Hunt Club Creek 2013 Summary Report

Watershed Features	
Area	2.93 square kilometres 0.07% of the Rideau Valley watershed
Land Use	9% agriculture 76% urban 15% forest 0% rural land-use 0% wetlands 0% unclassified
Surficial Geology	25% gravel 5% diamicton 1% organic deposits 2% bedrock 67% sand
Watercourse Length and Type	*Watercourse Type:* 28% natural 72% channelized *Flow Type:* 100% permanent 0% intermittent
Invasive Species	There were eight invasive species observed by CSW staff in 2013: purple loosestrife, yellow iris, common buckthorn, dog-strangling vine, Manitoba maple
Fish Community	One fish species has been captured in Hunt Club Creek. No game fish species present

Wetland Cover
0% of the watershed is wetland
Wetlands make up 0% of the vegetation cover

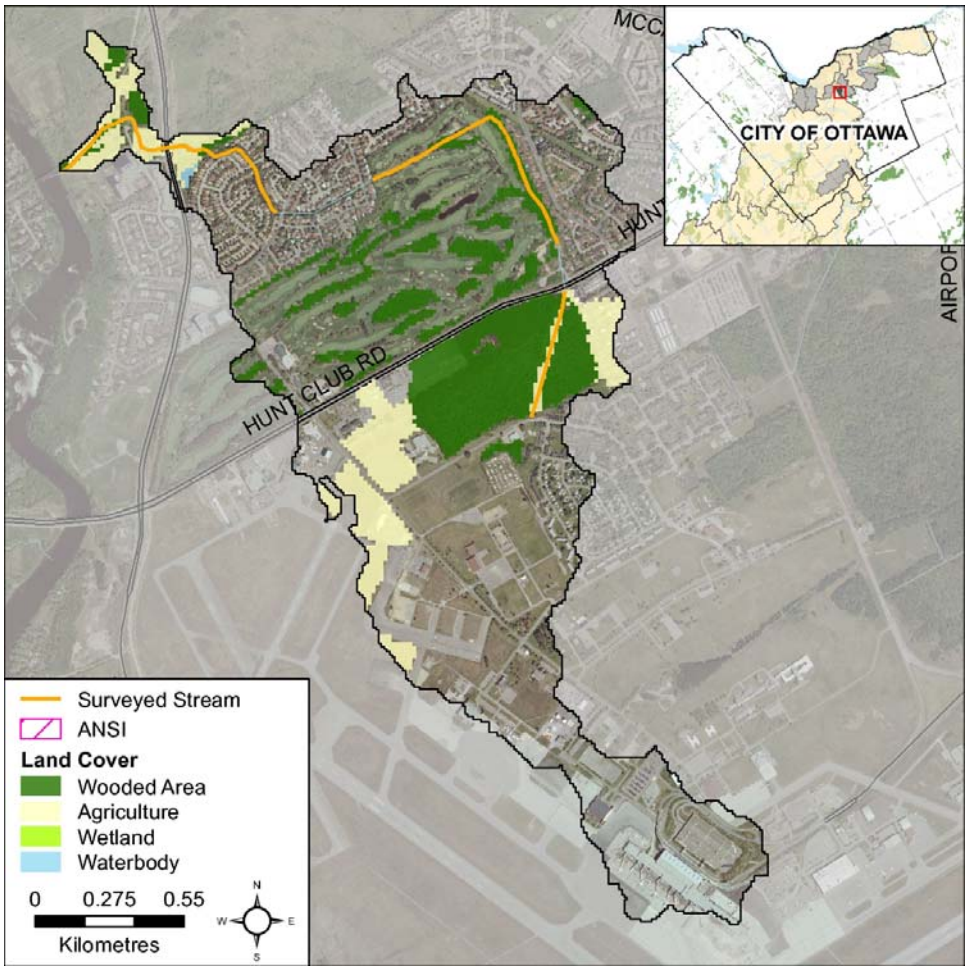


Figure 1 Land cover in the Hunt Club Creek catchment

Vegetation Cover		
Types	**Hectares**	**% of Cover**
Wetlands	0	0
Wooded Areas	32	23
Hedgerow	2	1
Plantation	104	76
TOTAL COVER		**100%**

Woodlot Cover		
Size Category	**Number of Woodlots**	**% of Woodlot Cover**
<1 ha	38	22
1-9 ha	7	53
10-30 ha	1	25
>30 ha	0	0
TOTAL		**100%**

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 2013 City Stream Watch collaborative.

Introduction

Hunt Club Creek is a tributary of the Rideau River that outlets North of Hunt Club Road. Sections of this urban creek have been piped underground, but the above-ground sections of Hunt Club Creek are approximately 2.8 kilometers long. The upper reaches of the creek are piped through land owned by the Ottawa International Airport, emerging above ground at De Niverville Private. From there the creek is channelized through residential areas and the Ottawa Hunt and Golf Club. A stormwater pond discharges into the creek just before it crosses Riverside Drive. It reaches the Rideau River West of Riverside Drive.

In 2013, Hunt Club Creek was monitored for the first time by the City Stream Watch Program. As part of the City Stream Watch monitoring activities, 28 sections along Hunt Club Creek were surveyed by staff and volunteers. The following is a summary of the 28 stream assessments carried out on Hunt Club Creek.

Hunt Club Creek Overbank Zone

Riparian Buffer Width Evaluation

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 of the left and right banks separately. Hunt Club Creek had a buffer of greater than 30 meters along 19 percent of the right bank and 26 percent along the left bank.

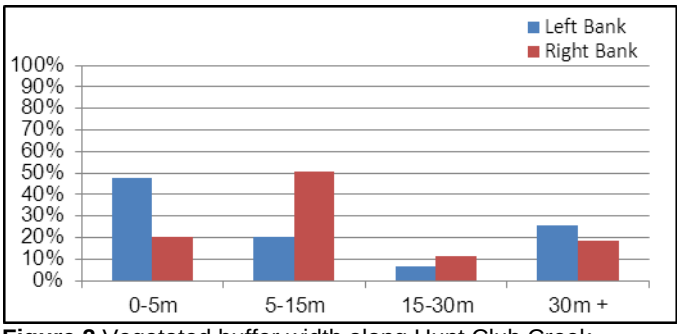


Figure 2 Vegetated buffer width along Hunt Club Creek

Vegetated buffer along Hunt Club Creek

Adjacent Land Use

The RVCA's Stream Characterization Program identifies six different land uses beside Hunt Club Creek (Figure 3). Surrounding land use is considered from the beginning to end of the survey section (100m) and up to 100m 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 49 percent of the stream, characterized by forest, scrubland and meadow. Twenty-four percent of the land use was recreational and the remaining land use consisted of residential and infrastructure.

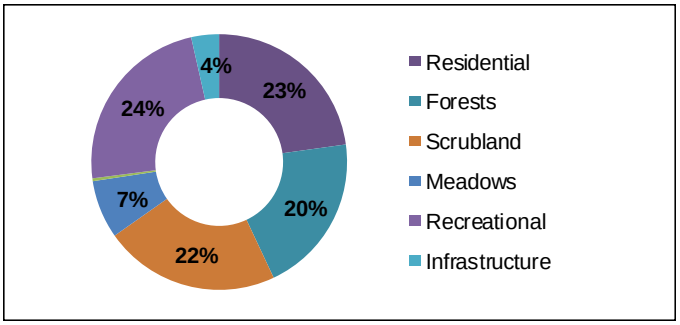


Figure 3 Land use along Hunt Club Creek

A boardwalk crossing Hunt Club Creek West of Riverside Drive

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. 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. Figure 4 shows that there were low levels of bank erosion observed on the left and right bank along most of Hunt Club Creek. Only one section of the creek showed high amounts of erosion, this section was located in the golf course.

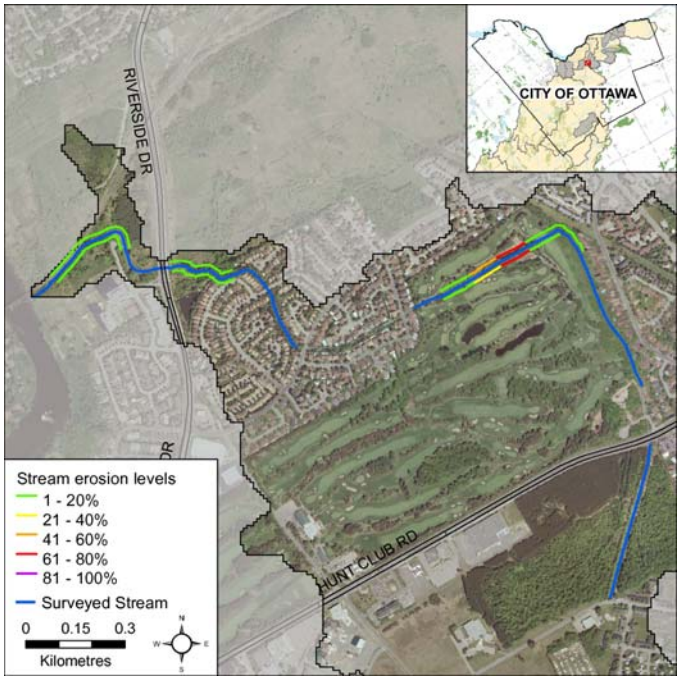


Figure 4 Erosion along Hunt Club Creek

Undercut Stream Banks

Undercut banks are a normal and natural part of stream function and can provide excellent refuge areas for fish. Figure 5 shows that Hunt Club Creek had low amounts of undercut banks along its length. The low levels may be due fact that the banks are quite stable, well vegetated and composed large amounts of bedrock and boulders. In addition, much of Hunt Club Creek is channelized with purposefully angled slopes that are less prone to undercutting.

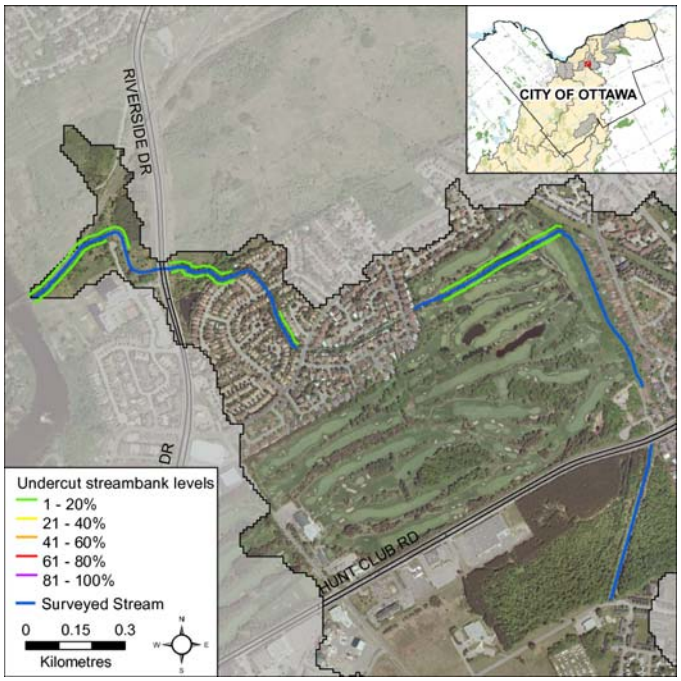


Figure 5 Undercut stream banks along Hunt Club Creek

Low levels of bank undercutting typical along Hunt Club 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 stream shading locations along Hunt Club Creek.

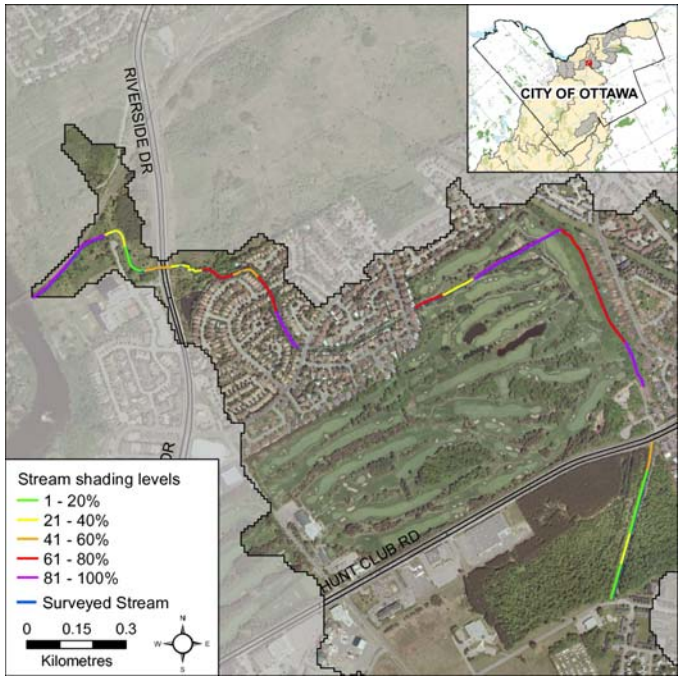


Figure 6 Stream shading along Hunt Club Creek

Instream Woody Debris

Figure 7 shows that the majority of Hunt Club Creek had 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.

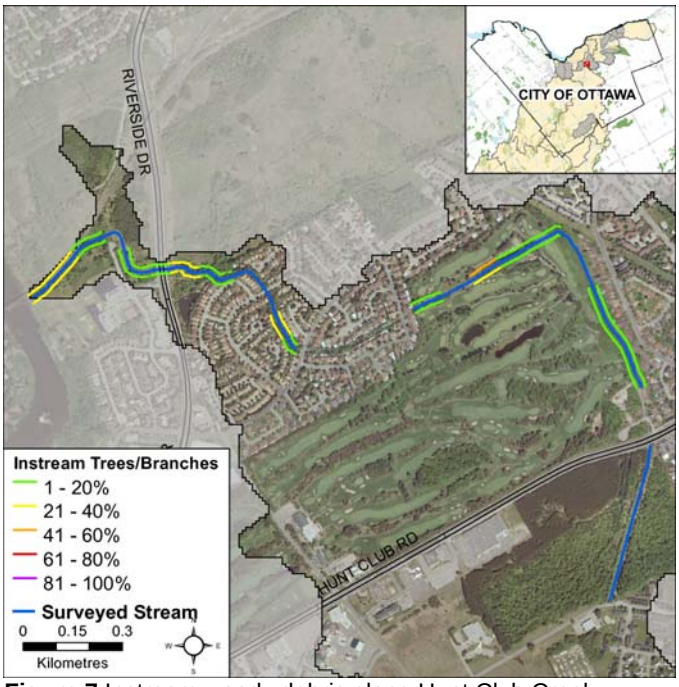


Figure 7 Instream woody debris along Hunt Club Creek

Stream shade along Hunt Club Creek

Instream woody debris on Hunt Club Creek

Overhanging Trees and Branches

Figure 8 shows that the majority of Hunt Club Creek had moderate to high levels of overhanging branches and trees. Overhanging branches and trees provide a food source, nutrients and shade which helps to moderate instream water temperatures.

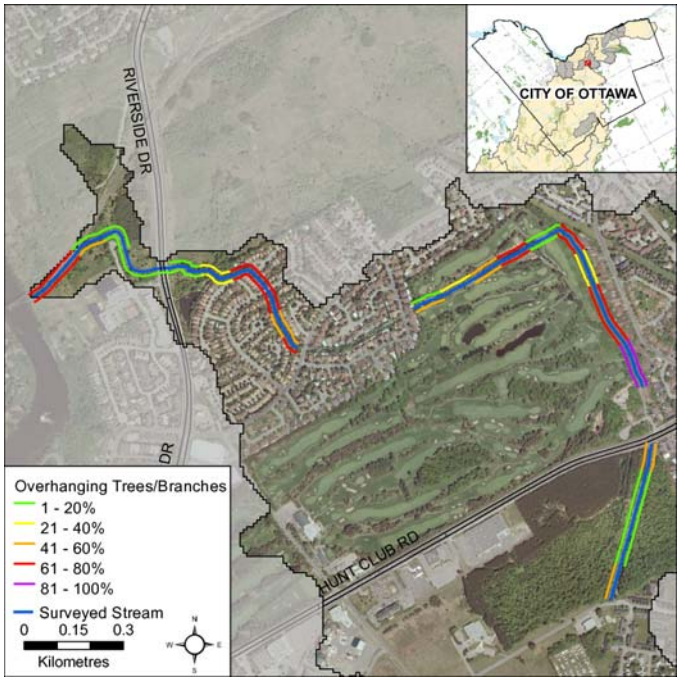


Figure 8 Overhanging trees and branches

Overhanging trees and branches on Hunt Club Creek

Anthropogenic Alterations

Figure 9 shows that there are no sections of Hunt Club Creek that remain “unaltered” or "natural". Sections considered "altered" account for 19 percent of the stream, and 81 percent of the sections sampled were considered “highly altered” due in part to the channelization of the creek. Areas classified as altered included existing road crossings, shoreline/instream modifications such as channelization and areas with little or no buffer.

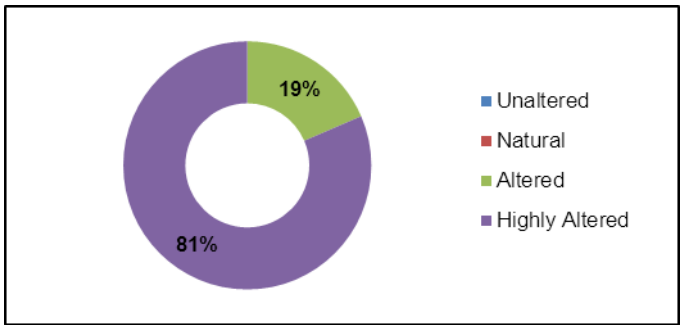
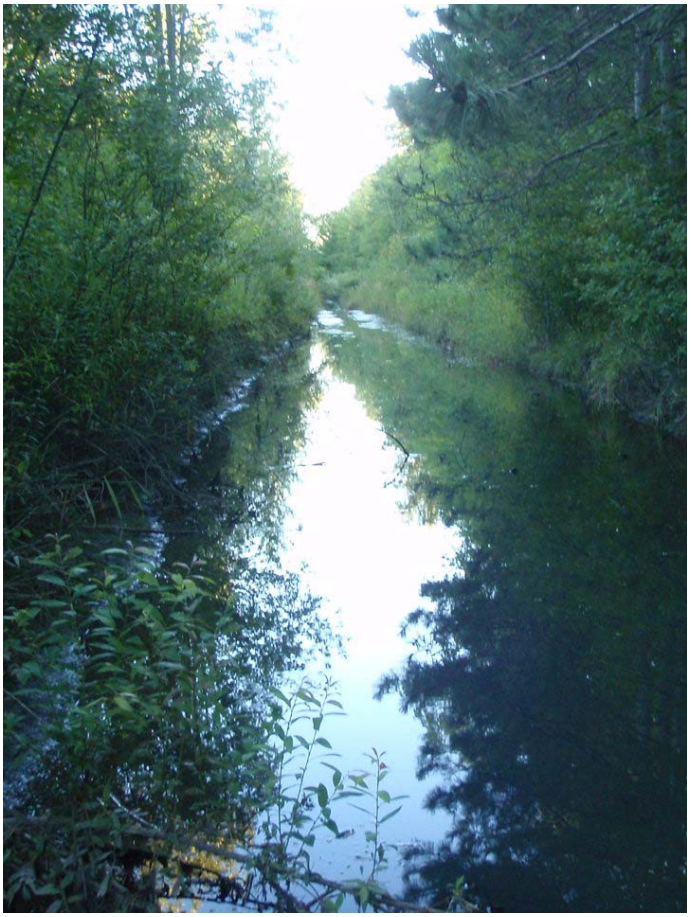


Figure 9 Anthropogenic alterations along Hunt Club Creek



Stream channelization along Hunt Club Creek

Hunt Club Creek Instream Aquatic Habitat

Habitat Complexity

Streams are naturally meandering systems and move over time; there are varying degrees of habitat complexity, depending on the creek. Examples of habitat complexity include variable habitat types such as pools and riffles as well as substrate variability and woody debris structure. A high percentage of habitat complexity (heterogeneity) typically increases the biodiversity of aquatic organisms within a system. Forty-eight percent of Hunt Club Creek was considered heterogeneous, as shown in Figure 10.

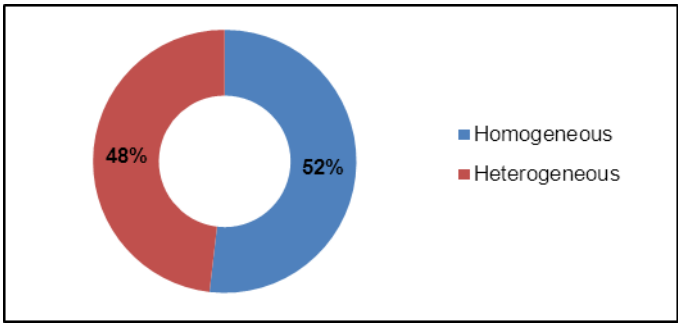


Figure 10 Instream habitat complexity in Hunt Club Creek

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).
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 where cobble and boulder substrate is found in Hunt Club Creek.

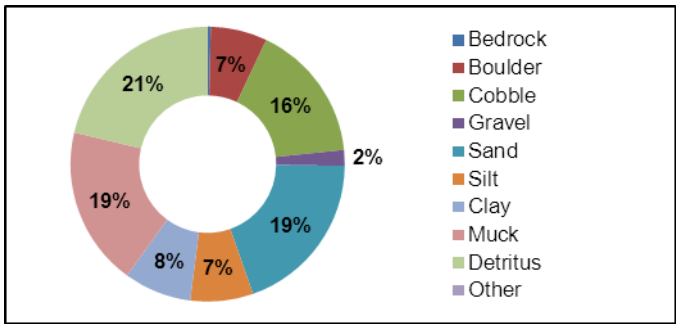


Figure 11 Instream substrate along Hunt Club Creek

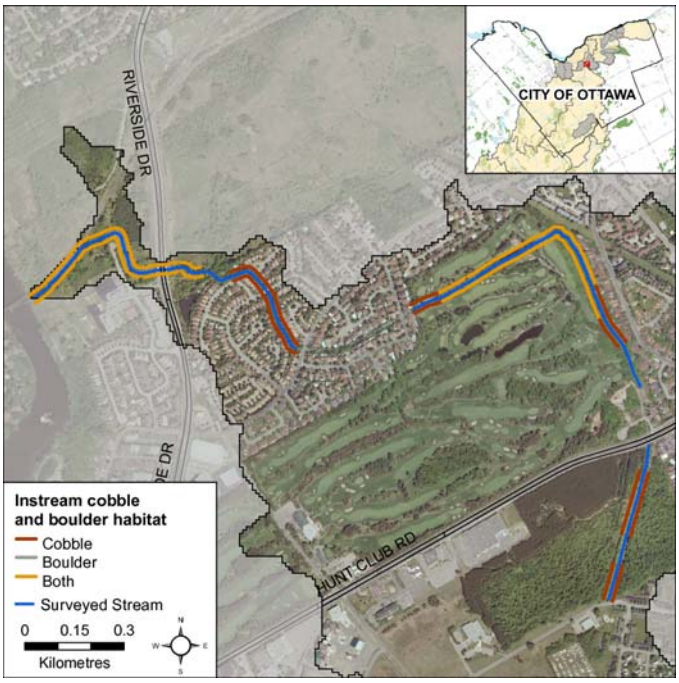


Figure 12 Instream substrate along Hunt Club Creek

Instream Morphology

Pools and riffles are important habitat features for fish. Riffles are areas of agitated water and they 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 areas 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 Hunt Club Creek is fairly uniform; 84 percent consists of runs, 12 percent riffles and five percent pools.

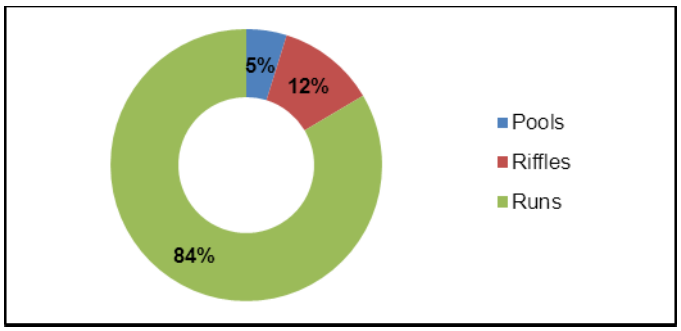


Figure 13 Instream morphology along Hunt Club Creek

Vegetation Type

Instream vegetation provides a variety of functions and is a critical component of the aquatic ecosystem. For example emergent plants along the shoreline can provide shoreline protection from wave action and important rearing habitat for species of waterfowl. Submerged plants provide habitat for fish to find shelter from predator fish while they feed. Floating plants such as water lilies shade the water and can keep temperatures cool while reducing algae growth. The majority of Hunt Club Creek has low diversity of instream vegetation. The dominant vegetation type, recorded at seventy-four percent, is algae. Figure 14 depicts the plant community structure for Hunt Club Creek.

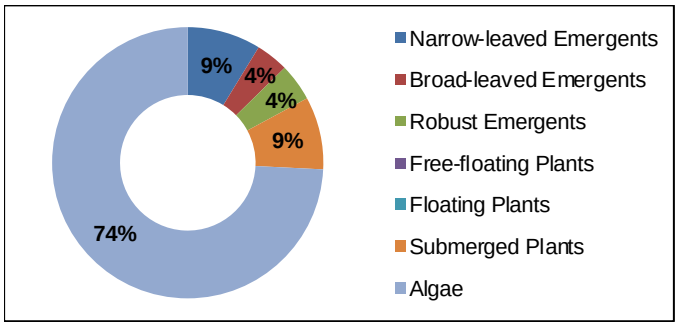


Figure 14 Vegetation types along Hunt Club Creek

Instream Vegetation Abundance

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 that Hunt Club Creek has very low levels of instream vegetation for most of its length with rare levels and no vegetation accounting for 64 percent. Low levels of vegetation may be due to high levels of stream shading along Hunt Club Creek. It is also a flashy system that is influenced by stormwater inputs, so vegetation may have a difficult time becoming established between rain events.

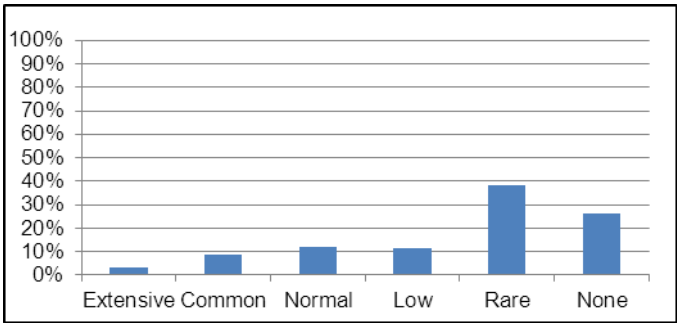


Figure 15 Instream vegetation abundance along Hunt Club

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. They can outcompete native species, having negative effects on local wildlife, fish and plant populations. Seventy percent of the sections surveyed along Hunt Club Creek had invasive species (Figure 16). The invasive species observed in Hunt Club Creek were common buckthorn (*Rhamnus cathartica)*, Manitoba maple (*Acer negundo*), purple loosestrife (*Lythrum salicaria*), dog strangling vine (*Cynanchum rossicum*) and yellow iris (*Iris pseudacorus*).

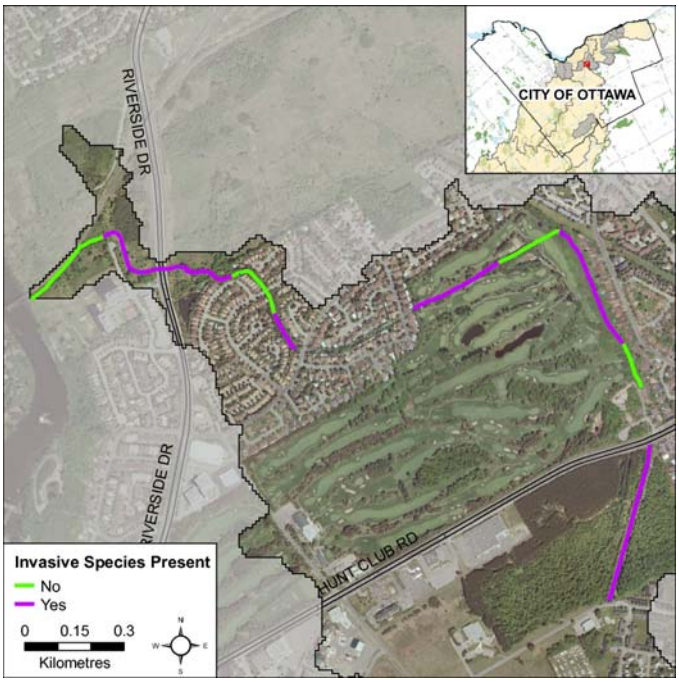


Figure 16 Invasive species along Hunt Club Creek

Yellow iris is an invasive species found on Hunt Club Creek

Wildlife

The diversity of fish and wildlife populations can be an indicator of water quality and overall stream health. Table 1 is a summary of all wildlife observed during stream surveys.

Wildlife	Observed
Birds	mallard duck, great blue heron, chickadee, red eye vireo, red winged blackbird, yellow warbler, cardinal, song sparrow, robin, mourning dove, house sparrow, yellow throat, crow, gold finch, bluejay
Mammals	deer, muskrat, raccoon tracks
Reptiles/Amphibians	green frog, leopard frog, bullfrog
Aquatic Insects	water striders
Other	dragonfly, damselfly, mosquitos, bumblebee

Table 1 Wildlife observed along Hunt Club Creek

Pollution

Figure 17 demonstrates the incidence of pollution/ garbage in Hunt Club Creek. Pollution and garbage in the stream is assessed visually and noted for each section where it is observed. Only fifteen percent of the sections did not have any observable garbage. Thirty-seven percent had floating garbage, 63 percent had garbage on the stream bottom, 33 percent had oil or gas trails and seven percent of the sections had discoloration on the channel bed. Although there was garbage observed in the many sections of the creek it was not in sufficient quantity to require a large scale cleanup at any specific locations.

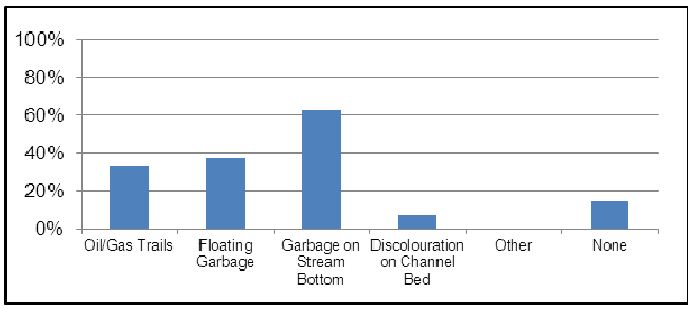


Figure 17 Pollution observed along Hunt Club Creek

Water Chemistry

During the Stream Characterization 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 warm water fish and 9.5 mg/L for cold water fish (CCME, 1999).
- A saturation value (concentration of oxygen in water) of 90 percent or above is considered healthy. Saturation levels above one hundred percent are not uncommon in sections of stream where there are high amounts of algae and other aquatic plants.
- 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.
- pH is a measure of relative acidity or alkalinity, ranging from 1 (most acidic) to 14 (most alkaline/ basic), with 7 occupying a neutral point. 2013 data for these four parameters is summarized in Table 2.

Month	Range	DO (mg/L)	DO(%)	Conductivity (µs/cm)	pH
June 2013	Low	6.61	66.45	259.00	7.48
	High	10.07	101.24	848.00	7.99
July 2013	Low	3.92	40.56	398.00	7.25
	High	10.29	106.47	1025.00	8.30

Table 2 Water chemistry collected along Hunt Club Creek

A volunteer using a YSI

Thermal Classification

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 warm water, cool water or cold water.

Two temperature loggers were installed on Hunt Club Creek from April until September 2013. One logger was located upstream of Riverside Drive and the second was located near De Niverville Private (Figure 18). Analysis of the data collected indicates that Hunt Club Creek is classified as a cold/cool water system. The water temperature of this creek is likely heavily influenced by the fact that reaches of the creek are piped underground and it is well shaded.

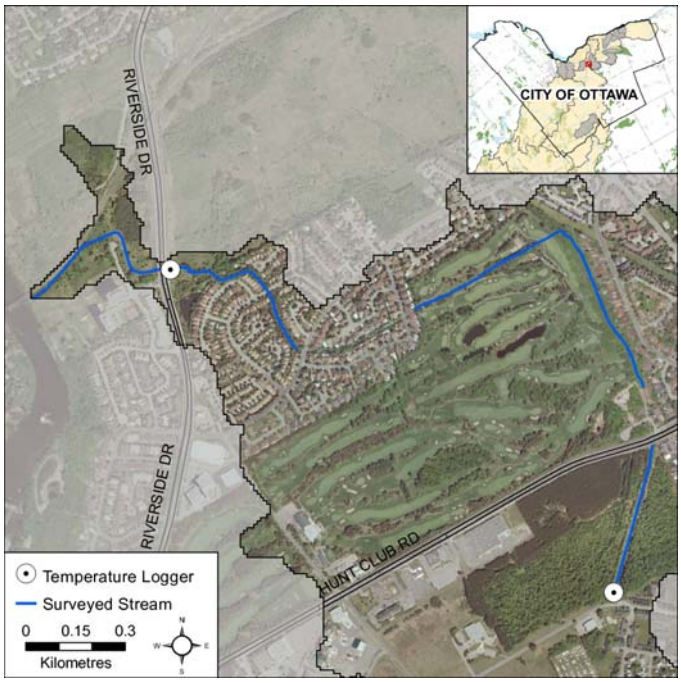


Figure 18 Temperature loggers along Hunt Club Creek

Temperature logger installed near Riverside Drive

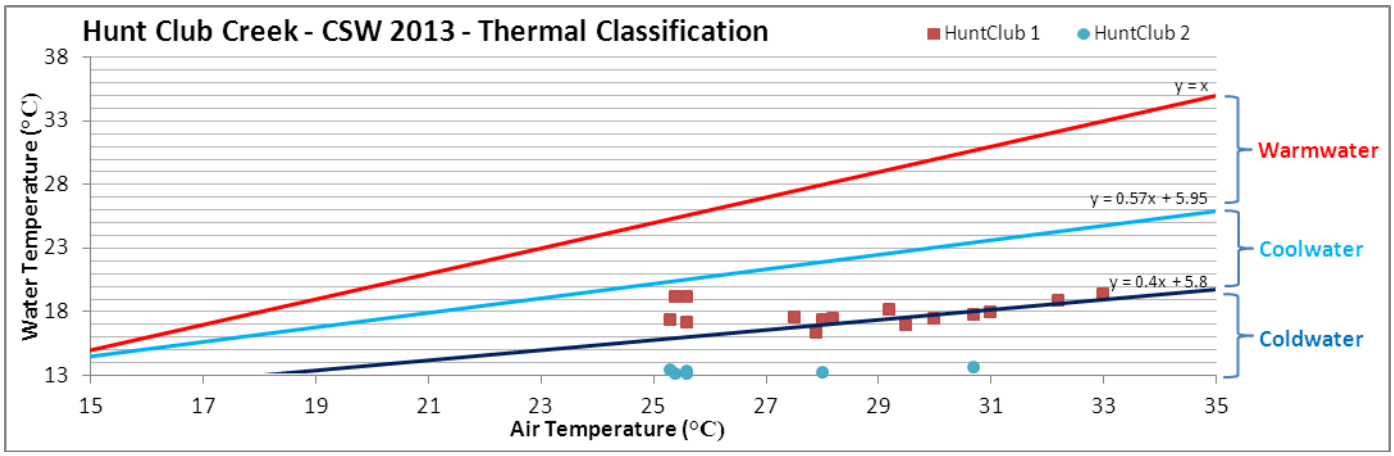


Figure 19 Thermal Classification for Hunt Club Creek

Each point on the graph represents a temperature that meets the following criteria:

- Sampling dates between July 1st and September 7th
- Sampling date is preceded by two consecutive days above 24.5°C
- Water temperatures are collected at 4pm
- Air temperature is recorded as the maximum temperature for that day

Fish Sampling

Fish sampling sites located along Hunt Club Creek are shown in Figure 20. The provincial fish code shown on the following map is provided in Table 3 along with the common name of the fish identified in Hunt Club Creek. Hunt Club Creek is classified as a cold/cool water system with only one species observed. Low species diversity may be attributed to the significant portion of the creek which is piped.

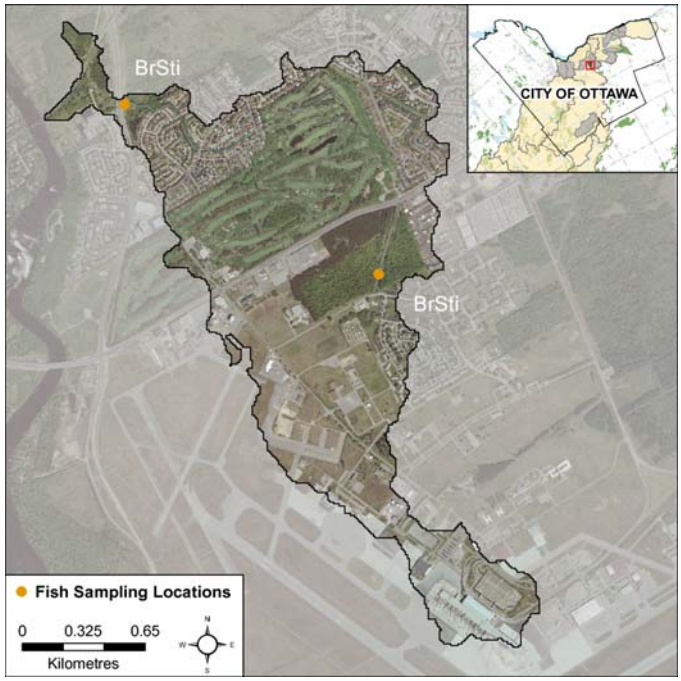


Figure 20 Hunt Club Creek fish sampling

Species observed in Hunt Club Creek (with fish code)
brook stickleback……BrSti

Table 3 Fish species observed in Mud 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 that Hunt Club Creek has three types of migratory obstructions: piped sections, a weir and one debris dam.

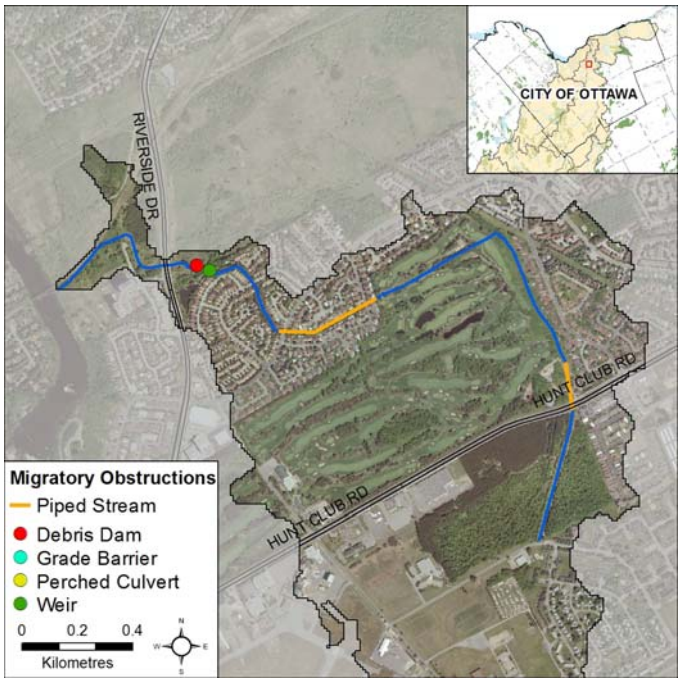


Figure 21 Migratory obstructions on Hunt Club Creek

Headwater Drainage Feature Sampling

The Headwater Drainage Feature sampling protocol is a rapid assessment method characterizing the amount of water, sediment transport, and storage capacity within headwater drainage features (HDF). An HDF is a depression in the land that conveys surface flow. As a result of their importance and a lack of information for headwater drainage features City Stream Watch has incorporated monitoring of these systems at four sites in the Hunt Club Creek catchment (Figure 22).

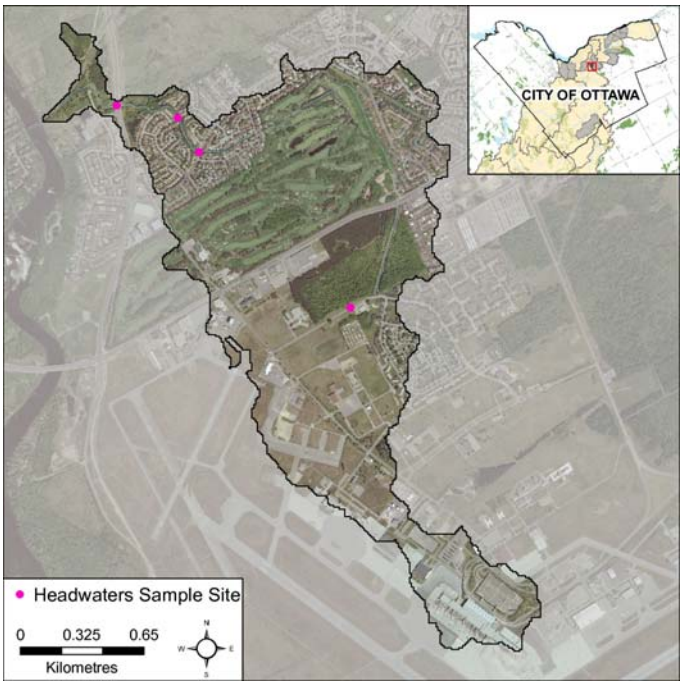


Figure 22 HDF sampling sites on Hunt Club Creek

Monitoring and Restoration

Monitoring and Restoration Projects on Hunt Club Creek

Table 4 below highlights the monitoring and restoration work that has been done on Hunt Club Creek to date by the Rideau Valley Conservation Authority.

Accomplishment	Year	Description
City Stream Watch Monitoring	2013	28 stream surveys were completed by City Stream Watch volunteers and staff
City Stream Watch Fish Sampling	2013	Two sites were sampled on Hunt Club Creek
City Stream Watch Thermal Classification	2013	Two temperature loggers were deployed from April until September
City Stream Watch Headwater Drainage Feature Sampling	2013	Four headwater drainage features were sampled in the Hunt Club Creek catchment
City Stream Watch Invasive Species Removal	2013	City Stream Watch volunteers removed yellow iris from Hunt Club Creek near Riverside Drive

Table 4 Monitoring and Restoration on Hunt Club Creek

2013 Restoration Activities

Hunt Club Creek Yellow Iris Removal

City Stream Watch volunteers removed yellow iris from Hunt Club Creek near Riverside Drive on June 22, 2014. The invasive species was discovered on the creek during stream surveys this season. The group spent six volunteer hours removing yellow iris from the creek. A second removal will be considered for next season as patches of yellow iris remain in the creek.

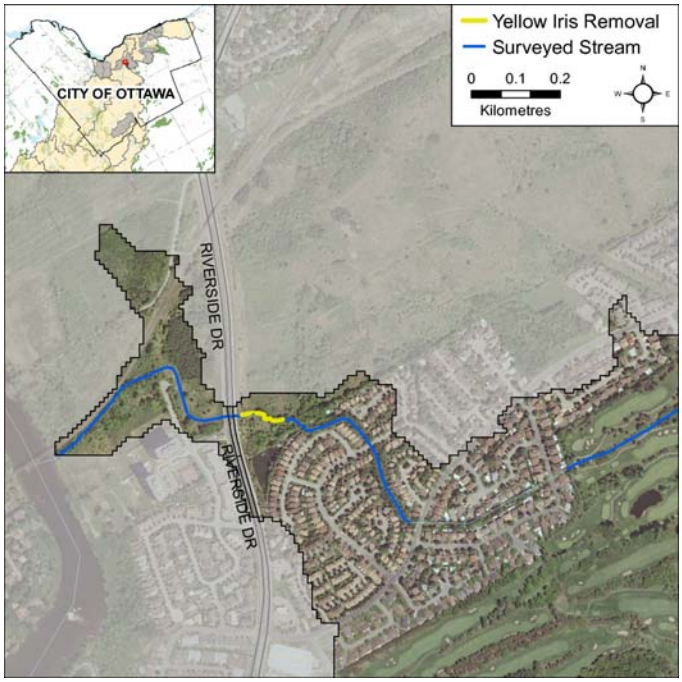


Figure 23 Yellow iris removal site on Hunt Club Creek

Potential Instream Restoration Opportunities

Figure 24 depicts the locations where City Stream Watch staff and volunteers made note of various instream restoration opportunities. No potential riparian restoration opportunities were noted during 2013 monitoring activities. This is likely because most of the creek has little bank erosion and is well shaded by a forested buffer.

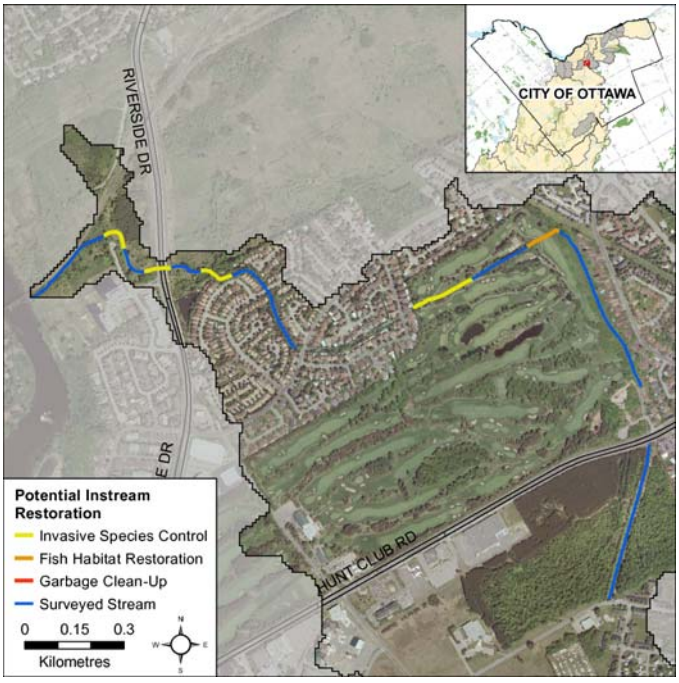
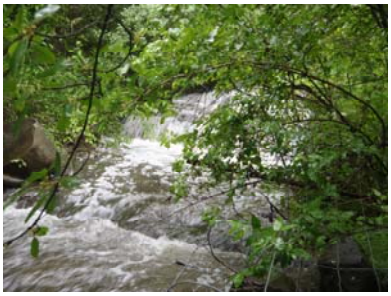


Figure 24 Potential instream restoration opportunities


References

1. Canadian Council of Ministers of the Environment (CCME), 1999. *Canadian Environmental Quality Guidelines and Summary Table* Retrieved From: http://www.ccme.ca/pulicatioins/ceqg_rcqe.html
2. Canadian Wildlife Service (CWS), Environment Canada. 2004. *How Much Habitat Is Enough? Second Edition* Retrieved from: http://www.ec.gc.ca/Publications/1B5F659B-B931-4F37-A988-3DD73DF656B7/CWSHowMuchHabitatisEnoughAFramework.pdf
3. Coker, G.A, C.B. Portt, and C.K. Minns. 2001. Morphological and Ecological Characteristics of Canadian Freshwater Fishes. Can. MS Rpt. Fish. Aquat. Sci. 2554: iv+89p.
4. Ontario Ministry of Natural Resources. 2008. *Field Guide to Aquatic Invasive Species.*
5. Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries Research Board of Canada Bulletin 184: 966 pages
6. 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 2013 City Stream Watch Program and the volunteer activities, please refer to the City Stream Watch 2013 Summary Report.

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