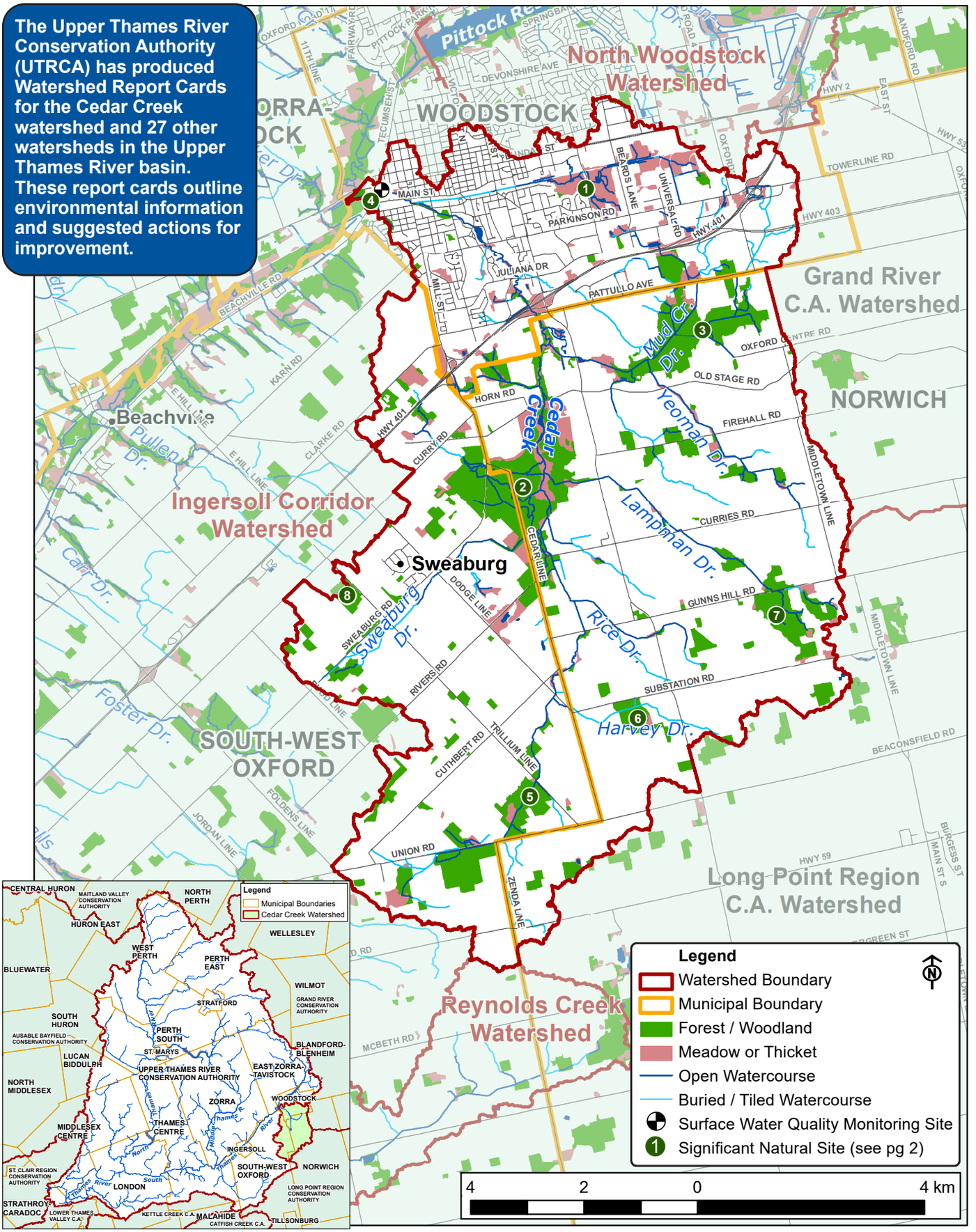
Surface Water Quality
D - Steady

Forest Conditions
D - Slight Decline

2022 Watershed Report Card

Cedar Creek

The Upper Thames River Conservation Authority (UTRCA) has produced Watershed Report Cards for the Cedar Creek watershed and 27 other watersheds in the Upper Thames River basin. These report cards outline environmental information and suggested actions for improvement.



Legend

- Watershed Boundary
- Municipal Boundary
- Forest / Woodland
- Meadow or Thicket
- Open Watercourse
- Buried / Tiled Watercourse
- Surface Water Quality Monitoring Site
- 1 Significant Natural Site (see pg 2)

4 2 0 4 km

2022 Watershed Report Card

Watershed Features

Feature	Description
Municipalities	Norwich Township (47%, 45 km^2), South-West Oxford (32%, 31 km^2), Woodstock (21%, 21 km^2) Total Area: 9,725 ha (97 km^2), 3% of the Upper Thames River watershed
Significant Natural Sites	Significant Wetlands: (1) Brick Ponds Wetlands, (2) Cedar Creek Swamp, (3) Oxford Centre Swamp, (4) Thames River Wetland. Other Wetlands: (5) Cedar Creek Source Complex I, (6) Cedar Creek Source Complex II (Jack Griffin's), (7) Gunn's Hill Rd. Wetland TRT1. Life Science Areas of Natural and Scientific Interest: (8) Trillium Woods Provincial Nature Reserve. (See map for numbered sites).
Land Cover	63% agriculture, 16% natural, 2% open space, 18% urban/built-up, 1% aggregate, < 1% water. 0.5% less agriculture and 0.5% more urban/built-up than five years ago. There is 10% impervious cover (e.g., hard surfaces such as roofs and roads).
Population	20,461 in 2021; a slight decline since 2016 primarily due to watershed boundary corrections
Soil Type	45% silty loam, 20% clay loam, 14% sandy loam, 14% not mapped (urban), 4% loam, 3% organic
Physiography	35% spillway, 29% till moraine, 27% drumlinized till plain, 9% drumlin
Soil Erosion/ Delivery	16% highly erodible (lands that could potentially contribute > 7 tonnes/ha/yr of soil to a watercourse). The average for the Upper Thames River watershed is 9%.
Tiling and Drainage	30% of the watershed has agricultural tile (15% random + 15% systematic), 18% urban drainage, 52% no tiling. An additional 3% of the watershed is tiled/drained compared to five years ago.
Watercourse Characteristics	Total length: 131 km of watercourses Watercourse type: 26% natural, 42% channelized, 32% buried/closed Temperature: 17% cool/coldwater, 83% warmwater/unconfirmed Main channel slope: 0.27% slope (low/flat); range is 0.09-1.26% in Upper Thames River watersheds
Dams and Barriers	Seven dams or other barriers to fish passage have been recorded including Southside Dam. Other barriers include perched culverts, beaver dams, and stormwater ponds. Cedar Creek was bypassed around Hodges Pond Dam in 2017.
Spills	<table><tr><th>2001-2005</th><th>2006-2010</th><th>2011-2015</th><th>2016-2020</th></tr><tr><td>10</td><td>34</td><td>21</td><td>23</td></tr></table> Recent reported spills involved fuels, industrial chemicals, and sewage.
Sewage Treatment	The portion of Cedar Creek watershed within Woodstock is serviced by the Woodstock Wastewater Treatment Plant, which discharges treated effluent to the South Thames River. All rural properties in the this watershed are serviced by private septic systems.
% Vegetation Cover and Types	Vegetation cover: 1,486 ha or 15.3% of the Cedar Creek watershed Composition: 52% deciduous forest, 16% mixed forest, 5% coniferous/plantation forest, 20% meadow, 7% thicket
Wetland Cover	7.0% (679 ha) of the watershed is in wetland cover. Environment Canada (2013) recommends at least 6% wetland cover. 3.4 ha of wetland cover was lost between 2010 and 2015.
Woodlot or Patch Size	<table><tr><th>Size Category</th><th>Number of Woodlots</th><th>Average Size (ha)</th><th>Total Woodland Area (ha)</th><th>% of Woodland Area</th><th>Largest Woodlot (ha)</th></tr><tr><td>Small (< 10 ha)</td><td>96</td><td>2</td><td>210</td><td>19</td><td rowspan="3">196</td></tr><tr><td>Medium (10-30 ha)</td><td>14</td><td>15</td><td>205</td><td>19</td></tr><tr><td>Large (> 30 ha)</td><td>8</td><td>83</td><td>666</td><td>62</td></tr></table>
Fish and Mussels	Fish Species - 33 including a historic species. Gamefish - Northern Pike, Smallmouth and Largemouth Bass. Mussel Species - 4.
Species-at-Risk	Birds - 9 species including Bank Swallow, Bobolink, Red-headed Woodpecker, and Wood Thrush. Fish - Northern Sunfish. Reptiles - Snapping Turtle and Midland Painted Turtle. Plants - American Chestnut, Butternut, Kentucky Coffee-tree.

For more information on watershed features and how they compare to the other 27 subwatersheds, see the tables in the full report: 2022 Upper Thames River Watershed Report Cards at www.thamesriver.on.ca.

2022 Watershed Report Card

Surface Water Quality

Surface water quality in Cedar Creek has remained steady since the last report card and scores an overall grade of D. Samples were taken at the provincial water quality monitoring station at Beachville Road and Highway 2 (see map). The UTRCA has a water quality target of a C grade for Cedar Creek by 2037.

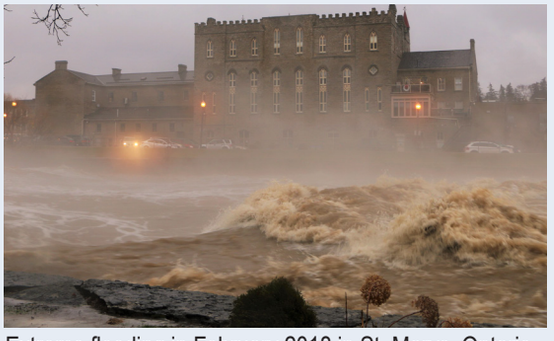
Since the 1970s, total phosphorus levels have been elevated and well above the aquatic life guideline. There has been some recent increase in phosphorus since 2015. *E. coli* bacteria levels have been steadily improving since 1990 but remain above the Upper Thames River watershed average. Nitrate levels, from sources such as fertilizer, have improved since the 1990s, with some increase in recent years to just above the aquatic guideline. Chloride levels (mainly from road salt) show an increasing trend since 1990 but remain below the aquatic life guideline.

Stream health based on benthic scores remains fairly steady and indicates impaired conditions. Stream health conditions are generally better in the headwaters and poorer downstream. Contributing factors likely include bank erosion, a lack of vegetative cover, and urban runoff.

Indicators	Cedar Creek					Upper Thames 2016-2020	Provincial Guideline	Indicator Description
	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020			
Phosphorus (mg/l) *	0.141 D	0.154 D	0.110 D	0.093 D	**0.151 D Decline**	0.110 D	0.030 B Aquatic Life	Phosphorus is found in products such as fertilizer, detergents, and waste, and contributes to excess algae and low oxygen in streams and lakes.
Bacteria (CFU *E. coli*/ 100 ml) **	638 D	414 D	389 D	370 D	**383 D Steady**	211 C	200 C Recreation	*E. coli* is a fecal coliform bacteria found in human and animal (livestock/wildlife/ pets) waste. *E. coli* is a strong indicator of the potential to have other disease-causing organisms in the water.
Benthic Score (FBI)	7.04 F	7.11 F	6.98 F	7.33 F	**7.04 F Improved**	5.99 D	< 5.00 B Target Only	Benthic organisms (aquatic invertebrates that live in stream sediments) are good indicators of water quality and stream health. The Family Biotic Index (FBI) scores each taxa according to its pollution tolerance.

*75th percentile, MECP Provincial Water Quality Monitoring Network data. **Geometric mean, Health Unit data. Province-wide grading system used (see page 8). In 2019, the Provincial Recreational Guideline for *E. coli* changed from 100 Colony Forming Units *E.coli* / 100 ml to 200 CFU *E.coli* / 100 ml.

Found in Cedar Creek, Northern Hog Suckers prefer clean water habitats with a fast-flowing current. They have a streamlined body, widely spread pectoral fins, and a head that is depressed toward the bottom of the stream. These characteristics enable the fish to camouflage in place until it is ready to move to a new location.



Extreme flooding in February 2018 in St. Marys, Ontario.

Climate Change

Climate change continues to be a critical issue. Locally, storms and floods are becoming more intense and frequent, which affects water quality by increasing runoff and erosion. Flooding and increased temperatures also stress native plant and animal species. Many local municipalities and industries are enacting Climate Action Plans that focus on reducing greenhouse gases and developing adaptation strategies, including nature-based solutions. Increasing natural cover (trees, wetlands, and forests) and green cover (agricultural cover crops) will absorb carbon and improve resiliency to climate change impacts.

2022 Watershed Report Card

Forest Conditions

Forest conditions in the Cedar Creek watershed have declined slightly since the last watershed report cards in 2017, and score an overall grade of D. It should be noted that some of the change is due to improved mapping methods and boundary corrections.

The percent forest cover (11.1%) has declined slightly from 11.3% in the last report card. The Environment Canada (EC) guideline for sustaining species and water quality in southern Ontario is 30% forest cover. The EC guideline for sustaining species and water quality in southern Ontario is a minimum of 30% forest cover. Meadows and other habitat types add another 4.2% cover for a total of 15.3% natural vegetation cover.

The percent forest interior (2.4%) decreased slightly from 2.5% in 2016 to score an F grade. While it is higher than the Upper Thames River average, it is still low and indicates that most woodlots are too small and narrow to support area sensitive species such as Scarlet Tanager and Ovenbird.

The percent riparian zone forested (37.5%) is lower than the target of 50%. Additional riparian areas are in permanent meadows and thickets (20.6%) for a total of 58.1% riparian zone vegetated.

Indicators	Cedar Creek 2022*	Upper Thames Average 2022*	EC Guideline **	Indicator Description
% Forest Cover	**11.1 D**	11.3 D	30.0 B	Percent forest cover is the percentage of the watershed that is forested or wooded. Forest cover includes upland and wetland forest types.
% Forest Interior	**2.4 F**	1.5 F	10.0 B	Percent forest interior is the percentage of the watershed that is forest interior. Forest interior is the protected core area 100 m inside a woodlot that some bird species require to nest successfully. The outer 100 m is considered “edge” habitat and prone to high predation, wind damage and alien species invasion.
% Riparian Zone Forested	**37.5 C**	35.7 C	50.0 B	Percent riparian zone forested is a measure of the amount of forest cover within a 30 m riparian/buffer zone adjacent to all open watercourses. Riparian habitats support high numbers of wildlife species and provide an array of ecological functions including water quality protection.

* 2022 report card data is based on 2015 colour air photography. ** EC Guideline - Environment Canada guideline based on “How much habitat is enough?” 2013. Grades based on Conservation Ontario (2022).

Losses and Gains

Forest Area Removed

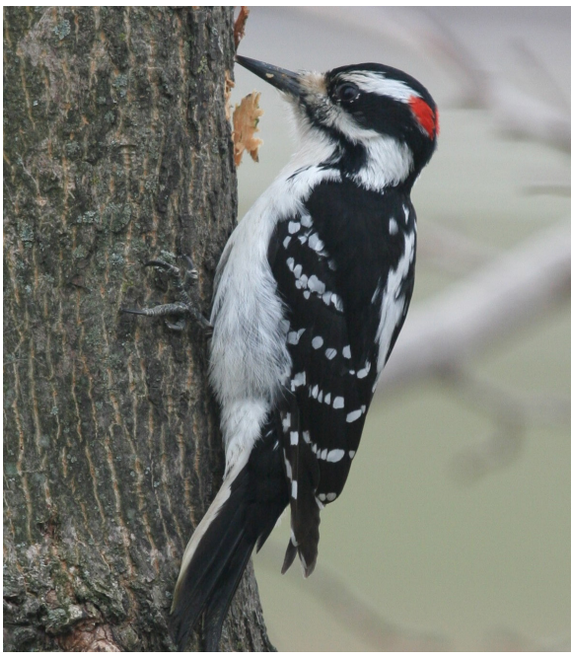
Years	ha
2000-2006	16
2006-2010	10
2010-2015	7

Approximately 7 ha of forest were cleared and converted to other uses (e.g., urban, agriculture, aggregates) between the 2010 and 2015 air photography. An additional 26 ha of forest were cleared in the previous 10 years. This is an urbanizing watershed.

Forest Area Gained

Years	ha
2010-2015	15

New data shows that approximately 15 ha of forest were gained between 2010 and 2015 due to forest succession and improved mapping. Several 20- to 30-year-old tree planting sites and some thickets matured to the point where they could be classified as mature woodland in 2015. This data demonstrates the value of continued tree planting and conservation efforts.



Hairy Woodpeckers nest locally in tree cavities, often in more mature forests. Photo: Brenda Gallagher

2022 Watershed Report Card

Groundwater

Municipal Water Supply

Some parts of the Cedar Creek watershed that are positioned in Woodstock and Sweaburg are supplied by Woodstock's 11 municipal wells. These wells draw groundwater from both bedrock and shallow overburden aquifers. Six of the 11 wells are designated as GUDI (groundwater under direct influence of surface water) as they are in a shallow overburden aquifer. Municipal well water is tested and treated.

Private Wells

Approximately 694 private wells are on record in the Cedar Creek watershed, drawing from overburden and bedrock aquifers. Properly constructed deep wells have a lower risk of contamination from the surface than shallow wells. The highest risk to a well is from contaminants and activities closest to the well. The safety, testing, and treatment of a private well are the responsibility of the well owner.

Groundwater Monitoring

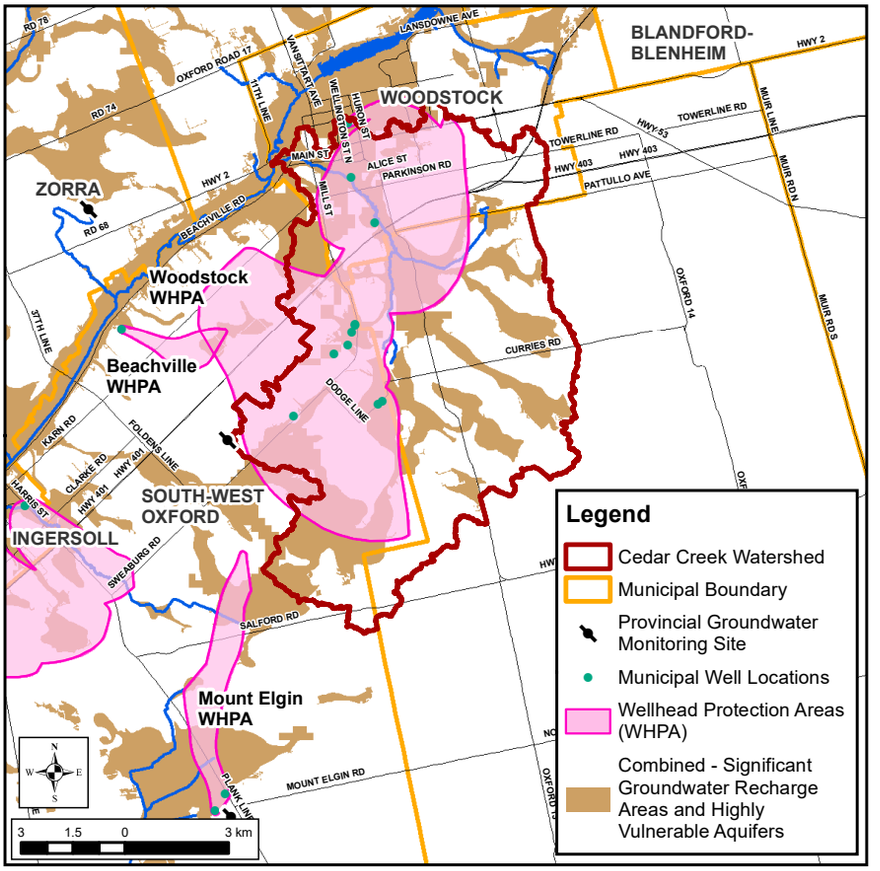
The Provincial Groundwater Monitoring Network has shown groundwater levels generally decline from May to October and increase (recharge) from late fall to early spring, with the largest increase in March (up to 1.5 m change). Recent data shows the recharge period is shifting later to November to May, with a trend of warmer and drier weather from October to November and cooler temperatures in May. The rate of decline in groundwater levels is directly related to maximum air temperatures. Summer rainfall does not typically affect groundwater levels as evaporation and plant uptake greatly exceeds rainfall, and most rainfall is utilized by plants during summer.

Did you know?

- About 50-70% of total local streamflow is baseflow from groundwater discharging into streams.
- Vegetation relies more on groundwater as it is more stable than rainfall. Most remaining wetlands are groundwater dependent.

Drinking Water Source Protection

Local source protection plans have been completed to protect sources of municipal drinking water. The Thames-Sydenham and Region Source Protection Plan (2015) has policies to address risks to municipal water systems. Visit www.sourcewaterprotection.on.ca for information on groundwater resources, Source Protection Plan policies, and a Water Supply System Summary for Woodstock.



On The Map

Significant Groundwater Recharge Areas: Areas where a relatively large volume of water makes its way from the ground's surface down to the aquifer.

Highly Vulnerable Aquifers: Areas where there is a relatively fast pathway from the ground's surface down to an aquifer, generally making the aquifer more vulnerable to contamination.

Wellhead Protection Areas: Areas surrounding the wellhead, through which contaminants are reasonably likely to move toward or reach the well.

Protecting these areas is very important for the protection of local groundwater as a source of drinking water.

2022 Watershed Report Card

Local Actions for Improvement

Individuals, groups, businesses, municipalities, and agencies all have a role in improving the health of the watershed through these suggested actions. For more information on agencies that can help, contact the UTRCA (see page 8).

A number of the local actions listed below are also identified in the following reports:

- The Thames River (Deshkan Ziibi) Shared Waters Approach to Water Quality and Quantity (Thames River Clearwater Revival, 2019),
- Oxford Natural Heritage Systems Study (County of Oxford, 2016),
- Upper Thames River Source Protection Area Approved Assessment Report (Thames-Sydenham Source Protection Region, 2015),
- 2009 Cedar Creek Water Quality Study (UTRCA, 2010),
- Woodstock Natural Heritage Study (UTRCA, 2007),
- East Woodstock Secondary Plan and Design Study, Natural Heritage Background Study (Earth Tech Canada Inc. 2007) and Servicing Report (Earth Tech, 2006),
- The Cedar Creek Management Strategy and Enhancement Plan (UTRCA, 1998).

Local Actions to Improve Surface Water and Groundwater

- Protect and establish buffers (native trees, grasses) along watercourses to cool streams, provide food for aquatic species, stabilize banks, and trap and absorb nutrients and other pollutants.
- Cedar Creek serves as a spawning and nursery area for South Thames gamefish. With improved habitat and water quality, the watershed may be capable of supporting a sport fishery. Mitigating the impacts of the dam in Southside Park, as well as preserving and enhancing stream and riparian habitat, will benefit the fish community.
- Use drain maintenance methods that protect aquatic habitat (e.g., low flow channels, spot or bottom cleanouts).
- Repair or replace faulty septic systems and ensure proper maintenance of the systems.
- Continue to implement agricultural Best Management Practices (BMPs):
  - Establish cover crops to protect soil from erosion, prevent nutrient loss, and build soil health.
  - Target work to reduce soil loss in highly erodible areas such as steep slopes and light soils (16% of the land is highly erodible).
  - Reduce nutrient loss from cropland (4R Stewardship Approach: right source, right rate, right time, right place).
  - Use best practices in manure storage and spreading, pesticide and fertilizer storage and application, fuel storage, and restricting livestock access to watercourses.
  - Complete and follow Environmental Farm Plans and Nutrient Management Plans (www.omafra.gov.on.ca).
  - Utilize grants for stewardship work from the UTRCA Clean Water Program (www.cleanwaterprogram.ca).
- In Woodstock, continue the following actions:
  - For new development, implement urban stormwater planning using Low Impact Development (LID), stormwater BMP, subwatershed studies, catchment area planning, and erosion control.
  - Incorporate LID into the planning process and promote the implementation of LID techniques, including in Master Plans, Secondary Plans, and any subwatershed studies.
  - Consider using a water balance and landscape approach for inbuilt and new development to manage stormwater runoff.
  - Maintain base flow to natural heritage features through water balance.
  - For existing development, implement pollution prevention and control planning for all aspects of stormwater runoff including combined storm-sewer overflows.
  - Continue to upgrade sewer systems where risk of contamination is greatest (e.g., extend sanitary sewers to urban properties on septic systems).
  - Minimize use of fertilizers, adhere to Ontario's Cosmetic Pesticide Ban, and utilize the municipal hazardous waste disposal program.

Local Actions to Improve Drinking Water

- Decommission abandoned wells according to Ministry of Environment, Conservation, and Parks standards.
- Homeowners with wells should understand the condition of their well and risks to their water supply (see www.wellaware.ca).
- Sample private wells each spring and fall (available through the Health Unit).
- Keep contaminants (e.g., fuel, pesticides, manure, waste) away from your well area. Consider septic system inspections (see www.omafra.gov.on.ca)
- To protect municipal drinking water sources, implement Source Protection Plan policies.

Local Actions to Improve Forests and Vegetation Cover

- Connect the existing riverside woodlands and meadows with additional plantings to create a continuous wildlife corridor along Cedar Creek and its tributaries.
- For tree planting and naturalization projects, create a more natural and diverse habitat by using a variety of native plant species that are better adapted to the local climate, pests, etc. The UTRCA provides tree planting assistance and advice, and grants may be available (see contact information on page 8).
- Municipalities can conserve woodlands, wetlands, and other natural areas by strengthening tree conservation by-laws and enforcement, Official Plan designations, and providing landowner incentives and education.
- Connect woodlots by planting shelterbelts, windbreaks, and buffers along fields and watercourses, which will also protect against soil erosion and improve water quality.
- Increase forest interior by making woodlots larger and wider by planting native trees and shrubs along the edges or allowing the edges to naturalize on their own.
- Landowners wishing to selectively log their woodlots should use Good Forestry Practices (i.e., Basal Area Guidelines, not Diameter Limit Harvesting) and hire a Certified Tree Marker to mark the woodlot and oversee harvesting.
- Landowners can improve the quality of their woodlots by identifying and removing invasive species such as buckthorn (see www.ontarioinvasiveplants.ca and www.thamesriver.on.ca).

Agricultural practices such as the use of cover crops and minimal tillage help the climate by reducing carbon loss while improving water quality and soil health.

Great Lakes Connection

The Cedar Creek watershed is in the Thames River watershed, which is part of the Lake Erie watershed. Water from Cedar Creek enters the South Thames at Woodstock and takes 4-10 days to flow through London, Chatham, and into Lake St. Clair. About two weeks later, it reaches Lake Erie via the Detroit River.

Shared Waters Approach

In 2012, partners in the Thames River watershed formed the Thames River Clear Water Revival to work together on the protection of water, with the shared goal of a healthy and vital Thames River which would also benefit Lake St. Clair and Lake Erie. This partnership brings together Indigenous peoples, three levels of government, two local conservation authorities, and the local community. A state of the environment report with a focus on actions needed for water quantity and quality was completed in 2019: The Thames River (Deshkan Ziibi) Shared Waters Approach to Water Quality and Quantity. Implementation by all partners is underway. The Shared Waters Approach contains significant input from four of the eight distinct First Nations whose traditional territory includes the Thames River watershed and highlights the positive participation and sharing of traditional ecological knowledge within this approach.

2022 Watershed Report Card

Highlights of Progress Since 2017

The Cedar Creek watershed is benefiting from many conservation efforts that continue to be implemented by individuals, groups, businesses, agencies, and municipalities on private and public lands. Examples of activities since 2017 include:

- There have been numerous upgrades to the Woodstock Wastewater Treatment Plant to ensure reliable performance, optimization of sewage treatment, and the promotion of green energy production. An aeration blower was rebuilt, a new chlorine chemical tanks was installed, and upgrades were made to the power supply and aerobic digestion.
- Following the bypass of Cedar Creek around the Hodge's Pond dam, the creek is now free-flowing and the UTRCA has recorded 14 fish species including two species-at-risk.
- Oxford County released its Managed Forest Plan (2018-2027) which aims to increase forest cover to maintain species and improve watershed health.
- Since 2017, Oxford County has planted approximately 16,000 trees in and around Cedar Creek Swamp.
- In 2018, UTRCA staff assisted landowners in establishing eight new wetlands. In total, 4.5 ha of marsh and swamp habitat were created and more than 30 ha of total landbase was naturalized. The County of Oxford, Canada-Ontario Agreement, and Ontario Power Generation were the principal funders in these projects.
- In 2019 and 2021, UTRCA staff stabilized eroded sections of the Pittock South Shore Trail by re-grading the slope and placing 180 tonnes of stone along the toe, improving the trail and aquatic habitat.
- A wetland rehabilitation project was completed near Highway 401 at Woodstock in partnership with the City of Woodstock and Ducks Unlimited with funding from the Cowan Foundation and Environment and Climate Change Canada. Runoff in surrounding areas is partially treated by the wetland/green infrastructure project.
- Restoration efforts have continued at the Brick Ponds Wetland in Woodstock, a partnership between the City of Woodstock, the UTRCA, Stewardship Oxford, Ducks Unlimited, and others. The partners created an interpretive trail with an observation deck and are working on Phragmites control.
- Watershed landowners completed five Clean Water Program (CWP) projects including wellhead protection and septic system upgrades. Since 2001, 121 projects have been completed in this watershed.
- Through the UTRCA's Communities for Nature program (2016-2020), 430 students and 35 community members helped plant 3,436 trees at Hodge's Pond.
- 7,415 trees were planted at nine sites through the UTRCA's Private Land Reforestation Program.
- Many municipalities in the Upper Thames River watershed are taking action on climate change. For example, the municipality of South-West Oxford and the City of Woodstock have climate change adaptation requirements recognized through Oxford County's Future Oxford objectives including a target of 100% renewable energy by 2050.
- Along with several partners, the UTRCA is restoring the headwaters of Cedar Creek at Hodge's Pond (photo below). The project has involved the removal of a small dam to improve water quality, wetland creation, and planting native trees, shrubs, and aquatic plants. Instream work has also been completed, and a hiking trail is being developed.

UTRCA staff restoring the headwaters of Cedar Creek at Hodge's Pond.

Ontario-Wide Report Cards

Conservation Authorities produce report cards for their watersheds every five years to track changes, using a standardized grading system (www.conservationontario.ca). Grades vary across the province, reflecting the range of physical characteristics and human activities. The complete set of UTRCA report cards and supporting information are available in a report titled 2022 Upper Thames River Watershed Report Cards (thamesriver.on.ca).

For more information, contact:

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