Watts Creek 2023 Catchment Report

Monitoring Activity in the City of Ottawa

The City Stream Watch program (CSW) provides an in-depth survey of a watercourse by which data is collected by wading through the stream and taking detailed observations every 100 meters (m). Since implementing the CSW program, MVCA staff and volunteers have surveyed more than 600 sections across 13 watercourses. This information has been utilized for the planning of riparian planting sites, habitat improvements, stream garbage pick-ups in Poole Creek and the Carp River, and invasive species removal events.

The City Stream Watch program has three broad goals:

- To provide long-term documentation of the aquatic and riparian conditions in our watershed
- To enhance public awareness about the condition and value of freshwater streams through volunteer engagement and the creation of catchment reports
- To use the information collected to encourage community driven restoration projects

When possible, each CSW assessment is enhanced with the application of other monitoring programs such as; benthic biomonitoring, fish community sampling, and assessing headwater drainage features.

Seasonal weather conditions were very wet in 2023 with sustained high water conditions for most of the season, with two flood events. This hampered the field surveys as sections would become too deep or fast for wading. However, with the perseverance of the crew and volunteers, 64 sections in two catchments were assessed. Given the atypical conditions, all assessments were subjected to the effects of high water; therefore they not reflect the overall health of the systems.

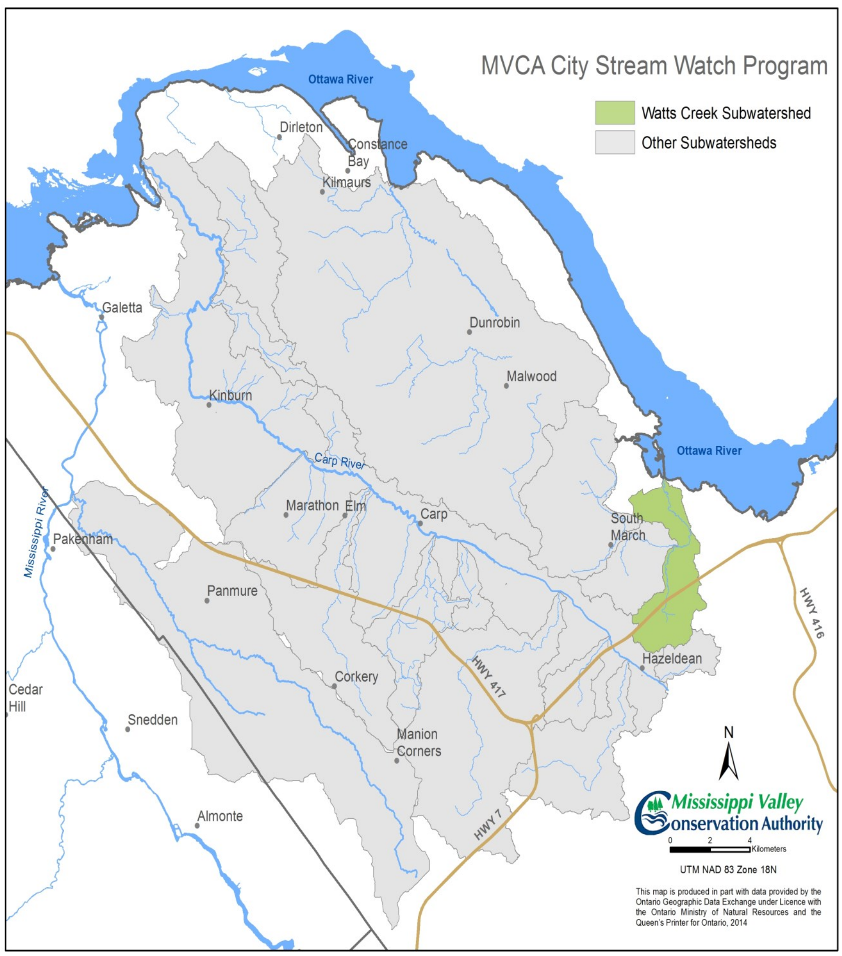


Figure 1: MVCA's City Stream Watch Area Highlighting the Location of the Watts Creek Subwatershed

Located in the west end of the City of Ottawa, the Watts Creek Watershed is comprised of two main watercourses – Watts Creek and Kizell Drain. The upper parts of both watercourses flow through highly urbanized areas in Kanata. Watts Creek flows north from the 417/Eagleson Rd area, through the National Capital Commission's Green Belt and the Department of National Defense properties to outlet into Shirley's Bay in the Ottawa River.

Kizell Drain is surveyed separately, and was last visited in 2016.

Table 1 presents a summary of some key features of the Watts Creek subwatershed.

Table 1: Watts Creek Subwatershed Features (does not include Kizell Drain area)	
Area	14.7 square kilometers 0.34% of Mississippi Valley watershed
Watercourse Length and Type	Total Length: 10.9 km 75.7% natural 24.3% channelized Flow Type: Permanent Thermal: cool to warm
Land Use	41.5% agriculture 29% urban 12% wooded area 11% rural land-use 6.5% wetlands
Surficial Geology	58% bedrock 24.5% clay 8% sand 6.5% organic deposits 2% gravel 1% diamicton

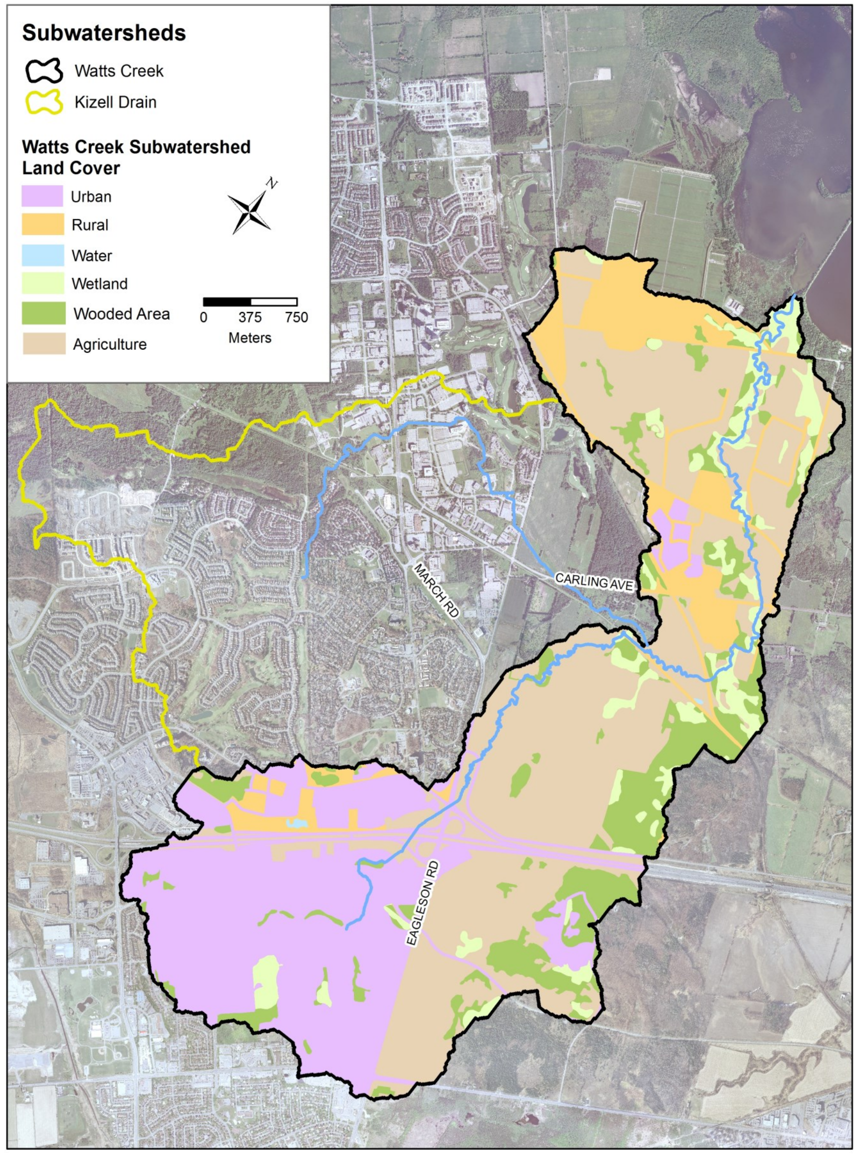
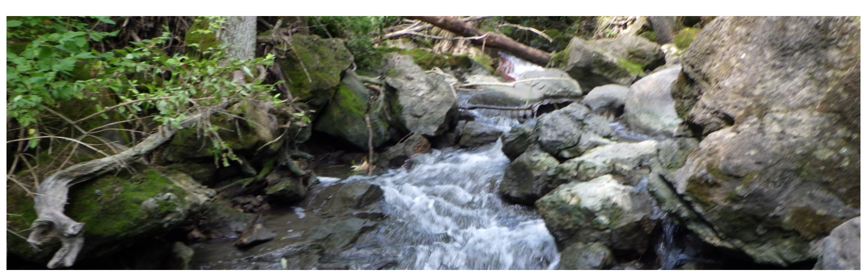


Figure 2: *Land use in the Watts Creek Subwatershed*

The Watts Creek Subwatershed

The headwaters of the Watts Creek subwatershed, located on the west side of Eagleson Road, are dominated by urban land use which makes up almost one third (29%) of the overall watershed area. The remaining two thirds of the watershed are located on NCC lands that are dominated by agricultural land use, at 41%. Wooded areas (12%), rural land use (11%) and wetlands (6.5%) make up the remaining land uses. The wooded areas are concentrated along the eastern edge of the subwatershed.



Monitoring in Watts Creek

With a length of just over 10 kilometers and draining an area of 14.7 sq. km, Watts Creek is a relatively small watercourse. Watts Creek transitions from a highly urbanized part of Kanata on the west side of Eagleson Road to the relatively undeveloped, agricultural NCC owned lands on the east side of March Road. This assessment focusses on a section of the creek extending from Eagleson Road to the point where Kizell drain enters the creek. In 2014 Carleton University's Cooke Lab undertook a detailed Stream Research and Remediation program on both watercourses and provided us with baseline fish community data.

Methodology

The macro stream assessment is completed using a protocol that divides the entire length of the creek into 100 metre (m) sections. Starting at the downstream end, a monitoring crew wades the creek and completes a detailed assessment at each 100 m section. If a section of the creek is un-wadeable, that section is bypassed and the assessment is continued once the creek becomes wadeable again. The parameters that are assessed include general land use, in-stream morphology, human alterations, water chemistry, plant life, and other features which are presented in this report.

In July and August of 2023, MVCA staff and volunteers surveyed the 43 sections of Watts Creek shown on Figure 3. This report presents a summary of the observations made along the 43 sampled sections, including the urban upstream sections not previously surveyed in 2014.

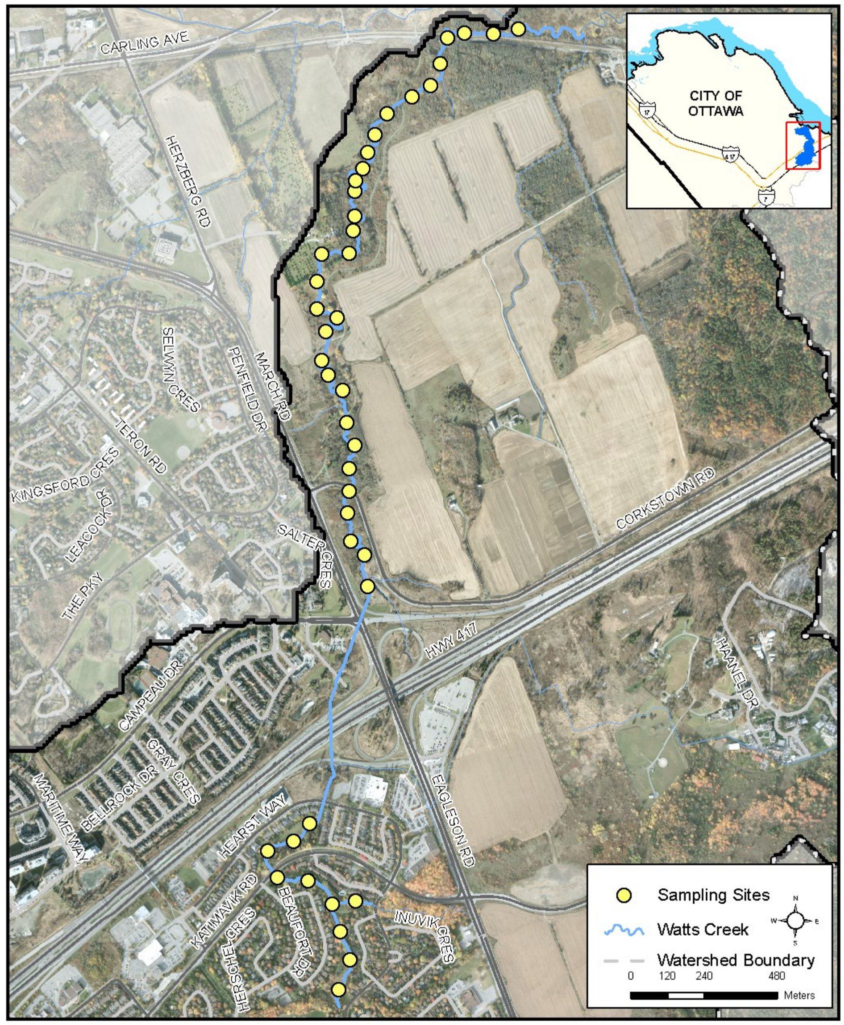


Figure 3: *Map depicting the Watts Creek monitoring sites*

Table 2: Watts Creek Assessment Facts

	Minimum	Maximum	Average
Air Temperature (°C)	17	30	22.4
Water Temperature (°C)	15.5	22.5	17.8
Stream Width (m)	1.07	7.0	3.67
Stream Depth (m)	0.10	1.3	0.38

As shown in Table 2, the sections of Watts Creek that were monitored in this assessment were relatively narrow and shallow with an average width of 3.7 m and depth of 0.4 m. During the monitoring visits the average water temperature was 17.8 °C. Despite the lack of shade, the creek still contains fairly cool water. It likely comes from the number of agricultural drains or tributaries as noticed along the creek, or other groundwater sources. These drains take rain water that has filtered into the soils, where it has potential to cool off before being released into the creek. The diversity of fish species found also reflect the cool water conditions with 6 of the 8 species known to prefer cooler conditions.

General Land Use Adjacent to Watts Creek

General land use along each surveyed section of Watts Creek was recorded based on eleven different categories. Surrounding land use is considered from for each survey section (100 m) 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.

The categories of land use include residential, forest, meadow, wetland, recreational, industrial, abandoned farm fields, active agriculture, pasture, scrubland and infrastructure. As summarized in Figure 4, the land use adjacent to this part of Watts Creek was assessed as mostly forested lands (35%), with meadow (22%) and some scrubland (17%). The upstream sections consisted of more urbanized areas such as recreational (9.4%) and residential (8%) with some Infrastructure (6.2%).

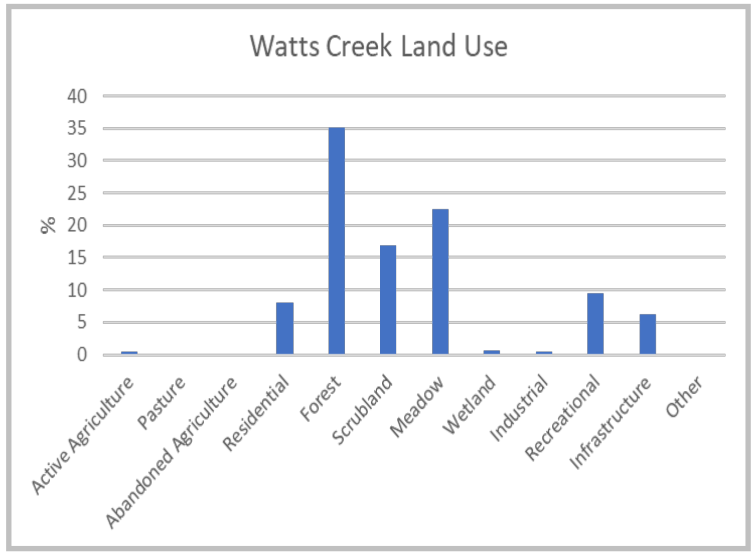


Figure 4: *Summary of Land Use Adjacent to Watts Creek*

Human Alterations to Watts Creek

In this assessment, human alterations refer to artificial changes to the actual channel of the watercourse either by straightening or relocation. Such alterations were usually made to accommodate development. A summary of the percentages of altered as opposed to natural channel is presented in Figure 5. Overall 58% of this part of Watts Creek was classified as “altered-natural”, reflecting a watercourse that would have been altered some time ago for agricultural purposes and has since naturalized. Fourteen percent was classified as “not altered”, and the remainder was either “altered” or “highly altered”.

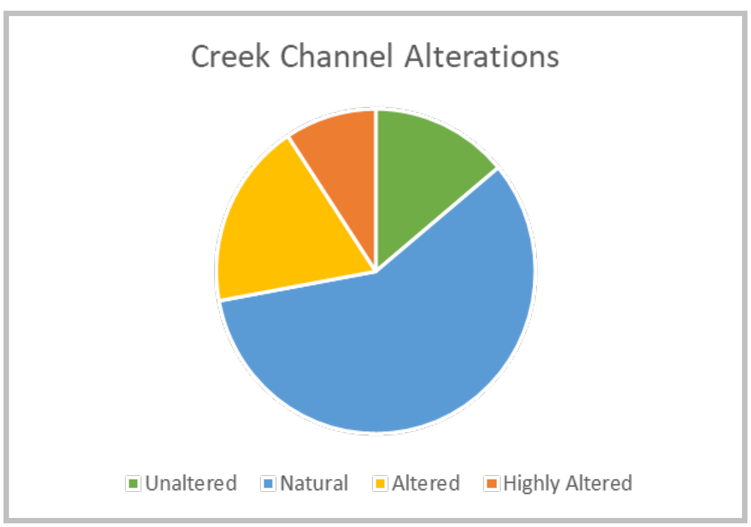


Figure 5: *Percentage of Watts Creek that has been altered*

Riparian Buffer along Watts Creek

The riparian buffer refers to the amount of 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 need to be near water for feeding and rearing young.

Environment Canada's Guideline: *How Much Habitat is Enough?* recommends a minimum 30 m wide vegetated buffer along at least 75% of the length of both sides of a watercourse.

For this assessment, we record the width of riparian buffer within 30 m of either side of the watercourse. As shown in Figure 6, it was found that for the areas assessed, Watts Creek has a very good riparian buffer for most of the downstream sections but the buffer reduces as you move upstream. Results presented in Figure 7 show that approximately 40% of both the left and right banks of the creek have a buffer width greater than 30 m, and about 25% have a buffer of 5 m or less.

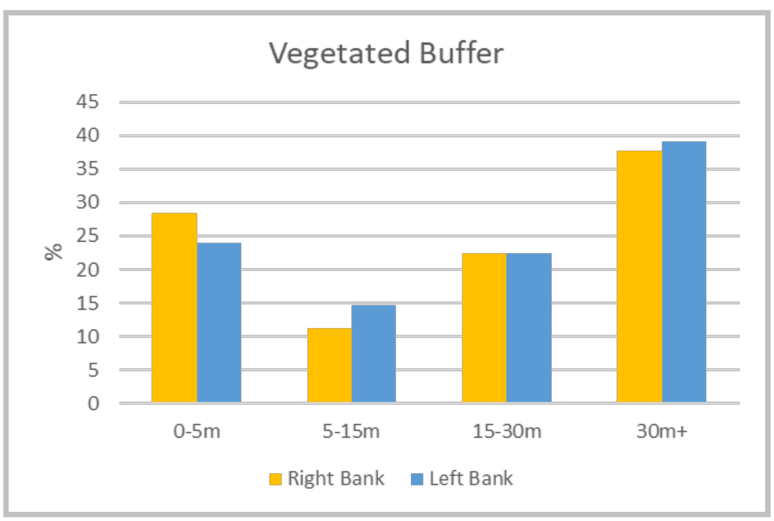


Figure 7: *Riparian buffer widths along Watts Creek*

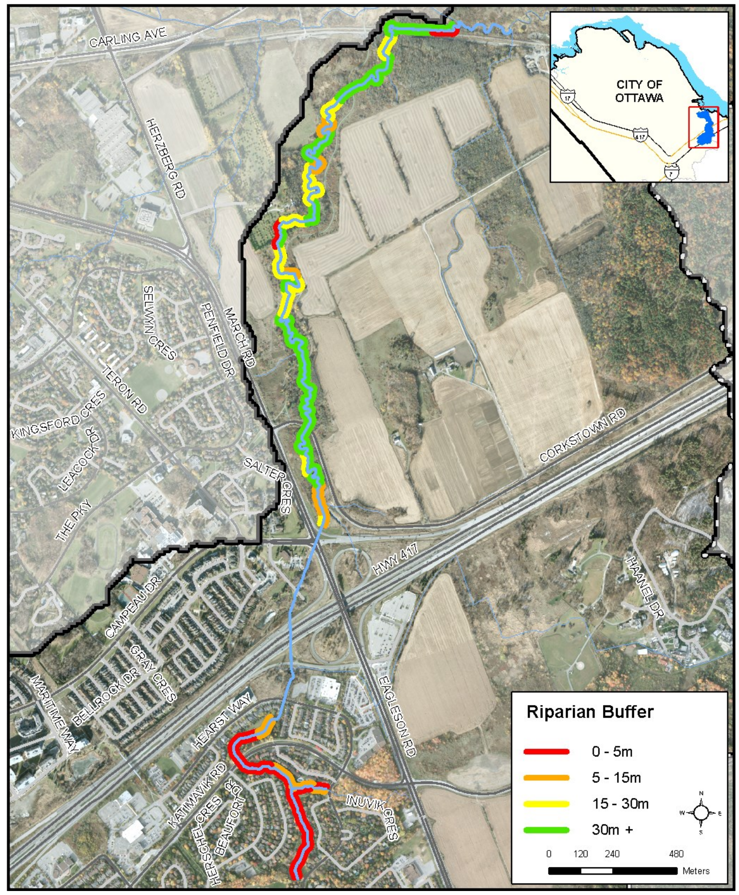


Figure 6: *Vegetated buffer width along Watts Creek*

Overhanging Trees and Branches

Overhanging branches and trees are a byproduct of a good riparian buffer, and they provide crucial nutrients, in the form of coarse particulate organic matter (leaves, insects, seeds etc.), to small streams (Vannote et al. 1980). This organic matter is broken down and eaten by aquatic insects, phytoplankton and zooplankton, which are important prey items of fish and wildlife. Overhanging branches also provide stream shading, and fallen logs create excellent habitat for fish.

Overall, Watts Creek has a measurable lack of overhanging trees and branches. This is largely a reflection of the type of surrounding vegetation community where the creek passes through large sections of meadow (Figure 8).

Figure 9 shows the data quantified as the percent of creek sections classified according to the various amounts of overhanging trees and branches. For example, 5% of the 43 surveyed stream sections on the right bank were classified as having zero overhanging trees and branches. 51% of the surveyed stream was found to have less than 40% overhanging branches.

It would be beneficial to plant a treed buffer along some of the sections of creek where it passes through large tracts of open meadow landscape.

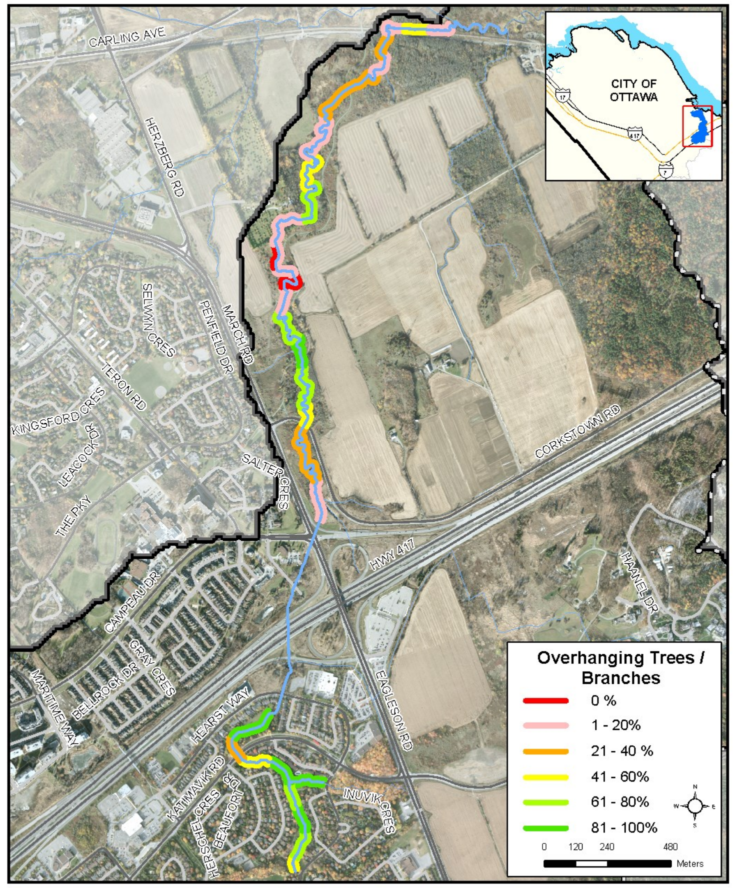
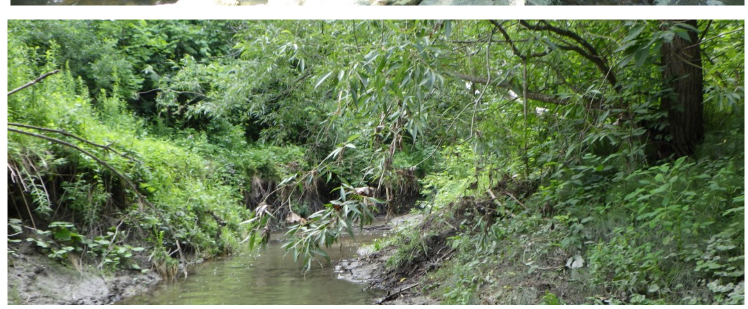


Figure 8: *Overhanging Trees & Branches along Watts Creek*



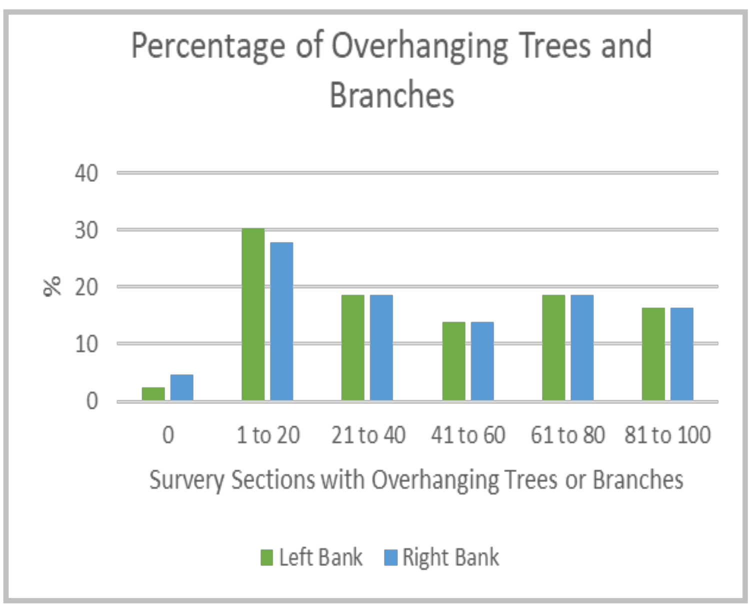


Figure 9: *Percentage of each surveyed section of Watts Creek with overhanging trees and branches*

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, with trees providing more full coverage and grasses providing much needed shade directly along the edges where shading from trees may not be available.

Figure 10 shows the variability in the amount of stream shading along different sections of Watts Creek. Overall, the stream shading along this part of Watts Creek is quite low in the upper reaches, but does have sections downstream with more shading. There are also a few sections having little or no shading. This is a reflection of the surrounding land use changing from forested areas to more meadow and urbanized areas. These areas could benefit from planting of trees and other tall vegetation along the banks of the creek.

Figure 11 shows the data quantified as the percent of creek sections classified according to the various levels of shading. With 2% at zero shading, 23% at 1 to 20 percent, and 14% at 21 to 40 percent, 40% of the surveyed stream has less than 40% shading. The area of highest shading was in the thickly forested area downstream of Eagleson Road shown in bright green in Figure 10.

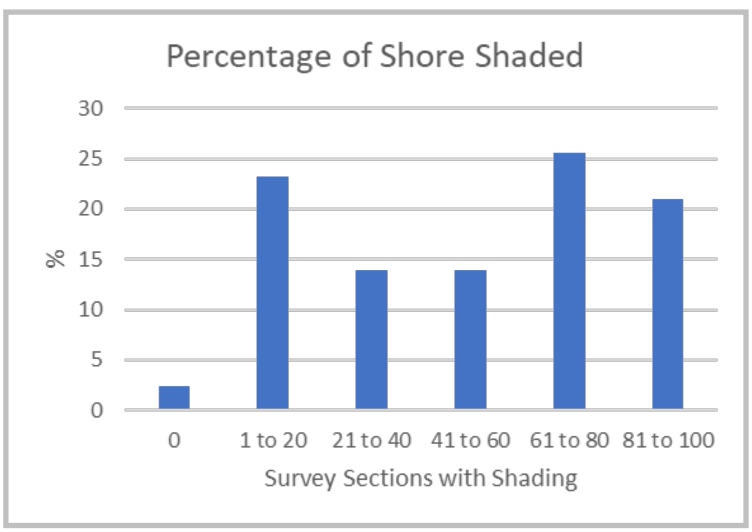


Figure 11: *Shading along Watts Creek*

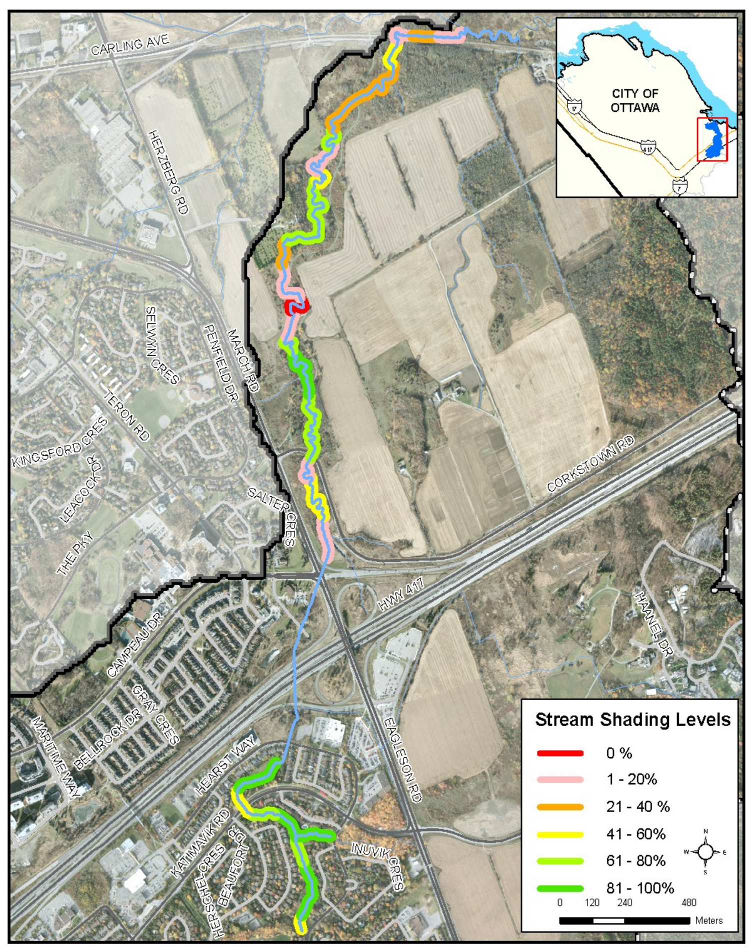


Figure 10: *Levels of Shading along Watts Creek*

Erosion and Streambank Undercutting

Rivers and streams are dynamic hydrologic systems, which are constantly changing in response to changes in the watershed. Streambank 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 and stream straightening works, 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 have detrimental impacts to important fish and wildlife habitat.

Erosion has the ability to create undercut stream banks. While some undercutting of stream banks can be a normal stream function, and can provide excellent refuge areas for fish, too much undercutting can become harmful if it is resulting in instability, erosion and sedimentation.

Figure 12 shows the percentage of undercut streambank along each surveyed section of Watts Creek. Undercutting was found on the outside bends of some of the more meandering sections of the channel. These areas may provide a habitat function and if relatively stable should be left to provide refuge and shelter habitat to aquatic species. Figure 13 shows that 48% of the creek has undercut banks and 13% has zero undercut banks. Some sections of extensive undercutting may be candidates for stabilization through shoreline planting, or other naturalized restoration work may be necessary to prevent further damage.

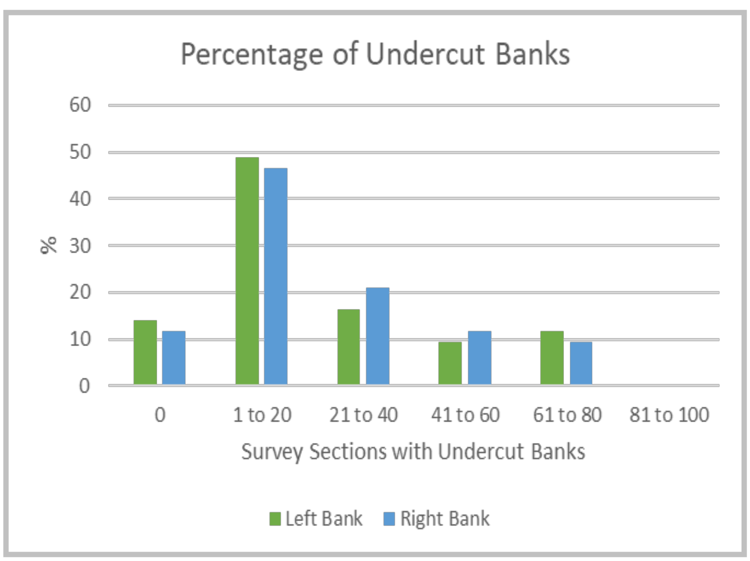


Figure 13: *Undercut stream banks along Watts Creek*

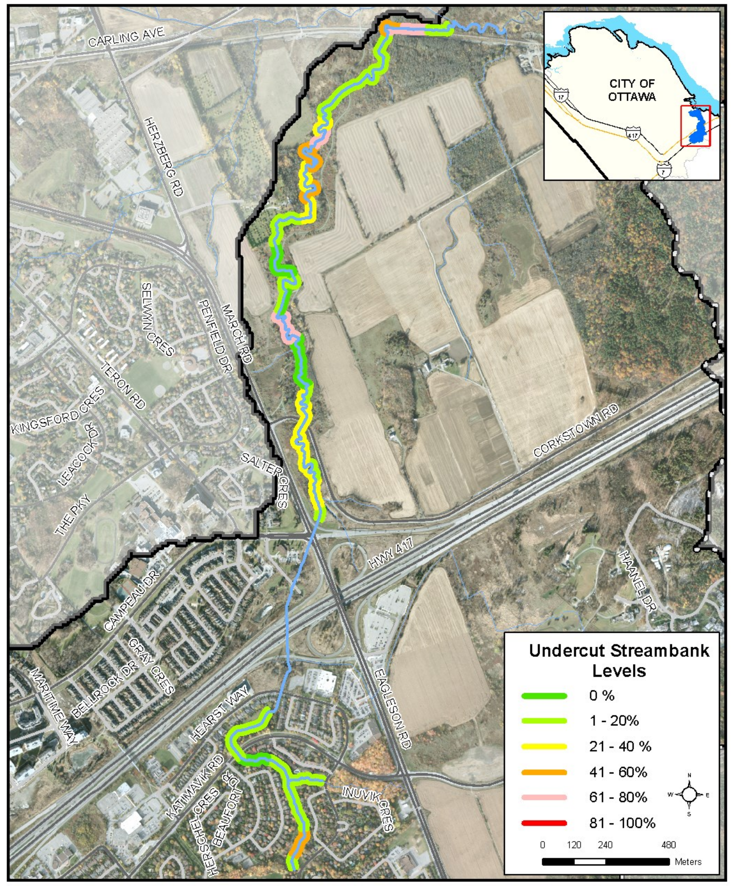


Figure 12: *Undercut stream banks along Watts Creek*

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, and therefore contribute 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 score shown in Figure 14 below is based on the presence or absence of gravel, cobble, or boulder substrates as well as the presence of woody material in each surveyed reach of Watts Creek. The presence of one of the variables carries a score of 1. A reach with all four features receives a score of 4 or high habitat complexity.

Only 6 of the 43 reaches received a score of 2 or less. This is likely due to the proximity of major road crossings and engineering of the channel altering the instream habitat and availability of woody debris.

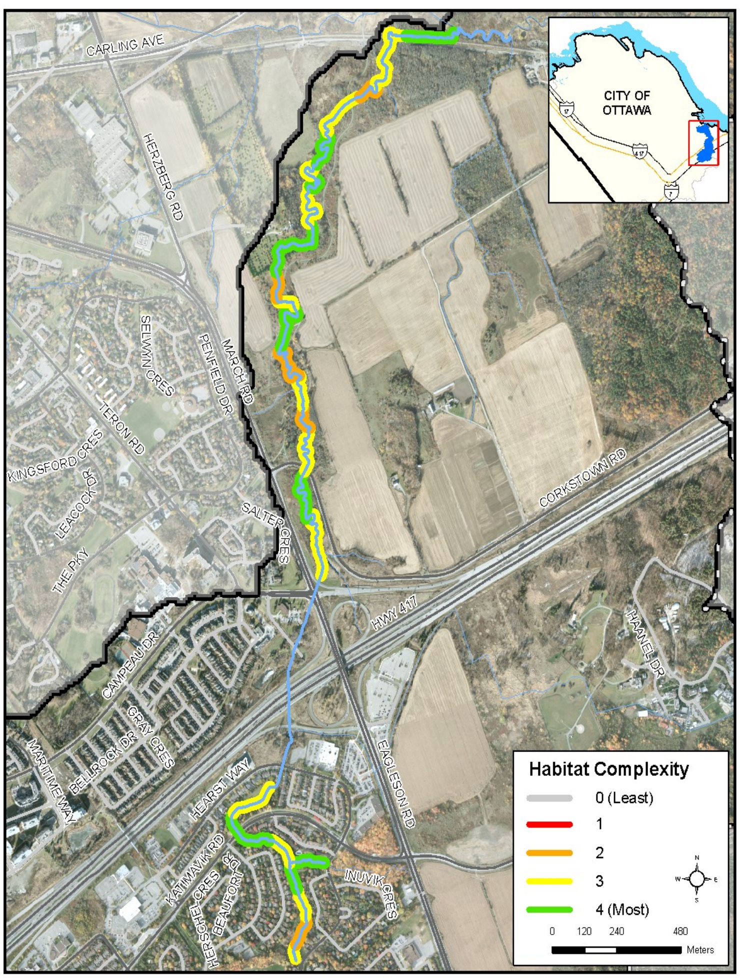


Figure 14: *Habitat complexity results for Watts Creek*

In-stream Morphology

In-stream morphology is categorized as pools, riffles, and runs. Pools and riffles are both 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 water 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. The in-stream morphology for Watts Creek can be seen in Figure 15.

It is beneficial for the health of the ecosystem if there is a variety of these in-stream features, allowing oxygen to flow mix into the creek, provide habitat diversity, and to have a well-connected watercourse. This section of Watts Creek was found to consist of 65% runs, 20% riffles and 14% pools. This suggests that stewardship efforts could be focused at creating more in-stream pool/riffle sequences to enhance fish habitat.

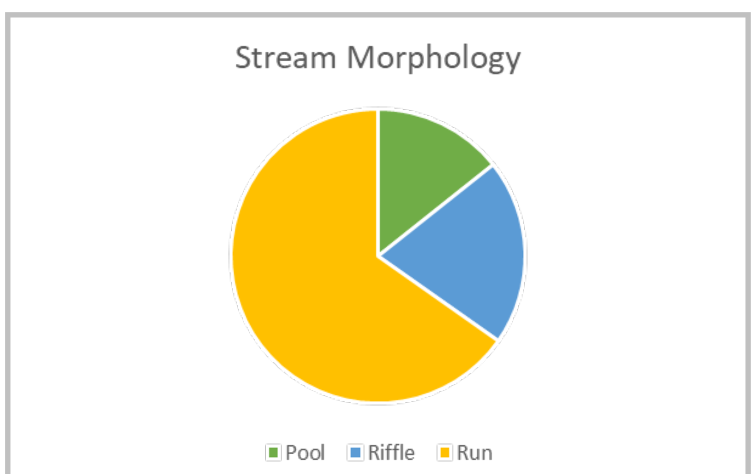


Figure 15: *In-stream morphology along Watts Creek*

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 because some species have specific habitat requirements and will only reproduce on certain types of substrate.

Figure 16 illustrates the different types of substrate that make up the bed of Watts Creek. Watts Creek is composed of high percentages of clay and silt. Clay (36% of the in-stream substrate) is prone to erosion and sedimentation and provides limited habitat for fish and invertebrates. A high amount of suspended clay was evident in the frequent cloudiness observed in the water. There is also an overall lack of cobble and boulder substrate, both of which provide good habitat for fish and invertebrates.

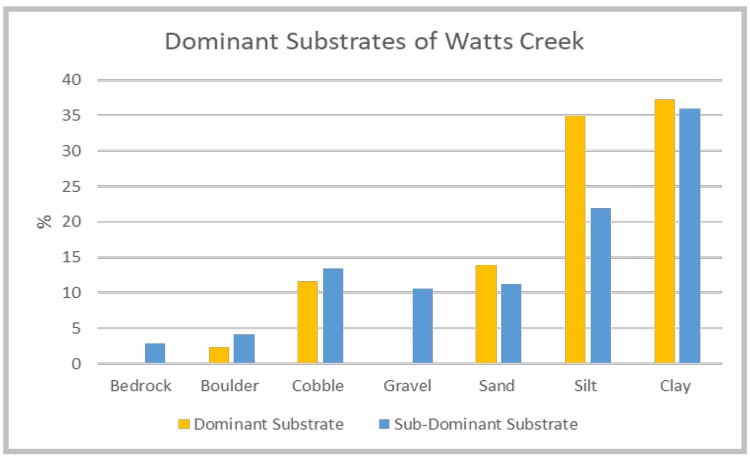


Figure 16: *Percentages of in-stream substrate types in Watts Creek*

Watts Creek is composed of high percentages of clay and silt with smaller percentages of cobble, gravel, sand, bedrock and boulders. Cobble, which makes up 13% of the dominant and 12% of the sub-dominant in-stream substrate, provides spawning habitat for fish and invertebrates. It also provides habitat for benthic invertebrates (organisms that live on the bottom of a waterbody or in the sediment) that are a key food source for many fish and wildlife species. Boulders, which make up 2% of Carp Creek's sub-dominant in-stream substrate, create cover and back eddies for larger fish to hide and rest out of the current.

Cobble and Boulder Habitat

As discussed, cobble and boulders both provide important fish habitat. Figure 17 shows the sections of Watts Creek where cobble and boulders were found to either be present or not present on the stream bed and shows that the creek has a moderate distribution of cobble and boulder substrates throughout the surveyed reaches.

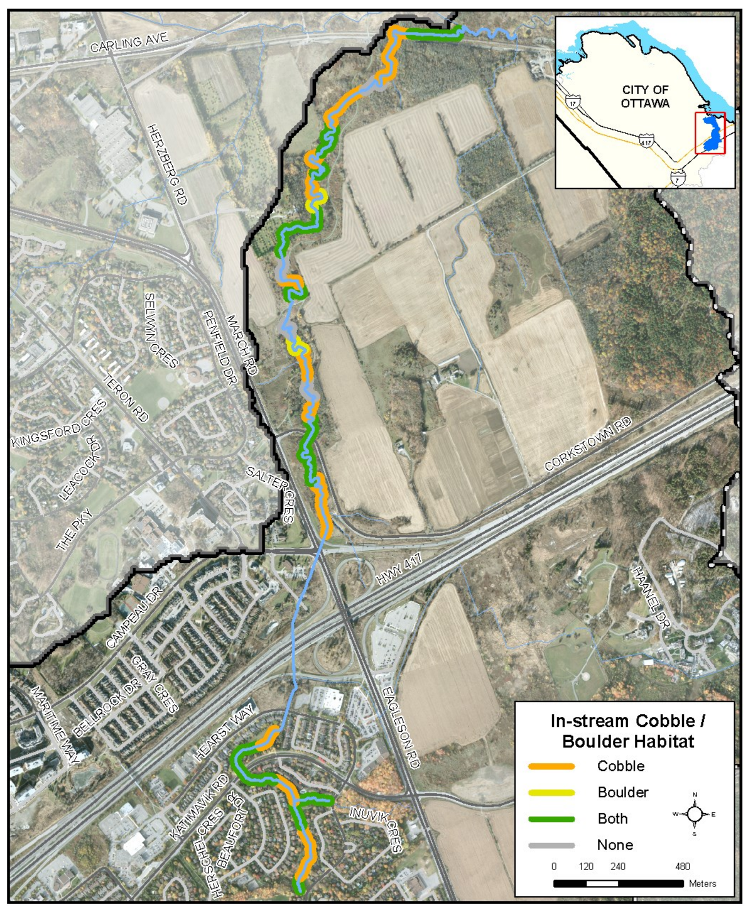


Figure 17: *Cobble and boulder habitat along Carp Creek*

In-Stream Vegetation

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 indicative of poor stream health. These are usually seen in streams with high nitrogen and phosphorous inputs (from runoff or wastewater).

Amount of In-stream Vegetation

For this assessment, the amount of instream vegetation is measured according to five categories, ranging from "extensive", where the stream is choked with vegetation, to "rare", where there are few plants.

Figure 18 shows the amounts of instream vegetation in Watts Creek. Overall it was found that this entire section of Watts Creek has very low amounts of instream vegetation. Only 11% of the stream was categorized as having a normal amount of vegetation with a combined 88% categorized as having low (16%), rare (24%) or no vegetation (48%).

Low instream vegetation levels in Watts Creek are likely due to the clay sediments and potential for high flows causing erosion after storm events. This makes it difficult for plants to find a stable place to put down roots. The cloudiness caused by the eroding/suspended clay will also reduce the amount of sunlight penetration into the water reducing a plant's ability to grow.

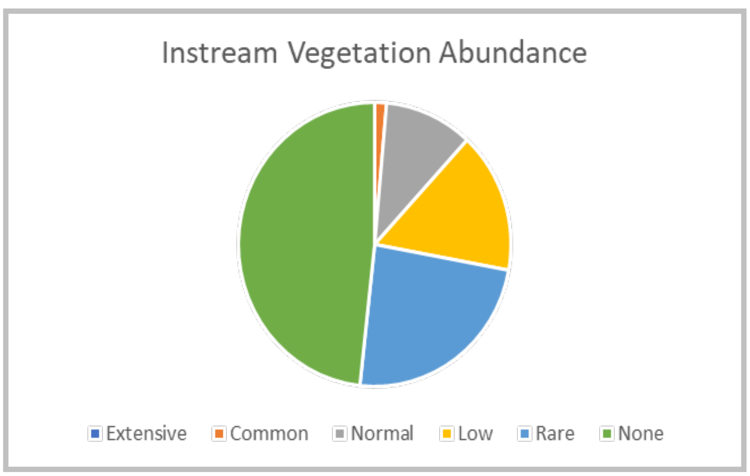


Figure 18: *Abundance of Vegetation in Watts Creek*

Types of Instream Vegetation

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 Figure 19, the in-stream vegetation that was observed in each surveyed section was divided by type into eight categories; narrow-leaved emergent, broad-leaved emergent, robust emergent, free floating plants, floating plants, submerged plants, algae and no plants. Broad-leaved emergent, free floating, and floating plants were absent from Watts Creek.

Overall, this section of Watts Creek was found to have a very low variety of vegetation with 33% having no vegetation and only four of the seven remaining categories were found to be present. At 28%, the high amount of algae is indicative of poor water quality.

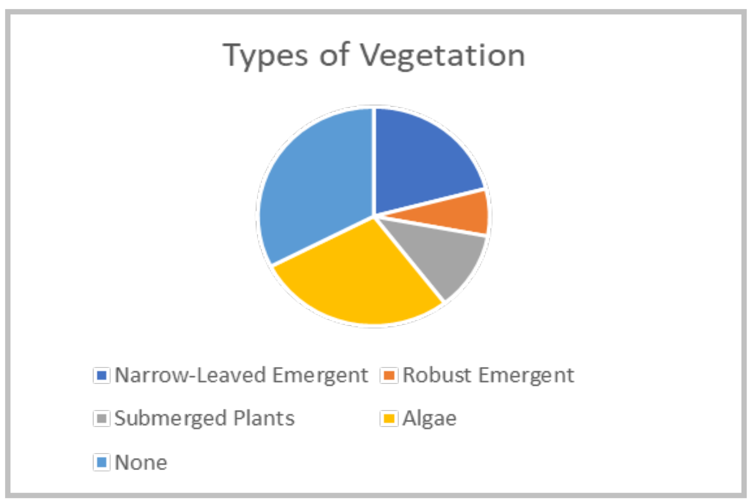


Figure 19: *Types of Vegetation in Watts Creek*

Water Chemistry and Quality

A YSI probe was used to collect water quality data including pH, dissolved oxygen, and conductivity, at each site assessed. The maximum, minimum, and average reading for each of those parameters are presented in Table 3.

Table 3: Watts Creek Water Quality Data

	Minimum	Maximum	Average
pH	7.35	8.54	8.08
Dissolved Oxygen (mg/L)	6.02	12.9	9.63
Conductivity (µS/cm)	1270	2334	1794

Dissolved oxygen measures the amount of available oxygen within the water that is accessible to wildlife. The lowest acceptable concentration of dissolved oxygen is 6.0mg/L for warm water fish and 9.5 mg/L for cold water fish. The average amount of dissolved oxygen in Watts Creek measured at 9.63 mg/L. These results in combination with our temperature readings indicate conditions to support the species of cool water fish found in Watts Creek, as seen in Figure 20.

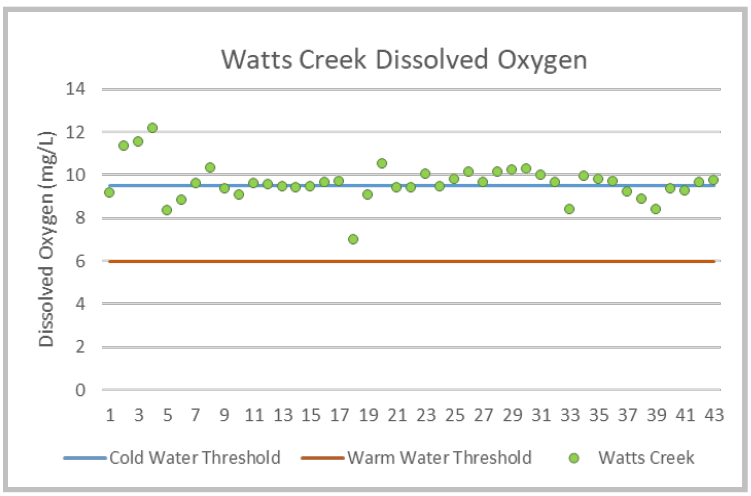


Figure 20: *Dissolved oxygen concentration results from Watts Creek*

Conductivity is defined as the ability of water to pass an electrical current, and is an indirect measurement of the saltiness of the water caused by dissolved ions. Fish cannot tolerate large increases in saltiness in the water. Factors that can change saltiness 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 introduced. Ideal and pristine conditions are 0-200 µS/cm and high conditions are 1,000-10,000 µS/cm. The average conductivity of Watts Creek was measured at 1794 µs/cm indicating that the creek has high levels of conductivity. Without further study it is hard to pinpoint the source, however sources within the watershed could include: road salt application on Highway 417 and the residential area south of the highway, runoff from adjacent farm lands, and/or from the soil erosion that is occurring along the creek 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.

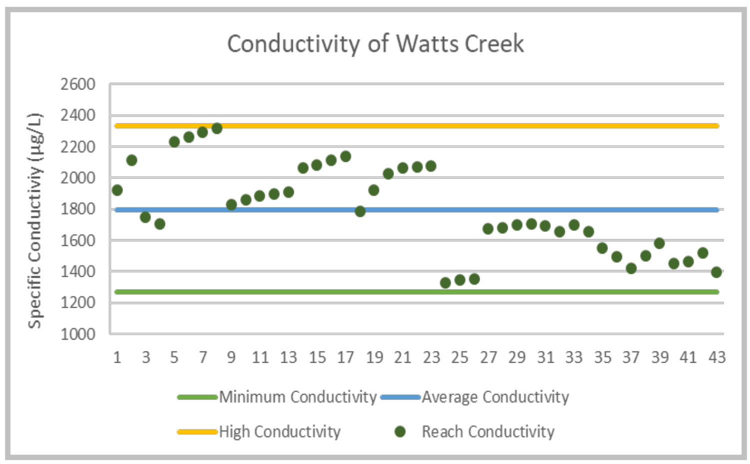


Figure 21: *Conductivity values found along Watts Creek*

The measurement of **pH** tells us the relative acidity or alkalinity of the creek. The scale ranges from 1 (most acidic) to 14 (most basic) and has 7 as the middle and most neutral point. The average pH of Watts Creek is 8, a relatively neutral condition, which is good for many species of fish to live in.

Dissolved Oxygen Saturation is measured as the ratio of dissolved oxygen relative to the maximum amount of oxygen that will dissolve 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 environment.

Combining the dissolved oxygen concentrations with the saturation values provides us with 6 categories to classify the suitability of stream for supporting various aquatic organisms. Results are shown in Figure 22.

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.

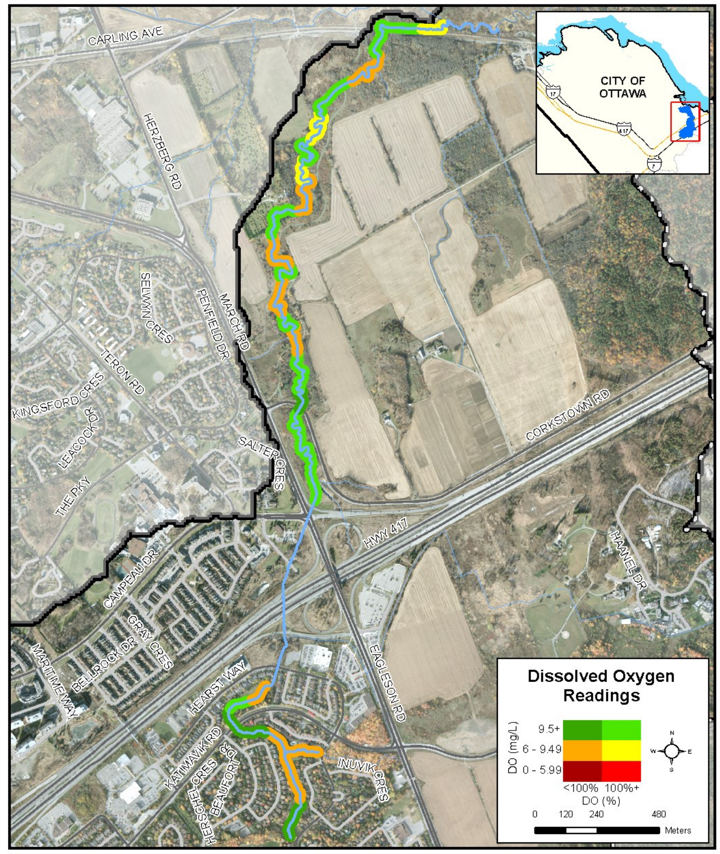


Figure 22: Dissolved Oxygen Concentration plus Saturation Results from Watts Creek

Areas of Water Quality Concern

This is a summary of areas that are potentially under stress due to one or several water chemistry factors.

In Watts Creek there were no reaches outside of the expected pH range. Conductivity values were below average in the upper half and gradually increased downstream of section 23. Dissolved oxygen was optimal for cold and warm water biota in many of the lower reaches, with sections throughout the Creek having optimal-sufficient conditions for warm water biota however 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 shown in Figure 23.

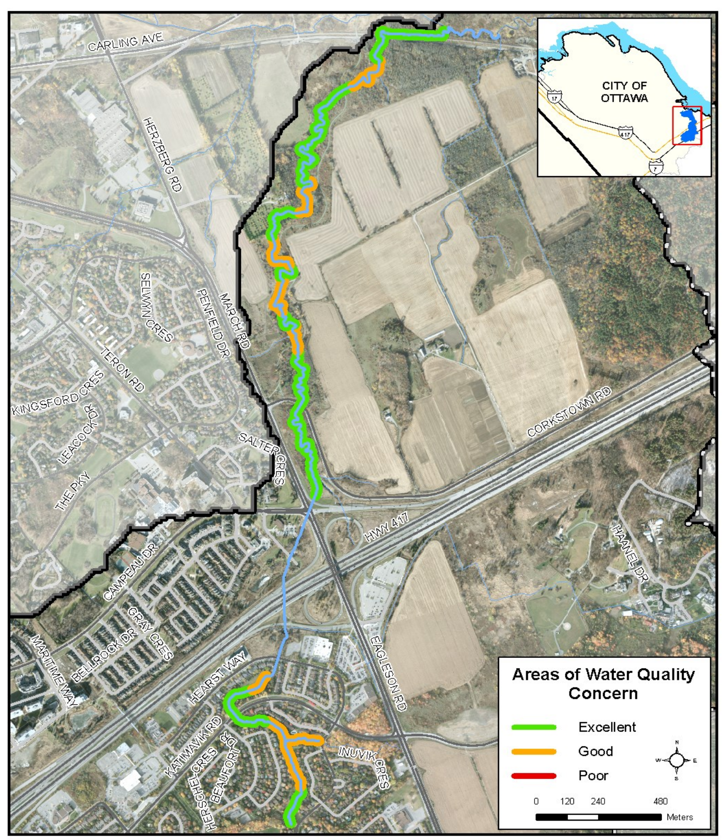


Figure 23: Areas of Water Quality Concern for Carp Creek

Thermal Classification

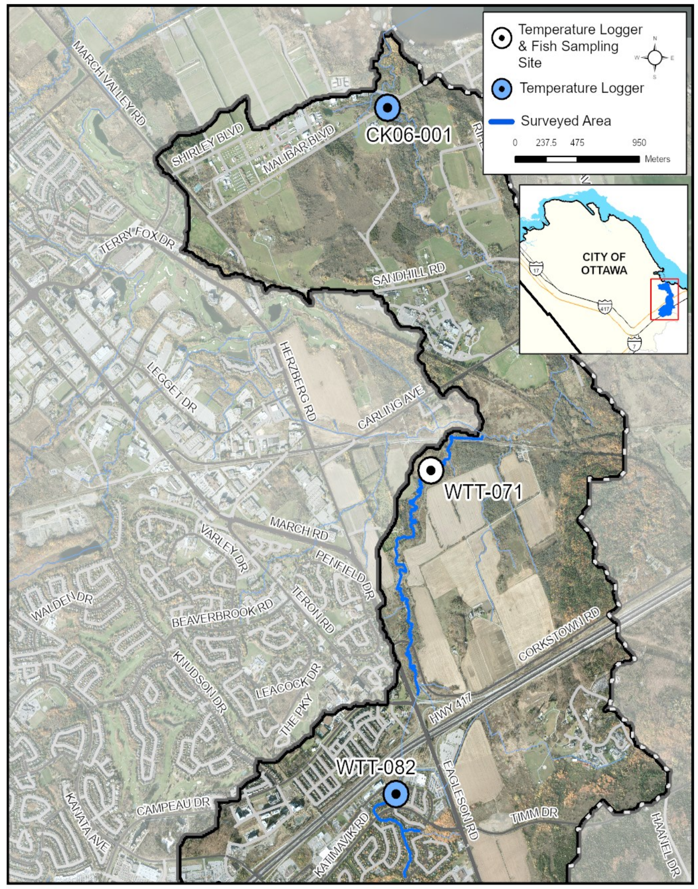


Figure 24 *Location of the temperature logger and fish sampling site on Watts Creek.*

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Figure 24 shows where the 2 temperature dataloggers were deployed in Watts Creek from May to October 2023 to give a representative sample of how water temperature fluctuates throughout the summer season. Additionally, an upstream site was previously monitored in 2022.

Many factors can influence fluctuations in stream temperature; including springs, tributaries, precipitation runoff, discharge pipes and stream shading from riparian vegetation. 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 25 shows the thermal classifications of Watts Creek for 2023.

Analysis of the data collected indicates that Watts Creek should be classified as a cool-cold stream. This is likely due to the primary source of water flowing into Watts Creek orginates from cool underground storm water and agricultural drains. The stream starts cool-cold in the headwater area (2022 data) and is classified as a cool water in the mid-reach (WTT-071). The water continues to warm into the cool-warm range downstream of the Kizell drain junction (CK6-001).

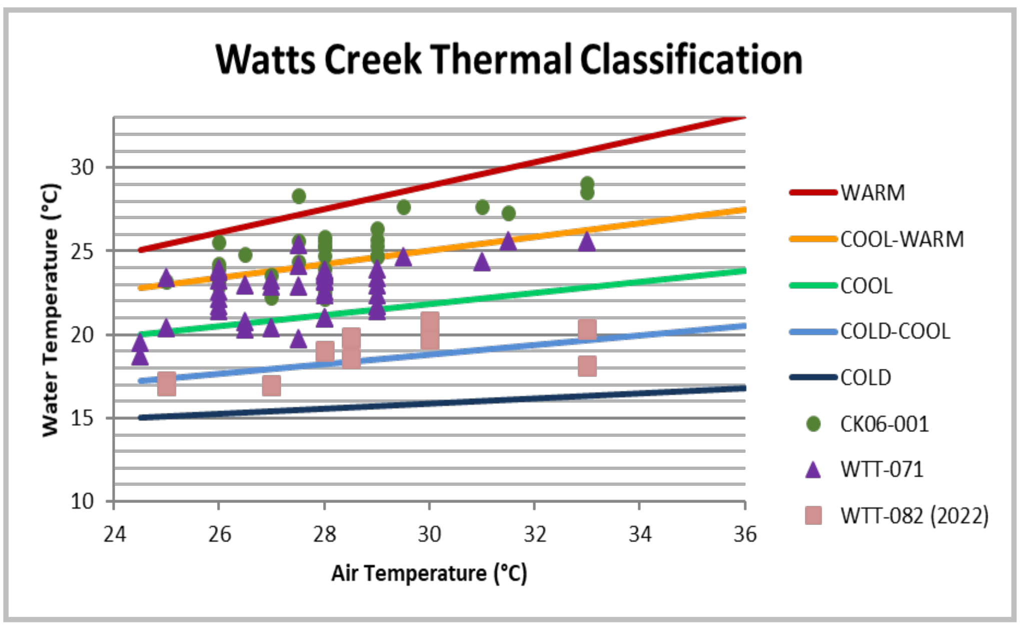


Figure 25: *Thermal classification of Watts Creek*

Each point on the graph 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 ^{o}C and was preceded by two consecutive days with a maximum air temperature ≥ 24.5 ^{o}C during which time no precipitation occurred.
- Water temperature is taken at 4:00 pm.

Fish Sampling

In 2023, MVCA used a method called electrofishing to sample Watts Creek's fish population just upstream of the NCC Pathway, in the same location as our temperature probe.

We found the community to be fairly limited in species diversity, capturing only 8 species. Most fish were found hiding in the filamentous algae or in the riffle before the culvert.

In 2013 Carleton University fished other reaches of Watts Creek and found 20 species of fish, many of which are different than the ones we caught. The fish species caught in 2023 are shown below in Table 4 (Thermal classes from Coker, 2001).

Table 4: Fish Species Found In Watts Creek 2023

Species Common Name	Thermal Class
Blacknose Shiner	Cool
Bluntnose Minnow	Warm
Brook Stickleback	Cool
Creek Chub	Cool
Fathead Minnow	Warm
Central Mudminnow	Cool
Longnose Dace	Cool
Yellow Perch	Cool

Migratory Obstructions

Migratory obstructions are features in a water way that prevent fish from freely swimming up and down stream. This can effect successful migration to breeding or foraging habitats as well as restricts a fish's ability to access deeper, cooler water refuges when summer droughts come. 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 26 there were many obstructions noted, most were debris dams related to the recent aggressive floods. There was also one large beaver dam noted, pictured below.

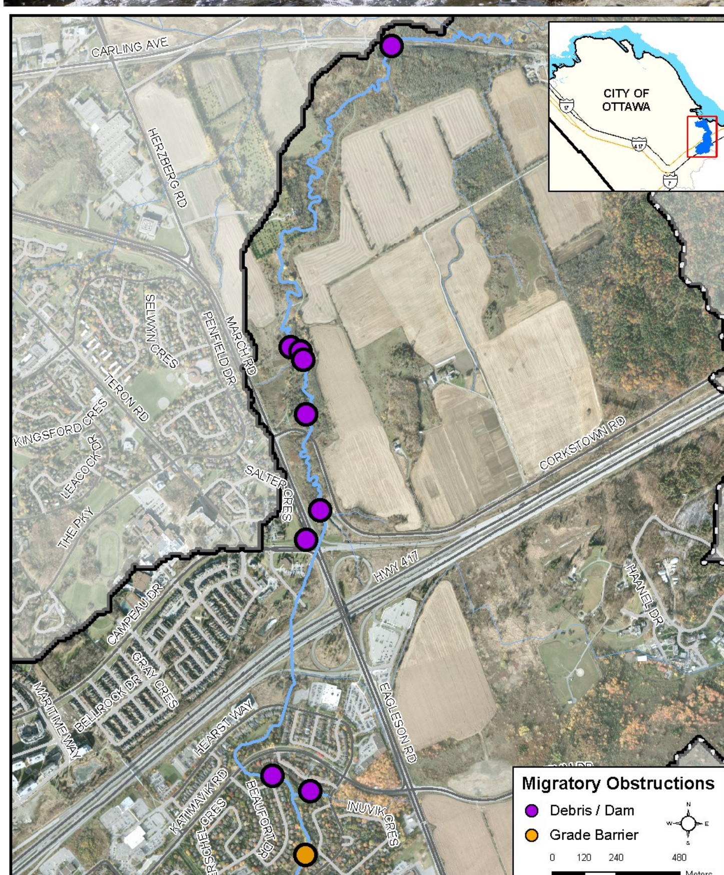
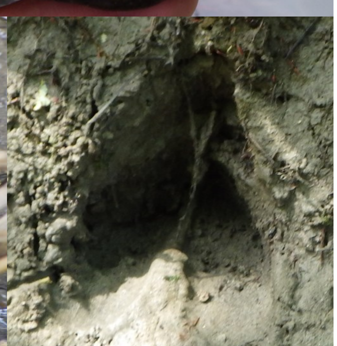


Figure 26 *Map of migratory obstructions on Watts Creek, 2023*

Wildlife Observed

Wildlife observed during the survey of Watts Creek is shown in Table 5.

Table 5: Watts Creek Wildlife Observed	
Birds	Duck, Chickadees, Robins, Sparrows, Song Birds
Mammals	Raccoon tracks, Chipmunk, Dog tracks and Whitetail Deer, Squirrels
Reptiles and Amphibians	Green Frog, Toad
Aquatic Insects	Dragonfly, Damselflies and Water Striders
Other	Snails, Mussels, Minnows, Bees, Monarch Butterfly, Moths



Potential Stewardship Opportunities

Naturally vegetated shorelines help reduce erosion, filter pollutants from entering the watercourse, assist in flood control, and provide food and habitat for a diversity of wildlife.

Figure 27 depicts the locations identified by MVCA staff and volunteers, as areas for potential riparian restoration activities. There is occasional garbage throughout the creek with the reaches in the more urban areas noted as being in the most need of clean-up efforts.

A much larger project will be to coordinate a stream restoration project for the middle sections shown in red in Figure 27. These sections have very little fish habitat, many invasive species and a few larger migratory obstructions.

Other potential actions would include contacting landowners and community members to explore the prospect for collaboration to work together on a voluntary basis to enhance their shorelines through a number of activities such as; increasing the unmowed areas along the shore, garbage clean-ups and invasive species removal days.

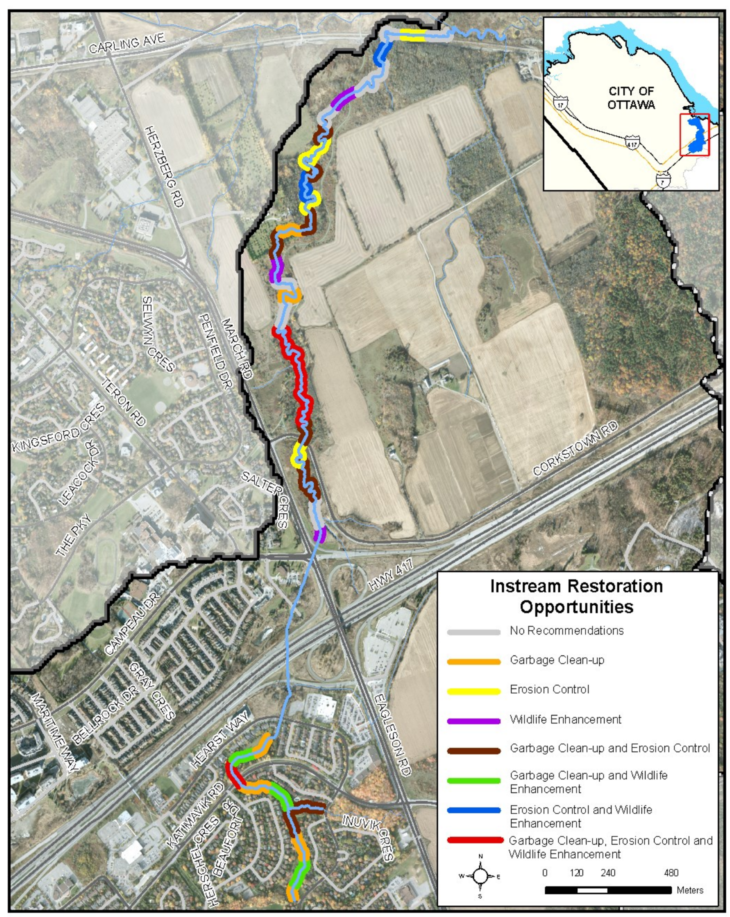


Figure 27: *Areas for potential restoration projects along Watts Creek*

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 our 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 skin.

Figure 28 shows that although there are nine identified invasive species in the Watts Creek Corridor, they are not all found everywhere. Table 6 summarizes which invasive species were identified in 2014 compared to 2023.

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

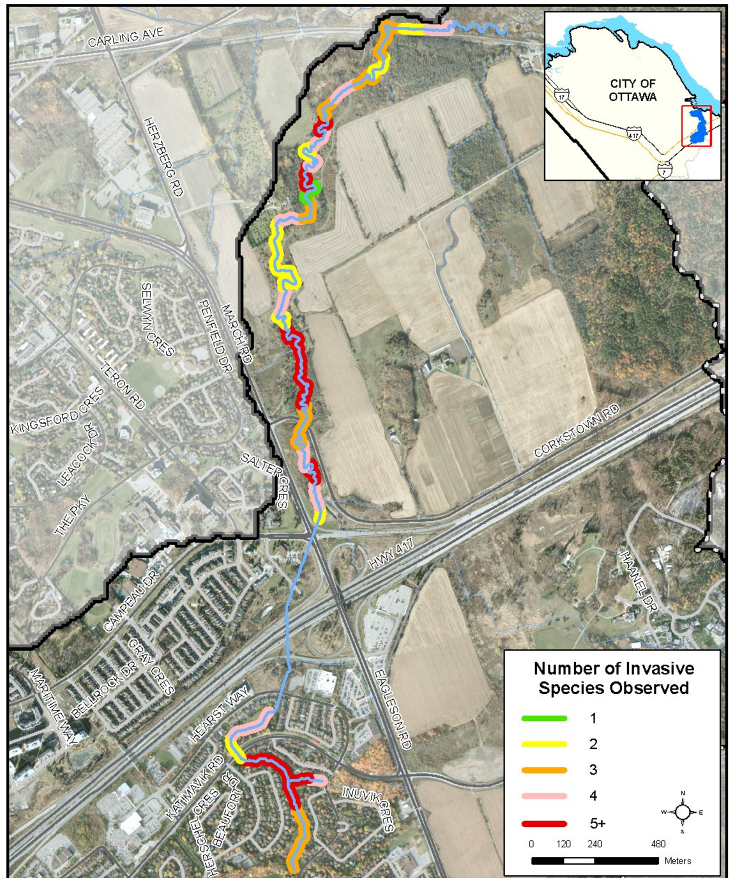


Figure 28: *Identified invasive species abundance in Watts Creek*

Table 6: Invasive Species Found in Watts Creek

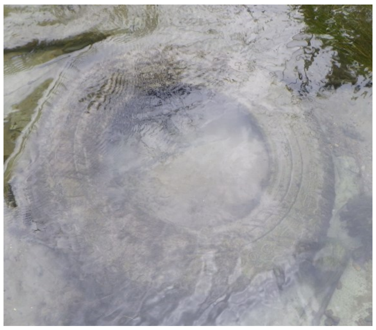
Invasive Species	2014	2023
Common Buckthorn		Y
Dog Strangling Vine		Y
Flowering Rush		Y
Garlic Mustard		Y
Glossy Buckthorn		Y
Himalayan Balsam		Y
Purple Loosestrife		Y
Poison Parsnip	Y	Y
Manitoba Maple	Y	Y

Invasive species found shown to the right (clockwise): Himalayan Balsam, Purple Loosestrife, Flowering Rush, Common Buckthorn and Garlic Mustard. Left is Goutweed found in an urban section and likely escaped from a garden.

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: www.ontarioinvasiveplants.ca

Pollution

Pollution could be seen throughout most of Watts Creek, particularly in the form of household waste, general litter and construction waste. 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 originate at roadways.



Potential Restoration Projects

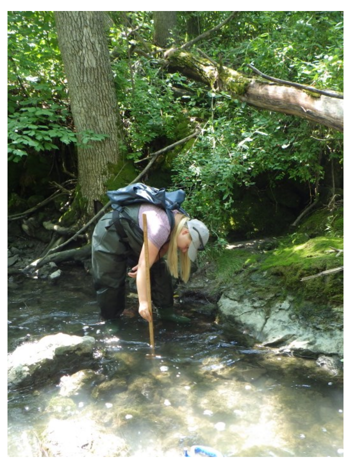
Watts Creek has many potential restoration opportunities, particularly to respond to invasive species, erosion and lack of habitat diversity. The information gathered through these surveys will help with the planning and implementation of future projects such as: fish habitat creation, invasive species removal, riparian planting, bank stabilization and removal of migratory obstructions.

Stream Comparison Between 2014 and 2023

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 surveyed values is part of the system's natural variability or if it is due to change over time.

F-Tests were run to compare the results from 2014 to those from 2023. As seen in Table 7, the mean results are very similar but with lower mean water levels, dissolved oxygen and conductivity readings than in 2023. All the variables have smaller variance ranges in 2023 with the exception of conductivity. There was a considerable difference in the weather experienced between these two years with increased rainfall frequency and amounts in 2023 affecting the observed stream conditions. It is unclear at this time if there are additional factors contributing to the recorded differences.



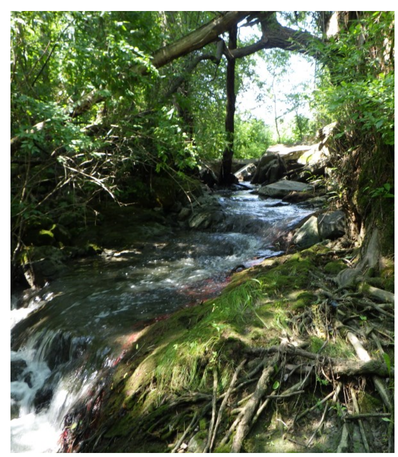


Table 7: Comparison of Water Quality Parameters in Watts Creek

	2014 Mean Results	2014 Variance	2023 Mean Results	2023 Variance	Significant Difference?
Water Temperature (°C)	17.5	2.06	17.8	3.08	No
Water Depth (m)	0.4	0.04	0.37	0.05	No
pH	7.9	0.02	8.08	0.04	No
Dissolved Oxygen (mg/L)	11.1	0.53	9.63	1.03	Yes
Specific Conductivity (µS/cm)	4221	905323	1794	83652	Yes

Report Summary

The results in the table below are a summary of the highlights from each of the report sections. Although mostly in an urban setting, Watts Creek has high amounts of shoreline vegetation, cool water temperatures, and no areas of concern with a poor water quality score. There are many sites of shoreline erosion which are leading to concerns about sediment entering the watercourse. The stream also has a few sections of poor habitat structure as well there are log jams possibly preventing fish movement.

The NCC owned Greenbelt lands provide the creek with healthy riparian buffers and shade cover. Half of the site surveyed had good aquatic habitat complexity, with only 6 sections receiving a poor score. These features combine to provide a diversity of habitats to benthic organisms, fish, and other animals that call Watts Creek home.

Through stewardship and education efforts with the community, gains can be made in reducing the littering and presence of invasive species.

Table 8: Watts Creek Data Summary Table 2023	
Number of Sections Surveyed	43
Average Stream Width (m)	3.67
Average Stream Depth (m)	0.38
Average Hydraulic Head (mm)	2.99
Average Water Temperature (˚C)	17.8
Average Conductivity (µS/cm)	1794
Average pH	8.08
Average Dissolved Oxygen Concentration (mg/L)	9.63
Average Dissolved Oxygen Saturation (%)	101.8
# of Areas of Water Quality Concern with a Poor Score	0
Dominant Adjacent Land Uses	Forest 35%
% Channel Alterations	Natural 58%
% Vegetated Riparian Buffer Width (>30 m)	39%
% Overhanging Trees & Branches >40% Section Coverage	56%
% Stream Shading >40% Section Coverage	63%
% of Undercut Banks >60% Section Coverage	14%
Dominant Substrate Type	Clay
Sub-Dominant Substrate Type	Silt
# Sections with a Habitat Complexity Score ≥3 variables	37
Dominant In-stream Morphology	Natural 76%
Dominant In-stream Vegetation Types	None 48%
Dominant Amount of In-stream Vegetation	None 47%
Thermal Class	Cool-cold
Migratory Obstructions	11
# of Identified Invasive Species	9
Potential Stewardship Activities	Riparian Planting Garbage Clean Up Fish Habitat Enhancement Erosion Control Structures Channel Modifications Invasive Species Control Wildlife Habitat Enhancement

How Does This Information Get Used?

The City Stream Watch Program is an excellent monitoring program that allows MVCA to assess the condition of subwatersheds over time. Stewardship activities can then be focused on reaches that need further work to help improve the health of the overall creek ecosystem.

MVCA uses stream surveys to target specific areas that need restoration work. Stream garbage clean-ups are conducted, blockages are removed; and shoreline planting, erosion control, and habitat enhancements are organized.

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

Call 613-253-0006 ext. 234, if you are interested

Volunteer projects that are carried out as a result of the City Stream Watch Program are:

- 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

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The City Stream Watch Collaborative is made up of: Rideau Valley Conservation Authority, Mississippi Valley Conservation Authority, South Nation Conservation Authority, The City of Ottawa, National Capital Commission, Ottawa Flyfishers Society, Ottawa Stewardship Council, Rideau Roundtable, and the Canadian Forces Fish and Game Club.