

Willow Creek SUBWATERSHED

Health Check 2018



Nottawasaga Valley
Conservation Authority

The Nottawasaga Valley Conservation Authority is your public agency dedicated to the preservation of a healthy environment. As your partner, the NVCA provides the expertise to help protect our water, our land, our future.



WHAT IS A SUBWATERSHED HEALTH CHECK?

NVCA's subwatershed health checks provide an overview of forest, wetlands, stream and groundwater health within the larger NVCA watershed. They also identify stewardship priorities, future challenges and opportunities to improve environmental health.

Watershed health checks were completed for all nine of NVCA's subwatersheds in 2018, and are produced every five years. Our science monitoring staff collects samples from forests, wetlands, streams and groundwater for data analysis. Our stewardship staff uses this information to determine the success of past restoration projects and areas in need of improvement.

NVCA began producing Subwatershed Report Cards in 2007. In 2013, they were renamed to Watershed Health Checks in an effort to differentiate these reports from Conservation Ontario's province-wide Watershed Report Cards.

What is a subwatershed?

A subwatershed is a smaller watershed within a larger basin. The water from the subwatershed contributes to a stream connected to the main river. In the Nottawasaga Valley Watershed, this river is the Nottawasaga River. Everything in a subwatershed is connected, meaning our actions upstream can affect conditions downstream.

Nottawasaga Valley Watershed's nine subwatersheds

- Blue Mountains Subwatershed
 - Lower Nottawasaga Subwatershed
 - Willow Creek Subwatershed
 - Mad River Subwatershed
 - Pine River Subwatershed
- Middle Nottawasaga River Subwatershed
 - Boyne River Subwatershed
 - Upper Nottawasaga Subwatershed
 - Innisfil Creek Subwatershed



WHAT WE MEASURED

We measured the status and health of the forests, wetlands, streams and groundwater in each subwatershed. We also reported the number of stewardship projects that were completed from 2002 to 2016.



Why Measure?

Measuring helps us better understand our watershed. With this information, we can better target where planning and restoration is needed and track progress of watershed conditions.

OUR GRADING SYSTEM

VERY GOOD	An environment that is at or close to natural conditions
GOOD	An environment close to natural conditions with minor disturbance
FAIR	A disturbed environment
POOR	A highly disturbed environment
VERY POOR	An environment that lacks natural features
NO DATA	Not enough data to make a conclusion

WHERE ARE WE?



ABOUT THE WILLOW CREEK SUBWATERSHED

Willow Creek and Matheson Creek are the two main streams in the Willow Creek subwatershed.

Willow Creek arises on the rolling sand loams of the Simcoe Uplands near the hamlet of Edgar. It flows into Little Lake – one of the few natural lakes in the Nottawasaga River watershed – just north of Barrie. The creek then enters a deep, groundwater-rich valley as it flows westward through Midhurst.

Matheson Creek arises along the forested slopes of the Oro Moraine near Craighurst and flows southward through a forested sand plain valley that cuts through the nearby uplands. It converges with Willow Creek northwest of Midhurst.

Downstream, Willow Creek flows through agricultural lowlands before entering the Minesing Wetlands west of George Johnston Road (County Road 28). Willow Creek discharges to the Nottawasaga River at the north end of the wetland.

Several small creek systems, the largest of which is Black Creek, arise along the groundwater-rich slopes of the Algonquin Bluffs near Snow Valley (south of Willow Creek). These creeks enter the Minesing Wetlands, joining with Willow Creek downstream of George Johnston Road.





FOREST CONDITIONS

Status: Good
Trend: Insufficient Data

Forests Conditions in the Willow Creek subwatershed are healthy. Large forests provide significant habitat for wildlife species that require forest interior habitat (deep, undisturbed forests) to thrive.

Forest cover is concentrated on the Oro Moraine and Algonquin Bluffs, as well as the Matheson Creek and Willow Creek valley corridors. The rolling sand loams of the Simcoe Uplands to the north and southwest of Little Lake are well-suited for agriculture and therefore support less forest cover.

Marsh and swamp wetlands within the subwatershed provide important habitat for a wide range of wildlife. An extensive fen is an open wetland dominated by low shrubs, ferns, sedges and grasses which supports rare plants and wildlife in the Minesing Wetlands.

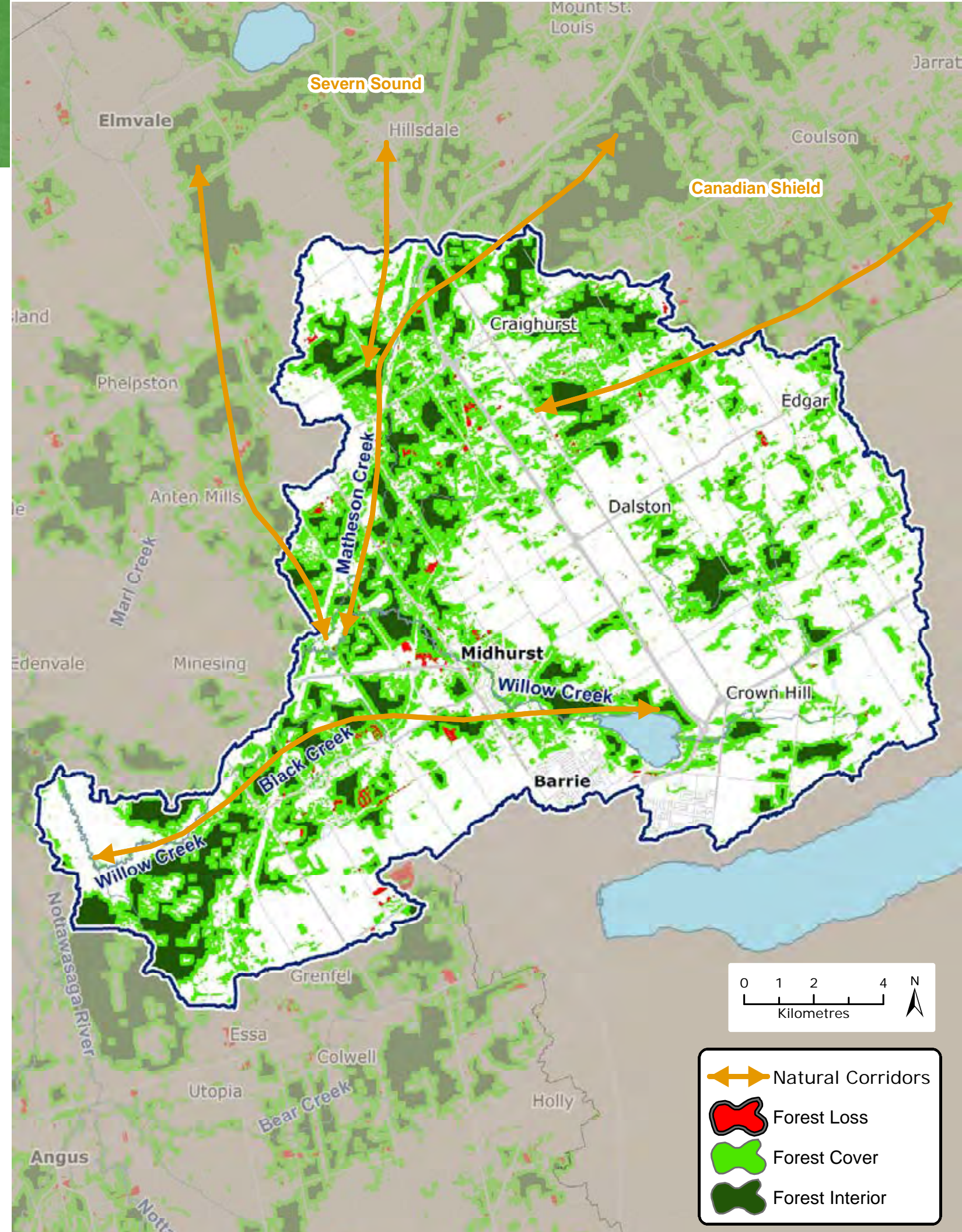
Mixed and coniferous forests in within the Minesing Wetlands, the Willow Creek valley and the headwaters (creek source area) of Matheson Creek provide shelter and food for deer during the harsh winter months.

As shown with orange arrows in map, forests cover in the Willow Creek subwatershed provides important linkages to nearby natural areas within the Nottawasaga River, Severn Sound and Lake Simcoe watersheds. This forest cover is also part of a significant natural corridor that extends from the Niagara Escarpment through the Minesing Wetlands and onto the Canadian Shield of Orillia.

Due to the lack of updated forest cover mapping, Global Forest Change analysis was used showing that there was a loss in subwatershed forest cover of 101 hectares (ha). This method of analysis did not explain the cause of the forest loss or allow for the determination of the amount of forest gain.

Indicators	Willow Creek Subwatershed	NVCA Watershed	Indicator Description
Forest Cover	41.2% (12,618 ha)	33.39%	Forest cover is the percentage of the watershed that is forested. Environment Canada suggests that 30% forest cover is the minimum needed to support healthy wildlife habitat; more coverage is beneficial.
Forest Interior	11.3% (3,455 ha)	9.11%	Forest interior is the area of forest that lies more than 100 m from a forest edge – away from the windy, dry conditions and predators that are associated with the edge. Sensitive forest birds, mammals, reptiles and amphibians require deep forest habitat for survival. Environment Canada suggests that 10% forest interior cover is the minimum needed to support a range of species.
Riparian Cover	59.4% (1,620 ha)	52%	Streamside vegetation (riparian cover) filters pollutants and provides important fish and wildlife habitat. Environment Canada suggests that at least 30 m on each side of the stream (over 75% of its length) should be in natural cover to support healthy streams. Only forest cover was available for riparian cover assessment in this Watershed Health Check.

Rating Scale:





WETLAND CONDITIONS

Status: Good
Trend: Declining

Wetlands play an important role in the ecological health of a subwatershed. They improve water quality by filtering runoff from agricultural and urban areas. Wetlands control flooding, reduce erosion and help maintain stream flows during dry periods by holding back water on the landscape. The wetland swamps, marshes and fens (an open wetland dominated by low shrubs, ferns, sedges and grasses) in the Willow Creek subwatershed provide habitat for a rich variety of plants and animals.

Wetland conditions within the Willow Creek subwatershed meet Environment Canada's wetland habitat guidelines, however, historical wetland loss has occurred. Ducks Unlimited Canada data indicate historical wetland loss in the former Vespra Township (the southern part of Springwater Township within the subwatershed) is 37%.

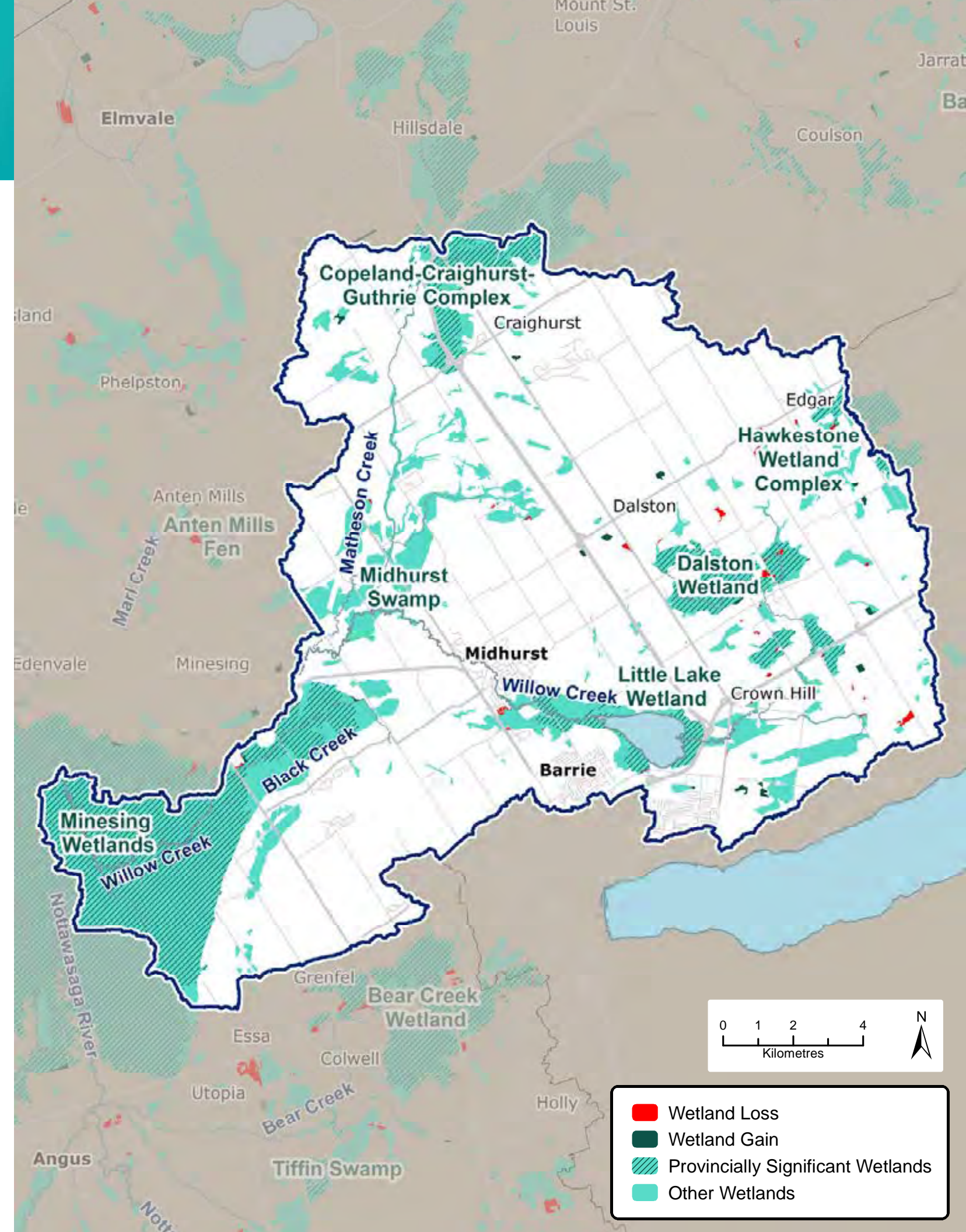
In Willow Creek subwatershed, based on satellite photo interpretation, between 2009 and 2016 there was a net subwatershed wetland loss of 4.5 hectares (ha). This represents a 0.1% decrease in wetland cover since 2008. Wetland loss was mostly associated with agricultural conversion and urban development activity.

At over 6,000 hectares, the Minesing Wetlands is recognized as internationally significant because of its important ecological, economic and cultural values. Extensive marshes along Willow Creek in Minesing support a rich variety of marsh bird species including the threatened Least Bittern. The Minesing Wetlands provide critical flood control functions for Wasaga Beach, holding back upstream floodwaters for several days and releasing it into the Nottawasaga River. The Minesing Wetlands is also a great place to go paddling.

Five groups of wetlands within the Willow Creek subwatershed have been evaluated as provincially significant by the Ontario Ministry of Natural Resources and Forestry: Minesing Wetlands, Little Lake Wetlands Complex, Dalston Wetlands Complex, Hawkstone Wetland Complex and the Copeland-Craighurst-Guthrie Wetland Complex. Provincial and municipal planning policies help protect these wetlands from development and site alteration. A number of unevaluated wetlands could be added to the evaluated Midhurst Swamp and Little Lake wetland complexes.

Indicators	Willow Creek Subwatershed	NVCA Watershed	Indicator Description	Trend (2009-2016)
Wetland Cover	23.4% (7,179 ha)	14.2%	10% wetland cover has been identified as a minimum guideline for healthy watersheds (Environment Canada).	Down -4.5 ha
Wetland Buffer (100m buffer area)	43.4% (2,065 ha)	39.2%	A buffer is a vegetated area next to a wetland or stream. Many wetland wildlife species require nearby upland areas for foraging, nesting and other activities. Only forest cover was available for buffer assessment through the 2018 Watershed Health Check.	Insufficient data

Rating Scale:



- Wetland Loss
- Wetland Gain
- Provincially Significant Wetlands
- Other Wetlands



STREAM HEALTH

Status: Fair
Trend: Declining

Stream health is determined by testing water chemistry and evaluating the health of benthic macroinvertebrates (water bugs). They are categorized as Unimpaired (very healthy), Below Potential (moderate health) and Impaired (very poor health). Final grades, like in the table below, are arrived at by merging these two factors.

Stream health in the Willow Creek subwatershed varies greatly ranging from Unimpaired to Impaired. Sections of both Willow and Matheson Creeks support healthy resident trout populations. Little Lake supports northern pike, bass and walleye.

Upstream of Little Lake, Willow Creek is considered Below Potential as it flows through a rolling agricultural landscape, receiving nutrients from the farm fields. Downstream of Little Lake, Willow Creek enters a forested, groundwater-rich (springs) valley extending through Midhurst and beyond to its confluence (where rivers join) with Matheson Creek. In normal conditions, stream health would improve as the river flows through the forest and is recharged with groundwater. A lack of stream health improvement, despite these beneficial inputs, shows the lingering effects of nutrient and algae-rich waters leaving Little Lake as well as inputs (nutrients, stormwater runoff) from the urban areas in Midhurst.

Flowing through a forested valley for much of its length, the stream health in Matheson Creek is graded as Unimpaired from its headwaters downstream to west of County Road 27. Near their confluence, Matheson and Willow Creeks are

considered Below Potential, with stream health declining to Impaired as the now combined Willow Creek enters an agricultural plain west of Highway 26. Sparse riparian (streambank) vegetation, livestock access to the creek and channel alteration significantly impact stream health in this area.

Downstream of George Johnston Road, Below Potential conditions return as Willow Creek enters the Minesing Wetlands. Lingering upstream water quality problems have created problematic wetland nutrient processes and significant algae growth in Willow Creek through the Minesing Wetlands, leading to a downgrading of the stream health (from the 2013 Watershed Health Check) through this relatively untouched landscape.

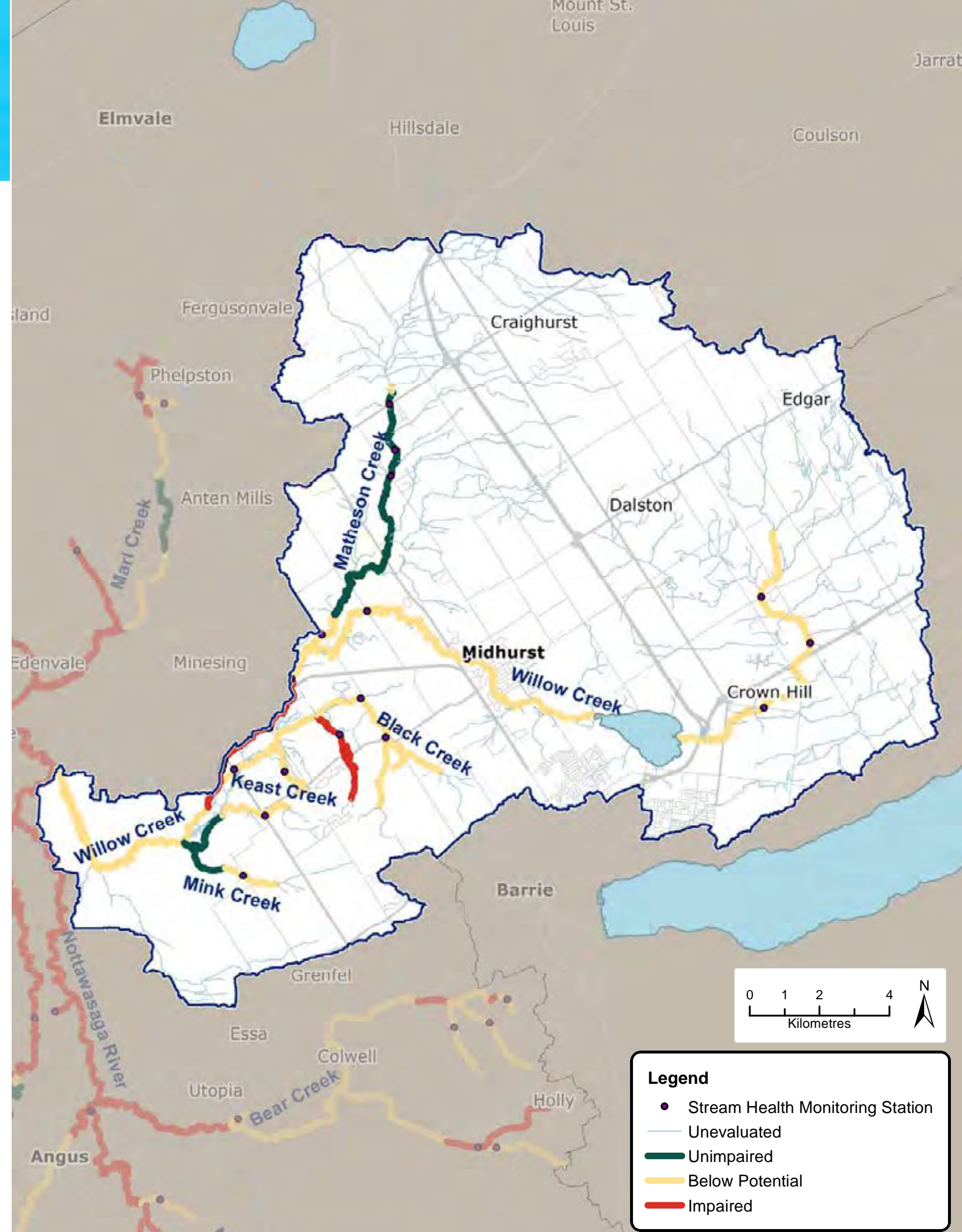
Stream health is variable in the Black Creek system, with some noticeable declines in health along Wilson Road and George Parkway. Formerly healthy cold water streams in this area show signs of degradation from increased development activities.

Nutrient concentrations (total phosphorus) are moderate in Willow Creek at George Johnston Road during low flow conditions, contributing to Impaired stream health.

Overall, stream health has declined since the 2013 Health Check. Part of the overall decline can be attributed to lower monitoring capacity available for the assessment of stream health mapping. The 2018 Watershed Health Check assessed only 19% of the river length in the Willow Creek subwatershed, down from 36% in 2013.

Indicators	Willow Creek Subwatershed	Indicator Description	Indicator Trend (2012-2016)
Benthic Grade	2.06	Insects and other "bugs" that inhabit the streambed are excellent indicators of stream health. Healthy streams receive a score of "3" while unhealthy streams receive a score of "1".	Down
Total Phosphorus (low flow; mg/L)	0.015	Total phosphorus indicates nutrient levels within a stream. Our healthiest streams have levels less than 0.01 mg/L during low flow conditions. Willow Creek range: 0.002–0.092 mg/L. Provincial Water Quality Guidelines suggest that levels greater than 0.03 mg/L result in unhealthy stream conditions.	No Change

Rating Scale:





GROUNDWATER QUALITY

Status:
 Chloride: Fair to Very Good
 Nitrate + Nitrite: Very Good

Groundwater is water that is stored underground in soils and bedrock fractures. When it rains or when snow melts, water absorbs into the ground, eventually feeding local streams and wetlands or filter down into aquifers. Aquifers may be separated into different layers. Sediments that are relatively impermeable, such as clay and silt, offer protection by limiting the amount of water to flow into the aquifer. This layer is called an aquitard. Aquifers located below aquitards are preferred drinking water sources.

It is important to keep contaminants out of groundwater because it supports a variety of uses including municipal and private water supplies, agricultural irrigation, and is a source for rivers and streams. Contaminants can come from both urban and rural areas. Chloride and nitrate are used here as indicators for groundwater quality. In urban areas, groundwater is susceptible to chloride due to excessive application of winter salt on roads and parking lots. In rural areas, nitrate in groundwater can be due to excessive and improper use of crop fertilizers.

Staff from the NVCA and the Province of Ontario have been working with municipalities, communities, and individual residents to reduce the potential for groundwater contamination. For opportunities to reduce these contaminants, please refer to the Watershed Stewardship section.

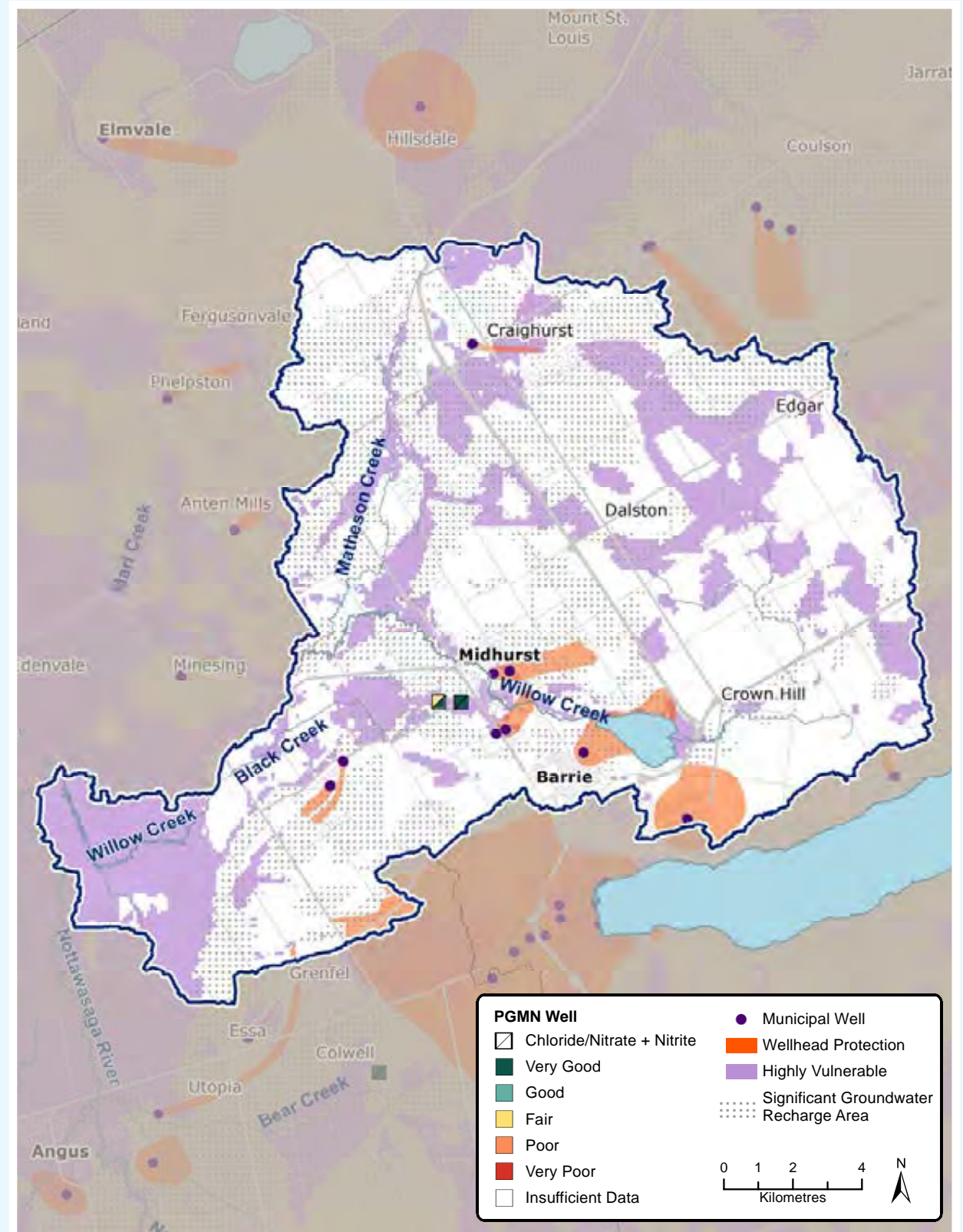
In the Willow Creek subwatershed, there are 17 municipal wells providing drinking water to residents. Through the Provincial Groundwater Monitoring Network (PGMN) partnership with the Ministry of the Environment, Conservation, and Parks, NVCA monitors water levels and water quality at two PGMN wells in this subwatershed. Groundwater monitoring began in 2003 and sampling has been conducted annually since 2008, allowing NVCA to track changes in groundwater levels and quality over time.

Results to date indicate that the PGMN monitoring wells meet Ontario Drinking Water Quality Standards; however, chloride in the shallow well is approaching the limit. The NVCA requires additional data to interpret trends in groundwater quality at the sampled wells. Since some wells are deeper than others and water chemistry differs between aquifers, individual samples do not necessarily reflect the broader groundwater quality in areas removed from a sampled well.

Indicators	Shallow Wells (0-20m)	Intermediate Wells (21-60 m)	Deep Wells (>60m)	Indicator Description
Number of wells	1	0	1	
Chloride (mg/L)	127.25	No Data	38.40	The Ontario guideline for chlorides in drinking water is 250 mg/L and is based on aesthetic objectives. Drinking water should not exceed this level.
Nitrite & Nitrate (mg/L)	0.06	No Data	0.05	The Ontario standard for nitrite and nitrate is 10 mg/L and is based on the maximum allowable concentration.. Drinking water should not exceed this level.

Results reflect health at the well and should not replace testing at private wells.

Rating Scale:



Ontario's Drinking Water Source Protection Program

Focuses on protecting municipal drinking water sources, including:

Wellhead Protection Areas

areas that contribute water to municipal wells,

Highly Vulnerable Aquifers areas where groundwater is close to ground surface

Significant Groundwater Recharge Areas

areas which feed the aquifers.



WATERSHED STEWARDSHIP

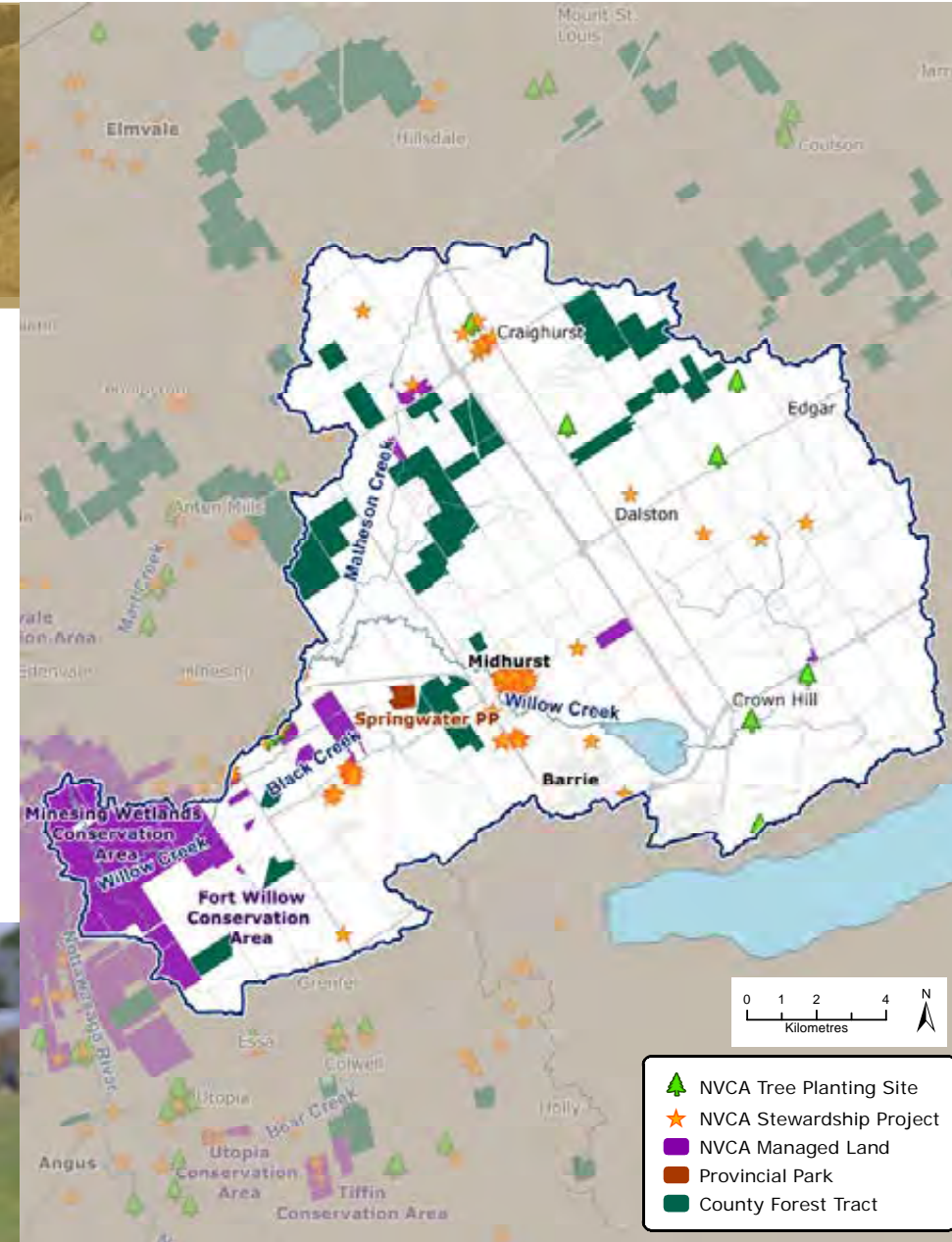


What is Watershed Stewardship?

Watershed Stewardship and Restoration is the responsible and sustainable care of our natural resources and wildlife within a watershed.

Protecting what we have, and enhancing and restoring where possible helps the environment, and protects human uses as well. As caretakers of our environment, we all need to implement stewardship practices that protect and restore natural resources.

We all depend on good stewardship of private and public lands to achieve healthy waters and sustainable ecosystems. With almost 96% of land in our watersheds privately owned, residents can play a critical role.



Forestry Program

The NVCA's Forestry Program provides trees, planting services and forest management advice for landowners throughout the watershed. Between 2002 and 2016, more than 1,691,000 trees have been planted on 363 properties, reforesting 890 hectares of land in the NVCA watershed. These future forests will help to moderate the effects of both drought and flooding, reduce soil erosion, provide habitat for wildlife, improve water quality and groundwater recharge, and mitigate climate change.

Healthy Waters Program

The NVCA's Healthy Waters Program provides landowners with free site visits, technical and financial support for eligible projects, such as tree planting, well decommissioning, stream bank stabilization, exclusion of livestock from streams and wetlands, prevention of manure runoff and nutrient management. Since 2002, landowners in the Willow Creek subwatershed have undertaken 148 stewardship projects through the support of this program. These projects have improved water quality, enhanced fish and wildlife habitat, protected species at risk, and prevented toxic algae blooms & fish kills.

Landowner Grant Assistance

To assist landowners with protecting the environment, NVCA's Stewardship and Forestry Programs provide technical assistance and a range of grant incentives to help offset the cost of projects on private property.

Grant rates range from 25% to 100% of eligible project costs.

To discuss your land management and stewardship goals

**Call us at
705-424-1479**



WATERSHED STEWARDSHIP

RESTORATION PRIORITIES

Each subwatershed in the Nottawasaga Valley encompasses unique landforms and land uses. As a result, stream health trends and watershed restoration priorities differ across subwatersheds.

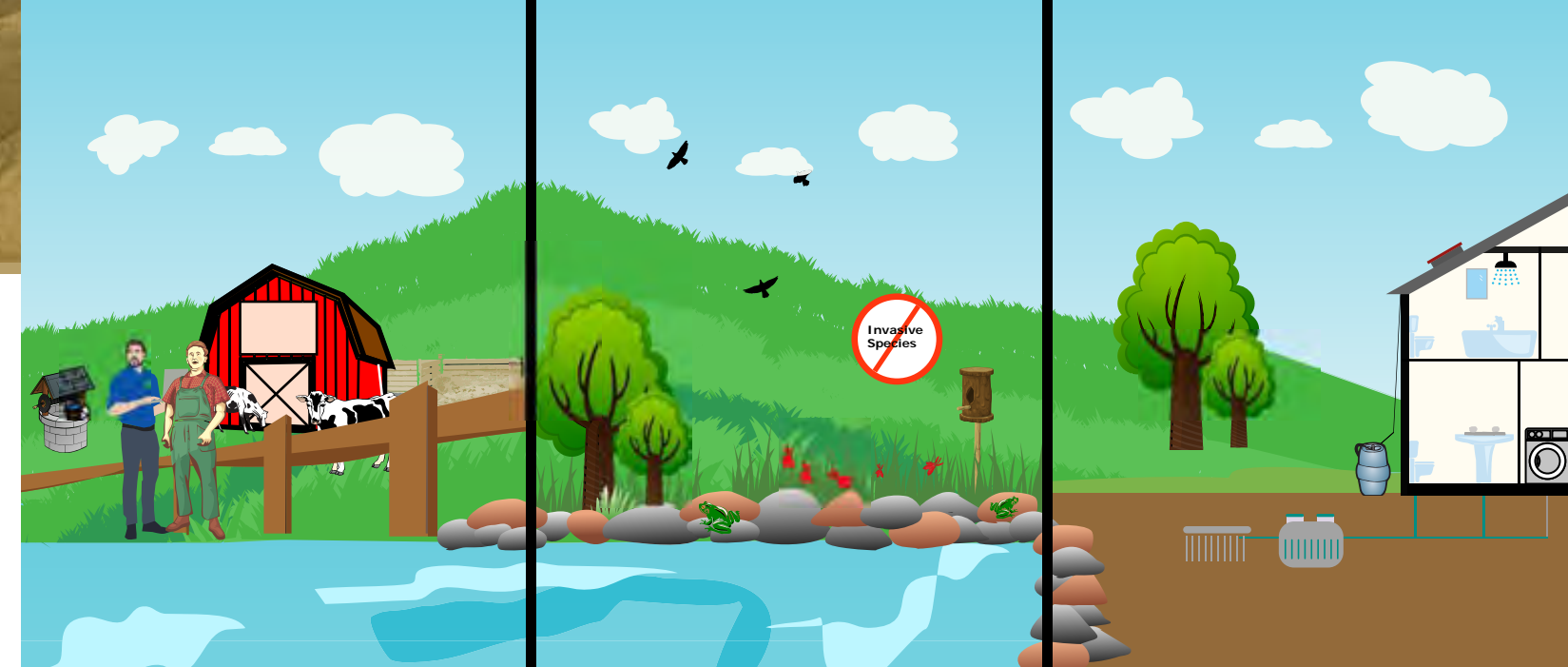
For example the Niagara Escarpment streams to the west are high quality trout streams. Consequently, the restoration priorities within this region align with opportunities to enhance these coldwater habitats as well as address broad water quality improvement objectives. Conversely the lower Nottawasaga River supports warmwater fish

species including Lake Sturgeon, a species at risk. The restoration priorities in this subwatershed are customized to enhance warmwater fish habitat as well as address other needs such as optimizing water quality at Wasaga Beach.

In addition to technical considerations, implementation of the restoration priorities would not be possible without the support from partners including local municipalities, environmental groups, landowners and generous funders.

Restoration Priorities for the Willow Creek Subwatershed

1. Enhance water quality, stream health and the capacity of Willow Creek to receive treated effluent by incorporating natural channel and fish habitat features, such as meanders, pools and stream-side tree cover, into ditched sections of Willow Creek near George Johnston Road.
2. Improve the quality of water entering Little Lake, by establishing vegetated buffer strips and completing agricultural best management practice projects in the upper reaches of Willow Creek.
3. Reduce flooding by increasing soil infiltration rates (speed at which water penetrates the ground) across the watershed by; increasing natural vegetation cover, protecting and restoring wetlands, and adopting low impact development techniques in urban areas.
4. Reduce soil erosion and runoff of both nutrients (e.g. phosphorus) and fecal bacteria, to safeguard surface water (rivers and lakes) and groundwater. This can be achieved through agricultural stewardship practices, streambank stabilization and good septic care.



HOW YOU CAN MAKE A DIFFERENCE

Farm Stewardship

- Upgrade manure storages; divert clean water from barnyards with eaves and berms
- Improve stream health by fencing out livestock
- Buffer streams from cropland and pasture (5-30m)
- Reduce soil erosion through conservation tillage, residue management and cover crops
- Reduce nutrient runoff and save money by implementing nutrient management planning
- Use water conservation measures and work with neighbours to coordinate water takings

Urban Stewardship

- Conserve water in the home – install low flow toilets and showerheads; and in the garden with rain barrels, mulch and rain gardens
- Reduce use of fertilizers
- Don't pour anything down storm drains as these drains flow untreated into rivers and lakes
- Plant neighbourhood trees to moderate the effect of extreme heat and enhance urban spaces
- Support Low Impact Development to increase groundwater recharge and reduce urban flooding

Habitat Restoration

- Protect and create stream and wetland buffers
- Plant natural vegetation between the water and adjacent land use practices
- Stabilize eroding stream banks
- Plant native trees, shrubs, wildflowers and grasses to support birds, pollinators and wildlife
- Learn to identify, safely remove and reduce spread of invasive species

Drinking Water Protection

- Decommission unused wells to prevent surface contaminants from reaching groundwater unfiltered
- Test your well for bacteria at least 3 times per year (your local health unit provides **free** testing)
- Regularly service your septic system (every 2-5 years) and avoid using cleaning products (like bleach) that kills the beneficial bacteria, on which your sewage treatment depends
- Properly dispose of household hazardous waste and pharmaceuticals
- Clean debris from around your well and ensure the lid is vermin proof
- Reduce micro-plastic contamination by installing a filter on you laundry machine

Before (Spring 2007)



After (Spring 2014)



An example of streambank restoration in the Willow Creek subwatershed: Stream bank stabilization and aquatic habitat improvement, Township of Springwater.

NVCA'S EDUCATION PROGRAMS

Over the past three decades, NVCA's Education Program has delivered high quality, hands on, environmentally based outdoor education.

Between 2010 and 2017 alone, 81,925 children and adults from within NVCA's jurisdiction and beyond participated in our programming. Thanks to a long-term partnership with the Simcoe County District School Board, our educators work with students at the Tiffin Centre for Conservation or at their schools to help them connect with local natural environments. NVCA also offers secondary school programming including Specialist High Skills Major certificate programs for high school students focused on their next steps at post-secondary school.

NVCA also develops public programming to help families connect with nature outside of school hours to increase human Eco Health. Active time in nature is known to improve mental and physical well-being, creativity and cognitive ability, while reducing stress, ADHD, depression, diabetes and heart disease.

Did you know that in addition to traditional summer camp, NVCA's programs now include stewardship, newcomer, junior leadership, and outreach camps? For more information about public programming such as drop-in events, festivals, and family nature days, visit www.nvca.on.ca.



‘Fostering a sense of wonder, appreciation and respect for the natural world through experiential learning and outdoor exploration’

PUBLIC LANDS MANAGEMENT

NVCA's land acquisition program focuses on strategic land securement for the long-term protection of natural features and functions. These properties also provide valuable recreational opportunities to watershed residents. The NVCA manages seven properties within the Willow Creek subwatershed totaling 1,795 hectares (ha).

County Forests are managed for a variety of environmental, social and economic purposes. There are 21 Simcoe County Forest tracts, corresponding to 1,990 ha that lies within the Willow Creek subwatershed.

Ontario Parks' mandate is "to protect significant natural and cultural resources in a system of parks and protected areas that is sustainable and provides opportunities for inspiration, enjoyment and education: now and for future generations." Ontario Parks manages one park areas (48 ha) within this subwatershed.

Many local municipalities also acquire and manage lands in the public trust.

IMPROVE YOUR ECOHEALTH IN OUR CONSERVATION AREAS

Natural areas clean our air, protect our water and can have a moderating effect on extreme weather. New research indicates that spending time in nature also provides important benefits that support mental health and emotional well-being.

NVCA owns and manages over 5,000 ha of land in the Nottawasaga Valley watershed, including 12 conservation areas with opportunities to hike, paddle, and fish. Here are some highlights of our conservation areas.

Tiffin Centre for Conservation

Located between Barrie and Angus, the Tiffin Conservation Area is home to NVCA's John Hix Conservation Administration Centre, and home to our Environmental Education Program. There are 18.5 km of looped trails that meander through a mixture of wetlands, forests, and open meadows.

Minesing Wetlands (in this subwatershed)

Minesing Wetlands acts as an important natural flood control reservoir. During periods of high water levels, the wetland fills up with water and slowly releases it into the Nottawasaga River and into Georgian Bay, protecting downstream communities including Wasaga Beach.

In addition to being a flood control mechanism, Minesing Wetlands is recognized as an internationally significant wetland because of its unique plant communities and diverse wildlife. Visitors can paddle, snowshoe or cross-country ski in this conservation area.

Ravines of Matheson (in this subwatershed)

The Ravines of Matheson is one of the properties owned by NVCA within the Willow Creek Subwatershed. This property is being protected for its ecological values and is not publically accessible.

Through Section 28 of the Conservation Authorities Act, NVCA has the responsibility to regulate activities in natural and hazardous areas in order to prevent the loss of life and property due to flooding and erosion, and to conserve and enhance natural resources. For more information, please visit our website at nvca.on.ca.



Did you know...

Land donations to Conservation Authorities may be eligible for tax benefits?

Contact NVCA about leaving a legacy gift of land.



Nottawasaga Valley
Conservation Authority

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Member of



Conservation
ONTARIO

Thank you to all of our landowners, community groups, schools, businesses, municipalities and other government agencies who support stewardship activities in our watershed!