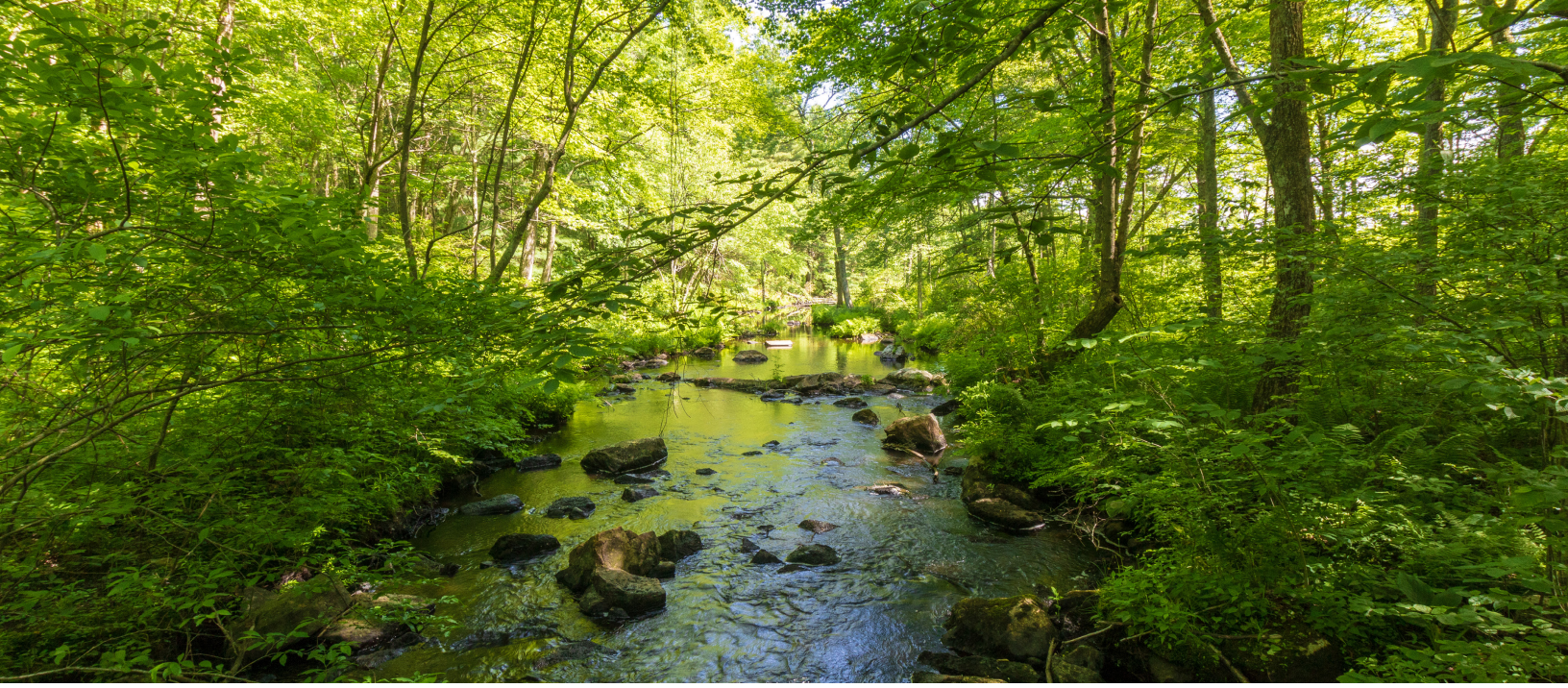
Grey Sauble
CONSERVATION

SAUBLE RIVER

2018 Watershed Health Review



STREAM HEALTH: EXCELLENT

FOREST CONDITIONS: EXCELLENT

WETLAND CONDITIONS: EXCELLENT

GROUNDWATER INFORMATION: INSUFFICIENT DATA

A B A -

SAUBLE

Watershed Health Review

94,330 ha
WATERSHED AREA

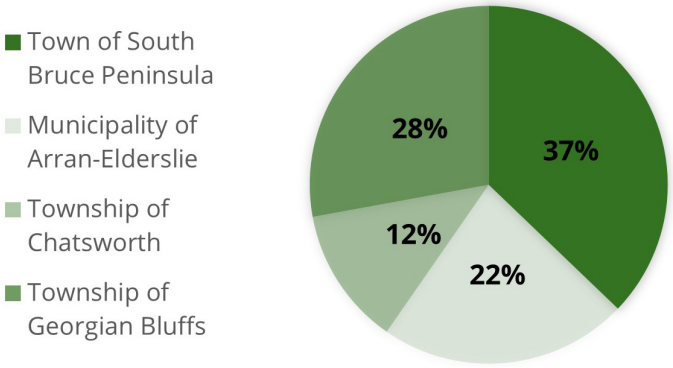
3,193 ha
GSCA LANDS

14,914
POPULATION

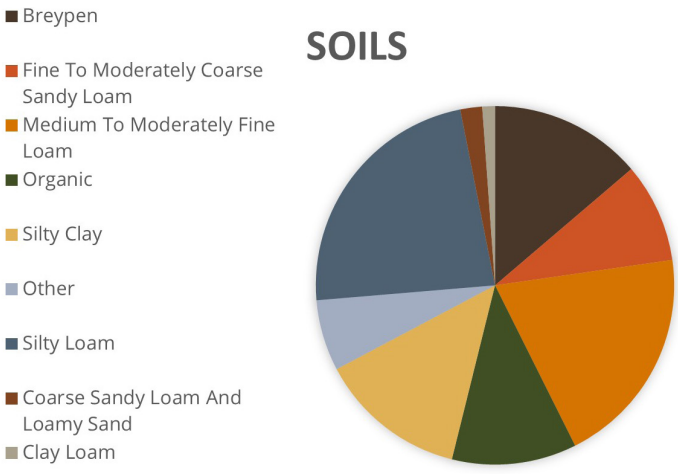
14 PRIVATELY OWNED DAMS

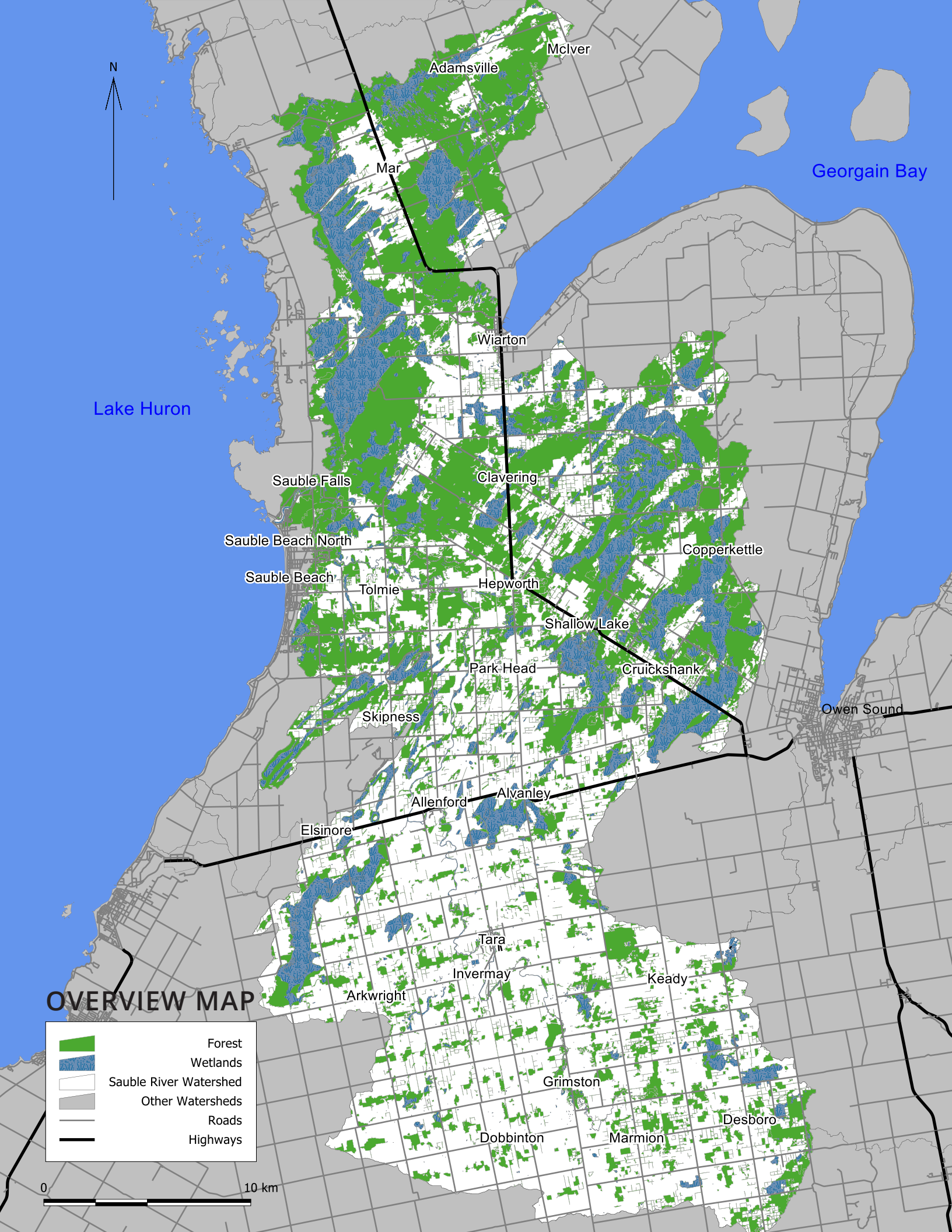
1 SEWAGE TREATMENT PLANT

MUNICPALITIES



SOILS




N
McIver
Adamsville
Mar
Georgain Bay
Wiarton
Lake Huron
Sauble Falls
Clavering
Sauble Beach North
Copperkettle
Sauble Beach
Tolmie
Hepworth
Shallow Lake
Park Head
Cruickshank
Skipness
Owen Sound
Allenford
Alvanley
Elsinore
Tara
Invermay
Keady
Arkwright
Grimston
Desboro
Dobbinton
Marmion
OVERVIEW MAP
Forest
Wetlands
Sauble River Watershed
Other Watersheds
Roads
Highways
0
10 km

A **STREAM HEALTH:** EXCELLENT

TREND: STABLE

GRADING CHART:

- **A: EXCELLENT**
- **B: GOOD**
- **C: FAIR**
- **D: POOR**
- **F: VERY POOR**
- **INSUFFICIENT DATA**

STREAM HEALTH

Overall, surface water quality of the Sauble River received an "A" letter grade, indicating excellent water quality. There are several water quality monitoring stations within this watershed but only the one closest to the outlet is used for scoring. This station is located at the Bruce Road 13 bridge, just upstream of Sauble Falls. Water quality data has been collected at this site since 1970, but only the last 15 years have been reviewed. Total Phosphorus values* have stayed consistent throughout the 15-year monitoring period, with results indicating trace amounts just above detection. It is important to continue to monitor this parameter as there is growing concern throughout the Great Lakes Basin over harmful algal blooms which are caused by high phosphorus loading. Agricultural runoff, golf course and residential fertilizers, as well as failing septic systems are all potential point sources that could increase Phosphorus levels. Landowners are urged to continue implementing Best Management Practices (BMP's) to maintain current results.

Fecal bacteria (E. coli) monitoring began in 2011, and since that time values** remain below the 100-count level. This level is a provincial target used to determine if beaches are safe for swimming. High E. coli counts are common after large rain events when manure from farm fields enters waterways or at sites with a high population of waterfowl.

Benthic invertebrates are small aquatic animals that live on the bottom of streams. These communities are excellent indicators of stream health because they are very sensitive to changes in environmental conditions.

The Family Biotic Index (FBI) was the index used to determine this stream health grade, however GSCA also uses the BioMAP Index, which is a more holistic index for stream health (presented on Page 13 along with more chemistry results). The FBI Index scores the benthic community consistently as an A grade, whereas the BioMAP Index scores the site consistently as a B .

The below table shows the results for the three parameters that count towards the report card grade. Sample size is represented by "n".

INDICATORS	2003-2007	2008-2012	2013-2017	GUIDELINE	INDICATOR DESCRIPTION
Total Phosphorus (mg/L)*	0.017 **A** (n=39)	0.0185 **A** (n=35)	0.016 **A** (n=40)	0.030 **B** Aquatic Life	Phosphorus is found in products such as fertilizer and detergents, and contributes to excess algal growth which creates low oxygen in streams and lakes.
Bacteria (# per 100 mL)**	N/A	37.26 **B** (n=15)	31.61 **B** (n=40)	100 **B** Recreation	E.coli is a fecal coliform bacteria found in human and animal waste. It is a strong indicator of the potential to have organisms present that could harm human health.
Benthic Score FBI Index***	N/A	4.22 **A** (n=2)	3.34 **A** (n=1)	<5.00 **B** Target Only	Benthic macroinvertebrates are small aquatic animals that live at the bottom of streams. These organisms are good indicators of water quality and are commonly used to diagnose watershed health.

*75th percentile, MECP PWQMN data. Grades based on Conservation Ontario standards (2017). **Geometric mean, GSCA data. ***Average. Grades based on Conservation Ontario standards (2017).

B **FOREST CONDITIONS:** EXCELLENT

TREND: NO TREND

GRADING CHART:

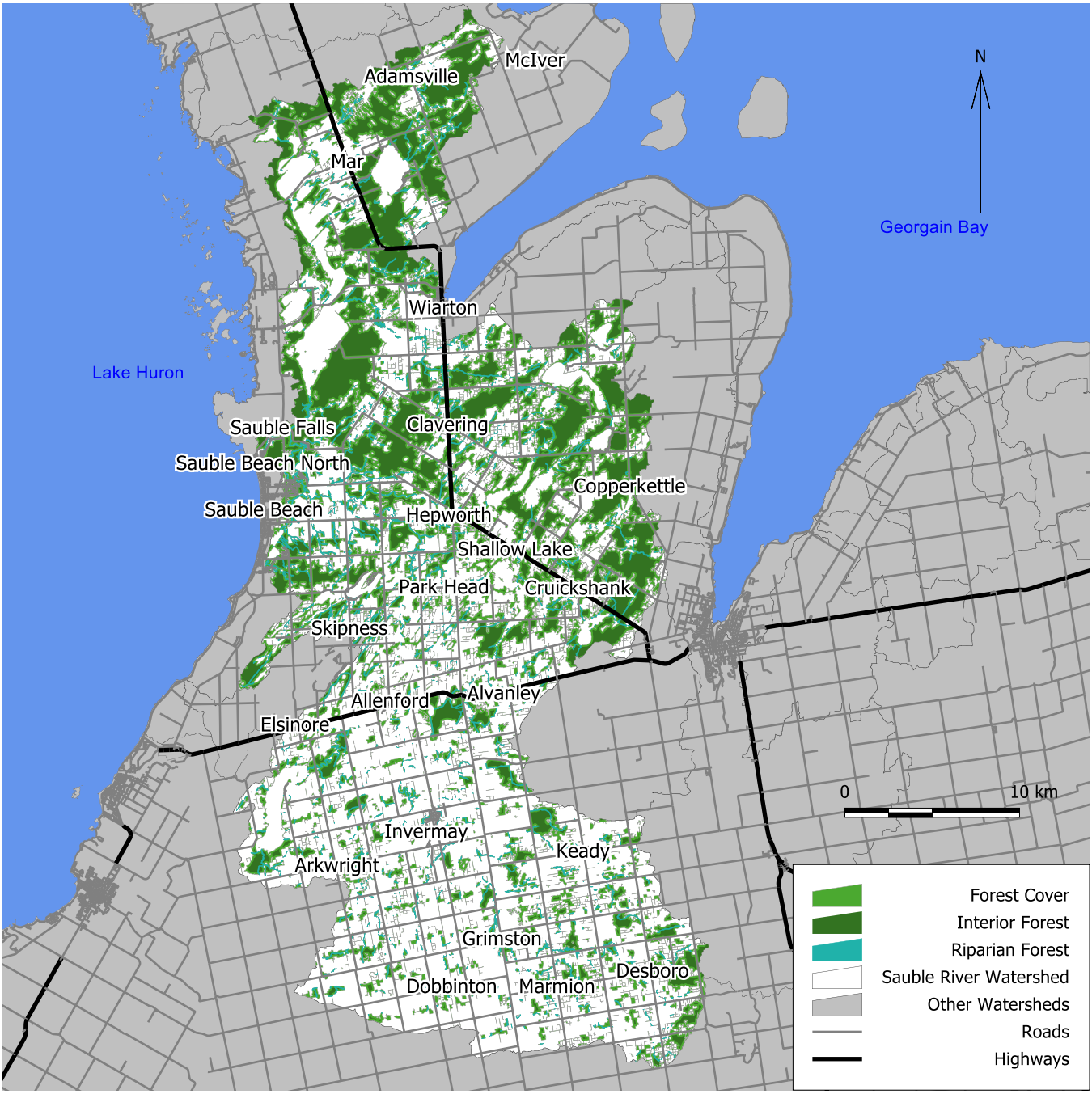
- **A: EXCELLENT**
- **B: GOOD**
- **C: FAIR**
- **D: POOR**
- **F: VERY POOR**
- **INSUFFICIENT DATA**

FOREST CONDITIONS

Forest cover is calculated by using up-to-date aerial imagery and applying Geographic Information Systems (GIS) mapping and analysis techniques. It takes 20 or more years for trees to become large enough to count towards the watershed report card grades. Currently, Grey Sauble Conservation Authority (GSCA) has planted 241 hectares in this watershed.

Riparian and interior forests provide important habitats and wildlife corridors, making this a key area for conservation efforts and habitat protection. Forests Ontario, Alternative Land Use Services (ALUS) and GSCA have programs that provide subsidies and incentives for landowners to plant more trees. GSCA also assists landowners with the Managed Forest Tax Incentive Program, which allows landowners with 4 hectares to be eligible for a tax break.

This map shows overall forest cover, interior forest, and riparian forests throughout the watershed. There is good forest cover throughout the northern portions of the watershed with much less coverage in the southern half. This is due to the major land use in the southern half of this watershed being agriculture. Tree cover in this area is usually limited to poorly drained areas and areas that are difficult to clear for row crops and livestock pasture. Tree planting is one of the simplest ways to improve all forest cover. Efforts could be made to improve forest connectivity and riparian cover. There are 28 GSCA properties in the Sauble River watershed, totaling 3193 ha of forest.



INDICATORS	2008-2012*	2013-2017*	ECCC GUIDELINE**	INDICATOR DESCRIPTION
% Forest Cover	41.04 **A**	39.6 **A**	30 **B**	Forest cover is the percentage of the watershed that is forested. Watersheds should contain at least 30% forest cover to sustain native flora and fauna (ECCC, 2013).
% Forest Interior	14.52 **A**	13.31 **A**	10 **B**	Forest interior is the remaining portion of a woodlot when a 100 metre buffer is removed. Forest interior provides native species with undisturbed habitat.
% Riparian Zone Forested	36.43 **C**	35.61 **C**	50 **B**	Percent riparian zone forested is a measure of the amount of forest cover within a 30 m riparian/buffer zone adjacent to all open watercourses. Riparian zones protect water quality and provide important ecological services, habitat and movement corridors for wildlife.

*Data based on 2015 colour air photography. **ECCC Guideline—Environment Canada guideline based on "How Much Habitat is Enough?" (2013). Grades based on Conservation Ontario standards (2017).

A **WETLAND CONDITIONS:** EXCELLENT

TREND: NO TREND

WETLAND CONDITIONS

GRADING CHART:

- **A: EXCELLENT**
- **B: GOOD**
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- **INSUFFICIENT DATA**

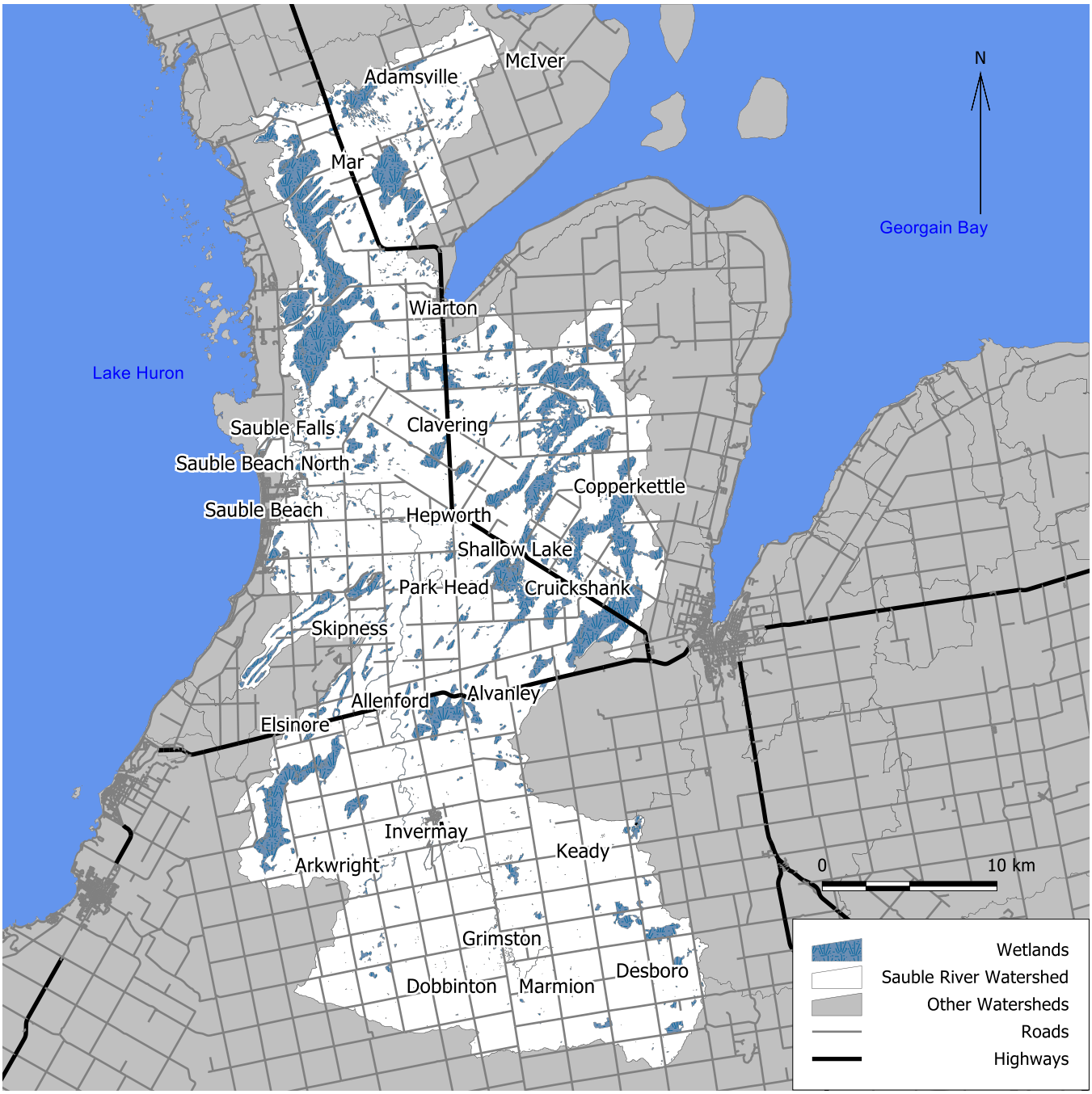
Wetlands are an important part of ecological function within a watershed. They provide many ecosystem services including: improving water quality by filtering runoff, assisting with flood control by storing water, and maintaining hydrological function during dry periods. Wetlands are also home to many rare species of flora and fauna.

Wetland cover in the Sauble River watershed was calculated using up-to-date aerial photography and applying Geographic Information Systems (GIS) and analysis techniques. Grey Sauble staff are constantly working to improve wetland information on a local scale.

Coverage in this watershed is excellent when compared to Environment and Climate Change Canada's habitat recommendations. Sauble River watershed currently has 10.25% wetland cover, with the recommended coverage being 10%. It is important to protect these wetlands as it is extremely difficult to get them back once they are gone.

There are many threats to wetlands in Southern Ontario, including land conversion for development, drainage for agriculture and invasive species such as Phragmites. Organizations including Ducks Unlimited Canada, ALUS Grey Bruce and GSCA are interested in working with landowners to protect wetland features, deliver restoration efforts, and create new wetland habitat.

The Shouldice Wetland Complex is a Provincially Significant Wetland within the Sauble River watershed. This 868 hectare swamp is home to many species of turtles and birds and is an important hydrological feature. Other notable wetlands in the Sauble River watershed include Skinner Marsh, Arran Lake Weland Complex, Allenford Station, and Albemarle Brook.



INDICATORS	2013-2017*	ECCC GUIDELINE**	INDICATOR DESCRIPTION
Wetland Cover (%)	15.71 **A**	10 **B**	Percent wetland cover is the percentage of the watershed that is in wetland cover. Wetlands include swamps (treed and thicket), bogs, fens and marshes.

*Data based on 2015 colour air photography. **ECCC Guideline—Environment Canada guideline based on "How Much Habitat is Enough?" (2013) Grades based on Conservation Ontario standards (2017).

GROUNDWATER INFORMATION:
INSUFFICIENT DATA

TREND:
N/A

GROUNDWATER

GRADING CHART:

- **A: EXCELLENT**
- **B: GOOD**
- **C: FAIR**
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- **F: VERY POOR**
- **INSUFFICIENT DATA**

Groundwater is water that is stored in bedrock fractures or between sand/gravel layers in aquifers. Through the Provincial Groundwater Monitoring Network (PGMN) partnership with the Ministry of Environment, Conservation and Parks, GSCA monitors water levels and water quality in 10 wells annually within the Grey Sauble watershed. There are three monitoring wells in this watershed. Unfortunately, these wells do not provide sufficient coverage to grade the groundwater resources for this entire watershed.

Surficial Geology and Soils

The southern headwaters of the Sauble River watershed is dominated by stoney, sandy, silt till and is part of the Late Wisconsinian glacial formation. The middle section of the watershed, closer to Lake Huron where the Sauble River enters, is dominated by sand and glaciolacustrine shallow water deposits. The northern part of the watershed is classified as rock dominated terrain with discontinuous thin drift cover and was formed during the Guelph Formation, comprised of dolostone. Silty loam and moderately to medium fine loam are the two dominant soil textures.

Drinking Water Source Protection

There are several drinking water systems in this watershed, including: Tara, Shallow Lake, Amabel-Sauble and Huron Woods in Sauble Beach. All of these drinking water systems, with the exception of two wells in Tara are classified as Groundwater Under Direct Influence of Surface Water (GUDI). Under the direct influence of surface water means the groundwater source is located near a surface water source such as a lake or river and receives surface water recharge. Due to the influence of surface water, the groundwater source is considered at risk of contamination from pathogens such as *Giardia lamblia* and viruses, which are not common in groundwater.

Wellhead Protection Areas (WHPA's)

Around each of these municipal wells are Wellhead Protection Areas (WHPA's). These areas highlight the time it takes for contaminants to reach drinking water, so it is important to monitor potential threats in these areas.

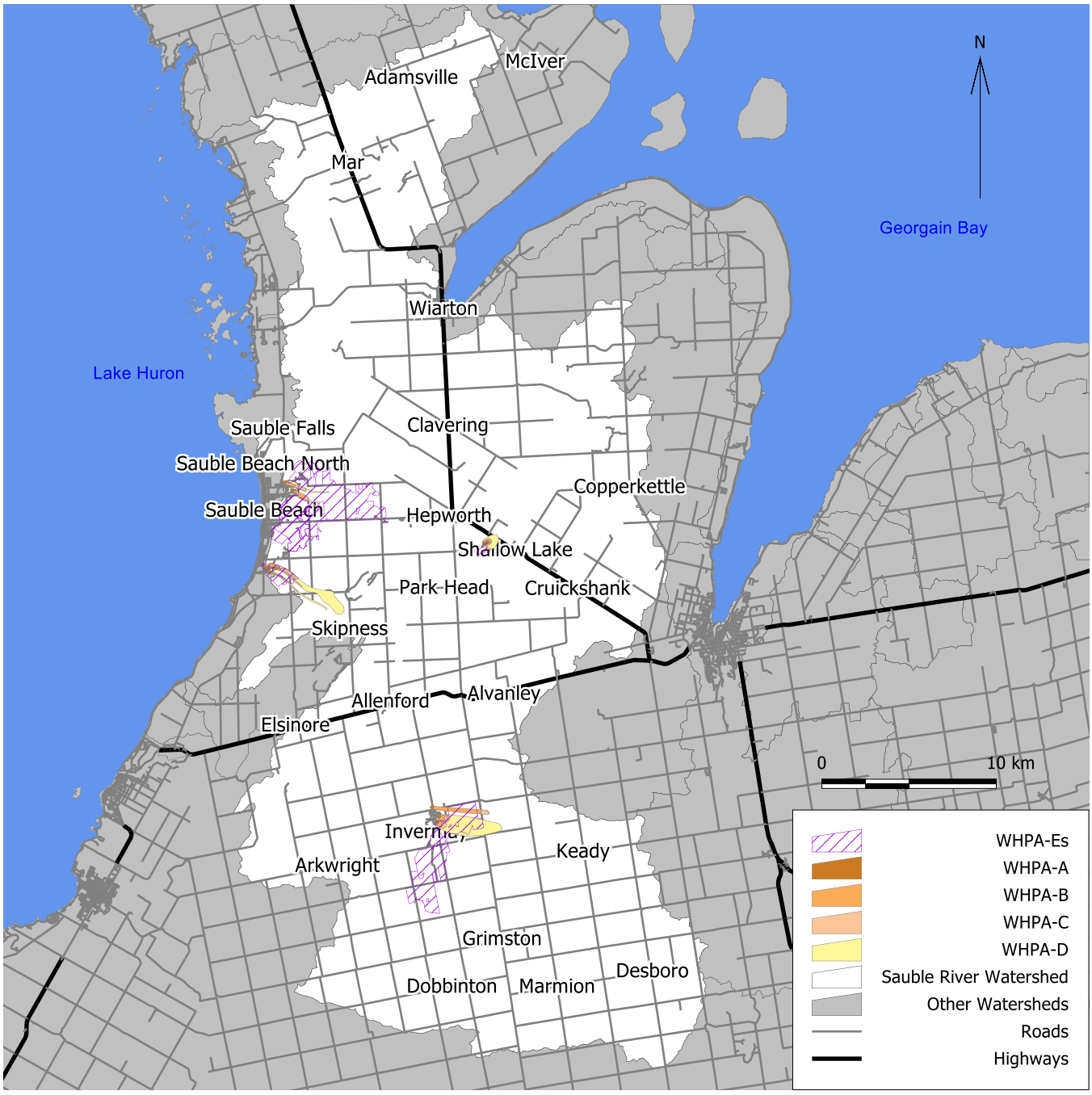
WHPA-A: 100 m radius around a municipal well

WHPA-B: Area where water can flow to the well in 2 years

WHPA-C: Area where water can flow to the well in 5 years

WHPA-D: Area where water can flow to the well is less than 25 years and not within WHPAs A, B or C

WHPA-E: Can only apply to GUDI wells, as it is the 2-hour time of travel within surface water that influences the well



ACTIONS FOR IMPROVEMENT

On the Shore

- Leave a minimum of 3 feet of native vegetation in place. Having a vegetated buffer helps to filter runoff, prevent erosion, maintain water levels, and deter waterfowl.
- Minimize fertilizer use to prevent excess nutrients from entering the lake.
- Learn how to identify and control invasive species.
- Regularly service your septic system.
- Decommission unused wells to prevent contaminants from entering groundwater.

On the Farm

- Improve water quality and habitat by fencing livestock out of streams.
- Maintain a vegetated buffer between crop land and waterways.
- Upgrade manure storage and barn eavestroughing to divert clean water.
- Reduce soil erosion through no-till, residue management and cover crops.
- Plant windbreaks to protect your soils.
- Reduce nutrient loss by implementing a nutrient management plan.
- Conserve water and minimize pesticide use.

In Town

- Leave a minimum of 3 feet of native vegetation along creeks and lakes. Plant native species to protect the shoreline and create habitat.
- Conserve water indoors and collect water outdoors using a rain barrel.
- Increase your land permeability by using rain gardens, mulch or permeable pavement.
- Minimize fertilizer use to prevent excess nutrients from entering streams.
- Dispose of chemicals properly and do not pour harmful substances down the drain as these outlet to local waterways.

For Municipalities and other Agencies

- Work together with GSCA on consistent planning regulations and adoption of bylaws that will protect watercourses, wetlands, and vegetated riparian buffers.
- Adopt your own environmental sustainability initiatives and community grants.
- Municipalities, developers and GSCA staff work together on adoption of Low
- Impact Development (LID) practices and promote natural designs (bio-swales, infiltration trenches, permeable pavement) and stormwater retrofits.
- Secure environmentally significant properties, specifically wetlands, shorelands and properties that will connect natural features.
- Ensure appropriate approvals and/or permits are obtained so that the approval authority can monitor for implementation of approval conditions.

ADDITIONAL SURFACE WATER QUALITY

CHEMICAL PARAMETERS	2003-2007	2008-2012	2013-2017
Nitrate (mg/L)*:	0.50 (n=39)	0.27 (n=36)	0.45 (n=40)
Chloride (mg/L)*:	15.2 (n=39)	12.58 (n=36)	12.28 (n=40)
Particulate residue (mg/L)*:	2.6 (n=39)	2.95 (n=37)	3.13 (n=40)

In addition to the parameters used to grade the surface water quality section, a suite of other chemical parameters is tested on water samples, including: nitrate, chloride and total suspended solids. Nitrates may be present in water due to decay of plant or animal material, agricultural fertilizers, domestic sewage, or treated wastewater contamination, and geological formations containing soluble nitrogen compounds. The allowable limit for the protection of aquatic life is 550 mg/L short term, or 13 mg/L long term (CCME, 2012). The results shown in the above table indicate that nitrate concentrations are far below the allowable limit and have remained consistent over 15 years.

Chloride occurs naturally in the environment in mineral deposits and therefore many surface water and groundwater sources are naturally saline. However, chloride may be added to surface water through anthropogenic sources such as: salting of roads, agricultural or industrial fertilizers and sewage treatment. The allowable limit for chlorides in freshwater is 640 mg/L short term and 120 mg/L long term (CCME, 2011). The results shown in the above table indicate that chloride concentrations are below the long-term allowable limit and have remained consistent over 15 years.

Total suspended solids (TSS) in healthy streams have levels that show less than a 25 mg/L increase over background levels for short-term events and less than a 5 mg/L increase over longer term exposures (CCME, 2002). Suspended matter consists of silt, clay, fine particles of organic and inorganic matter, soluble organic compounds, plankton, and other microscopic organisms. The amount and type of suspended solids in surface water directly relates to the turbidity, or clarity of the water (CCME, 2002). TSS results have stayed consistent over 15 years and are therefore indicative of a healthy stream.

Additional Benthic Scoring:

A benthic index is a way to convert biological data into a measure of water quality. The BioMAP Index is a more holistic index than Hilsenhoff Family Biotic Index (FBI) and may provide further insights into the benthic invertebrate community and surface water quality. The BioMAP Index requires the identification to the lowest practical level (genus or species) measures water quality based on the presence of sensitive species at the site. All species are ranked based on their sensitivity values and the average of the top 25% is used to determine the grade.

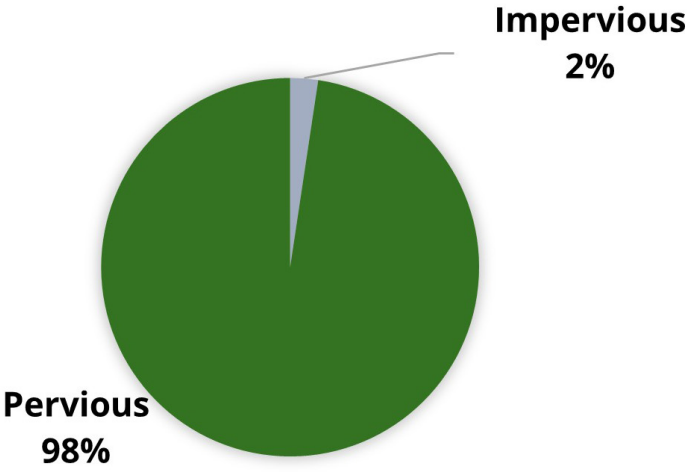
BioMAP attempts to classify watersheds as impaired, unimpaired or in transition based on the size of the watercourse: creek <4 m, stream 4-16 m, river 16-64 m. These classifications and how they relate to the report card grading scores can be found on Page 15. The BioMAP Index is not commonly used by other Conservation Authoirties due to the added identification requirements and the grading system used for the watersheds is unique to GSCA.

	2008-2012	2013-2017	GUIDELINE
Benthic Score BioMAP*(Qualitative)	2.90 **A** (n=2)	3.00 **A** (n=1)	>2.4 **B** Target Only

Canadian Council of Ministers of the Environment. (2012). Nitrate Fact Sheet. Retrieved online from, http://ceqg-rcqe.ccme.ca/download/en/197/
Canadian Council of Ministers of the Environment. (2011). Chloride Fact Sheet. Retrieved online from, http://ceqg-rcqe.ccme.ca/download/en/337/
Canadian Council of Ministers of the Environment. (2002). Total Particulate Matter. Retrieved online from, http://ceqg-rcqe.ccme.ca/download/en/217
Griffiths, R. (1999). BioMAP: Bioassessment of Water Quality. Niagara College: Canada: The Centre for Environmental Training.

ADDITIONAL WATERSHED FEATURES

LAND PERMEABILITY



1339 km
of watercourses

2.4%
of this watershed is regulated under the Niagara Escarpment Commission.

3696 ha
AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSI)
For Example: Mountain Lake Fen, Sauble Falls, Arkwright Drumlins

Rare Species
Hungerford's Crawling Water Beetle, Bobolink, American Hart's Tongue Fern, Butternut

Invasive Species
Round Goby, Phragmites, Wild Chervil, European Buckthorn, Beech Bark Disease

Fish Species
Brook, Rainbow and Brown Trout, Coho and Chinook Salmon, Smallmouth Bass and Yellow Perch etc.

Potential Stressors
Golf course irrigation, quarry activities, agricultural run-off, failing septic systems

Stewardship
In 2017, GSCA received a grant from the Ministry of Environment, Conservation and Parks Great Lakes Guardian Community Fund to implement clean water projects in the Village of Tara. This funding allowed for 1635 m of fencing to be installed along the Sauble River, preventing cattle from accessing surface water.

In the past, the Cleaning Up Rural Beaches program also focused on stewardship initiatives along the Sauble River to help limit E.coli along Lake Huron's beaches. These programs have been essential for implementing agricultural Best Management Practices for water quality.

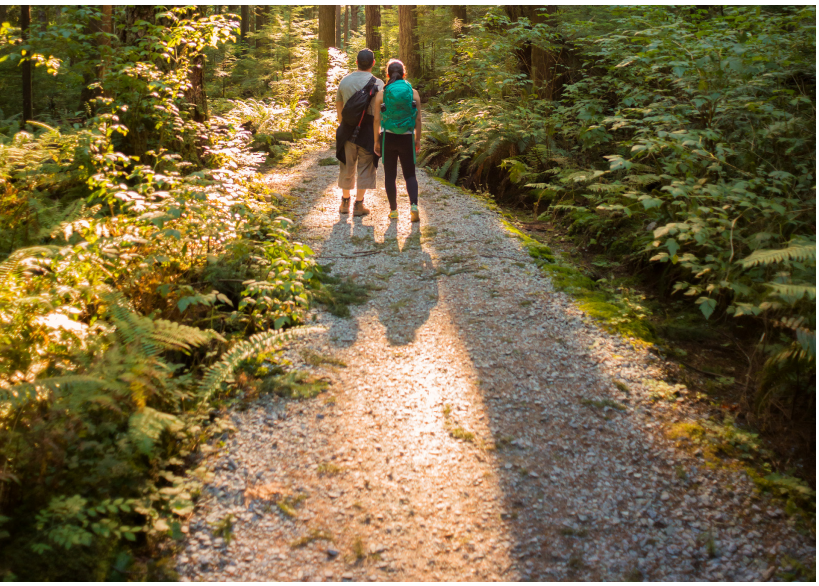
REFERENCES FOR HEALTH REVIEW GRADING

The below tables were developed by Conservation Ontario and the Watershed Report Card Working Group. The exception to the water quality table is the column representing BioMAP, which was developed by GSCA. These tables show how the grades were determined for each category. Points are awarded per category based on the grade and the final grade is based on an average of all points.

Total Phosphorus (mg/L)	E.coli (#/100 mL)	Benthic	Benthic Invertebrates (BioMAP)	Point Score	Grade	Overall Surface Water Quality Grade	
						Final Points	Final Grade
<0.020	0-3	0.00-4.25	Creek (<4m) 4.0 Stream (4-16m) >3.4 River (16-64m) >3.0	5	A	>4.4	A
0.020-0.030	31-100	4.26-5.00	Creek (<4m) >3.4 Stream (4-16m) >3.0 River (16-64m) >2.4	4	B	3.5-4.4	B
0.031-0.060	101-300	5.01-5.75	Creek (<4m) 3.4-3.2 Stream (4-16m) 3.0-2.6 River (16-64m) 2.4-2.0	3	C	2.5-3.4	C
0.061-0.180	301-1000	5.76-6.50	Creek (<4m) <3.2 Stream (4-16m) <2.6 River (16-64m) <2.0	2	D	1.5-2.4	D
>0.180	>1000	6.51-10.00	Creek (<4m) <2.6 Stream (4-16m) <2.0 River (16-64m) <1.5	1	F	<1.5	F

% Forest Cover	% Interior Forest	% Riparian Forest	Point Score	Grade	Overall Forest Conditions	
					Final Points	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	27.5-42.5	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

Grade	% Wetland Cover
A	>11.5
B	8.6-11.5
C	5.6-8.5
D	2.5-5.5
F	<2.5



What is a Conservation Authority?

Conservation authorities are local agencies that operate at a watershed-scale to protect, manage, and conserve natural resources and share an appreciation of the environment with others. Through partnerships in communities across Ontario, conservation authorities are able to help protect people and property from natural hazards like flooding and erosion and address specific environmental challenges we face locally.

GSCA is one of 36 Conservation Authorities Across Ontario

Over 13 million people, approximately 95% of Ontario's population live in areas that are managed by conservaiton authorities (CAs).

Guided by the Conservation Authorities Act of 1946, which was recently updated in 2017, Ontario's CAs are charged with the responsibility of "ensuring the conservation, restoration, development and management of Ontario's natural resources through programs that balance human, environmental and economic needs."

Member of

Conservation ONTARIO
Natural Champions

THANK YOU

To all the landowners, community groups, schools, businesses, municipalities and other government agencies who value watershed health and support our efforts to monitor and protect it!

Grey Sauble
CONSERVATION