



# The Annapolis Watershed 2011 Report Card



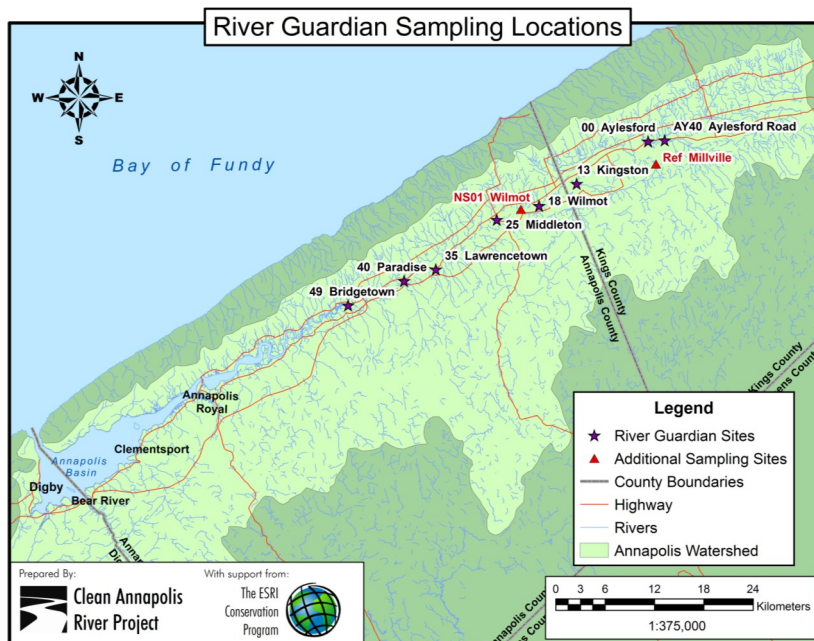
## Monitoring the Annapolis River Watershed

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. The 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 4000 water samples. The River Guardians are all residents of the Annapolis River watershed and come from many different backgrounds. With over 19 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 2011 monitoring season. Read on to discover what has been happening in your watershed. This report card gives an overview of the status of the river for 2011, if you have any comments or suggestions for future reporting, please contact us.

### The Annapolis River watershed and its regular sampling locations. ►

Some issues facing the Annapolis watershed include fecal contamination, shoreline erosion, high summer water temperatures, low levels of dissolved oxygen and high levels of nutrients such as nitrogen and phosphorus.



## What is a Watershed?

A river is not an isolated body of water. It interacts with the air, land and water bodies surrounding it. A watershed represents the drainage basin or catchment area of a certain water body. Water from lakes, streams, run-off and ground water all empty into a central body of water, in our case, the Annapolis River. Our watershed stretches from Berwick to Digby, following the path carved by the river. Its borders are determined by the elevation of the North and South Mountains and it is the third largest in Nova Scotia.

Since all forms of land and water are interconnected, it would be impractical to focus restoration efforts solely on the Annapolis River. All of the land, air and water systems in the watershed interact with and affect each other, meaning ecological health is much better managed at a watershed scale.

# What do we measure ?



**E. coli Bacteria** live in the digestive tract of warm-blooded animals. They occupy the same ecological niche as many human pathogens and are used to indicate the potential presence of harmful organisms (e.g. *Cryptosporidium*, which can cause diarrhea). *E. coli* bacteria have been identified as a major source of concern in the Annapolis River 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. Levels below 60% can cause stress to cold-water fish. 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 health and abundance of aquatic species. Trout and salmon experience stress at temperatures in excess of 20°C and death occurs after prolonged exposure to temperatures over 24°C.



**Turbidity** measures the amount of suspended sediment in a water sample. It varies depending on soil type, amount of shoreline erosion and surrounding land use, among other things. Baseline levels are specific to each watercourse and need to be established in order to determine the significance of peak levels. Generally, turbidity values below 10 NTU are acceptable. Water that is too turbid can block light from reaching aquatic plants and interfere with feeding mechanisms of zooplankton. Turbidity is highly variable and can spike during periods of heavy rainfall or snowmelt.

**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, 7 being neutral, and 14 being the most basic. 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. When present in elevated concentrations, they can degrade water quality by causing algal blooms that may lead to low dissolved oxygen levels. Nitrogen levels below 0.9 mg/L and phosphorous levels below 0.3 mg/L are considered acceptable. For the Annapolis River watershed, the major sources of these nutrients are domestic on-site and municipal wastewater discharges, as well as runoff of chemical fertilizers and manure applied to urban and agricultural lands. Nitrogen and phosphorus were monitored by Environment Canada at Millville and Wilmot.



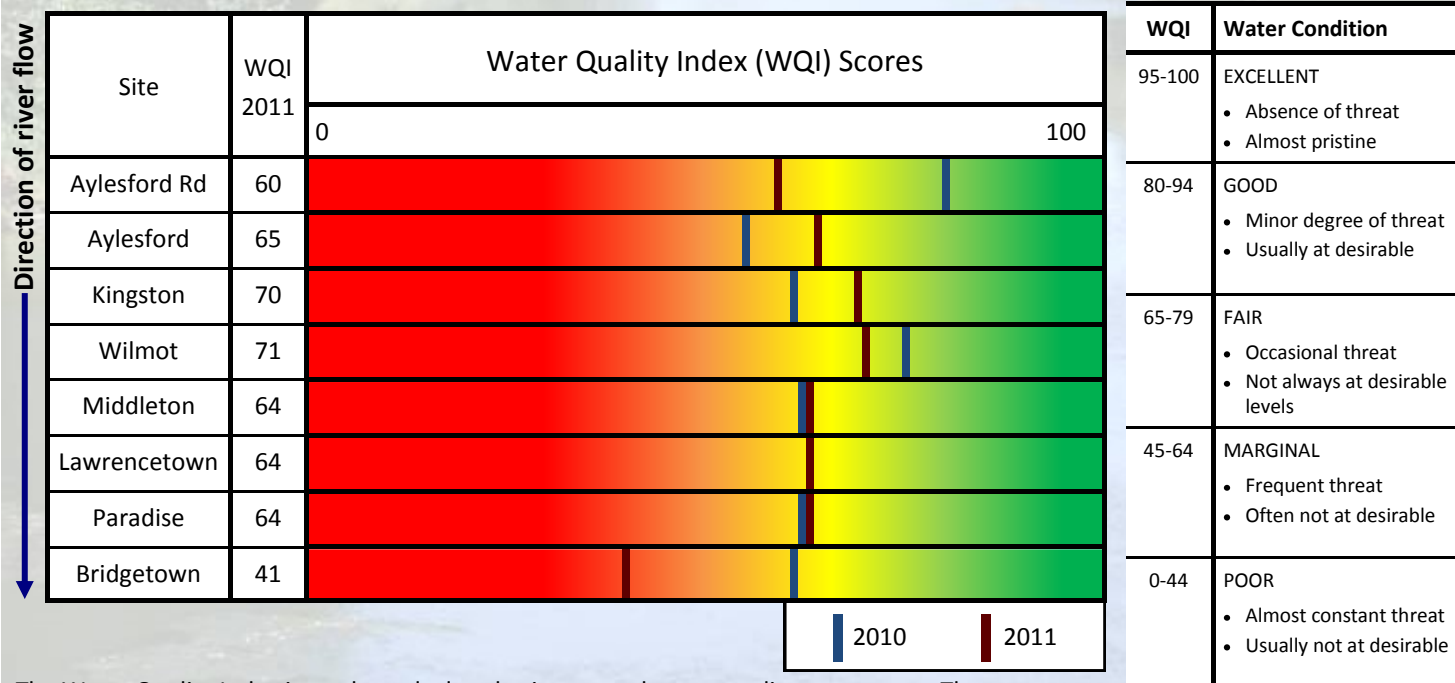
# The Health of the Annapolis River in 2011

Variable	Status (2011)	Comment	Trend (1992 to 2011)
E. coli Bacteria	Poor	40% of 110 samples fell outside the objective for water contact recreation (e.g. swimming). This year, as in the past, rainfall amounts contributed to high E. Coli levels.	↓ at 3 locations ↑ at 1 location ↔ at 4 locations
Dissolved Oxygen	Good	98% of 103 samples were above 60% saturation. DO levels lower than 60% saturation cause stress to aquatic life.	↑ at 1 location ↓ at 2 locations ↔ at 5 locations
Water Temp.	Fair	29% of the 48 samples collected during the summer months (July, August, September) had temperatures greater than 20 °C.	↓ at 2 locations ↔ at 6 locations
pH	Good	5% of the 111 pH samples collected were outside the objective of 6.5 to 9.	↑ at 1 location ↔ at 6 locations
Nitrogen	Poor	3 out of the 9 samples (33%) were above the objective of 0.9 mg/L.	↔ at 1 location*
Phosphorus	Poor	6 out of the 9 samples (67%) were above the objective of 0.03 mg/L.	↔ at 1 location*
Turbidity	Fair	21% of 63 samples were above the 10 NTU objective.	↔ at 8 locations**
Trend Legend		↑ Improving   ↓ Declining   ↔ No trend detected	

\* Only one River Guardians site (Wilmot) is still sampled for nutrients. Millville is an additional reference site that is sampled, but was not included in the chart above. Nutrient trends cover the period of 2006—2011.

\*\* Turbidity sampling was started in 2009, and therefore trends cover the period of 2009-2011.

Water quality objectives and analyses are described in the full River Guardians Report, which is available at [www.annapolisriver.ca](http://www.annapolisriver.ca)



The Water Quality Index is a value calculated using several water quality parameters. The parameters used in this calculation were E.coli bacteria count, Dissolved Oxygen, Temperature, pH and Turbidity. See <http://annapolisriver.ca/riverguardians.php> for methodology.





Thanks to the 2011 River Guardians volunteers:

**Mike Brobbel**  
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**Adrian deMontfort**  
**Claire Diggins**  
**Matthew Guy**  
**Vicky Parker**  
**Daren Parks**  
**Tami Parks**  
**Natalie Verstichelen**

This program would not be possible without their dedication.

The following partners work with CARP to help deliver many programs, including the Annapolis River Guardians:

Acadia Centre for Estuarine Research  
 Environment Canada—Atlantic Ecosystem Initiatives  
 Science Horizons Youth Internship

### Beyond River Guardians

Other CARP projects of 2011:

- \* *Broken Brooks* -Assessed and ranked culverts as barriers to fish migration.
- \* *Clementsport Dam Removal and Restoration* - Removed a derelict dam and restored a portion of the Moose River.
- \* *EHAP* -Worked with rural homeowners to ensure their septic systems are functioning and well-maintained.
- \* *EnerGuide* -Promoted actions that can be used to conserve water and energy through projects.



### 2012 Anticipated Projects

- \* River Guardians
- \* EHAP
- \* Rural water assessments
- \* Aquatic connectivity assessments
- \* Clementsport Dam post-removal restoration and monitoring
- \* Endangered species monitoring (Striped Bass/Wood Turtle)
- \* Salmon and trout habitat assessments

### What can I do?

There are things that each of us, as residents of the Annapolis River watershed, can do to address the problems facing 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 and planting natural vegetation along watercourses provides a home for wildlife, keeps waters cool, filters out pollution, and reduces erosion.
- 2. Encourage fencing of watercourses!** Livestock are a source of *E. coli* bacteria and can trample riverbanks, which increases erosion. 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 tanks are pumped out every 3-5 years 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 phosphate-free and biodegradable products. Reduce or eliminate the cosmetic use of pesticides for lawns and gardens wherever possible.

### About Clean Annapolis River Project

- ♦ CARP is a charitable, community based organization working to restore and protect the ecological health of the Annapolis River watershed through science, leadership and community engagement.
- ♦ CARP was established in 1990 and works with individuals, businesses, universities, government and other non-profit groups to improve the health of the watershed.
- ♦ For more information on CARP's water quality monitoring programs or if you would like a presentation of the results to your group or organization, contact Levi Cliche at CARP.

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