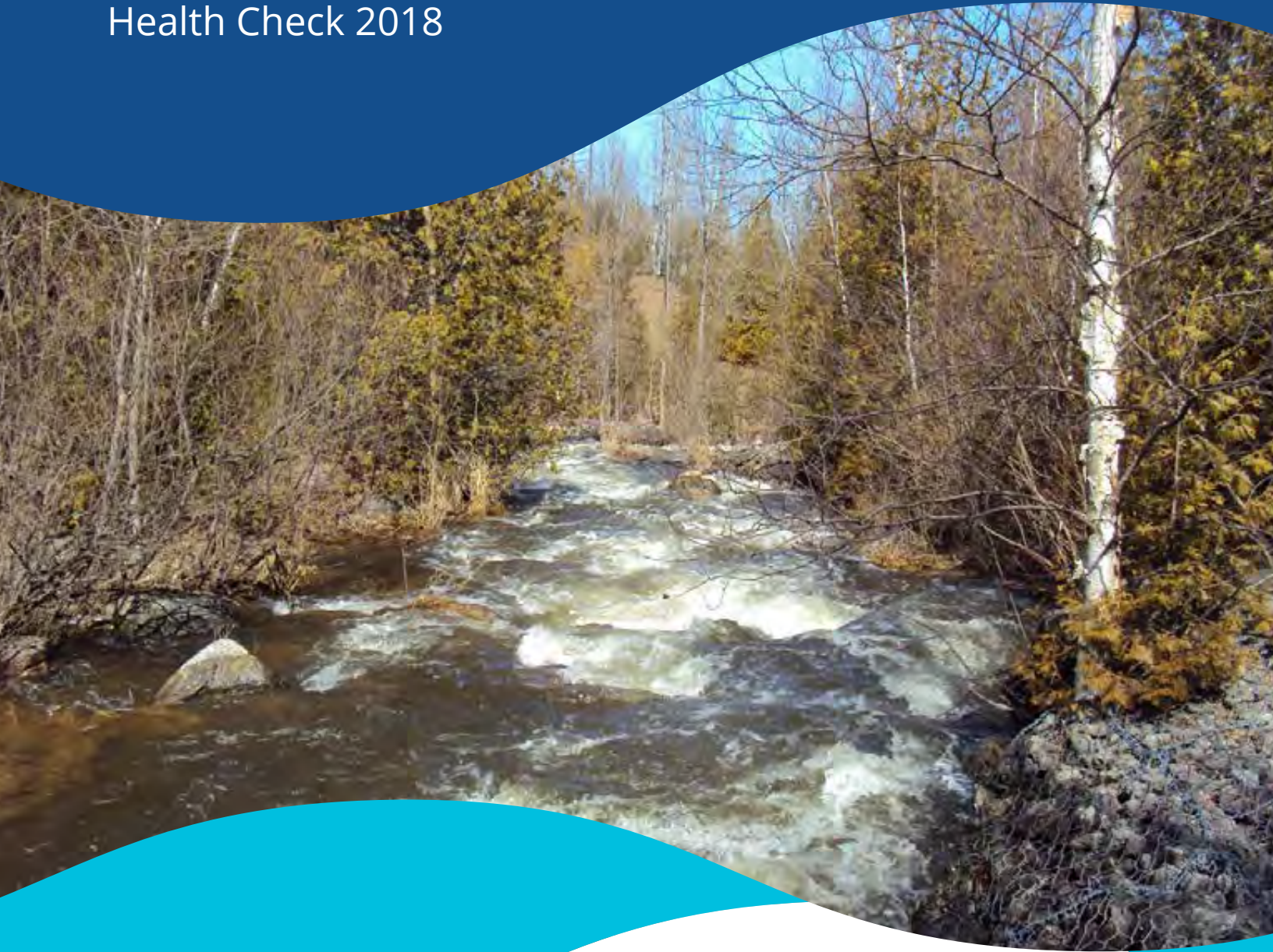


Pine River SUBWATERSHED

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 PINE RIVER SUBWATERSHED

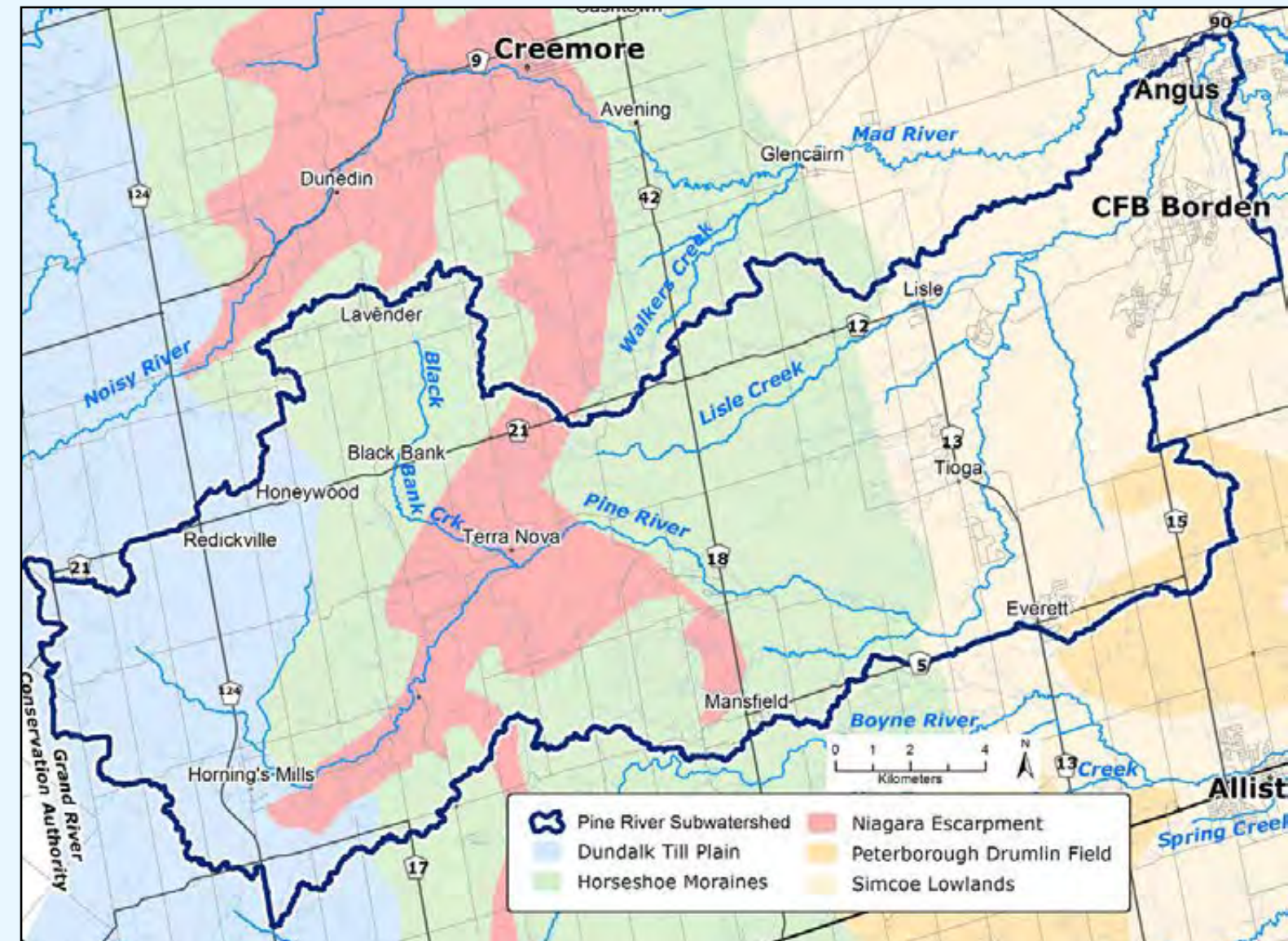
The Pine River arises within a series of wetlands southwest of Redickville. The river flows eastward through a rolling rural/agricultural landscape to Horning's Mills, at times flowing underground before re-emerging as cold springs further downstream. At Horning's Mills, the river cascades over the mill pond and enters the extensive forests and steep slopes associated with the Niagara Escarpment (a World Biosphere Reserve) that extend northeast through the Pine River Provincial Fishing Area and the hamlet of Terra Nova. Through this area the Pine River receives additional flow from a number of spring-fed tributaries.

East of the Escarpment zone near Airport Road (County Road 18), the Pine River meanders through a mix of forested and agricultural lands which extend to CFB Borden (Base). The river then enters a steep, narrow, well-forested valley system that

extends to Angus where the river briefly flows through an urban area before discharging to the Nottawasaga River upstream of County Road 90.

Black Bank Creek arises in the Escarpment zone near the subwatershed boundary at Lavender. The creek cascades south through Black Bank, joining the Pine River near Terra Nova. Most of its drainage area is forested – Black Bank Creek is considered one of the most pristine streams in the watershed.

Arising on the Escarpment west of Airport Road, Lisle Creek flows eastward through rugged, forested Escarpment and moraine features before emerging onto an agricultural plain in former Tosorontio Township. Downstream of Lisle, Lisle Creek flows through the sand plains of CFB Borden, discharging to the Pine River in the central portion of CFB Borden.





FOREST CONDITIONS

Status: Very Good
Trend: Insufficient Data

Forest conditions in the Pine River subwatershed are healthy. This subwatershed boasts the largest percentage of forest cover and forest interior habitat in the NVCA jurisdiction. Large forests provide significant habitat for wildlife species that require forest interior habitat (deep, undisturbed forests) to thrive.

Large forests are found throughout the Niagara Escarpment zone and in the central portion of the Pine River subwatershed between Airport Road and Tioga. Mixed and coniferous forests cover in the Pine River valley between Horning's Mills and Angus provide shelter and food for deer during the harsh winter months.

Significant forest cover also extends along the river valleys through CFB Borden. Agricultural areas near Mansfield and Everett, and the active operations areas of CFB Borden have fewer forests.

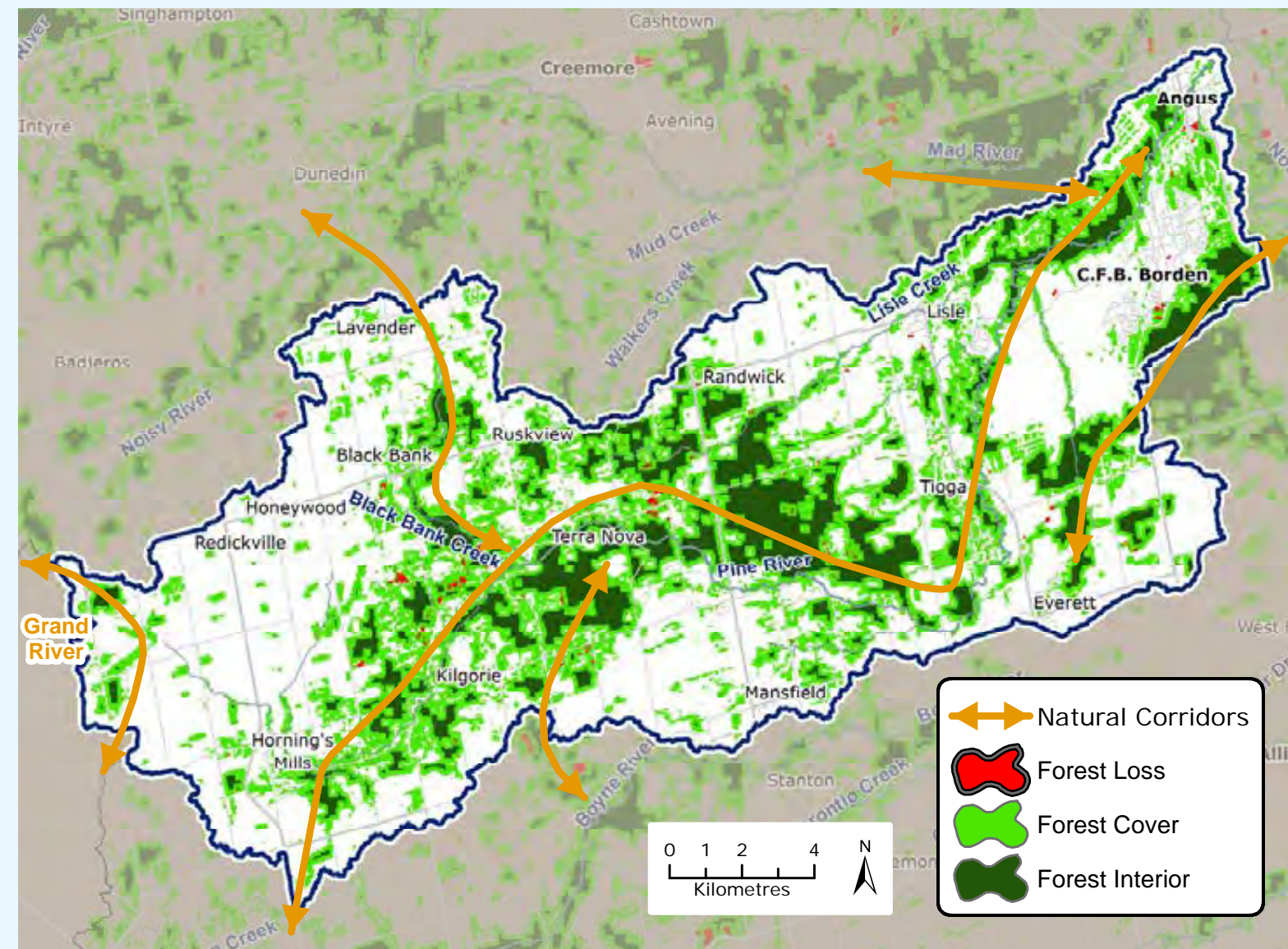
As shown with orange arrows in the map, forests extending east of Horning's Mills through CFB Borden are integral parts of a provincial-scale natural corridor that extends northeast from the Niagara Escarpment to the Canadian Shield north of Orillia. Wetlands in the headwaters (river source areas) west of the Escarpment are connected to similar wetland habitats in the Grand River watershed. Forests and wetlands are also linked to the Boyne River subwatershed to the south, the Mad River subwatershed to the north and the Middle Nottawasaga subwatershed to the east.

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 73 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	Pine River Subwatershed	NVCA Watershed	Indicator Description
Forest Cover	41.2% (14,296 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	13.0% (5,275 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	62.6% (2,025 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 swamps and marshes in the Pine River 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 Pine River subwatershed are generally healthy according to Environment Canada's wetland habitat guidelines. Though wetland cover is just above 10% of the subwatershed, much of the land is steep or has well-drained soils, suggesting that natural wetland coverage was always fairly low, however, historical wetland loss has occurred. Data from Ducks Unlimited Canada indicate historical wetland loss in Mulmur Township (within the Escarpment portion of the Pine subwatershed) – is 30.8%.

Based on satellite photo interpretation, between 2009 and 2016 there was a net subwatershed wetland loss of 40.0 hectares (ha). This represents a 1.1% decrease in wetland cover since 2008. Wetland loss was mostly associated with agricultural conversion.

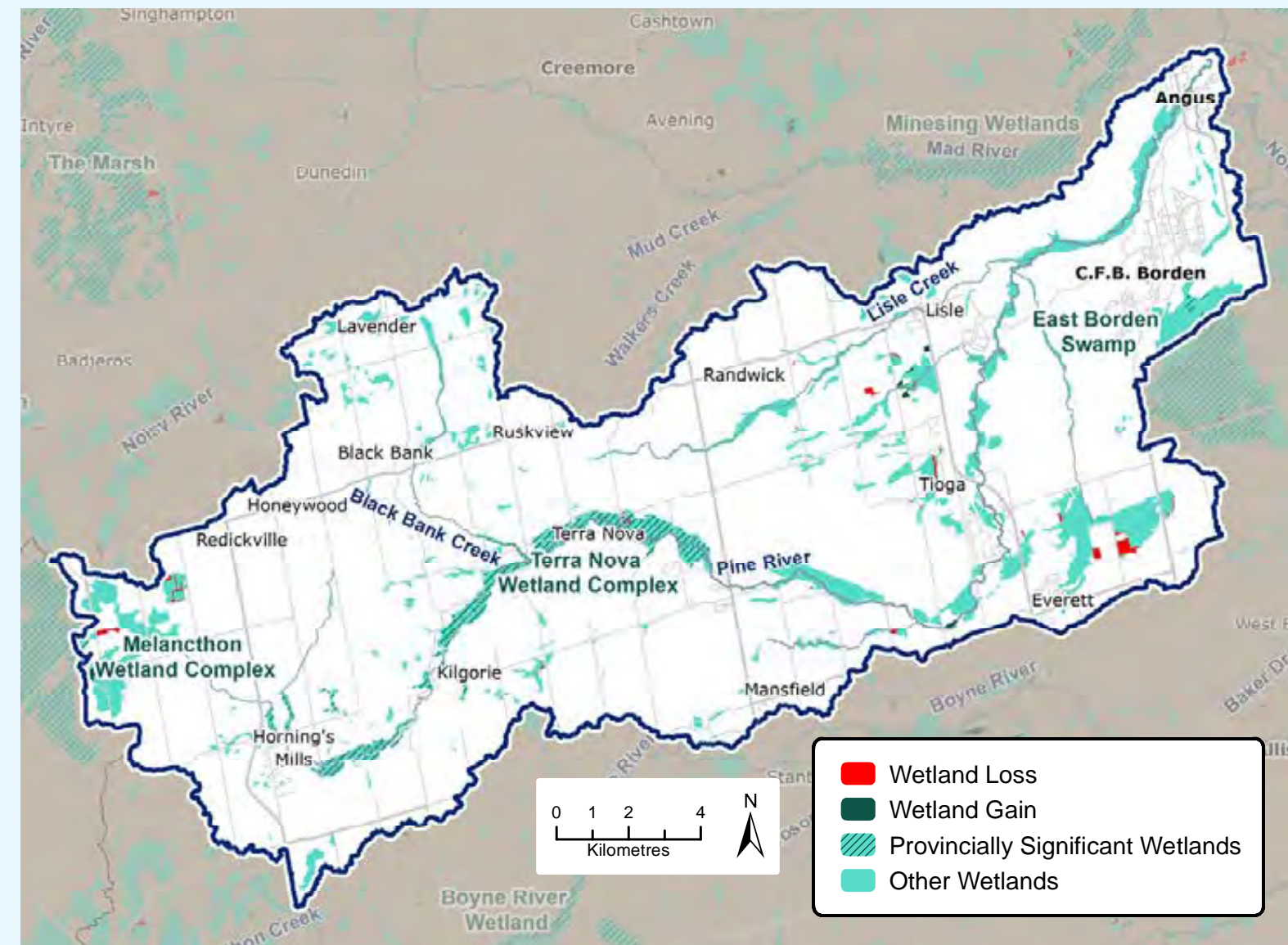
Similar to other subwatersheds in the Niagara Escarpment, the headwaters of the Pine River are fed by wetlands. A series of wetlands lines the Pine River valley from Horning's Mills to Angus. Swamp forests are found northeast of Everett, but these forested wetlands are under pressure from agricultural and urban expansion.

Three groups of wetlands have been evaluated as provincially significant by the Ontario Ministry of Natural Resources and Forestry: Melancthon Wetland Complex, Terra Nova Wetland Complex and the East Borden Swamp Complex. Provincial and municipal planning policies help protect these wetlands from development and site alteration. The unevaluated wetlands in the headwaters of the Pine River and north east of Everett should be evaluated for their significance.



Indicators	Pine River Subwatershed	NVCA Watershed	Indicator Description	Trend (2009-2016)
Wetland Cover	10.6% (3,670 ha)	14.2%	10% wetland cover has been identified as a minimum guideline for healthy watersheds (Environment Canada).	Down -40.0 ha
Wetland Buffer (100m buffer area)	50.9% (2,856 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:





STREAM HEALTH

Status: Good
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, like in the table below, are arrived at by merging these two factors.

Stream habitat in the Pine River subwatershed is generally Unimpaired, though areas rated as Below Potential are found near Horning's Mills, near Tioga, through Angus, and along Lisle Creek. The main branch of the Pine River and downstream sections of Black Bank Creek and Lisle Creek support healthy resident and migratory trout populations. Brook trout reside in the headwaters of these systems and in some small Escarpment tributaries.

The headwaters of the Pine River flow through a mosaic of farm fields and wetlands. These headwaters were Below Potential in previous Watershed Health Checks, but were not assessed in this update. Below Potential conditions were observed through Horning's Mills, as large online ponds degraded stream health and counteracted the benefits of clean groundwater discharge (springs) from the Niagara Escarpment. By the time the Pine River leaves the Escarpment, the main branch and tributaries have received enough groundwater, leading the river to Unimpaired conditions along the remainder of the Pine River valley across Dufferin County.

As the Pine River leaves the Dufferin and Simcoe County Forests, it enters a more open rural/

agricultural landscape. Through this region, stream health drops to Below Potential for a short period. Unimpaired stream health returns as it flows through the forests of CFB Borden. Stream health is lowered to Below Potential and Impaired as the river collects wastewater treatment plant discharge from Borden as well as stormwater runoff from urban areas of Angus.

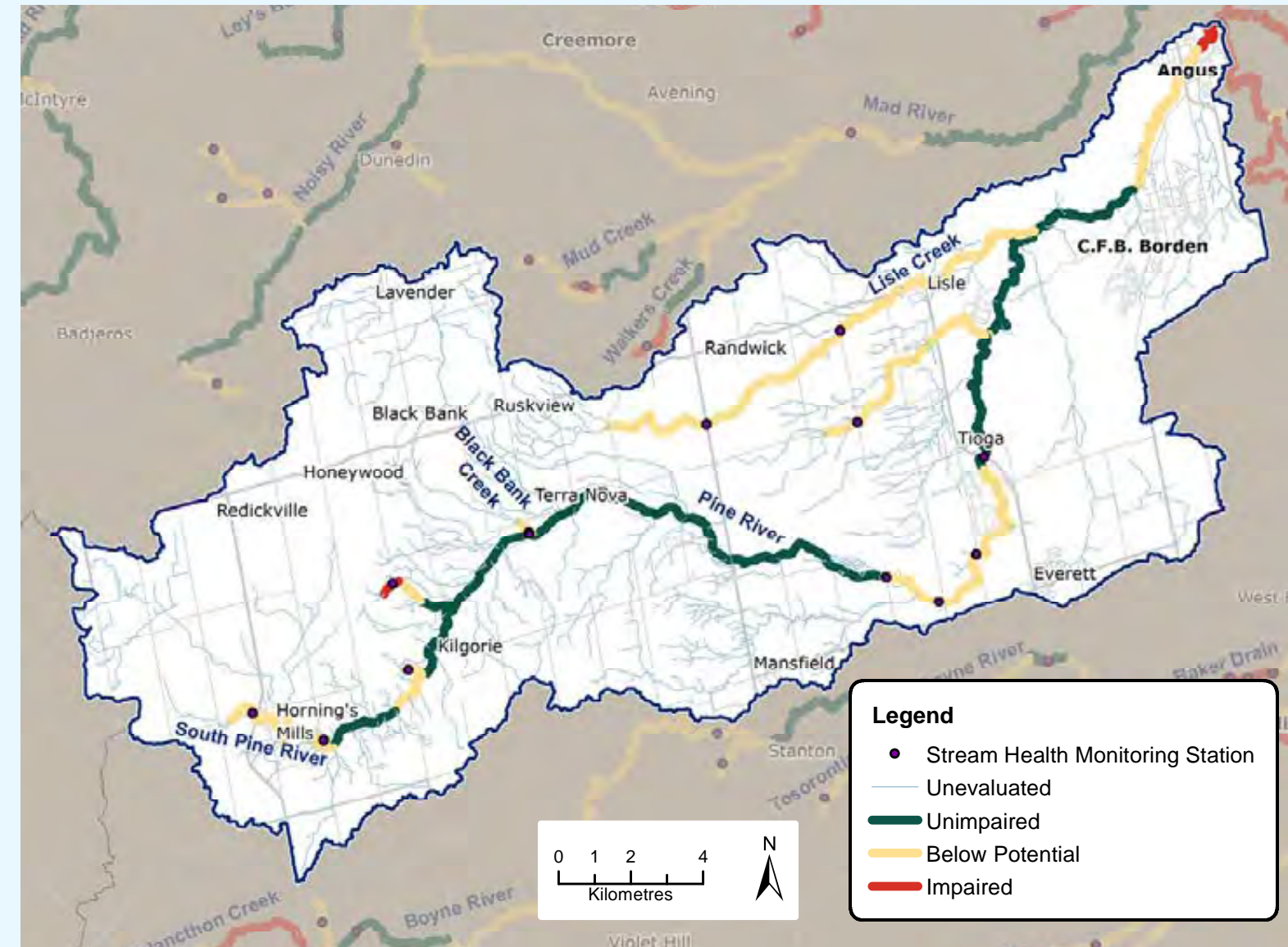
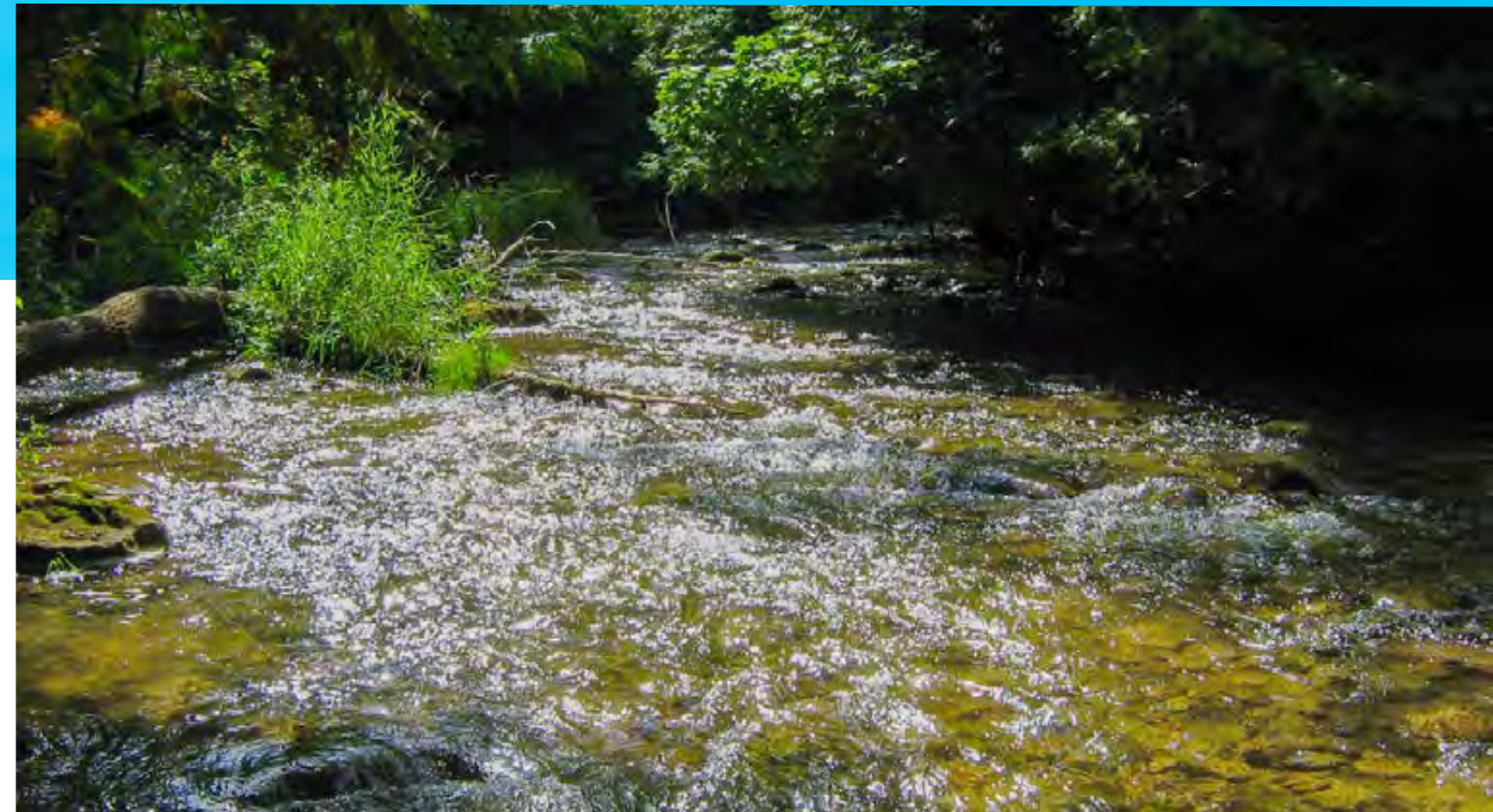
Stream health in Lisle Creek is graded Below Potential due to sparse riparian (streambank) vegetation and nutrient inputs from agriculture and rural settlements. Many of the other smaller Escarpment tributaries are graded at Below Potential due to impacts from online ponds and sparse riparian vegetation. Black Bank Creek previously found to be Unimpaired, was not assessed in this Health Check.

At Angus, the Pine River exhibits moderately elevated phosphorus levels during low flow conditions. This is likely due to wastewater treatment plant discharge – but remains below provincial phosphorus objectives. Wastewater treatment plant improvements in the 1980s and early 1990s have significantly reduced phosphorus levels in this river section.

Overall, stream health has shown little change in condition since the 2013 Health Check. Declines in benthic grades reflect lower monitoring capacity available for the assessment of subwatershed streams. The 2018 Watershed Health Check assessed only 16% of the river length in the Pine River subwatershed, down from 27% in 2013.

Indicators	Pine River Subwatershed	Indicator Description	Indicator Trend (2012-2016)
Benthic Grade	2.39	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".	Insufficient Data
Total Phosphorus (low flow; mg/L)	0.013	Total phosphorus indicates nutrient levels within a stream. Our healthiest streams have levels less than 0.01 mg/L during low flow conditions. Pine River range: 0.004–0.083 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: 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 Pine River subwatershed, there are eight municipal wells providing drinking water to residents. Through the Provincial Groundwater Monitoring Network (PGMN) partnership with the Ministry of the Environment, Conservation, and Parks, the NVCA monitors water levels and water quality at one PGMN well in this subwatershed. Groundwater monitoring began in 2003 and sampling has been conducted annually since 2008, allowing the NVCA to track changes in groundwater levels and quality over time.

Results to date indicate that the PGMN monitoring well meets Ontario Drinking Water Quality Standards. The NVCA requires additional data to interpret trends in groundwater quality at the sampled well. 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	0	1	0	
Chloride (mg/L)	No Data	1.35	No Data	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	0.06	No Data	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:



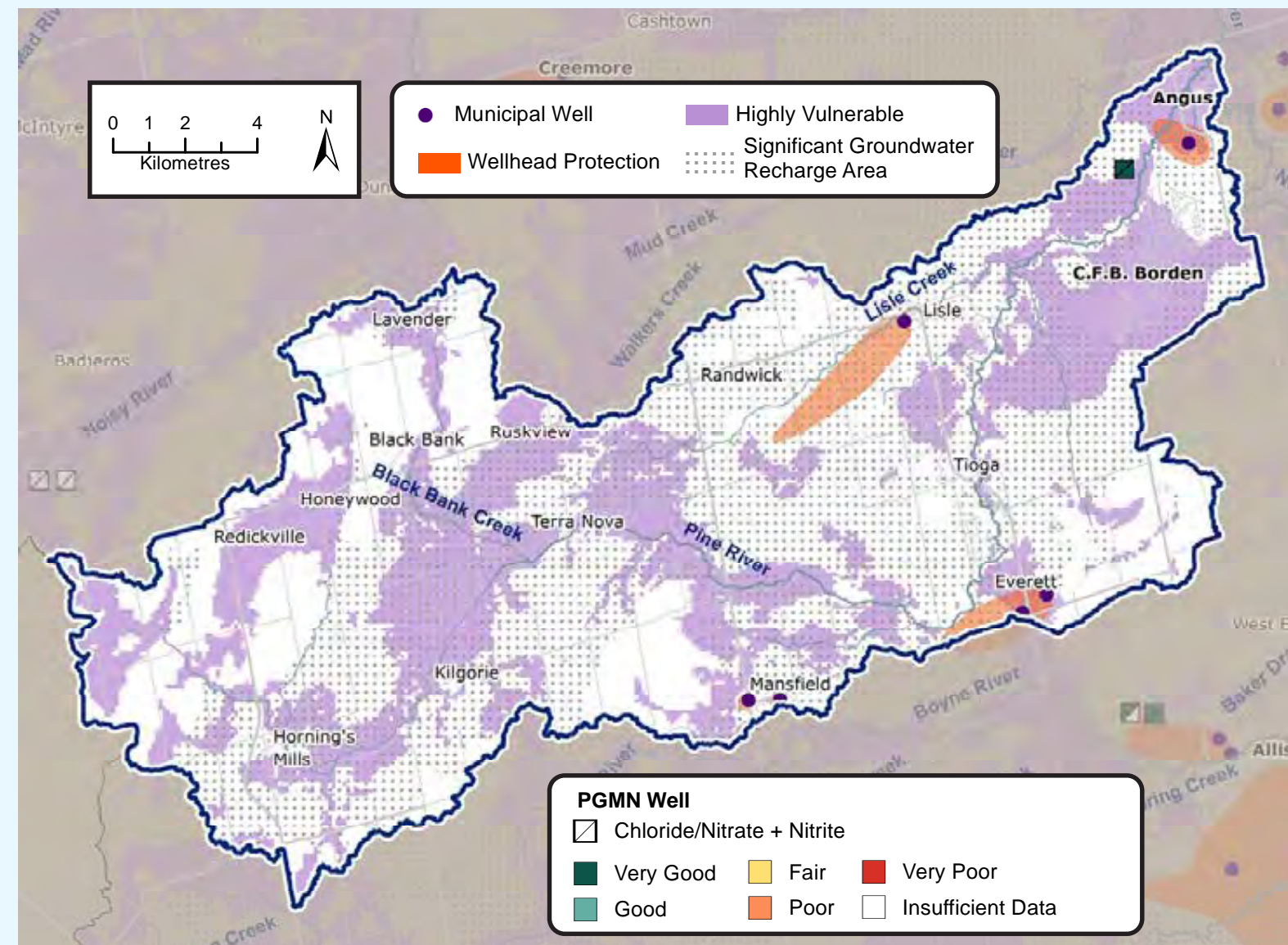
Ontario's Drinking Water Source Protection Program

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

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

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 Pine River subwatershed have undertaken 71 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.

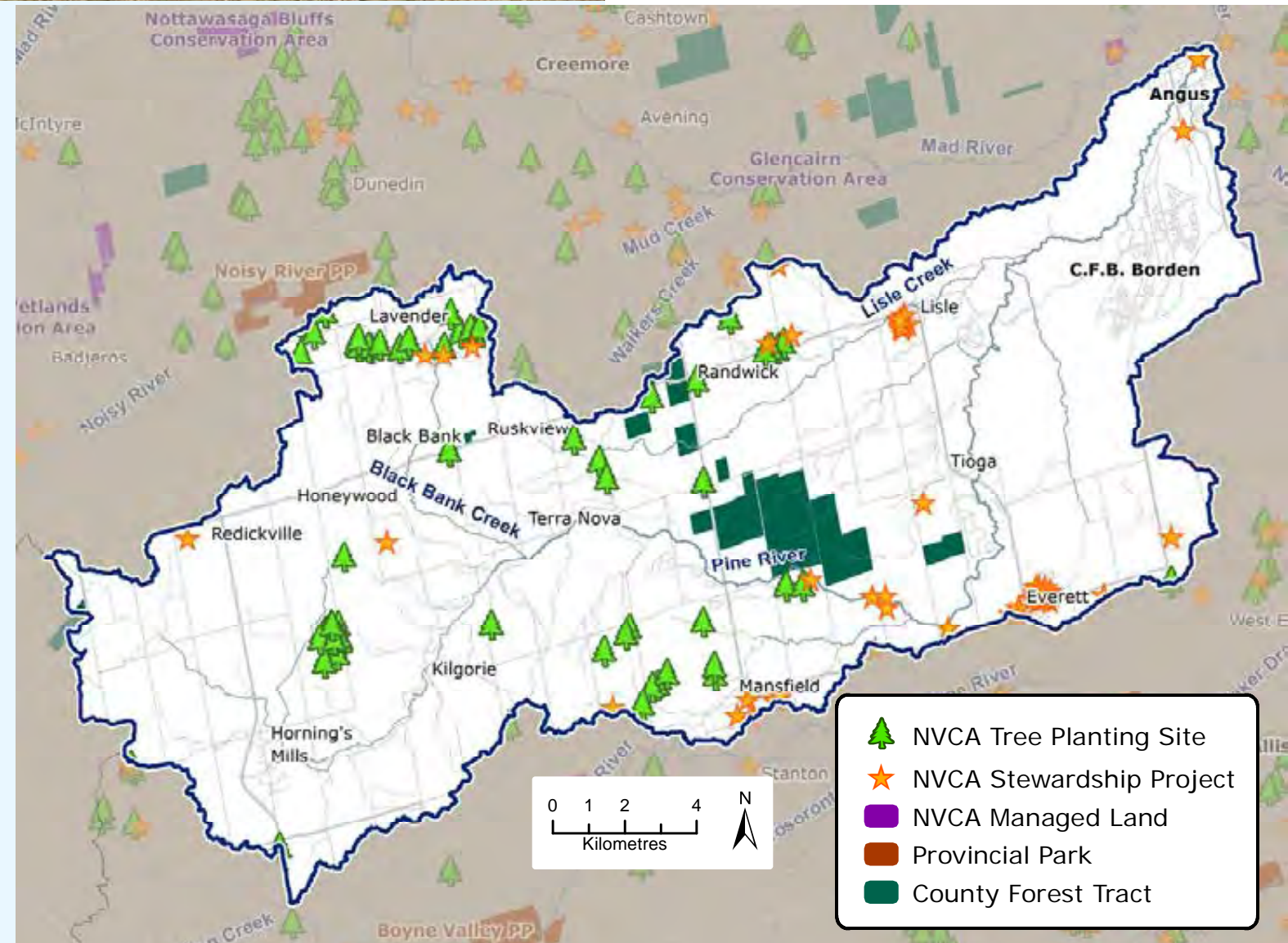
Landowner Grant Assistance

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.

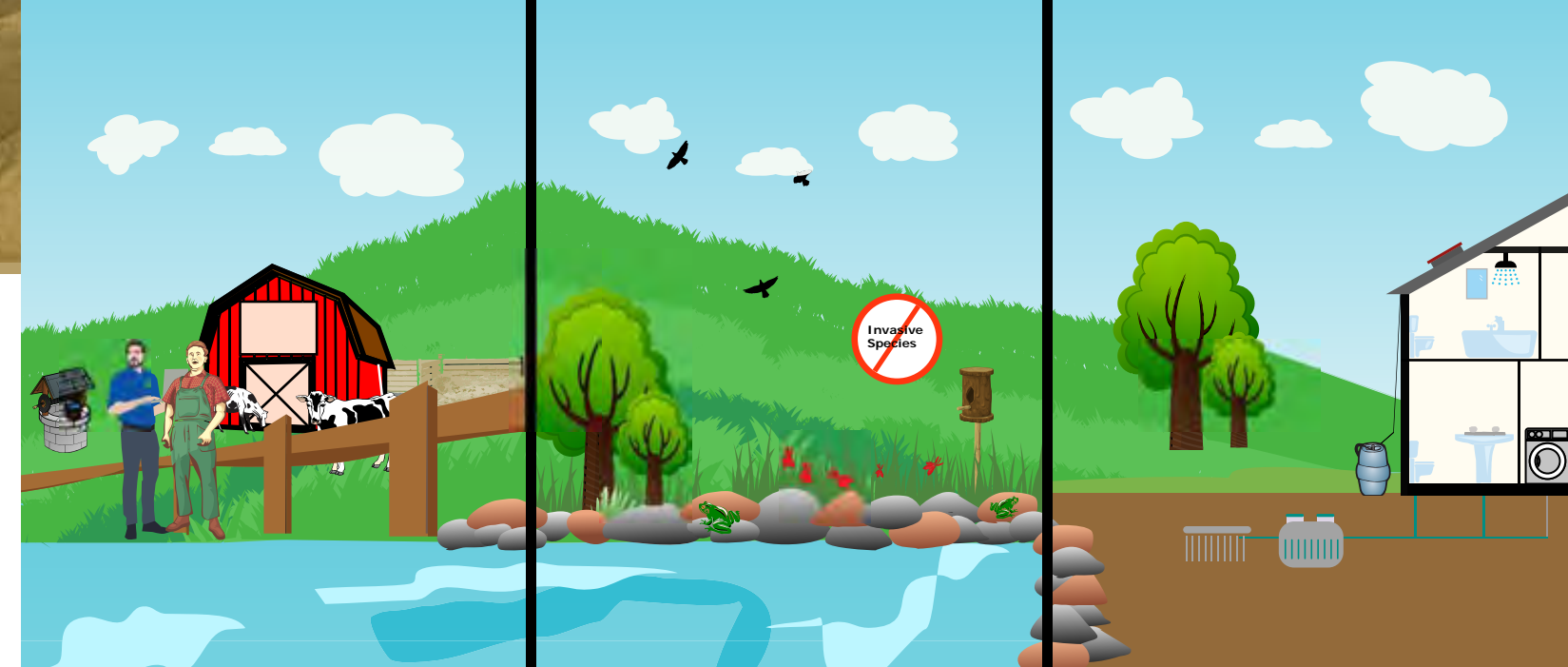
For example the Niagara Escarpment streams to the west are high quality trout streams. Consequently, the restoration priorities within this region align with opportunities to enhance these coldwater habitats as well as address broad water quality improvement objectives. Conversely the lower Nottawasaga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

1. Improve bank stability and water quality by completing stream-side tree planting, habitat friendly bank stabilization activities and installation of livestock exclusion fencing on the Pine River between Sideroad 17 Mulmur and the hamlet of Tioga in Adjala Tosorontio.
2. Improve water quality and fish habitat by retrofitting dam structures to bottom discharge and removing dams in headwater reaches and tributary streams.
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 2013)



After (Summer 2013)



An example of streambank restoration in the Pine River Subwatershed: Stabilization of stream banks and improvement of aquatic habitat on the Pine River in Angus, Township of Essa.

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. To date, NVCA does not own or manage any properties within the Pine River Subwatershed. However, the Pine River Provincial Fishing Area in Mulmur is managed by Friends of the Pine River, a partner of the NVCA. County Forests are managed for a variety of environmental, social and economic purposes. There are three Simcoe and seven Dufferin County Forest tracts, totaling 1,115 hectares (ha) within the Pine River 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 Pine River 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

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.

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.

Pine River Provincial Fishing Area (in this subwatershed)

The Pine River Provincial Fishing Area in Mulmur is managed by Friends of the Pine River, a partner of the NVCA. The fishing area is located within forested areas and fed by cold springs and is a great spot for hiking.

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

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!