Ausable Bayfield

Watershed Report Card 2023

Watershed Report Card

This report is about the state of your forests, wetlands, and water resources.

AUSABLE BAYFIELD CONSERVATION

CREATING AWARENESS | TAKING ACTION

Member of Conservation ONTARIO

WHERE IS YOUR SUBWATERSHED?

Our area is divided into 16 local subwatersheds that drain into a river or directly into Lake Huron. In which subwatershed do you live?

Please refer to this map as you review the report card for your subwatershed and consider your connection to your creek, your river, and your lake.

Ausable Bayfield 2023

Watershed Report Card

AUSABLE BAYFIELD CONSERVATION

CREATING AWARENESS | TAKING ACTION

Conservation ONTARIO

Natural Champions

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Available in alternate formats upon request.

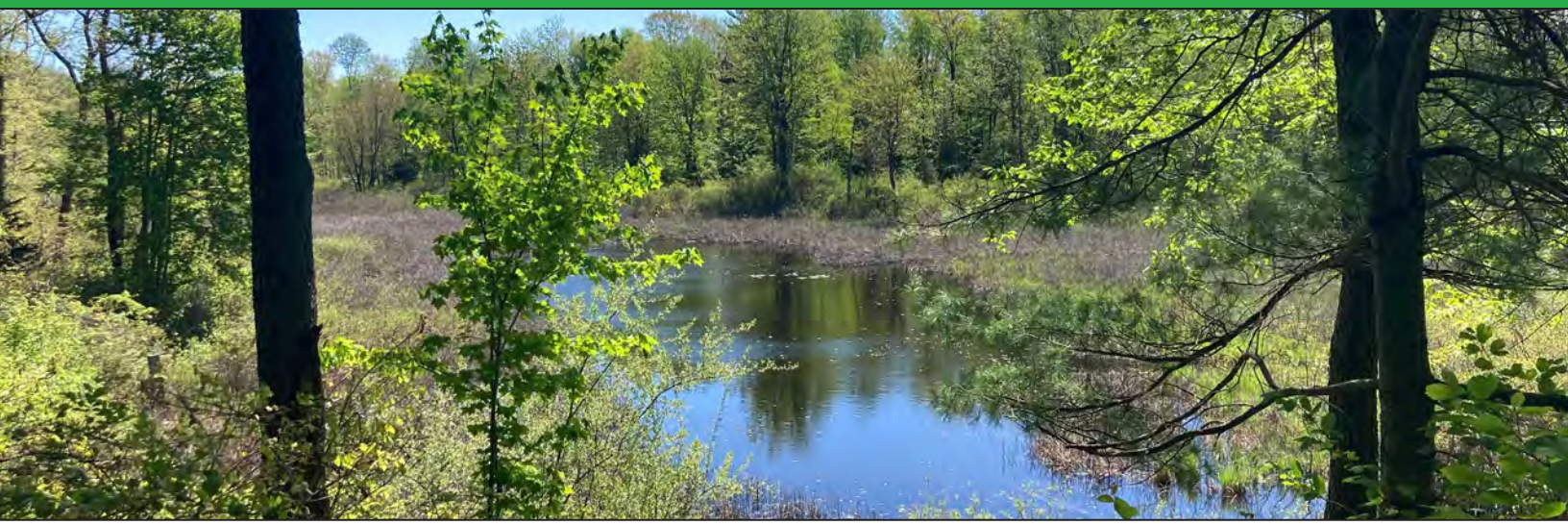
The Ausable Bayfield Conservation Authority (ABCA) acknowledges the original stewards of this land, the Haudenosaunee and Anishinaabe. We recognize the Huron Tract Treaty signed in 1827. We recognize that this territory was subject to the Dish with One Spoon wampum, under which multiple nations agreed to care for the land and resources including plants and animals, in peace. As shared stewards of this land and water, the ABCA is grateful to have the opportunity to work in this territory.

Staff of the ABCA took many of the photos except where credited otherwise.

The Forest Conditions aerial photo on Page 8 is by A. Moore.

The pitcher and water glass photo on Page 25 is by Daniel Holm, The Word & Image Studio.

The colourful cover crop photo on Page 30 is taken at GerardCornelisFarms Inc.



EXECUTIVE SUMMARY

Welcome to the Watershed Report Card 2023. We hope this report provides meaningful information for landowners and community groups to help protect and enhance the watersheds of the Ausable Bayfield Conservation Authority (ABCA) area.

Report cards are based on forest conditions, and surface water and groundwater quality, in 16 subwatersheds in the ABCA area. These subwatersheds include three Bayfield River subwatersheds, eight Ausable River subwatersheds, two Parkhill Creek subwatersheds, the Mud Creek subwatershed, and two smaller Lake Huron subwatersheds.

Compared with the previous Watershed Report Cards (2007, 2013, 2018), grades have remained steady for all indicators, and have ranged from A to D.

Water quality has remained steady for most subwatersheds. Grades ranged from A to D, with most of these subwatersheds receiving C grades.

Most subwatersheds received a D grade for forest conditions, indicating 'poor' conditions across much of the ABCA area.

Groundwater quality is generally very good throughout our area but some monitoring wells failed to meet the drinking water standard for nitrate and the guideline for chloride. Therefore, they received a 'less than A grade.'

When it comes to environmental improvement, thinking about your backyard creek, and its contributing watershed, is an important first step. Taking conservation action, as an individual and as a community, helps us to protect our biodiversity and respond to a changing climate.

These report cards help us to understand our local area better and to guide us in the following ways:

- **Save** natural areas that need protection,
- **Seed** areas with native plants, and
- **Steward** our working landscape.

Each subwatershed report card suggests conservation actions. When these actions are implemented together, they will have positive effects for our communities.

ACKNOWLEDGEMENTS

Principal Report Contributors: Ian Jean and Tim Cumming

Many individual and community actions noted in the Ausable Bayfield Watershed Report Card 2023 are facilitated by funding from our local member municipalities and the Ontario Ministries of the Environment, Conservation and Parks; Agriculture, Food and Rural Affairs; and Natural Resources and Forestry; and the federal departments of Fisheries and Oceans Canada; and Environment and Climate Change Canada.

Ausable Bayfield Conservation Authority (ABCA) would like to acknowledge the support of our partners in the provision of data used in grading the indicators presented in this Watershed Report Card:

Ausable Bayfield Maitland Valley Source Protection Region – GIS mapping

Environmental Systems Research Institute (ESRI) – Geographic Information Systems (GIS) mapping data

Land Information Ontario (LIO) – GIS mapping data

Ontario Ministry of Agriculture, Food and Rural Affairs – Land use and soil information

Ontario Ministry of the Environment, Conservation and Parks – Laboratory water quality analysis and GIS mapping data

Ontario Ministry of Natural Resources and Forestry – Species at risk and aerial photography Water Resources Information Program (WRIP) – GIS mapping

We would like to thank Renee Sandelowsky and Kate Monk for their insightful and thorough review of this Watershed Report Card.

Funding for the report cards, from our member municipalities, is gratefully acknowledged.

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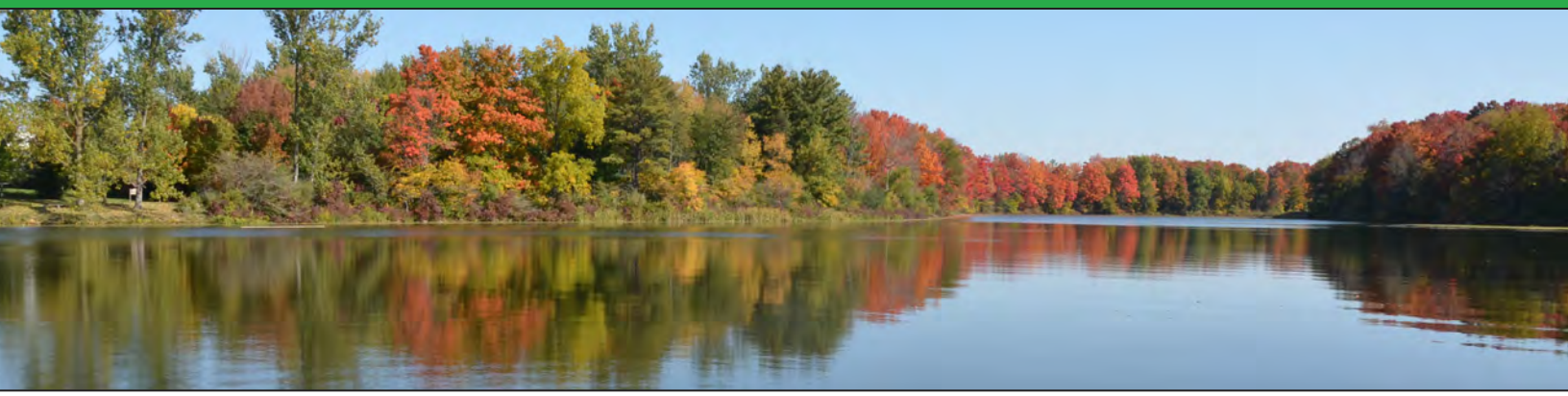

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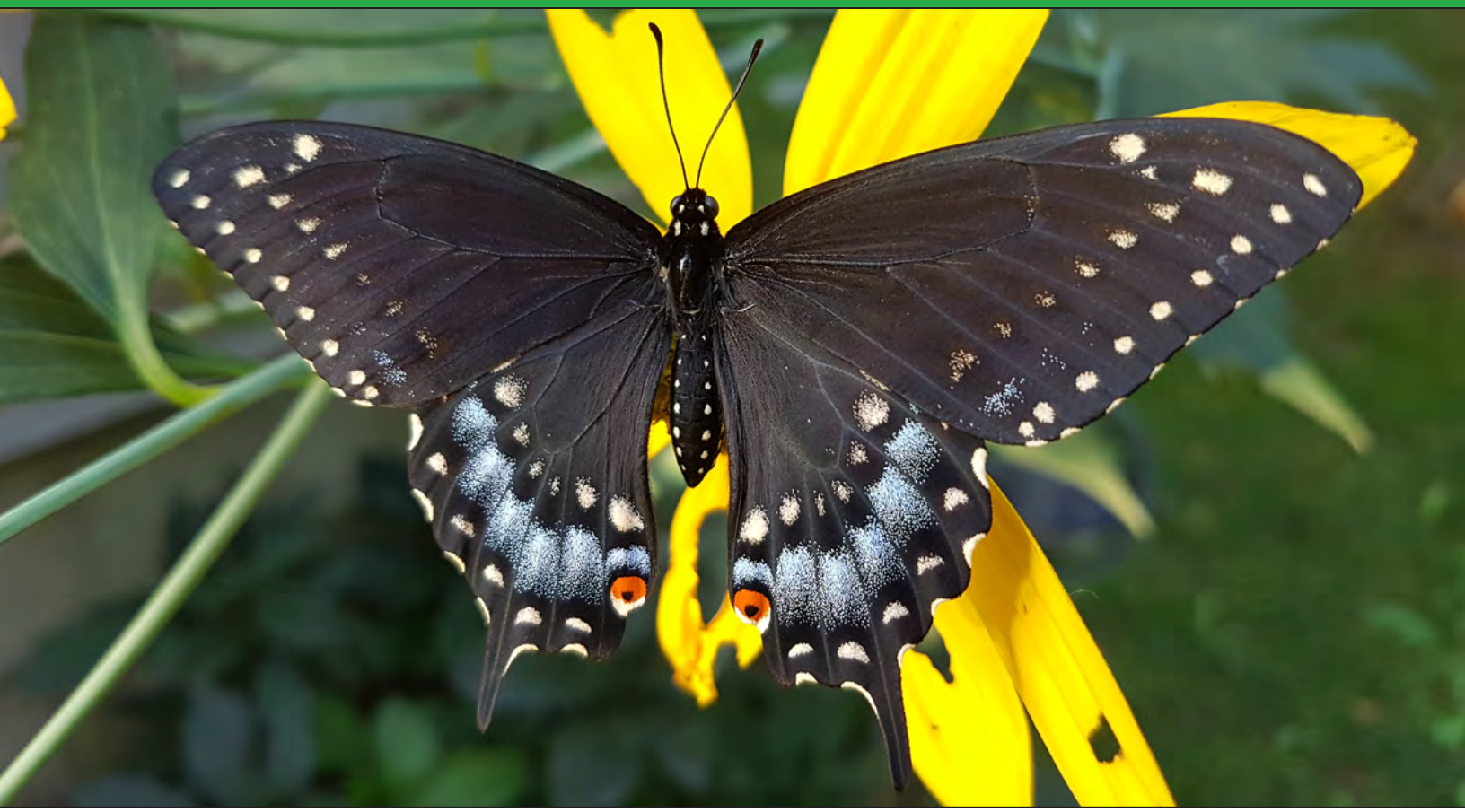

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INTRODUCTION

The watersheds of the Ausable Bayfield Conservation Authority (ABCA) area are situated along Lake Huron's southeast shore. These watersheds comprise one of the most agriculturally productive regions in Canada. Urban development has also been rising, leading to increased pressure on water and forests. The Ausable River supports one of the most diverse communities of aquatic species in Canada. Some of these species are now at risk (Appendix B) and need protection.

Many residents ask us what they can do to improve their environment. A place to start to improve the environment is your backyard creek and watershed.

A watershed is an area of land that drains (or sheds) rainfall or snowmelt to a common water body, such as a stream or lake. Watersheds are natural systems that reflect the cumulative effects of individual human decisions. When we restore wetlands, we hold water on the landscape and reduce downstream flooding and erosion. If we add year-round vegetative cover, we reduce soil loss to our watercourses.

Watershed management helps to balance human uses with the needs of the natural world. This report card provides an opportunity for watershed residents to learn about local creeks, streams, and forests, and understand their link to the broader natural world.

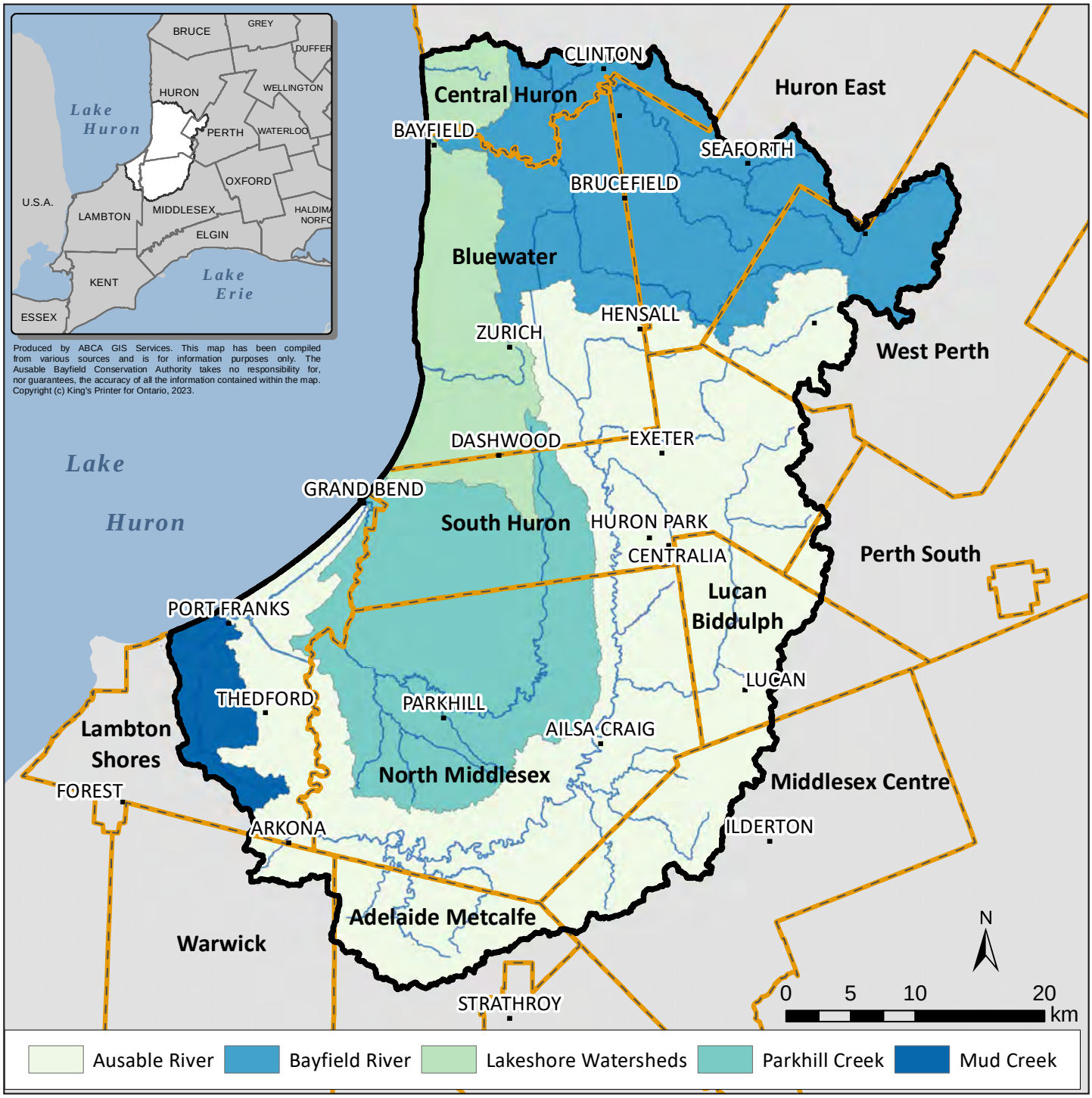
Here we provide a summary of data from existing monitoring programs, list activities to improve watershed conditions, and include baseline information for comparison with future conditions. Reporting follows a five-year cycle. This frequency provides sufficient data for statistical analyses, but it also helps minimize seasonal variations.

This is the fourth Watershed Report Card for the ABCA area. We have been analyzing data over the previous five years and compare it to five-year periods in earlier report cards (Veliz *et al*. 2006, Brock and Veliz 2013, Coleman *et al*. 2018). In five years, we will re-assess watersheds to determine if conditions are changing.

Think Like a Watershed

We all live in a watershed.

Water flows downhill, so watershed boundaries are based on topography (*e.g.*, ridges or hills). Water in a watershed is connected; therefore neighbouring municipalities share local environmental conditions. In the ABCA area, five major watersheds overlap multiple municipalities (Map 1).



Map 1: Major watersheds and municipalities in the Ausable Bayfield Conservation Authority area.

Objectives and Components

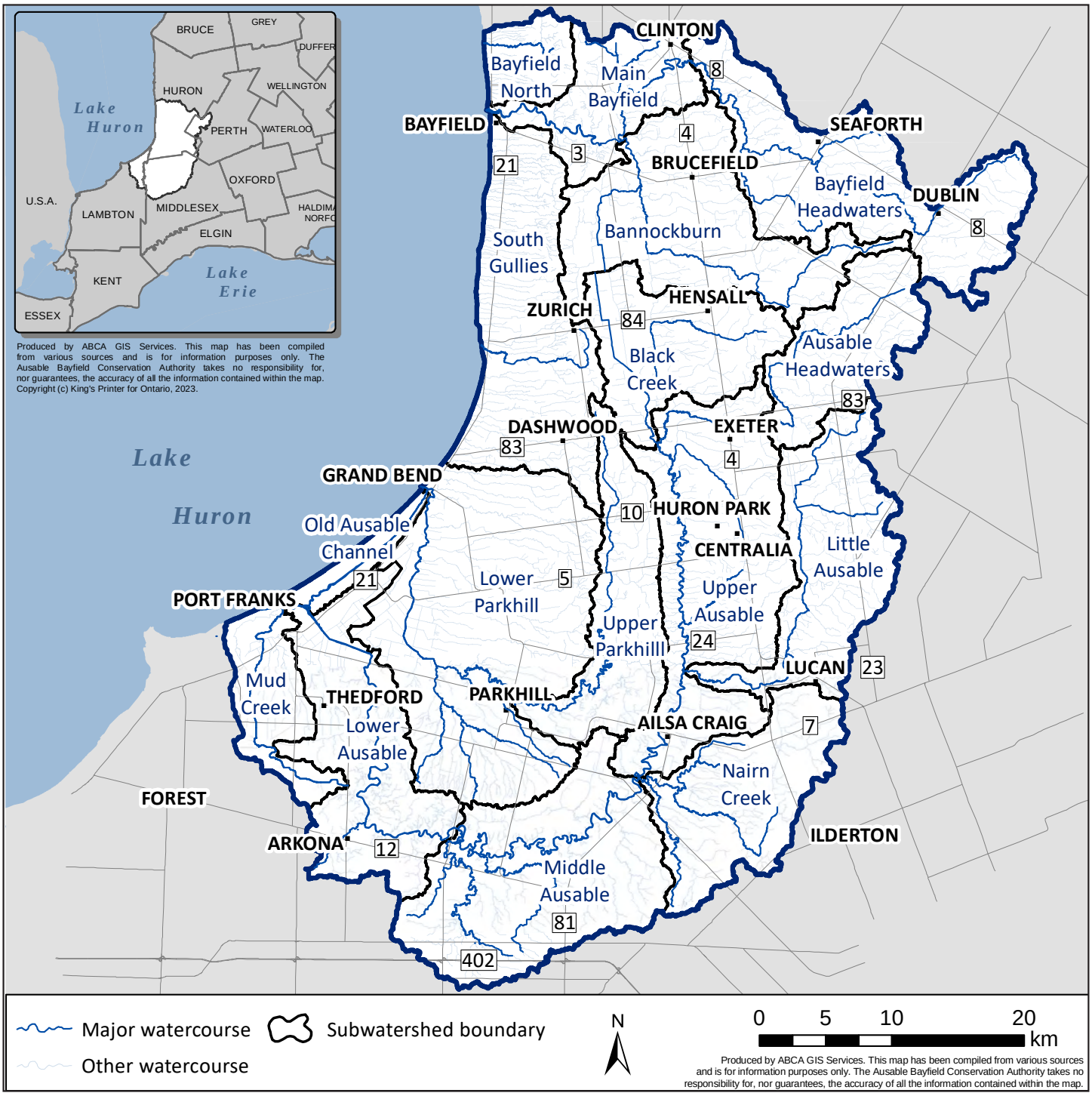
The ABCA area is divided into 16 subwatersheds, that drain into a major river or their tributaries, or directly into Lake Huron (Map 2).

Objectives of this report are to:

1. To use environmental health indicators for forest, wetland, and water, and;
2. To describe opportunities to improve conditions.

Components of this report are:

1. A description of ecosystem indicators with comparisons to previous years; and
2. Subwatershed report cards.



Map 2: Sixteen subwatersheds of the Ausable Bayfield Conservation Authority area.

Forest conditions and water quality impact aquatic life, which Ausable Bayfield Conservation Authority staff monitor along with the indicators listed in Table 1.

WHAT WE MEASURED

Conservation Ontario has provided a standardized set of indicators and evaluation system for reporting on watershed health conditions. These guidelines ensure consistency and use of information across all conservation authorities.

Five categories contribute to our understanding of general watershed health: forest conditions, wetland cover, overwinter vegetative cover on agricultural lands, surface water quality, and groundwater quality. These categories are listed below with their indicators.

Table 1: Watershed evaluation categories with associated indicators of environmental quality.

Category	Indicators
Forest Conditions	• Percentage of forest cover • Percentage of interior forest • Percentage of forested streamside area
Wetland Cover	• Percentage of watershed that is wetland
Overwinter Vegetative Cover	• Percentage of agricultural land covered by wheat, hay, or forages (plants eaten by grazing livestock) during the winter season
Surface Water Quality	• Total phosphorus concentration • E. coli concentration • Benthic* macroinvertebrates • Chloride concentration
Groundwater Quality	• Chloride concentration • Nitrate concentration

* Benthic is the bed (or bottom) of a water body.

Ausable Bayfield Conservation Authority staff monitor water quality at various sites, including wetlands which help to manage stormwater and reduce flooding and erosion.

MONITORING MATTERS

Monitoring is important because it provides baseline data for current conditions that allows us to detect changes in environmental conditions. Such changes may be gradual, taking place over many years from many sources, or sudden, such as a spill or contamination.

Monitoring indicator species, such as benthic invertebrates and mussels, can tell a longer-term story of ecosystem health, compared with water sampling that provides a snapshot in time.

Monitoring can also identify new threats such as invasive species, or concerns such as poor drinking water or lake swimming conditions. Without monitoring, these threats could go undetected and have implications for human and ecosystem health.

Monitoring helps to evaluate progress towards our goals. This helps us to determine the effectiveness of our actions, and how best to proceed in the future. The Watershed Report Card, which is produced every five years, provides an opportunity for this type of evaluation.

With every new Watershed Report Card, we can measure our efforts, and determine the best ways to continue to protect and enhance the watershed. We can then take the needed positive actions in partnership with the community.

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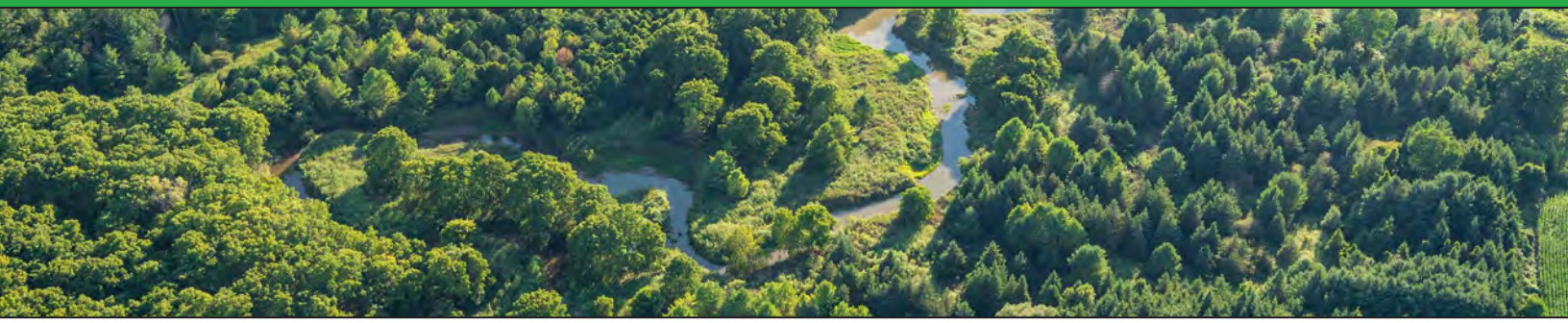
FOREST CONDITIONS



Forests and trees help maintain water quality and store carbon. They provide habitat as well as economic and recreational opportunities. In urban areas, they provide shade and a cooling effect, and act as a tool to manage stormwater. Forests absorb and re-direct water in ways that can mitigate and prevent downstream flooding. Forests need to be valued as important natural infrastructure.

Methods

Forest data was extracted from the Ausable Bayfield Conservation Authority (ABCA) natural heritage layer using Geographic Information Systems (GIS) digital mapping. Wooded areas included included deciduous and coniferous forests, treed swamps, and both young and mature plantations. Any heritage feature that was less than 0.5 hectares (1.2 acres), including street trees, small windbreaks or woodland patches, was not likely detected during this mapping exercise. It is important to note we have measured forest cover in the watershed but we have not extensively studied other forest conditions such forest health.

To determine a grade for overall forest conditions in each subwatershed, three indicators were given point scores, then averaged to determine a final grade for overall forest conditions in each subwatershed (Table 2):

- Forest cover was calculated as the percentage of forested area within a subwatershed.
- Forest interior was the percentage of forest cover after subtracting a 100-metre zone around the perimeter of each woodland.
- Streamside forest cover was the amount of forest cover within a 30-metre zone on both sides of an open watercourse.

Table 2: Forest condition indicator scoring and grading (adapted from Conservation Ontario).

Forest Cover (%)	Forest Interior (%)	Streamside Cover (%)	Point Score	Grade	Average Point Score	Final Grade
>35.0	>11.5	>57.5	5	A	>4.4	A
25.1-35.0	8.6-11.5	42.6-57.5	4	B	3.5-4.4	B
15.1-25.0	5.6-8.5	27.6-42.5	3	C	2.5-3.4	C
5.0-15.0	2.5-5.5	12.5-27.5	2	D	1.5-2.4	D
<5.0	<2.5	<12.5	1	F	<1.5	F

Results

Ten of 16 watersheds received D grades for overall forest conditions (Table 3, Map 3). Most watersheds received D grades for forest cover, F grades for forest interior, and D grades for streamside cover. Results were based on 2015 aerial photography.

Our current forest cover of about 14% is 4% higher than the 10% levels found in the 1949 Ausable Valley Conservation Report. That 4% increase is a result of reforestation efforts from the 1950s forward.

The many F grades for forest interior reflect the fragmented nature and small size of most woodlots in southwestern Ontario (Table 3, Map 3).

The Old Ausable Channel and Bayfield North subwatersheds scored highest for overall conditions, receiving A and B grades, respectively. These high grades result from Pinery Provincial Park in the Old Ausable Channel and large swaths of upland forest in Bayfield North.

Improving Forest Conditions

An average of 36,000 trees are planted annually across the ABCA area, totaling more than 185,000 trees over the past five years.

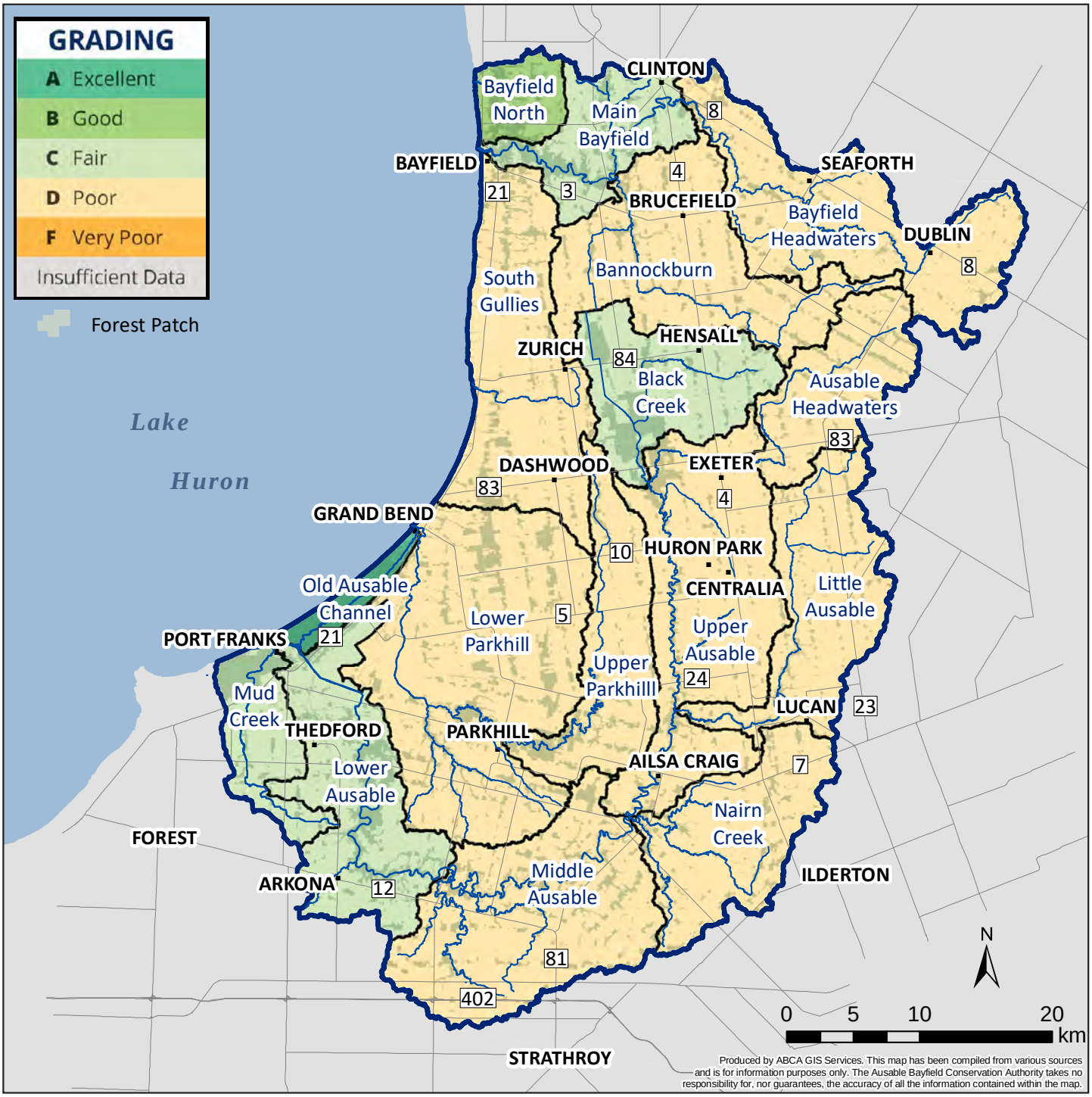
Tree planting at current levels helps to maintain existing forest cover and conditions, and offset forest losses which occur through land clearing and development.

Table 3: Percentage of forest cover, forest interior, and streamside cover, their grades, and overall forest conditions grade for each subwatershed.

Subwatershed	Forest Cover		Forest Interior		Streamside Cover		Overall Grade
	Percentage	Grade	Percentage	Grade	Percentage	Grade	
Ausable Headwaters	10.4	D	1.2	F	19.5	D	D
Bannockburn	10.8	D	1.4	F	26.3	D	D
Bayfield Headwaters	7.6	D	0.7	F	17.2	D	D
Bayfield North	30.5	B	9.0	B	63.9	A	B
Black Creek	20.6	C	9.6	B	31.7	C	C
Little Ausable	6.5	D	0.3	F	18.4	D	D
Lower Ausable	20.5	C	4.0	D	46.9	B	C
Lower Parkhill	14.7	D	3.6	D	26.0	D	D
Main Bayfield	22.9	C	4.7	D	54.8	B	C
Middle Ausable	13.6	D	1.9	F	42.7	B	D
Mud Creek	24.3	C	10.7	B	33.8	C	C
Nairn Creek	9.7	D	0.9	F	28.8	C	D
Old Ausable Channel	82.1	A	43.8	A	76.9	A	A
South Gullies	11.7	D	2.1	F	24.2	D	D
Upper Ausable	10.7	D	2.2	F	31.0	C	D
Upper Parkhill	14.1	D	2.3	F	40.3	C	D
Entire ABCA Area	14.2		3.3		32.6		

The most recent tree planting in the ABCA area has focused on windbreaks, buffer strips, and forest connectivity. These types of projects build ecosystem resiliency and protect water quality. These focused plantings may not result in large grade changes in the report card but they do help to maintain and improve watershed health.

This report focuses on forest quantity, which may overlook important declines in quality. A changing climate presents new challenges such as extreme weather, disease and pests. Planting a diversity of species, monitoring and reporting disease and pests, and removing invasive species can help improve forest health.



Map 3: Grade distribution of forest conditions in the Ausable Bayfield Conservation Authority area.

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WETLAND COVER

Wetlands temporarily store water from rain and runoff and help to mitigate the risk of flooding during wet periods and slowly sustain flow during drier periods. Wetlands also filter water, sequester carbon, provide habitat for wildlife including many species at risk, and provide us with recreational opportunities such as canoeing, hunting, fishing, and birdwatching.

Prior to European settlement, wetland coverage for Southern Ontario was approximately 25% (Ducks Unlimited Canada 2010). Environment Canada (2013) suggests a major watershed have at least 10% wetland cover and each subwatershed within have at least 6% wetland cover.

Methods

Wetland cover data was extracted from the Ausable Bayfield Conservation Authority (ABCA) natural heritage layer using Geographic Information Systems (GIS) digital mapping. For the purposes of this report, wetlands were defined as land seasonally or permanently flooded by shallow water, as well as land where the water table is close to the surface.

Results

Wetland cover is low at 2% to 3% of most subwatersheds (Map 4), and just 2% of the entire ABCA area. This value is substantially lower than the 6.6% required for a B grade or 11.5% required for an A grade.

Wetland cover was lowest (below 1%) in the Ausable Headwaters and Little Ausable subwatersheds.

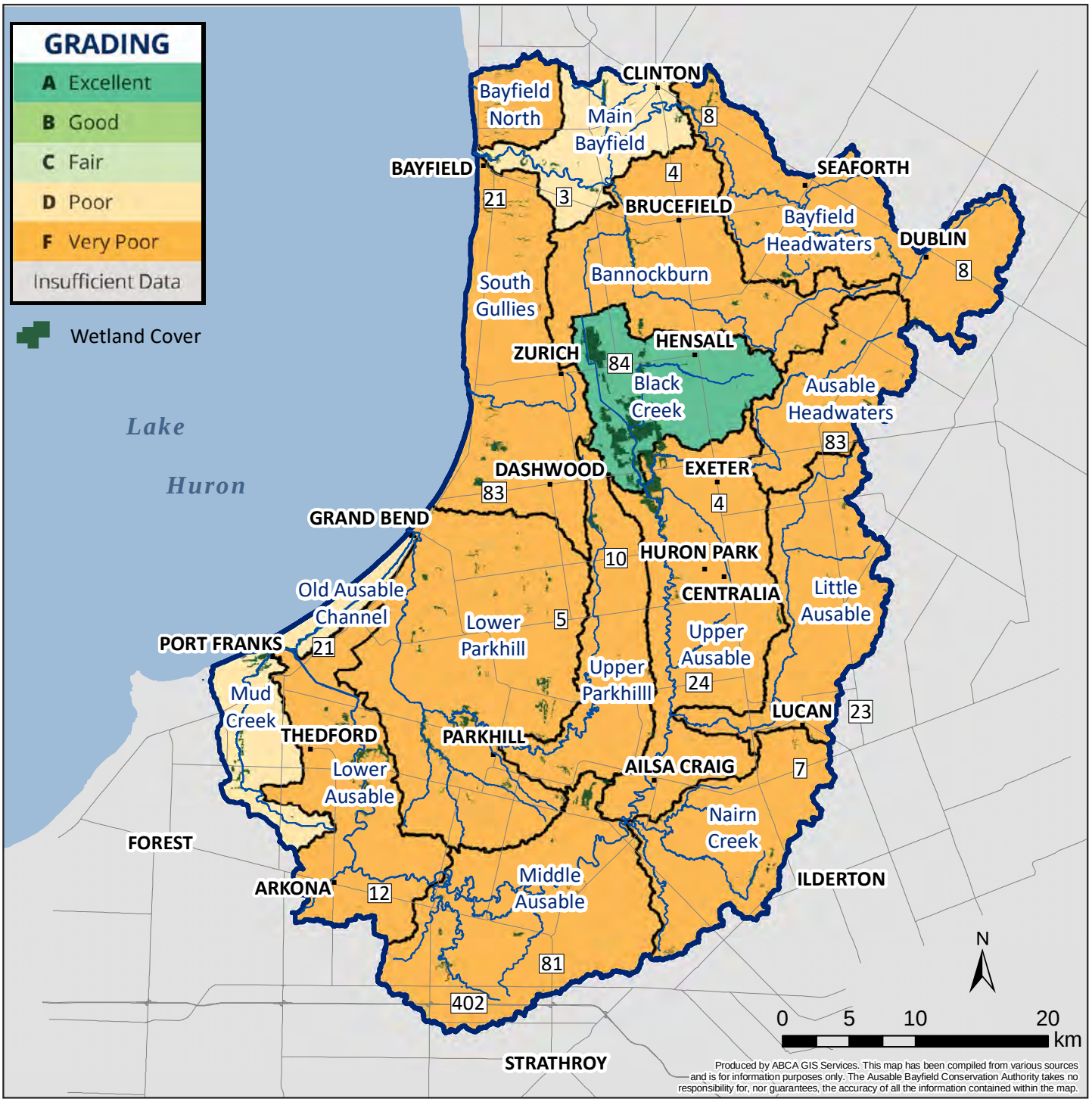
Wetland cover in most other subwatersheds ranged from 1% to 3%. The largest wetland in the ABCA area is the provincially significant Hay Swamp located in the Black Creek subwatershed. This subwatershed scored an A grade with wetland cover measuring 11.7%.

Relative to most subwatersheds, the Old Ausable Channel (OAC) also has a large percentage of wetland cover. However, it did not meet the definition used by the Ontario Wetland Evaluation system, resulting in a D grade.

Improving Wetland Cover

Wetlands are sensitive ecosystems, under pressure from development, pollution, and invasive species. Wetland cover is low in our area so existing wetlands need to be conserved and protected. Wetland restoration also benefits water quality and protects against flooding.

Most wetlands in our area are wet woodlands or swamps. Some people may see swamps as unproductive, but their ecological role must not be undervalued. Considering the critical role of wetlands for flood and erosion prevention, water quality and biodiversity, continued wetland loss is likely to have serious consequences.



Map 4: Grade distribution of wetland cover in the Ausable Bayfield Conservation Authority area.

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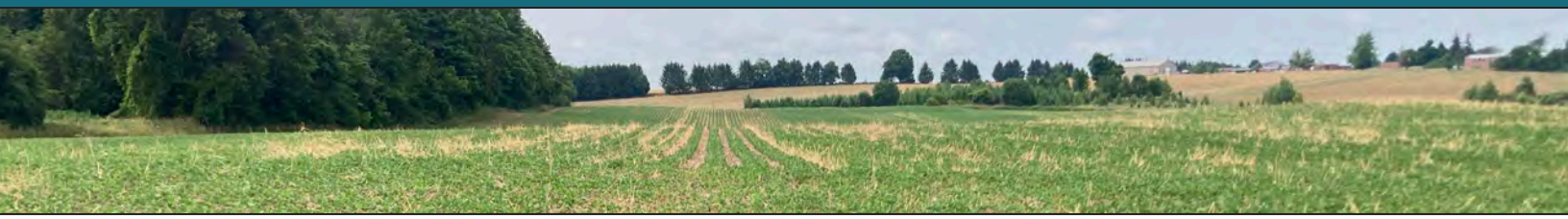
OVERWINTER VEGETATIVE COVER ON AGRICULTURAL LANDS



The health of soil and downstream water quality can be impacted by the amount and duration of vegetative plant cover on agricultural lands in the watershed during the year.

In our developed landscape, low-impact development (LID) can reduce the effects of urbanization. A rain garden is one example of an urban LID strategy. Best management practices such as cover crops and improved crop diversity, with hay and other forage (plant food for livestock), are important in rural areas.

Cover crops are grown to protect and enrich the soil. There are many ways they could be incorporated into cash crop rotations.

Methods

Agricultural land use is the total area of agricultural land within a watershed and is expressed as a percentage. Overwinter vegetative cover is the total area of agricultural land covered by wheat, forages, or hay during the winter season, and which is also expressed as a percentage. If fields were in a corn-soybean-wheat rotation, a minimum of 30% of overwinter vegetative cover might be expected. The percentage of overwinter vegetative cover on agricultural lands was not assigned a point score or final grade.

In the 2018 Watershed Report Card, overwinter cover was calculated with aerial imagery of the Ausable Bayfield Conservation Authority (ABCA) area from 2010 and 2015 and the Modified Soil Adjusted Vegetative Index (MSAVI) algorithm. Due to the early spring flight date for the aerial imagery, it is likely that the MSAVI algorithm underestimated hay, pasture, and winter wheat fields.

For the 2023 Watershed Report Card, overwinter cover is still expressed as a percentage of agricultural land; however, the method for calculating the overwinter vegetative cover in a subwatershed has changed. Instead of using aerial imagery, the annual crop inventory layer published by Agriculture and Agri-Food Canada (AAFC) was used. AAFC uses satellite imagery and remote sensing techniques to determine the type of crop grown in fields across Canada every year.

From the AAFC crop layer, the number of acres of winter wheat, hay, and pasture can be extracted, and a percentage calculated based on the number of farmable acres per subwatershed.

The AAFC crop inventory layer allows for percentages to be calculated every year, compared to only two years using the aerial imagery. Using this five-year range of data (2017-2021) to calculate overwinter cover provides a more consistent approach that follows the same five-year period as the other indicators in this Watershed Report Card.

An important consideration is that the AAFC annual crop inventory layer includes hay, pasture, and winter wheat, but may miss overwinter cover planted specifically as a cover crop. Therefore, this method does not incorporate cover crop acres into the total overwinter cover amount.

Results

In the ABCA area, overwinter cover ranged from 11% to 35% of agricultural land.

Higher hay, pasture and winter wheat percentages were seen in the Bayfield Headwaters, Main Bayfield, Bayfield North, Little Ausable, Upper Ausable and Nairn Creek subwatersheds over the five years.

Lower overwinter percentages were seen in the Bannockburn, South Gullies, Ausable Headwaters, Black Creek, Lower Ausable, Middle Ausable, Mud Creek, Upper Parkhill and Lower Parkhill subwatersheds.

If AAFC begins to produce an agricultural layer that reports directly on cover crops then this methodology can be refined. If you are interested in this analysis, please contact us and share your thoughts.

An overwintered, eight-species cover crop grown at the Huronview Demonstration Farm, near Clinton, helped to protect the gently sloping fields, adjacent to the Bayfield River, from erosion. It also contributed nutrients to the soil, which helped grow the soybeans that were planted into it in the spring.

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SURFACE WATER QUALITY

Rivers, creeks, surface drainage, wetlands, and lakes are common sources of surface water. Having clean and reliable surface water is important for health, recreation, agriculture, and as freshwater habitat.

Our surface water monitoring began in 1964. Current programs focus on monitoring, maintaining and improving water quality. For this report, surface water samples were collected at nine sites through the Provincial Water Quality Monitoring Network (PWQMN). The remaining seven watersheds were sampled as part of an enhanced monitoring program and monitoring in the Bayfield North subwatershed (Map 5, Appendix A).

In most subwatersheds, surface water sampling of total phosphorus, *Escherichia coli* (E. coli), and chloride occurred once per month from March to November, while benthic invertebrate sampling occurred once per year in autumn.

Map 5: Surface water quality monitoring sites in the Ausable Bayfield Conservation Authority area.

Total Phosphorus

Phosphorus is an important nutrient for aquatic plants. Fish and other organisms in the food web rely on those plants. When phosphorus becomes too plentiful, rapid growth of algae and aquatic plants may occur. This process, called eutrophication, may deplete oxygen and thereby damage ecosystems by killing fish and making drinking water unsafe to drink. To prevent eutrophication, the Provincial Water Quality Objective set by the Ontario Ministry of the Environment, Conservation and Parks (MECP) is a total phosphorus concentration of less than 0.03 milligrams (mg) per litre (L).

Sources of phosphorus may be natural or anthropogenic (resulting from human activity), and include soil and organic matter, wildlife waste, detergents, faulty septic systems, and runoff from agricultural fields or fertilized lawns.

Methods – Total Phosphorus

Water samples were analyzed for total phosphorus monthly from March to November at one site per subwatershed over a five-year period (2017-2021) (Appendix A).

The 75th percentile was converted to a point score and a grade for each subwatershed according to Conservation Ontario guidelines (2022) (Table 4). The 75th percentile phosphorus concentration was calculated for each site and represents the value below which 75% of the values occur. The 75th percentile was used instead of a median (*i.e.*, 50th percentile) to account for the tendency of samples to be collected during dry weather. (Samples taken during drier weather do not capture the elevated levels of total phosphorus during storms.)

In addition to this five-year summary, long-term trends were assessed for March 2000 to November 2021. Linear regression was used to evaluate the trends in monthly concentrations for normally distributed datasets, whereas a Mann-Kendall test was used for non-normally distributed datasets. Trends were found to be statistically significant when the magnitude of the change was large relative to the variation of the data around the trend line (*i.e.*, p-value < 0.05).

Table 4. Surface water quality indicator scoring and grading (adapted from Conservation Ontario).

Total Phosphorus (mg/L) – 75th Percentile	*Escherichia coli* (cfu*/100 mL) – Geometric Mean	Benthic Invertebrates (Modified Family Biotic Index†)	Point Score	Grade
<0.020	0-30	<4.25	5	A
0.020-0.030	31-100	4.26-5.00	4	B
0.031-0.060	101-300	5.01-5.75	3	C
0.061-0.180	301-1000	5.76-6.50	2	D
>0.180	>1000	6.51-10.00	1	F

* cfu – colony forming units
† based on New York State tolerance values

Results – Total Phosphorus

Two of the 16 subwatersheds (Old Ausable Channel and Bayfield North) met the Provincial Water Quality Objective of less than 0.03 mg/L (Figure 1). Grades ranged from A to D, with most subwatersheds receiving C or D grades.

An increase in water flow can result in higher levels of phosphorus delivery to watercourses. Without flow data, it is challenging to determine trends over time. Regardless of the constraints, we understand that it is important for the community to know if water quality is improving. Analysis of a long-term dataset of the entire Ausable Bayfield Conservation Authority (ABCA) area showed that there has not been significant change in total phosphorus concentrations over the past 18 years. On a more local scale, there has been significant long-term improvement of concentrations in the Upper Ausable subwatershed. The Ausable Headwaters, Nairn Creek, Lower Ausable, and Mud Creek subwatersheds have seen significant increasing trends in total phosphorus concentrations, indicating worsening conditions. All other subwatersheds have not experienced significant change in total phosphorus concentrations.

High sediment levels (bottle at left) can be associated with elevated phosphorus concentrations.

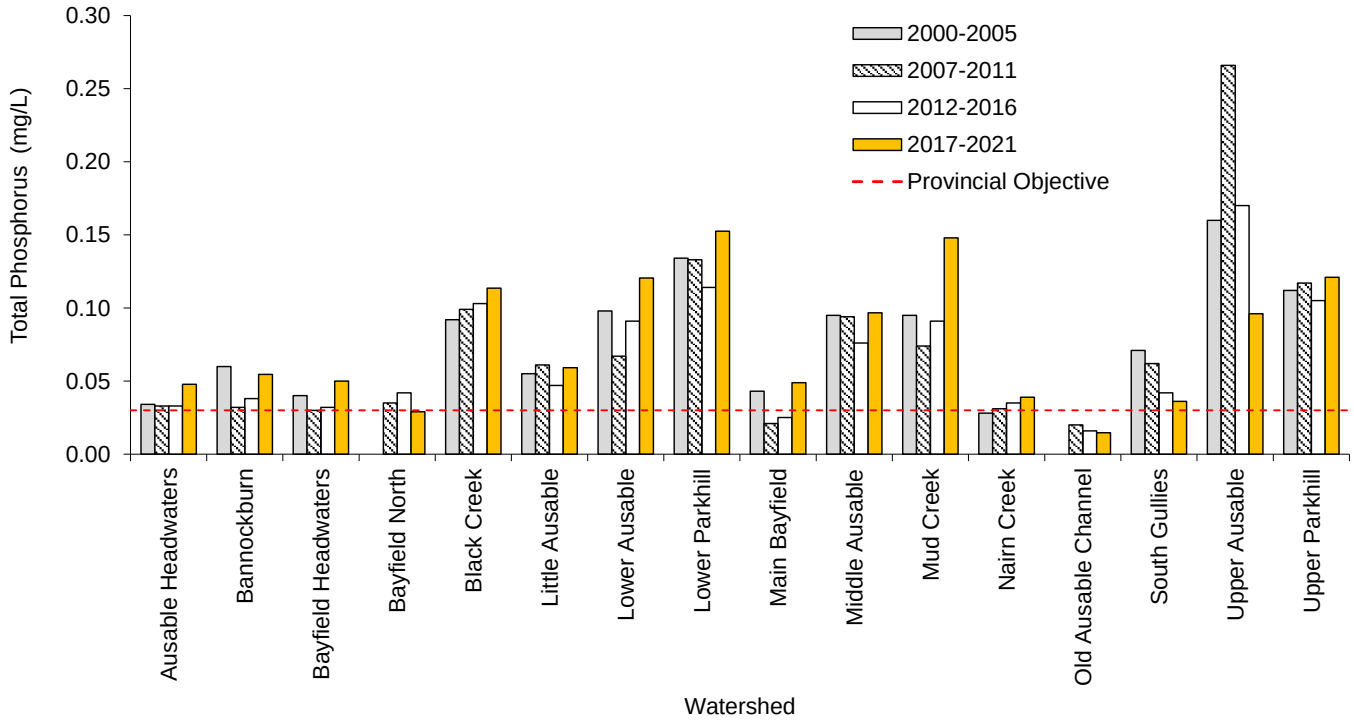


Figure 1: Total phosphorus concentrations in the Ausable Bayfield Conservation Authority area. The dotted red line represents the Provincial Water Quality Objective (0.03 mg/L).

Ausable Bayfield Conservation Authority staff monitor E. coli in streams and rivers, as well as Lake Huron, as upstream surface water is connected to the lake where we swim, fish and obtain drinking water for treatment.

Escherichia coli

Escherichia coli (E. coli) are fecal coliform bacteria commonly found in the intestines of animals and humans. The presence of E. coli in water indicates recent sewage or animal waste contamination, and that there is potential for other disease-causing organisms to exist.

Methods – *Escherichia coli*

Water samples were analyzed for E. coli monthly from March to November at one site per subwatershed over a five-year period (2017-2021) (Appendix A). The geometric mean was used, as opposed to average, to calculate E. coli concentrations for each site as it best represents the true conditions when a set of numbers covers a wide range. A geometric mean is calculated as the *n*th root of the product of *n* numbers. The geometric mean concentration of E. coli was then converted to a point score and grade for each subwatershed according to Conservation Ontario guidelines (2022) (Table 4).

In addition to this five-year summary, long-term trends were assessed for March 2000 to November 2021. Linear regression, which is used to determine the relationship between two variables, was used to evaluate the trends in monthly concentrations for normally distributed datasets. Trends were statistically statistically significant when the magnitude of the change was large relative to the variation of the data around the trend line (*i.e.*, p-value < 0.05).

Results – *Escherichia coli*

Eleven of 16 subwatersheds met the recreational guideline of a geometric mean concentration less than or equal to 200 cfu/100 mL (cfu stands for colony forming unit that estimates the number of microbial cells in a sample) (Figure 2). Grades ranged from A to D, with most subwatersheds receiving a C grade. Some high E. coli concentrations were detected, which may suggest a local point source, but grades suggest concentrations are 'fair' across much of the ABCA area.

Generally, E. coli concentrations appear to have improved over the past fifteen years. Further analysis shows that the Bayfield North and Black Creek subwatersheds had significant decreasing trends *(i.e.*, improvement) in annual geometric mean concentrations. This result is based on 19 years of data for the Black Creek subwatershed (2003–2021), and seven years of data for the Bayfield North subwatershed (2011–2012, 2017–2021). The Old Ausable Channel (OAC) and Mud Creek subwatersheds had increasing trends (*i.e.*, worsening conditions) over the same 19-year period. Although the OAC subwatershed has seen a significant increase, E. coli concentrations remain low and meet the requirements for an A grade. The OAC was the only subwatershed to receive an A grade.

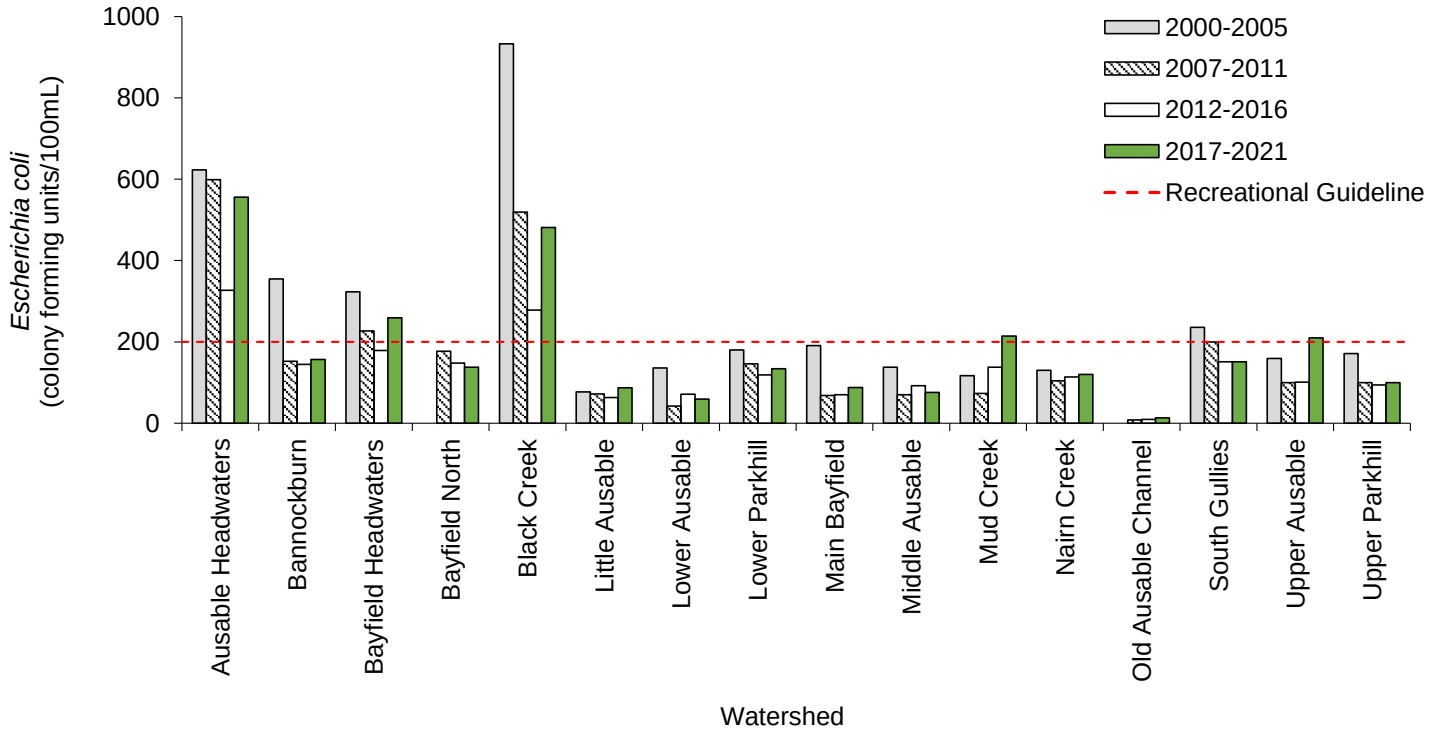


Figure 2: *Escherichia coli* (E. coli) concentrations in the Ausable Bayfield Conservation Authority area. The dotted red line represents the Recreational Water Quality Guideline (200 cfu/100 mL)

Ausable Bayfield Conservation Authority staff kick up sediment on the bottom of a river to collect benthic invertebrates in a net, which are then identified to determine water quality.

Benthic Macroinvertebrates

Benthic macroinvertebrates are commonly used as indicators of aquatic environmental quality. Invertebrates are animals without backbones, such as insects, crustaceans, mollusks, and worms. 'Benthic' refers to the bottom of lakes and rivers, where these invertebrates are found. 'Macro' refers to the subset of larger or visible invertebrates that can be seen without the use of a microscope.

Methods – Benthic Invertebrates

Each species that makes up a benthic community will have a different tolerance to the variety of stressors and pollutants that may be present in the local environment. Tolerance values between zero and 10 can be assigned to these animals, with zero meaning intolerant to pollution and 10 meaning tolerant. The presence of pollution-intolerant species generally indicates a healthy aquatic environment.

A stonefly is an example of a benthic macroinvertebrate that indicates good water quality.

Tolerance values were used to calculate the Hilsenhoff 1988 Family Biotic Index (FBI), as modified by New York State (Smith *et al*. 2009). The FBI index provided a score for each subwatershed (Table 4) that reflected the environmental quality.

Benthic monitoring sites are now sampled on an annual basis; however, some sites had been sampled on an alternating year schedule in the past. The Lower Parkhill subwatershed used a different sampling site (HPDESJ1) than previous years due to high water levels at the former monitoring site. In addition, there is no benthic invertebrate monitoring site for the Old Ausable Channel subwatershed as this habitat is more like a wetland, and the other sites are riverine.

Results – Benthic Invertebrates

The benthic invertebrate scores for most subwatersheds decreased slightly compared with the scores from the 2018 report card, which means a minor shift towards better conditions. The FBI values were generally between four and six, indicating that there were a variety of animals (both tolerant and intolerant to organic pollution) at each monitoring site. Grades ranged from B to F, with most subwatersheds receiving a C grade (Figure 3).

The Main Bayfield (4.80), Nairn Creek (4.92), and Upper Parkhill (4.94) subwatersheds received B grades. Of all the subwatersheds, Bayfield North saw the greatest change since the 2018 report card, dropping from a B grade to a D. The Mud Creek subwatershed had the highest FBI value (6.80) and an F grade, suggesting that this site was more degraded than other sites.

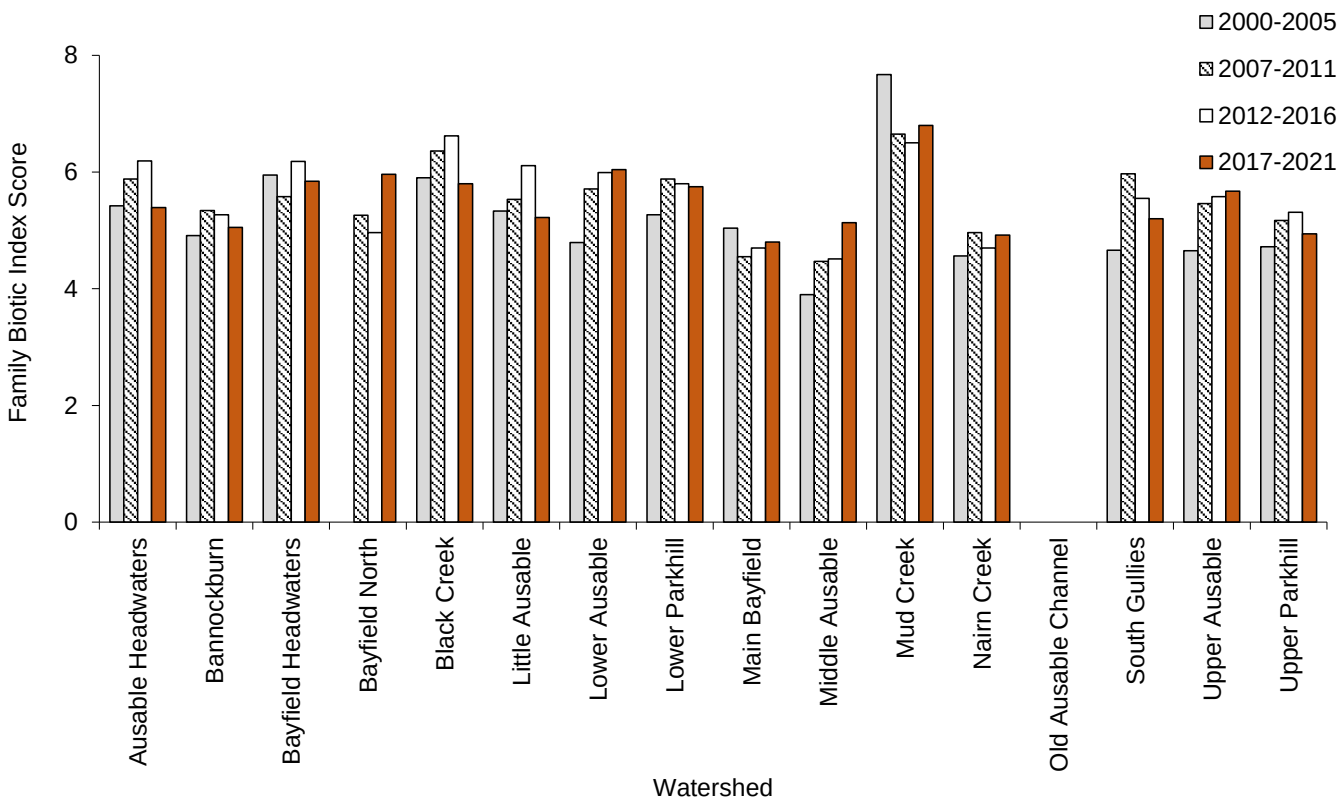


Figure 3: Benthic invertebrate Family Biotic Index (FBI) scores in the Ausable Bayfield Conservation Authority area. A score of 1 represents a healthy watershed and a score of 10 represents a degraded watershed.

Excess chloride can degrade habitat for the Redside Dace (above) and other fish species. Effective use of salt (Sodium chloride) is one tool to melt ice on roads, parking lots and sidewalks, but overuse can negatively impact both surface and groundwater quality.

Chloride

An average of five million tonnes of salts are used as de-icers on roadways in Canada every year (Environment and Climate Change Canada 2022). Salt escapes from salt storage facilities and snow disposal sites by way of roadways and enters the environment in runoff from roadways. This can have major impacts on freshwater ecosystems, soil, and human health.

We must use practices that keep the public safe during icy conditions while, at the same time, protecting aquatic systems and drinking water sources.

Methods – Chloride

The 75th percentile of chloride concentration is reported as milligrams per litre (mg/L) for each subwatershed over a five-year period (2017–2021; March–November). Chloride was measured only at Provincial Water Quality Monitoring Network (PWQMN) sites, meaning that chloride results are available for nine of the 16 subwatersheds. These results were compared to the chronic exposure guideline of 120 mg/L (Canadian Council of Ministers of the Environment 2011).

This is the first time that chloride has been included in a Watershed Report Card as an indicator of surface water quality. At this time, it is considered an optional indicator, and, therefore, was not given a grade or included in the calculations of overall surface water quality (Conservation Ontario 2022).

Results – Chloride

Surface water chloride concentrations ranged from 28.5 mg/L in the Lower Parkhill subwatershed to 60.7 mg/L in the Bayfield Headwaters subwatershed. All subwatersheds were well below the chronic exposure guideline of 120 mg/L, an unsurprising result given the relatively low road density and paved surfaces in this area compared with more urban centres. Although chloride concentrations were relatively low, chloride concentrations appear to be increasing in some subwatersheds, particularly Bayfield Headwaters and Black Creek (Figure 4).

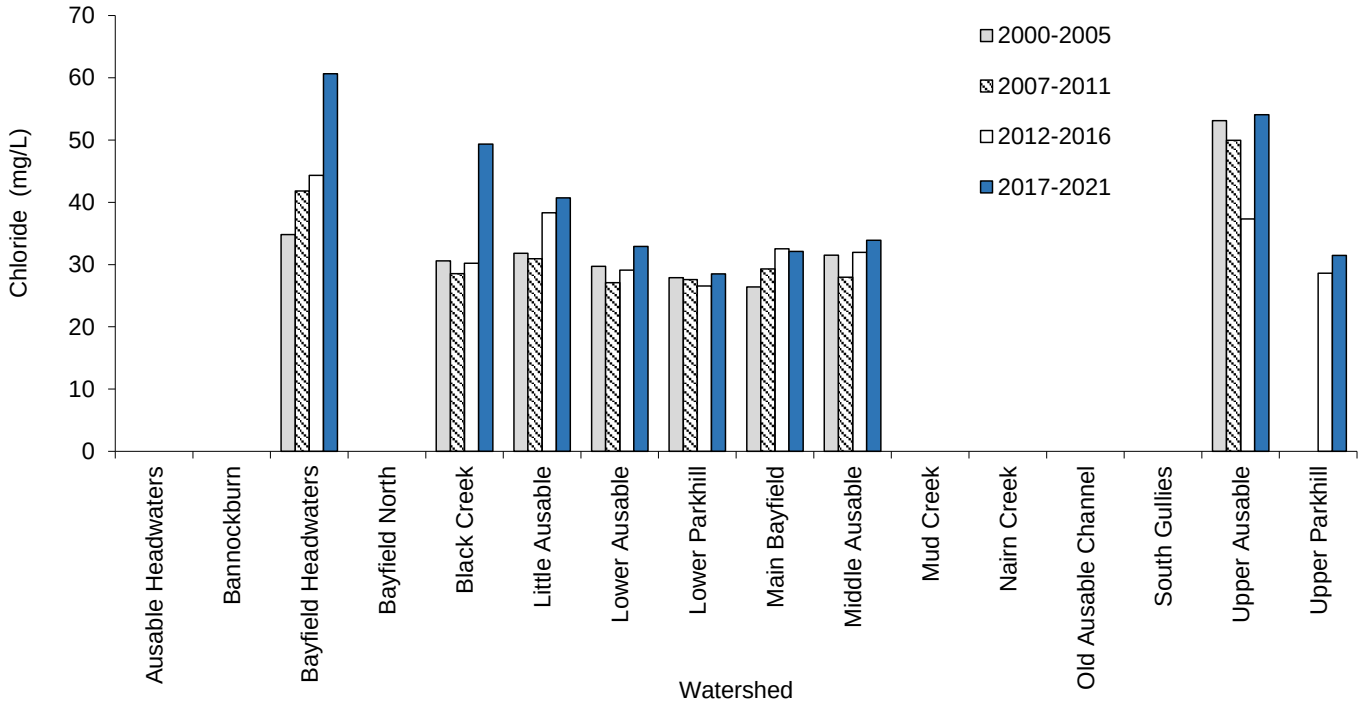


Figure 4: Surface water chloride concentrations (mg/L) in the Ausable Bayfield Conservation Authority area. Chloride is measured at Provincial Water Quality Monitoring Network sites.

Overall Surface Water Quality

The point scores for each water quality indicator (total phosphorus, E. coli, and benthic invertebrates) were averaged to determine an overall point score for a subwatershed. This point score was then given a final grade for each subwatershed according to Table 5. Based on these calculations, 12 out of 16 subwatersheds received C grades, indicating 'fair' surface water quality.

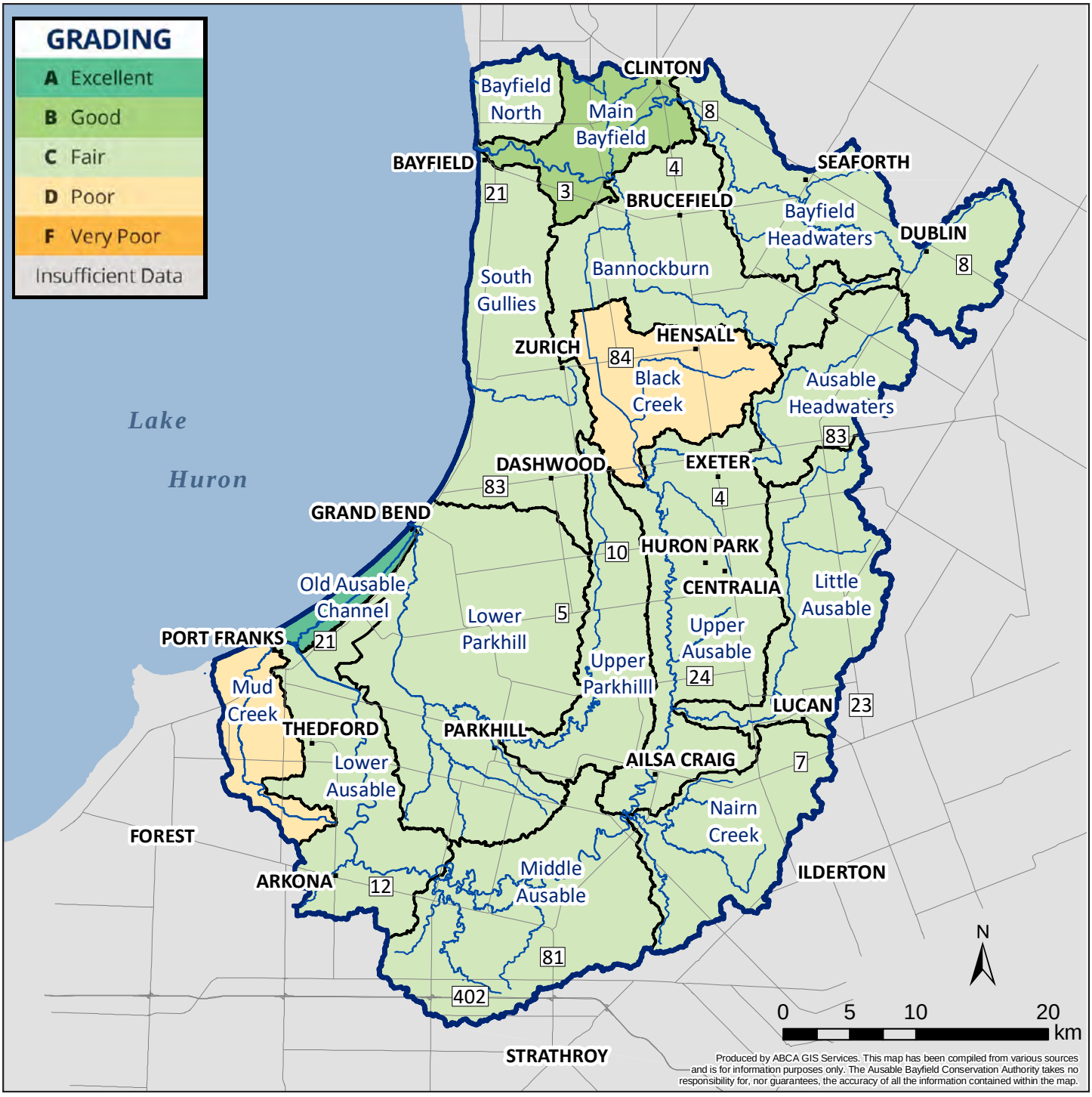
Only the Old Ausable Channel subwatershed received an A grade for overall surface water quality. Water quality was 'excellent' within the channel, most of which is within Pinery Provincial Park (Map 6).

Main Bayfield was the only subwatershed to receive a B grade which indicates 'good' water quality. Detailed studies in this subwatershed have been ongoing since 2013 as this area is a priority watershed for the *Healthy Lake Huron* partnership (**healthylakehuron.ca**).

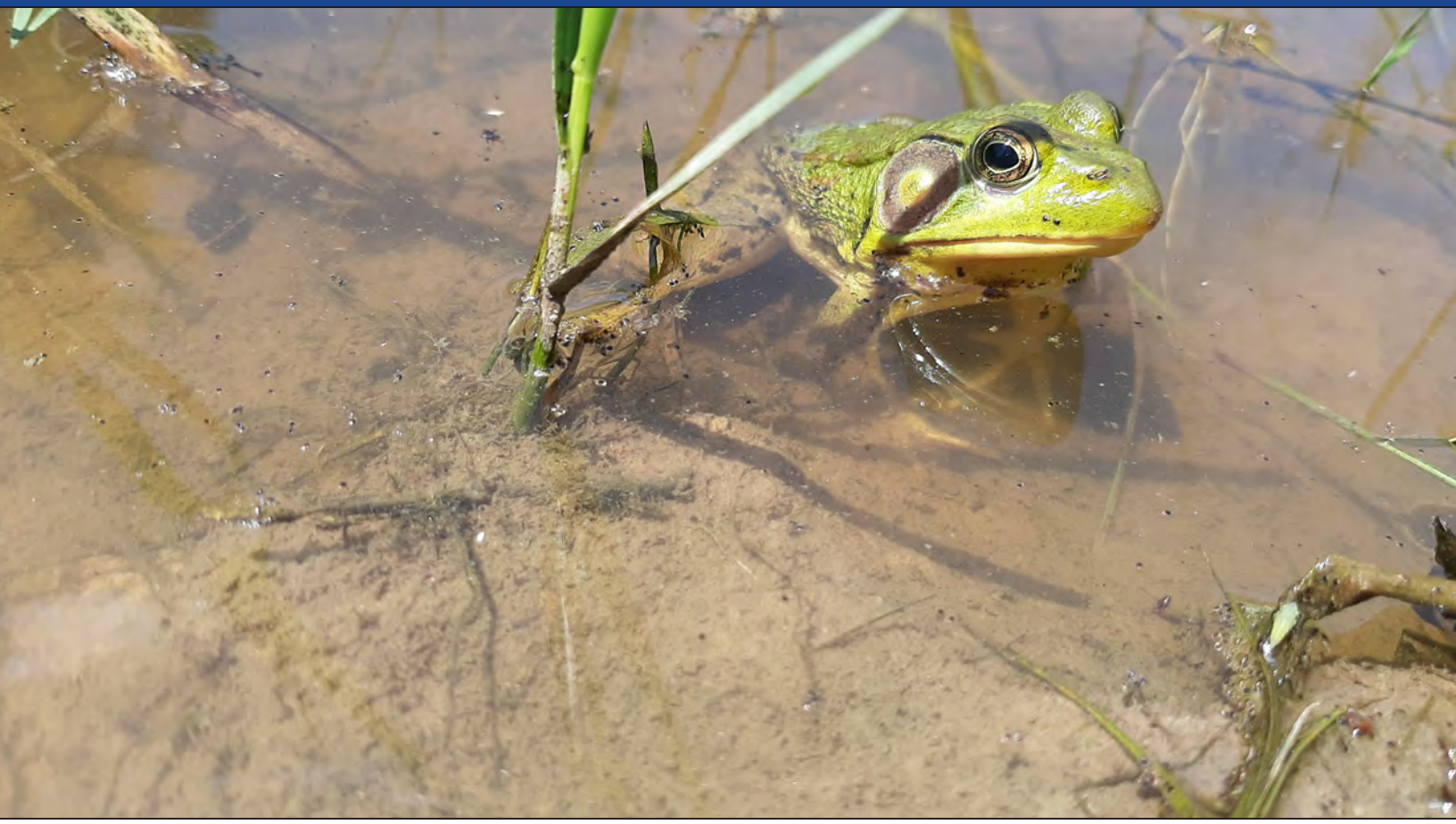
Table 5. Overall surface water quality scoring and grading (adapted from Conservation Ontario).

Average Point Score	Overall Surface Water Quality Grade
>4.4	A
3.5-4.4	B
2.5-3.4	C
1.5-2.4	D
<1.5	F

Grades were largely unchanged from the 2018 report card except for the Ausable Headwaters and Lower Parkhill subwatersheds, both of which have recently moved from a D to a C due to improved benthic scores, despite higher concentrations of both total phosphorus and E. coli.



Map 6: Distribution of surface water quality grades in the Ausable Bayfield Conservation Authority area.



Frogs can be especially sensitive to changes in water quality due to their thin, semi-permeable skin. Actions that support improved water quality benefit us all.

Improving Surface Water Quality

There are many ways to improve surface water quality in local creeks, rivers, and Lake Huron. More than 75% of the land in the ABCA area is used for agricultural production. Given this large proportion, stewardship-based actions that promote agricultural best management practices (BMPs) continue to be very important for surface water quality and the overall health of our area. There are many different practices that could be considered BMPs. Priority BMPs prevent water movement that may contribute to soil erosion. Reduced tillage, cover crop use, and increased vegetative cover are examples of these practices, and improve soil health.

Improved soil health helps to infiltrate water where it lands, therefore avoiding runoff. Water may also be held back by berms and rain gardens that allow sediment to settle before entering a waterway.

If sediment or other pollutants do enter a waterway, additional BMPs that can help trap and treat water include stormwater ponds, and two-stage channel design for drains and ditches.

The Huronview Demonstration Farm near Clinton, Ontario showcases many of these agricultural BMPs and is open to the public for self-guided tours and public events. Visit **abca.ca** to learn more about forestry and stewardship actions and how to get involved through local community projects.

Ausable Bayfield

GROUNDWATER QUALITY

Drinking water in our region includes groundwater from municipal and private wells. Treated surface water from Lake Huron is also a source of drinking water for many local hamlets, villages and towns.

Groundwater moves through soil and bedrock into aquifers, which are underground formations that carry water downward or horizontally. Since it is hard to see these structures underground, we can only infer the source of water for individual monitoring wells. The flow of water underground does not relate to watershed boundaries at the surface so grades were assigned to each monitoring well instead of each subwatershed.

The Provincial Groundwater Monitoring Network (PGMN) is a partnership program between the Ontario Ministry of the Environment, Conservation and Parks and conservation authorities. Groundwater level and water quality information for Ontario's key aquifers is collected through the PGMN. Many aquifers exist throughout our area and some being quite localized. It is important to monitor private drinking water wells regularly even if a nearby monitoring well meets drinking water standards. For this report, two indicators were used to assess groundwater quality: nitrate (in the forms of nitrate and nitrite) and chloride.

Concentrations of nitrate may reflect local geological conditions. In addition, runoff from fertilizer and manure applications and faulty septic systems can contribute to increased concentrations of nitrate.

The Ontario Drinking Water Quality Standard (ODWQS) for nitrate (nitrate and nitrite) is 10 mg/L. Concentrations above this standard can potentially cause a harmful condition in infants less than six months old (Ontario Ministry of Health and Long-Term Care 2018).

High chloride concentrations can occur naturally, which can be related to the type of rock in contact with the water. High chloride concentrations can also come from human sources, such as road salt. Sodium chloride (salt) in drinking water is generally not considered harmful for consumption but water may have a salty taste at concentrations above 200 mg/L (Health Canada 2008).

Methods

Sampling and water chemistry analysis occurred once per year at 14 PGMN monitoring wells (Map 7). Most but not all subwatersheds have at least one monitoring well within their boundaries.

Conservation Ontario (2022) recommends using the 75th percentile concentrations of nitrate and chloride over a minimum of a ten-year period. Given the sensitivity of the drinking water resource, ABCA used the maximum concentrations of nitrate or chloride instead of the 75th percentile. Two grading categories were used, with a monitoring well receiving either an 'A grade' or 'Less than A grade' (Table 6). We hope this reporting approach informs people of issues that may impact their own wells near a monitoring well.

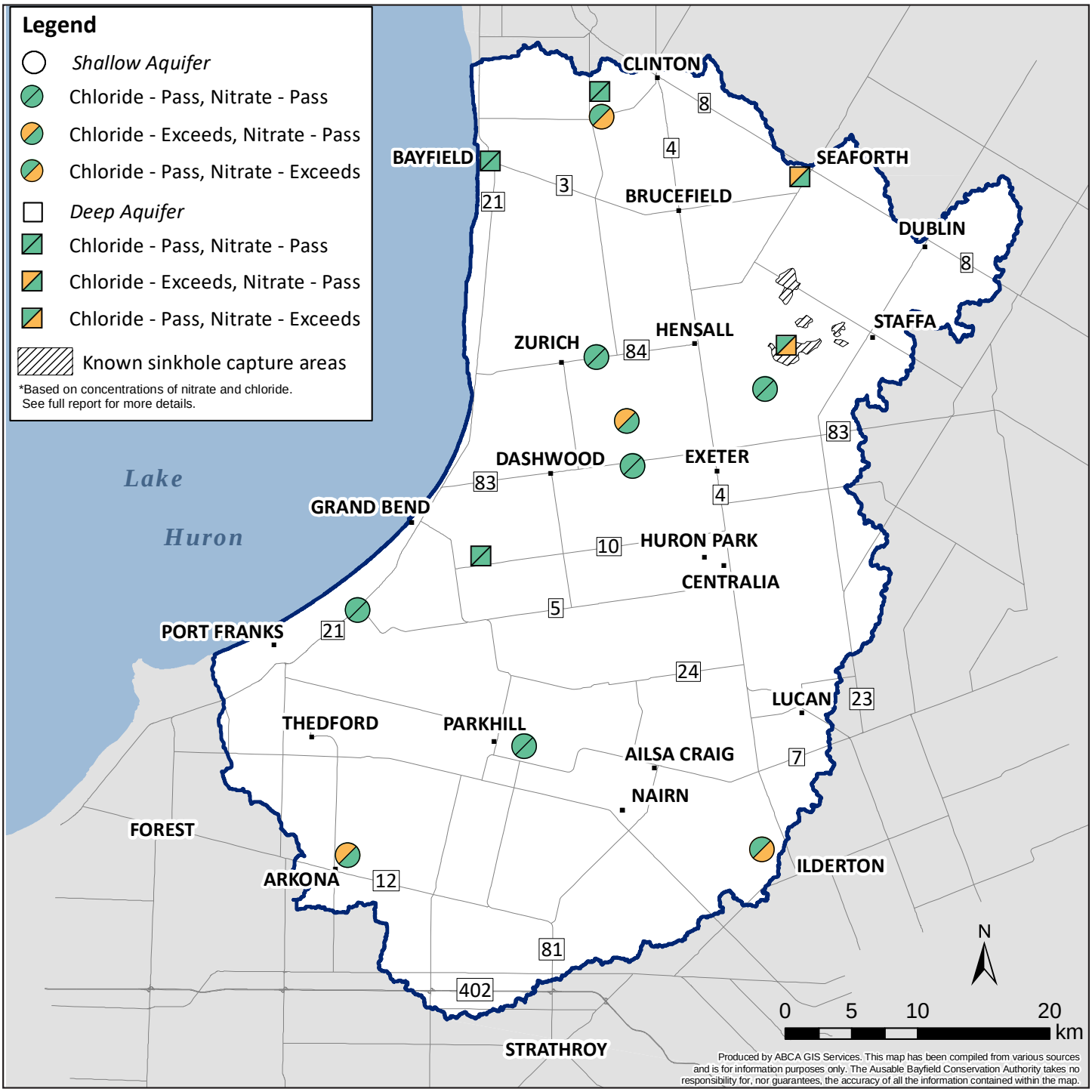
Results – Nitrate

Although three wells received a 'less than A grade' due to concentrations of nitrate, most of the provincial monitoring wells came close to the detection limit (0.05 mg/L) most of the time (Map 7). The concentrations of nitrate at the well near Staffa ranged from 6 to 9 mg/L over the period of record (2007-2021). It is likely that high concentrations of nitrate in this well are a result of surface water contamination through nearby sinkholes. The TR9 shallow well, near Clinton, exceeded the ODWQS for nitrate six times over the fifteen-year period, indicating potential surface water contamination (Table 7). Concentrations of nitrate at the Nairn well were not close to the ODWQS, but they were above the barely detectable concentrations of nitrate found at most monitoring wells.

Table 6. Groundwater quality indicator scoring and grading for monitoring wells (adapted from Conservation Ontario 2017).

Nitrate* (mg/L)	Chloride (mg/L)	Grade
0-2.5	0-62.5	A
2.6-5.0	62.6-125.0	Less than A
5.7-7.5	125.1-187.5	Less than A
7.6-10.0	187.6-250.0	Less than A
>10.0	>250.0	Less than A

*Nitrate = Concentrations of nitrogen that are in the form of nitrate and nitrite.



Map 7: Groundwater quality conditions at the 14 provincial monitoring wells in the Ausable Bayfield Conservation Authority area.

Table 7. Groundwater monitoring wells in the Ausable Bayfield Conservation Authority (ABCA) area that received a 'less than A grade' for nitrate or chloride concentrations.

Well Name (Nearest Urban Area)	Type of Well	Indicator with 'less than an A grade'	Maximum Concentration between 2007-2021	Standard or Guideline
Sinkhole (Staffa)	Deep	Nitrate	9.7 mg/L	10.0 mg/L
TR9 (Clinton)	Shallow	Nitrate	18.3 mg/L	10.0 mg/L
Nairn (Nairn)	Shallow	Nitrate	4.6 mg/L	10.0 mg/L
Seaforth	Deep	Chloride	363.0 mg/L	250.0 mg/L
Rock Glen	Shallow	Chloride	90.0 mg/L	250.0 mg/L
Parkhill (Parkhill)	Shallow	Chloride	84.8 mg/L	250.0 mg/L
Hay 2 (Exeter)	Shallow	Chloride	93.5 mg/L	250.0 mg/L

Results – Chloride

The Rock Glen well near Arkona had chloride concentrations that ranged from 70 to 90 mg/L from 2007 to 2021. These values were typically higher than what was observed at the other monitoring wells (i.e., close to 10 mg/L). The Parkhill well also received a 'less than A grade' for a chloride reading of 85 mg/L in 2011. The Seaforth well exceeded the guideline five times over the 15-year period, with four of the five exceedances occurring in the past five years. A well near Exeter, in the Black Creek subwatershed, received its first 'less than A grade' for a chloride concentration of 93.5 mg/L in 2020. Two out of the six wells that did not receive an 'A grade' are deep bedrock wells (Table 7), demonstrating that deep wells are not precluded from contamination.

Improving Groundwater Quality

Groundwater is expensive and difficult (if not impossible) to clean up, so prevention of contamination in the first place is far preferable to clean up. While some industrial and agricultural activities have the potential to contaminate groundwater if not properly managed, households are also an important source of potential groundwater contamination (Environment and Climate Change Canada 2017). Properly maintaining wellheads and reducing nutrient inputs into surface water limits the potential for contaminants to reach groundwater sources.

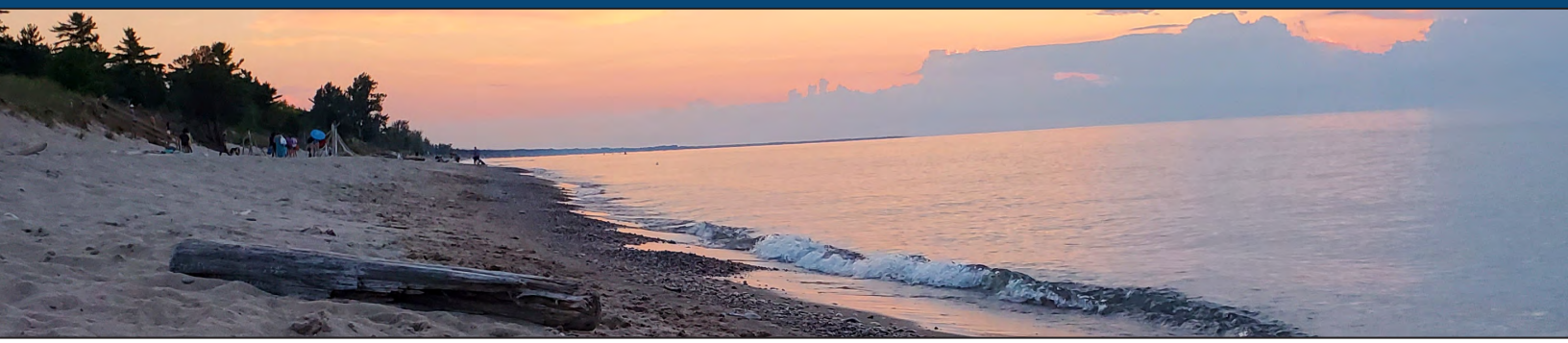
Groundwater from wells is the municipal drinking water source in Brucefield, Clinton, Seaforth, Zurich, and Varna. Learn about your municipal well or intake: **www.sourcewaterinfo.on.ca**

If you have a private well, remember to test your drinking water in spring and autumn. For resources about water testing and well protection tips visit:

www.ogwa.ca/well_water_testing.php

Visit **abca.ca** for more information on water well stewardship. Grants may be available to help upgrade or decommission wells.

SUMMARY



Forest cover remains low across the Ausable Bayfield Conservation Authority area. Although forest cover has shown little to no change from previous report cards, the thousands of trees planted every year indicate that watershed residents understand and value the benefits of trees and forests.

Wetland cover is very low. As most wetlands on our landscape are wet woodlands, or swamps, conservation of these areas is key from an ecological perspective, and for maintaining water quality and natural water storage. Additional water storage features will help to reduce soil erosion and mitigate the risk of flooding.

We evaluated chloride in surface water for the first time in this report card, and results exhibited good conditions. Almost all subwatersheds met the recreational guideline for E. coli, but many did not meet the objective for total phosphorus. Low forest and wetland cover, combined with predominantly clay soils and intensive rural and urban land uses, contribute to water quality conditions that need improvement.

Most, but not all, groundwater samples at monitoring wells met the drinking water standard for nitrate and the guideline for chloride. Water quality in private wells may differ from monitoring wells, and landowners with private wells should regularly test their drinking water.

We are aware A grades may not be feasible due to both natural conditions of the watershed (*e.g.*, soil and topography) and land use pressures. The agricultural productivity of this region means this area is important for global food production. There is also a need for residential development. It is important to continue to employ best practices for agriculture and urbanizing areas.

Improvements have been seen for some indicators since the start of monitoring in 2002. We can continue to work toward improvement by the next Watershed Report Card in five years' time.

Monitoring allows us to evaluate current environmental conditions, detect changes to ecosystem health, and decide how best to proceed. Working together to improve watershed health will in turn support human, economic, and ecological health.

Cover crops protect and enrich the soil and help to improve water quality.

NEXT STEPS

Together we can improve watershed health. We must focus our actions on saving natural areas, seeding (*e.g.*, planting trees, native gardens), and being environmental stewards by using best rural or urban land use practices (Carolinian Canada 2017). These approaches can be applied at different scales such as your own backyard, local creek, subwatershed, and Lake Huron. The 'Thumbs Up' projects in the subwatershed report cards highlight individuals and groups making a difference. Here are actions all of us can take as an individual, community organization, or agency:

What can *you* do?

On your farm or rural property

- Use conservation tillage, rotate crops, leave crop residue, and plant cover crops
- Install berms and grassed waterways
- Plant row crops across the hillside slope on erosion-prone soils
- Restrict livestock access from waterways
- Balance nutrient application and crop requirements; use 4R nutrient stewardship (the right fertilizer source at the right rate, at the right time and in the right places)
- Plant vegetation to buffer watercourses, and naturalize part of your property
- Properly decommission abandoned wells
- Inspect and pump out your septic system every three to five years
- Balance nutrient application and crop requirements
- Connect small woodlots to larger tracts, square up existing woodlots, re-forest marginal farmland, and plant windbreaks
- Join the Huron-Perth Chapter of the Ontario Woodlot Association to help you manage your woodlot
- Visit Huronview Demonstration farm in Clinton, Ontario to learn about rural BMPs

At your home or cottage

- Install a rain barrel or rain garden (see rain gardens in Bayfield, Clinton, or Hensall)
- Plant trees, shrubs, and a native garden to support wildlife
- Every three to five years, inspect and pump out your septic system
- Be 'Smart about Salt' and use a minimum amount of de-icing salt
- Volunteer in programs such as community turtle monitoring or the Volunteer Rain Gauge Network
- Avoid using fertilizers and chemicals on your lawn

Enhancing watershed health helps to preserve habitat for species like Brook Trout.

What can your community do?

- Construct wetlands or water retention areas
- Connect important existing natural areas
- Invite environmental experts as guest speakers at your community organization events
- Improve wastewater treatment plants, local landfill facilities, and stormwater management
- Preserve sand dunes as they provide protection
- Protect wetlands and support purchase of key wetlands to preserve coldwater flow

What can agencies do?

- Promote reintroduction of native species and other forest management practices such as prevention and control of invasive species
- Encourage financial incentive programs, such as County Clean Water projects
- Develop a healthy forest management strategy for remediating impacts of invasive pests
- Evaluate key areas for coldwater fish
- Support water quality monitoring at beaches
- Assess tributaries to determine those most prone to erosion and identify stormwater retention options
- Maintain bio-monitoring programs
- Promote proper electronic and hazardous waste disposal
- Support municipal policies that protect natural areas on a watershed basis
- Protect wetlands and review drainage works to ensure baseflow is not diverted, storage in the wetland is not reduced, and channelization does not reduce habitat features
- Evaluate the effects of nutrient management planning at the watershed scale
- Work with the community to enhance local trail networks
- Encourage innovative, low-maintenance drainage techniques such as two stage ditches in municipal drains
- Re-visit watershed plans; evaluate stewardship efforts and best management practices

Watershed Report Card

CHAPTER 3:

SUBWATERSHED REPORT CARDS

AUSABLE BAYFIELD CONSERVATION

CREATING AWARENESS | TAKING ACTION

Member of Conservation ONTARIO

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Appendix A: Data used to determine watershed report card grades for surface water quality conditions throughout the Ausable Bayfield Conservation Authority (ABCA) area

Watershed	Site	Total Phosphorus		*Escherichia coli* (*E. coli*)		Chloride		Benthic Invertebrates	
		Years of Data	Number of Samples	Years of Data	Number of Samples	Years of Data	Number of Samples	Years of Data	Number of Samples
Ausable Headwaters	HASTAF1	2017-2021	43	2017-2021	43	–		2017-2021	5
Bannockburn	MBBAN1	2017-2021	43	2017-2021	43	–	–	2017-2021	5
Bayfield Headwaters	MBSEA1	2017-2021	43	2017-2021	43	2017-2021	39	2017-2021	5
Bayfield North	GULGUL5	2017-2021	43	2017-2021	39	–	–	–	–
	GULGUL2	–	–	–	–	–	–	2017-2020	4
Black Creek	MABLA2	2017-2021	43	2017-2021	43	2017-2021	39	2017-2021	5
Little Ausable	MALIT2	2017-2021	42	2017-2021	42	–	38	2017-2021	5
Lower Ausable	MABOG1	2017-2021	43	2017-2021	43	2017-2021	39	–	–
	MADECK2	–	–	–	–	–		2017-2021	5
Lower Parkhill	MPMCIN1	2017-2021	43	2017-2021	43	2017-2021	39	–	–
	HPDESJ1	–	–	–	–	–	–	2017, 2019	2
Main Bayfield	MBVAR1	2017-2021	43	2017-2021	43	2017-2021	39	2017-2021	5
Middle Ausable	MASPR1	2017-2021	42	2017-2021	42	2017-2021	38	–	–
	MAGLAS1	–	–	–	–	–	–	2017-2020	4
Mud Creek	MMOUTER1	2017-2021	43	2017-2021	43	–	–	–	–
	HMUD21	–	–	–	–	–	–	2017, 2019-2021	4
Nairn Creek	MANAIRN1	2017-2021	42	2017-2021	42	–	–	2017-2021	5
Old Ausable Channel	OACDAM1	2017-2021	39	2017-2021	38	–	–	–	–
South Gullies	GULZUR8	2012-2016	42	2017-2021	42	–	–	2017-2021	5
Upper Ausable	MAEXE1	2012-2016	43	2017-2021	43	2017-2021	39	2017-2021	5
Upper Parkhill	MPMCGUF1	2012-2016	42	2017-2021	42	2017-2021	38	2017-2021	5

Appendix B: Species at risk in ABCA area (Ausable Bayfield Conservation Authority 2022, Ontario Ministry of Natural Resources and Forestry 2022).

Watershed	Species Type	Species Name
Ausable Headwaters	Bird	Bank Swallow, Bobolink, Eastern Wood-pewee, Red-headed Woodpecker, Wood Thrush
	Reptile	Snapping Turtle
	Plant	Butternut
Bannockburn	Mammal	Little Brown Bat
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Canada Warbler, Eastern Meadowlark, Eastern Wood-pewee, Red-headed Woodpecker, Wood Thrush
	Reptile	Snapping Turtle
	Fish	Northern Brook Lamprey
	Mussel	Rainbow Mussel
	Plant	Two including Butternut
Bayfield Headwaters	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Meadowlark, Red-headed Woodpecker, Wood Thrush
	Reptile	Two including Snapping Turtle
	Mussel	Rainbow Mussel
	Plant	Green Dragon
Bayfield North	Bird	Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood-pewee, Wood Thrush
	Reptile	Three including Snapping Turtle and Queensnake
	Fish	Black Redhorse, Redside Dace
	Insect	Monarch
	Plant	Black Ash, Butternut
Black Creek	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, Eastern Wood-pewee, Wood Thrush
	Reptile	Blanding's Turtle, Snapping Turtle
Little Ausable	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, Eastern Wood-pewee, Red-headed Woodpecker, Short-eared Owl, Wood Thrush
	Reptile	Snapping Turtle
	Fish	Black Redhorse
	Mussel	Rainbow Mussel, Wavy-rayed Lampmussel
	Plant	Heart-leaved Plantain

Watershed	Species Type	Species Name
Lower Ausable	Mammal	American Badger
	Bird	Acadian Flycatcher, Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Cerulean Warbler, Chimney Swift, Eastern Meadowlark, Eastern Whip-poor-will, Eastern Wood-pewee, Least Bittern, Louisiana Waterthrush, Northern Bobwhite, Red-headed Woodpecker, Wood Thrush
	Reptile	Ten including Blanding's Turtle, Common Five-lined Skink, Eastern Hog-nosed Snake, Eastern Musk Turtle, Eastern Ribbonsnake, Eastern Spiny Softshell Turtle, Northern Map Turtle, Snapping Turtle, Queensnake
	Fish	Northern Sunfish
	Mussel	Mapleleaf Mussel, Northern Riffleshell, Purple Wartyback, Snuffbox
	Insect	Gypsy Cuckoo Bumble Bee
	Plant	Thirteen including Broad Beech Fern, Butternut, Dwarf Hackberry, Eastern Flowering Dogwood, False Rue-anemone, Fern-leaved Yellow False Foxglove, Green Dragon, Pitcher's Thistle, Riddell's Goldenrod, Spoon-leaved Moss, Tuberous Indian-plantain
Lower Parkhill	Mammal	American Badger, Little Brown Bat
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Canada Warbler, Chimney Swift, Eastern Meadowlark, Eastern Whip-poor-will, Grasshopper Sparrow, Northern Bobwhite, Red-headed Woodpecker, Wood Thrush,
	Reptile	Common Five-lined Skink, Eastern Hog-nosed Snake, Snapping Turtle
	Fish	River Redhorse
	Plant	Butternut, Drooping Trillium, Dwarf Hackberry, False Rue-anemone, Green Dragon, Heart-leaved Plantain, Pitcher's Thistle, Riddell's Goldenrod
Main Bayfield	Mammal	Little Brown Bat
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, Eastern Wood-pewee, Louisiana Waterthrush, Northern Bobwhite, Wood Thrush,
	Reptile	Three including Snapping Turtle and Queensnake
	Fish	Black Redhorse
	Mussel	Mapleleaf Mussel, Rainbow Mussel
	Plant	Butternut, Green Dragon, Tuberous Indian-plantain, Wood-poppy

Watershed	Species Type	Species Name
Middle Ausable	Mammal	American Badger
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Barn Owl, Bobolink, Eastern Meadowlark, Eastern Wood-pewee, Loggerhead Shrike, Red-headed Woodpecker, Short-eared Owl, Wood Thrush,
	Reptile	Four including Eastern Spiny Softshell Turtle, Northern Map Turtle and Snapping Turtle
	Mussel	Kidneyshell, Mapleleaf Mussel, Northern Riffleshell, Rainbow Mussel, Snuffbox, Wavy-rayed Lampmussel
	Plant	Eastern Flowering Dogwood, Green Dragon
Mud Creek	Mammal	Little Brown Bat
	Bird	Acadian Flycatcher, Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Canada Warbler, Cerulean Warbler, Eastern Meadowlark, Eastern Wood-pewee, Least Bittern, Louisiana Waterthrush, Northern Bobwhite, Prothonotary Warbler, Red-headed Woodpecker, Wood Thrush
	Reptile	Six including Blanding's Turtle, Eastern Hog-nosed Snake, Eastern Musk Turtle, Eastern Ribbonsnake, Snapping Turtle
	Fish	Grass Pickerel, Lake Chubsucker, Pugnose Shiner
	Plant	Thirteen including Black Ash, Bluehearts, Butternut, Cucumber Tree, Dense Blazing Star, Drooping Trillium, Dwarf Hackberry, Eastern Flowering Dogwood, Heart-leaved Plantain, Pitcher's Thistle, Showy Goldenrod
Nairn Creek	Bird	Acadian Flycatcher, Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood-pewee, Least Bittern, Loggerhead Shrike, Prothonotary Warbler, Red-headed Woodpecker, Wood-poppy, Wood Thrush
	Reptile	Snapping Turtle
	Fish	Northern Brook Lamprey
	Mussel	Kidneyshell, Northern Riffleshell, Rainbow Mussel, Wavy-rayed Lampmussel
	Plant	Butternut, Dense Blazing Star, Wood-poppy

Watershed	Species Type	Species Name
Old Ausable Channel	Mammal	Little Brown Bat, Woodland Vole
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Canada Warbler, Cerulean Warbler, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood-pewee, Least Bittern, Prothonotary Warbler, Red-headed Woodpecker, Wood Thrush
	Reptile	Blanding's Turtle, Common Five-Lined Skink, Eastern Hog-nosed Snake, Eastern Musk Turtle, Eastern Ribbonsnake, Northern Map Turtle, Snapping Turtle
	Fish	Grass Pickerel, Lake Chubsucker, Northern Sunfish, Pugnose Shiner
	Insect	Aweme Borer Moth, Monarch, Mottled Duskywing, Northern Barrens Tiger Beetle, Rusty-patched Bumble Bee
	Plant	Seven including Bluehearts, Dense Blazing Star, Dwarf Hackberry, Fern-leaved Yellow False Foxglove, Green Dragon, Pitcher's Thistle
South Gullies	Mammal	Little Brown Bat
	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood-pewee, Red-headed Woodpecker, Wood Thrush
	Reptile	Blanding's Turtle, Snapping Turtle
	Fish	Redside Dace
	Plant	Butternut
Upper Ausable	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, Eastern Wood-pewee, Red-headed Woodpecker, Wood Thrush
	Reptile	Northern Map Turtle, Snapping Turtle
	Fish	Black Redhorse, Northern Sunfish
	Mussel	Kidneyshell, Northern Riffleshell, Rainbow Mussel, Snuffbox, Wavy-rayed Lampmussel
	Plant	Five including Butternut, False Hop Sedge, Green Dragon, Riddell's Goldenrod
Upper Parkhill	Bird	Bald Eagle, Bank Swallow, Barn Swallow, Bobolink, Eastern Meadowlark, Eastern Wood-pewee, Prothonotary Warbler, Red-headed Woodpecker, Wood Thrush
	Reptile	Snapping Turtle
	Plant	Seven including Butternut, False Hop Sedge, False Rue-anemone Green Dragon, Riddell's Goldenrod

Watershed Report Card

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Do you have questions?

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The Watershed Report Card is available online and in other formats upon request.