

Watershed Evaluation of BMPs (WEBs)

An Overview of the Bras d'Henri and Fourchette Watershed Projects

The Chaudière-Appalaches region in southern Quebec is an intensely farmed area of cropland, dairy operations and hog production. Two of the major rivers in the area, the Chaudière and the Etchemin, empty into the St. Lawrence River from the south, just upstream of Quebec City. Water quality issues such as nutrient (nitrogen and phosphorus) and pathogen loading have been identified within these watersheds and linked to agricultural activities.

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 other 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 Bras d'Henri and Fourchette Watersheds

The WEBs study occurs within two sets of twin micro-watersheds, one pair in the Bras d'Henri sub-watershed and the second pair in the Fourchette sub-watershed. Each micro-watershed is about three square kilometres in area.

The Bras d'Henri River (drainage area 150 km²) is located on the fertile St. Lawrence Lowlands in the Beauvillage sub-watershed of the Chaudière River. This sub-watershed supports one of the highest concentrations of animal production in Quebec and nearly two-thirds of the area is used to grow crops.

The Fourchette feeder is part of the Le Bras sub-watershed (drainage area 222 km²), a tributary of the Etchemin River. Water quality within the Etchemin River watershed ranks as the second poorest in Quebec in terms of its phosphorus load.

Why Study BMPs in these Watersheds?

The Bras d'Henri and Fourchette sub-watersheds are a rich source of existing water quality and related data. Water quality monitoring has been conducted in the Bras d'Henri River since 1988, with hydrometric measurements taken since 1972. In addition, expertise in hydrologic modelling and cost-benefit studies of surface and subsurface drainage practices at the sub-watershed level dates back to 1995. Also, a regional team of federal, provincial and university research agencies is already in place.

The twin watersheds study in the Fourchette sub-watershed has been underway since 2001. It has established a significant relationship in the export of non-point source sediments and nutrients (nitrogen and phosphorus) from the two micro-watersheds. Water quality and enteric pathogen (*E. coli* and *Salmonella*) levels were also monitored. In 2003, on-farm BMPs designed to improve water quality in the stream were installed.

The Bras d'Henri /Fourchette Study Approach

Within the Bras d'Henri and Fourchette sub-watersheds, the effectiveness of four BMPs is being tested:

- 1. Surface Runoff Control** - Sediment and contaminant transport from agricultural soils to ditches and streams is exacerbated locally by steep stream bank and ditch side slopes, continuous annual row cropping, and a general lack of erosion control methods. Efforts to address this issue include producer education, establishing riparian buffer strips, reducing the side slope of stream and ditch banks and planting shrubs and trees along these, and establishing grassed waterways.
- 2. Reduced Herbicide Use** – A weed control program on corn fields involves herbicide reduction achieved through the use of a decision support system (DSS) developed by AAFC. The DSS is used to determine whether spraying is required or not and, if so, at what level. Under experimental conditions, use of the DSS has reduced herbicide loads by as much as 30 per cent. Using the DSS will demonstrate that reducing herbicide use does not necessarily impair crop yields and can have financial and environmental benefits.
- 3. Hog Slurry Management** – Hog slurry is being applied to forage and corn using a low-ramp spreader equipped with trail hoses. The practice will be evaluated as a method of reducing nitrogen loss through ammonia volatilization in both cropping systems. In addition, post-emergence application of liquid hog manure on corn will optimize plant nitrogen and phosphorus use efficiency, further reducing the environmental risks of water and air pollution.
- 4. Crop Rotation** – The recommended practice of gradually introducing perennial crops, such as alfalfa, into the crop rotation will protect surface soils and enhance nutrient uptake while improving soil structure, thereby improving water quality. Harvested alfalfa can export twice the volume of nitrates as corn for the same amount of dry matter removed. Also, the use of annual crops in rotation with corn will be encouraged to help break the pest cycle, while providing both positive environmental and economic benefits.

The impact of these four BMPs on water quality will be assessed at treated watershed outlets and compared to those of the control (untreated) watersheds. The specific impact of individual BMPs will also be analyzed at the field–stream interface by comparing those fields receiving treatment with those that do not.

Who is Involved?

The multi-disciplinary team on this WEBS project consists of producers and councillor members of Club de fertilisation de la Beauce; scientists and staff from Agriculture and Agri-Food Canada; the [Quebec Ministry of Agriculture, Fisheries and Food](#); the [Quebec Ministry of Sustainable Development, Environment and Parks](#); the [Research and Development Institute for the Agri-Environment](#); and the [National Institute for Scientific Research – Water, Earth and Environment](#).

Additional Information

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To learn more about WEBS, visit the **Greencover Canada website** at: www.agr.gc.ca/env/greencover-verdir, or contact:

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