NOVA SCOTIA ENVIRONMENTAL FARM PLAN

factsheet

Water Quality Impact of Cattle Access to Watercourses

Background

Direct access to surface water has traditionally been an inexpensive and simple way to provide water for grazing livestock. However, allowing livestock unrestricted access to watercourses can negatively affect the aquatic environment, as well as the health and productivity of the animals themselves. Although there have been numerous studies conducted in arid to semi-arid regions showing the impact of direct access on water quality, there have been few in more humid temperate regions, such as Nova Scotia.

Purpose of Research

To determine the water quality impacts of allowing cattle access to watercourses in Nova Scotia.

Sites

Research took place at two sites that were representative of direct watering systems in Nova Scotia.

Site #1: Falmouth, Nova Scotia

- Fifty cow-calf pairs were provided restricted access to a branch of the Avon River.
- The access point had experienced severe erosion throughout the years (Fig. 1).
- The river bottom consists of fine silt and sediment, which was easily stirred up by the cattle.

Figure 1: Site #1 in Falmouth, Nova Scotia.

Site #2: Antigonish, Nova Scotia

- Approximately 16 to 20 heifers and dry cows were provided restricted access to a small tributary of the South Rights River (Fig. 2).
- The stream has a well-gravelled bottom and flows through forest, agricultural and residential land.

Figure 2: Site #2 in Antigonish, Nova Scotia.

Water Quality Monitoring

- Weekly water samples were collected both upstream and downstream from the cattle watering sites and also adjacent to the access points.
- Sampling was conducted during the grazing seasons of 2004 and 2005.
- To determine water quality, samples were analysed for several parameters, including nutrients, biochemical oxygen demand, *E. coli* and total suspended solids (TSS).
- Since many of these parameters were found in low levels, only the results for *E. coli,* which is a bacterial indicator of fecal contamination, and TSS, which measures solids suspended in the water, are summarized in this factsheet.

E. coli Results

- At both locations, average *E. coli* concentrations exceeded the recreational guideline of 200 CFU/100 mL (Fig. 3).
- Although there is no *E. coli* guideline for livestock, exposure to high levels could cause herd health concerns and reduce weight gain.
- **In Falmouth,** although downstream and access point averages were higher than upstream, statistical tests of the data showed that there was no significant difference between locations. This is largely due to variability in the data.

- **In Antigonish,** the average *E. coli* concentration downstream was significantly higher than upstream, indicating that cattle could have caused increased *E. coli* concentrations

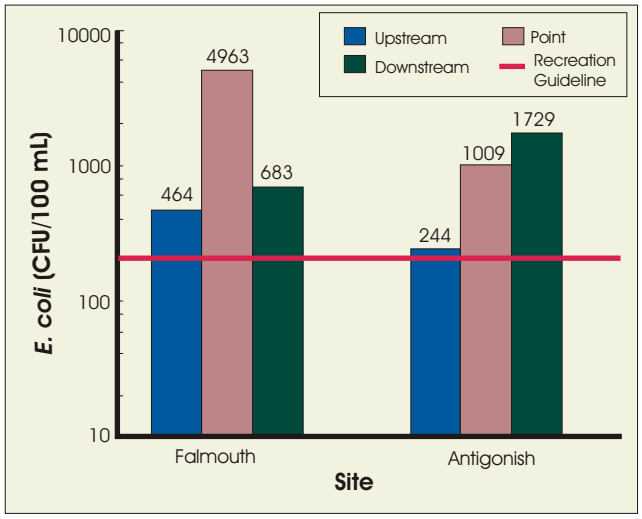

Figure 3: Average *E. coli* concentrations (CFU/100 mL) at Falmouth and Antigonish sites.

Total Suspended Solids (TSS) Results

- The TSS levels at both sites were below levels considered harmful to aquatic life. Unimproved access points for other sites could, however, have cumulative impacts.
- **In Falmouth,** the average TSS level at the access point was significantly higher than upstream and downstream (Fig. 4). This could be caused by the bank erosion and/or cattle disturbing the bottom sediment when they entered the water.
- TSS is a concern because sediment can carry water pollutants, such as nutrients, chemicals and pathogens. Deposited sediment may suffocate fish, amphibian and insect eggs or larvae.
- There was no significant difference between upstream and downstream TSS levels, which indicates that the sediment settled out before the downstream location.
- **In Antigonish**, the TSS levels were similar at the upstream, downstream and access point locations. This indicates that the cattle did not increase TSS.
- This was probably due to the solid, gravelly bottom with little silt in-stream.

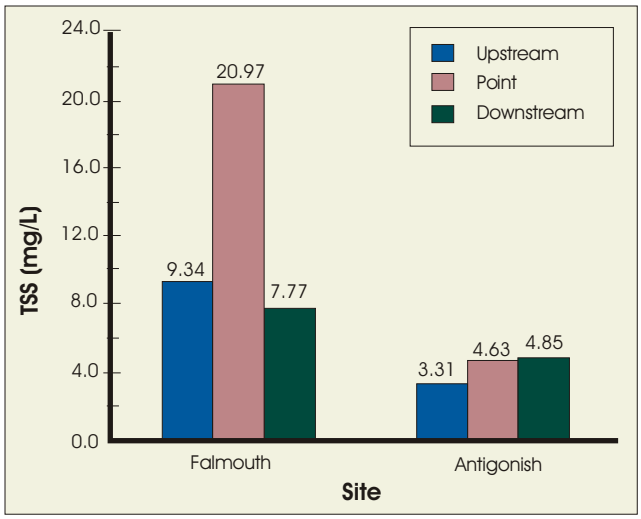

Figure 4: Average TSS at Falmouth and Antigonish sites.

Summary

- Cattle access at both watering sites did not appear to influence biochemical oxygen demand or nutrient levels.
- The presence of cattle appeared to increase TSS and *E. coli* levels. The extent of the impact depended on the site.
- Average *E. coli* levels were above recreational guidelines.
- Elevated levels could cause herd illness and problems with weight gain.
- Alternative watering systems should be investigated in order to reduce point source contamination and improve herd health.

Additional Resources Available

The following factsheets on pasture water systems are available through the Nova Scotia Environmental Farm Plan Program, Agriculture and Agri-Food Canada and the Nova Scotia Department of Agriculture:

- *Livestock Watering Systems for Pastures*
- *Do Limited Access Ramps Improve Water Quality?*
- *Providing Water with Limited Access Ramps*

For more information about the water quality impact of cattle access or available cattle watering systems, contact the Nova Scotia Environmental Farm Plan Program at (902) 893-7338.

The research project entitled: "Development of Improved Cattle Access to Watercourses" received funding from Agriculture and Agri-Food Canada's Greencover Canada Program, an initiative under the federal-provincial-territorial Agricultural Policy Framework. The research project was developed in consultation with:

Canada

NOVA SCOTIA ENVIRONMENTAL FARM PLAN

DALHOUSIE UNIVERSITY FACULTY OF AGRICULTURE

NOVA SCOTIA