



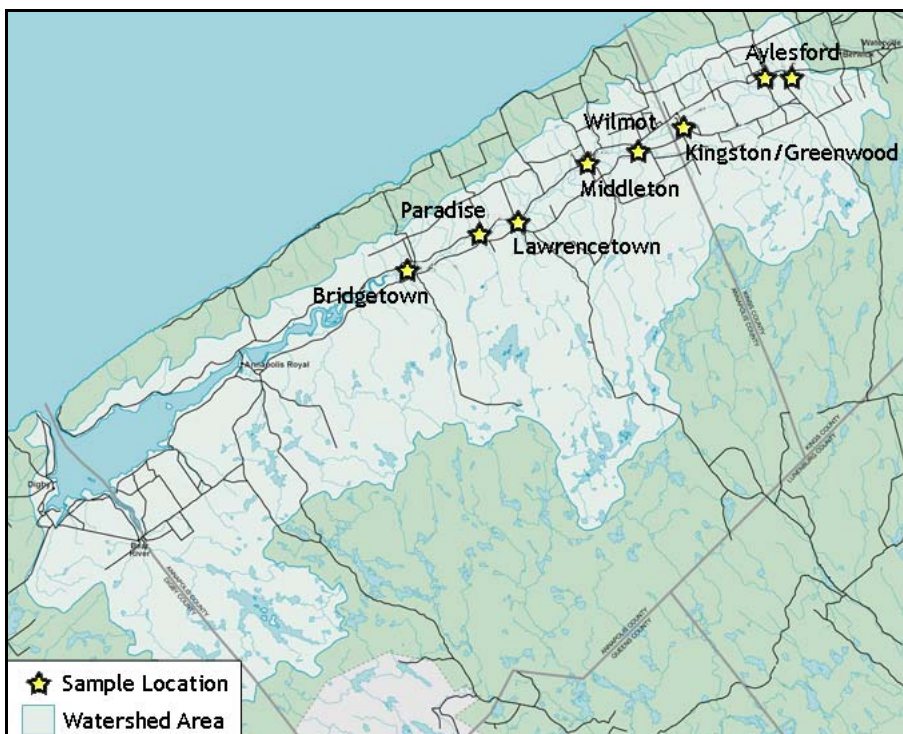
# The Annapolis Watershed 2009 Report Card

## 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. 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 18 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 2009 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.



The Annapolis River watershed and the 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 and runoff as well as ground water all empty into a central body of water, in this case, the Annapolis River. Our watershed begins in Berwick and follows the river all the way to Digby. Its borders are outlined by the North and South Mountains. 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 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*, which can cause diarrhea). *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 health and abundance of aquatic species. Trout and salmon experience stress at temperatures in excess of 20°C, with death occurring after prolonged exposure to temperatures over 24°C.



Turbidity is a measurement of the amount of suspended sediment in a water sample. Turbidity varies depending on soil type, amount of shoreline erosion and surrounding land use, among other things. Waters that are too turbid tend to block light from reaching aquatic plants and can 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 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, as well as runoff of chemical fertilizers and manure applied to urban and agricultural lands. Nitrogen and phosphorus were monitored by Environment Canada at Wilmot and Lawrencetown.

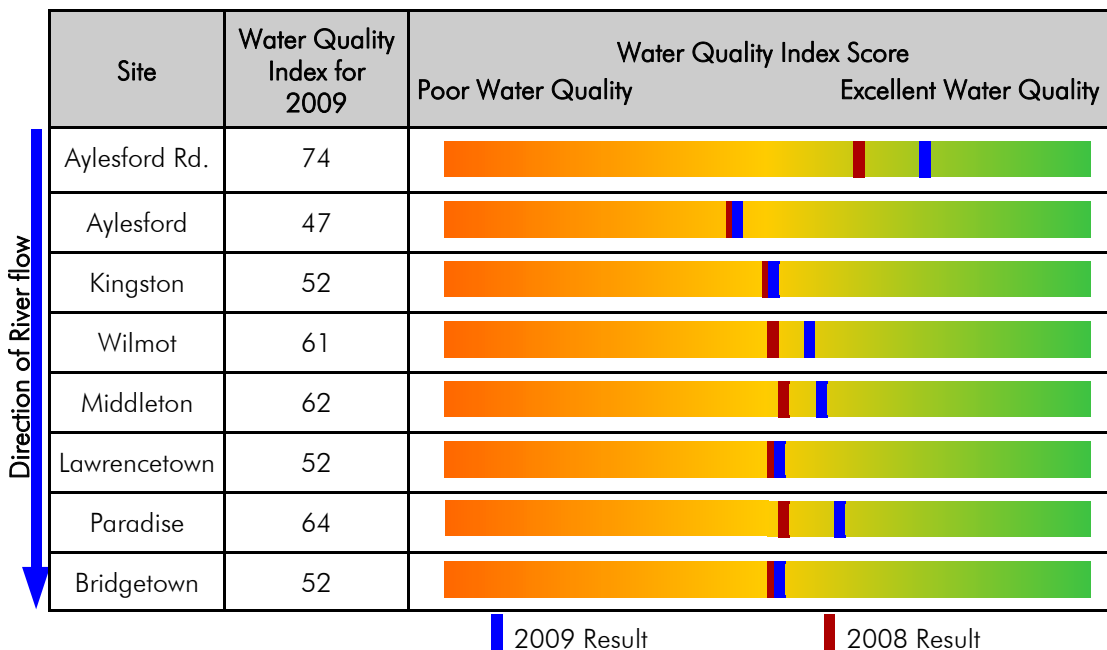


# The Health of the Annapolis River

Variable	Status (2009)	Comment	Trend (1992 to 2009)	
<i>E. coli</i> Bacteria	Poor	36% of the 111 samples fell outside the objective for water contact recreation (e.g. swimming). The summer of 2009 was unusually rainy, which is linked to elevated <i>E. coli</i> levels.	↓ at 2 locations ↑ at 1 location ↔ at 5 locations	
Dissolved Oxygen (DO) Saturation	Good	2 out of 109 samples (2%) in the upper river were below 60% saturation. DO levels lower than 60% saturation cause stress to aquatic life.	↓ at 2 locations ↑ at 1 location ↔ at 5 locations	
Water Temperature	Fair	23% of the samples collected during the summer months (July, August and September) had temperatures greater than 20 °C.	↓ at 2 locations ↔ at 6 locations	
pH	Good	3% of 110 pH samples were outside of the objective of 6.5 to 9.	↔ at all locations	
Nitrogen	Good	All 6 samples collected in 2009 were below the objective of 0.9 mg/L.	↔ at both Locations*	
Phosphorus	Poor	4 out of the 6 samples (67%) in 2009 were above the objective of 0.03 mg/L.	↔ at both Locations*	
Turbidity	Good	13% of samples taken in 2009 were above the 10 NTU objective.	Insufficient Information	
Trend Legend		↑ Improving	↓ Declining	↔ No trend detected

\*Nutrient trends only cover the period of 2006-2009.

Water quality objectives and analyses are described in the full River Guardians Report, which is available at [annapolis-river.ca/projects\\_guardians.php](http://annapolis-river.ca/projects_guardians.php).



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](http://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 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 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 phosphate-free and biodegradable products. Reduce or eliminate the cosmetic use of pesticides for lawns and gardens wherever possible.



**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 Andy Sharpe at CARP.

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### Beyond River Guardians

In addition to River Guardians, CARP participated in many other projects in 2009, including:

- Working with land owners to fence livestock out of water courses and to re-vegetate eroded stream banks with native vegetation.
- Performing a feasibility study for restoration of fish passage past Moose River's Clementsport Dam.
- Working with rural homeowners to ensure their septic systems are functioning and well-maintained.
- Promoting actions that can be used to conserve water and energy through projects such as EnerGuide for Houses and Stormwater Management.
- Working to manage invasive species, such as glossy buckthorn, in the watershed.

Thanks to the 2009 River Guardians volunteers:

Claire Diggins	Lisa Garand	Daren Parks
Chelsea Fougère	Matthew Guy	Tami & CJ Parks
Robert Garand	Ronald Jones	Lori Scott

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 Coastal Action Program  
Human Resources and Skills Development Canada  
Nova Scotia Environment