Taylor Creek 2012 Summary Report

Watershed Features	
Area	10.71 square kilometres 0.25% of the Rideau River watershed
Land Use	14% agriculture 57% urban 7% forest 1% rural land-use 20% wetlands 1% unclassified
Surficial Geology	70% clay 2% diamicton 3% organic deposits 5% bedrock 10% sand
Watercourse Length and Type	*Total length:* *Watercourse type:* 81% natural 19% channelized *Flow type:* 100% permanent
Invasive Species	There were six invasive species observed by CSW staff in 2012: purple loosestrife, yellow iris, flowering rush, Himalayan balsam, garlic mustard, and Japanese knotweed
Fish Community	9 fish species have been caught in Taylor Creek

Wetland Cover
19% of the watershed is wetland
Wetlands make up 75% of the vegetation cover

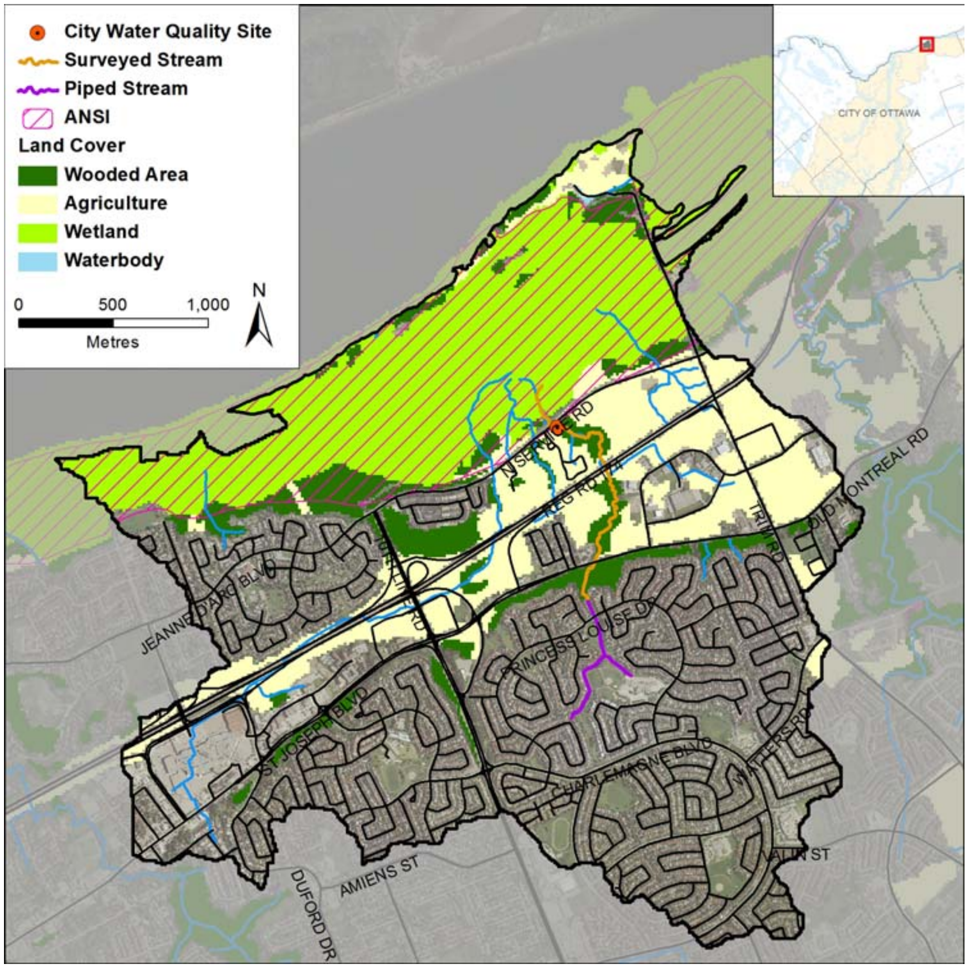

Figure 1. Land cover in the Taylor Creek catchment

Vegetation Cover		
Types	**Hectares**	**% of Cover**
Wetlands	208	75
Wooded Areas	69	25
Hedgerow	0	0
Plantation	0	0
TOTAL COVER		**100%**

Woodlot Cover		
Size Category	**Number of Woodlots**	**% of Woodlots**
<1 ha	49	14.6
1-9 ha	18	85.4
10-30 ha	0	0
>30 ha	0	0

The Rideau Valley Conservation Authority, in partnership with seven other agencies in Ottawa (City of Ottawa, Heron Park Community Association, Ottawa Flyfishers Society, Ottawa Stewardship Council, Rideau Roundtable, National Defence HQ - Fish and Game Club, and the National Capital Commission) form the 2012 City Stream Watch collaborative.

Introduction

Taylor Creek is a tributary of the Ottawa River located just west of Trim Road in the east end of the City of Ottawa. Approximately 1.7 kilometers in length, the creek originates in the Fallingbrook Community east of 10th Line road and empties into the Ottawa River at Petrie Island, a provincially significant wetland. The upper reaches of Taylor Creek are entombed, with water surfacing north of Princess Louise Drive. From that point the creek quickly flows into an area of karst topography including the Princess Louise Falls south of St. Joseph boulevard. This section of the creek is a popular recreation destination with pathways connecting it to nearby residential areas. From St. Joseph Boulevard, Taylor Creek flows north crossing Highway 174 and North Service Road before it reaches the Ottawa River. Due to increased development pressure in the area, in 2009 and 2010 the City of Ottawa carried out erosion control measures on Taylor Creek to help remediate some of the severe erosion on the Creek.

As part of the City Stream Watch monitoring activities in 2012, 17 sections along Taylor Creek were surveyed by staff and volunteers. The following is a summary of the 17 macro stream assessments carried out on Taylor Creek.

Low Water Conditions in the Rideau Valley Watershed

The Government of Ontario has set up the Ontario Low Water Response (OLWR), which ensures that the province is prepared for low water conditions in the future. The response plan is intended to help co-ordinate and support local response in the event of drought. Local teams are established in areas experiencing low water conditions so that the local community can carry out actions to reduce and better manage water use. As an important part of the Low Water Response Team for the watershed, the Rideau Valley Conservation Authority (RVCA) measures precipitation, stream flow and water levels which indicate the severity of low water conditions in the watershed. In 2012, the Rideau Valley Watershed was impacted by low water conditions. RVCA first declared Level 1 low water status on April 5, 2012. Level 1 status continued until July 13, 2012 when the status was increased to Level 2. On October 3, 2012 the Level 2 low water status was lifted for most of the watershed except for the Kemptville Creek subwatershed which remained at Level 1 status. This information is important to highlight as the drought impacted aquatic habitat conditions in the Rideau watershed in 2012.

Droughts are natural events that occur periodically over time. In the past, periods of dry weather and low water levels were relatively uncommon happening every decade or so. But with changing weather patterns, low water levels may occur more often, especially with increasing demand for water. It can be argued that "many species of biota, both terrestrial and aquatic, have evolved many different adaptations to contend with drought" (Humphries, 2003). However it is important to keep in mind that drought conditions can "enhance siltation, change the composition of aquatic vegetation, alter channel shape and affect water chemistry" (Lake, 2003). These changes may result in direct and indirect impacts on vegetation, fish species, invertebrates and amphibians (Lake, 2003).

Overbank Zone

Riparian Buffer along Taylor Creek

The riparian or shoreline zone is that special area where the land meets the water. Well-vegetated shorelines are critically important in protecting water quality and creating healthy aquatic habitats, lakes and rivers. Natural shorelines intercept sediments and contaminants that could impact water quality conditions and harm fish habitat in streams. Well established buffers protect the banks against erosion, improve habitat for fish by shading and cooling the water and provide protection for birds and other wildlife that feed and rear young near water. A recommended target (from Environment Canada's Guideline: *How Much Habitat is Enough?*) is to maintain a minimum 30 meter wide vegetated buffer along at least 75 percent of the length of both sides of rivers, creeks and streams.
Figure 2 demonstrates the buffer conditions on Taylor Creek for the left and right banks separately. Results show that 67 percent of both the left and right bank of Taylor Creek has a buffer width greater than 30 meters.

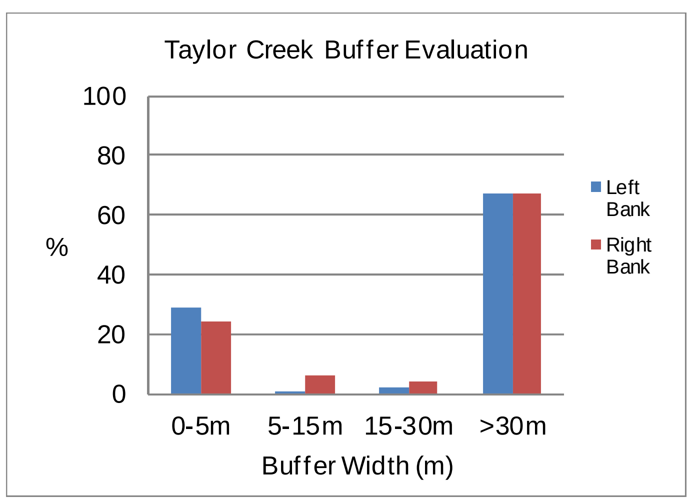

Figure 2. Vegetated buffer width along Taylor Creek

Land Use beside Taylor Creek

Figure 3 demonstrates the eight different land uses identified along the banks adjacent to Taylor Creek. Surrounding land use is considered from the beginning to end of the survey section (100 metres) and up to 100 metres on each side of the creek. Land use outside of this area is not considered for the surveys but is nonetheless part of the subwatershed and will influence the creek. Natural areas made up 72 percent of Taylor Creek, characterized by forest, scrubland meadow and wetland. The remaining land use consisted of residential, infrastructure, recreation, and industrial/commercial.

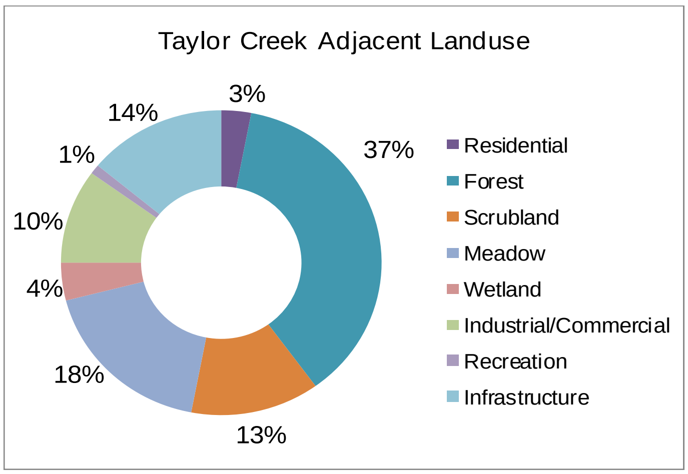

Figure 3. Landuse alongside Taylor Creek

Shoreline Zone

Erosion

Erosion is a normal, important stream process and may not affect actual bank stability; however, excessive erosion and deposition of sediment within a stream can have a detrimental effect on important fish and wildlife habitat. Bank stability indicates how much soil has eroded from the bank into the stream. Poor bank stability can greatly contribute to the amount of sediment carried in a waterbody as well as loss of bank vegetation due to bank failure, resulting in trees falling into the stream and the potential to impact instream migration. Seventy-three percent of the left bank and 83 percent of the right bank was considered stable along Taylor Creek. Bank stability has improved since this creek was last surveyed in 2007. Improvements are likely the result of the 2009/2010 Taylor Creek Erosion Works project by the City of Ottawa. The project saw erosion control measures implemented from St. Joseph Boulevard to North Service road. Figure 4 shows the observed erosion locations along the Creek. There were some locations downstream of highway 174 where CSW staff and volunteers noted highly unstable banks but apart from those locations low to moderate levels of erosion were observed along the remainder of the creek.

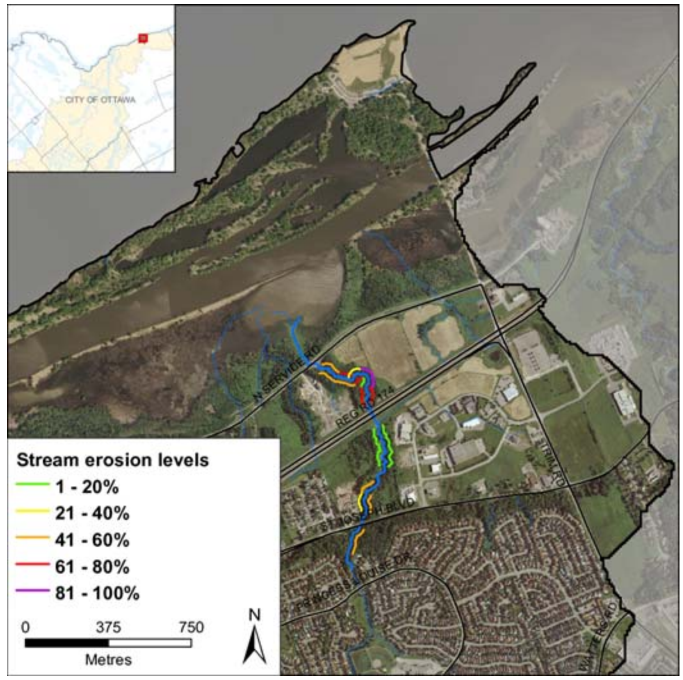

Figure 4. Erosion along Taylor Creek

Streambank Undercutting

Undercut banks are a normal and natural part of stream function and can provide excellent refuge areas for fish. Figure 5 shows the identified undercut banks on Taylor Creek. The most undercutting was observed on the north and south sides of North Service road.

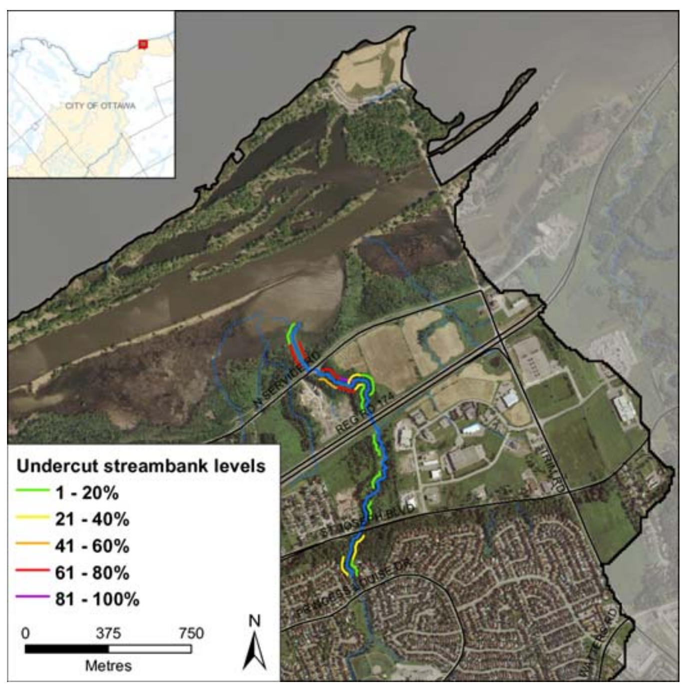

Figure 5. Undercut streambanks along Taylor Creek

Stream Shading

Grasses, shrubs and trees all contribute towards shading a stream. Shade is important in moderating stream temperature, contributing to food supply and helping with nutrient reduction within a stream. Figure 6 shows the varying degrees of stream shading along Taylor Creek.

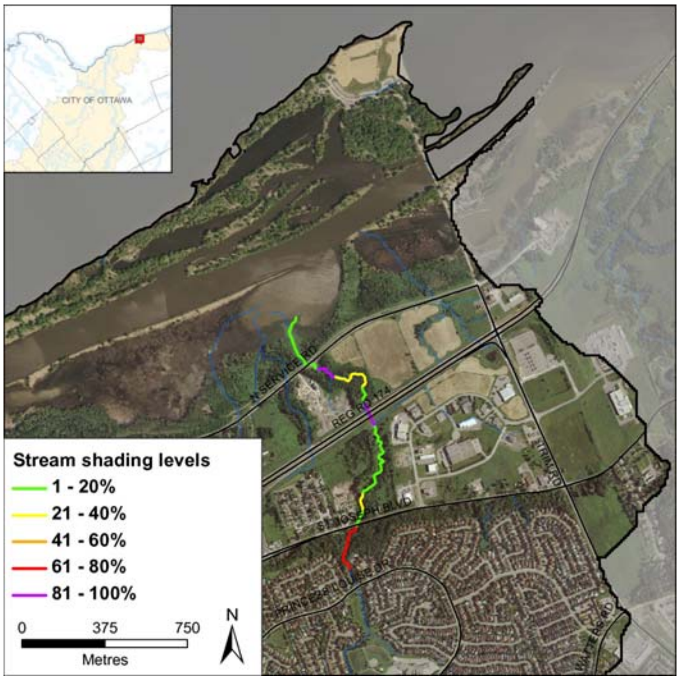

Figure 6. Stream shading along Taylor Creek

Human Alterations

Figure 7 shows that 18 percent of Taylor Creek remains “unaltered.” Sections considered “natural” with some human changes account for 24 percent of sections. "Altered" sections accounted for 29 percent of the stream, with the remaining 29 percent of sections sampled being considered “highly altered” (e.g., include road crossings, shoreline/instream modifications and little or no buffer).

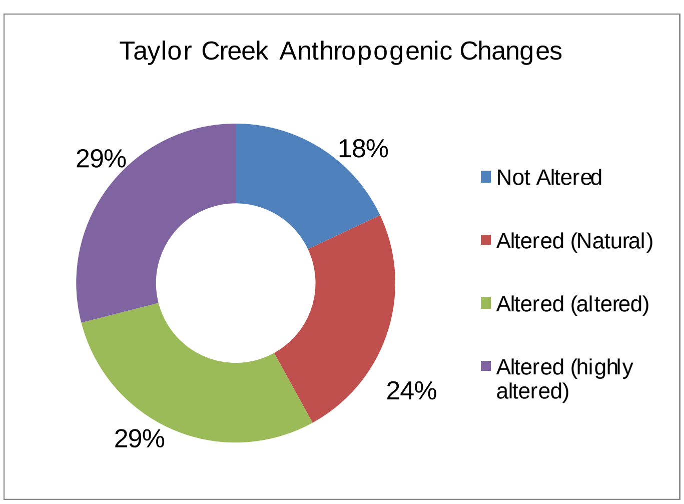

Figure 7. Alterations to Taylor Creek

Overhanging Trees and Branches

Figure 8 shows that although there are some sections of the creek with no overhanging trees and branches, the majority of Taylor Creek has varying levels of overhanging branches and trees. Overhanging branches and trees provide a food source, nutrients and shade which helps to moderate instream water temperatures.

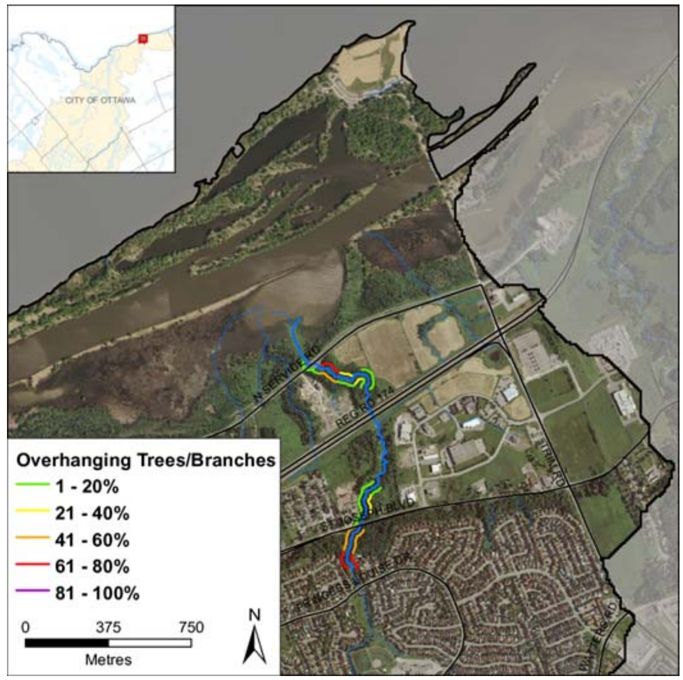

Figure 8. Overhanging trees and branches

Photo 1. Overhanging trees and branches on Taylor Creek

Instream Woody Debris

Figure 9 shows that the majority of Taylor Creek has moderate to low levels of instream woody debris in the form of branches and trees. Instream woody debris is important for fish and benthic habitat, by providing refuge and feeding areas.

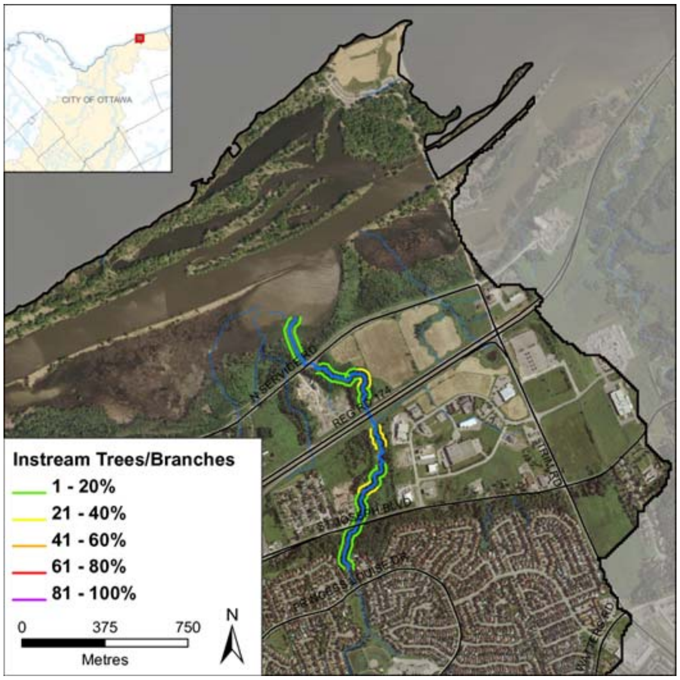

Figure 9. Instream trees and branches

Instream Aquatic Habitat

Habitat Complexity

Streams are naturally meandering systems and move over time. As such, there are varying degrees of habitat complexity depending on the creek. A high percentage of habitat complexity (heterogeneity) typically increases biodiversity of aquatic organisms within a system. Seventy-one percent of Taylor Creek was considered heterogeneous as shown in Figure 10.

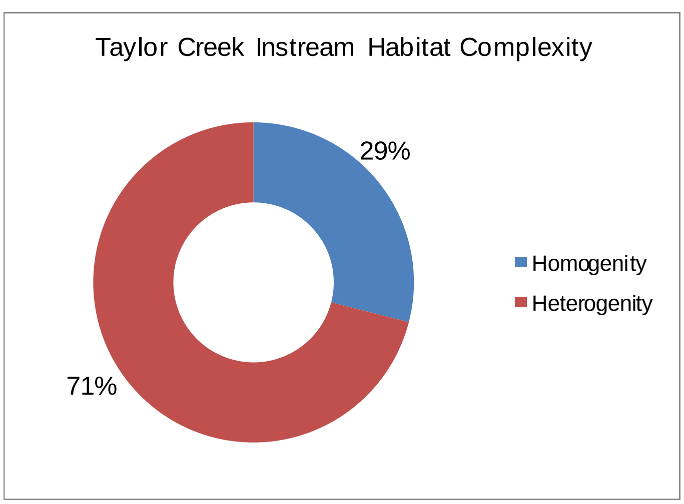

Figure 10. Instream habitat complexity in Taylor Creek

Instream Substrate

Diverse substrate is important for fish and benthic invertebrate habitat because some species have specific substrate requirements and for example will only reproduce on certain types of substrate. Figure 11 demonstrates that the composition of the substrate in Taylor Creek is fairly diverse.

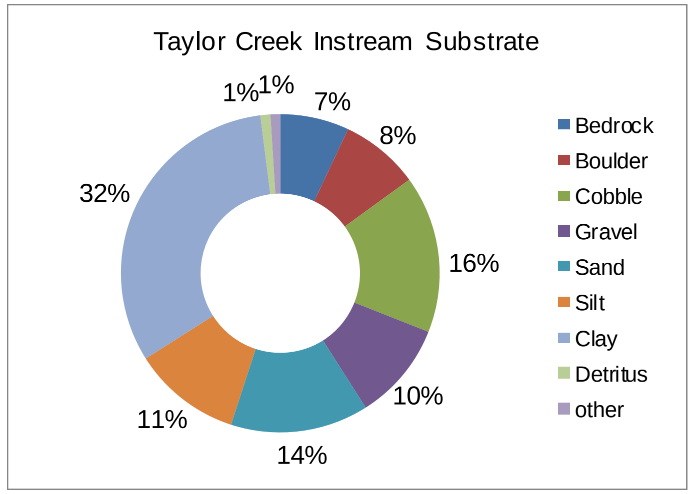

Figure 11. Instream substrate in Taylor Creek

Boulders create instream cover and back eddies for large fish to hide and/or rest out of the current. Cobble provides important over wintering and/or spawning habitat for small or juvenile fish. Cobble can also provide habitat conditions for benthic invertebrates that are a key food source for many fish and wildlife species. Figure 12 shows various locations where cobble and boulder substrate is found in Taylor Creek.

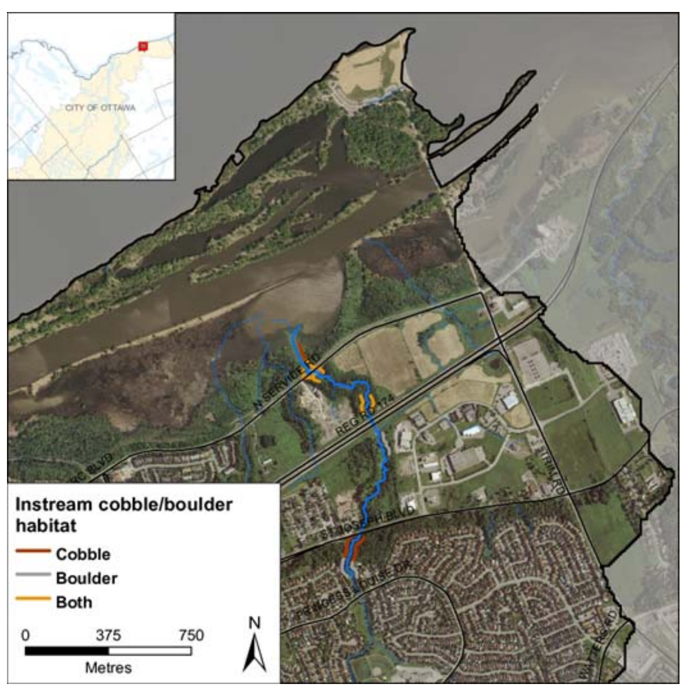

Figure 12. Cobble and boulder habitat along Taylor Creek

Instream Morphology

Pools and riffles are important features for fish habitat. Riffles are areas of agitated water that contribute higher dissolved oxygen to the stream and act as spawning substrate for some species of fish, such as walleye. Pools provide shelter for fish and can be refuge pools in the summer if water levels drop and water temperature in the creek increases. Pools also provide important over wintering areas for fish. Runs are usually moderately shallow, with unagitated surfaces of water and areas where the thalweg (deepest part of the channel) is in the center of the channel. Figure 13 shows that Taylor Creek is somewhat complex; consisting of runs at 79 percent, riffles at15 percent and pools at six percent.

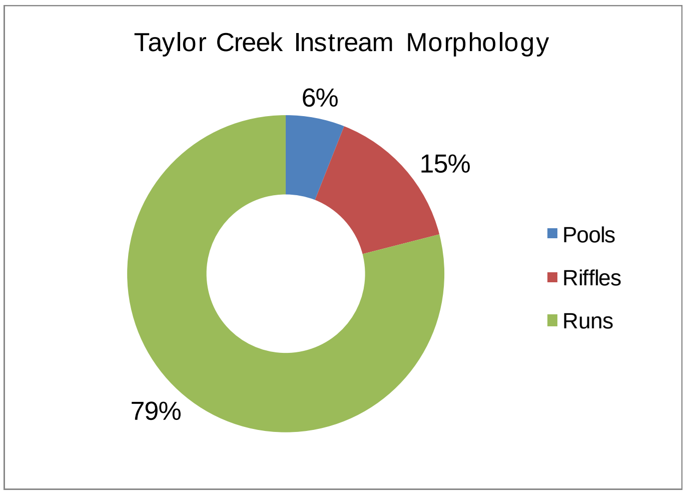

Figure 13. Instream morphology in Taylor Creek

Types of Instream Vegetation

Taylor Creek has very limited diversity of instream vegetation, as seen in Figure 14. The dominant vegetation type at eighty-six percent consisted of algae. A total of six percent of the vegetation community was recorded as submerged vegetation. Narrow emergent, robust emergent, broad emergent, free-floating and floating vegetation made up the remaining eight percent of the vegetation community.

Photo 2. High concentrations of algae on Taylor Creek

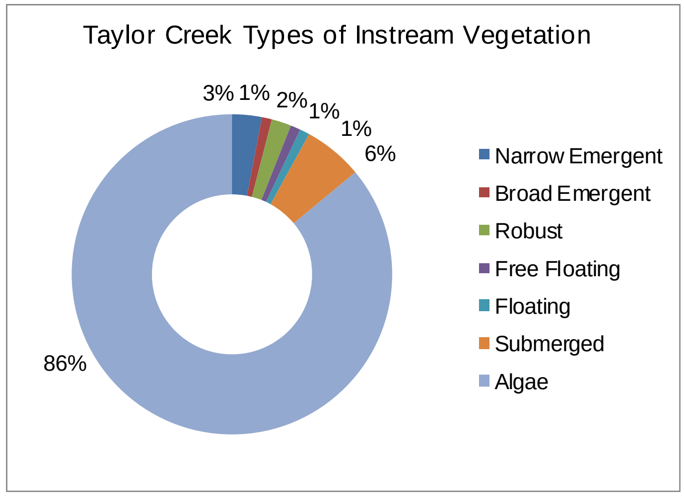

Figure 14. Instream vegetation types in Taylor Creek

Amount of Instream Vegetation

Instream vegetation is an important factor for a healthy stream ecosystem. Vegetation helps to remove contaminants from the water, contributes oxygen to the stream, and provides habitat for fish and wildlife. Too much vegetation can also be detrimental. Figure 15 demonstrates the frequency of instream vegetation in Taylor Creek. Taylor Creek has varying levels of instream vegetation for most of its length. Forty-eight percent of the creek had low levels of vegetation, and eleven percent had rare or no vegetation. Twenty percent had common levels of vegetation and 15 percent of the creek had extensive levels of vegetation. The remaining six percent of the creek had normal levels of vegetation.

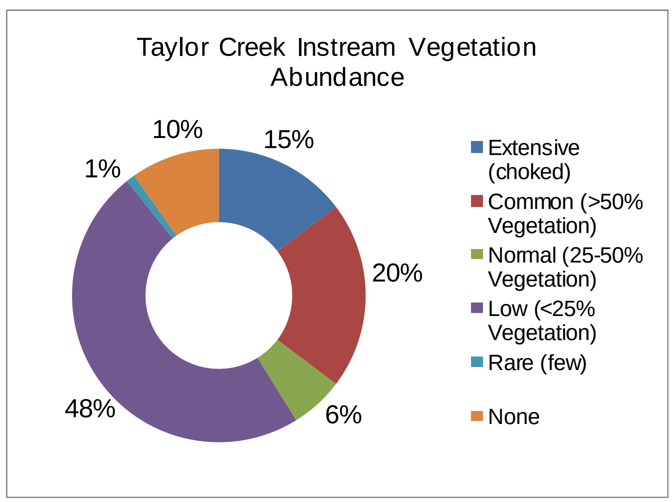

Figure 15. Vegetation abundance in Taylor Creek

Invasive Species

Invasive species can have major implications on streams and species diversity. Invasive species are one of the largest threats to ecosystems throughout Ontario and can outcompete native species, having negative effects on local wildlife, fish and plant populations. In Taylor Creek, invasive species were observed in 100 percent of the sections surveyed, and often more than one species was present in the same area (Figure 16). The invasive species observed in Taylor Creek include purple loosestrife (*Lythrum salicaria)*, yellow iris (*Iris pseudacorus*), flowering rush (*Butomus umbellatus*), Himalayan balsam (*Impatiens glandulifera*), garlic mustard (*Alliaria petiolata)*, and Japanese knotweed (*Fallopia japonica)*.

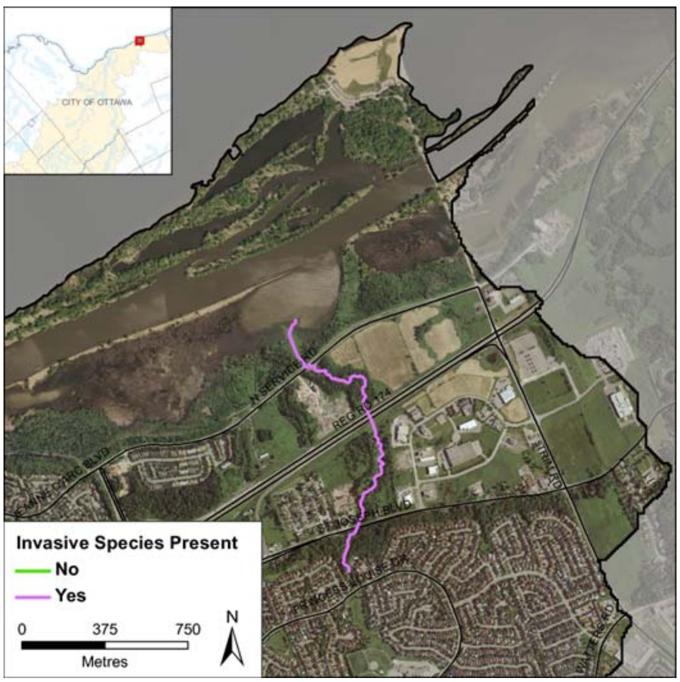

Figure 16. Invasive species along Taylor Creek

Photo 3. Himalayan balsam on Taylor Creek. This invasive species is especially prolific on Taylor Creek

Wildlife

The diversity of fish and wildlife populations can be an indicator of water quality and overall stream health. Table 5 is a summary of all wildlife observed during stream surveys along Taylor Creek.

Wildlife	Observed
Birds	pileated woodpecker, cardinal, redtail hawk, swallow, crow
Mammals	deer, beaver, raccoon, red squirrel, coyote tracks
Reptiles/Amphibians	leopard frog, green frog, bullfrog
Aquatic Insects	*corixidae sp*., water strider, *tabanidae sp.* , isopod
Other	moth, bumblebee, crayfish, mosquito, leech, snail, horsefly, cicada

Table 5. Wildlife observed along Taylor Creek

Pollution

Figure 17 demonstrates the incidence of pollution/ garbage in Taylor Creek. Pollution and garbage in the stream is assessed visually and noted for each section where it is observed. None of the sections on Taylor Creek were free from garbage. Floating garbage and garbage on the stream bottom were each recorded in 88 percent of the sections. In 2012 a stream garbage cleanup was held on this creek to remove garbage that had accumulated at the base of the waterfall at St. Joseph boulevard. A cleanup is recommended at this site on an annual basis to help reduce the amount of garbage that travels downstream.

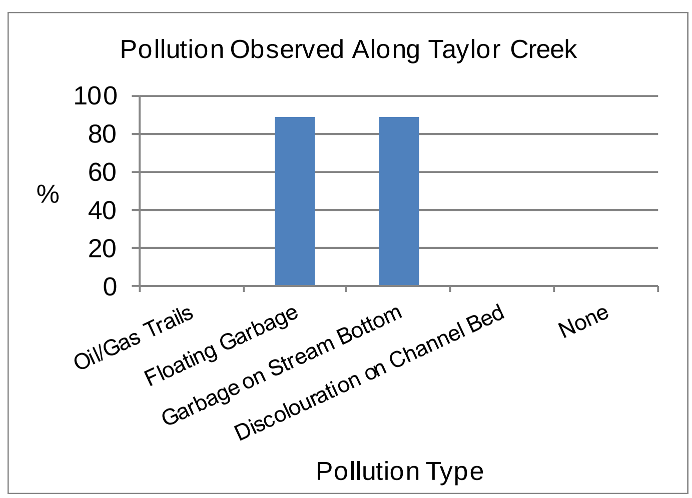

Figure 17. Pollution observed along Taylor Creek

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Figure 18 shows where two temperature dataloggers were deployed in Taylor Creek from April to late September 2012 to give a representative sample of how water temperature fluctuates. Unfortunately the temperature datalogger that was installed near St. Joseph boulevard was taken over the course of the season so temperature data was only available for the site close to Service road.

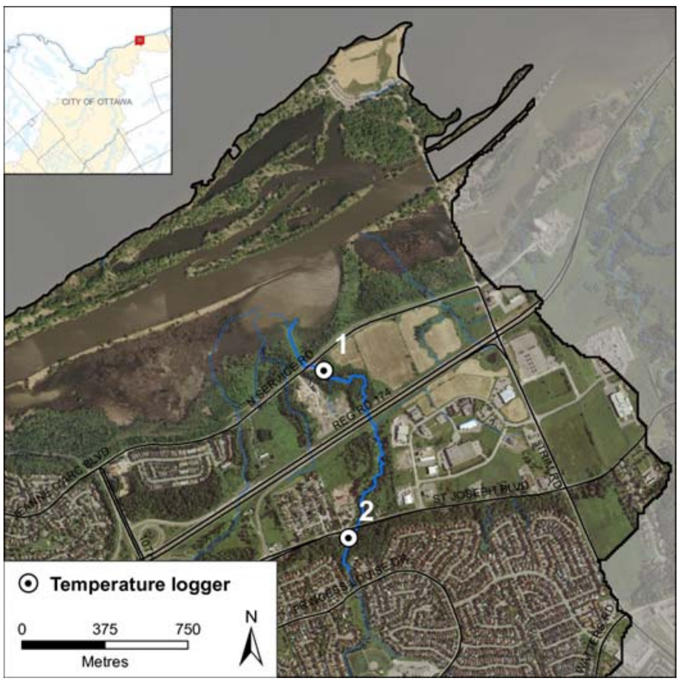

Figure 18. Temperature dataloggers along Taylor Creek

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 Stoneman and Jones method) to classify a watercourse as either warmwater, coolwater or cold water. Figure 19 shows the thermal classification of Taylor Creek. Analysis of the data collected indicates that Taylor Creek is a coolwater system.

Photo 4. Location where a temperature datalogger was deployed on Taylor Creek

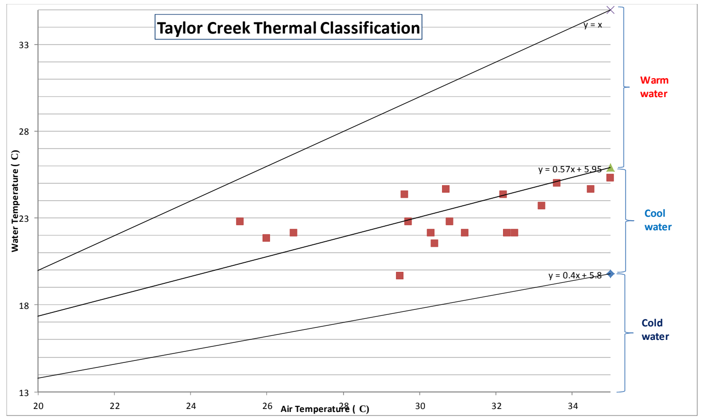

Figure 19. Thermal Classification for Taylor Creek

Fish Sampling

Fish sampling sites located along Taylor Creek are shown in Figure 20. Fish sampling was conducted by the Rideau Valley Conservation Authority and the City of Ottawa. The provincial fish codes shown on the map are listed (in Table 6) beside the common name of those fish species identified in Taylor Creek.

Figure 20. Fish species observed in Taylor Creek

Species Legend			
BaKil	banded killifish	**CrChu**	creek chub
BrMin	brassy minnow	**FhMin**	fathead minnow
BrSti	brook stickleback	**Pumpk**	pumpkinseed
CeMud	central mudminnow	**WhSuc**	white sucker
CoShi	common shiner		

Table 6. Fish species observed in Taylor Creek

Migratory Obstructions

It is important to know locations of migratory obstructions because these can prevent fish from accessing important spawning and rearing habitat. Migratory obstructions can be natural or manmade, and they can be permanent or seasonal. Figure 21 shows the locations of migratory obstructions in Taylor Creek. Most of the obstructions at the time of the survey were grade barriers that may only be barriers during low water conditions with the exception of the Princess Louise Falls.

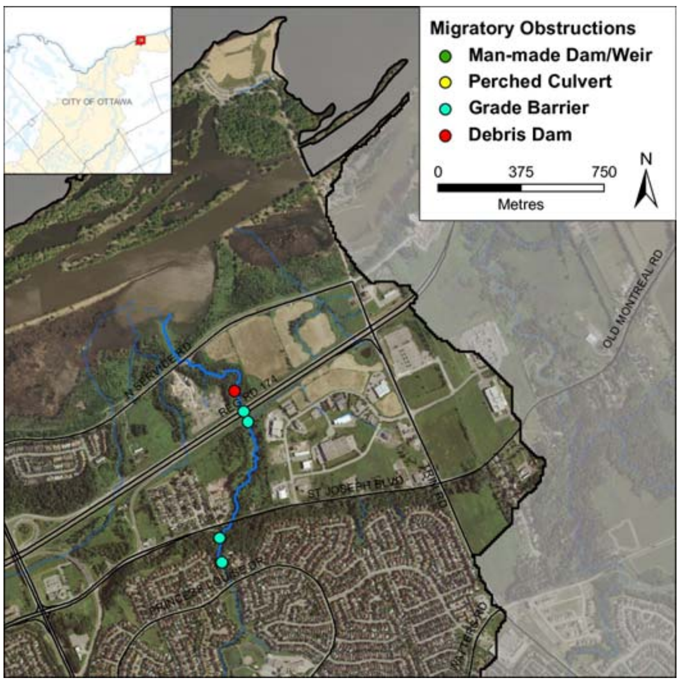

Figure 21. Migratory obstructions in Taylor Creek

Photo 5. A migratory obstruction on Taylor Creek

Water Chemistry

During the macrostream survey, a YSI probe is used to collect water chemistry, as follows:

- Dissolved Oxygen is a measure of the amount of oxygen dissolved in water. The lowest acceptable concentration of dissolved oxygen is 6.0 mg/L for early stages of warmwater fish and 9.5 mg/L for cold water fish (CCME, 1999). A saturation value of 90 percent or above is considered healthy
- Conductivity is the ability of a substance to transfer electricity. This measure is influenced by the presence of dissolved salts and other ions in the stream 2012
- pH is a measure of relative acidity or alkalinity, ranging from one (most acidic) to 14 (most alkaline/ basic), with seven occupying a neutral point

2012 data for these three parameters is summarized in Table 7.

Month	Range	DO (mg/L)	DO (%)	Conductivity (µs/cm)	pH
May	low	-	-	-	-
	high	-	-	-	-
June	low	-	-	-	-
	high	-	-	-	-
July	low	5.82	61.34	586	5.59
	high	14.89*	156.92	2000	8.33
August	low	10.06	105.59	822	7.9
	high	10.54	110.62	924	8.27

Table 7. 2012 Water chemistry collected along Taylor Creek
** This value was collected following a rain event*

Photo 6. A volunteer using a YSI to collect water chemistry

Stream Comparison Between 2007 and 2012

The following tables provide a comparison of Taylor Creek between the 2007 and 2012 survey years.

Anthropogenic Changes

Table 8 shows that between 2007 and 2012 anthropogenic alterations along Taylor Creek have increased. This change reflects development in the area although some of this change can be attributed to changes in the macro stream protocol that is used. In 2010 anthropogenic alterations were further defined in the protocol, which would have caused some land uses to shift categories.

Anthropogentic Alterations	2007 (%)	2012 (%)
None	33	18
"Natural" conditions with minor human alterations	27	24
"Altered" with considerable human impact but significant natural portions	40	29
"Highly altered" by humans with few natural portions	n/a	29

Table 8. Comparison of anthropogenic alterations along Taylor Creek between 2007 and 2012

Bank Stability Changes

According to observations bank stability has improved significantly since 2007. In 2007, 45 percent of the banks were considered stable. In 2012, 76 percent of the left bank and 83 percent of the right bank was stable. The improved bank stability on Taylor Creek is likely due to erosion control measures that were carried out in 2009 and 2010 as part of the Taylor Creek Erosion Works project by the City of Ottawa. The project saw erosion control measures implemented from St. Joseph Boulevard to North Service road in response to increased development pressures. Erosion control measures included the use of bioengineering techniques.

Bank Stability	2007	2012 Left Bank	2012 Right Bank
Stable	45	76	83
Unstable	55	24	17

Table 9. Comparison of bank stability between 2007 and 2012

Changes in Instream Vegetation

Table 10 shows that there has been a significant increase in instream vegetation in Taylor Creek since 2007. In 2007 the amount of low and rare levels of vegetation totaled 87 percent and there were no sections with extensive levels of vegetation. In 2012 the number for low and rare levels has dropped to 50 percent and extensive and common vegetaion levels were recorded for 36 percent of the stream. Some changes may be attributed to changes in the macro stream protocol, but the significant increase in extensive and common levels of vegetation (algae) suggest that there are high amounts of nutrients entering the system.

Instream Vegetation	2007 (%)	2012 (%)
Extensive	0	15
Common	n/a	21
Normal	13	6
Low	7	49
Rare	80	1
None	n/a	10

Table 10. Comparison of instream vegetation levels between 2007 and 2012

Changes in Pollution and Garbage

Overall the amount of pollution and garbage in Taylor Creek has increased since 2007. Table 11 shows that in 2007, 13 percent of the stream was free of garbage. In 2012 there was garbage recorded in 100 percent of the stream. The amount of floating garbage and garbage on the stream bottom has also increased since 2007.

Pollution/Garbage	2007	2012
None	13	0
Floating Garbage	20	88
Garbage on Stream Bottom	67	88
Oil or Gas Trails	0	0
Discoloration of Channel Bed	n/a	0

Table 11. Comparison of pollution/garbage levels between 2007 and 2012

Photo 7. A bicycle that was removed from the creek bottom during the 2012 Taylor Creek stream cleanup

Monitoring and Restoration

Past Monitoring and Restoration Projects on Taylor Creek

Table 12 below highlights the monitoring and restoration work that has been done on Taylor Creek to date by the Rideau Valley Conservation Authority and other agencies.

Accomplishment	Year	Description
City Stream Watch Monitoring	2007	15 macro stream surveys were completed by City Stream Watch staff and volunteers
Stream Garbage Cleanup (CSW)	2007	City Stream Watch staff joined forces with the Fallingbrook 4th Orleans Scouts to clean from St. Joseph boulevard to the falls
City of Ottawa Taylor Creek Erosion Works Project	2009 to 2010	City of Ottawa completed erosion control works providing stabilization where active erosion had occurred
City Stream Watch Monitoring	2012	17 macro stream surveys were completed by City Stream Watch staff and volunteers
City Stream Watch Fish Sampling	2012	Using an electrofisher, a site south of North Service road was sampled 3 times from May and a site north of North Service road was sampled once
City Stream Watch Thermal Classification	2012	Two temperature data loggers were deployed in Taylor Creek from April to September
Stream Garbage Cleanup (CSW)	2012	City Stream Watch staff and 10 volunteers spent 28 volunteer hours cleaning the creek from Princess Louise falls to just north of St. Joseph Boulevard.

Table 12. Monitoring and restoration projects on Taylor Creek

2012 Restoration Activities

Taylor Creek Stream Cleanup

This year City Stream Watch returned to clean up the area around Princess Louise Falls on Taylor Creek. In late July volunteers and CSW staff cleaned from north of St. Joseph Boulevard to the falls. This section of the stream becomes heavily polluted as debris of human origin accumulates at the base of the falls. Ten volunteers turned out and put in 28 hours of work to help ensure that Princess Louise Falls remains healthy and beautiful for everyone to enjoy. A cleanup is recommended on a annual basis at this site.

Photo 8. Volunteers at the Taylor Creek stream cleanup

Figure 22. Location of the 2012 Taylor Creek stream cleanup

Potential Riparian Restoration Opportunities

Figure 23 depicts the locations where City Stream Watch staff and volunteers made note of opportunities for future riparian restoration activities on Taylor Creek.

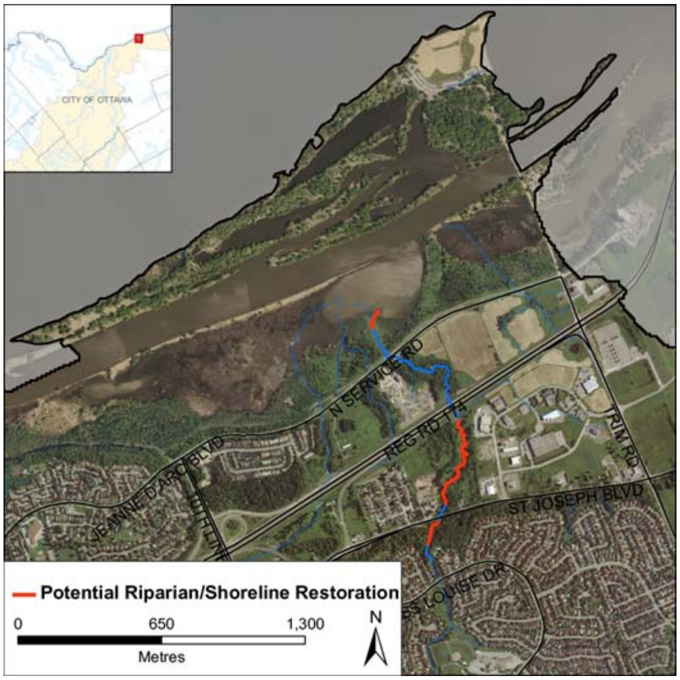

Figure 23. Taylor Creek riparian restoration opportunities

Potential Instream Restoration Opportunities

Figure 24 depicts the locations where various instream restoration activities can be implemented as a result of observations made during the stream survey assessments.

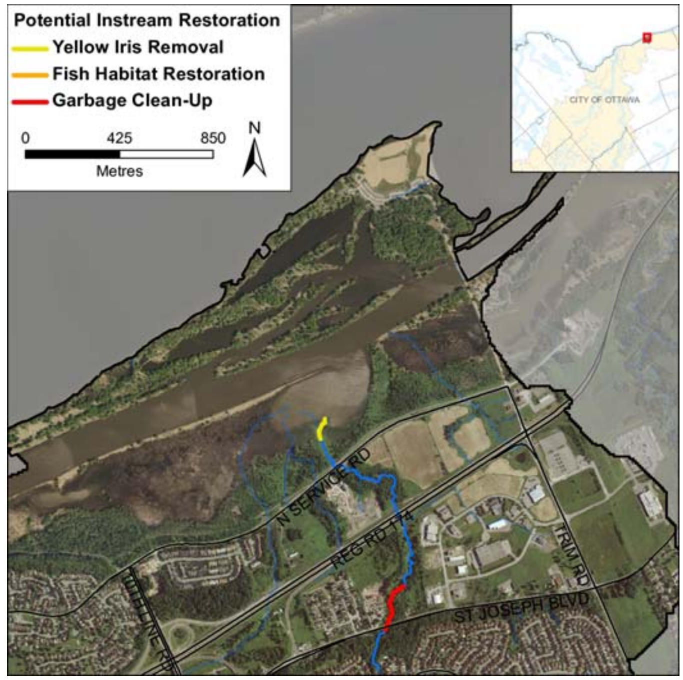

Figure 24. Potential instream restoration opportunities along Taylor Creek

Photo 9. A section of Taylor Creek where riparian planting was identified as a potential restoration opportunity.

Photo 10. Existing rip rap and wooden retaining wall installed by as part of the City of Ottawa Erosion Control Works on Taylor Creek.



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For more information of the overall 2012 City Stream Watch Program and the volunteer activities, please refer to the City Stream Watch Summary Report 2012.

To view the macrostream protocol used, please see the City Stream Watch website: http://www.rvca.cac/programs/streamwatch/index.html


Ottawa Flyfishers – Pêcheurs à la mouche d'Ottawa
Ottawa Stewardship Council – Conseil de l'intendance environnementale d'Ottawa
Rideau Valley Conservation Authority
Ottawa
Heron Park Community Association
National Defence – Défense nationale
La table ronde sur la Rivière Rideau River Roundtable
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