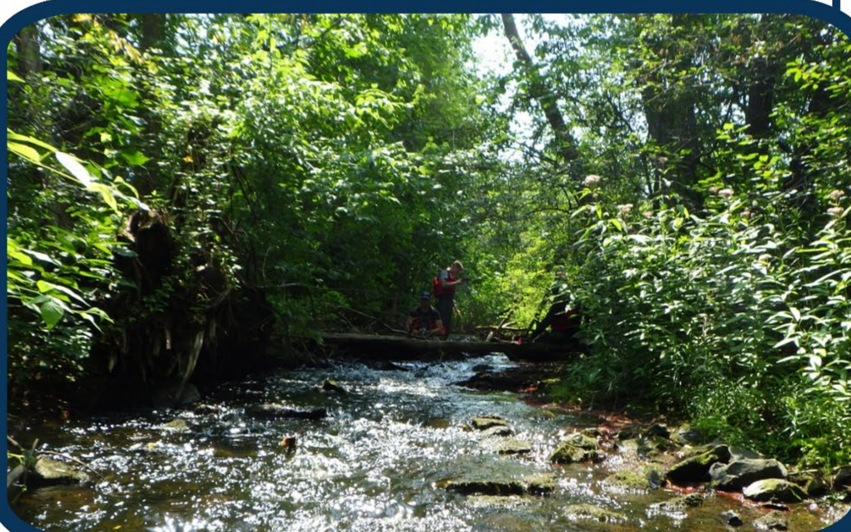
Catchment Report:

Poole Creek 2024



Acknowledgements

The Mississippi Valley Conservation Authority in partnership with the City of Ottawa, National Capital Commission, Ottawa Flyfishers Society, Canadian Forces Ottawa Fish and Game Club, Ottawa Stewardship Council, Rideau Roundtable, South Nation Conservation, and Rideau Valley Conservation Authority form the City Stream Watch 2024 collaborative.

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Introduction

The City Stream Watch (CSW) program was established in 2003 by the Rideau Valley Conservation Authority (RVCA), along with a collection of community groups, and was later expanded to include the Mississippi Valley (MVCA) and the South Nation (SNC) Conservation Authorities. Under the program, several creeks and tributaries within the **City of Ottawa** are surveyed annually on a rotating basis by staff and volunteers.

The purpose of these surveys is to gather and document detailed data regarding characteristics and overall health of various waterways within the watersheds. Stewardship and restoration opportunities are identified, and various rehabilitation and enhancement projects are carried out.

Image 1. Upturned tree roots shading a section of Poole Creek near Stittsville.

Report Summary

Although mostly in an urban setting, Poole Creek has high amounts of shoreline vegetation, cool water temperatures, and had only nine areas of concern with a poor water quality score, out of 50 surveyed sections. There are many sites of shoreline erosion along the recreational pathways which are contributing to sedimentation concerns. The stream also has sections of poor habitat structure, and log jams possibly reducing fish movement.

There are sections that provide the creek with healthy riparian buffers and shade cover. Over half of the sites surveyed had good aquatic habitat complexity, with only seven sections receiving a score of two or less. These features combine to provide a diversity of habitats to benthic organisms, fish, and the other animals that call Poole Creek home. Through stewardship and education efforts with the community, gains can be made in reducing the amount of littering and presence of invasive species.

The results in Table 18, at the end of this report are a summary of the highlights from each of the report sections.

Poole Creek Overview

Located in the west end of the City of Ottawa, hereafter referred to as the City, Poole Creek is one of eight major tributaries of the Carp River with an area of 20.8 kilometers^2 (km). It has a length of 11.4 (km) and drains an area of 17.3 km^2.

Poole Creek's headwaters originate in the Goulbourn Provincially Significant Wetland Complex near the Highway 7 and Hazeldean Road interchange. The Poole Creek portion of the wetland outlets near Westridge Drive and then flows northeast to the Carp River, north of Maple Grove Road.

The Poole Creek subwatershed is dominated by a mix of wooded and wetland areas in the headwaters and with urban spaces occupying the remainder (Figure 1). Of note is that the Goulbourn Provincially Significant Wetland Complex and the dense forest cover along the creek corridor support a unique ecosystem in the City.

Ecological Significance

Crossing a mixture of wetland, woodland and urban/residential areas, the creek provides a natural corridor and habitat for a range of aquatic and terrestrial species. The City of Ottawa's Carp River Watershed/Subwatershed Study previously described the upper reach of Poole Creek as being in good condition and able to support a cold-water fishery.

The cold water creates ideal living conditions for thermally sensitive fish species, such as brown trout and mottled sculpin; this feature is rare in the landscape within the City. The forested corridor along large sections of the creek provides shade which helps protect the waters from warming and further enhances the Poole Creek watershed.

Catchment Features

Land Cover

- 49.2% of the catchment are Urban areas
- 50.8% of the catchment are Natural areas

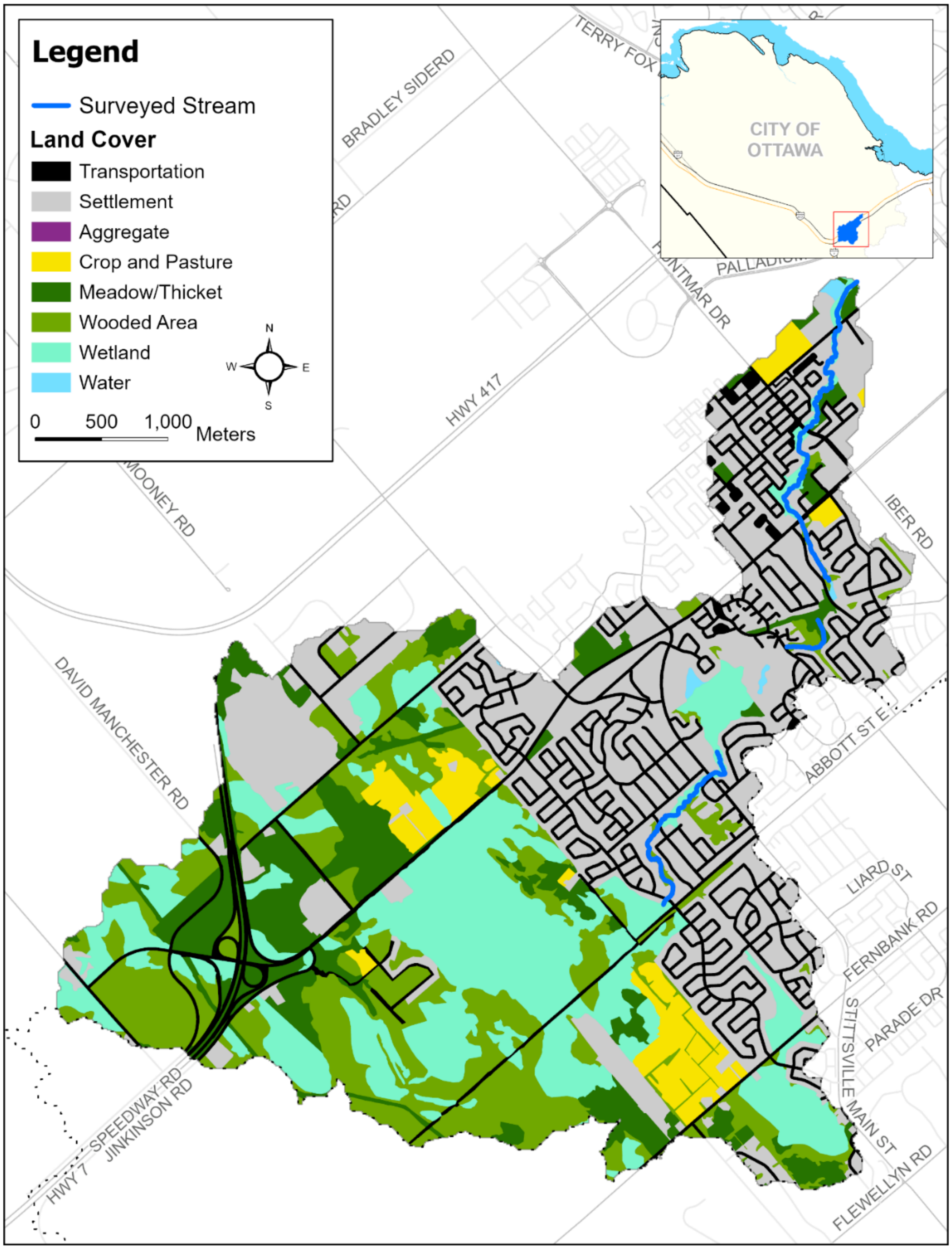

Figure 1. Land cover in the Poole Creek watershed.

Poole Creek Catchment Area

Image 2. Beaver pond and wetland area along Poole Creek in Stittsville.

Table 1. Poole Creek catchment land use.

Percent	Land Use
0%	Aggregate
4.4%	Crop and Pasture
31.6%	Settlement
13.2%	Transportation
11.4%	Meadow
17.8%	Wooded Area
21.6%	Wetland

Table 2. Poole Creek catchment surficial geology.

Percent	Surficial Geology
6.8%	Clay
11.4%	Diamicton
9.4%	Gravel
31.8%	Organic Deposits
36.8%	Paleozoic Bedrock
3.8%	Sand

Table 3. Poole Creek catchment vegetation cover.

Type	Hectares (Ha)	% of Vegetation
Hedgerow	7.5	0.9%
Plantation	8.5	1.0%
Regenerative	3.6	0.5%
Treed	350	42.9%
Wetland	446	54.7%
Total Cover	815.9	100%

Table 4. Poole Creek catchment assessment Facts.

Parameter	Min	Max	Mean
Air Temp. (°C)	20	31	25
Water Temp. (°C)	13.9	23.8	19.6
Stream Width (m)	2.5	45	5.7
Stream Depth (m)	0.09	1.3	0.48

Seasonal Weather Conditions

Seasonal weather conditions were very wet in 2024 with sustained high-water conditions for most of the season due to frequent rain events. Field surveys of sections were impacted as the water was too deep or fast for wading. However, with the perseverance of the crew and volunteers, 50 sections were assessed. Given the atypical conditions, all assessments were subjected to the effects of high water; therefore, they may not reflect the overall long-term health of the system.

The observations and assessments of the field work completed on these fifty sections (5 km) of Poole Creek are summarized in this report.

Image 1. Flooding within the area that Poole Creek intersects the Carp River.

Poole Creek Overbank Zone

Riparian Buffer Width Evaluation

Image 2. Section along Poole Creek with a vegetated buffer of approximately 10 to 15 meters wide.

The riparian buffer refers to the vegetated area along the edges of the stream banks. It can consist of a variety of vegetation types including trees, shrubs, grasses, and other plants. Vegetated buffers are critically important for protecting water quality and creating healthy aquatic habitats. They intercept sediments and contaminants and protect the stream banks against erosion. Buffers also improve habitat for aquatic species by shading and cooling the water and provide protection for birds and other wildlife that utilize the area for feeding and rearing young. Environment and Climate Change Canada recommend 30 meters (m) of natural vegetation on both sides of a stream for at least 75% of the stream length (Environment Canada, 2013).

The Riparian buffer width evaluation for Poole Creek is shown in Table 5 and Figure 2. Only 2% of the left bank had greater than 30 meters of buffer – while the right bank had no sections greater than 30 meters. A 15 to 30 meter buffer was present along 6% of the left bank and 8% of the right bank. A 5 to 15 meter buffer was present along 31 % of the left bank and 34% of the right bank. A buffer of 5 meters or less was observed along 62% of the left bank and 58% of the right bank. Overall, evaluations of the buffer width for all sections surveyed were determined to be below the recommendations of Environment and Climate Change Canada (2013).

Table 5. Vegetated buffer width along surveyed sections of Poole Creek.

Riparian Buffer Width (Metres)	Left Bank (% of Surveyed Sections)	Right Bank (% of Surveyed Sections)
0 to 5	62%	58%
5 to 15	31%	34%
15 to 30	6%	8%
Greater than 30 m	2%	0%

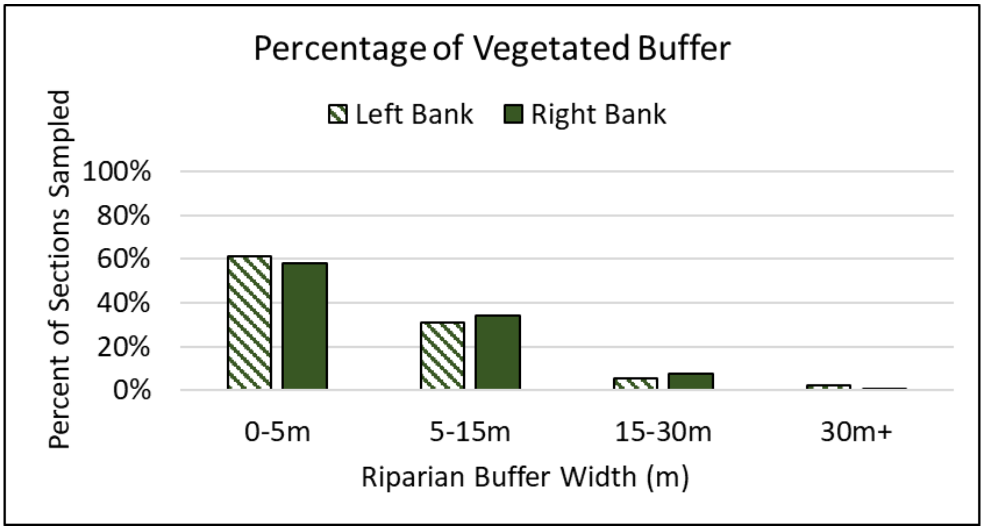

Figure 2. Vegetated buffer width along surveyed sections of Poole Creek.

Image 5. Poole Creek flows under Huntmar Drive with a vegetated buffer less than 5 meters wide.

Riparian Buffer Alterations

Alterations within the riparian buffer were assessed within three distinct shoreline zones (0-5 meters, 5-15 meters, 15-30 meters) and are evaluated based on the dominant vegetative community and/or land cover type. Evaluation of anthropogenic alterations to the natural riparian cover is shown in Table 6 and Figure 3.

The Poole Creek riparian zones surveyed were mostly altered with the remaining amount split between natural and highly altered. Alterations were mainly associated with residential land uses and infrastructure such as roadways.

Table 6. Levels of riparian buffer alterations observed along surveyed portions of Poole Creek.

Riparian Buffer Coverage	Left Bank (Percent of Surveyed Sections)	Right Bank (Percent of Surveyed Sections)
Highly Altered	20%	20%
Altered	60%	56%
Natural	20%	24%

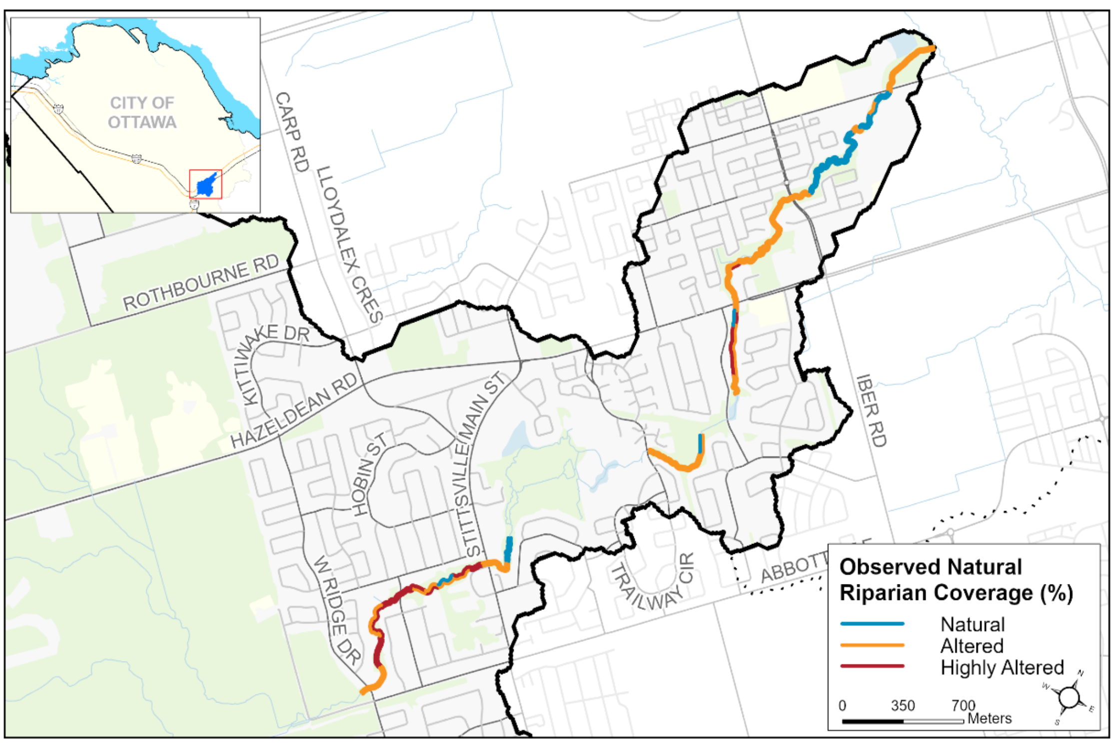

Figure 3. Levels of riparian buffer alterations along surveyed sections of Poole Creek.

Adjacent Land Use

Image 3. Section along Poole Creek with forest, scrubland, and meadow land areas.

General land use along each surveyed section of Poole Creek was recorded based on eleven different categories. Surrounding land use is considered for each 100 m section and extending outward 100 m on each side of the creek. Land use outside of this area is not included in the surveys but is nonetheless part of the subwatershed and will influence the creek. Table 7 and Figure 4 summarize the percentage of adjacent land use identified along the surveyed sections. Poole Creek catchment is naturally composed of scrublands with 15% of the surveyed areas containing this land type. These areas transition into forest in 12% of the areas, wetlands in 10%, and meadow in 8% of the adjacent lands. Aside from the natural areas; recreational and residential areas dominate the landscape at 22 and 19% of the landscape respectively. Industrial uses were noted in 8% of areas and infrastructure identified as 6% of adjacent lands.

Table 7. Percent of adjacent land use categories observed along surveyed sections of Poole Creek.

Adjacent Land Use Category	Percent of Surveyed Sections
Infrastructure	6%
Recreational	22%
Industrial	8%
Wetland	10%
Meadow	8%
Scrubland	15%
Forest	12%
Residential	19%

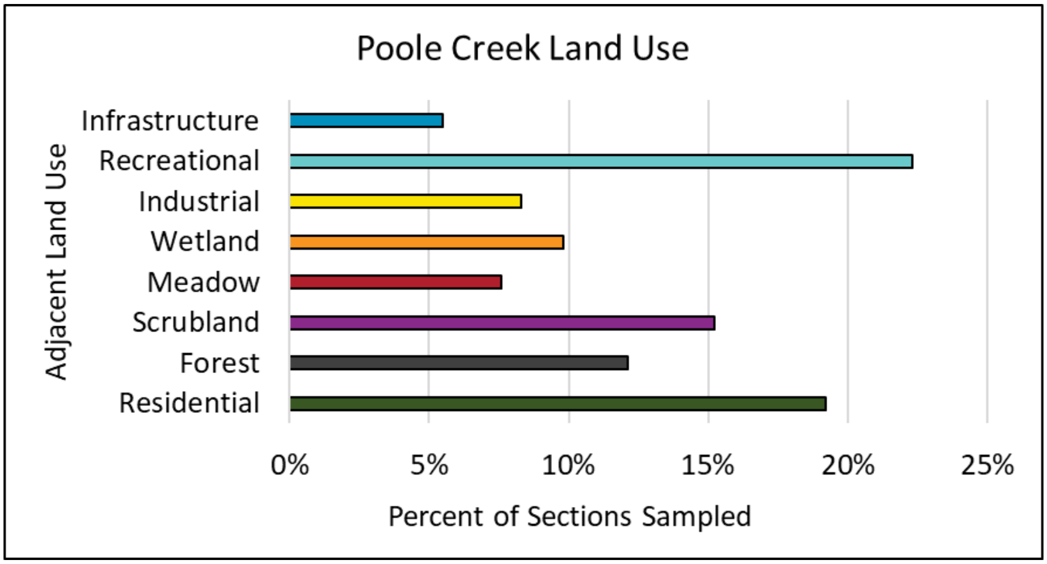

Figure 4. Percent of adjacent land use categories observed along surveyed sections of Poole Creek.

Image 4. Section of Poole Creek with a recreational bridge in Stittsville.

Poole Creek Shoreline Zone

Anthropogenic Alterations

In this assessment, human alterations refer to artificial changes to the actual channel of the watercourse either by straightening or realignment. Such alterations are usually made to accommodate development.

Table 8 and Figure 5 show the levels of anthropogenic alterations in the 50 sections surveyed along Poole Creek. Overall, 48% of surveyed sections were classified as "natural", reflecting a watercourse that would have been altered some time ago for agricultural or infrastructural purposes and has since naturalized. There were no sections classified as unaltered and the remainder was either altered at 46% or highly altered at 6%.

Table 8. Levels of Anthropogenic alterations observed along surveyed portions of Poole Creek.

Anthropogenic Level of Alteration	Percent of Surveyed Sections
Unaltered	0%
Natural	48%
Altered	46%
Highly Altered	6%

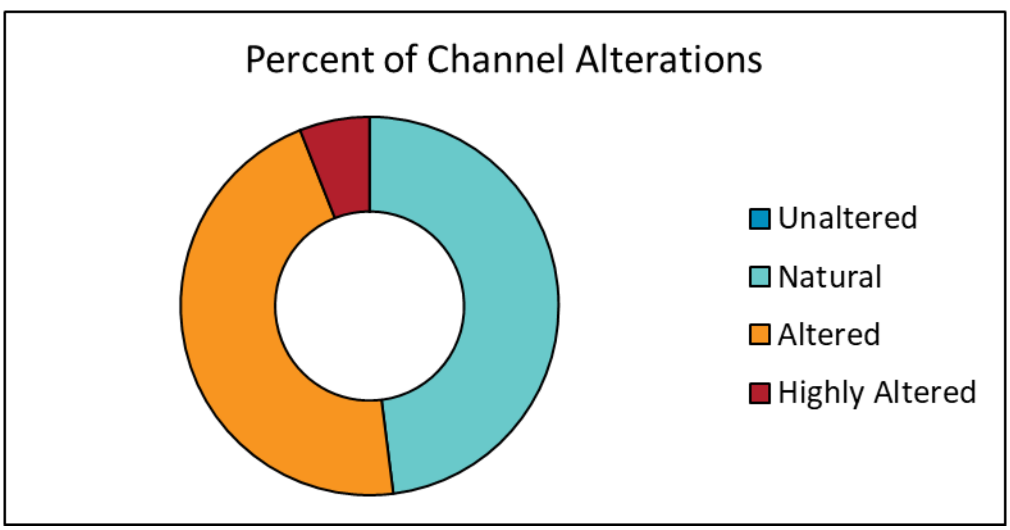

Figure 5. Percent of surveyed sections levels of anthropogenic alterations observed along surveyed portions of Poole Creek.

Image 5. Section of Poole Creek depicting natural levels of anthropogenic alterations, most of this section was wetland.

Image 6. Section along Poole Creek with high levels of anthropogenic alterations. Multiple stormwater outlets are visible throughout Poole Creek's urban areas.

Erosion

Rivers and streams are dynamic hydrologic systems, which are constantly changing in response to changes in the watershed. Stream bank erosion is a natural process that can produce beneficial outcomes by helping to regulate flow and to shape a variety of habitat features. When the natural rate of erosion is accelerated or changed through human activities such as over-clearing of catchment and stream bank vegetation, or realignment, the system is thrown off-balance. The acceleration of the natural erosion process can lead to stream channel instability, land loss, sedimentation, habitat loss and other adverse effects. These impacts can be detrimental to fish and wildlife habitat. Erosion can also create undercut stream banks. While some undercutting of stream banks can be part of normal stream function, providing refuge areas for fish, too much undercutting can become harmful if it results in instability, erosion, and sedimentation.

Table 9 and Figure 6 shows where moderate erosion was observed across the surveyed portions. Some level of bank instability was observed in 36% of the left and 33% of the right bank of sections surveyed. Stream undercutting was observed in 22% of the left and right banks.

Table 9. Stream erosion levels observed along surveyed sections of Poole Creek.

Stream Erosion and Undercutting	Left Bank (Percent of Surveyed Sections)	Right Bank (Percent of Surveyed Sections)
Erosion	36%	33%
Undercut Banks	22%	22%

Image 7. Undercut bank along a section of Poole Creek, creating habitat for fish and wildlife.

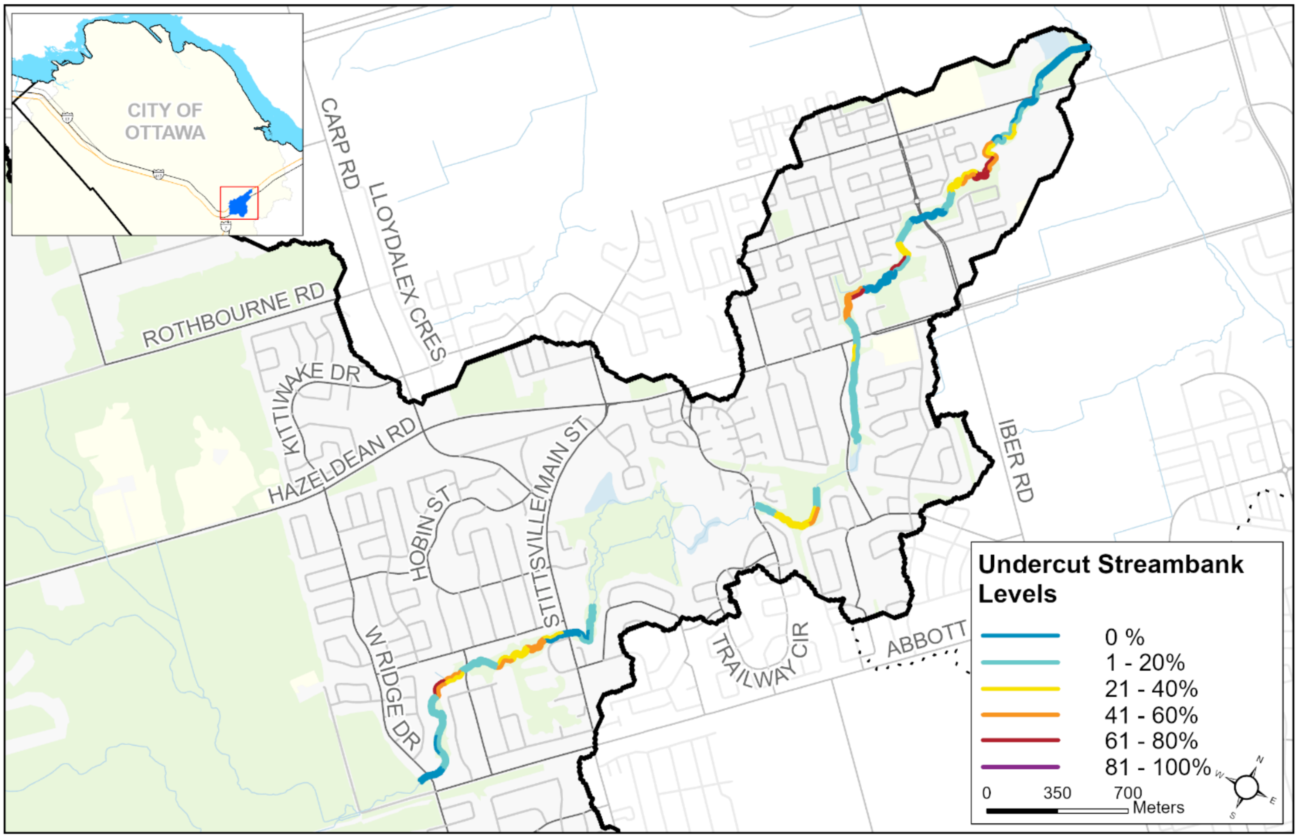

Figure 6. Undercut streambank levels observed along surveyed sections of Poole Creek.

Image 8. Erosion along a section of Poole Creek in a residential area where the shoreline lacks a natural riparian buffer.

Stream Shading

Shade is important in moderating stream temperature, contributing to food supply, and helping with nutrient reduction within a stream. Grasses, shrubs, and trees can all provide shading to a stream. Trees provide more full coverage, and tall grasses provide shade directly along the edges where shading from trees might not be available. Table 10 and Figure 7 show the distribution of these shading levels as a percentage along Poole Creek. 16% of surveyed sections had a shade cover of 81% - 100%; 24% of sections had 61% - 80% shade cover; 20% of sections had 41% - 60% cover; 8% of sections had 21% - 40% cover; and 16% of sections had one to 20% cover. Only 8 sections of Poole Creek had no shade cover. Figure 8 shows the percentage of sections surveyed with various levels of stream shading.

Table 10. Levels of stream shading found along surveyed portions of Poole Creek.

Level of stream shading	Percent of Surveyed Sections
0%	16%
1% - 20%	16%
21% - 40%	8%
41% – 60%	20%
61% – 80%	24%
81% – 100%	16%

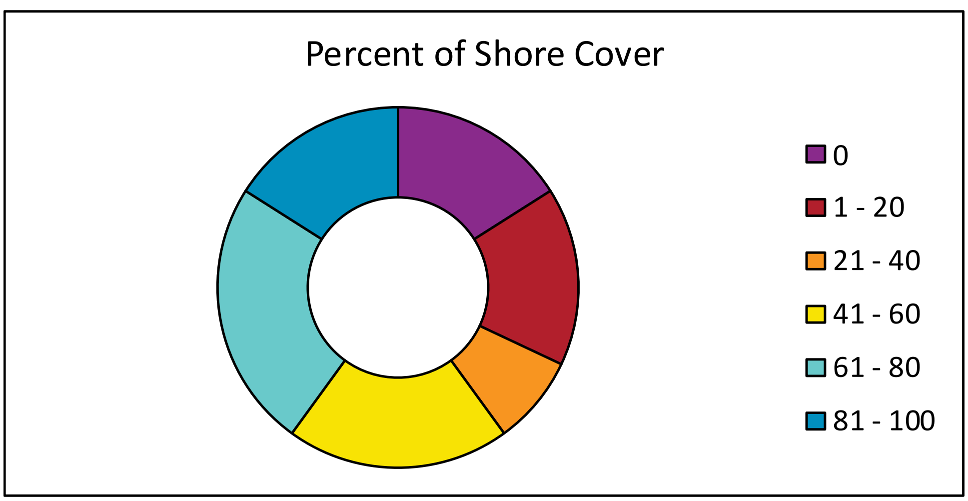

Figure 7. Levels of stream shading found along surveyed portions of Poole Creek.

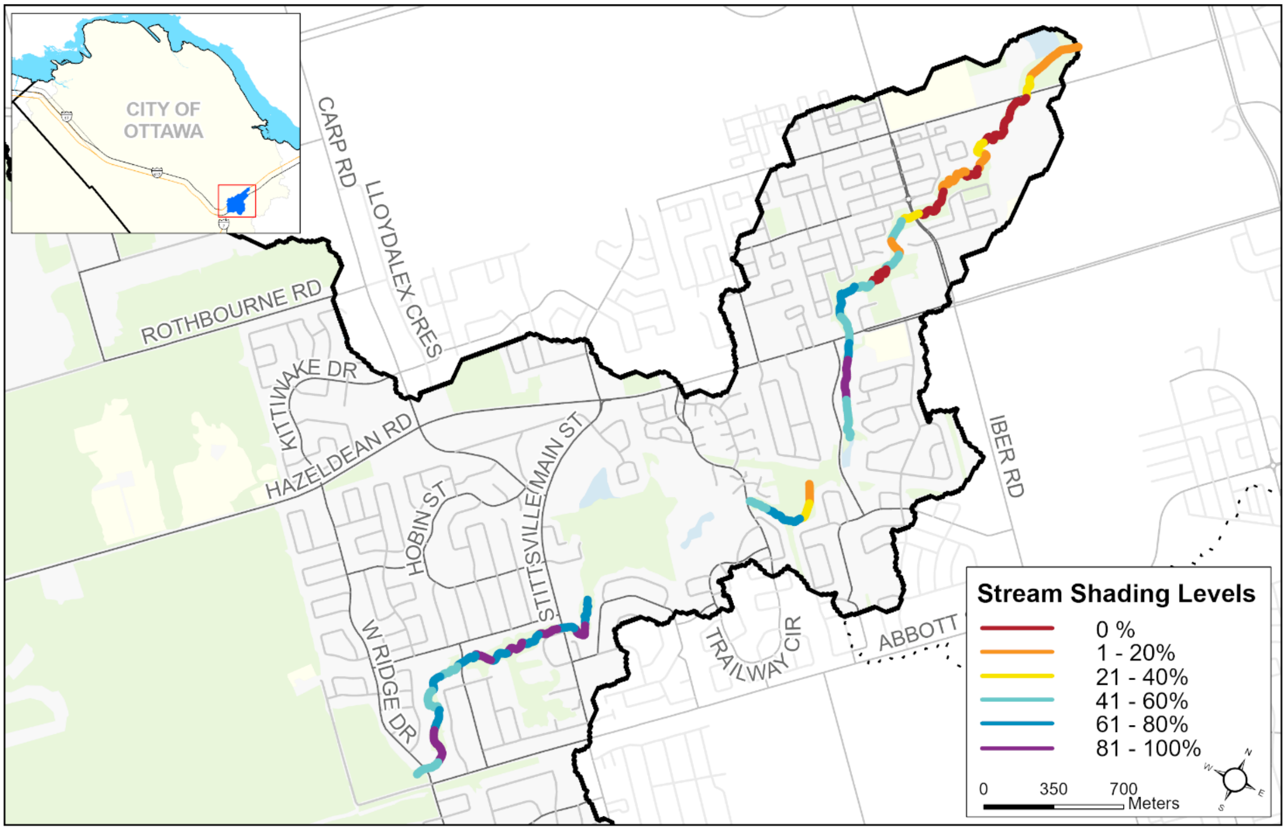

Figure 8. Stream shading along surveyed portions of Poole Creek.

Image 9. Section of Poole Creek with low overhead shading but has abundant close to the water shading from tall grasses.

Overhanging Trees and Branches

Overhanging branches and trees are a byproduct of a good riparian buffer, and they provide crucial nutrients to small streams in the form of coarse particulate organic matter such as leaves, insects, seeds, and more (Vannote et al. 1980). This organic matter is broken down and eaten by aquatic insects and zooplankton- which are an important source of prey for fish and other wildlife. Overhanging branches also provide stream shading, and fallen logs create excellent cover habitat for fish. Overall, Poole Creek possesses a moderate lack of overhanging trees and branches in the downstream sections compared to higher percentages upstream. This is largely a reflection of the surrounding landscape as the creek flows through large sections of low vegetation, wetlands, and near walking paths. Figure 9 shows the presence and percentage within each section of overhanging trees and branches that were observed along Poole Creek. Of the surveyed portions, 46% of the sections had over 40% of overhanging trees and branches on the left bank, and 52% on the right bank of the creek.

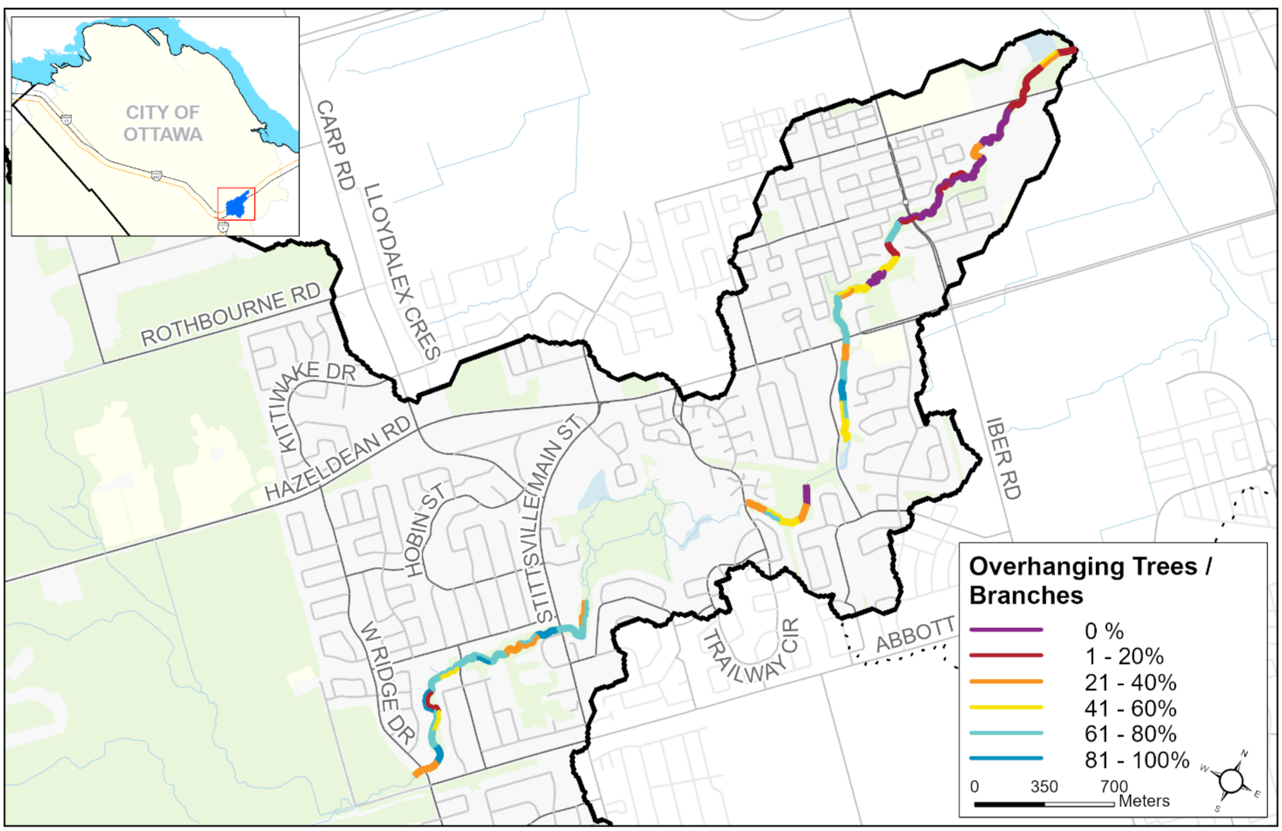

Figure 9. Amount of overhanging trees and branches along surveyed portions of Poole Creek.

Image 10. MVCA staff conducting City Stream Watch surveys in a shaded, forested section of Poole Creek.

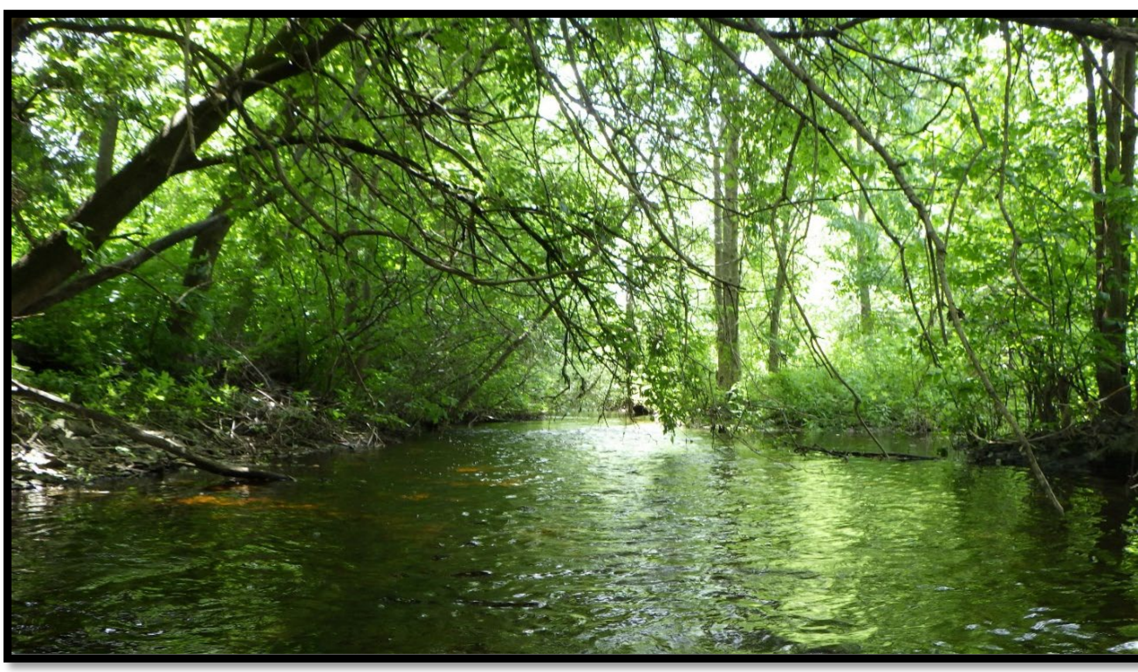

Image 11. Overhanging trees in this section of the Stittsville area provide shade and contribute food and habitat resources to Poole Creek.

Poole Creek In-stream Aquatic Habitat

Habitat Complexity

Habitat complexity is a measure of the overall diversity of habitat types and features within a stream. Streams with high habitat diversity support a greater variety of species' niches; thereby contributing to a greater potential for species diversity. Factors such as substrate, flow conditions, and cover material all provide crucial habitat functions for aquatic life.

The habitat complexity scores are assessed based on the presence or absence of cobble or boulder substrates, as well as the presence of woody material and in-stream plants in each surveyed reach of Poole Creek. The presence of each variable carries a score of one. A reach with all four features receives a score of four or high habitat complexity. Figure 10 shows habitat complexity of the sections surveyed. Only 7 of the 50 reaches surveyed received a score of two or less. 22% had a score of three, and 64% had all four variables – for a score of four or high habitat complexity.

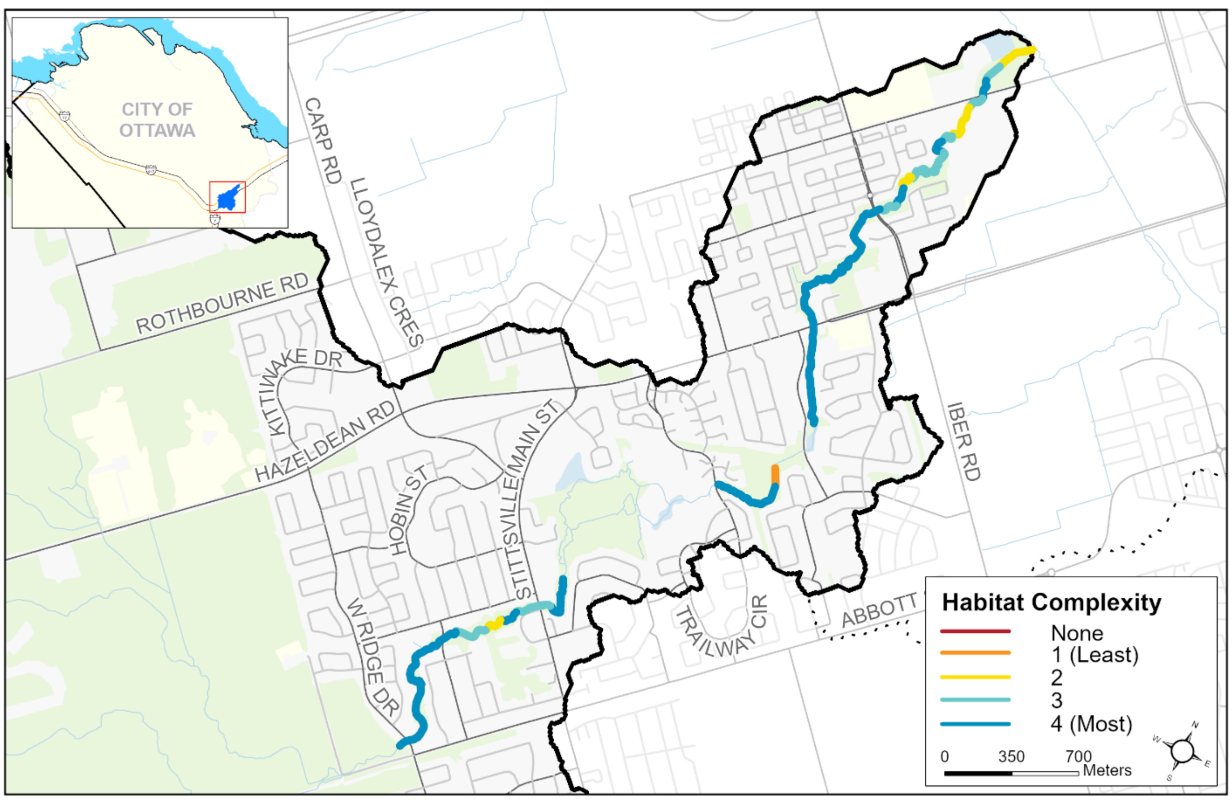

Figure 10. In-stream habitat complexity along surveyed portions of Poole Creek.

Image 12. Section of Poole Creek with high habitat complexity featuring boulders, cobble, gravel, and in-stream wood structures.

Image 16. Rocks and woody debris provide a diverse habitat for not only fish but benthic invertebrates as well. In this photo caddisfly casings made of twigs are attached to a rock – sampled from an area of faster flowering water in Poole Creek.

In-stream Substrate

In-stream substrate describes the composition of the bed of the watercourse. A diversity of substrate composition is important for fish and benthic invertebrates as some species have specific habitat requirements and will only reproduce on certain types of substrates. Substrate amounts are broken down into two categories, dominant and presence. Dominant substrate is determined by choosing one type for each section that is more abundant than the others. The presence of substrate types is an overall amount identified in the creek.

Substrate complexity along Poole Creek was observed to be heterogenous in 92% of sections surveyed; meaning a very diverse substrate composition throughout the creek, and homogenous in the remaining 8%. Table 11 and Figure 11 show the substrate types observed. It is a system dominated by cobble, with this substrate identified in 26% of sections. Other substrate types included bedrock (2%), boulder (6%), gravel (12%), sand (16%), silt (17%) and Clay (22%).

Table 11. In-stream substrate types found along surveyed portions of Poole Creek.

Substrate Type	Percent of Substrate Presence	Percent of Dominant Substrate
Bedrock	2%	0%
Boulder	6%	0%
Cobble	26%	40%
Gravel	12%	4%
Sand	16%	18%
Silt	17%	6%
Clay	22%	32%

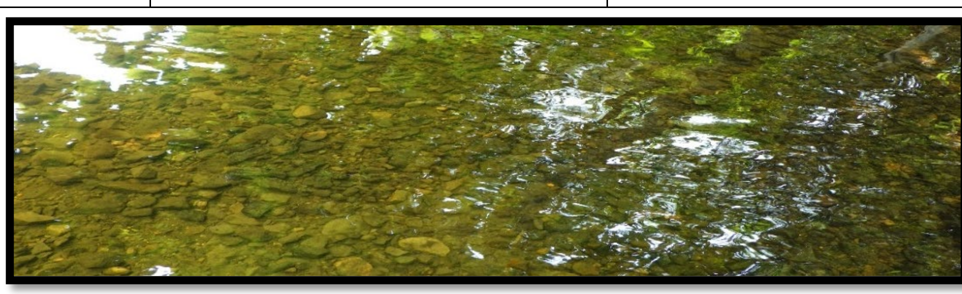

Image 13. Areas of mixed substrate types of cobble, gravel, and sand can be found along sections of Poole Creek.

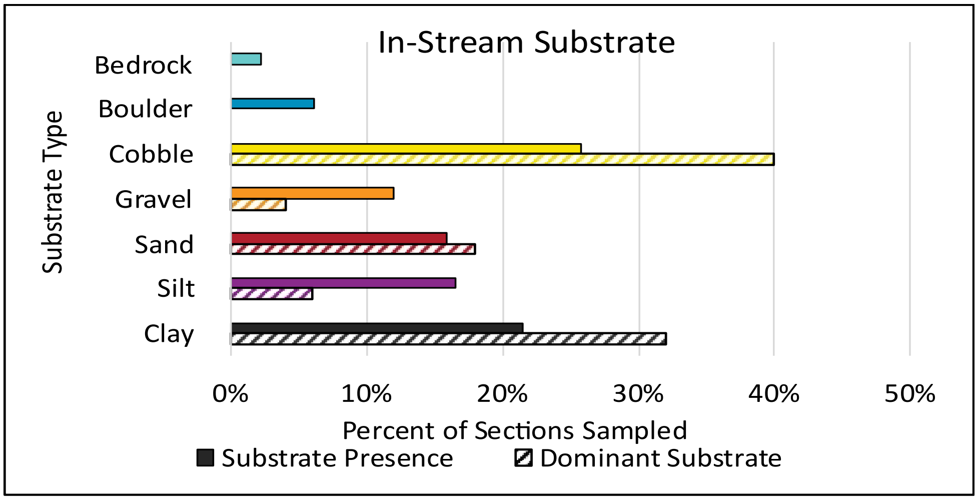

Figure 81. In-stream substrate types along surveyed sections of Poole Creek.

Figure 12 shows the dominant substrate types along the creek. From the assessed areas, cobble was the dominant substrate type in 40% of sections surveyed. These sections further demonstrate the benefits of cobble and boulder substrates for fish habitat complexity. Clay was dominant in 32%, sand in 18%, silt in 6%, and gravel were dominant in 4% of sections.

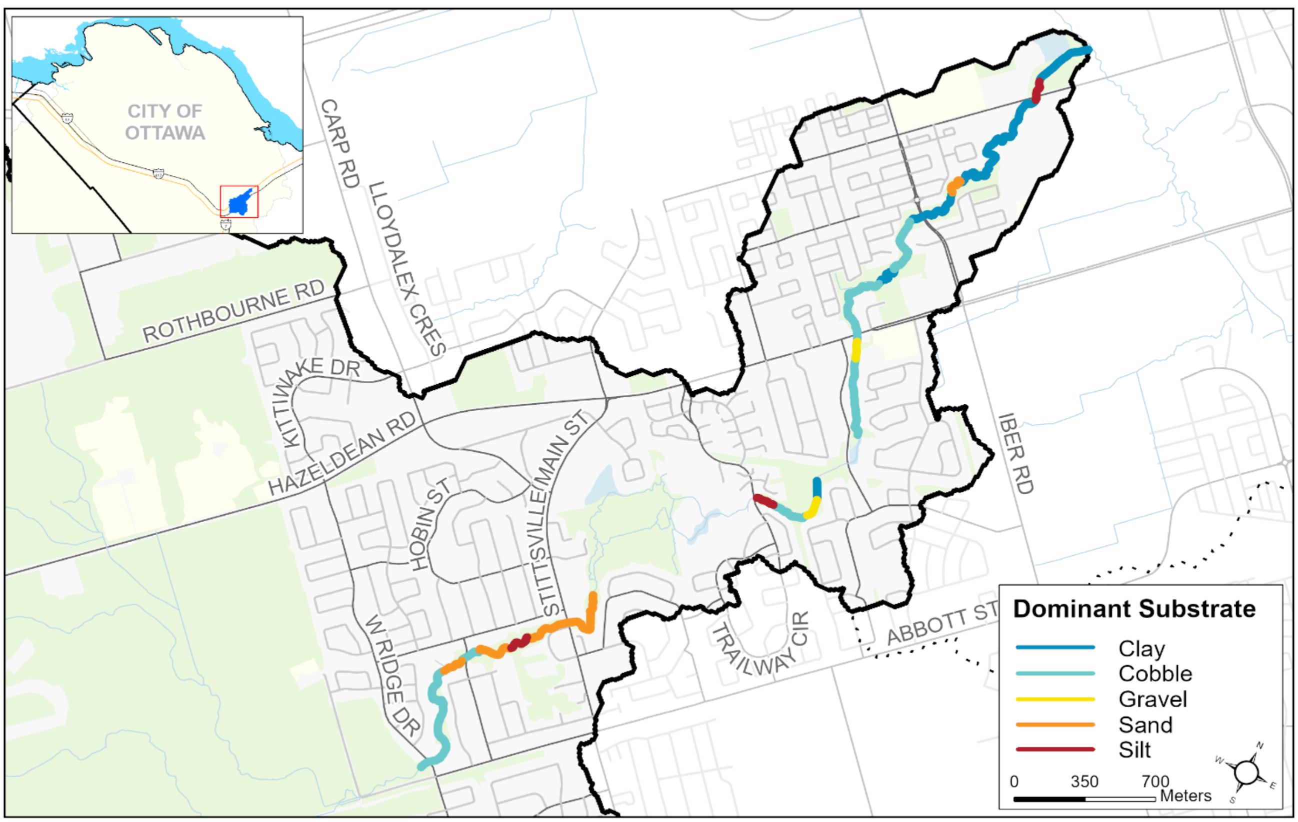

Figure 12. In-stream dominant substrate along surveyed portions of Poole Creek.

In-stream Morphology

Image 14. Run, pool, riffle sequence found in a section of Poole Creek.

In-stream morphology is categorized as pools, riffles, and runs. Pools and riffles are each very important for fish habitat. Pools, which are deeper and usually slower flowing sections in the stream, provide shelter for fish, especially when water levels drop or when the temperatures increase. Riffles are sections of agitated and fast-moving water that help to provide dissolved oxygen to the stream; they also provide spawning habitat for some species of fish. Runs are areas along a creek that are typically shallow and have unagitated water surfaces. Table 12 and Figure 13 show that the surveyed portions of Poole Creek have a moderate to low diversity of morphological conditions. Poole Creek is made up of mostly runs (66% of surveyed sections), and only 20% riffles, and 14% pools. Although there is a low occurrence of pools and riffles, the ones present contribute to healthy habitat for aquatic species of different life stages.

Table 12. In-stream Morphology types found along surveyed sections of Poole Creek.

Morphology Type	Percent of Surveyed Sections
Riffles	20%
Pools	14%
Runs	66%

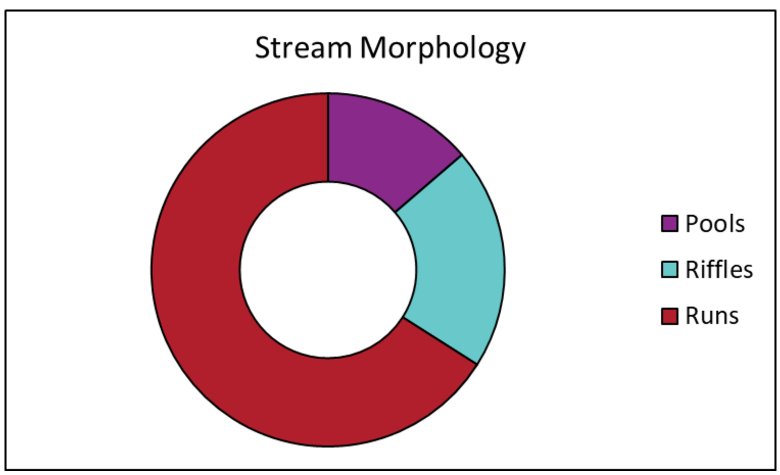

Figure 13. In-stream morphology types along surveyed portions of Poole Creek.

In-stream Vegetation Abundance

A well-balanced amount and suitable variety of in-stream vegetation is important for a healthy stream ecosystem. Aquatic plants provide habitat for fish and wildlife, contribute oxygen to the stream, and help to remove contaminants from the water. However, too much in-stream vegetation can be detrimental and can signify an unhealthy stream. Certain types of vegetation, such as algae, can also be indictive of poor stream health. These are usually seen in streams with high nitrogen and phosphorus inputs (from runoff or wastewater). For this assessment, the amount of in-stream vegetation is measured according to five categories ranging from “extensive” where the stream is choked with vegetation, to “rare” where there are few plants. Table 13 and Figure 14 show the amount of in-stream vegetation observed along the surveyed sections of Poole Creek. Overall it was found that the surveyed sections of Poole Creek have very low amounts of in-stream vegetation with only 11% having “normal” amounts, and the remaining sections categorized as having “low” (12%), “rare” (11%), or no vegetation (52%).

Table 13. Amount of in-stream vegetation found along surveyed sections of Poole Creek.

Abundance of Vegetation Classification	Percent of Abundance of Vegetation in Surveyed Sections
Extensive	3%
Common	12%
Normal	11%
Low	12%
Rare	11%
None	52%

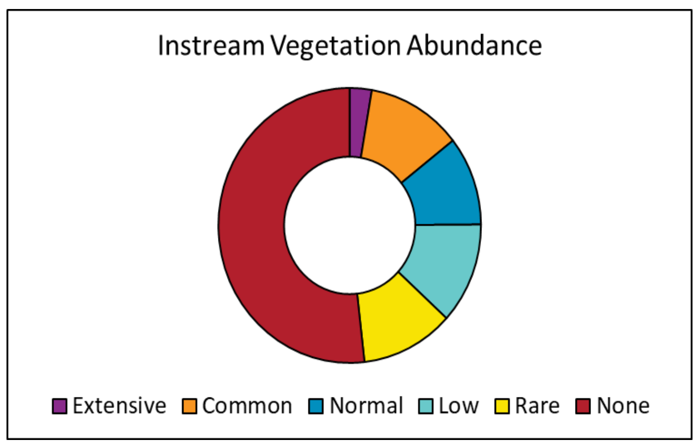

Figure 14. Amount of in-stream vegetation found along surveyed sections of Poole Creek.

In-stream Vegetation Types

There are many factors that can influence the presence of aquatic plants; some of which include the substrate type, increases in air and water temperature, and the time of year the assessment was completed. As seen in Table 14 and Figure 15, the in-stream vegetation that was observed was divided by type into eight categories. Overall Poole Creek was found to have a very high variety of vegetation in the sections it was observed, as over half (52%) of the sections contained no vegetation. The dominant types observed when vegetation was present were narrow-leaved emergent (32%), and submerged plants (34%). Other types observed were broad-leaved emergent (12%), algae (14%), and robust emergent (8%); with small amounts of free-floating and floating plants.

Table 14. In-stream vegetation types found along surveyed portions of Poole Creek.

Vegetation Type	Percent of Vegetation Types Present	Percent of Dominant Vegetation
Narrow-leaved Emergent	16%	32%
Broad-leaved Emergent	8%	12%
Robust Emergent	4%	8%
Free-floating Plants	1%	0%
Floating Plants	1%	0%
Submerged Plants	14%	34%
Algae	8%	14%

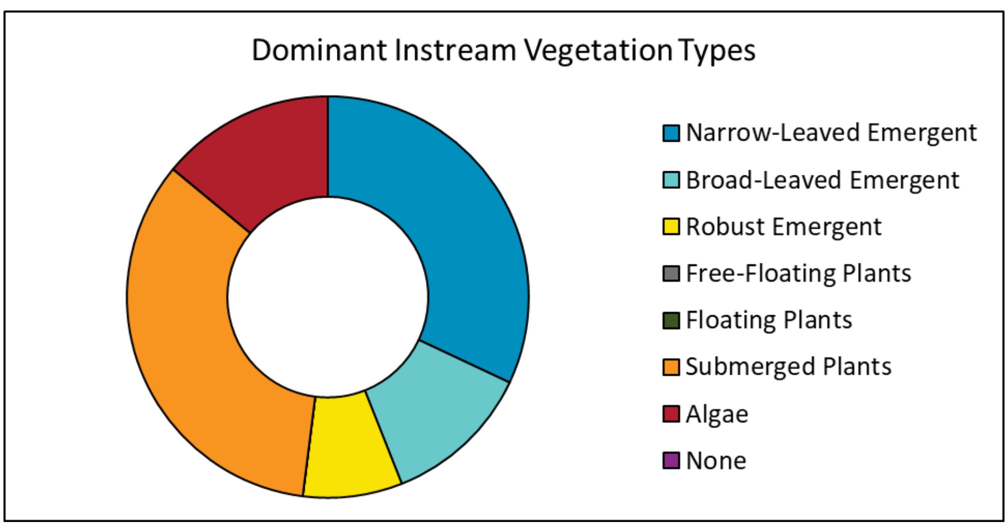

Figure 15. Dominant in-stream vegetation types found along surveyed portions of Poole Creek.

Image 19. Submerged plants seen throughout Poole Creek.

Image 20. Broad-leaved emergent plants such as Broad-leaf Arrowhead can be found in the wetland areas of Poole Creek.

Poole Creek Water Chemistry and Quality

Water Chemistry and Quality Assessment

A YSI probe was used to collect water quality data such as pH, dissolved oxygen, and conductivity at each site assessed. The maximum, minimum, and average reading for each of those parameters are presented in Table 15. Poole Creek had minor fluctuations in the pH range of 7.1 to 9.4 with an average of 8.1. Dissolved oxygen fluctuated from 4.0 to 13.0 mg/L with an average of 8.3 mg/L. Conductivity readings ranged from 631 to 1285 µS/cm, with an average of 909 µS/cm.

Table 15. Water quality parameters assessed in surveyed sections of Poole Creek.

Parameter	Minimum	Maximum	Average
pH	7.1	9.4	8.1
Dissolved Oxygen (mg/L)	4.0	13.0	8.3
Conductivity (µS/cm)	631	1285	909

Dissolved Oxygen

Dissolved oxygen measures the amount of available oxygen within the water that is accessible to wildlife. The lowest acceptable concentration of dissolved oxygen is 6.0 mg/L for warm water threshold and 9.5 mg/L for cold water threshold. The average amount of dissolved oxygen in Poole Creek measured at 8.3 mg/L. These results in combination with our temperature readings indicate conditions to support the species of cool water fish found in Poole Creek, as seen in Figure 16.

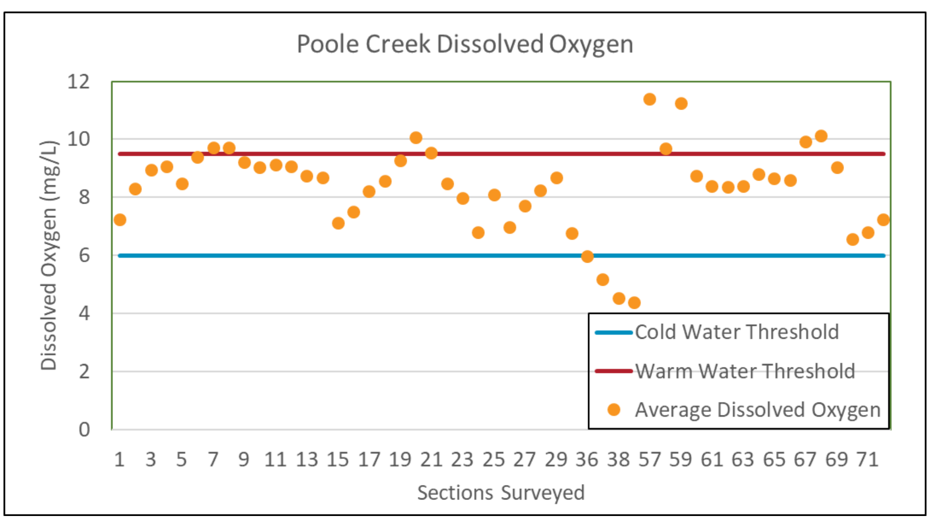

Figure 16. Dissolved oxygen values assessed along surveyed sections of Poole Creek.

Conductivity

Conductivity is defined as the ability of water to pass an electrical current and is an indirect measurement of the salinity of the water caused by dissolved ions. Fish cannot tolerate large increases in salinity in the water. Factors that affect salinity of freshwater include climate change and human activities. Warmer conditions increase the evaporation of water, leaving existing water with higher concentrations of dissolved ions. Industrial and human wastewater often has high conductivity and can influence the creek's conductivity if present. Pristine conditions are 0 to 200 µS/cm and conditions are considered high from 1,000 to 10,000 µS/cm. The average conductivity of Poole Creek was measured at 909 µS/cm indicating that the creek is just below high levels. Further assessments are needed to identify the cause, however, potential sources within the watershed include road salt application and soil erosion occurring along the banks. The fish and benthic invertebrates in this system are likely also affected by the high turbidity after a storm event which can reduce visibility for finding food or could smother eggs. Figure 17 shows the conductivity of each reach in comparison to the maximum, minimum, and average of Poole Creek.

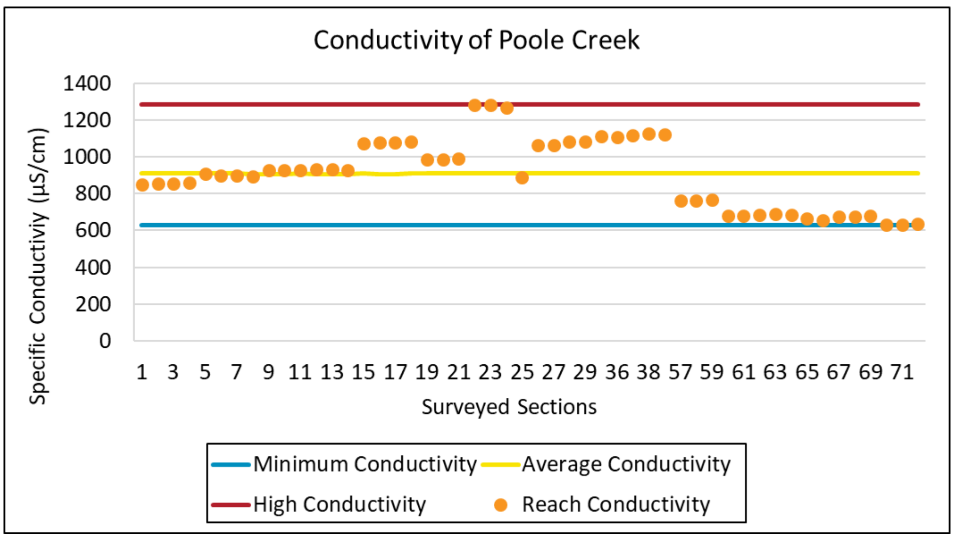

Figure 17. Conductivity values assessed along surveyed sections of Poole Creek.

pH

pH tells us the relative acidity or alkalinity of the creek. The scale ranges from one (acidic) to 14 (basic) and seven as a neutral condition. The average pH of Poole Creek is 8.1, a relatively neutral condition.

Dissolved Oxygen Saturation

Dissolved Oxygen Saturation is measured as the ratio of dissolved oxygen relative to the maximum amount of oxygen that will dissolve in the water based on the temperature and atmospheric pressure. Well oxygenated water will stabilize at/or above 100% saturation. However, the presence of decaying matter/pollutants can drastically reduce these levels. Oxygen input through photosynthesis has the potential to increase saturation above 100% to a maximum of 500%, depending on the productivity level of the local environment.

Combining the dissolved oxygen concentrations with saturation values provides six categories to classify the suitability of stream reaches for supporting various aquatic organisms. Results shown in Figure 18 illustrate that Poole Creek has mostly "good" dissolved oxygen saturation scoring a three, with some sections of excellent condition scoring a six, and there are three sections of very poor scoring a one.

1) **<100% Saturation / <6.0 mg/L Concentration**
   Oxygen: concentration and saturation are not sufficient to support aquatic life and may represent impairment.
2) **>100% Saturation / <6.0 mg/L Concentration**
   Oxygen: concentration is not sufficient to support aquatic life; however, saturation levels indicate that the water has stabilized at its estimated maximum. This is indicative of higher water temperatures and stagnant flows.
3) **<100% Saturation / 6.0-9.5 mg/L Concentration**
   Oxygen: concentration is sufficient to support warm water biota; however, depletion factors are likely present.
4) **>100% Saturation / 6.0-9.5 mg/L Concentration**
   Oxygen: concentration and saturation levels are optimal for warm water biota.
5) **<100% Saturation / >9.5 mg/L Concentration**
   Oxygen: concentration is sufficient to support cold water biota; however, depletion factors are likely present.
6) **>100% Saturation / >9.5 mg/L Concentration**
   Oxygen: concentration and saturation levels are optimal for warm and cold-water biota.

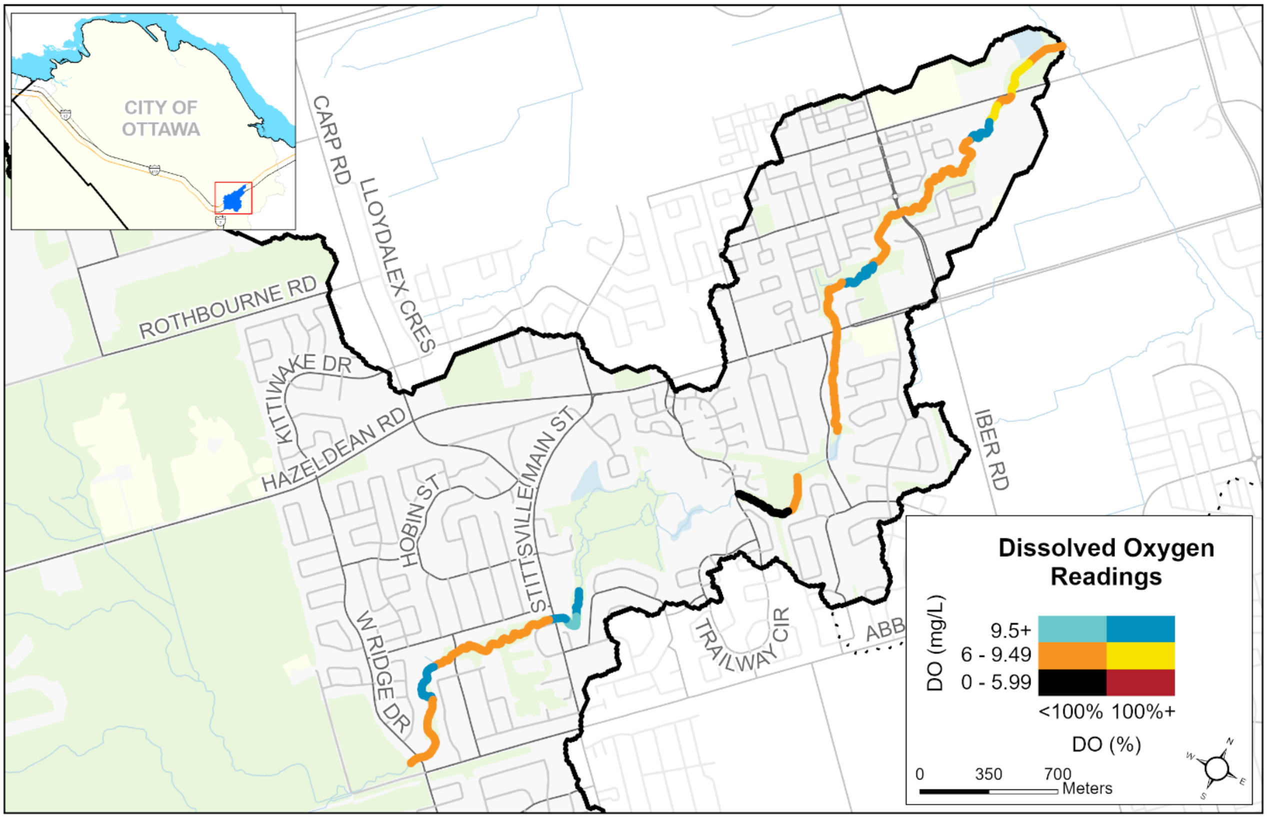

Figure 18. Map showing dissolved oxygen saturation along surveyed sections of Poole Creek.

Image 15. MVCA staff collecting water chemistry readings in Poole Creek using a YSI Water Quality Meter.

Areas of Water Quality Concern

There were several sections noted as potentially under stress due to one or more chemistry parameters.

Two sites were measured to be outside of the expected pH range. Conductivity values were below average in the upper and lower portions of the creek but increased in the middle of the catchment. Dissolved oxygen was generally optimal for cool and warm water biota in many of the reaches, with some reaches being viable for cold water species. However, in the sub-optimal sections, depletion factors may be present that would stress cold water biota. These areas with oxygen-depleted conditions combined with areas of elevated conductivity values resulted in the "good" rankings. Figure 19 recognizes the areas of poor, good and excellent water quality across the surveyed reaches of Poole Creek.

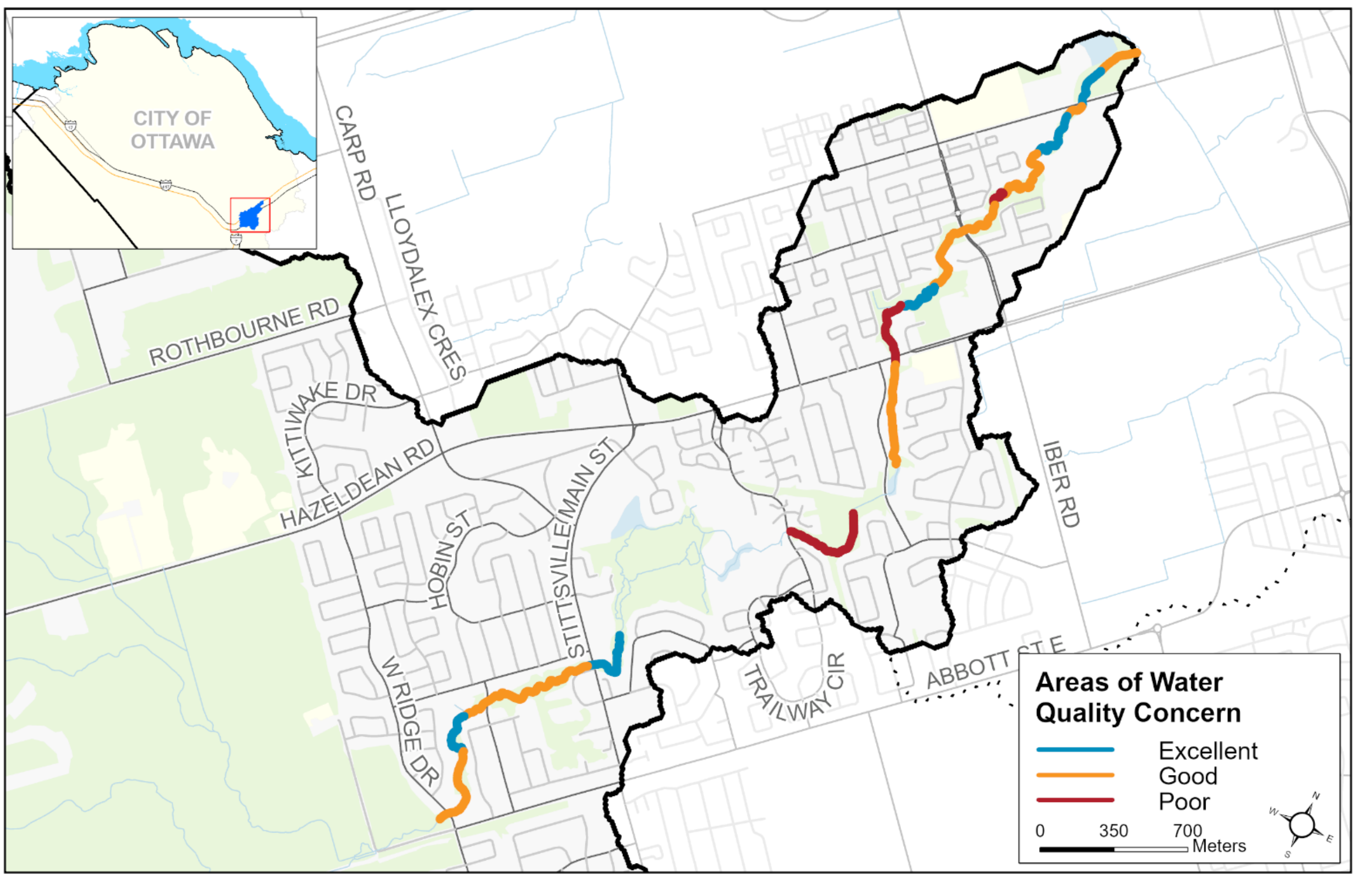

Figure 19. Map showing areas of water quality concern along surveyed sections of Poole Creek.

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical, and biological health. Figure 21 shows where the four temperature dataloggers were deployed in Poole Creek. To give a representative sample of how water temperature fluctuates throughout the summer season, sensors were in place from May to October 2024. Unfortunately, the data logger located at Jonathan Pack Street malfunctioned and the data was unretrievable. Many factors can influence fluctuations in stream temperature including springs, tributaries, precipitation runoff, discharge pipes, and stream shading. Water temperature is used along with the maximum air temperature (using the revised Stoneman and Jones method by Cindy Chu et al) to classify a watercourse as either warm, cool-warm, cool, cold-cool, or cold water. Figure 20 shows the thermal classifications of Poole Creek for 2024. Analysis of the data collected indicates that Poole Creek should be classified as a cool stream between Westridge Drive and Hazeldean Road. A lack of shade and cool water inputs in the lower reach results in the creek warming significantly by the time it reaches the outlet near Maple Grove Road.

Each point on the graph (Figure 20) represents a water temperature that was taken under the following conditions:

- Sampling dates between July 1 and August 31.
- Sampling date has a maximum air temperature ≥ 24.5 °C and was preceded by two consecutive days with a maximum air temperature ≥ 24.5 °C during which time no precipitation occurred.
- Water temperature is taken at 4:00 pm.

Image 22. Temperature Logger placed in Poole Creek by Westridge Drive from May to September.

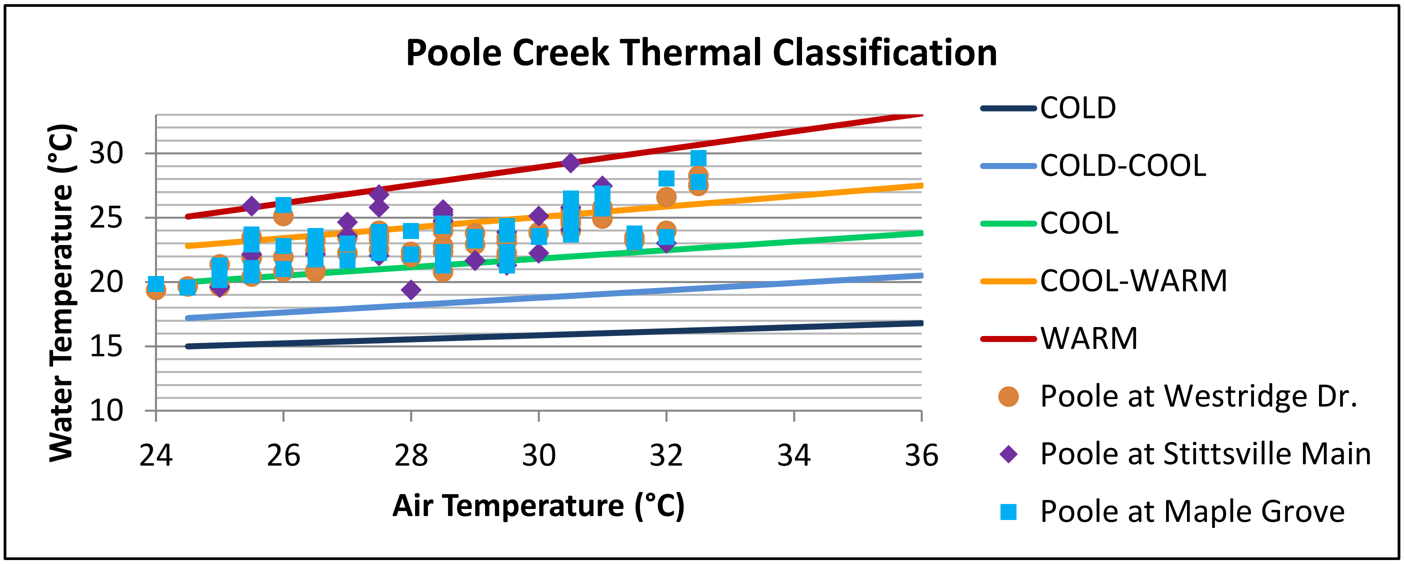

Figure 20. Thermal classification assessed in 3 locations along Poole Creek using temperature loggers.

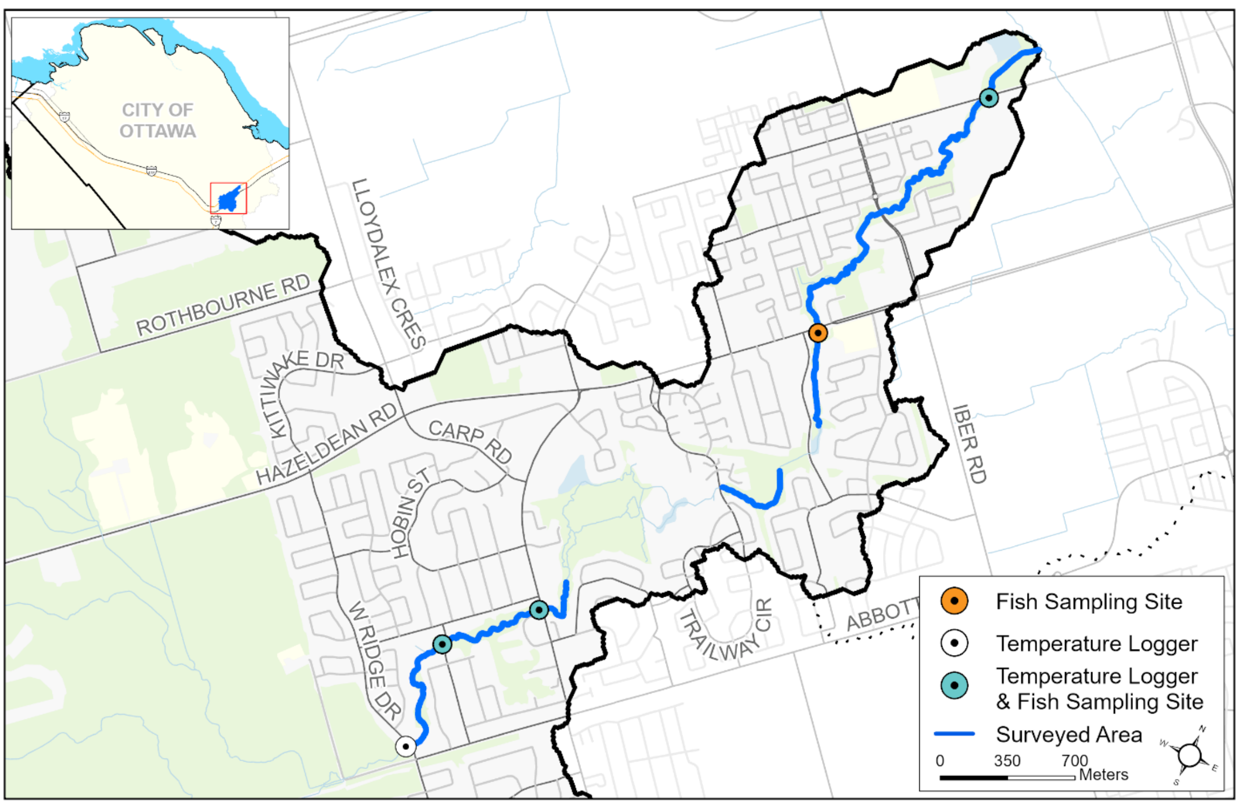

Figure 21. Map showing temperature logger and E-fishing locations along Poole Creek.

Poole Creek Stream Health

Fish Sampling

In 2024 MVCA utilized electrofishing to sample Poole Creek's fish population at four locations (Figure 21). A fairly diverse fish community was noted, capturing 18 different species. Most fish were found hiding in features such as undercut banks or in-stream vegetation. The total known species' list from 2018 to 2024 for Poole Creek is summarized below by thermal classification (based on Coker, 2001); species with an "*" indicate ones captured in 2024.

Cold Thermal Class

- Brown Trout
- Mottled Sculpin*

Cool Thermal Class

- American Eel
- Banded Killifish*
- Blackchin shiner*
- Brassy Minnow
- Brook Stickleback*
- Central Mudminnow*
- Central Stoneroller*
- Common Carp
- Common Shiner*
- Creek Chub*
- Finescale Dace
- Golden Shiner
- Hornyhead Chub*
- Iowa Darter*
- Johnny/Tessellated Darter*
- Longnose Dace
- Northern Pearl Dace
- Northern Pike*
- Northern Redbelly Dace
- Rockbass
- Western Blacknose Dace*
- White Sucker*

Warm Thermal Class

- Bluntnose Minnow*
- Fathead Minnow*
- Logperch*
- Pumpkinseed*

Image 23. A young Northern Pike caught during E-fishing in Poole Creek at Jonathan Pack Street. This species was also observed in the wetland areas along the creek.

Image 24. A cold-water indicator species; the Mottled Sculpin was captured at four E-fishing sites along Poole Creek and was observed throughout other reaches.

Image 25. A young Common White Sucker caught while E-fishing in Poole Creek at three of the four sites.

Migratory Obstructions

Migratory obstructions are features in a waterway that prevent fish from freely swimming up and down the stream. This can affect successful migration to breeding or foraging habitats as well as restricts a fish's ability to access deeper, cooler water refuges when droughts occur. These obstructions can be anthropogenic, such as perched culverts or debris dams at road crossings, or they can be natural features such as waterfalls and beaver dams. As seen in Figure 22 there were many obstructions noted, most were debris dams likely related to high water levels and fast flows. There were also three beaver dams and five lodges noted.

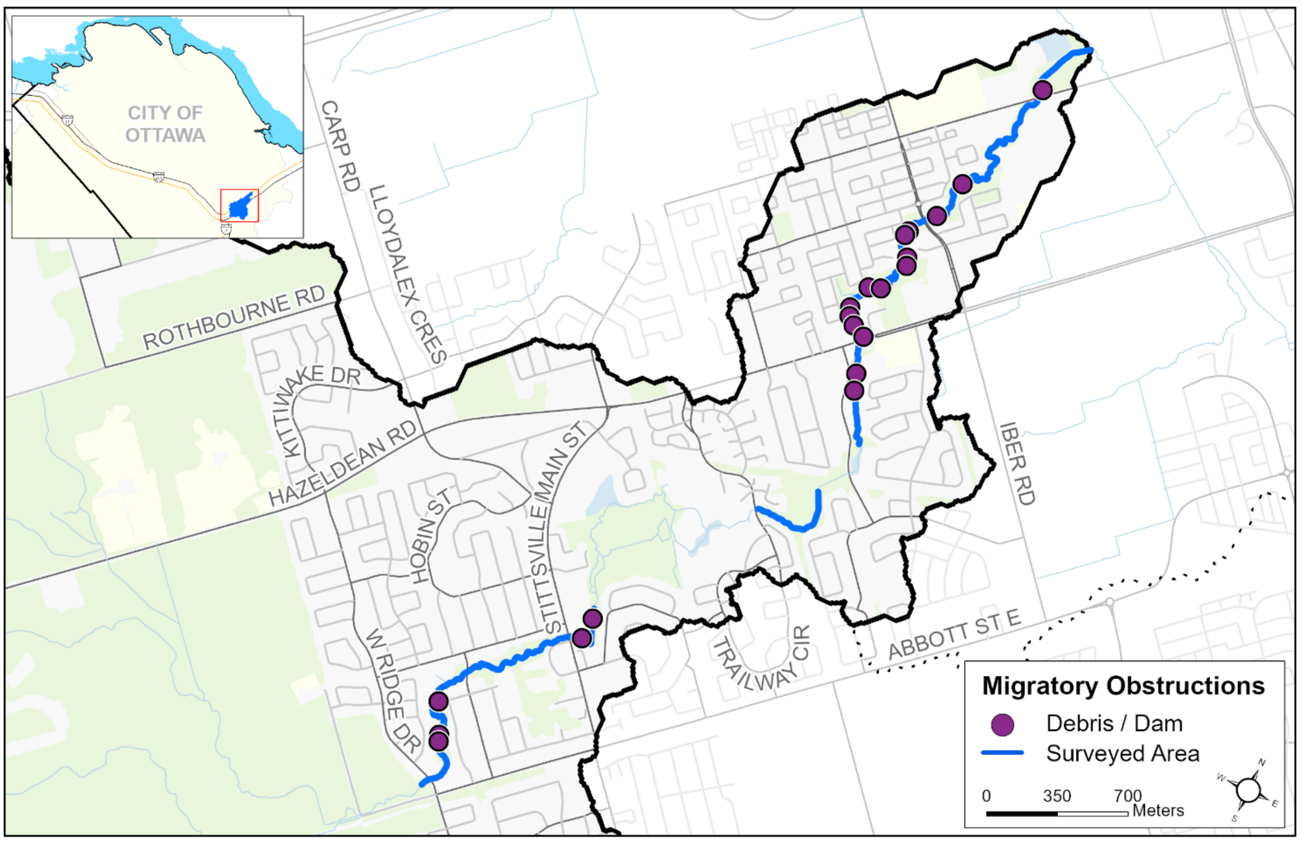

Figure 22. Map showing locations of migratory obstructions in Poole Creek.

Image 26. Significant debris dam causing a change in flow in Poole Creek.

Image 167. Debris dam causing a migratory obstruction in Poole Creek near Maple Grove Road.

Wildlife

Diversity of fish and wildlife found along the creek can be an indicator of stream health. Having a high diversity can mean the creek has a good range of habitat and a healthy ecosystem to provide food, breeding areas, and more. Incidental wildlife observations were noted during monitoring and survey activities and are summarized below. Due to time and expertise limitations, this list does not represent an extensive summary of the species associated with Poole Creek.

Birds

- Mallard duck
- Song birds
- Great Egret
- Kingfisher
- Ruby-throated Hummingbird
- Northern Flicker

Mammals

- Raccoon tracks
- Dog tracks
- Chipmunk
- Beaver
- Squirrels
- Cat

Reptiles and Amphibians

- Green Frog
- Leopard Frog
- Tadpoles
- Garter Snake
- Snapping Turtle

Aquatic and Flying Insects

- Dragonflies
- Damselflies
- Water Striders
- Caddisflies
- Alderfly
- Butterflies
- Moths
- Bees

Other

- Snails
- Mussels
- Minnow Species
- Brown Trout
- Crayfish

Image 28. Non-invasive wildlife observed along Poole Creek from left to right: Amber Snails, Grapeleaf Skeletonizer Larvae, Ebony Jewelwing Damselfly and a Crayfish.

Invasive Species

Invasive Species are a concern as they can impact local species' diversity and richness by outcompeting native species. This can result in the reduction of available food and habitat that native plants and animals rely upon. Species such as Giant Hogweed and Wild Parsnip are also a human health concern as the sap from these plants can cause chemical burns to the skin. Figure 23 shows that although there are ten identified invasive species in the Poole Creek corridor, they are not all found throughout. Of note some of the species found are escaped garden plants that have spread along the creek. Table 16 summarizes the invasive species identified in 2018 compared to 2024 and the quantities observed.

For more information on identifying and reporting invasive species visit www.invadingspecies.com managed by the Ontario Federation of Anglers and Hunters.

For information on choosing local native species as part of your gardening and landscaping choices please read the Ontario Invasive Plants Council Document "Grow Me Instead" found here https://www.ontarioinvasiveplants.ca/

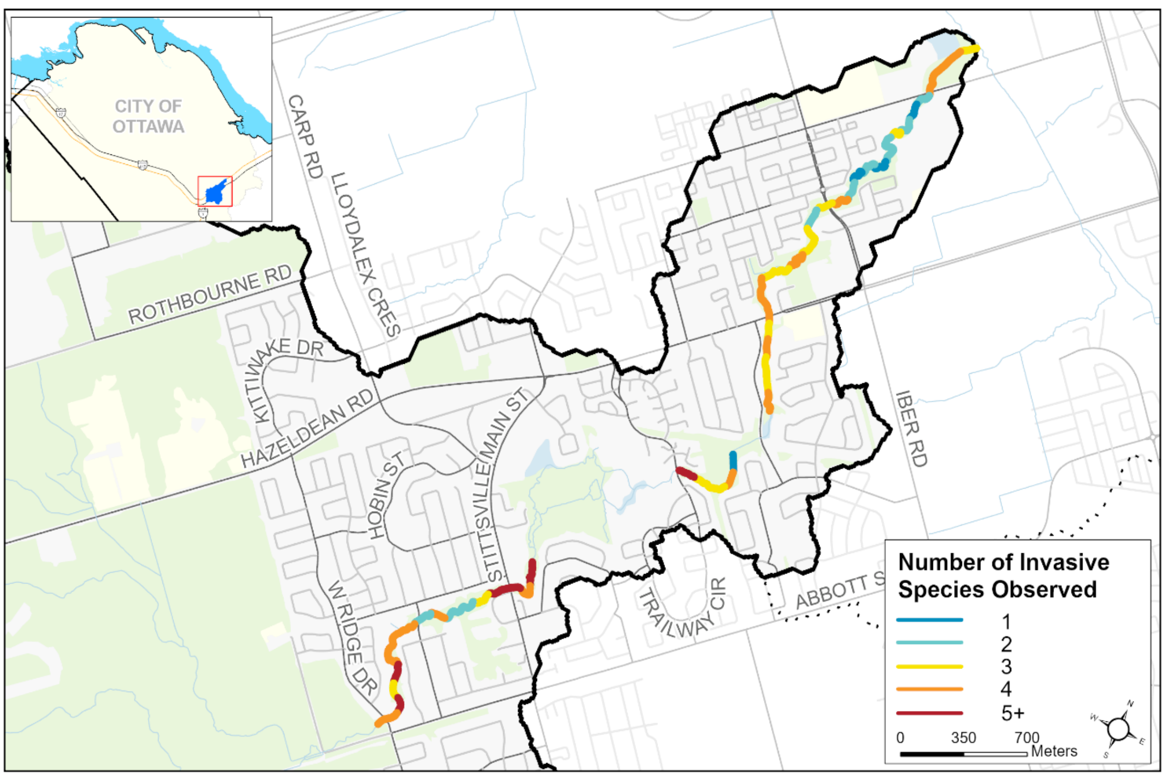

Figure 23. Map showing the number of invasive species observed along the surveyed sections of Poole Creek.

Table 16. Comparison of the amount of invasive species observed along the surveyed sections of Poole Creek in 2018 and 2024.

Invasive Species	Percent of Creek with Invasive Species 2018	Percent of Creek with Invasive Species 2024
Common Buckthorn	21%	56%
Curly Leaved Pondweed	28%	2%
European Alder	6%	0%
Flowering Rush	23%	8%
Himalayan Balsam	8%	0%
Garlic Mustard	0%	18%
Glossy Buckthorn	0%	22%
Japanese Knotweed	0%	4%
Lily of the Valley	0%	8%
Manitoba Maple	21%	70%
Norway Maple	6%	2%
Periwinkle	4%	6%
Phragmites	6%	4%
Wild Parsnip	26%	36%
Purple Loosestrife	60%	70%
Rusty Crayfish	9%	0%
Other	14%	0%

Pollution

Pollution could be seen throughout most of Poole Creek, particularly in the form of general litter, household waste, and construction waste. A large amount of the waste was found adjacent to the public pathway between Stittsville Main Street and Jonathan Pack Street. Items could be seen on the stream bottom, floating, and stuck in log jams contributing to migratory obstructions. There were also two sections that had an oily substance on the water surface likely due to the numerous storm water outlets that transport water runoff from roadways and parking lots to the creek.

Image 29. Invasive species observed along Poole Creek from left to right: Curly Leaved Pondweed, Flowering Rush, and Goutweed which likely escaped from a nearby garden.

Potential Restoration Opportunities

The information gathered through these surveys helps with the planning and implementation of future projects such as invasive species removal, riparian planting, bank stabilization, litter clean ups, and removal of migratory obstructions. Other potential actions would include contacting landowners and community members to explore further collaboration through a voluntary basis to enhance their shorelines.

Poole Creek has many potential restoration opportunities related to invasive species, erosion, and garbage. Figure 24 depicts the locations identified as areas for potential restoration and clean-up activities.

In the fall of 2024, a stream garbage clean-up event was held at the Sweetnam Drive area of Poole Creek; over 180 kg of garbage was removed, additional activities are planned for 2025.

Image 30. Photos showing garbage removed from Poole Creek during a volunteer clean up day.

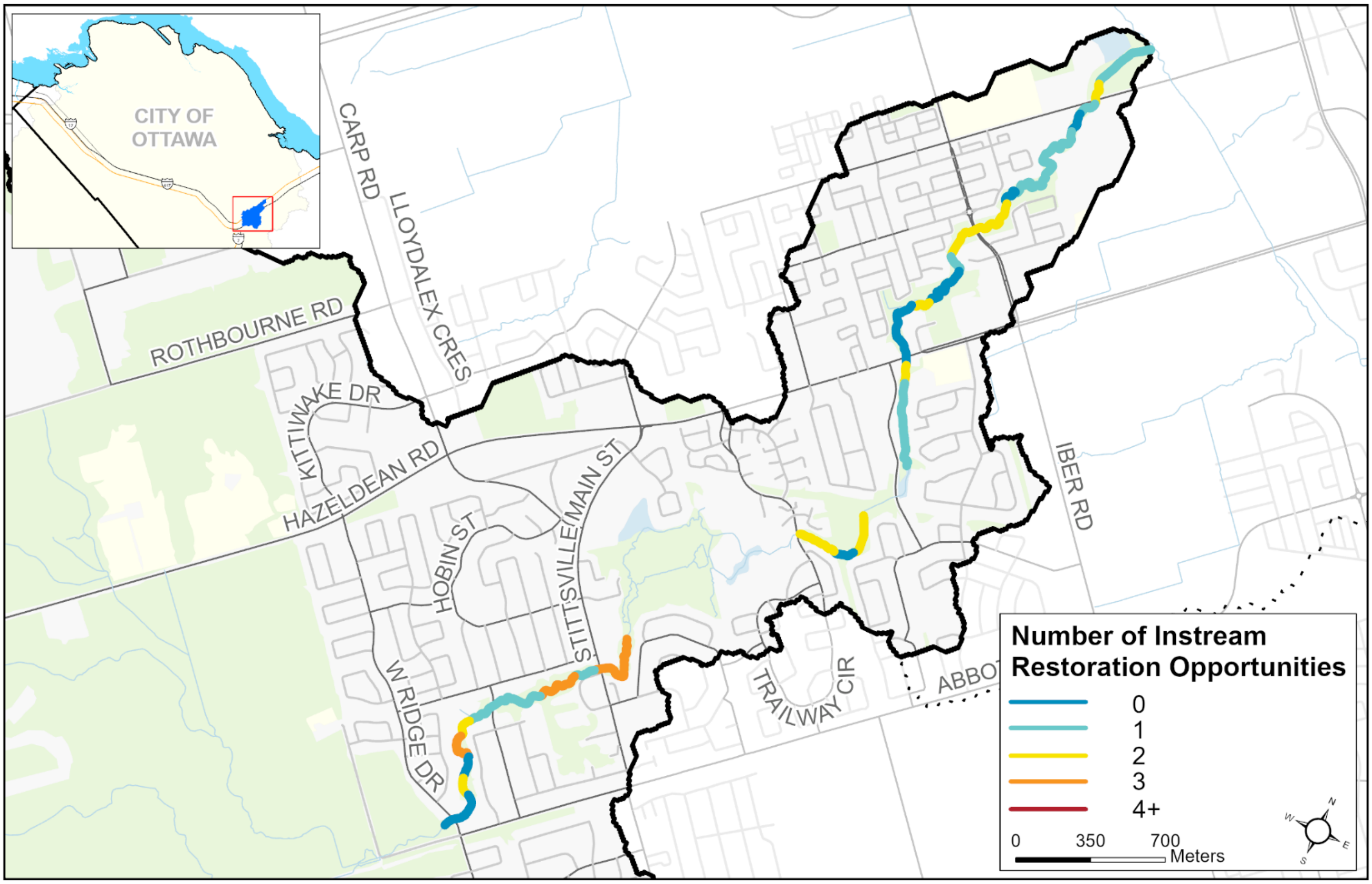

Figure 24. Map showing the number of restoration opportunities along the surveyed sections of Poole Creek.

Poole Creek Comparison Between 2018 and 2024

Water Chemistry

Water chemistry parameters are tracked throughout the entire surveyed system and reflect the general conditions of the environment. Shifts in these conditions can be indicative of general ecological changes within the environment. However, due to the limited number of sampling years completed, it is difficult to determine if a change in values is part of the system's natural variability or if it is due to other factors.

T-Tests were run to compare the results from 2018 to those from 2024. As seen in Table 17, the average results are similar but with higher mean water levels, dissolved oxygen, pH, and water temperature readings in 2024. All the variables have smaller variance ranges in 2024. There was a considerable difference in the weather between the two years, with increased rainfall frequency and amounts in 2024 affecting the observed stream conditions. It is unclear currently if there are additional factors contributing to the differences.

Table 17. Comparison of water chemistry values in Poole Creek and T-test results showing if there is a significant difference.

Parameter	2018 Average	2018 Variance	2024 Average	2024 Variance	Significant Difference?
Water Temperature	18.2	4.9	19.6	3.7	Yes
Water Depth (m)	0.47	0.17	0.48	0.05	No
pH	7.76	0.22	8.07	0.06	Yes
Dissolved Oxygen (mg/L)	8.04	3.83	8.34	2.1	No
Conductivity (µS/cm)	1097	70181	909	34958	Yes

Poole Creek Report Summary

Table 18. Poole Creek Summary Table.

Item	Value
Number of Sections Surveyed	50
Average Stream Width (m)	5.68
Average Stream Depth (m)	0.48
Average Hydraulic Head (mm)	9.14
Average Water Temperature (˚C)	19.6
Average Conductivity (µS/cm)	909
Average pH	8.07
Average Dissolved Oxygen Concentration (mg/L)	8.34
Average Dissolved Oxygen Saturation (%)	90.5
# of Areas of Water Quality Concern with a Poor Score	9
Dominant Adjacent Land Uses	Recreational
% Channel Alterations	52%
% Vegetated Riparian Buffer Width (> 30 m)	2%
% Overhanging Trees & Branches > 40% Section Coverage	49%
% Stream Shading > 40% Section Coverage	60%
% of Undercut Banks > 60% Section Coverage	6%
Dominant Substrate Type	Cobble
Sub-Dominant Substrate Type	Cobble
# Sections with a Habitat Complexity Score ≥ 3 variables	43
Dominant In-stream Morphology	Runs
Dominant In-stream Vegetation Types	Submerged
Dominant Amount of In-stream Vegetation	None
Thermal Class	Cool
Migratory Obstructions	22
# of Identified Invasive Species	17

How Does This Information Get Used?

The City Stream Watch Program is a monitoring program that allows MVCA to assess the condition of the sub-watersheds over time. Stewardship activities can then be planned and organized for priority reaches that can help improve the health of the overall creek ecosystem.

Stream garbage clean-ups are conducted, blockages are removed and shoreline planting, erosion control, and habitat enhancements are completed.

MVCA is always looking for volunteers to help with monitoring and stewardship programs!

Email stewardship@mvc.on.ca if you are interested.

The volunteer-based City Stream Watch Program offers many benefits to our watershed as well as personal gratification and learning opportunities for the volunteers. Projects/programs executed include:

- Planting trees and shrubs along the shoreline
- Removing invasive plant species
- Stream garbage clean-ups
- Learning about and participating in monitoring the streams
- Learning about and participating in fish sampling/identification and wildlife identification
- Learning about and participating in benthic invertebrate sampling/identification
- Participating in nature photography

Image 31. MVCA staff & City Stream Watch volunteers.

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