



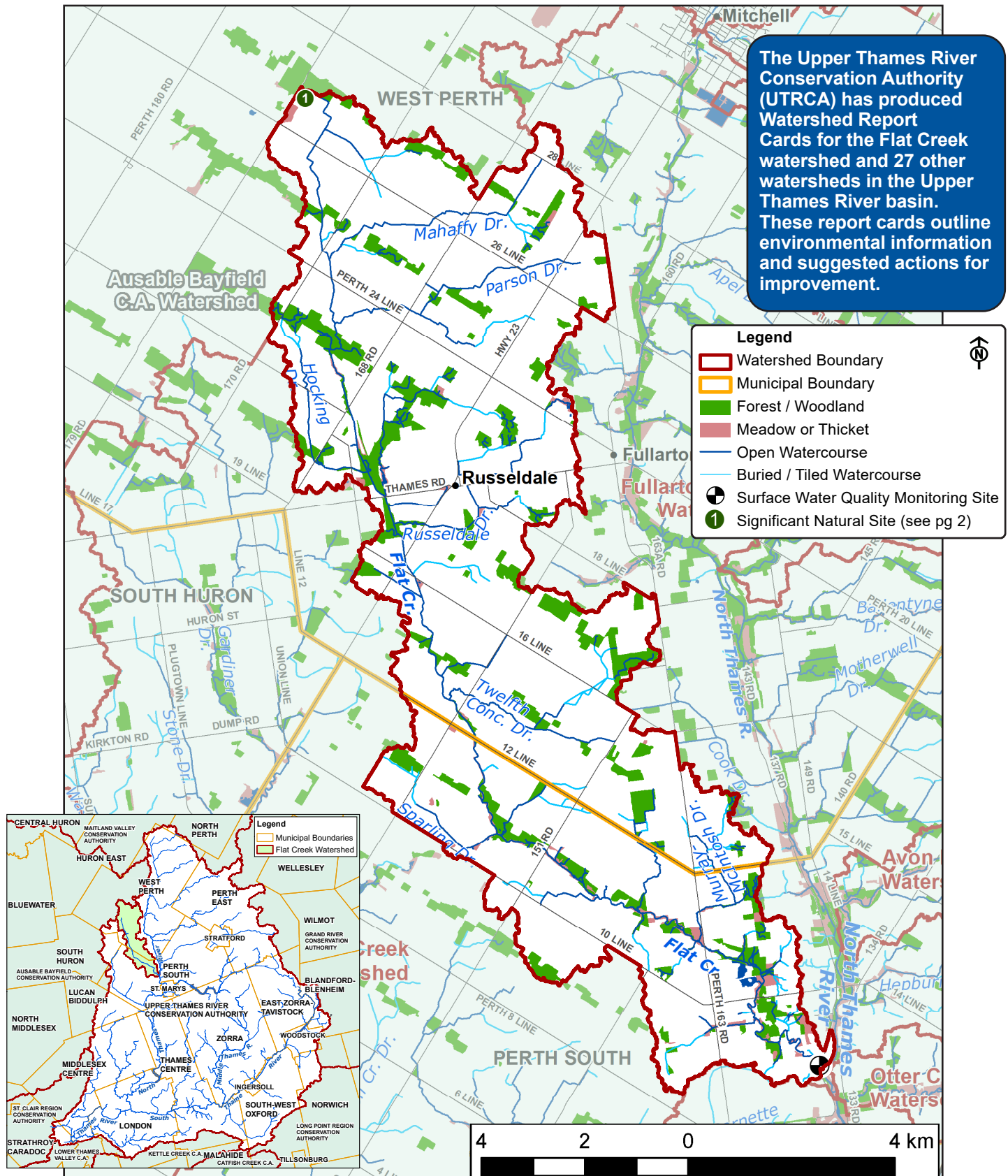
Surface Water Quality
C - Steady

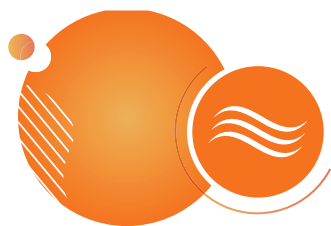


Forest Conditions
D - Steady

2022 Watershed Report Card

Flat Creek

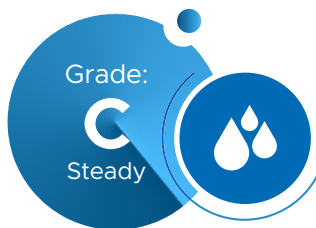




Watershed Features

Feature	Description					
Municipalities	West Perth (71%, 65 km²), Perth South (29%, 26 km²). Total Area: 9,053 ha (91 km²), 3% of Upper Thames River watershed					
Significant Natural Sites	Wetlands: (1) McGrath Swamp (see numbered site on map). Earth Science Areas of Natural and Scientific Interest: Staffa Kame Complex, North Thames Valley, Staffa-Dublin Moraine, Fullarton Moraine					
Land Cover	85% agriculture, 12% natural vegetation, 0% open space, 3% urban/built-up, < 1% aggregates, < 1% water. 2% of the watershed is in impervious cover (e.g., hard surfaces such as roof and roads).					
Population	623 in 2021; a 6% increase since 2016					
Soil Type	73% clay loam, 12% silty loam, 9% bottomland, 6% loam					
Physiography	57% undrumlinized till plain, 24% spillway, 19% till moraine					
Soil Erosion/Delivery	10% 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	67% of the watershed has agricultural field tile (23% random + 43% systematic), 3% urban drainage, 30% no tiling. There is 2% more tiling in the watershed compared to five years ago.					
Watercourse Characteristics	Total length:	140 km of watercourses				
	Watercourse type:	33% natural, 46% channelized, 22% buried/closed				
	Temperature:	15% cool/coldwater, 84% warmwater/unconfirmed				
	Main channel slope:	0.15% slope (very low/veryflat); range is 0.09-1.26% in Upper Thames River watersheds				
Dams and Barriers	11 barriers to fish passage have been documented in this watershed. Barriers include dams, weirs, perched culverts, beaver dams, stormwater ponds, etc.					
Spills	2001-2005	2006-2010	2011-2015	2016-2020	Recent reported spill involved an industrial chemical.	
	0	5	2	1		
Sewage Treatment	No sewage treatment plants discharge to Flat Creek. Rural residences in the watershed are serviced by private septic systems.					
% Vegetation Cover and Types	Vegetation cover:	1,056 ha or 11.7% of the Flat Creek watershed				
	Composition:	81% deciduous forest, 4% mixed forest, 3% plantation/coniferous forest, 10% meadow, 2% thicket				
Wetland Cover	2.4% (213 ha) of the watershed is in wetland cover. Environment Canada (2013) recommends at least 6% wetland cover. No wetland cover was lost between 2010 and 2015.					
Woodlot or Patch Size	Size Category	Number of Woodlots	Average Size (ha)	Total Woodland Area (ha)	% of Woodland Area	Largest Woodlot (ha)
	Small (< 10 ha)	62	3	204	22	96
	Medium (10-30 ha)	22	20	434	47	
	Large (> 30 ha)	5	58	291	31	
Fish and Mussels	Fish Species: 37 species including one newly recorded species (Northern Pearl Dace) Gamefish: Smallmouth and Largemouth Bass, Northern Pike Mussel Species: 5 species					
Species-at-Risk	Birds: 7 species including Bank Swallow and Wood Thrush Fish: Black Redhorse and Northern Sunfish Mussels: Wavy-rayed Lampmussel Reptiles: Midland Painted Turtle Plants: Green Dragon					

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 Flat Creek is generally better than the Upper Thames River average, and scores an overall grade of C. In 2002, a water quality monitoring station was added at Road 137 (see map). The UTRCA has a water quality target of a B grade for Flat Creek by 2037.

The phosphorus grade has declined since the last report card in 2016, but remains better than the Upper Thames River average. Fecal bacteria (*E. coli*) levels have remained steady since 2016, are relatively low, and are better than the Upper Thames River average.

Nitrate levels (from sources such as fertilizer and waste) have shown some increase. Since 2016, they have remained above the guideline for aquatic life. Chloride levels (mainly from road salt) remain below the aquatic guideline.

Stream health or water quality, as indicated by benthic monitoring, shows conditions have been fairly consistent over time, and near the Upper Thames River average.

Indicators	Flat Creek					Upper Thames 2016-2020	Provincial Guideline	Indicator Description
	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020			
Phosphorus (mg/l) *	No data	0.085 D	0.060 C	0.034 C	0.079 D Declined	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) **	No data	226 C	167 C	108 C	91 B Steady	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)	5.91 D	6.02 D	5.88 D	6.06 D	6.03 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 Flat Creek, the Central Mudminnow is capable of gulping air at the water surface or breathing air using their air bladder. This allows the fish to survive in low oxygen waterbodies in which many other species cannot survive. Central Mudminnows can spend time foraging for invertebrate organisms in hypoxic (i.e., depleted oxygen) waters by closing their gill covers and ceasing respiration.



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 Flat Creek watershed have remained fairly steady since the last watershed report card 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 (10.3%) is unchanged since the last report card. The Environment Canada (EC) guideline for sustaining species and water quality in southern Ontario is minimum 30% forest cover. Meadows and thickets add another 1.4% cover for a total of 11.7% natural vegetation cover.

The percent forest interior (0.9%) is very low, indicating most woodlots are too small and narrow to support area sensitive species such as Scarlet Tanager and Ovenbird. The EC guideline for southern Ontario is 10% forest interior.

The percent riparian zone forested (35.0%) has increased from 20.9% since 2017, primarily due to improved mapping. Levels are still below the EC guideline of 50%. Additional riparian areas are in permanent meadows and thickets (9.2%) for a total of 44.2% riparian zone vegetated.

Indicators	Flat Creek 2022*	Upper Thames Average 2022*	EC Guideline **	Indicator Description
% Forest Cover	10.3 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	0.9 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	35.0 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	2	Approximately 1 ha of forest were cleared and converted to other uses (e.g., urban, agriculture, aggregates) between the 2010 and 2015 air photography. An additional 2-3 ha of forest were cleared in the previous 10 years.
2006-2010	< 1	
2010-2015	1	

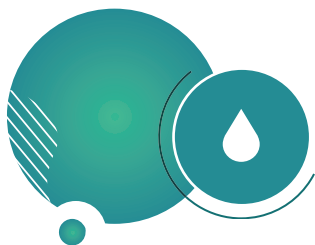
Forest Area Gained

Years	ha	
2010-2015	11	New data shows that approximately 11 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



Private Wells

Groundwater is the source of all drinking water in the Flat Creek watershed. Approximately 190 private wells are on record in this watershed, drawing from both bedrock and overburden aquifers. Properly constructed deep wells have a lower risk of contamination from the surface than shallow wells. The highest risk to any 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

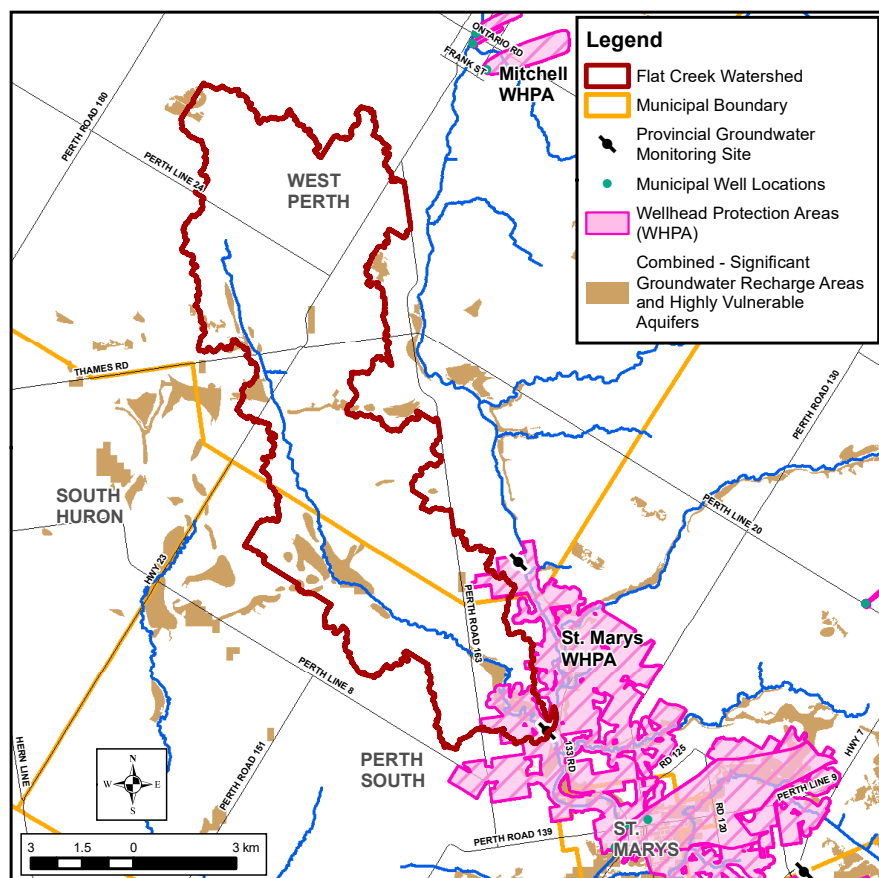
The Provincial Groundwater Monitoring Network has shown groundwater levels generally decline from May to October and increase (recharge) from late fall to early spring, with the largest increase in March (up to 1.5 m change). Recent data shows the recharge period is shifting later to November to May, 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 St. Marys.



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 Natural Heritage Systems Study (Perth County, 2018 and 2019)
- Upper Thames River Source Protection Area Approved Assessment Report (Thames-Sydenham Source Protection Region, 2015)
- Recovery Strategy for the Thames River Aquatic Ecosystem (Thames River Recovery Team, 2005)

Local Actions to Improve Surface Water and Groundwater

- Enhancing riparian cover is a priority in this watershed. 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.
- 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.
- Adhere to Ontario's Cosmetic Pesticide Ban and utilize the municipal hazardous waste disposal program.
- 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 urban areas, 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.



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.

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 Conditions

- Connect the existing riverside woodlands and meadows with additional plantings to create a continuous wildlife corridor along Flat 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 isolated 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 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.
- Woodlot owners can improve the quality of their woodlots by identifying and removing invasive alien species such as buckthorn (see www.ontarioinvasiveplants.ca and www.thamesriver.on.ca). Keep out livestock and unauthorized motorized vehicles to protect habitat quality.

Great Lakes Connection

Flat Creek is in the Thames River watershed, which is part of the Lake Erie watershed. Water from Flat Creek enters the North Thames upstream of St. Marys and takes 4-10 days to flow through London, Chatham, and into Lake St. Clair. About two weeks later, it reaches Lake Erie via Lake 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 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 Flat 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:

- Watershed landowners completed two Clean Water Program (CWP) projects including fragile land retirement and erosion control. The Clean Water Program was initiated in 2001 as a partnership between local municipalities to fund environmental projects (see www.cleanwaterprogram.ca). From 2001 to 2020, 27 CWP projects were completed.
- 3,632 trees were planted at six properties under the UTRCA's Private Land Reforestation Program from 2016 to 2020. These trees are planted into windbreaks and watercourse buffers as well as existing woodlots or new woodlots as block plantings.
- Many municipalities in the Upper Thames River watershed are taking action on climate change. Perth County municipalities share a Climate Change Coordinator. There is a commitment to reducing greenhouse gas emissions and taking action on climate change by the Federation of Canadian Municipalities under the Partners for Climate Protection Program, a network of more than 350 Canadian municipal governments.
- The Perth Children's Water Festival was launched virtually in October 2021 due to the COVID-19 pandemic. The festival, which is normally a multi-day outdoor event, is a fun and educational way for students in grades 4 and 5 to learn about the importance of water in their daily lives. The UTRCA and the Festival Organizing Committee hosted the event that ran once a month for seven months.
- Perth South held its first Tree Power in 2021, a partnership between UTRCA and the municipality. A total of 300 trees were available and residents of Perth South were able to order their choice of five native hardwood tree species: American sycamore, basswood, red maple, swamp white oak, and river birch. The aim was to increase tree and leaf cover.

- 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.



Providing native trees to residents as part of the Tree Power event in Perth South in 2021.



In 2007 and 2015, trees were planted into blocks on UTRCA land to connect three woodlots. These younger plantings are nearing maturity, creating excellent habitat for wildlife.



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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Thames
Canadian Heritage River