WILLOW CREEK SUBWATERSHED Health Check 2023

Barrie | Oro-Medonte | Springwater





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 2023 Subwatershed Health Checks provide an overview of forests, wetlands, stream and groundwater health across the NVCA watershed between 2017 - 2021. 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 2023, 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 NVCA 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 Middle Nottawasaga River Subwatershed

Boyne River Subwatershed Pine River Subwatershed

Innisfil Creek Subwatershed

Upper Nottawasaga River Subwatershed

Lower Nottawasaga River Subwatershed Willow Creek Subwatershed

Mad River 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 2021.



Forest Conditions



Wetland Conditions



Stream Health



Groundwater Quality



Watershed Stewardship

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

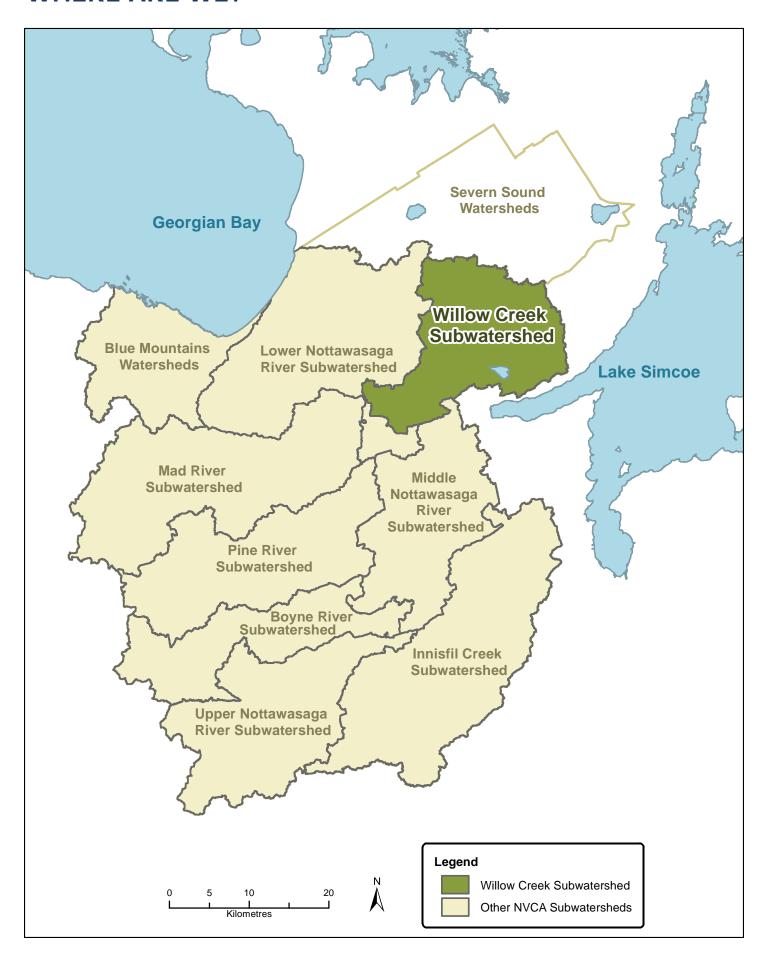
VERY POOR

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.



Status: Very Good

Trend: Declining

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.

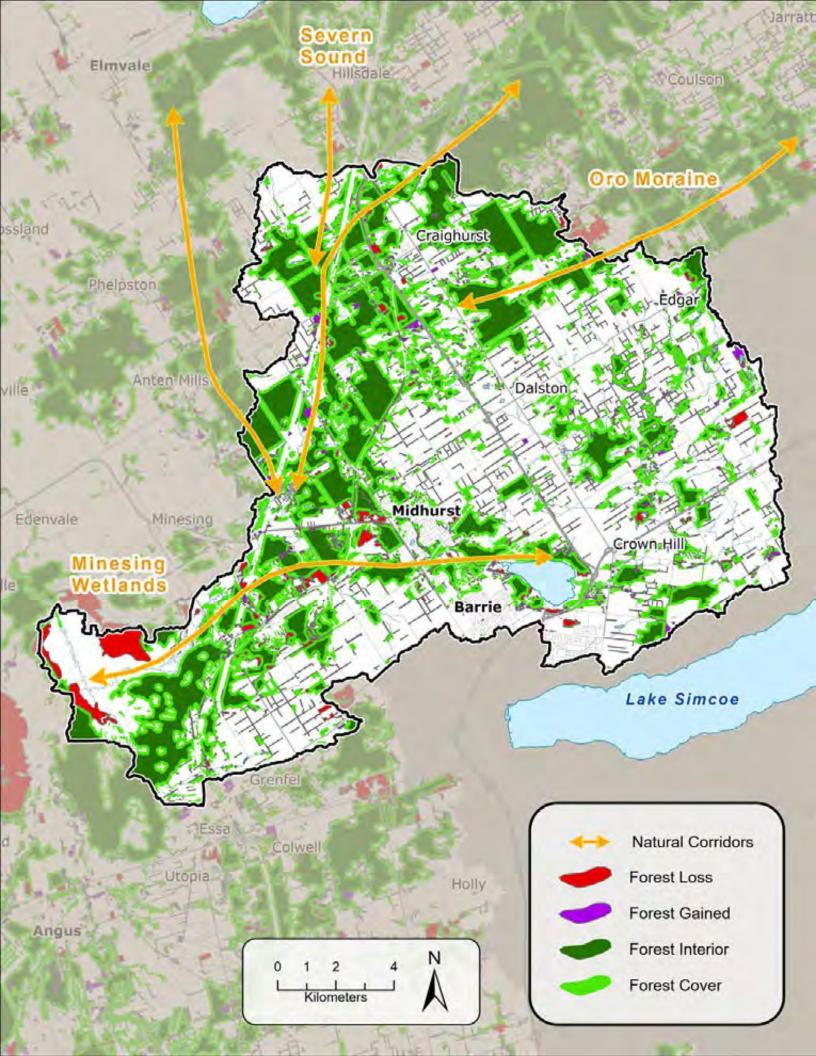
As shown with orange arrows in map, forests cover in the Willow Creek subwatershed provides important linkages to nearby natural areas within the Nottawasaga River, Severn Sound and Lake Simcoe watersheds. This forest cover is also part of a significant natural corridor that extends from the Niagara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

Although forest conditions remain Very Good, forest cover declined by 4.9% (612 ha) between 2008 and 2018. Similarly, forest interior declined by 4.7% (214 ha) over this time period.

Indicators	Willow Creek Subwatershed	NVCA Watershed	Indicator Description	Trend (2008-2018)
Forest Cover	38.7% (11,861 ha)	32.2%	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.	-612 ha (-4.9%)
Forest Interior	14.1% (4,335 ha)	10.2%	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.	-214 ha (-4.7%)
Riparian Cover	79.6% (2,176 ha)	68%	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.	Insufficient Data

Rating Scale:

VERY GOOD GOOD FAIR POOR VERY POOR NO DATA





Status: Good

Trend: Improving

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 subwatershed (1800-2002) is 17%. From 2002 to 2016, an additional net wetland loss of 0.2% (13.7 ha) occurred.

In the Willow Creek subwatershed, based on satellite photo interpretation, between 2016 and 2018 there was a net wetland gain of 5.4 hectares (ha). This represents a 0.1% increase in wetland cover since 2016. Natural wetland

regeneration (53.8 ha) in low-lying areas accounted for all wetland gains. Wetland loss (48.4 ha) was dominated by agricultural conversion.

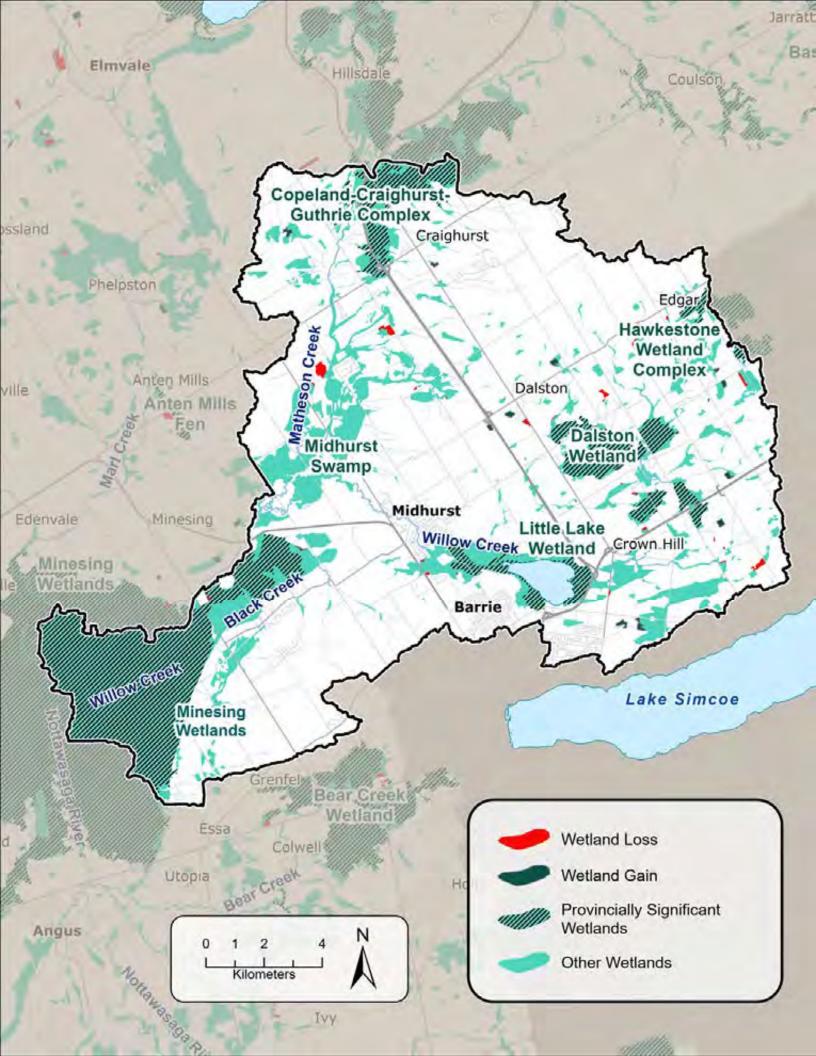
At over 6,000 hectares, the Minesing Wetlands is recognized as internationally significant because of its important ecological, economic and cultural values. Extensive marshes along Willow Creek in Minesing support a rich variety of marsh bird species including the threatened Least Bittern. The Minesing Wetlands provide critical flood control functions for Wasaga Beach, holding back upstream floodwaters for several days before releasing flows back 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 Wetland, Dalston Wetland, Hawkstone Wetland Complex and the Copeland-Craighurst-Guthrie Wetland Complex. Provincial and municipal planning policies help protect these wetlands from development and site alteration.

Indicators	Willow Creek Subwatershed	NVCA Watershed	Indicator Description	Trend (2016-2018)
Wetland Cover	23.7% (7,263 ha)	14.5%	10% wetland cover has been identified as a minimum guideline for healthy watersheds (Environment Canada).	+5.4 ha (+0.1%)
Wetland Buffer (100m buffer area)	54.8% (2,627 ha)	49.6%	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:

 VERY GOOD
 FAIR
 POOR
 VERY POOR
 NO DATA





Status: Fair

Trend: No Change

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 are determined 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 with Matheson Creek (where they join). Under normal conditions, stream health would improve as the river flows through the forest and is recharged with groundwater. However, 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. Prior to their confluence, Matheson Creek is considered

Below Potential while Willow Creeks has become Impaired due to agricultural impacts including heavy bank erosion. After they join, Willow Creek stream health declines to Impaired as it 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.

At George Johnston Road, through the efforts of NVCA Stewardship program habitat improvements are bringing life back to lower Willow Creek. 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 periods of anoxia (no oxygen) that can suffocate aquatic species, despite Minesing being a relatively untouched wetland landscape.

Stream health is Below Potential in the formerly healthy coldwater Black Creek system. Increased development activity has applied pressure to this sensitive system.

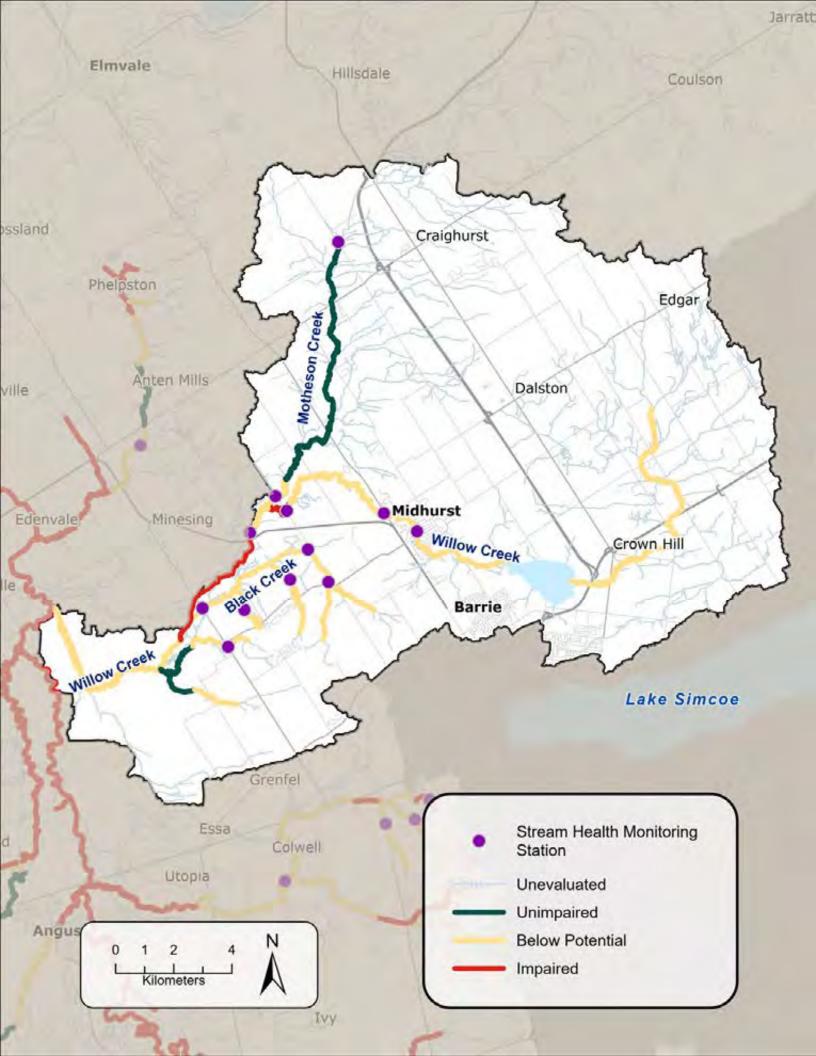
Nutrient concentrations (total phosphorus) are moderate in Willow Creek at George Johnston Road during low flow conditions, contributing to Impaired stream health.

Overall, stream health has declined since the 2013 Health Check. Part of the calculated decline can be attributed to lower monitoring capacity available for the assessment of stream health mapping. The 2023 Watershed Health Check assessed only 19% of the river length in the Willow Creek subwatershed, down from a high of 36% in 2013.

Indicators	Willow Creek Subwatershed	Indicator Description	Indicator Trend (2012-2021)
Benthic Grade	2.11	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"	Improving
Total Phosphorus (low flow; mg/L)	0.017	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: 0.010—0.135 mg/L. Provincial Water Quality Guidelines suggest that levels greater than 0.03 mg/L result in unhealthy stream conditions.	No Change

Rating Scale:

 VERY GOOD
 GOOD
 FAIR
 POOR
 VERY POOR
 NO DATA





Data availability: 13 of 14 years (2008-2021)

Status: Chloride - Very Poor 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 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 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.

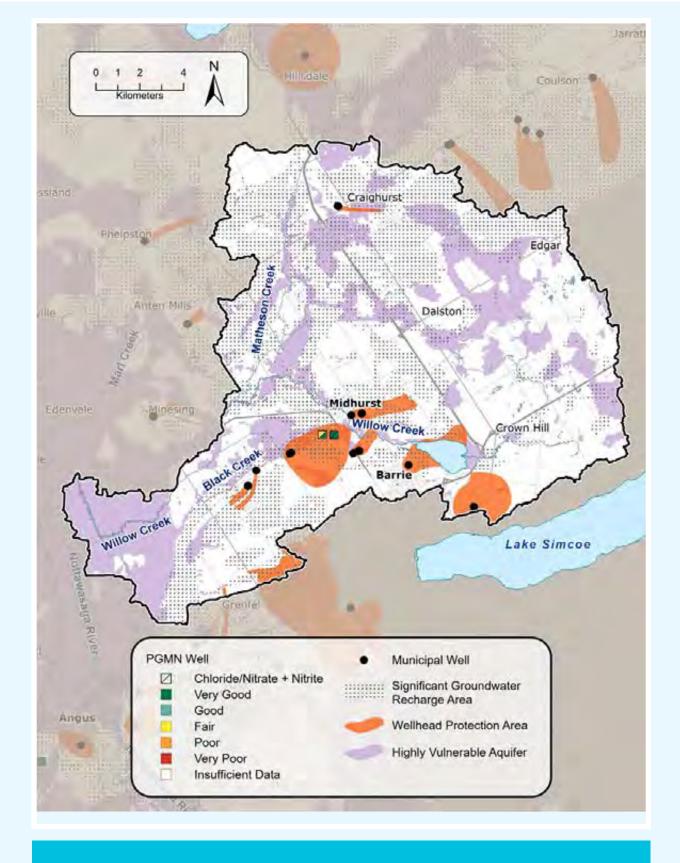
In the Willow Creek subwatershed, there are 18 municipal wells providing drinking water to residents. Through the Provincial Groundwater Monitoring Network (PGMN) partnership with the Ministry of the Environment, Conservation, and Parks, NVCA monitors water levels and water quality at two PGMN wells 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 indicate that the chloride levels in the shallow well exceed the Ontario Drinking Water Quality Standards. Whereas, chloride levels are considered Very Good in the deep well. Nitrate+Nitrite is Very Good in both the deep and shallow wells. 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 the area.

Indicators	Shallow Wells (0-20m)	Intermediate Wells (21-60 m)	Deep Wells (>60m)	Indicator Description
Number of PGMN wells	1	0	1	
Chloride (mg/L)	263.0	No Data	33.9	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)	0.1	No Data	0.1	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.

Rating Scale:

VERY GOOD	GOOD	FAIR	POOR	VERY POOR	NO DATA



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.

Landowner Grant Assistance

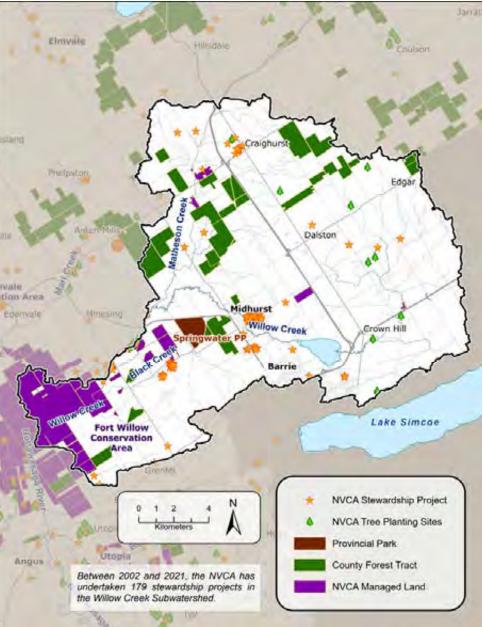
To assist landowners with protecting the environment, NVCA's Stewardship and Forestry Programs provide technical assistance and a range of grant incentives to help offset the cost of projects on private property.

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





Forestry Program

NVCA's Forestry Program provides trees, planting services and forest management advice for landowners throughout the watershed. Between 2002 and 2021, more than 2.3 million trees have been planted on 669 properties, reforesting 1,384 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

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. From 2002 to 2021, landowners in the Willow Creek subwatershed have undertaken 179 stewardship projects on their properties 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.





RESTORATION PRIORITIES

Each subwatershed in the Nottawasaga Valley encompasses unique landforms and land uses. As a result, restoration priorities differ across subwatersheds to their local needs. Healthy waters depend on a healthy watershed; the lands that drain into them.

Engaging landowners, farmers and volunteers in voluntary, hands-on stewardship projects to restore and protect natural infrastructure creates climate resilient landscapes and communities. Habitat restoration of wetlands, rivers, forests, native grasslands and

certain farming practices help create carbon-rich, 'spongy' soils. Healthy soils increase flood attenuation, drought resilience, and reduce pollution-runoff. Other benefits include including reduced water pollution and maintaining cool river temperatures.

The implementation of the restoration priorities would not be possible without support from our partners including local municipalities, environmental groups, landowners and funders.

Restoration Priorities for the Willow Creek Subwatershed

- 1. Complete stream restoration projects including stream-side tree and shrub planting, bank stabilization using natural woody material and livestock exclusion fencing to extend the section with good water quality and coldwater trout habitat to maximize enhance water quality and coldwater trout stream habitat in the Willow Creek.
- 2. Improve water quality in Little Lake by reducing sediment and nutrient inputs through stream-side tree and shrub planting, bank stabilization using natural woody material, livestock exclusion fencing and agricultural best management practice projects
- 3. Protect water quality, fisheries and reduce the likelihood of toxic algae blooms on the Willow Creek by offsetting additional phosphorus loading from expanding development.
- 4. Reduce flooding by increasing soil infiltration rates across the watershed by increasing natural vegetation cover, protecting and restoring wetlands, encouraging farm soil health practices, and adopting low impact development techniques in urban areas.
- 5. Reduce soil erosion and runoff of nutrients (e.g. phosphorus) and fecal bacteria, to protect streams, lakes and groundwater through agricultural stewardship practices, streambank stabilization and good septic care.
- 6. Restore swamp forest within the Minesing wetlands to protect species at risk.

Before (2020) After (2021)

An example of streambank restoration in the Willow Creek subwatershed: For over 10 years, NVCA staff and volunteers have been installing Christmas trees into the streambank. These structures act like sediment traps and use natural processes to recreate the meanders that existed in Willow Creek many years ago.



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

NVCA'S EDUCATION PROGRAMS

NVCA's Environmental Education Program has been delivering high-quality programming for over 40 years. During 2009-2022, we have collectively interacted with more than 132,000 students whom have visited us at the Tiffin Centre for Conservation, or we have been invited to visit school yards and green spaces to deliver outdoor programming within their communities.

Our current inventory of over 40 different programs cover topics of Science and Technology, Art, Cultural History, Geography, Survival Skills and Outdoor Recreation which increasingly incorporates Indigenous ways of knowing. Further, the NVCA Education Program has always kept step with provincial curriculum while addressing real time environmental issues, opportunities and solutions.

As such, the most recent program developments have included a climate change program for elementary students, and will soon include one for secondary schools.

We hire professionals from a wide variety of expertise including Ontario College of Teachers educators, and graduates from science, environmental studies, music, art and recreation, creating a team rich in diverse skills, abilities and knowledge. This enables NVCA wto provide watershed students with the best knowledge and opportunities from the most qualified educator for the subject.

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 ha.

County Forests are managed for a variety of environmental, social and economic purposes. There are 17 Simcoe County Forest tracts, corresponding to 2,080 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 River watershed, including 11 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 approximately 10 km of looped trails that meander through a mixture of wetlands, forests, and open meadows. NVCA manages a portion of the Tiffin Conservation Area on behalf of its partner, Ontario Heritage Trust.

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 publicly accessible.

Fort Willow Conservation Area (in this subwatershed)

The Fort Willow Conservation Area is a significant historical site within the NVCA watershed. This site was originally used by local Indigenous peoples, followed by fur traders, explorers, military and eventually European settlers. It is publicly accessible.

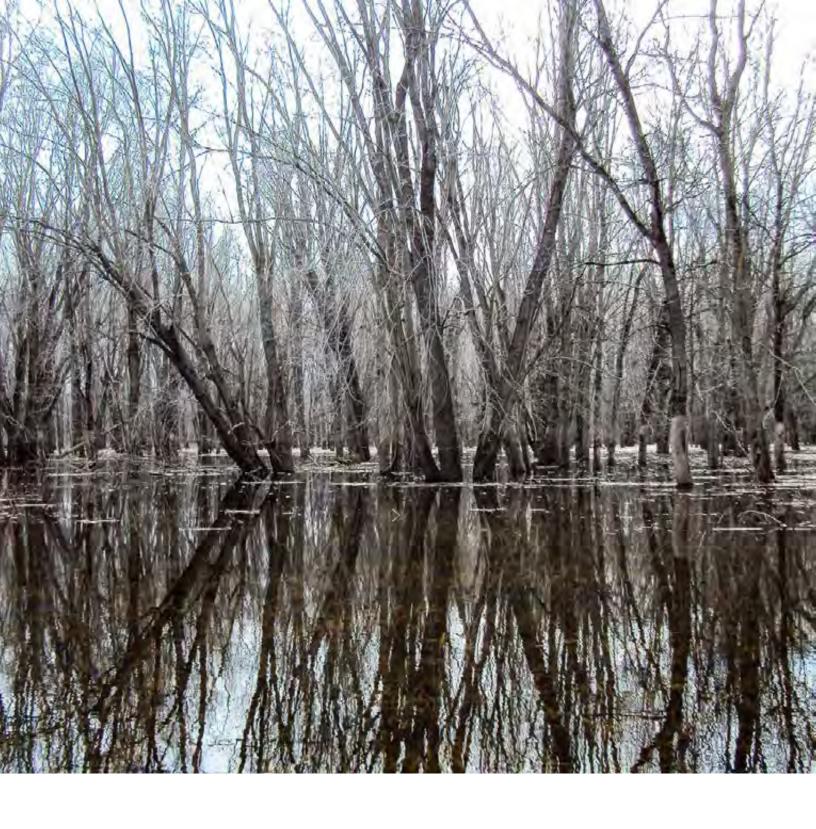
Through Section 28 of the Conservation Authorities Act, NVCA has the responsibility to regulate activities in natural and hazardous areas in order to prevent the loss of life and property due to flooding and erosion, and to conserve and enhance natural resources. For more information, please visit our 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 8195 8th Line, Utopia ON LOM 1TO 705-424-1479 • admin@nvca.on.ca



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