



2022 Watershed Report Card

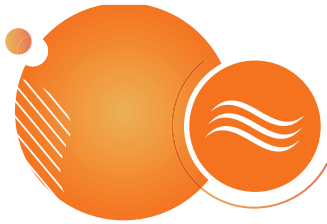
Avon River

The Upper Thames River Conservation Authority (UTRCA) has produced Watershed Report Cards for the Avon River 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 / Tilled Watercourse
- Surface Water Quality Monitoring Site
- Significant Natural Site (see pg 2)

Scale: 4 2 0 4 km



Watershed Features

Feature	Description																												
Municipalities	Perth East (51%, 84 km²), Perth South (31%, 51 km²), Stratford (17%, 28 km²) Total Area: 162 km² (16,277 ha), 4.8% of Upper Thames River watershed																												
Significant Natural Sites	Significant Wetlands: (1) Little Lakes Swamp Complex, (2) Gads Hill South Swamp. Other Wetlands: (3) Shakespeare Avon Wetland Complex, (4) Stratford Wetland Complex. Life Science Areas of Natural and Scientific Interest: (1). (See numbered sites on map. Some sites have more than one designation).																												
Land Cover	69% agriculture, 14% natural vegetation, 2% open space/golf, 14% urban/built-up, < 1% aggregates, 1% water. There has been little change from five years ago. There is 7% impervious cover (e.g., hard surfaces such as roofs and roads).																												
Population	34,900 in 2021; a 6% increase since 2016																												
Soil Type	78% silty loam, 10% clay loam, 7% bottomland, 4% organic, 1% sandy loam, 1% not mapped/urban																												
Physiography	75% undrumlinized till plain, 12% spillway, 6% kame moraine, 4% till moraine, 3% peat muck																												
Soil Erosion/ Delivery	6% 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	61% of the watershed has agricultural field tile (19% random + 43% systematic), 14% urban drainage, 25% no tiling. An additional 1% of the watershed is tiled compared to five years ago.																												
Watercourse Characteristics	Total length: Watercourse type: Temperature: Main channel slope:	259 km of watercourses 23% natural, 54% channelized, 24% buried/closed 27% cool/coldwater, 77% warmwater/unconfirmed 0.26% slope (low/flat); range is 0.09-1.26% in Upper Thames River watershed																											
Dams and Barriers	19 barriers to fish movement recorded including Thomas Orr Dam, John Street Weir, and Shakespeare Conservation Area Dam. Other barriers include perched culverts, beaver dams, and stormwater ponds.																												
Spills	<table><tr><td>2001-2005</td><td>2006-2010</td><td>2011-2015</td><td>2016-2020</td></tr><tr><td>36</td><td>30</td><td>14</td><td>19</td></tr></table>				2001-2005	2006-2010	2011-2015	2016-2020	36	30	14	19	Recent reported spills involved fuels, industrial chemicals, and sewage.																
2001-2005	2006-2010	2011-2015	2016-2020																										
36	30	14	19																										
Sewage Treatment	The Stratford Wastewater Treatment Plant discharges treated effluent to the Avon River. Rural residences in the watershed are serviced by private septic systems.																												
% Vegetation Cover and Types	Vegetation cover: Composition:	2,188 ha or 13.4% of the Avon River watershed 67% deciduous forest, 10% mixed forest, 4% coniferous plantation forest, 16% meadow, 2% thicket																											
Wetland Cover	5.7% (929 ha) of the watershed is in wetland cover. Environment Canada (2013) recommends at least 6% wetland cover. 1.5 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>161</td><td>3</td><td>424</td><td>24</td><td rowspan="3">377</td></tr><tr><td>Medium (10-30 ha)</td><td>25</td><td>18</td><td>441</td><td>25</td></tr><tr><td>Large (> 30 ha)</td><td>12</td><td>77</td><td>926</td><td>52</td></tr></table>							Size Category	Number of Woodlots	Average Size (ha)	Total Woodland Area (ha)	% of Woodland Area	Largest Woodlot (ha)	Small (< 10 ha)	161	3	424	24	377	Medium (10-30 ha)	25	18	441	25	Large (> 30 ha)	12	77	926	52
Size Category	Number of Woodlots	Average Size (ha)	Total Woodland Area (ha)	% of Woodland Area	Largest Woodlot (ha)																								
Small (< 10 ha)	161	3	424	24	377																								
Medium (10-30 ha)	25	18	441	25																									
Large (> 30 ha)	12	77	926	52																									
Fish and Mussels	Fish Species: 45 Gamefish: Smallmouth and Largemouth Bass, Brook Trout, and stocked Rainbow Trout Mussel Species: 4, plus 2 species with historic records																												
Species-at-Risk	Birds: 9 species including Barn Swallow, Bobolink, and Chimney Swift Fish: Northern Sunfish, Silver Shiner Insects: Monarch Mammals: American Badger, Gray Fox Reptiles: Snapping Turtle, Midland Painted Turtle. Plants: Cucumber Tree, 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.



Surface Water Quality

Surface water quality in the Avon River watershed has remained fairly steady since the last report card and scores an overall grade of D. Samples were taken at the water monitoring station on Perth Line 32 (see map). The UTRCA water quality target for the watershed is a C grade by 2037.

Phosphorus levels have improved significantly since the 1970s but remain elevated with some increase in recent years.

Fecal bacteria (*E. coli*) levels have shown improvement since the 1980s and have improved since 2015 but remain higher than the Upper Thames River average.

Nitrate levels (sources such as fertilizer) have shown some

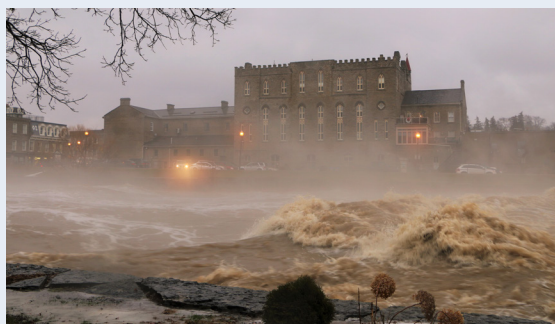
increase over the long term with levels above the aquatic life guideline. Chloride levels (mostly from road salt) have had an increasing trend since the 1980s, with a continued increase since 2015. Approximately half of samples are above the aquatic life guideline. Metals such as lead, copper, and zinc, have improved over the long term to current low levels.

Water quality, as indicated by benthic monitoring, is similar to the Upper Thames River average. Impaired water quality, (measured where the Avon River exits Stratford) improves as the river flows through a natural and well-buffered stream channel before outletting to the North Thames River.

Indicators	Avon River					Upper Thames 2016-2020	Provincial Guideline	Indicator Description
	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020			
Phosphorus (mg/l) *	0.162 D	0.128 D	0.116 D	0.155 D	0.174 D Steady	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 <i>E. coli</i> / 100 ml) **	711 D	415 C	315 C	378 C	309 D Improved	211 C	200 C Recreation	<i>E. coli</i> is a fecal coliform bacteria found in human and animal (livestock/wildlife/pets) waste. <i>E. coli</i> is a strong indicator of the potential to have other disease-causing organisms in the water.
Benthic Score (FBI)	5.96 D	6.23 D	5.93 D	5.79 D	5.77 D Steady	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 the Avon River, the Blacknose Dace prefers clear, cool headwater and medium-sized streams with gravel bottoms. They are common in moderate to fast flowing water and are often found in trout streams. During spawning, the males turn orange-red along the lateral stripe and pectoral fins.



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.



Forest Conditions

Forest conditions in the Avon River watershed have improved slightly since 2017 with an overall grade of D. It should be noted that some of the change is due to improved mapping methods.

The percent forest cover (11%) has increased slightly from 10.5% five years ago primarily due to improved mapping and natural succession (see bottom table). The Environment Canada (EC) guideline for sustaining species and water quality in southern Ontario is minimum 30% forest cover. Meadows and thickets add another 2.5% cover, for a total of 13.5% natural vegetation cover in the Avon River watershed.

The percent forest interior (2.5%) has increased slightly from 2.4%, improving the grade from F to D. This change is due

primarily to improved mapping and boundary corrections. Aside from the large Gads Hill South Swamp, most other woodlots are too small and narrow to provide habitat for area-sensitive birds such as the Scarlet Tanager and Ovenbird. The EC guideline for southern Ontario is 10%.

The percent riparian zone forested (30.6%) is up from 19.8% five years ago, improving the grade from D to C. This change is due to improved mapping methods. Levels are still below the EC guideline of 50%. Additional riparian areas are in meadow and thicket (13.4%) for a total of 44% riparian zone vegetated.

Indicators	Avon River 2022*	Upper Thames Average 2022*	EC Guideline **	Indicator Description
% Forest Cover	11.0 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	2.5 D	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	30.6 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

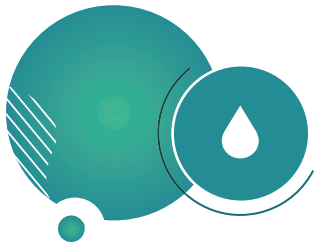
Years	ha	
2000-2006	8	Approximately 7 ha of forest were cleared and converted to other uses (e.g., urban, agriculture, aggregates) between the 2010 and 2015 air photography. An additional 16 ha of forest were cleared in the previous 10 years.
2006-2010	8	
2010-2015	7	

Forest Area Gained

Years	ha	
2010-2015	45	New data shows that approximately 45 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.



Red Bellied Woodpeckers nest locally in tree cavities in deciduous and mixed woodlands.



Municipal Water Supply

The City of Stratford has 11 municipal wells that draw groundwater from a deep bedrock aquifer and supply water to 34,200 people. Municipal well water is tested and treated.

Private Wells

Approximately 915 private wells are on record in the Avon River watershed, the majority drawing from bedrock aquifers. Some private wells draw from shallower aquifers including a fairly large overburden aquifer (< 18 m below ground) located southwest of Stratford and along the Avon River. 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 UTRCA has monitored three Provincial Groundwater Monitoring Network wells at Shakespeare Conservation Area since 2003, and added two wells near the outlet of the Avon River, north of St. Marys, in 2014. Data 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

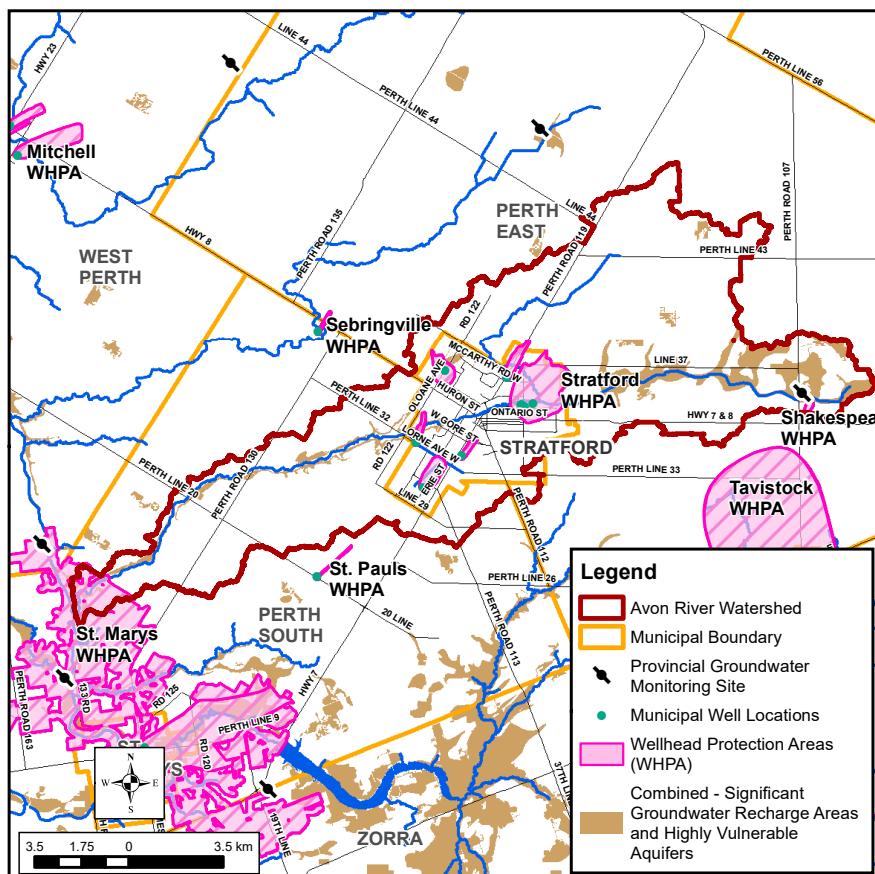
data shows the recharge period is shifting later to November to May, with a trend of warmer and drier weather from October to November and cooler temperatures in May. The rate of decline in groundwater levels is directly related to maximum air temperatures. Summer rainfall does not typically affect groundwater levels as evaporation and plant uptake greatly exceed 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

Plans have been completed to protect local 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 and Source Protection Plan policies.



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.



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 Zibi) Shared Waters Approach to Water Quality and Quantity (Thames River Clearwater Revival, 2019)
- Perth County Natural Heritage Systems Study (Perth County, 2018 and 2019)
- City of Stratford West Secondary Plan (GSP Group Inc., 2008), Court Drain and McNamara Drain (McCormick Rankin Corp., 2007), Roadhouse Drain Master Drainage Plan (Draft) (McCormick Rankin, 2007), Northeast Secondary Plan (City of Stratford, 2004)
- City of Stratford Natural Heritage Inventory (UTRCA, 2004)
- Roundtable on the Environment for the 21st Century Report, Charting Stratford's Environmental Future (City of Stratford, 2004)
- Ellice Swamp and Gads Hill Swamp Conservation Management Guiding Document (UTRCA, 2004)
- Stratford-Avon River Environmental Management Project (Thames River Implementation Committee, 1984)
- Avon Valley Plan (UTRCA, 1952)

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.
- Consider dam or barrier removal to improve stream health and fish passage, especially when a barrier no longer serves its intended purpose.
- Improve stream habitat (e.g., riffle creation in Stratford and the upper reaches of the Avon River).
- 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 system.
- Continue to implement agricultural Best Management Practices (BMPs):
 - Establish cover crops to protect soil from erosion, prevent nutrient loss, and build soil health.
 - 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 Stratford, the following actions should be continued:
 - For new development, implement urban stormwater planning using Low Impact Development (LID), stormwater BMPs, 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.
 - Consider naturalizing the Avon River between the John Street Weir and Thomas Orr Dam.

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 the Avon River 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).
- Continue to implement recommendations from the Ellice Swamp and Gads Hill Swamp Conservation Management Guiding Document (UTRCA 2004). These large, diverse swamps provide valuable wildlife habitat.
- Conserve woodlands, wetlands, and other natural areas through Official Plan designations, tree cutting by-law enforcement, landowner incentives, education, etc.
- Connect woodlots by planting shelterbelts, windbreaks, and buffers along fields and watercourses, which will also protect against soil erosion and improve water quality. Older, denser windbreaks should be thinned.
- Increase forest interior by making woodlots larger and rounder 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.



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 Avon River watershed is in the Thames River watershed, which is part of the Lake Erie watershed. Water from the Avon River enters the North Thames upstream of St. Marys and takes 4-10 days to flow through London and Chatham to 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 Zibi) Shared Waters Approach to Water Quality and Quantity. Implementation by 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 Avon River watershed is benefiting from the 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 are many active local community groups and municipal committees working to improve the environment including the Energy and Environment Committee (EEC), Climate Momentum, Avon River Environmental Association, Rotary Club of Stratford, and Stratford Beautification Committee.
- The UTRCA and Festival Hydro partnered to launch a Tree Power program in Stratford in 2021. The program offers native trees to residents to plant on their own properties to increase urban tree cover. Other partners include the City of Stratford's EEC and Stratford Master Gardeners.
- The UTRCA continued shoreline naturalization projects along the banks of Lake Victoria from 2017 to 2021. This includes 60 m of shoreline stabilization, an accessible canoe/kayak launch, and the extension of an accessible trail along the water's edge. Partners include Avon River Environmental Association, City of Stratford, City of Stratford ECC, The Green Hair Spa, and the Rotary Club of Stratford.
- UTRCA partnered with AISIN Canada in planting more than 500 native trees at Stratford's Dog Park with assistance from Stratford District Secondary School.
- Through the UTRCA's Communities for Nature program, community partners planted 2,170 trees and 1,160 native wildflowers, grasses, and aquatic plants with 625 students and 195 community volunteers at eight sites including TJ Dolan, Stratford-Perth Museum, and SERC.
- UTRCA partnered with Schaeffler Canada to plant hardwood and cedar trees on their property to provide shade around recreation fields.
- Stratford became Ontario's second Bee City in 2017. In June 2019, Bedford Public School students planted more than 300 native wildflowers in an effort to turn their school yard into a bird, butterfly, and bee habitat.
- The UTRCA and the City of Stratford's EEC worked on invasive species control in the TJ Dolan area along the Avon River. A public webinar was held to educate the public on invasive species.
- The City of Stratford has lined approximately 10 km of sanitary sewer to reduce infiltration from groundwater into the sanitary system. The City plans to continue this work to improve the operation of the sanitary collection system and protect properties during extreme weather events. The City has also made infrastructure upgrades to increase hydraulic capacity and reduce flooding events.
- The Stratford Wastewater Treatment Plant has received several improvements including upgrades to the primary clarifiers and pump system, new filter beds, and a new UV light chamber coating to optimize treatment.
- 4,610 trees were planted at 15 properties under the UTRCA's Private Land Reforestation Program.
- Perth County contracted the UTRCA to complete the Perth County Natural Heritage Systems Study (Perth County, 2018 and 2019) to identify existing important natural heritage features on the landscape.
- Watershed landowners completed five Clean Water Program projects including retirement of fragile land and erosion control projects from 2016 to 2020. Since 2001, 95 projects have been completed in this watershed.



The Upper Avon Conservation Club began planting trees along the Avon River and its tributaries in 1994. The work continues today in partnership with the UTRCA.



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 (www.thamesriver.on.ca).

For more information, contact:

Upper Thames River Conservation Authority

1424 Clarke Road, London, Ontario, Canada N5V 5B9
519-451-2800

info@thamesriver.on.ca

www.thamesriver.on.ca



Thames
Canadian Heritage River