

The Annapolis Watershed 2015 Report Card

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, runoff 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 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.

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), along with the Annapolis River Guardians, a group of dedicated volunteers, monitor conditions in the Annapolis River in an attempt to answer these questions.

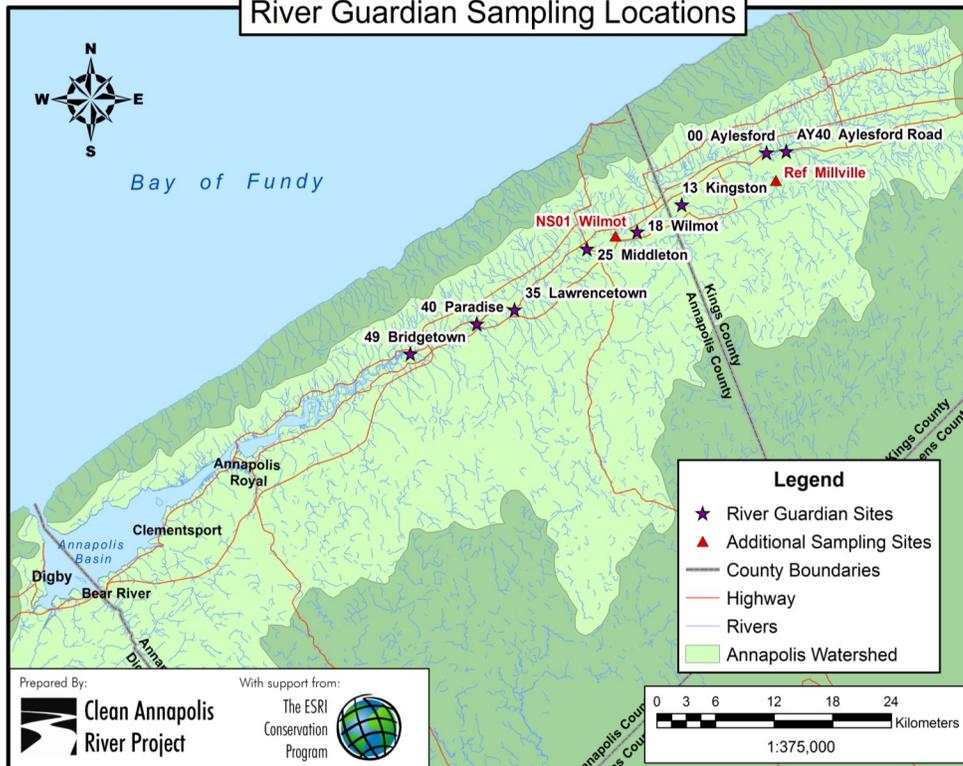
The Annapolis River Guardians program is one of the longest running and most extensive volunteer-based water quality monitoring programs in Eastern Canada. Started in 1992, the program has involved over 100 volunteers who have collected more than 4500 water samples. The River Guardians are all residents of the Annapolis River watershed and come from many different backgrounds.

With over 26 years of data, the program has contributed significantly to our understanding of the Annapolis River watershed. Some issues facing the 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.

The stars on the left-hand map show the locations where water quality is regularly monitored. This report card summarizes the program and its findings for the 2015 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 2015, if you have any comments or suggestions for future reporting, please contact us.

River Guardian Sampling Locations



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 cause 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, 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 6.5 mg/L 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 0.03 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

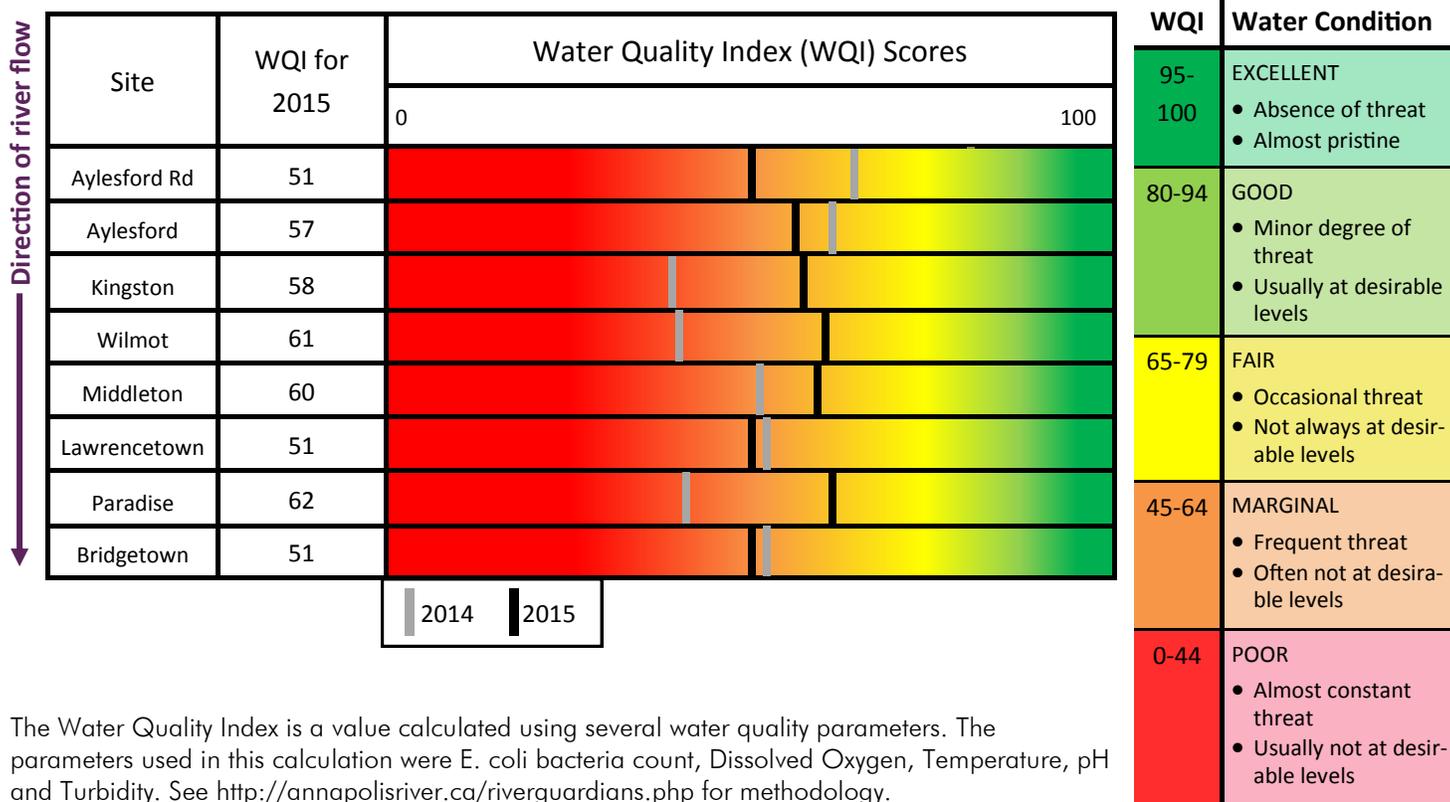
Health of the Annapolis River 2015

Variable	Status (2015)	Comment	Trend (1992 to 2015)	
E. coli Bacteria	Poor	84.6% of 104 samples fell outside the objective for water contact for recreation (e.g. swimming)	↓ at 4 locations ↔ at 4 locations	
Dissolved Oxygen	Good	One sample (1%) fell below the 6.5 mg/L guideline for cold water species	↓ at 7 locations ↔ at 1 location	
Water Temp.	Poor	58% of the 48 samples collected during the summer months (July, August, September) had temperatures greater than 20 °C	↓ at 7 locations ↔ at 1 locations	
pH	Good	1% of the collected pH samples were outside the objective of 6.5 to 9	↑ at 4 locations ↔ at 4 locations	
Turbidity	Poor	48% of 89 samples were above the 10 NTU objective	↔ at 8 locations*	
Nitrogen	Fair	17.6% of 17 samples were above the 0.90 mg/L objective	↔ at 1 location**	
Phosphorus	Poor	58.8% of 17 samples were above the 0.03 mg/L objective	↔ at 1 location**	
Trend Legend		↑ Improving	↓ Declining	↔ No trend detected

*Turbidity sampling was started in 2009, and therefore trends cover the period of 2009-2015.

** Nutrients are sampled at only 1 location. Trends are calculated based on data collected between 2006-2015.

Water quality objectives and analyses are described in the full River Guardians Report, which is available at 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.

What can I do?



There are things that each of us, as residents of the Annapolis River watershed, can do to protect the river's 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.

The continuation of the Annapolis River Guardians would not have been possible without the financial support from:

TD Friends of the Environment



**TD Friends of the
Environment
Foundation**

Thanks to the 2015 River Guardian volunteers:

Wendy Courtice	Blair Hayden
Steve Forbes	Cody Cole
Claire Diggins	Ron Kielback
Vicky Parker	Tami Parks
Kevin O'Keefe	Kelly Whalen

This program would not be possible without their dedication.

2016-2017 Anticipated Projects

- * River Guardians Monitoring
- * Fish Habitat Restoration
- * Endangered Species Monitoring (Striped Bass/Wood Turtle)
- * Estuary Health Assessment
- * Ocean Acidification Monitoring

About Clean Annapolis River Project

- ◆ CARP is a charitable, community based organization working to enhance 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.
- ◆ CARP operates across the Annapolis watershed, which encompasses an area of about 2000 km², making it Nova Scotia's third largest watershed.

314 St. George Street • P.O. Box 395 • Annapolis Royal, NS • B0S 1A0
Phone: (902) 532-7533 • Toll-free: 1-888-547-4344 • Fax: (902) 532-3038
carp@annapolisriver.ca • www.annapolisriver.ca

