This Health Check describes the health of forests, wetlands, streams and groundwater within the Mad River subwatershed. It identifies stewardship priorities and programs to improve environmental health. Healthy ecosystems sustain healthy communities – future challenges and opportunities for the watershed community are outlined.

The Mad River arises as two stream branches (Mad River and Noisy River) within a series of wetlands west of the Niagara Escarpment. Both rivers meander eastward though a mix of agricultural lands and wetlands approaching the Escarpment east of Highway 124. Within the Escarpment zone (World Biosphere Reserve), the Mad and Noisy Rivers cascade through deep, well-forested valleys, converging west of Creemore.

From Creemore through Avening, the Mad River flows through a broad agricultural plan. Near Glencairn, the river enters a forested valley system that extends downstream to Angus. Flowing north, the Mad River enters the Minesing Wetlands where it discharges to the Nottawasaga River.

Coates Creek arises on the broad agricultural ridge northwest of Cashtown. The creek flows eastward through agricultural sand plains and wetlands before entering a reservoir at the New Lowell Conservation Area. Downstream of the reservoir, Coates Creek discharges to the Mad River within the Minesing Wetlands.

Walkers Creek is a smaller stream system that flows eastward from the Escarpment slopes east of Randwick, entering the Mad River near Glencairn. The south branch (Walkers Creek) flows through a series of wetlands and forested valleys while the north branch (Mud Creek) flows through an agricultural landscape.

The Nottawasaga Valley Conservation Authority is a public agency dedicated to the preservation of a healthy environment through specialized programs to protect, conserve and enhance our water, wetlands, forests and lands. This Health Check describes the conditions of natural features within the subwatershed, as well as stewardship actions to help maintain the area. Health Checks for the NVCA watershed and subwatersheds can be found online: www.nvca.on.ca

Watershed indicators rating scale:
The Mad River subwatershed supports healthy forest cover. Large forests provide significant habitat for wildlife species that require deep, undisturbed forest habitat (forest interior) to thrive.

Forest cover is concentrated in the headwater swamps west of the Escarpment and in the wetlands/forests downstream of Glencairn. Till plains west of the Escarpment and flat outwash and sand plains east of the Escarpment are well-suited for agriculture and support less forest cover.

Escarpment forests near Singhampton are provincially significant, supporting several rare fern species as well as a variety of nesting bird species. Coniferous and mixed forests within the headwater swamps, along the Escarpment and in the river valley through CFB Borden provide important winter habitat for deer.

Headwater forests provide important linkages to adjacent natural areas within the Nottawasaga River, Saugeen River, Beaver River and Grand River watersheds. Escarpment forests are part of a larger provincial-scale natural corridor that extends from Niagara Falls to Tobermory. The Mad River valley provides a fragmented natural corridor from the Escarpment downstream to the Minesing Wetlands.

Based on satellite photo interpretation, between 2002 and 2008 there was a net gain in subwatershed forest cover of 124 ha. This represents a 0.8% increase in forest cover since 2002. Growth of young conifer plantations was responsible for most of the forest gain. It will take many years of wise forest management for young conifer plantations to evolve into fully functioning natural forests.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mad River Subwatershed</th>
<th>NVCA Watershed</th>
<th>Indicator Description</th>
<th>Trend (2002-2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Cover</td>
<td>35.1% (15,841 ha)</td>
<td>32.6%</td>
<td>Forest cover is the percentage of the watershed that is forested. Environment Canada suggests that <strong>30% forest cover</strong> is the minimum needed to support healthy wildlife habitat; more coverage is beneficial.</td>
<td>+124 ha</td>
</tr>
<tr>
<td>Forest Interior</td>
<td>11.6% (5,249 ha)</td>
<td>10.3%</td>
<td>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 <strong>10% forest interior cover</strong> is the minimum needed to support a range of species.</td>
<td>Insufficient data</td>
</tr>
<tr>
<td>Riparian Cover</td>
<td>66.6% (3,290 ha)</td>
<td>64.9%</td>
<td>Streamside forest cover (riparian vegetation) filters pollutants and provides important fish and wildlife habitat. Environment Canada suggests that at least <strong>30 m on each side of the stream</strong> (over 75% of its length) should be in natural cover to support healthy streams.</td>
<td>Insufficient data</td>
</tr>
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**Ratings:**
- **very good**
- **good**
- **fair**
- **poor**
- **very poor**
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 hold back water on the landscape, which controls flooding, reduces erosion and helps maintain stream flows during dry periods. The wetland swamps and marshes in the Mad River subwatershed provide habitat for a rich variety of flora and fauna.

Wetland conditions in the Mad River subwatershed meet Environment Canada minimum guidelines for wetland and are considered generally healthy; however, historical wetland loss has been significant. A recent Ducks Unlimited Canada study pegs historical wetland loss in the (former) Nottawasaga Township – the central portion of the Mad subwatershed – at 55.4%.

Based on satellite photo interpretation, between 2002 and 2008 there was a net subwatershed wetland loss of 14 ha. This represents a 0.2% decrease in wetland cover since 2002. Wetland losses were associated with agricultural conversion and development activities.

Large wetlands are found west of the Escarpment in the headwaters of the Mad and Noisy River. A mosaic of wetlands is present in the lowlands east of Avening and along the Mad River valley through Base Borden. The Mad merges with the Nottawasaga River in the Minesing Wetlands.

The Minesing Wetlands is recognized as internationally significant because of its important ecological, economic and cultural values. A rare Buttonbush thicket swamp is found at the junction of the Mad and Nottawasaga Rivers. Nearby marshes support a variety of threatened and endangered bird species. The Minesing Wetlands provides critical flood control functions for Wasaga Beach, holding back upstream floodwaters for several days and releasing them in a controlled fashion.

Five wetland groupings in the Mad River subwatershed – Melancthon Wetland Complex, Hatherton Wetland Complex, The Marsh, Rob Roy Swamp and parts of the Minesing Wetland Complex – have been identified as provincially significant by the Ontario Ministry of Natural Resources. Provincial and municipal planning policies help protect these wetlands from development and site alteration. A large, unevaluated wetland complex is present in the headwaters of the Noisy River. This wetland complex is an important landscape feature in this headwater area. A number of unevaluated wetlands could be added to the evaluated wetland complexes in this subwatershed.

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<tr>
<td>Wetland Cover</td>
<td>16.9% (7,628 ha)</td>
<td>12.3%</td>
<td>10% wetland cover has been identified as a minimum guideline for healthy watersheds (Environment Canada).</td>
<td>-14 ha</td>
</tr>
<tr>
<td>Wetland Buffer</td>
<td>45.7% (2,904 ha)</td>
<td>51.5%</td>
<td>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.</td>
<td>Insufficient data</td>
</tr>
</tbody>
</table>
Surface water quality and stream habitat in the Mad River subwatershed is variable. The Mad and Noisy Rivers and some tributaries support healthy resident and migratory trout populations.

The Mad and Noisy Rivers exhibit “unimpaired” stream health through the wetland/rural areas west of the Niagara Escarpment. Stream health improves further as these systems enter the Escarpment zone. Extensive forest cover and groundwater discharge (springs) through this zone provide excellent trout habitat.

East of the Escarpment slopes, stream health declines to “below potential” as the Mad River enters an agricultural landscape with relatively sparse forest cover. Unimpaired stream health returns east of Glencairn and continues through Angus as the river flows through dense forest stands in Base Borden. Stream health declines to below potential through Angus prior to entering the Minesing Wetlands.

Coates Creek flows through an agricultural landscape. Stream health is below potential to “impaired” due to sparse streamside cover next to farm fields, aggregate pits and urban areas. The dam at New Lowell Conservation Area impacts stream health and the creek is considered impaired from the dam downstream to the Minesing Wetlands.

Walkers Creek and Mud Creek are in good health through the Escarpment zone; however, sparse riparian cover and livestock impacts degrade stream conditions downstream of this zone. Recent cattle fencing along Mud Creek should result in improved stream health over time.

Nutrient concentrations (total phosphorus) are generally low at the Glencairn water quality sampling station reflecting the unimpaired stream health scores in that reach. Bacteria (E. coli) levels in the downstream reach of the Boyne River fluctuate throughout the summer months – swimming outside of regularly monitored beaches should be undertaken at your own risk. Bacteria levels in Coates Creek generally exceed the provincial recreational guideline for swimming.

Overall, stream health has remained unchanged since the 2007 report card. Refinements to mapping reflect additional information available from expanded monitoring coverage.

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<tbody>
<tr>
<td>Benthic Grade</td>
<td>2.39</td>
<td>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”.</td>
<td><img src="image" alt="Trend" /></td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>0.012</td>
<td>Total phosphorus indicates nutrient levels within a stream. Our healthiest streams have levels less than 0.01 mg/L during low flow conditions. During storm events NVCA streams often exceed 0.03 mg/L (Mad River range: 0.002—0.525 mg/L). Provincial Water Quality Guidelines suggest that levels greater than 0.03 mg/L result in unhealthy stream conditions.</td>
<td><img src="image" alt="Trend" /></td>
</tr>
<tr>
<td>E. coli</td>
<td>78</td>
<td>Escherichia coli bacteria are found in human and animal waste. They naturally occur in our streams but higher levels may indicate fecal contamination. Ontario Recreational Water Quality Guidelines suggest that waters with less than 100 CFU’s/100 mL are safe for swimming. E. coli is not closely tied to stream health. This data is presented for general public information only.</td>
<td>Insufficient Data</td>
</tr>
</tbody>
</table>
Groundwater is water that is stored underground in bedrock fractures or between sand/gravel grains in aquifers. Groundwater sinks into the ground from rain or snowmelt then moves to spring and seep discharge areas, which feed streams and wetlands, or downward into aquifers. Aquifers may be separated by layers of fine-grained silts or clays (aquitards) that tend to block the downward movement of water. Aquifers located below aquitards are often protected from potential surface contamination and are preferred for drinking water sources.

Groundwater sustains stream flow and wetland levels during dry spells. It supports a variety of human uses including municipal water supplies, private water supplies and agricultural irrigation. More than 130 municipal wells and 10,000 private wells are located within the NVCA watershed. These wells provide drinking water for most watershed residents.

Ontario’s Source Water Protection initiative is focused on protecting municipal drinking water sources. Key areas of interest include 1) Wellhead Protection Areas (areas that drain down toward municipal wells), 2) Highly Vulnerable Aquifers (generally where groundwater lies close to ground surface) and 3) Significant Groundwater Recharge Areas (which feed our aquifers). Nitrates from septic systems and fertilizer use, *E. coli* from various sources, and sodium and chloride from road salting are potential sources of contamination.

Through the Provincial Groundwater Monitoring Program (PGMN) partnership with the Ministry of the Environment, the NVCA monitors water levels and water quality in 16 wells within the watershed. Groundwater monitoring began in 2003 and is now being conducted annually. Monitoring data allows the NVCA to track changes in groundwater quantity and quality over time.

There are currently no PGMN wells within the Mad River subwatershed. NVCA continues to work with the province and member municipalities to improve PGMN coverage where feasible.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mad River Subwatershed Monitoring Well Results*</th>
<th>Indicator Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride (mg/L)</td>
<td>Shallow (0 wells) Intermediate (0 wells) Deep (0 wells)</td>
<td>Chloride occurs naturally in the environment; however, high concentrations can indicate human impacts (e.g. road salt, landfills). The Canadian guideline for chlorides in drinking water is 250 mg/L and is based on aesthetic objectives. Drinking water should not exceed this level.</td>
</tr>
<tr>
<td>Nitrite &amp; Nitrate (mg/L)</td>
<td>Shallow (0 wells) Intermediate (0 wells) Deep (0 wells)</td>
<td>Naturally occurring forms of nitrogen can be found as nitrites and nitrates in groundwater. High concentrations of this element can be related to human activities (e.g. excessive fertilizer application, failing septic systems). The Ontario (and Canada) standard for nitrite and nitrate (as nitrogen) is 10 mg/L. Drinking water levels should not exceed this level.</td>
</tr>
</tbody>
</table>

Well types are classified by their depth below ground in meters: Shallow (0-20 m); Intermediate (21-60 m); Deep (>60m). *Results reflect health at the well and should not replace testing at private wells. Baseline data for groundwater health will be presented in the 2018 Health Checks (8-10 years of data is required to analyze trends).
Watershed Stewardship is the responsible and sustainable care of our natural resources and wildlife within a watershed. As caretakers of our environment, we need to implement stewardship practices that protect and restore natural resources. (Conservation Ontario)

Almost **96% of land in our watersheds is privately owned.** We all depend on good private land stewardship to achieve healthy waters and sustainable ecosystems. To help landowners protect the environment, the NVCA provides a range of technical assistance and grant incentives to help offset the cost of projects on private lands. Grant rates for the various NVCA programs range from 25% to 95% of eligible project costs.

**STEWARDSHIP PROGRAMS**
The NVCA’s stewardship programs encourage landowners to undertake projects that restore our environment and help ensure the future of our healthy waters.

The NVCA’s **Forestry Program** provides trees, planting services and forest management advice for landowners throughout the watershed. Since 2002, landowners in the Mad River subwatershed have helped plant **189,200 trees**, reforesting **79 ha**. More than **25 landowners** have been involved.

The NVCA’s **Healthy Waters Program** provides landowners with technical and financial support for eligible projects, such as water improvement projects and strategic river habitat restoration. Since 2002, landowners in the Mad River subwatershed have undertaken **60 stewardship projects** on their properties through the support of this program! These projects have stabilized stream banks, improved fish and wildlife habitat, and decreased nutrient runoff – and have kept literally trillions of *E. coli* bacteria from reaching our streams and lakes.

**PUBLIC LANDS MANAGEMENT**
The NVCA’s **Conservation Lands Program** focuses on acquiring lands for the long-term protection of significant natural features and functions. To date, the NVCA manages five properties within the Mad River subwatershed totaling **1,151 ha**.

**County Forests** are managed for a variety of environmental, social and economic purposes. Portions of nine tracts lie within Simcoe County, one tract is part of the Dufferin County Forest while the remaining tract is a part of the Grey County Forest. These tracts total **926 ha**.

**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 two park areas (350 ha) within this subwatershed.

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

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**Congratulations to our Watershed Stewards in the Mad River Subwatershed!**
The Palomino Family worked with their tenant farmer Mr. Trott to improve river water quality. Livestock were fenced from the river, creating a naturalized buffer. The NVCA planted trees to help stabilize the banks and shade the stream. This wonderful project helped reduce bank erosion, and significantly decreased runoff of nutrients and bacteria. The 61 kg/year of phosphorus runoff reduced can help prevent about 30 tonnes of algal growth.

*This is only one of the many community champions that are helping to improve subwatershed health!*
Forest, wetland and stream conditions in the Mad River subwatershed are generally healthy. There are significant stewardship opportunities to restore impacted trout and salmon habitats in the Mad River between the communities of Creemore and Avening. This will increase the extent of high quality trout and salmon habitat in this system. Achieving this goal will also contribute to improved water quality further downstream in the Nottawasaga River.

Healthy Waters Depend on All of Us

Key Actions to Improve Habitat & Water Quality:
- Protect and create stream and wetland “buffers” – areas of natural vegetation between the water and adjacent land use practices
- Plant trees along streamsides and stabilize eroding steam banks
- Implement agricultural best management practices to reduce nutrient, sediment and bacteria runoff
- Reduce the spread of invasive species and pathogens

Urban Water Quality & Quantity:
- Conserve water in the home and garden
- Use rain barrels, mulch and rain gardens
- Reduce or stop use of fertilizers
- Don’t pour anything down storm drains – these drains often flow untreated into local water bodies

Habitat Enhancement:
- Plant native trees, shrubs, wildflowers and grasses to support birds, butterflies and other wildlife
- Learn to identify and remove invasive species

Protect Your Drinking Water – Well & Septic Care:
- Decommission unused wells to prevent surface contaminants from reaching groundwater
- 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 to 5 years) and avoid using products that kill beneficial bacteria, which aids in the breakdown of septic waste

Agricultural Best Management Practices:
- Upgrade manure storages and divert clean water from pastures and barn yards 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 use of 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
- Minimize pesticide use wherever possible

How You Can Make a Difference
- Undertake stewardship projects on your property
- Volunteer at community stream and habitat restoration work days and events
- Participate in citizen science (e.g. amphibian and breeding bird monitoring)
- Donate funds for land conservation or habitat and water improvement projects
- Step into nature – check out our interactive conservation area guide at nvca.on.ca
- Join a local ‘Friends of’ or Field Naturalist group
- Attend community workshops – learn about your local environment
- Manage your forest and receive tax benefits – check out the Managed Forest Tax Incentive Program
- Donate your lands as a living legacy – contact the NVCA to learn more
- Stay informed about upcoming events – check us out on Facebook and Twitter
Our Watershed Ecosystems Benefit Us All

A healthy natural heritage and water resource system is the foundation of a high quality sustainable community. Often these services are overlooked and undervalued. The ecosystem services provided by our lands and waters include:

- healthy agriculture
- clean drinking water
- waste assimilation
- fish and wildlife habitat
- climate stabilization
- flood and erosion control
- forest products
- spiritual and inspirational values
- recreation and ecotourism

Ecosystem services will become even more important as urban growth continues in our watershed communities. This will bring large numbers of new people into our community with expectations for healthy landscapes and streams, clean drinking water and opportunities for recreation.

New growth represents challenges and opportunities for us as a watershed community. Water resources, including stormwater and wastewater, must be carefully managed in urbanizing areas to ensure that the health of our rivers, stream and lakes is protected. Development must be planned to ensure it is safe from flooding and erosion hazards. Interconnected forests, wetlands and streams are needed to maintain water quality as well as the variety of life on our landscape.

Community stewardship will continue to be an important tool to restore subwatershed health. Through innovative planning and wise stewardship, we can sustainably manage our local streams, lakes and natural areas for the benefit of present and future generations.

THANK YOU!

Thanks to all of our Watershed Champions – landowners, community groups, schools, businesses, municipalities and other government agencies – who support stewardship activities in our watershed!

For more information or to get involved, contact the NVCA at (705)424-1479 or www.nvca.on.ca

Partner Municipalities in the Mad River Subwatershed:
CFB Borden, Township of Adjala-Tosorontio, Clearview Township, Township of Springwater, Township of Melancthon, Township of Mulmur, Municipality of Grey Highlands

"Working Together to Protect and Restore"