

The Annapolis Watershed Report Card

Evaluating 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 residents of the Annapolis Watershed. The Annapolis River Guardians try to answer these questions by learning more about the Annapolis River. The River Guardians are a volunteer water quality monitoring group who, with the help of staff from the Clean Annapolis River Project (CARP), monitor conditions on the Annapolis River.



The Annapolis River Guardians is one of the longest-running and most extensive volunteer based water quality programs in Eastern Canada. Started in 1992, the program has involved over 90 volunteers and collected over 3500 water samples. The River Guardians are all residents of the Annapolis Watershed, and come from many different backgrounds. With over 14 years of data, the program has contributed significantly to our understanding of the Annapolis River. This report card summarizes the program and its findings for the 2005 monitoring season. Read on to discover what's been happening in your watershed!

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. Any drop of water that falls into the white area on the map below, will eventually drain into the Annapolis River. This area represents our watershed, which extends from Berwick to Digby, making it the third largest watershed in the province. A watershed is determined in part by the natural elevation a landscape, and is based on the natural shape of the land instead of municipal boundaries. The Annapolis Watershed lies across three counties: Kings County, Annapolis County and Digby County.

There are several issues of environmental concern in the Annapolis Watershed: contamination by fecal bacteria, elevated summer water temperatures, the levels of oxygen dissolved in the water, nutrients such as nitrate and phosphorous, and erosion along riverbanks.

The stars on the map represent the sites where the Annapolis River Guardians collect their water samples. There were 8 sampling sites in 2005: Aylesford Road, Aylesford, Kingston, Wilmot, Middleton, Lawrencetown, Paradise and Bridgetown.



Why do we care?

The Annapolis River provides many services to residents of the watershed. The river is used for recreational activities such as swimming, boating, and fishing, and also has aesthetic value, a fact recognized by the tourists that come to the valley every summer.

The river also has cultural value for the citizens of the Annapolis Valley. Stemming from the time when it was used by the Mi'kmaq people, the river has provided transportation for colonization, and boasts the oldest permanent European settlement on its shores. The days of shipbuilding brought prosperity to many towns along the river, and the Annapolis River hosts the only tidal power plant in North America.

Farming is one of the traditional industries in the Annapolis Valley, and it has long depended on the waters of the Annapolis River. The river provides water both for crop irrigation and livestock watering.

The river supports the different kinds of wildlife that live along its shores, including the vulnerable wood turtle, pictured at right. Waterfowl, birds of prey, muskrats, turtles and fish all call the Annapolis River home.



What do we measure?

Fecal Bacteria (E.coli)

E.coli 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 are used as indicators for the possible presence of potentially dangerous pathogens. These bacteria have been identified as a major source of concern in the Annapolis River watershed. The potential sources of fecal contamination in the watershed include malfunctioning central sewage treatment plants, poorly maintained on-site septic systems, aquatic wildlife (i.e. beavers, muskrats, waterfowl), domestic animals, and agricultural livestock.

Dissolved Oxygen

Dissolved oxygen (DO) is a widely used and important general indicator of the health of a river system. Aquatic organisms, such as fish, require oxygen in solution, just as terrestrial organisms need oxygen to breathe. Oxygen in the atmosphere, which is readily available to terrestrial organisms, must be dissolved into the water where it is present in much lower concentrations. Wind, wave action, rainfall and photosynthesis help aerate waterways and increase dissolved oxygen levels. Sewage, other highly organic inputs, lower rates of photosynthesis and diffusion from the atmosphere due to ice cover can lead to decreased oxygen levels.

Water Temperature

Water temperature, like dissolved oxygen, 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 species experience stress at water temperatures in excess of 20°C, with lethality occurring after prolonged exposure to temperatures over 24°C.

Acidity

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 being neutral. Every unit decrease in pH represents a 10 fold increase in acidity. To ensure the health of freshwater aquatic life, pH levels should not vary beyond a range of 6.5-9.0. 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.

Nutrients

Nutrients such as Nitrogen (N) and Phosphorus (P) are necessary for all forms of life, but when they are present in elevated concentrations, they can have toxic effects. Elevated levels can cause oxygen depletion from algal blooms, and affect aquatic life such as amphibians. The sources that can lead to increased levels of these nutrients are human and animal waste, atmospheric inputs, industrial waste and artificial fertilizers.

The Annapolis Watershed in 2005

Variable	Status		Trend				
Fecal Bacteria (E.coli)	☹️	86% of samples met guidelines for basic use (swimming, livestock watering, irrigation) 14% of samples were unsatisfactory for all uses.	↑				
Dissolved Oxygen	😊	Levels were high enough to support aquatic life. Some samples near Bridgetown, however, had very low levels of DO. These were found to be in the tidal salt water late in summer and early fall.	↔️				
Water Temperature	☹️	25% of the samples collected during the summer months had temperatures of 20°C or higher. This follows the same trend seen in past years.	↔️				
pH	😊	Most pH values were between 5.5-7.5, a range that can support aquatic life, although values decreased slightly from 2004 to 2005.	↓				
Nutrients	☹️	More than 70% of the nutrient samples collected exceeded guidelines.	?				
Legend	😊 Good	☹️ Fair	☹️ Poor	↑ Improving	↔️ Stable	↓ Worsening	? Insufficient data

A New Year, New Questions

Every sampling season brings new challenges. Below are some of the questions that were raised by the results of the 2005 sampling season.

- Although E.coli levels improved in 2005 compared to 2004, high levels of bacteria are still being found in the upper river, particularly near Aylesford. The monitoring program in 2006 will continue to investigate this trend and identify possible sources.
- Low dissolved oxygen levels were found in the lower reaches of the river, where salt water is pushed up by the tide to Bridgetown. During 2006, CARP will track changes in dissolved oxygen levels between Annapolis Royal and Bridgetown. Some of the questions that we'll try to answer include: Was this result unique for 2005, or does it occur every year? What is the extent of the depressed oxygen levels? Where does this occur and for how long?
- This was the first year that we were able to regularly monitor nutrient levels in the river. In 2006 we hope to monitor nutrient levels again to assess if this is a regular problem for the Annapolis River.
- Even though pH levels were generally good this year, there was a statistically significant drop in pH for 2005, when compared to past years. Does this represent the start of a downward trend in pH values? Or were the levels in 2005 affected by unusually bad acid rain events? By monitoring again next season, we can hopefully see whether this trend will continue to worsen or if levels improve.

What can I do?

There are things that each of us can do as residents of the Annapolis Watershed to ensure that our river stays healthy for years to come. Whether we act as individuals, or as part of larger organizations, these simple steps can make a big impact.

Protect vegetation along riverbanks and streams.

Vegetation provides a home for wildlife, keeps waters cool, filters out pollutants and reduces erosion.

Support the fencing of streams. Livestock trample riverbanks which increases erosion, stir up sediment that washes downstream, and are one of the sources of bacterial contamination in the river.

Conserve water. Reducing shower times and installing low-flow appliances are two easy ways to conserve water. Rivers rely on inputs from groundwater to maintain flow during the dry summer season.

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.

Reduce the use of cosmetic pesticides. Pesticides used domestically and for cosmetic treatments of landscapes are often washed into river systems, where they can damage wildlife.

Take the One-Tonne Challenge. Stop idling, use energy efficient appliances, and reduce your heating bills by becoming part of Environment Canada's One-Tonne Challenge campaign to reduce use of fossil fuels.

Get involved! Not sure where to start? Find an environmental organization in your area, and learn more about the place you call home.



Want to know more?

This newsletter represents a summary of the 2005 Annapolis River Guardians Report. The full report, as well as other information on the watershed, can be downloaded from our website at www.annapolisriver.ca.

All monitoring results are available in an online searchable database at www.fundybay.com.

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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The 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. We use a *multi-stakeholder* approach to improve the health of the river by working with individuals, businesses, academics, government and other non-profit organizations. CARP was founded in 1990, and has been involved in over 100 projects relating to volunteer water quality monitoring, fish habitat restoration, public education, coastal zone management, private stewardship initiatives, sustainable agriculture, pollution prevention and many other issues. CARP is not an advocacy group, but believes that by working together, residents of our watershed can create the sustainable communities and clean environment that we all deserve.

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 2005 season:

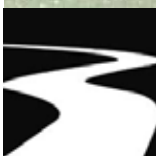
Claire Diggins, Kris Godwin, Marika and Rick Godwin, Harold and Pam Griffin, Ronald Jones, Ross McLaughlin, Tami and C.J. Parks, Jennifer Robinson, and Steve Schell.

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The Clean
Annapolis River
Project