



Grey Sauble
CONSERVATION

UPPER SAUBLE

2018 Subwatershed Health Review





STREAM HEALTH:
FAIR



C

FOREST CONDITIONS:
POOR



D

WETLAND CONDITIONS:
FAIR



C

GROUNDWATER INFORMATION:
INSUFFICIENT DATA



-

UPPER SAUBLE

Subwatershed Health Review

21,402 ha
WATERSHED AREA



69.8 ha
GSCA LANDS



2933
APPROX. POPULATION



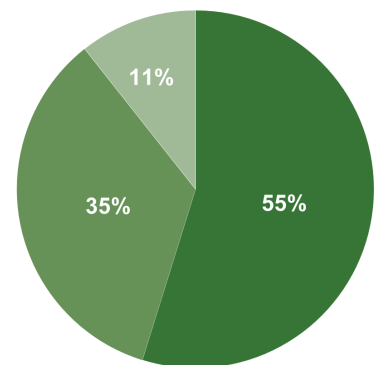
2 PRIVATELY OWNED DAMS



0 SEWAGE TREATMENT PLANT

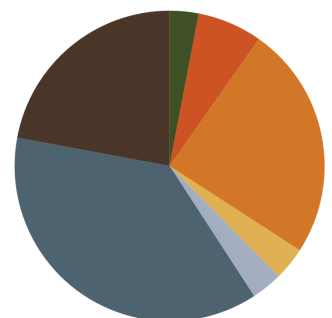
MUNICIPALITIES

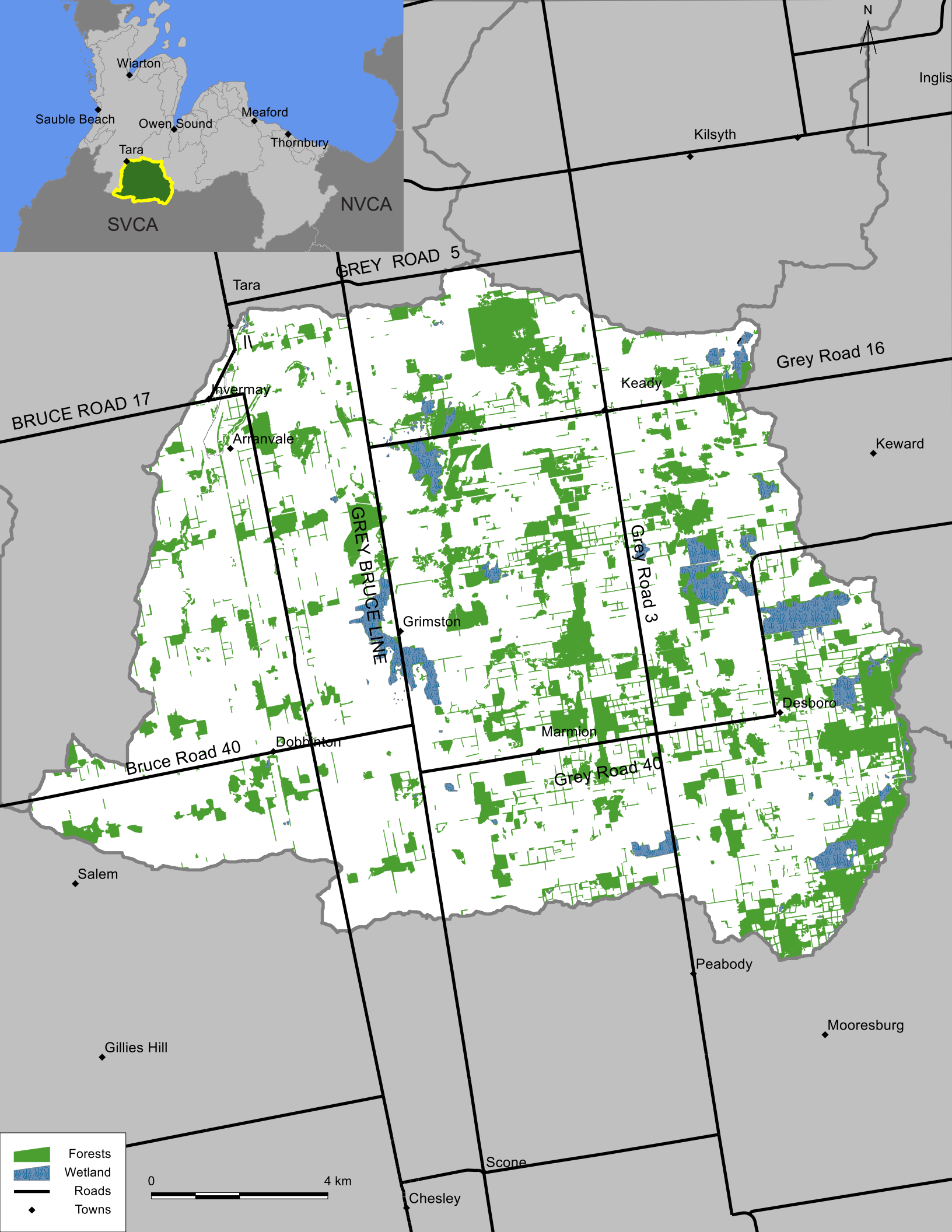
- Township of Chatsworth
- Municipality of Arran-Elderslie
- Township of Georgian Bluffs



- Clay Loam
- Fine To Moderately Coarse Sandy Loam
- Medium To Moderately Fine Loam
- Organic
- Other
- Silty Clay
- Silty Loam

Soils







**STREAM
HEALTH:**
FAIR

TREND:
NO TREND



GRADING CHART:

A: EXCELLENT

B: GOOD

C: FAIR

D: POOR

F: VERY POOR

**INSUFFICIENT
DATA**

STREAM HEALTH

Overall, surface water quality in the Upper Sauble subwatershed received a “C” letter grade, indicating fair water quality. The only stream sampling location is near the bottom end of this subwatershed, just upstream of the former Tara Dam site within the Grey Sauble Conservation Authority’s (GSCA) Tara property. Sampling began in 2012 and has provided 6 years of continuous data.

The “75th percentile” is used to evaluate most water chemistry parameters. The resulting value typically represents the normal levels found in the water samples. Total Phosphorous is generally the most common parameter of interest for surface water monitoring. It is important to continue to monitor this parameter due to growing concerns 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.

Over the two monitoring periods, total phosphorous levels have remained constant but are generally higher than the Provincial Water Quality Objective of 0.03 mg/l. Landowners are urged to continue implementing Best Management Practices (BMP’s) in order to improve current levels.

Fecal bacteria (E.coli) levels are generally summarized by their Geometric Mean values. The Provincial Water Quality Objective for swimming conditions is 100 count/100 ml. This level is used to determine if beaches are safe for swimming. High E.coli counts are common in local waterways after large rain events carry stormwater from urban areas or flush sediment and manure from agricultural fields. Unrestricted livestock access to waterways can also directly contribute E. coli to surface water. In general, geometric mean E. coli levels have consistently remained below the Provincial objective at this sampling location.



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

The Family Biotic Index (FBI) was the index used to determine this stream health grade for this Subwatershed Health Review due to its simplicity. However, GSCA also uses the BioMAP Index, which provides additional insight into the stream's health. This data is presented on Page 13 along with additional water chemistry results. Based on the limited number of samples, the FBI index suggests that stream health has improved slightly from "poor" to "fair".



The table below shows the results for the three parameters that are used to determine the report card grade. Sample size is represented by "n".

INDICATORS	2008-2012	2013-2017	GUIDELINE	INDICATOR DESCRIPTION
Total Phosphorus (mg/L)*	0.034 C (n=8)	0.035 C (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)**	68.17 B (n=8)	55.36 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***	5.96 D (n=2)	5.31 C (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).



D **FOREST
CONDITIONS:
POOR**

**TREND:
STABLE**



FOREST CONDITIONS

GRADING CHART:

A: EXCELLENT

B: GOOD

C: FAIR

D: POOR

F: VERY POOR

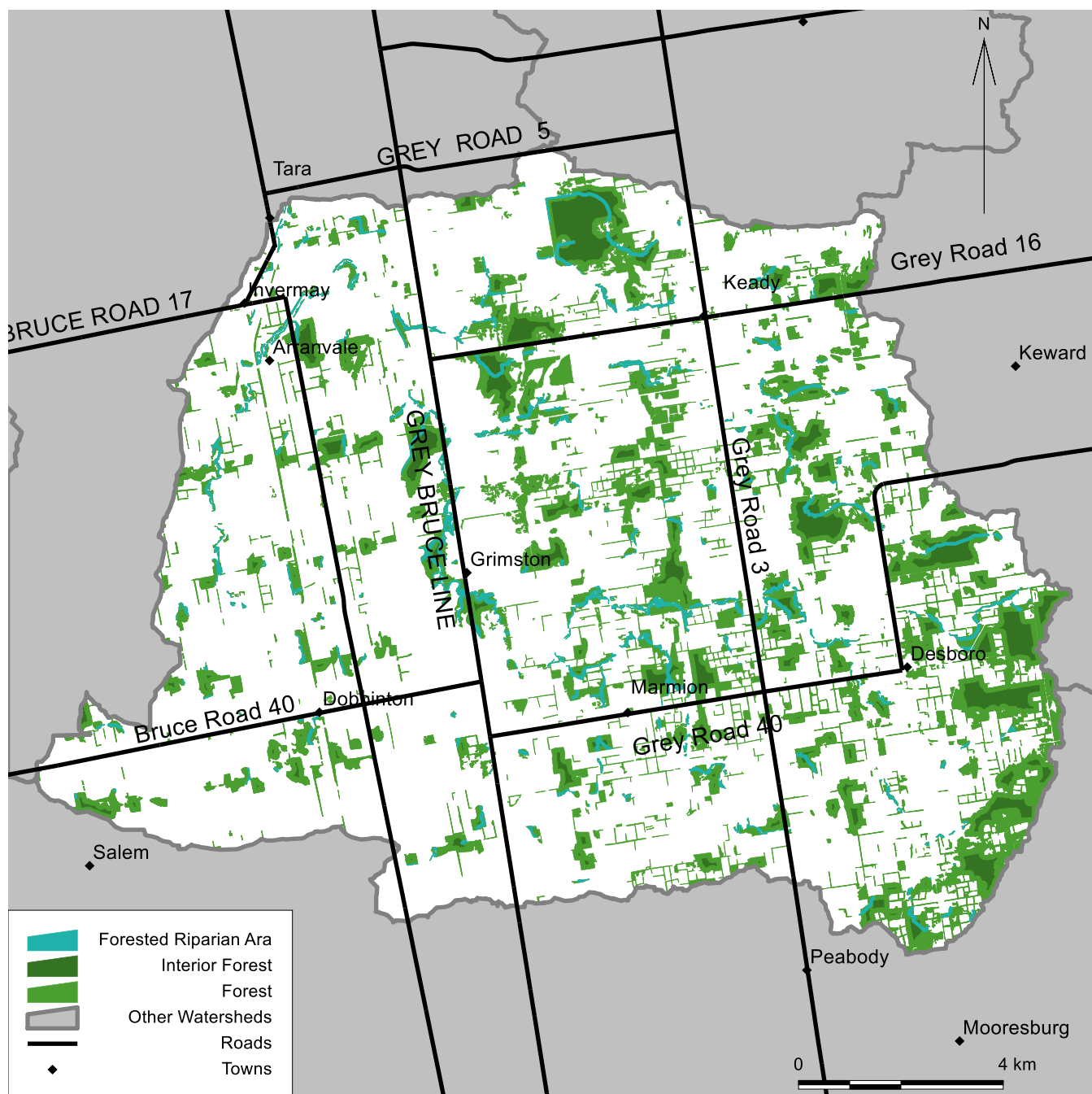
**INSUFFICIENT
DATA**

Forest cover is calculated by using up-to-date air photos and applying Geographic Information Systems (GIS) mapping and analysis techniques. It takes over 20 years for trees to become large enough to count towards the Subwatershed Health Review. Currently, GSCA has planted approximately 69.5 hectares of trees in this subwatershed.

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 or more to be eligible for a tax break.

This map shows overall forest cover, interior forest, and riparian forests on public and private properties throughout the subwatershed. The Upper Sauble subwatershed has some of the most productive farmland within the Grey Sauble jurisdiction. As a result, most of the forests have been cleared from the area. Total forest cover is graded a "C", but the patches are small and fragmented resulting in poor interior forest cover and poor forest cover along the waterways. The overall grade is a "D". Some tree planting has occurred within the watershed but improving the overall grade will be challenging. Any improvements to the overall tree coverage will be considered a huge benefit.

There are two GSCA properties in the Upper Sauble subwatershed, totaling 56 hectares of forest.



INDICATORS	2008-2013	2013-2018	ECCC GUIDELINE**	INDICATOR DESCRIPTION
% Forest Cover	18.83 D	18.85 D	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	2.94 D	2.84 D	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	22.38 D	22.70 D	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).



C **WETLAND
CONDITIONS:**
FAIR

TREND:
NO TREND



WETLAND CONDITIONS

GRADING CHART:

A: EXCELLENT

B: GOOD

C: FAIR

D: POOR

F: VERY POOR

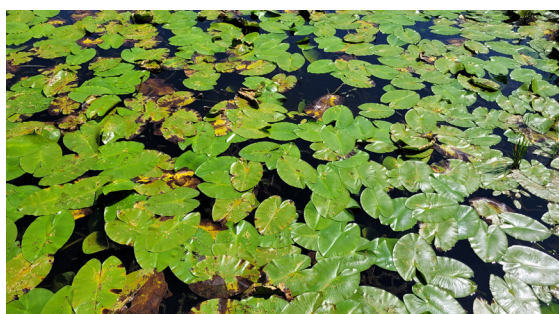
**INSUFFICIENT
DATA**

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.

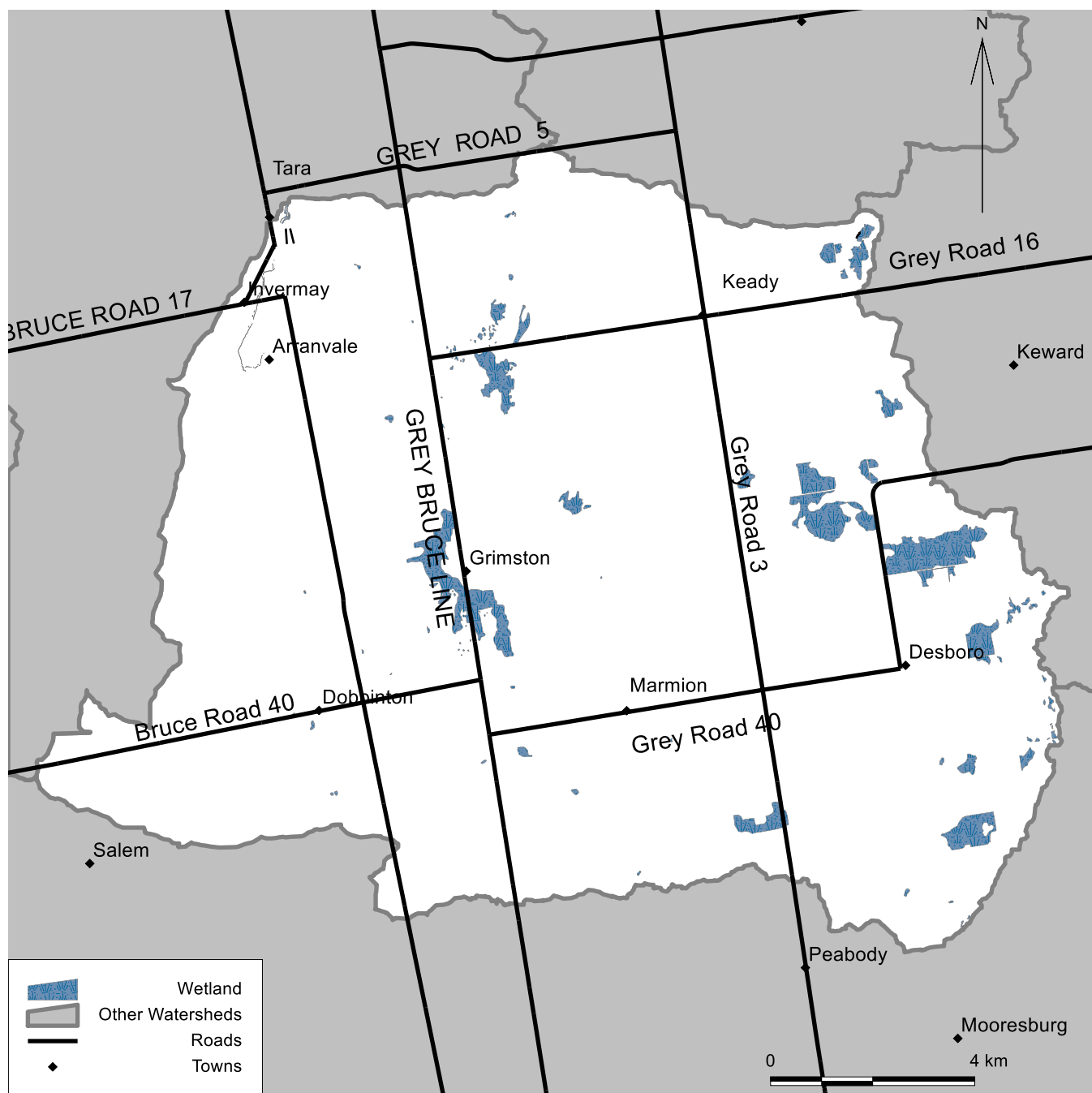
Wetland cover was calculated using up-to-date air photos and applying Geographic Information Systems (GIS) and analysis techniques. Grey Sauble staff are constantly working to improve wetland information on a local scale. Future updates to this data may occur after confirming actual wetland cover on the ground. Other changes to the existing wetland cover may result from drainage practices or wetland creation projects.

Coverage in this subwatershed is poor when compared to Environment and Climate Change Canada's habitat recommendations. The Upper Sauble subwatershed currently has 3% 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 Tara Wetland is a Provincially Significant Wetland located approximately 10 km upstream from the Village of Tara. This 131 hectare wetland, comprised of both swamp and marsh communities, is an important hydrologic feature and provides excellent wildlife habitat. It is home to several significant species, including Northern Pintail, Red Fox, numerous waterfowl species and also provides spawning habitat for Northern Pike.



INDICATORS	2013-2017*	ECCC GUIDELINE**	INDICATOR DESCRIPTION
Wetland Cover (%)	3.27 C	10 B	Percent wetland cover is the percentage of the watershed that is 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
	D: POOR
	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. However, there are no PGMN wells in Upper Sauble subwatershed. There is insufficient information available to grade groundwater within this subwatershed.

Surficial Geology and Soils

The Upper Sauble subwatershed is dominated by stoney, sandy, silt till and is part of the Late Wisconsinian glacial formation.

Drinking Water Source Protection

The community of Tara has a large residential municipal groundwater system with three supply wells that 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 E.coli, which are not common in deeper groundwater sources. The Tara wellhead protection area (WHPA) includes capture zones extend predominantly in an easterly direction to a maximum distance of approximately 3.7 km from the wells. Furthermore, a WHPA-E was delineated for Tara Well No. 3, which is located 50m from the Sauble River and its floodplain. Under flood conditions, areas are not only affected within the town of Tara but also further upstream. The WHPA-E extends 4.8 km in the upstream direction of the river flow and includes all tributaries within the 2-hour Time-of-Travel. A 120m setback or the regulation limit, and areas with agricultural tile drainage were added.

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.

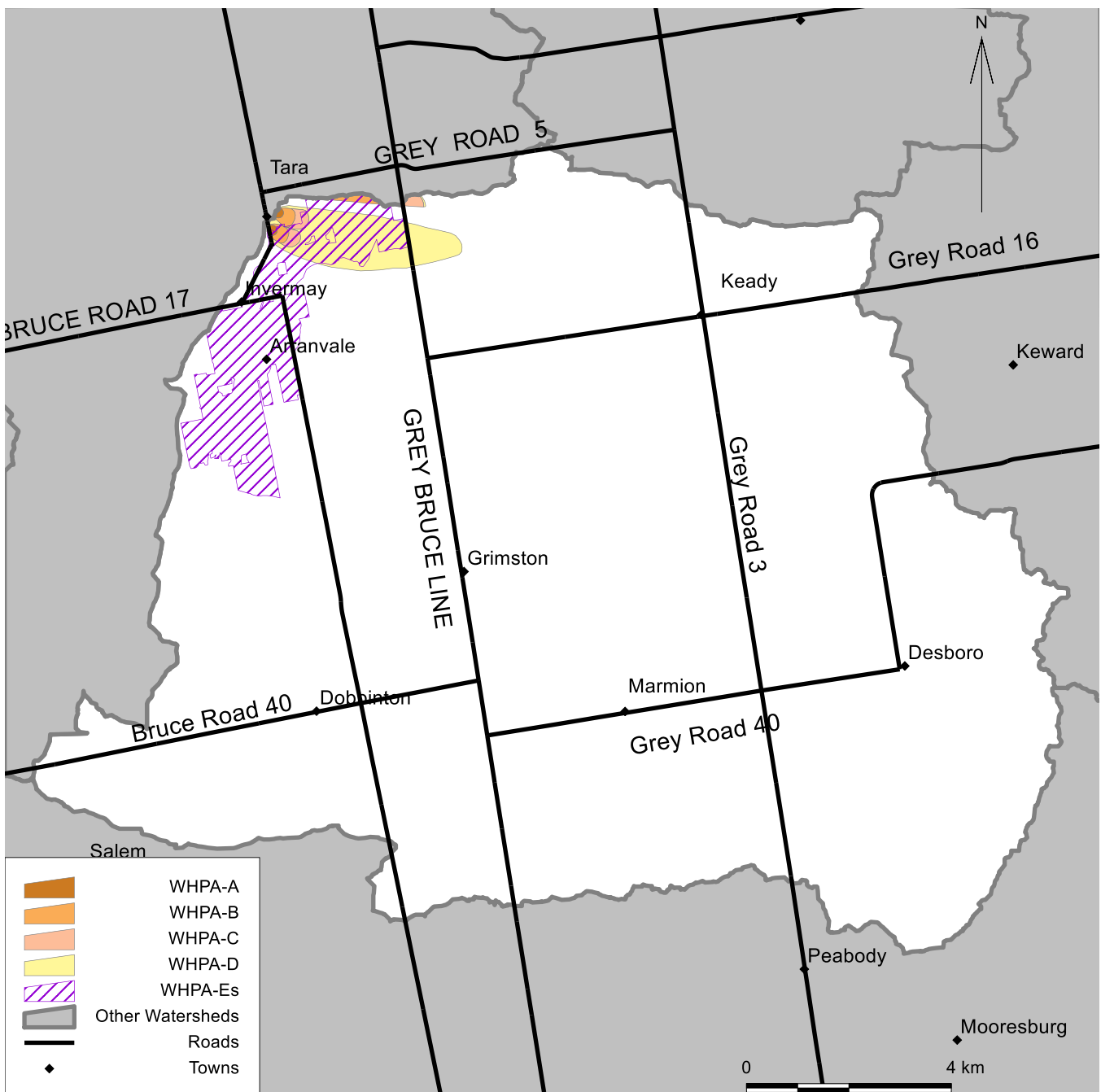
WHPA-A: 100 m radius around a municipal well

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.
- Adopt 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

In addition to the parameters used to grade the surface water quality section, a suite of other chemical parameters are tested through 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.

CHEMICAL PARAMETERS	2008-2012	2013-2017
Nitrate (mg/L)*:	2.16 (n=8)	1.19 (n=40)
Chloride (mg/L)*:	N/A	12 (n=39)
Particulate residue (mg/L)*:	N/A	3 (n=39)

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 Authorities due to the added identification requirements and the grading system used for the watersheds is unique to GSCA.

	2008-2012	2013-2017	STREAM (4-16M)	GUIDELINE
Benthic Score BioMAP*(Qualitative)	3.22 B (n=1)	3.06 B (n=3)	A=>3.4 B=>3.0 C=2.4-3.0 D=<2.4 F=<2.0	>3.0 B Target Only

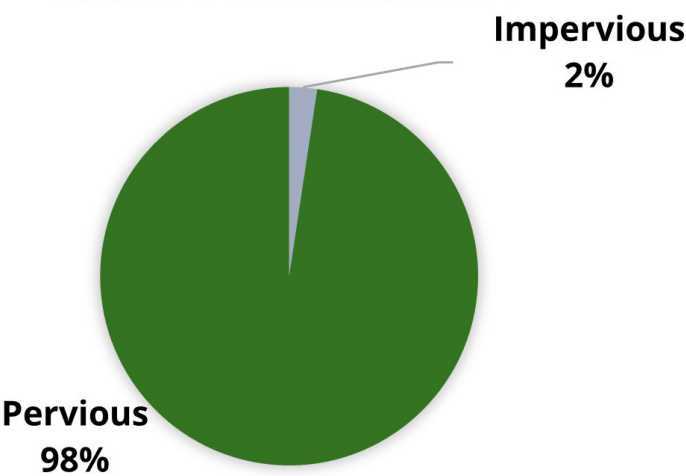
Canadian Council of Ministers of the Environment. (2012). Nitrate Fact Sheet. Retrieved online from, <http://ceqg-rcqe.ccme.ca/download/en/197/>
Canadian Council of Ministers of the Environment. (2011). Chloride Fact Sheet. Retrieved online from, <http://ceqg-rcqe.ccme.ca/download/en/337/>
Canadian Council 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

299.94 km
of watercourses

463 ha
AREAS OF NATURAL AND
SCIENTIFIC INTEREST (ANSI)
For Example: Dobbington
Esker and Tara Moraine



Rare Species

Brook Trout

Invasive Species

Phragmites, Giant
Hogweed, Wild Parsnip

Fish Species

Blacknose Dace,
Blackside Darter,
Bluntnose Minnow, Brook
Stickleback, Brook Trout,
Central Mudminnow,
Common Shiner 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 conservation 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

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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!

