Affairs](#). Landowners within the two micro-watersheds are key co-operators.

## Additional Information

For more information about the South Nation Watershed project, please contact:

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

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