

INNISFIL CREEK SUBWATERSHED

Health Check 2023

Adjala-Tosorontio | Bradford West Gwillimbury |
Caledon | Essa | Innisfil | Mono | New Tecumseth



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 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

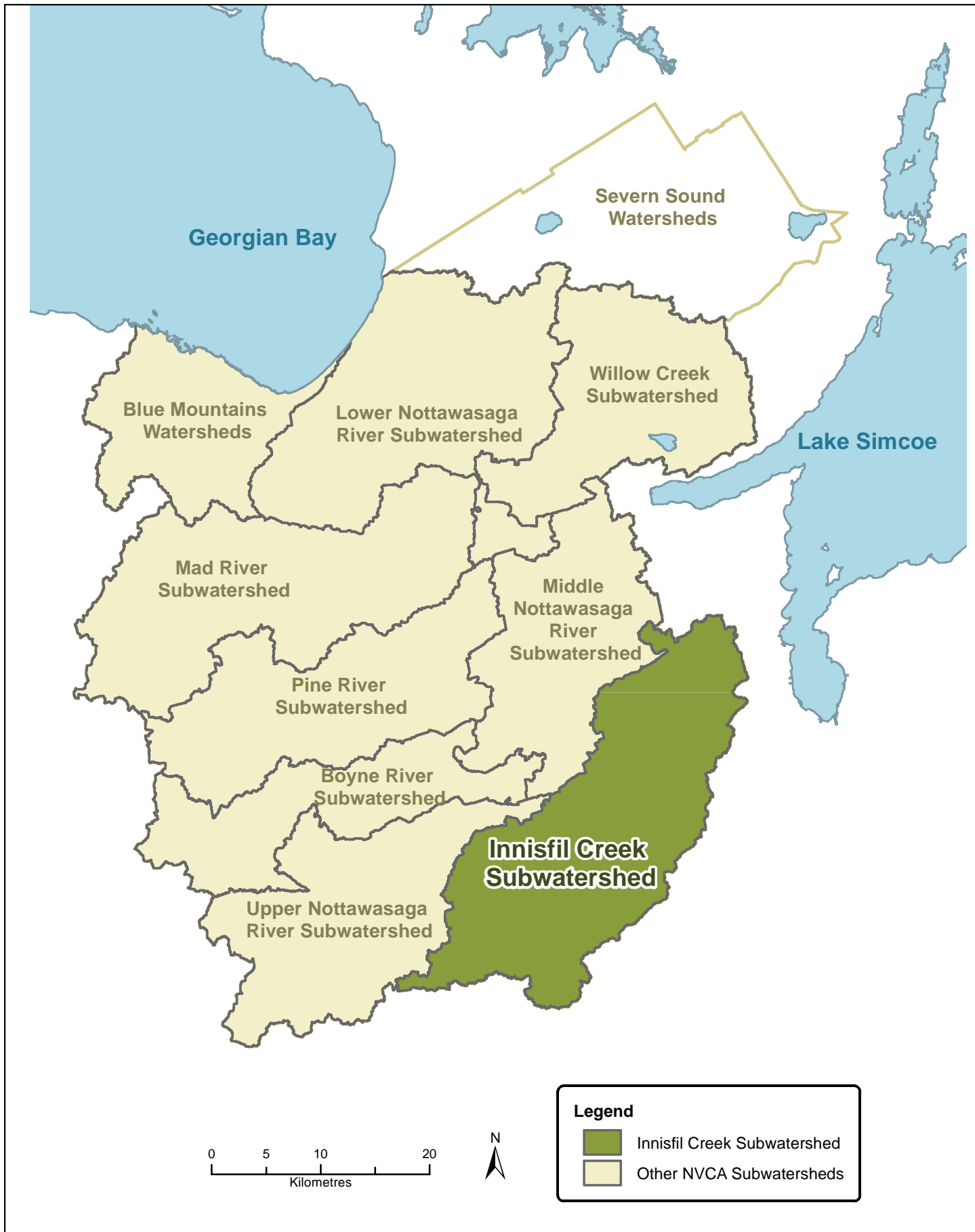
OUR GRADING SYSTEM

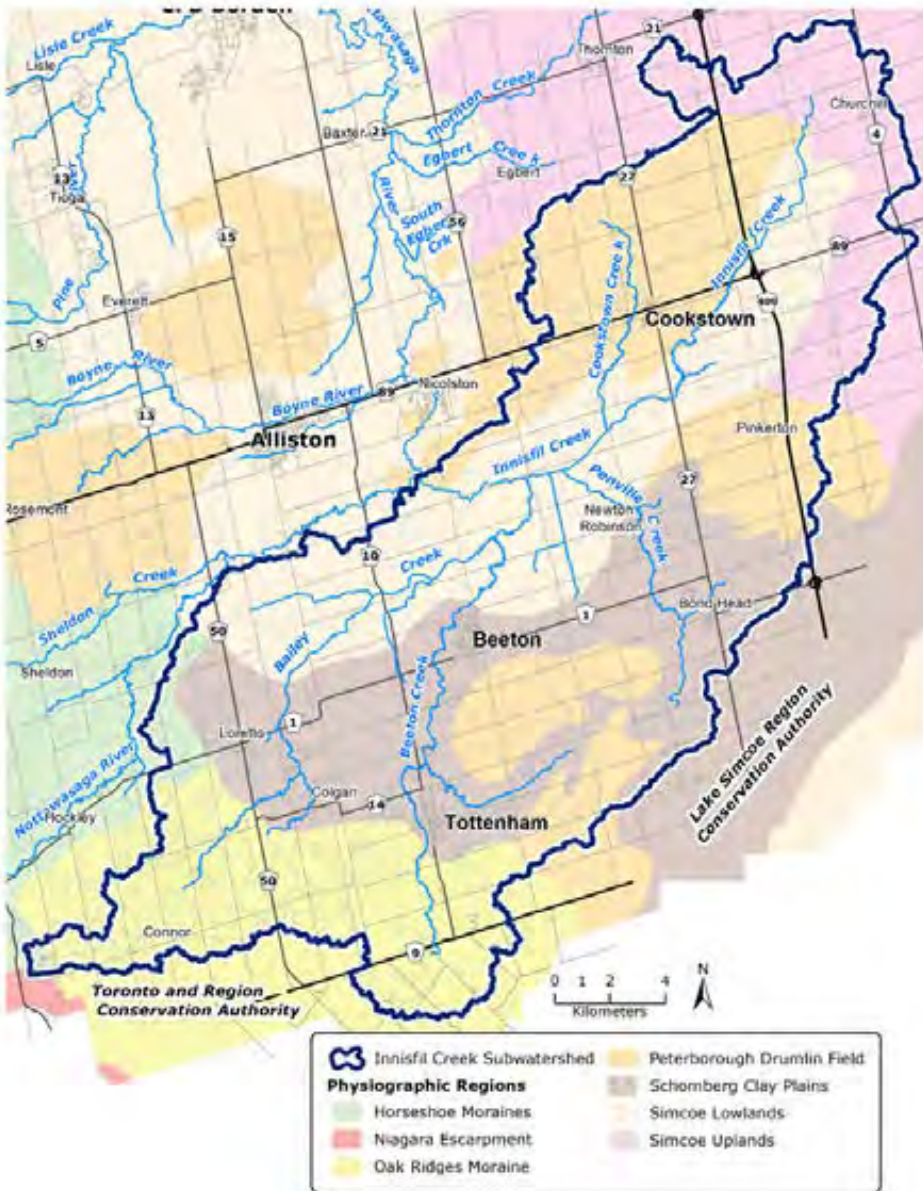
VERY GOOD	An environment that is at or close to natural conditions
GOOD	An environment close to natural conditions with minor disturbance
FAIR	A disturbed environment
POOR	A highly disturbed environment
VERY POOR	An environment that lacks natural features
NO DATA	Not enough data to make a conclusion

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.

WHERE ARE WE?





ABOUT THE INNISFIL CREEK SUBWATERSHED

The Innisfil Creek subwatershed consists of four main creek systems – Innisfil Creek, Bailey Creek, Beeton Creek and Penville Creek – that drain the southeast portion of the Nottawasaga River watershed.

Innisfil Creek arises on the gently rolling sand-silt plains of the Simcoe Uplands south of Barrie. Emerging from headwater forests and wetlands, it flows south into intensively farmed lowlands that extend through Cookstown downstream to the Nottawasaga River.

Bailey Creek emerges on the Oak Ridges Moraine near the hamlet of Connor. It winds southeastward through rolling forests and farm fields. Bailey Creek descends into the Schomberg Clay Plains north of Colgan, passing through a mix of agricultural lands and swamp/lowland forest. Downstream, the creek enters an intensive agricultural area within the Simcoe Lowlands as it flows eastward toward Beeton Creek.

Beeton Creek arises on the Oak Ridges Moraine south of Tottenham. Flowing north, the creek enters a reservoir at the Tottenham Conservation Area and then continues downstream. An east branch, originating east of Tottenham, flows westward through agricultural lands and enters Beeton Creek north of Tottenham. Beeton Creek continues to flow northward through an agricultural landscape, skirting the west side of Beeton before joining Bailey Creek and then entering Innisfil Creek.

Penville Creek emerges within a mix of hills (drumlins) and clay plains near Bond Head, flowing northward through agricultural lands before entering Innisfil Creek north of Newton Robinson.



FOREST CONDITIONS

Status: Poor

Trend: Neutral

Forest cover is Poor within the Innisfil Creek subwatershed compared to the rest of the Nottawasaga River watershed. Soils and slopes are well suited to farming and support extensive potato, sod and market farming operations.

Large forest tracts are restricted to the Cookstown Hollows Swamp, an extensive swamp east of Cookstown, the Bailey Creek Swamp forest north of Loretto and scattered stands on the Oak Ridges Moraine. These large forest blocks provide significant habitat for wildlife species that require undisturbed, deep forest habitat to thrive. Swamp forest cover in the middle section of Bailey Creek, Cookstown Hollows Swamp and the headwaters (creek source area) of Innisfil Creek provide important winter habitat for deer.

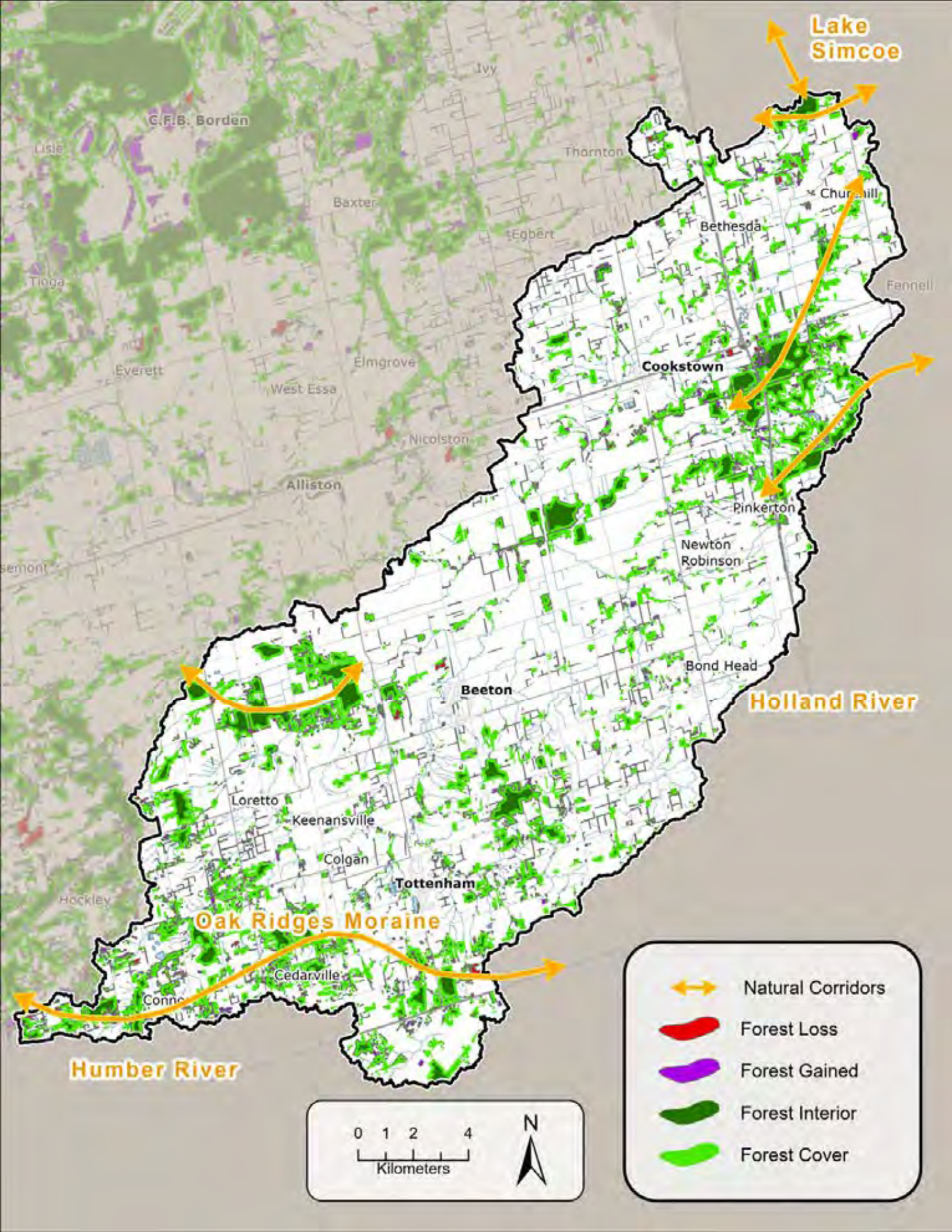
As shown by the orange arrows on the map, forests headwaters (creek source areas) along the Oak Ridges Moraine provide natural corridors linking to the Lake Simcoe watershed to the east and northeast, as well as to the Upper Nottawasaga subwatershed to the west. Fragmented forest cover along the Innisfil Creek valley provides an ecological link to the Nottawasaga River valley to the west.

Forest conditions remain Poor. Forest cover decreased by 2.6% (243.7 ha) between 2008 and 2018. Despite this overall decrease, forest interior increased by 2.8% (39.7 ha) over this time period. Regenerating forest cover and maturing plantations next to remaining large forests likely accounted for this increase.

Indicators	Innisfil Creek Subwatershed	NVCA Watershed	Indicator Description	Trend (2008-2018)
Forest Cover	18.5% (9,070 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.	-243.7 ha (-2.6%)
Forest Interior	2.9% (1,436 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.	+39.7 ha (+2.8%)
Riparian Cover	52.7% (2,787 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:







WETLAND CONDITIONS

Status: Fair
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 and marshes in the Innisfil Creek subwatershed provide habitat for a rich variety of plants and animals. Many animals that live in wetlands also depend on nearby upland habitats for nesting, foraging and hibernation.

Wetland conditions within the Innisfil Creek subwatershed are Fair to Poor compared Environment Canada's wetland habitat guidelines. Historically, large areas of wetlands in the Innisfil Creek subwatershed were cleared and drained to provide farmland. Data from Ducks Unlimited Canada indicate historical wetland loss of 67.3% within the subwatershed (1800 to 2002). From 2002 to 2016, an additional net wetland loss of 3.3% (132.8 ha) occurred.

In the Innisfil Creek subwatershed, based on satellite photo interpretation, between 2016 and 2018 there was a net wetland loss of 2.9 hectares (ha). This represents a 0.1% decrease in wetland cover since 2016. Wetland gains (41.5 ha) were associated with natural regeneration in low-lying areas. Wetland loss (44.5 ha) was generally associated with agricultural conversion.

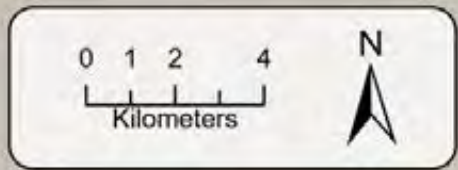
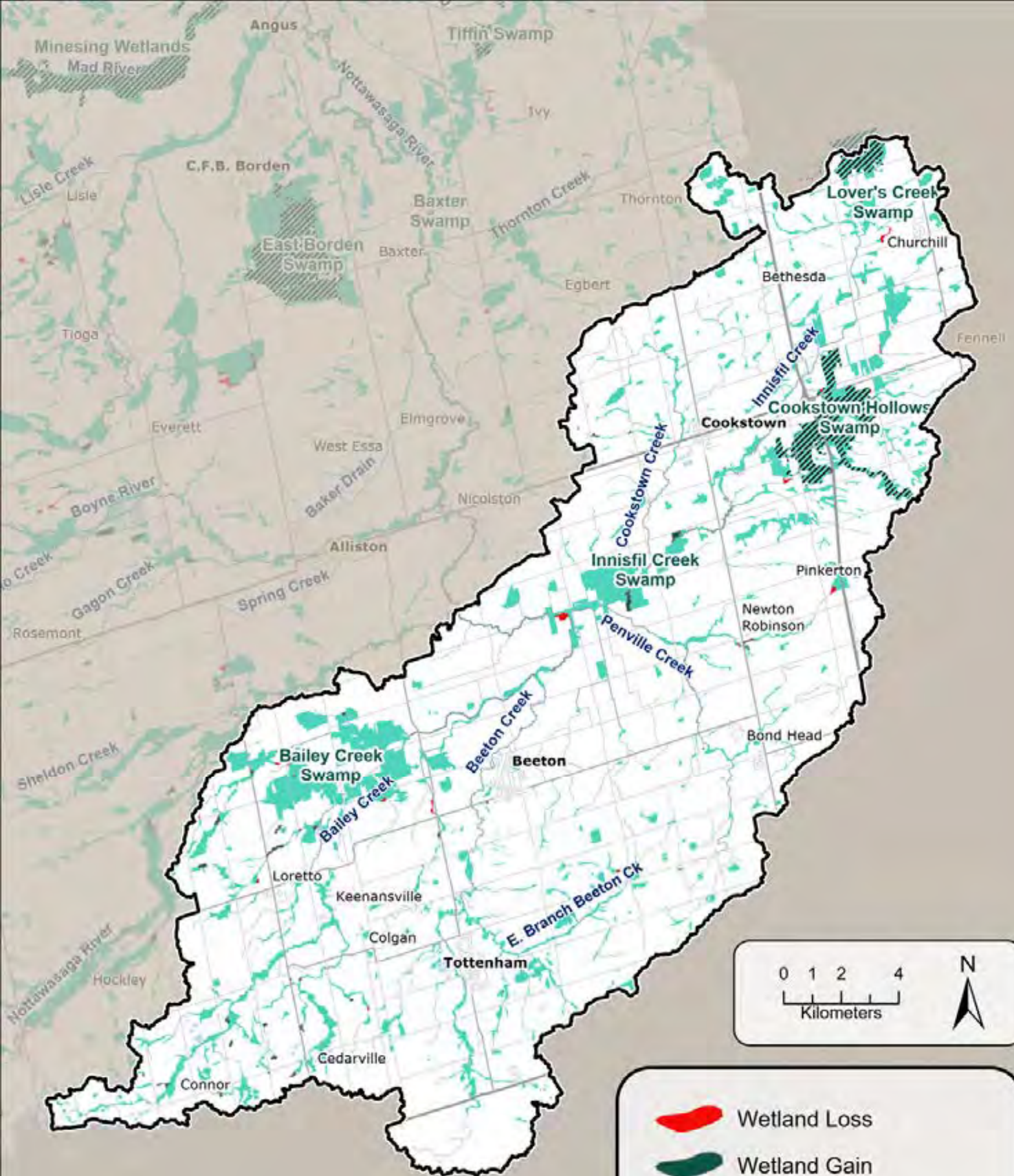
Large wetlands are associated with the Cookstown Hollows Swamp, Innisfil Creek Swamp and Bailey Creek Swamp. Other subwatershed wetlands tend to be small and isolated.

The Cookstown Hollows Swamp and the Lovers Creek Swamp have been evaluated as provincially significant by the Ministry of Natural Resources. Provincial and municipal planning policies help protect these wetlands from development and site alteration. Only Cookstown Hollows Swamp lies fully within this subwatershed.

Indicators	Innisfil Creek Subwatershed	NVCA Watershed	Indicator Description	Trend (2016-2018)
Wetland Cover	10% (4,914 ha)	14.5%	10% wetland cover has been identified as a minimum guideline for healthy watersheds (Environment Canada).	-2.9 ha (-0.1%)
Wetland Buffer (100m buffer area)	37.4% (3,301 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:







STREAM HEALTH

Status: Very Poor

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 are determined by merging these two factors.

Stream health in the Innisfil Creek subwatershed is very poor compared to the rest of the Nottawasaga River subwatersheds. Trout habitat is limited to the cool headwaters of the Innisfil, Bailey and Beeton Creek systems, and is in decline.

The headwaters of Innisfil Creek are fed by groundwater discharge (springs) and have been shown in previous health checks to exhibit Unimpaired stream health as they flow through wetlands and forests on the Simcoe Uplands. These headwater areas were not assessed in this Watershed Health Check. Stream health in Innisfil Creek rapidly declines a few kilometres downstream of the headwaters to Impaired. This condition persists along its entire length as it flows through the Simcoe Lowlands due to sparse riparian (streambank) vegetation, agricultural drainage and channel dredging. Extensive water taking for field irrigation reduces stream flow during drier summer conditions.

Stream health in the moraine headwaters of Bailey and Beeton Creeks ranges from Unimpaired to Impaired. Natural valley systems and springs support healthy stream sections, while Impaired sections are associated with the numerous online ponds across the Oak Ridges Moraine. Stream health declines as these creeks enter the intensive agricultural areas of the Simcoe Lowlands. The Tottenham reservoir warms the waters of Beeton Creek and rainbow trout are generally absent downstream of the dam. Urban stormwater from Tottenham and Beeton also adversely impacts this system.

The smaller tributaries of Innisfil Creek have Below Potential or Impaired stream health largely influenced by a lack of natural vegetation and the dominance of intensive agricultural land use.

At its bottom end, Innisfil Creek exhibits elevated phosphorus levels (66% above the provincial objective) during low flow periods. Extensive agriculture in the subwatershed contributes to high nutrient loadings.

Overall, stream health in Innisfil Creek has shown continual decline since the 2007 Health Check. Recent declines extend further upstream along Innisfil, Bailey, Beeton and Penville Creeks. Sections of healthy streams are limited in the Innisfil Creek subwatershed. The 2023 Watershed Health Check assessed 19% of the river length in the Innisfil Creek subwatershed, the highest ever.

Indicators	Innisfil Creek Subwatershed	Indicator Description	Indicator Trend (2012-2016)
Benthic Grade	1.38	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".	No Change
Total Phosphorus (low flow; mg/L)	0.05	Total phosphorus indicates nutrient levels within a stream. Our healthiest streams have levels less than 0.01 mg/L during low flow conditions. Innisfil Creek range in all conditions: 0.022–0.416 mg/L. Provincial Water Quality Guidelines suggest that levels greater than 0.03 mg/L result in unhealthy stream conditions.	Declining

Rating Scale:





GROUNDWATER QUALITY

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

Status: 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 Innisfil Creek subwatershed, there are 14 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 three 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.

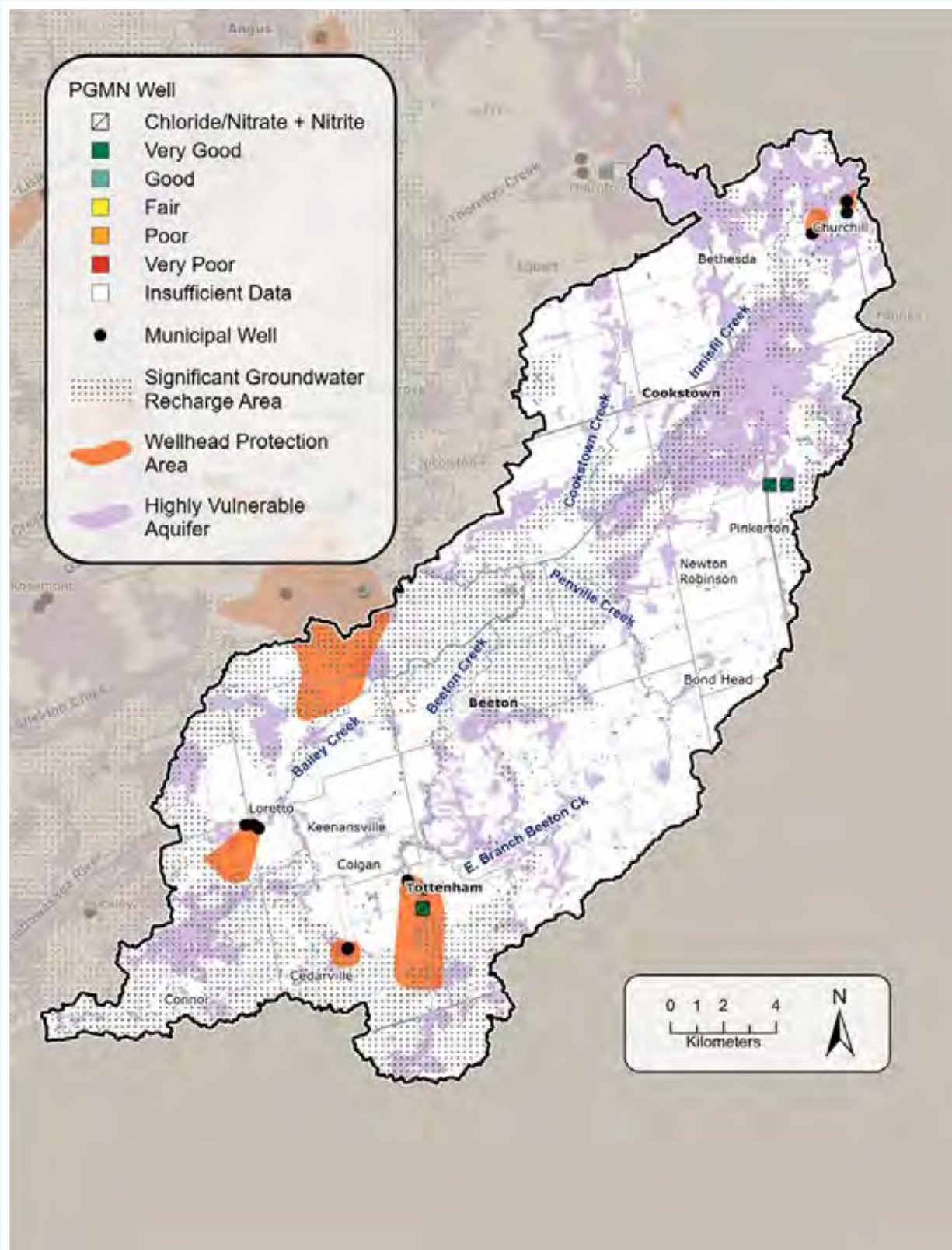
Results indicate that the PGMN monitoring wells meet Ontario Drinking Water Quality Standards. NVCA requires additional data to interpret trends in groundwater quality at the sampled wells. Since some wells are deeper than others and water chemistry differs between aquifers, individual samples do not 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	0	1	2	
Chloride (mg/L)	No Data	19.2	15.2	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)	No Data	0.6	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.

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.

Landowner Grant Assistance

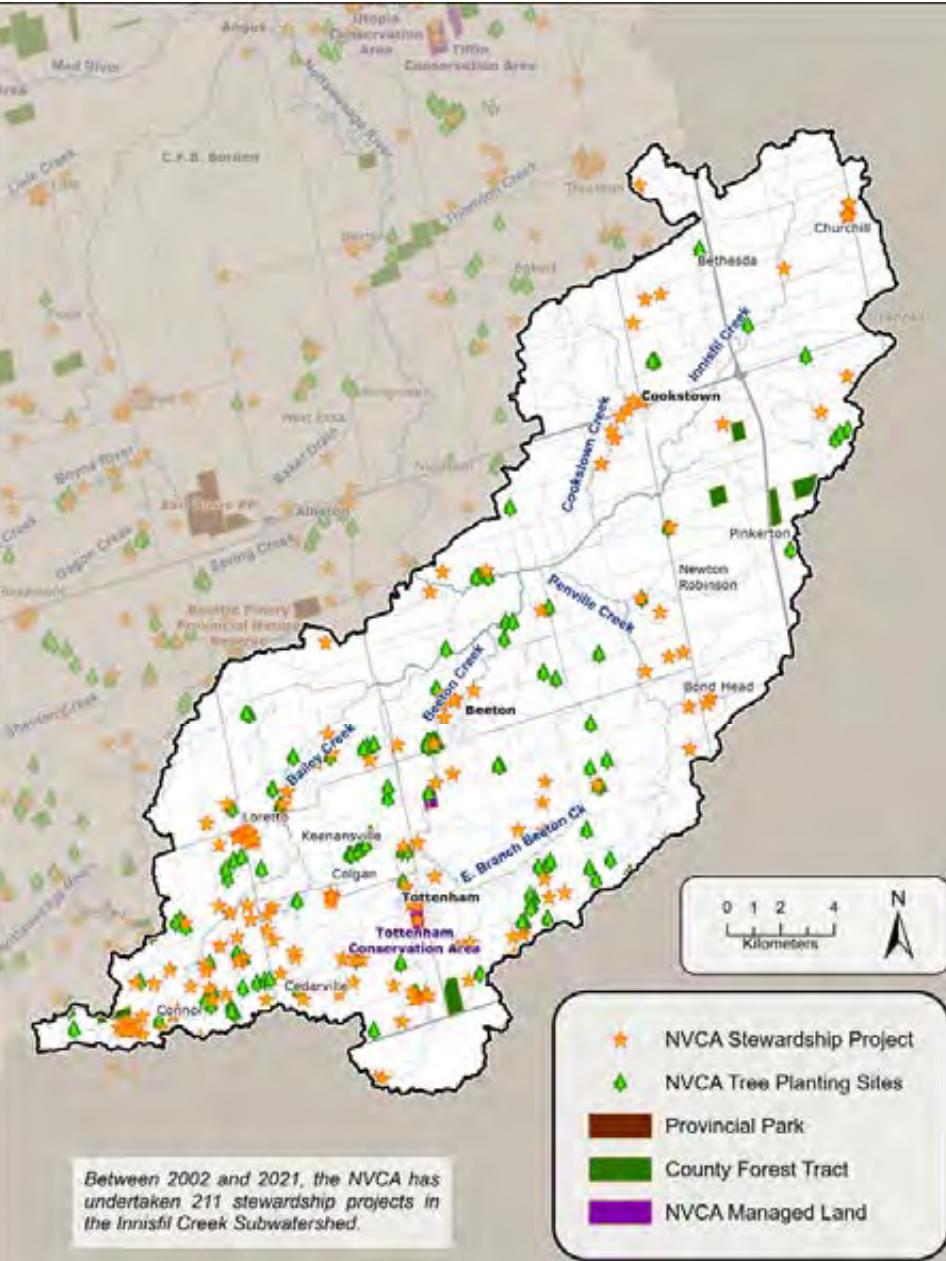
To assist landowners with protecting the environment, NVCA's Stewardship and Forestry Programs provide technical assistance and a range of grant incentives to help offset the cost of projects on private property.

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 Innisfil Creek subwatershed have undertaken 211 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.





WATERSHED STEWARDSHIP

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 Innisfil Creek Subwatershed

1. Improve stream health and fish habitat by continuing to complete floodplain construction, stream bank stabilization with a habitat-friendly approach, livestock exclusion fencing and stream-side tree planting on Beeton Creek between the 7th Line New Tecumseth and the Bailey Creek confluence located north of the 10th Line.
2. Reduce runoff, erosion, climate resiliency and improve water quality and habitat value by working with drainage engineers to create enhanced municipal drains (e.g. Innisfil drain). Incorporate natural channel features such as nested channel design, floodplains, riffles, and riparian wetlands areas in sections of stream which have been altered to promote drainage.
3. Reduce flooding by increasing soil infiltration rates 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.
5. Reduce erosion and improve water quality by planting and widening natural stream buffers to filter agriculture and rural runoff, and stabilize banks.

Before (2017)

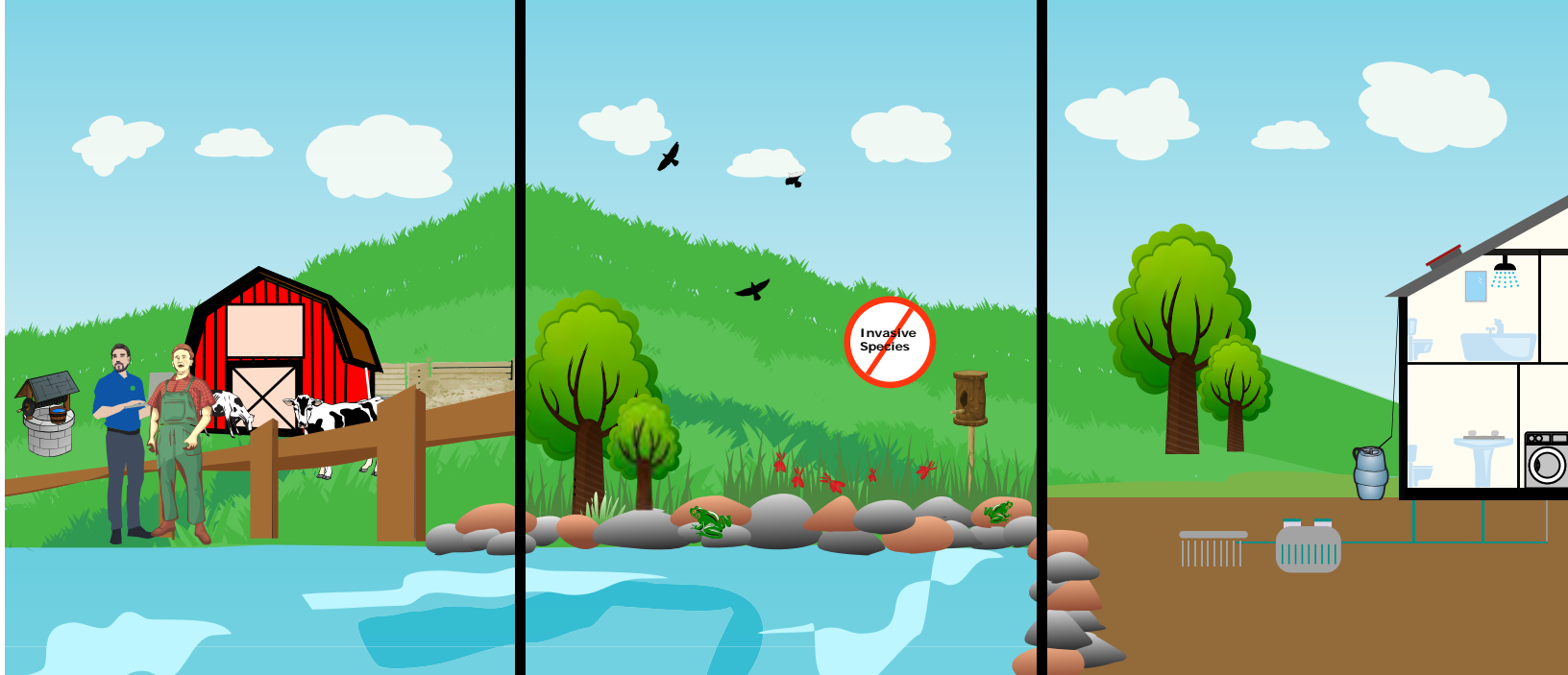


After (2018)



An example of stream restoration in the Innisfil subwatershed:

A retrofitted failed ice dam structure completed to reestablish a fish migratory route and maintain cool water in Beeton Creek.



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. NVCA manages two properties within the Innisfil Creek subwatershed totaling 84 ha.

County Forests are managed for a variety of environmental, social and economic purposes. There are five Simcoe County Forest tracts totaling 312 ha within the Innisfil 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." There are no Ontario Parks within the Innisfil Creek 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

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.

Tottenham Conservation Area (in this subwatershed)

Tottenham Conservation Area is one of the properties NVCA owns within the Innisfil Creek Subwatershed. This property is managed in partnership with the Town of New Tecumseth. The water reservoir and dam are a significant recreational feature of the property.

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!