Ottawa East Tributary 2012

Summary Report

Watershed Features

Area	6 square kilometres 0.14% of the Rideau River watershed
Land Use	28% agriculture 33% urban 28% forest 9% rural land-use 1% unclassified
Surficial Geology	46% clay 32% diamicton 17% bedrock 5% sand
Watercourse Length and Type	*Total length:* *Watercourse type*: 94% natural 6% channelized *Flow type:* 81% permanent 19% intermittent
Invasive Species	There were four invasive species observed by CSW staff in 2012: Manitoba maple, purple loosestrife, yellow iris, and garlic mustard
Fish Community	3 fish species were captured in Ottawa East Tributary

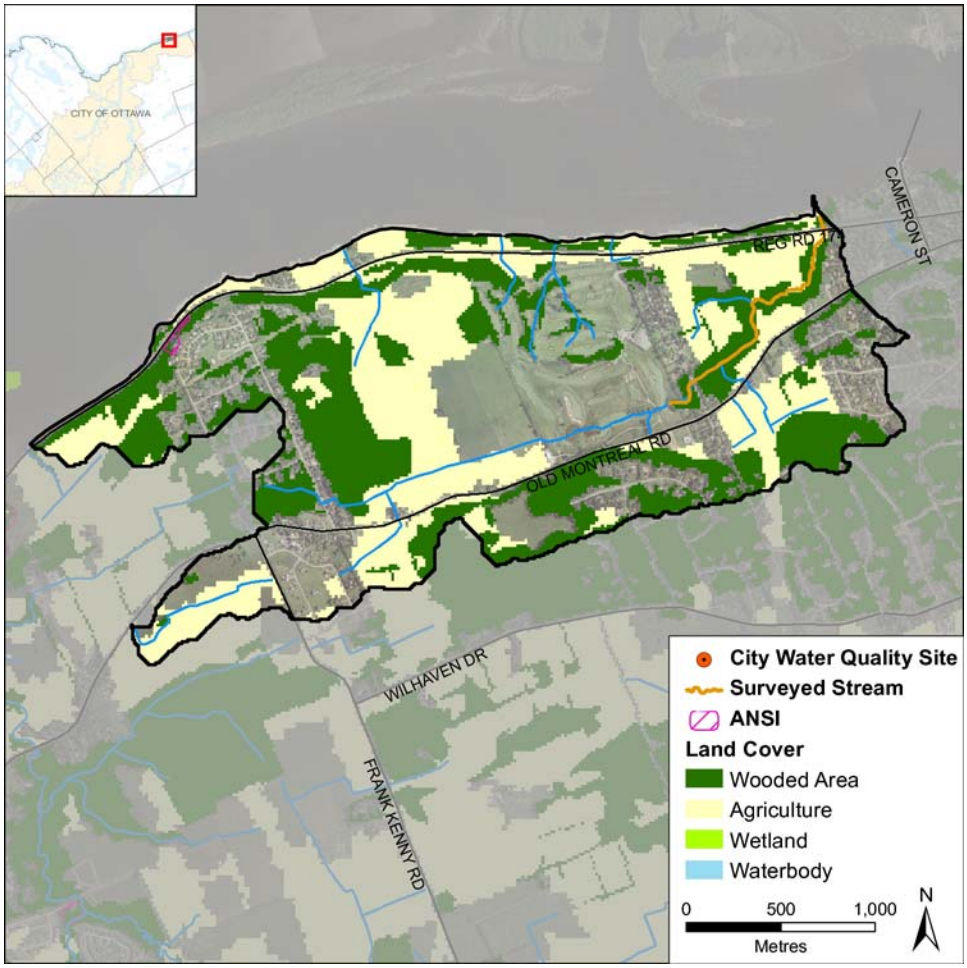

Figure 1. Land cover in the Ottawa East Tributary catchment

Vegetation Cover

Types	Hectares	% of Cover
Wetlands	0	0
Wooded Areas	170	100
Hedgerow	1	0
Plantation	0	0
TOTAL COVER		**100%**

Woodlot Cover

Size Category	Number of Woodlots	% of Woodlots
<1 ha	43	7.4
1-9 ha	1	20
10-30 ha	20	32.5
>30 ha	4	40.1

Wetland Cover

0% of the watershed is wetland

Wetlands make up 0% of the vegetation cover

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

Ottawa East Tributary is a first order stream that outlets to the Ottawa River in the far east end of the City of Ottawa just west of the village of Cumberland. Approximately 1.6 kilometers in length, the creek originates west of the Camelot Golf and Country Club off of Quigley Hill Road and empties in to the Ottawa River west of the Cumberland/Masson Ferry launch. The upper reaches of Ottawa East Tributary are piped through the Camelot Golf and Country Club. Along the south end of the golf course, water from the creek comes to surface in the form of constructed pools and ponds. At the south east edge of the golf course the creek begins to flow freely as it approaches Quigley Hill Road. After crossing Quigley Hill Road, Ottawa East Tributary runs north of Montreal Road and reaches the Ottawa River west of Cumberland Village.

In 2012, Ottawa East Tributary was surveyed for the first time by the City Stream Watch Program. As part of the City Stream Watch monitoring activities, 16 sections along Ottawa East Tributary were surveyed by staff and volunteers in 2012. The following is a summary of the 16 macro stream assessments carried out on Ottawa East Tributary.

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 Ottawa East Tributary

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 Ottawa East Tributary for the left and right banks separately. Results show that 92 percent of both the left and right banks of Ottawa East Tributary have a buffer width greater than 30 meters.

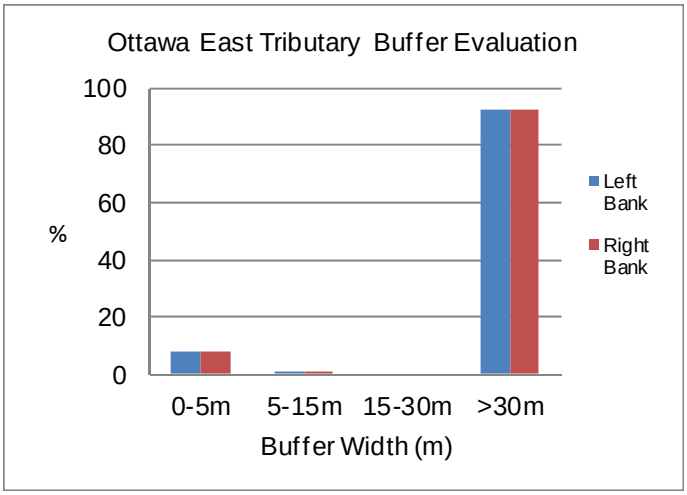

Figure 2. Vegetated buffer width along Ottawa East Tributary

Land Use beside Ottawa East Tributary

Figure 3 demonstrates the six different land uses identified along the banks adjacent to Ottawa East Tributary. 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 88 percent of the stream, characterized by forest, scrubland and meadow. The remaining land use consisted of agriculture and infrastructure.

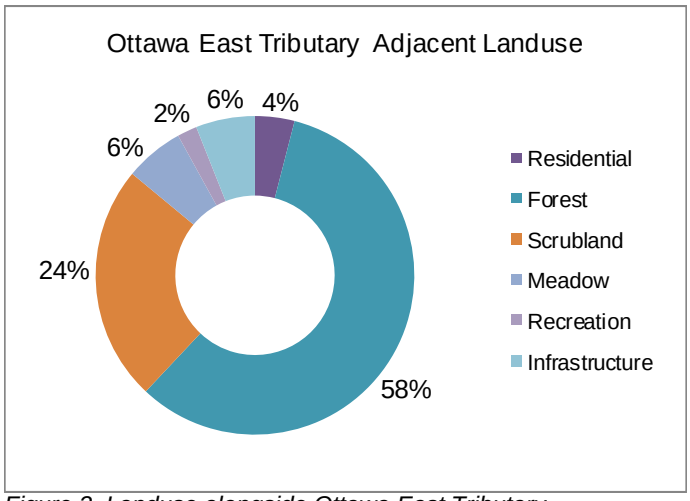

Figure 3. Landuse alongside Ottawa East Tributary

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. Eighty percent of the both the left and right bank was considered stable along Ottawa East Tributary. Figure 4 shows the observed erosion locations along Ottawa East Tributary and demonstrates that there were varying levels of erosion with the most evidence of erosion just east of Quigley Hill road.

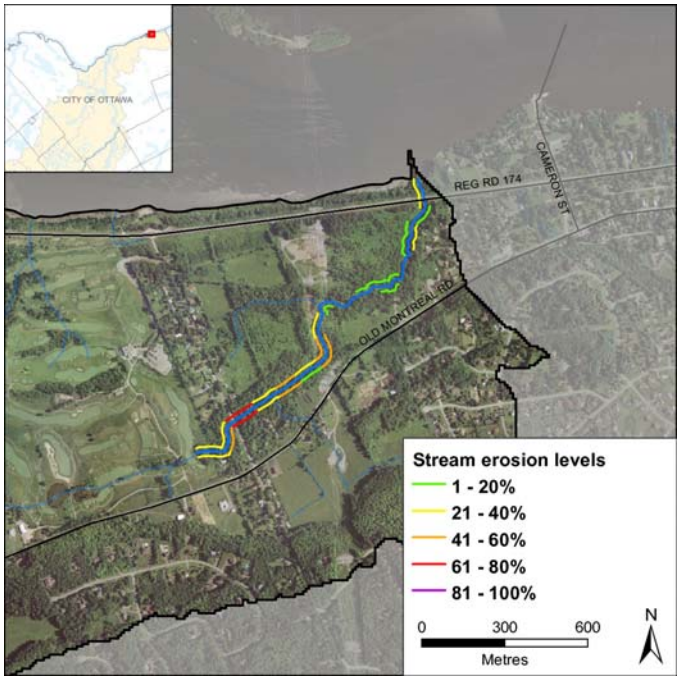

Figure 4. Erosion along Ottawa East Tributary

Streambank Undercutting

Undercut banks are a normal and natural part of stream function and can provide excellent refuge areas for fish. Figure 5 shows that Ottawa East Tributary has very few locations with identified undercut banks.

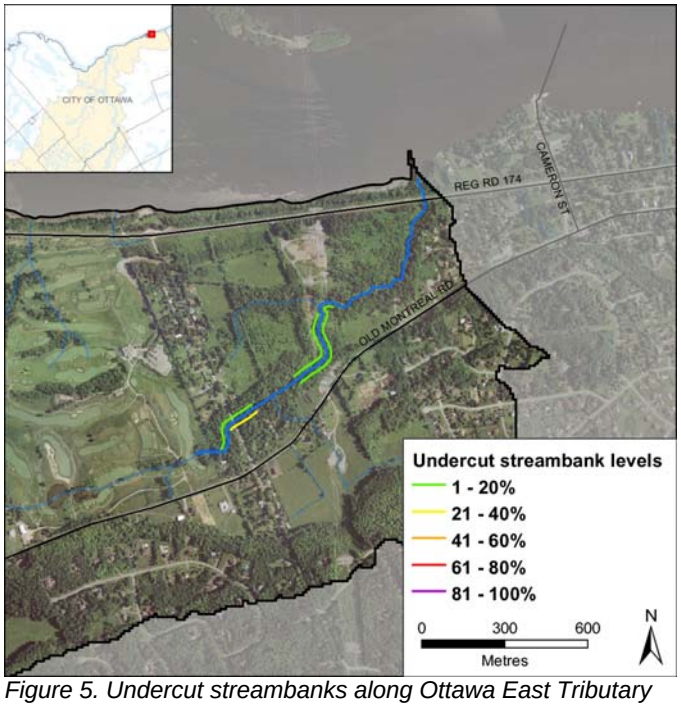

Figure 5. Undercut streambanks along Ottawa East Tributary

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 stream shading locations along Ottawa East Tributary.

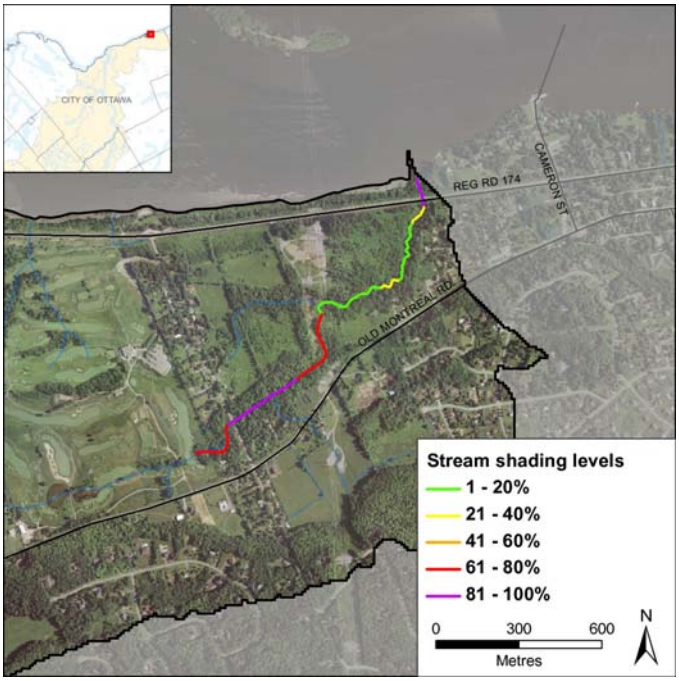

Figure 6. Stream shading along Ottawa East Tributary

Human Alterations

Figure 7 shows that 69 percent of Ottawa East Tributary remains “unaltered.” Sections considered “natural” with some human changes account for 19 percent of sections. "Altered" sections accounted for six percent of the stream, with the remaining six percent of sections sampled being considered “highly altered” (e.g., include road crossings, shoreline/instream modifications and little or no buffer).

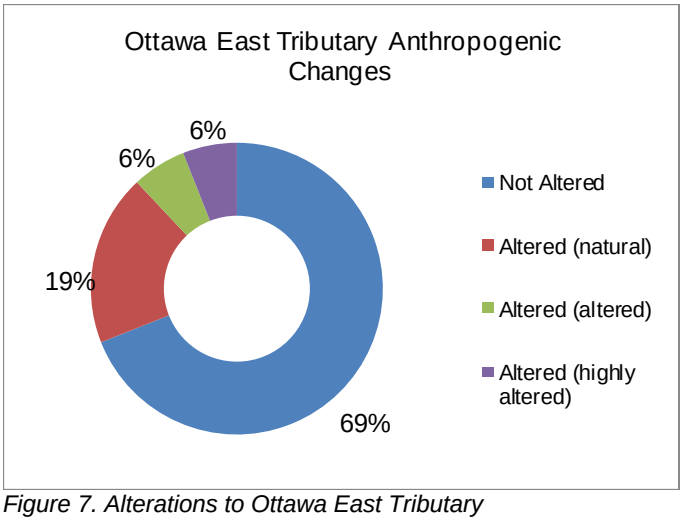

Figure 7. Alterations to Ottawa East Tributary

Overhanging Trees and Branches

Figure 8 shows that the majority of Ottawa East Tributary 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.

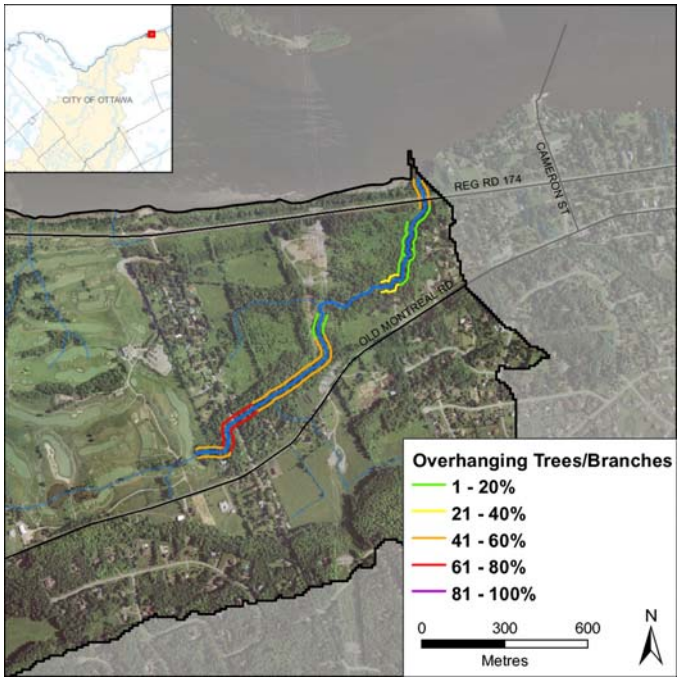

Figure 8. Overhanging trees and branches

Photo 1. Overhanging trees and branches providing shade on Ottawa East Tributary

Instream Woody Debris

Figure 9 shows that the majority of Ottawa East Tributary has varying 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.

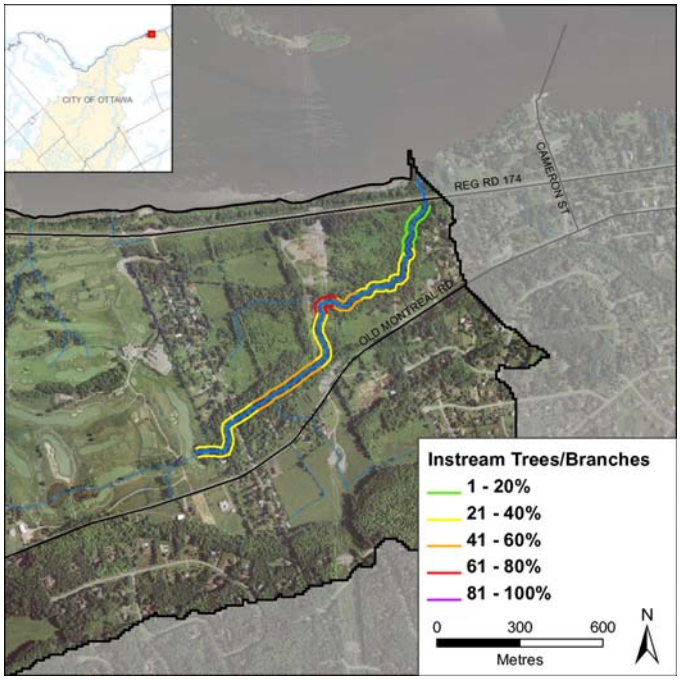

Figure 9. Instream trees and branches

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. Fifty-six percent of Ottawa East Tributary was considered heterogeneous as shown in Figure 10.

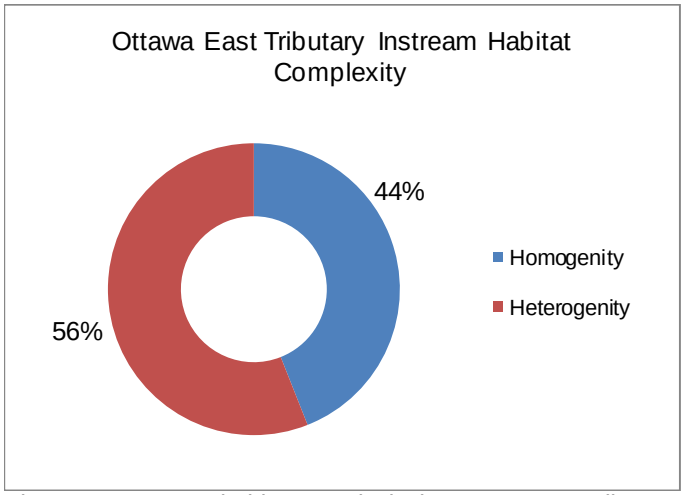

Figure 10. Instream habitat complexity in Ottawa East Tributary

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 Ottawa East Tributary is very diverse.

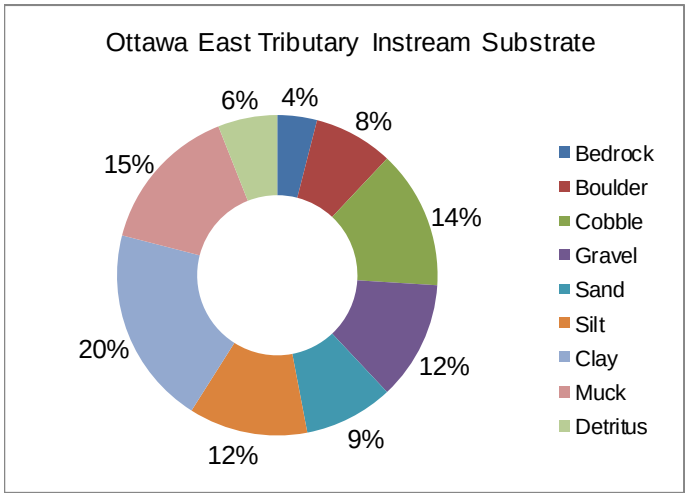

Figure 11. Instream substrate in Ottawa East Tributary

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 Ottawa East Tributary.

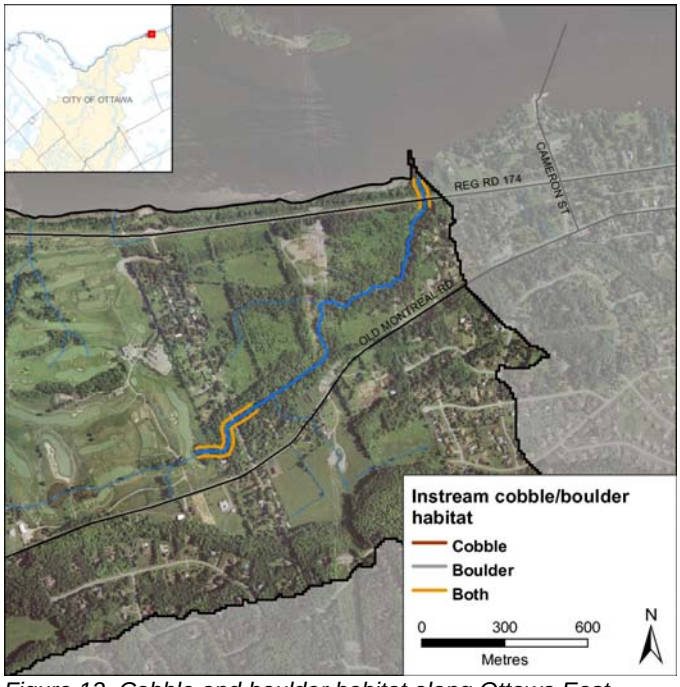

Figure 12. Cobble and boulder habitat along Ottawa East Tributary

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 Ottawa East Tributary has somewhat variable instream morphology; consisting of runs at 71 percent, riffles at 21 percent and pools at eight percent.

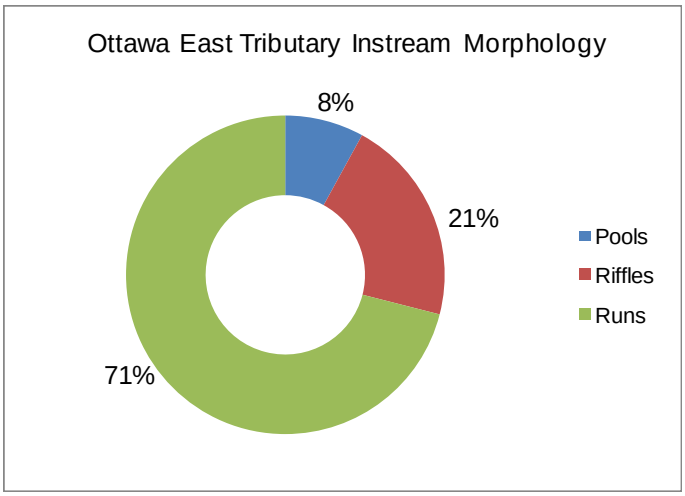

Figure 13. Instream morphology in Ottawa East Tributary

Types of Instream Vegetation

The majority of Ottawa East Tributary has limited diversity of instream vegetation, as seen in Figure 14. The dominant vegetation type at fifty-nine percent consisted of algae. A total of 21 percent of the vegetation community was recorded as narrow-leaved emergent vegetation. Submerged vegetation was recorded at 11 percent. Broad leaved emergent, robust emergent, free-floating and floating vegetation made up the remaining nine percent of the vegetation community.

Photo 2. Extensive levels of algae on a section upstream of a beaver dam on Ottawa East Tributary

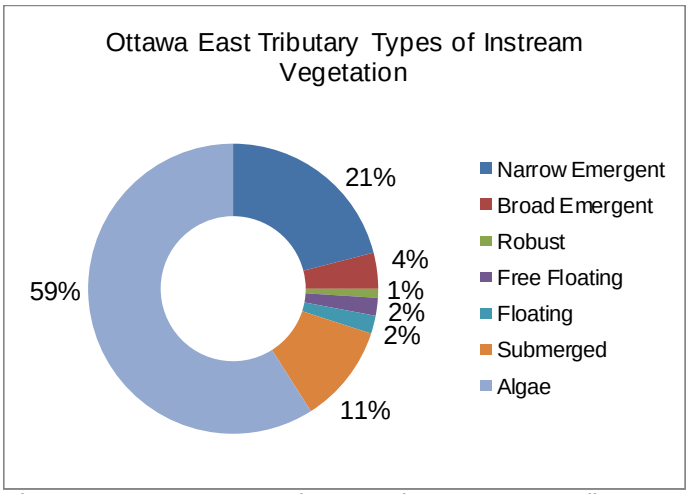

Figure 14. Instream vegetation types in Ottawa East Tributary

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 Ottawa East Tributary. Ottawa East Tributary has low levels of instream vegetation for most of its length. Fifty-eight percent of the creek had low vegetation levels. Sixteen percent had normal levels of vegetation, three percent had common levels and the remaining 23 percent had extensive levels.

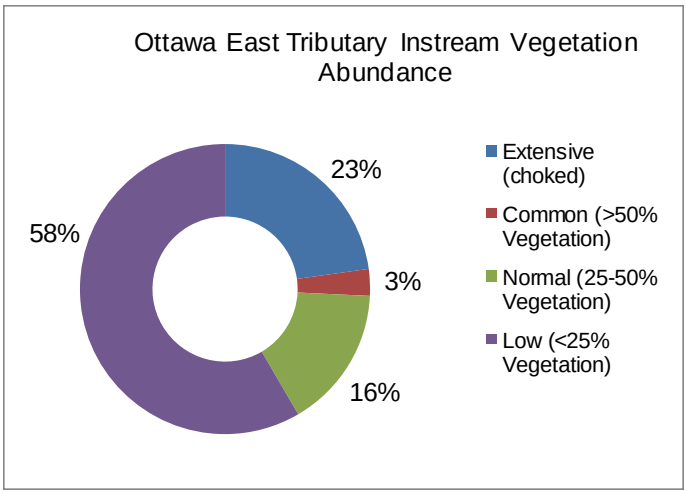

Figure 15. Vegetation abundance in Ottawa East Tributary

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. On Ottawa East Tributary, invasive species were observed in 88 percent of the sections surveyed, and often more than one species was present in the same area (Figure 16). The species observed in Ottawa East Tributary include Manitoba maple (*Acer negundo)*, purple loosestrife (*Lythrum salicaria)*, yellow iris (*Iris pseudacorus*), and garlic mustard (*Alliaria petiolata)*.

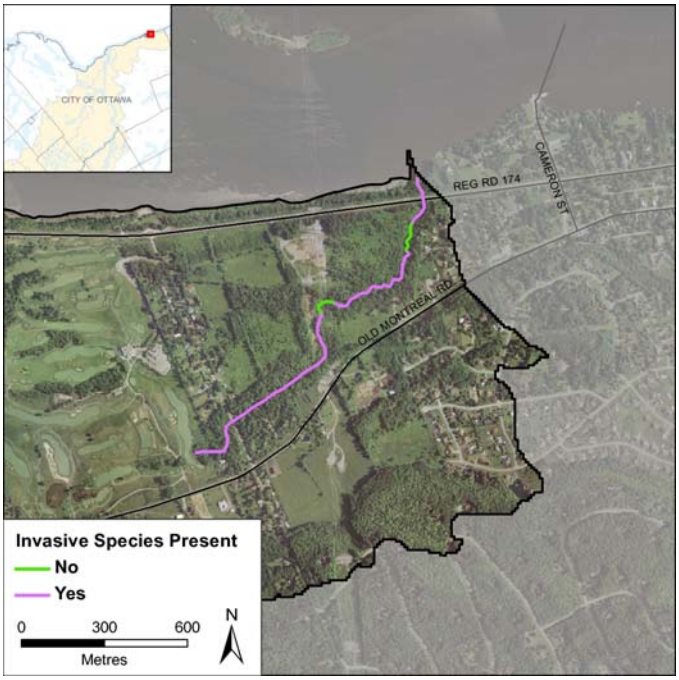

Figure 16. Invasive species along Ottawa East Tributary

Photo 3. Garlic mustard, and invasive species found on Ottawa East Tributary

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.

Wildlife	Observed
Birds	green heron, chickadee, white throat sparrow, robin, blue jay, woodpecker, catbird, turkey vulture, redtail hawk, cowbird
Mammals	deer, raccoon, beaver, red squirrel
Reptiles/Amphibians	green frog, tadpole, american toad
Aquatic Insects	water strider, water boatman
Other	monarch, spiketail, cabbage white, damselfly, jewelwing, cicada, deerfly, bumblebee, snail, blackfly, mosquito, caterpillar

Table 5. Wildlife observed along Ottawa East Tributary

Pollution

Figure 17 demonstrates the incidence of pollution/ garbage in Ottawa East Tributary. Pollution and garbage in the stream is assessed visually and noted for each section where it is observed. Forty-four percent of the sections did not have any observable garbage. Fifty percent had floating garbage, and 56 percent had garbage on the stream bottom.

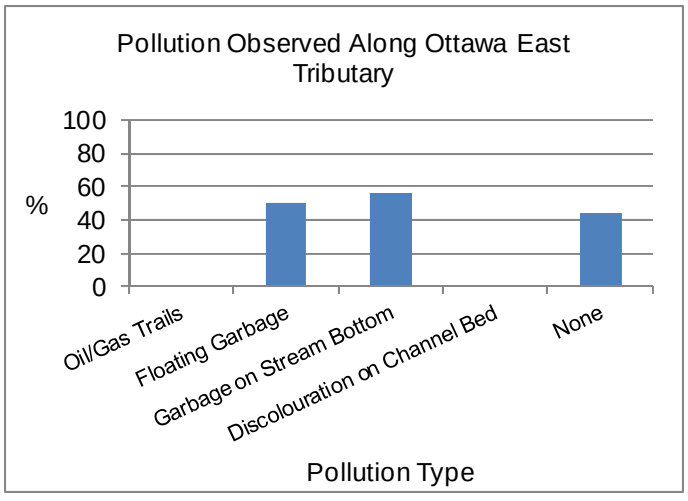

Figure 17. Pollution observed along Ottawa East Tributary

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 Ottawa East Tributary from April to late September 2012 to give a representative sample of how water temperature fluctuates. Unfortunately no data was available from temperature logger #2. Therefore, temperature data was evaluated using only data retrieved from temperature logger #1.

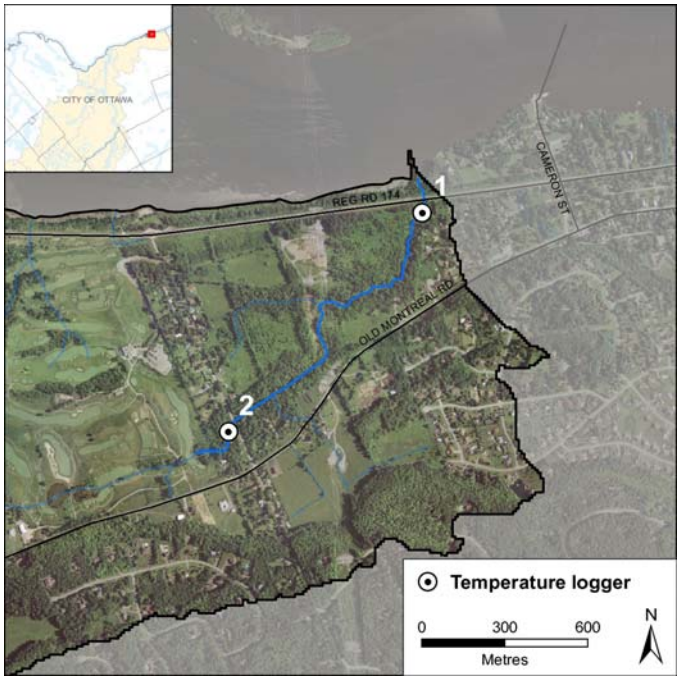

Figure 18. Temperature dataloggers along Ottawa East Tributary

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 Ottawa East Tributary. Analysis of the data collected indicates that Ottawa East Tributary is a coolwater system.

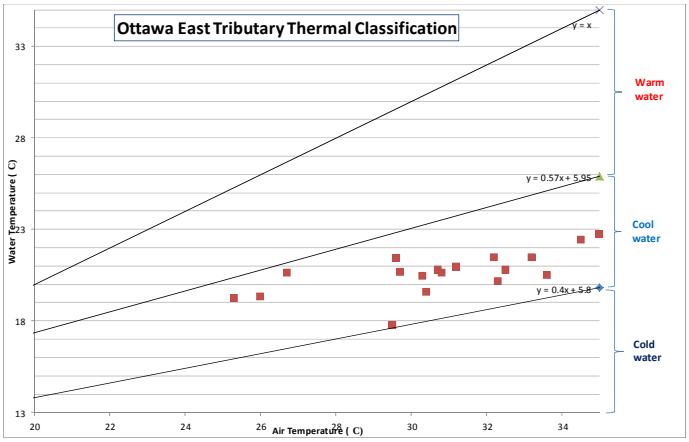

Figure 19. Thermal Classification for Ottawa East Tributary

Fish Sampling

Fish sampling sites located along Ottawa East Tributary are shown in Figure 20, fish sampling occurred between May and July 2012. The provincial fish codes shown on the map are listed (in Table 6) beside the common name of those fish species identified in Ottawa East Tributary.

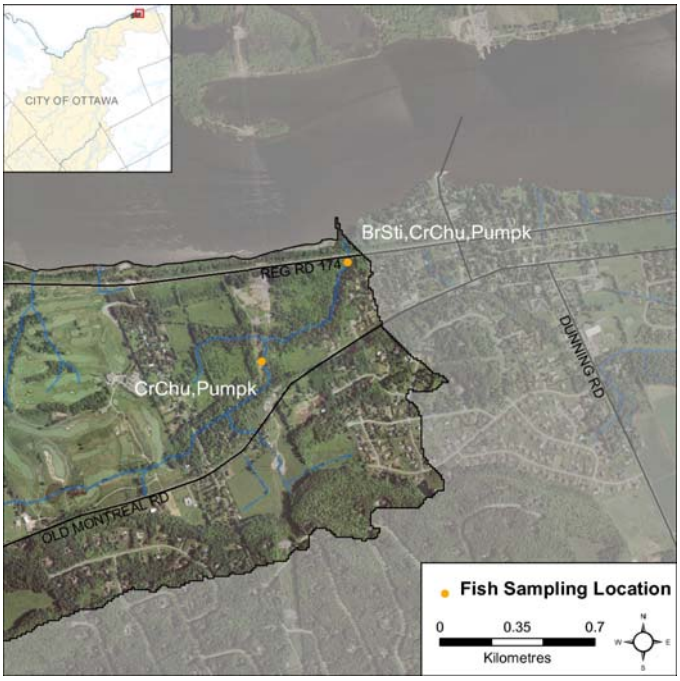

Figure 20. Fish species observed in Ottawa East Tributary

Species Legend	
BrSti	brook stickleback
CrChu	creek chub
Pumpk	pumpkinseed

Table 6. Fish species observed in Ottawa East Tributary

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 and types of migratory obstructions on Ottawa East Tributary.

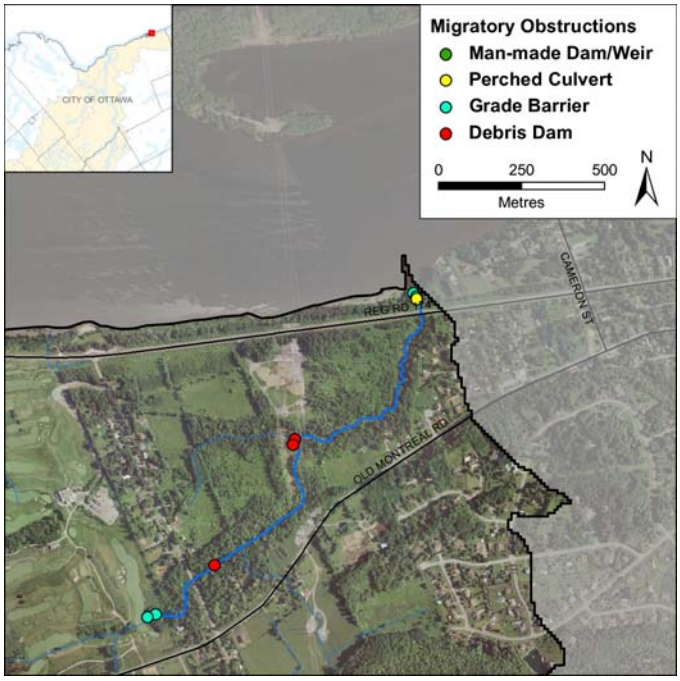

Figure 21. Migratory obstructions in Ottawa East Tributary

Photo 4. A grade barrier near the mouth of Ottawa East Tributary

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	4.28	47.18	302	7.3
	high	12.87	141.87	854	8.49
August	low	-	-	-	-
	high	-	-	-	-

Table 7. 2012 Water chemistry collected along Ottawa East Tributary

**Data is only available for the month of July as the system was sampled only within that time frame*

Monitoring and Restoration

Past Monitoring and Restoration Projects on Ottawa East Tributary

Table 15 below highlights the monitoring and restoration work that has been done on Ottawa East Tributary to date by the Rideau Valley Conservation Authority. This was the first year that Ottawa East Tributary was monitored by the City Stream Watch Program so all activities listed are from 2012.

Accomplishment	Year	Description
City Stream Watch Monitoring	2012	16 macro stream surveys were completed by City Stream Watch staff and volunteers
City Stream Watch Fish Sampling	2012	One site South of highway 174 was sampled 4 times from May until July
City Stream Watch Thermal Classification	2012	Two temperature data loggers were deployed in Ottawa East Tributary from April to September

Table 8. Monitoring and restoration projects

Potential Riparian Restoration Opportunities

Figure 22 depicts the locations where City Stream Watch staff and volunteers made note of opportunities for future riparian restoration activities.

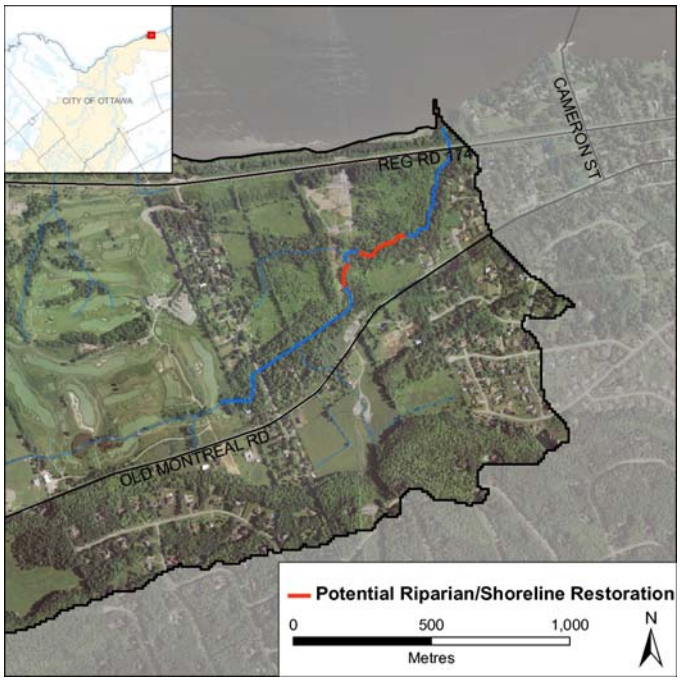

Figure 22. Ottawa East Tributary riparian restoration opportunities

Potential Instream Restoration Opportunities

Figure 23 depicts the locations where various instream restoration activities can be implemented as a result of observations made during the stream survey assessments.

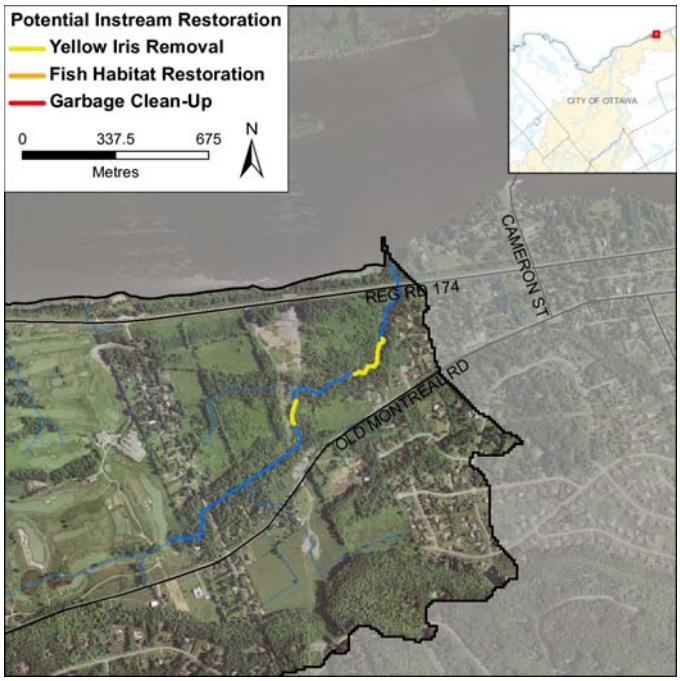

Figure 23. Potential instream restoration opportunities along Ottawa East Tributary



References

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7. Stoneman, C.L. and M.L. Jones. 1996. *A Simple Method to Evaluate the Thermal Stability of Trout Streams.*

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