

The Annapolis Watershed

2008 REPORT CARD



Monitoring the Annapolis River

How healthy is the Annapolis River? Are conditions deteriorating or improving? What can we do about it? These are all questions asked by both residents of the Annapolis Valley and visitors. Clean Annapolis River Project (CARP), with the Annapolis River Guardians, a group of dedicated volunteers, monitor conditions in the Annapolis River in an attempt to answer these questions.

The Annapolis River Guardians is one of the longest running and most extensive volunteer-based water monitoring programs in Eastern Canada. Started in 1992, the program has involved over 90 volunteers who have collected more than 3500 water samples. The River Guardians are all residents of the Annapolis Watershed and come from many different backgrounds. With over 17 years of data, the program has contributed significantly to our understanding of the Annapolis River. The stars on the map below indicate some of the locations where water quality is monitored. This report card summarizes the program and its findings for the 2008 monitoring season. Read on to discover what has been happening in your watershed. Please note that this report card is a work in progress; we welcome input on how it can be improved to meet your needs.

What is a Watershed?

A watershed represents the drainage basin or catchment area for a particular body of water. In the case of the Annapolis Watershed, the water body that we refer to is the Annapolis River and Estuary. Any drop of water that falls into the white area on the map below will eventually drain into the Annapolis River, flow into the Annapolis Basin and out to the Bay of Fundy. This area represents our watershed, which extends from Berwick to Digby, making it the third largest in the province. A watershed is determined by the natural elevation of the land. In the case of the Annapolis Watershed, the North and South Mountains define the boundaries.

Watercourses do not follow political boundaries. For example, the Annapolis Watershed lies across three counties: Kings, Annapolis and Digby. For this reason, water, in its various forms (e.g. surface and ground water) is best understood and managed at the scale of a watershed.

There are several issues of environmental concern in the Annapolis Watershed: contamination by fecal bacteria, elevated summer water temperatures, low dissolved oxygen levels, erosion along riverbanks, and high concentrations of some nutrients, such as phosphorus. We monitor several different water quality parameters, in order to get a better understanding of the health of the river.



What do we measure?

E. coli Bacteria are bacteria that live in the digestive tract of warm-blooded animals. Because they occupy the same ecological niche as many disease-causing organisms (human pathogens), E. coli is used as an indicator for the presence of potentially dangerous organisms (e.g. Cryptosporidium). E. coli bacteria have been identified as a major source of concern in the Annapolis Watershed. The potential sources of contamination in the watershed include poorly maintained on-site (domestic) septic systems, malfunctioning central sewage treatment plants, aquatic wildlife (e.g. beavers and waterfowl), domestic animals, and livestock.

Dissolved Oxygen (DO) is a widely used and important general indicator of the health of aquatic systems. Aquatic organisms, such as fish, require oxygen dissolved in the water to survive. Sewage, manure, or algal blooms resulting from elevated nutrient levels can result in low DO levels.

Water temperature also serves as a broad indicator of water quality. The temperature of water has a direct bearing on the aquatic species present and their abundance. For example, trout and salmon experience stress at water temperatures in excess of 20°C, with death occurring after prolonged exposure to temperatures over 24°C.

pH is a measure of the acidic/basic nature of water. It is expressed on a scale from 0 to 14, with 0 being the most acidic and a pH of 7.0 being neutral. To ensure the health of freshwater aquatic life, pH levels should not vary beyond a range of 6.5 to 9.0. Levels below 5.0 are known to negatively affect many species of fish, such as salmon and trout. pH varies naturally, but it can also be influenced by human factors, such as acid rain inputs.

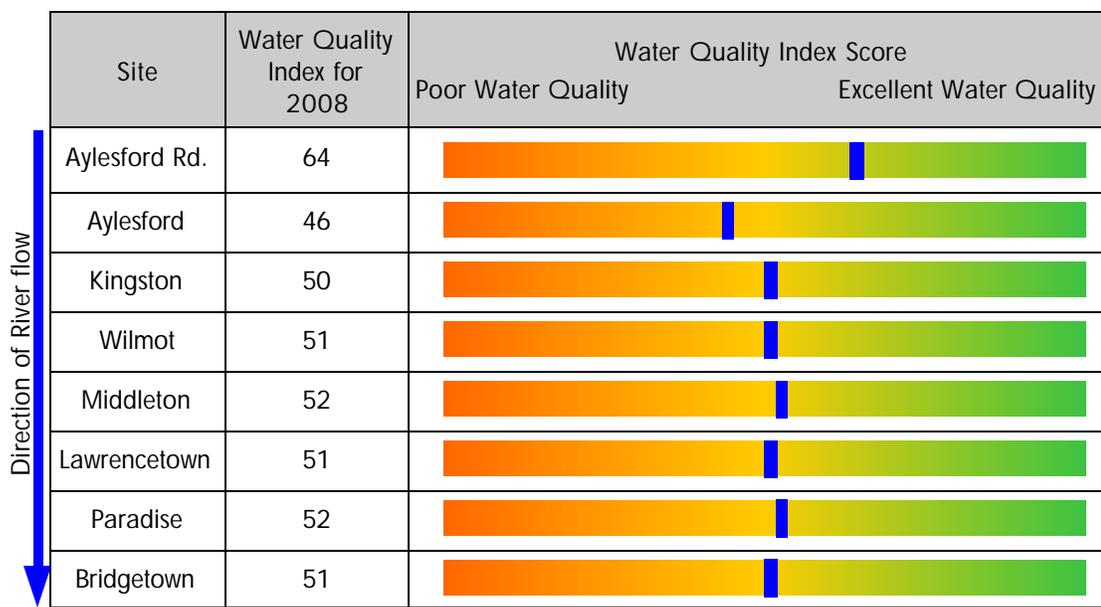
Nitrogen and phosphorus are nutrients which are essential for all forms of life, but when present in elevated concentrations can degrade water quality by causing algal blooms that may lead to low dissolved oxygen levels. For the Annapolis Watershed, the most important sources of these nutrients are domestic on-site and municipal wastewater discharges, and runoff of chemical fertilizers and manure applied to urban and agricultural lands.

Benthic invertebrates include aquatic insects (e.g. mayflies) and other organisms that live on the bottom of watercourses. Some invertebrates are very sensitive to pollution, while others are pollution tolerant and can thrive in a contaminated environment. By counting the types and number of benthic invertebrates present in a watercourse, we can learn a great deal about the water quality at that site.



The Health of the Annapolis River

Variable	Status (2008)	Comment	Trend (1992 to 2008)		
E. coli Bacteria	Fair	27% of the 106 samples exceeded the guideline for water contact recreation (e.g. swimming).	↓ at 2 locations ↑ at 1 location ↔ at 5 locations		
Dissolved Oxygen (DO) Saturation	Good	1 out of 111 samples (0.9%) of the upper river was below 60% saturation. Below Bridgetown, however, very low DO levels occurred in the underlying saltwater during the late summer and early autumn.	↓ at 2 locations ↑ at 1 location ↔ at 5 locations		
Water Temperature	Poor	66% of the samples collected during the summer months had temperatures of 20 °C or higher.	↓ at 3 locations ↔ at 5 locations		
pH	Good	10% of 108 pH samples were below 6.5. For most of the sampling season, pH was within the acceptable 6.5 - 9 range. Low pH values were recorded during and immediately after Hurricane Hanna.	↔ at all locations		
Nitrogen	Fair	2 out of the 14 samples (14%) in 2008 were above the suggested guideline of 0.9mg/L.	?		
Phosphorus	Poor	8 out of the 14 samples (57%) in 2008 were above the suggested guideline of 0.03mg/L.	?		
Benthic Invertebrates	Good	Both samples taken of the Annapolis River in 2008 had a Family Biotic Index result of less than 5.	?		
Turbidity	Good	11% of samples taken in 2008 were above 10 NTU. This guideline is an interim value and will be revised in future sampling seasons.	?		
Trend Legend		↑ Improving	↓ Declining	↔ Unchanging	? Insufficient Information



The Water Quality Index is a value calculated using several different water quality parameters. The parameters used in this calculation were E. Coli bacteria count, Dissolved Oxygen, Temperature, pH and turbidity. See annapolisriver.ca/projects_guardians.php for methodology.

What can I do?

There are things that each of us, as residents of the Annapolis Watershed, can do to address the problems facing the river to improve its health for years to come. Whether we act as individuals, or as part of larger organizations, these actions can make an impact.

1. Keep shorelines green. Maintaining natural vegetation along watercourses provides a home for wildlife, keeps waters cool, filters out pollution, and reduces erosion.
2. Encourage fencing of watercourses. Livestock can trample riverbanks, increase erosion and are a source of E. coli bacteria. Fencing livestock out of watercourses is better for both the livestock and the river.
3. Conserve water. Installing low-flow appliances, modifying existing fixtures (e.g. installing toilet dams) and collecting rain water for gardening are easy ways to conserve water. Rivers rely on inputs from groundwater to maintain flow during the dry summer season.
4. Keep sewage where it belongs. Ensure that domestic septic systems are pumped out and maintained regularly, and that municipal sewage treatment plants are operated to the highest possible standards.
5. Curb chemical inputs. For cleaning products used in the home, look for those that are phosphate-free and biodegradable. Reduce the cosmetic use of pesticides, at home and in your garden, wherever possible.



A New Year, New Questions

Every sampling season brings new challenges. Here are some of the activities CARP hopes to pursue in 2009:

- Track down sources of E. coli contamination in tributaries of the Annapolis River near Aylesford
- Continue to develop a baseline level of total suspended solids, which serves as a good indicator of erosion
- Work with municipalities in the watershed to reduce water use and improve sewage treatment facilities
- Educate homeowners on actions they can take to conserve water and reduce pollution
- Assist landowners to fence livestock out of watercourses, stabilize eroding slopes and re-vegetate banks with native vegetation.

What to know more?

Clean Annapolis River Project (CARP) is a charitable, community-owned corporation created to work with the community and interested organizations to foster the conservation, restoration and sustainable use of the freshwater and marine ecosystems of the Annapolis River and its watershed. Founded in 1990, we use a multi-stakeholder approach to improve the health of the river by working with individuals, businesses, universities, government and other non-profit groups. CARP is not an advocacy group, but believes that by working together, we can create the sustainable communities and healthy environment that we all deserve.

This newsletter is a summary of the 2008 Annual Water Quality Monitoring Report for the Annapolis River. The full report, as well as other information on the watershed, is available at www.annapolisriver.ca

If you have any questions about the material presented in this newsletter, require further monitoring details, or would like a presentation on these results to your group or organization, please contact:

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Thank You

The Annapolis River Guardians is a volunteer-based program. Without the dedication of the volunteers, the program would not be the success that it is. We would therefore like to extend our thanks to the volunteers who contributed their time and energy during the 2008 season:

Claire Diggins, Marika Godwin and Ross Dickson, Ronald Jones, Tami and C.J.Parks, Matthew Guy, Chelsea Fougère, Justin Markey-Thomas, Daren Parks.

The following partners work with CARP to help deliver its water quality monitoring programs, including the Annapolis River Guardians:

Acadia Centre for Estuarine Research, Environment Canada—Atlantic Coastal Action Program, Human Resources and Skills Development Canada, and Nova Scotia Environment.