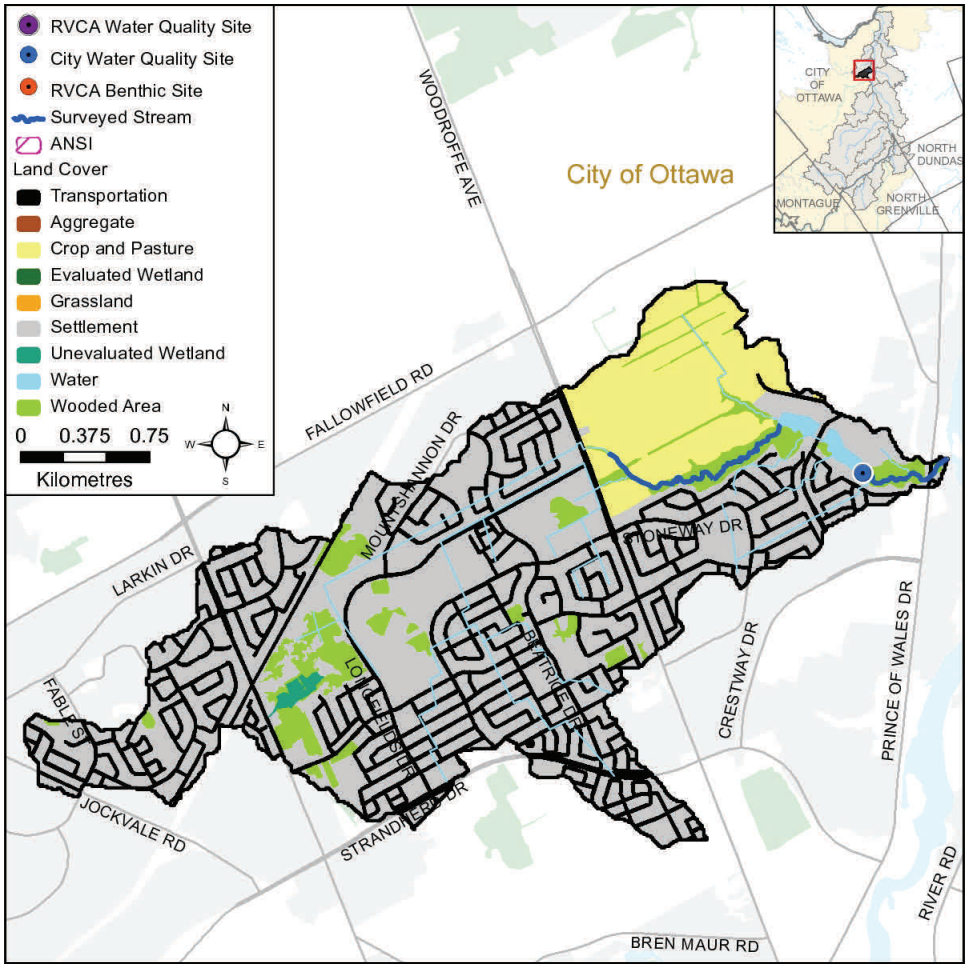
BARRHAVEN CREEK CATCHMENT

LOWER RIDEAU RIVER SUBWATERSHED REPORT 2012

RIDEAU VALLEY CONSERVATION AUTHORITY



The RVCA produces individual reports for 16 catchments in the Lower Rideau subwatershed. Using data collected and analysed by the RVCA through its watershed monitoring and land cover classification programs, surface water quality conditions are reported for Barrhaven Creek along with a summary of environmental conditions for the surrounding countryside every six years.

This information is used to help better understand the effects of human activity on our water resources, allows us to better track environmental change over time and helps focus watershed management actions where they are needed the most.

The following pages of this report are a compilation of that work. For other Lower Rideau catchments and the Lower Rideau Subwatershed Report, please visit the RVCA website at www.rvca.ca.

Inside

Catchment Facts

- Contains Longfield/Davidson Height and old Barrhaven communities and is highly urbanized
- The Clarke Bellinger Stormwater Control Facility is an on-line facility upstream of Prince of Wales drive treating stormwater runoff from the Longfields/ Davidson Height communities, as well as “Old Barrhaven” neighbourhoods north of the CN railway line and northeast of the Walter Baker Recreation Complex. Operation of the stormwater management facility moderates flow of stormwater from the upstream urban area to prevent accelerated erosion along Barrhaven Creek
- West of Woodroofe Avenue the creek and a northern tributary flow through NCC owned agricultural lands before entering a well defined valley (Sachs Woods)
- The only remaining natural channels are between Woodroffe Avenue and the upper end of the stormwater facility and between the lower end of the facility to the creek’s confluence with the Rideau River
- Drains 7 sq. km of land or 0.9% of the Lower Rideau Subwatershed and 0.2% of the Rideau Valley Watershed
- Dominant land cover is settlement (56%), followed by transportation (23%), crop and pastureland (13%) and woodland (8%)
- Riparian buffer (30 m. wide along both sides of Barrhaven Creek and its tributaries) is comprised of woodland (53%), settlement (25%), crop and pastureland (19%) and transportation (3%)
- Contains a cool/warm water baitfish and recreational fishery with 20 fish species
- Water quality rating is poor along Barrhaven Creek
- Woodland cover has increased by 1.9 percent (14 ha.) from 2002 to 2008
- During 2009, volunteers completed macro surveys on Barrhaven Creek, starting at the mouth and working upstream (excluding the stormwater management facility), taking measurements and making observations on in-stream and riparian habitat, bank stability, land use, etc.
- The City of Ottawa used the Ontario Stream Assessment Protocol in 2009 to evaluate the reach directly downstream of stormwater management facility. Data collected included channel morphology, benthos and fish species
- During 2009, RVCA conducted fish sampling and temperature profiling on the creek
- Major studies completed include: Barrhaven Creek Watershed Planning Study, 1989 (UMA Engineering for RVCA); Preliminary Design Brief - Longfield/Davidson Stormwater Facility and Barrhaven Creek Outlet to the Rideau River, 1991 (Delcan for the City of Nepean); Review and Update of Serviceability Study (February 1993) for Longfield/Davidson Heights, 1998 (Erion Associates for the City of Nepean)
- Any proposed works to alter Barrhaven Creek and its tributaries are subject to the “alteration to waterways” provision of Ontario Regulation 174/06

1) Surface Water Quality

Assessment of streams in the Lower Rideau is based on 24 parameters including nutrients (total phosphorus, total Kjeldahl nitrogen, nitrates), E. coli, metals (like aluminum and copper) and additional chemical/physical parameters (such as alkalinity, chlorides pH and total suspended solids). Each parameter is evaluated against established guidelines to determine water quality conditions. Those parameters that frequently exceed guidelines are presented below.

The assessment of water quality throughout the Lower Rideau Subwatershed also looks at water quality targets that are presented in the 2005 Lower Rideau Watershed Strategy (LRWS), to see if they are being met. The LRWS identifies improving water quality as a priority concern; specifically reducing the levels of nutrients, bacteria and contaminants in the Lower Rideau.

1) a. Barrhaven Creek

Surface water quality conditions in Barrhaven Creek are monitored through the City of Ottawa's Baseline Water Quality Program. See. Figure 1 for the location.

The water quality rating for Barrhaven Creek is "Poor" as determined by the CCME Water Quality Index (CCME WQI). Analysis of the data has been examined from 2006-2011, to examine if conditions have changed in this timeframe. Table 1 outlines the WQI scores and their corresponding ratings. For more information on the CCME WQI please see the Lower Rideau Subwatershed Report.

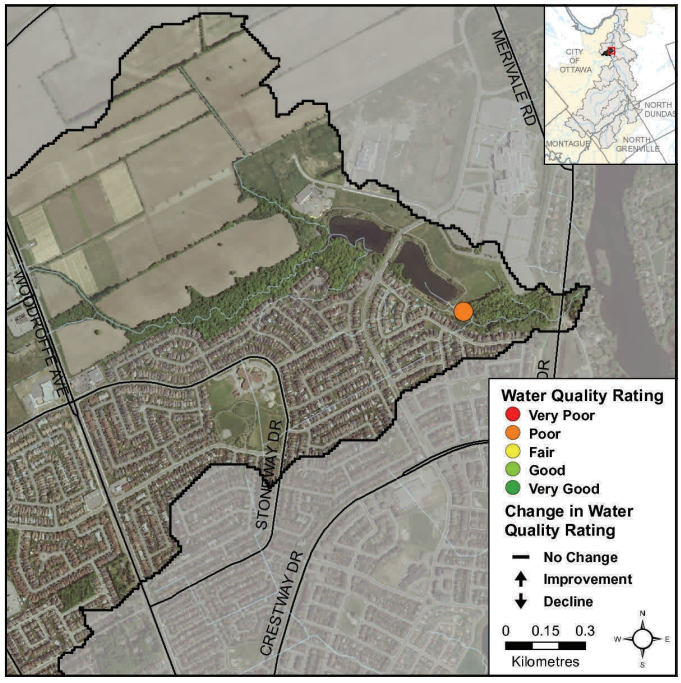


Figure 1. Sampling site in Barrhaven Creek

Table 1. WQI Ratings and corresponding index scores (RVCA terminology, original WQI category names in brackets).

Rating	Index Score
Very good (Excellent)	95-100
Good	80-94
Fair	65-79
Poor (Marginal)	45-64
Very poor (Poor)	0-44

Barrhaven Creek Nutrients

Total phosphorus (TP) is used as a primary indicator of excessive nutrient loading and may contribute to abundant aquatic vegetation growth and depleted dissolved oxygen levels. The Provincial Water Quality Objectives (PWQO) of 0.030mg/l is used as the TP Guideline. Concentrations greater than 0.030 mg/l indicate an excessive amount of TP. Barrhaven Creek TP results are shown in Figure 2. In addition to the TP guideline, the LRWS set the target for TP concentration of 0.030 mg/l (PWQO) at the 85th percentile for tributaries of the Rideau River, such as Barrhaven Creek. Percentile plots for this data are shown in Figure 3. Any point to the left of the 85th percentile line (vertical) and above the guideline (horizontal line) have failed to reach the LRWS target.

Total Kjeldahl nitrogen (TKN) is used as a secondary indicator of nutrient loading; RVCA uses a guideline of 0.500 mg/l (TKN Guideline) to assess TKN concentrations. Barrhaven Creek TKN results are shown in Figure 4.

Tables 2 and 3 summarize average nutrient concentrations at the monitored site on Barrhaven Creek and shows the proportion of samples that meet guidelines. Highlighted values indicates that the average value exceeded the guideline.

Table 2. Summary of total phosphorous results for Barrhaven Creek from 2006-2011

Total Phosphorus 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK77-06	0.069	6	18

Table 3. Summary of total Kjeldahl nitrogen results for Barrhaven Creek from 2006-2011

Total Kjeldahl Nitrogen 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK77-06	0.876	17	18

Barrhaven Creek Nutrients: Site CK77-06

The majority of samples at site CK77-06 were above the TP guideline of 0.030mg/l (Fig. 2), please note that data was not available for the 2000-2005 period. Only six percent of samples were below the guideline and the average concentration was 0.069 mg/l. Percentile plots of TP data are shown for the 2006-2011 time period (Fig. 3). The LRWS target has not been achieved at this site and the concentration at the 85th percentile is quite high at 0.090 mg/l.

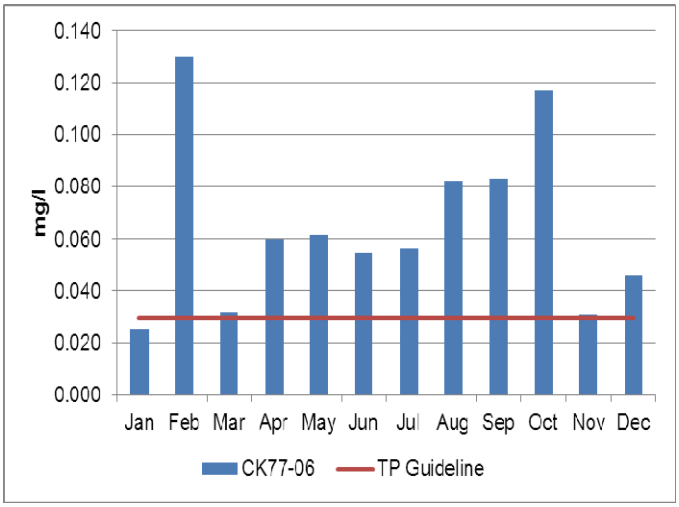


Figure 2. Total phosphorus concentration in Barrhaven Creek

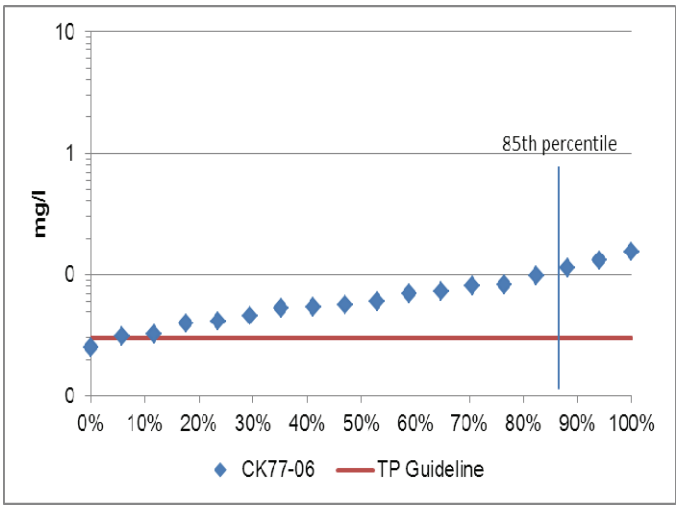


Figure 3. Percentile plot of total phosphorous in Barrhaven Creek

TKN is used as a secondary indicatory of nutrient enrichment. Figure 4 shows that almost all results exceeded the TKN guideline of 0.500 mg/l, only seventeen percent of samples were below guidelines. The average concentration was 0.876 mg/l, far exceeding the guideline.

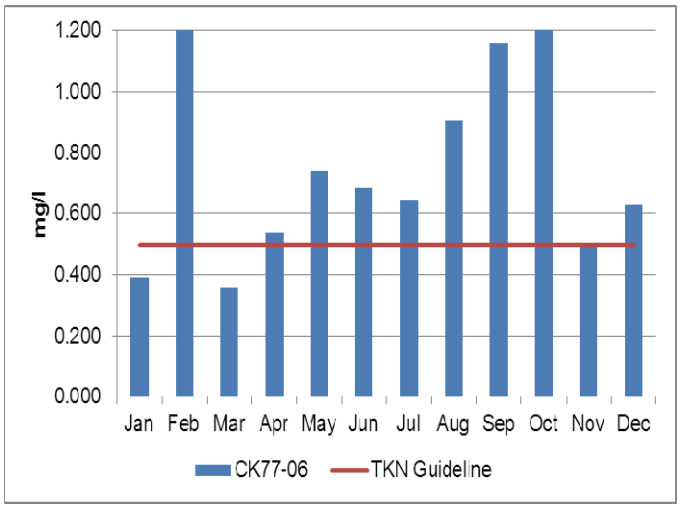


Figure 4. Total Kjeldahl nitrogen concentrations in Barrhaven Creek

Barrhaven Creek Nutrients Summary

Overall the data suggests that nutrient loading is a significant problem at this site; efforts should be made to reduce nutrient inputs to the creek.

Barrhaven Creek E. coli

E. coli is used as an indicator of bacterial pollution from human or animal waste; in elevated concentrations it can pose a health risk. A guideline of 100 colony forming units/100 millilitres (CFU/100ml) is used, E. coli counts greater than this guideline indicate that bacterial contamination may be a problem within a waterbody. The Lower Rideau Watershed Strategy (2005) also set a target of E. coli counts at 200 CFU/100ml for the 80th percentile and no counts that exceed 2000 CFU/100ml in tributaries of the watershed.

Table 4 summarizes the geometric mean at the monitored site on Barrhaven Creek and shows the proportion of samples that meet the E. coli guideline of 100 CFU/100ml. Highlighted values indicate averages that have exceeded the guideline.

Figure 5 shows the results of the geometric mean with respect to the guideline from 2006-2011 (Fig. 5). Figure 6 shows percentile plots of the data for the period of interest 2006-2011 (Fig. 6). Any point to the left of the 80th percentile line (vertical) and above the guideline (horizontal line) have failed to reach the LRWS target.

Table 4. Summary of E. coli results for Barrhaven Creek.

E. coli 2006-2011			
Site	Geometric mean (mg/l)	% Below Guideline	No. Samples
CK43-02	152	35	18

Barrhaven Creek E. coli: Site CK77-06

E. coli counts above the guideline occasionally occurred at site CK77-06 on Barrhaven Creek. Thirty-five percent of samples (Fig. 5) were below the guideline and the count at the geometric mean was 152 CFU/100ml. A percentile plot of E.coli data shows the LRWS target at the 80th percentile was not achieved as the E. coli count at this point is 728 CFU/100ml, exceeding the target of 200 CFU/100ml.

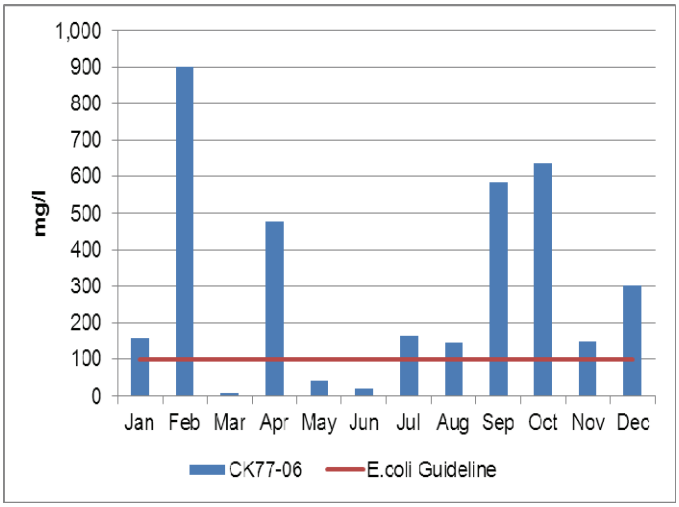


Figure 5. E. coli counts in Barrhaven Creek

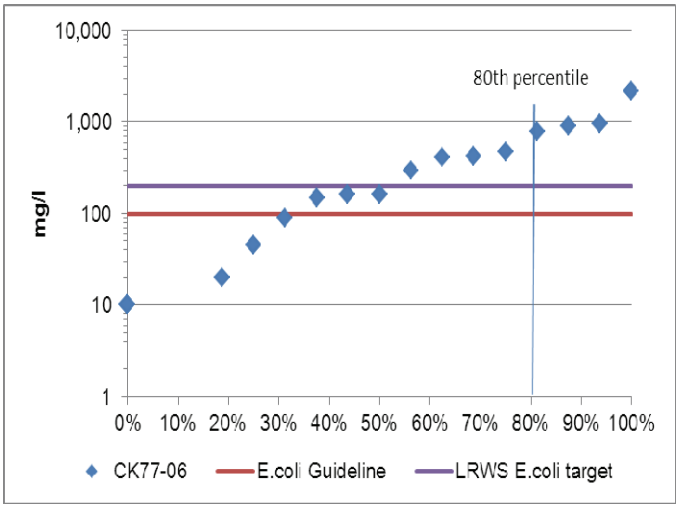


Figure 6. Percentile plots of E. coli in Barrhaven Creek

Barrhaven Creek E. coli Summary

These statistics indicate that bacterial counts are often elevated and efforts should be made to minimize sources of contamination to the creek to protect overall water quality and aquatic life.

Barrhaven Creek Metals

Of the metals routinely monitored in Barrhaven Creek, aluminum (Al) and copper (Cu) both reported concentrations above their respective PWQO. In elevated concentrations these metals can have toxic effects on sensitive aquatic species.

Table 5 summarizes average metal concentrations at monitored sites on Barrhaven Creek and shows the proportion of samples that meet guidelines. Highlighted values indicate averages that have exceeded the guidelines.

Figures 7 and 8 show the results for site CK77-06 with respect to guidelines for the 2006-2011 (Figures 7 and 8) time period. The guidelines for each metal as stated by the PWQO are Al 0.075 mg/l and Cu 0.005 mg/l. The Lower Rideau Watershed Strategy (2005) also set a target for Cu concentration of 0.005mg/l at the 80th percentile. Figure 9 shows percentile plots of the data for 2006-2011 time period. Any point to the left of the 80th percentile line (vertical) and above the guideline (horizontal line) have failed to reach the LRWS target.

Table 5. Summary of metal results for Stevens Creek.

Aluminum 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
CK77-06	0.222	22	18
Copper 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
CK77-06	0.007	22	18

Barrhaven Creek Metals: Site CK77-06

The majority of metals monitored at site CK77-06 were below guidelines; however results for aluminum (Al) and copper (Cu) were occasionally elevated.

The Al guideline of 0.075 mg/l was generally exceeded; twenty-two percent of samples (Fig. 7) were below and the average concentration was 0.222 mg/l.

Results for Cu concentrations were also occasionally above the guideline of 0.005 mg/l. Twenty-two percent of samples (Fig. 8) were below the guideline and the average concentration was 0.007 mg/l. A percentile plot of Cu data shows that the LRWS was not achieved at this site as the Cu concentration at the 80th percentile was equal to 0.009 mg/l (Fig. 9)

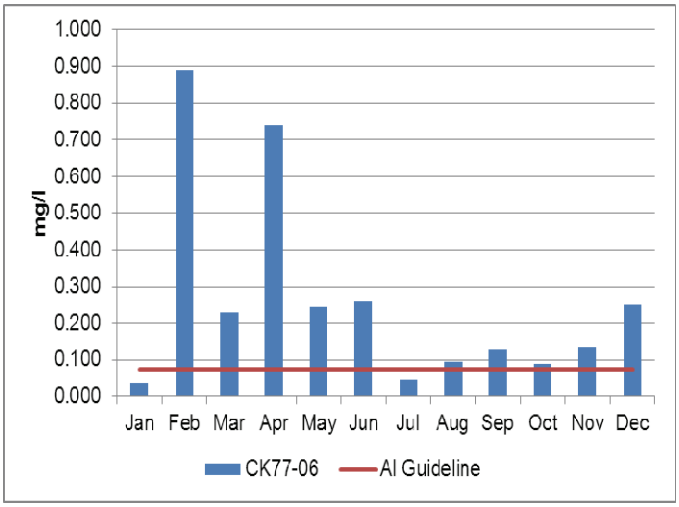


Figure 7. Aluminum concentrations in Barrhaven Creek

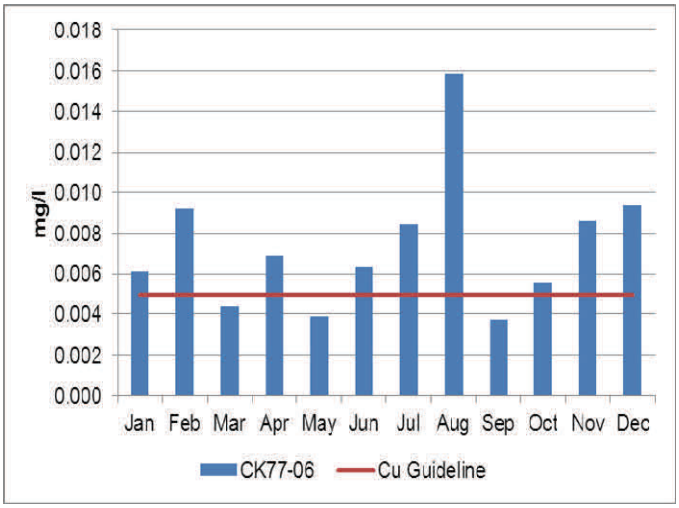


Figure 8. Copper concentrations in Barrhaven Creek

Image of a mink frog

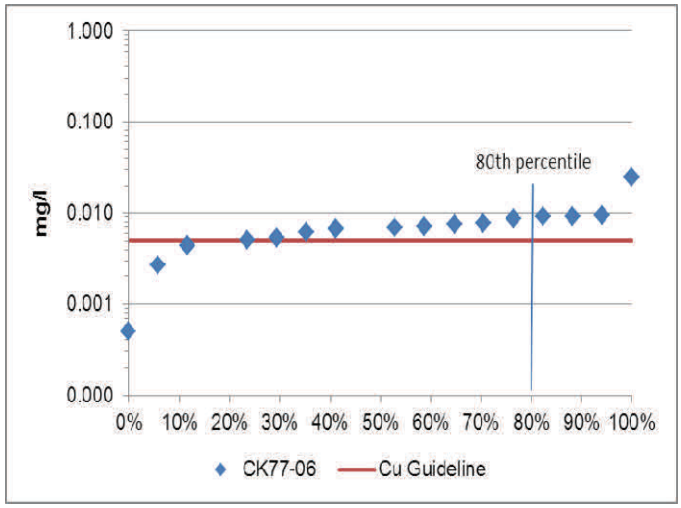


Figure 9. Percentile plots of Copper in Barrhaven Creek

Barrhaven Creek Metals Summary

Overall the data shows that metal pollution is a problem in the creek and efforts should be made to reduce concentrations wherever possible.

A riffle pool riffle sequence along Barrhaven Creek

2) a. Overbank Zone

Riparian Buffer along Barrhaven Creek and Tributaries

Figure 10 shows the extent of the naturally vegetated riparian zone in the catchment, 30 metres on either side of all waterbodies and watercourses. Results from the RVCA's Land Cover Classification Program show that 53 percent of streams, creeks and lakes are buffered with woodland, the remaining 47 percent of the riparian buffer is occupied by settlement, crop and pastureland and transportation.

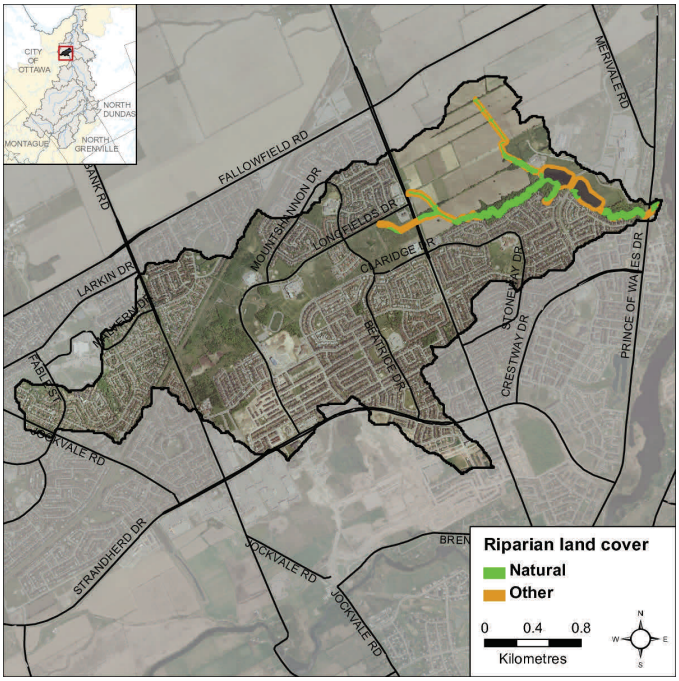


Figure 10. Catchment land cover in the riparian zone

Data from the RVCA's Macrostream Survey Program (Stream Characterization) is used in this section of the report and is generated from an assessment of 20 (100 metre long) sections along Barrhaven Creek in 2009.

Riparian Buffer along Barrhaven 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 metre wide vegetated buffer along at least 75 percent of the length of both sides of rivers, creeks and streams. Figure 11 demonstrates the buffer conditions of the left and right banks separately. Barrhaven Creek had a buffer of greater than 30 metres along 37 percent of the left bank and 68 percent of the right bank.

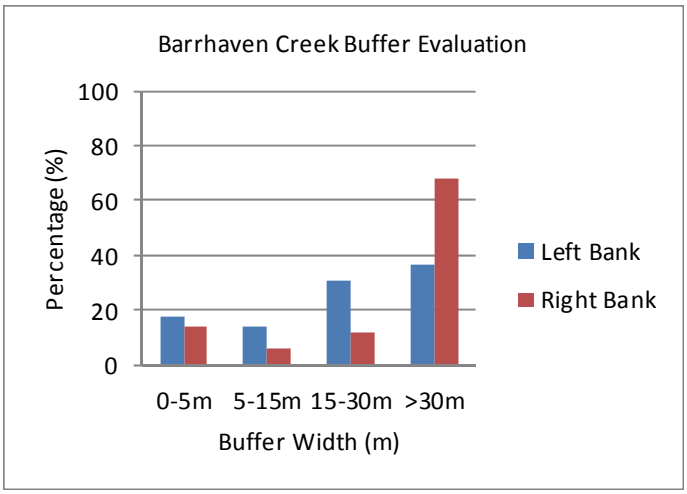


Figure 11. Vegetated buffer width along Barrhaven Creek

Land Use beside Barrhaven Creek

The RVCA's Macrostream Survey Program identifies six different land uses beside Barrhaven Creek (Figure 12). 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 52 percent of the stream, characterized by forest, scrubland and meadow. The remaining land use consisted of residential, active agriculture, and infrastructure.

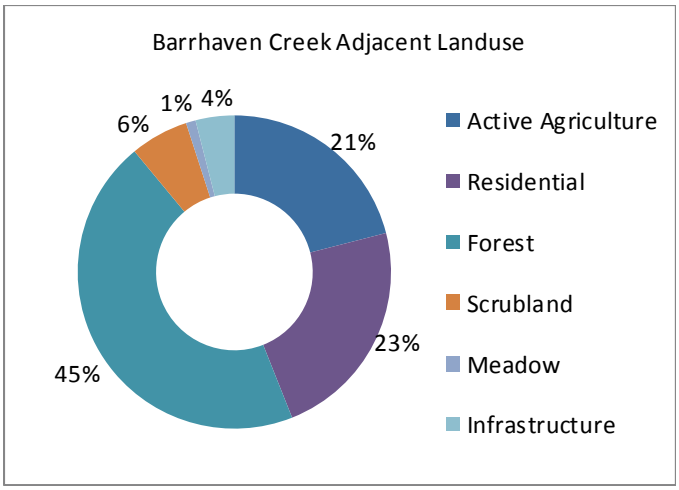


Figure 12. Land use alongside Barrhaven Creek

2) b. 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. Figure 13 shows the bank stability of the left and right bank along Barrhaven Creek.

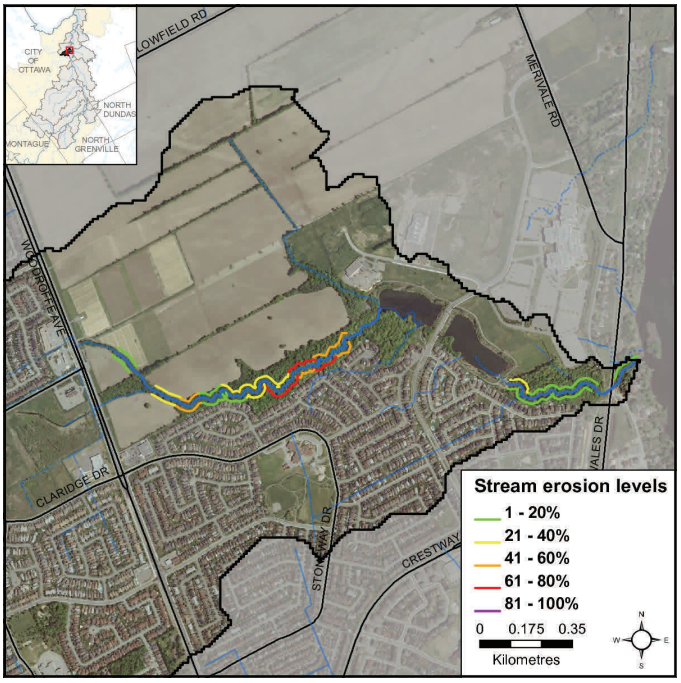


Figure 13. Erosion along Barrhaven Creek

Streambank Undercutting

Undercut banks are a normal and natural part of stream function and can provide excellent refuge areas for fish. Figure 14 shows that Barrhaven Creek had several locations with identified undercut banks.

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 15 shows the stream shading locations along Barrhaven Creek.

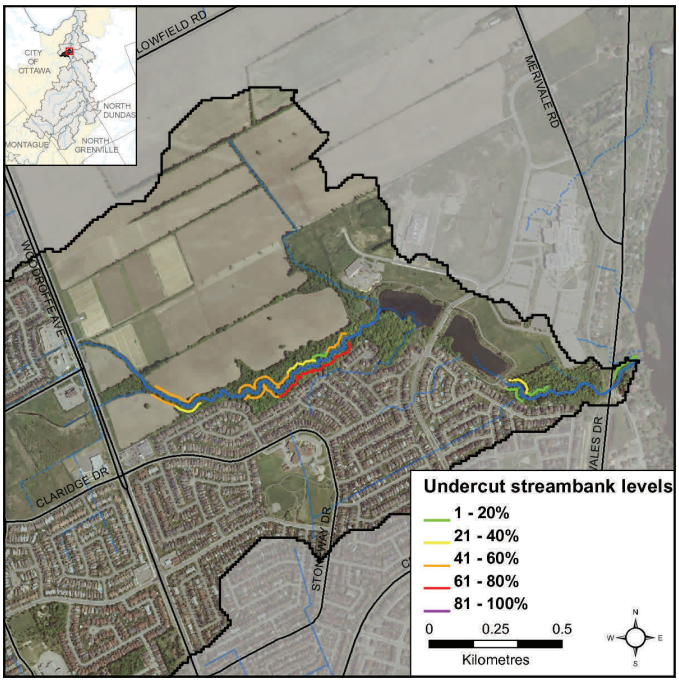


Figure 14. Undercut streambank along Barrhaven Creek

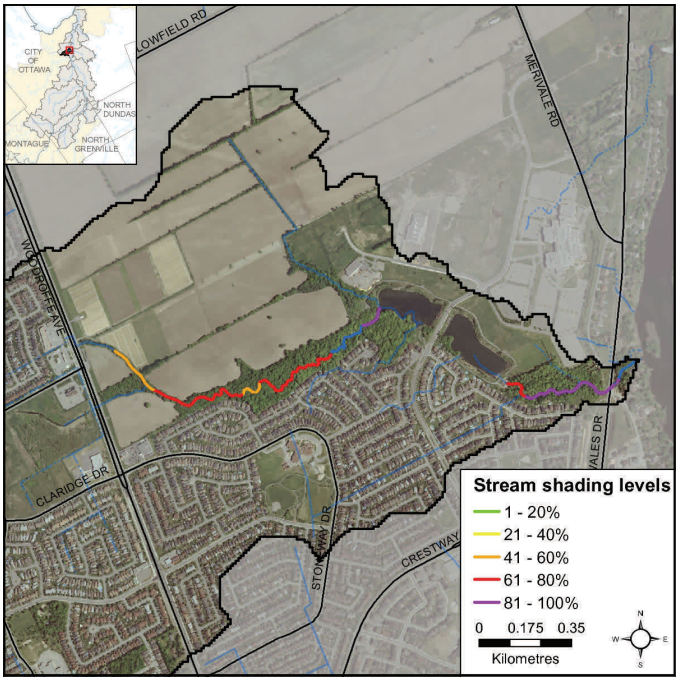


Figure 15. Stream shading along Barrhaven Creek

Human Alterations

Figure 16 shows that five percent of Barrhaven Creek remains “unaltered.” Sections considered “natural” with some human changes accounted for 65 percent of sections. "Altered" sections accounted for 10 percent of the stream, with the remaining 20 percent of sections sampled being considered “highly altered” (e.g., include road crossings, shoreline/instream modifications and little or no buffer).

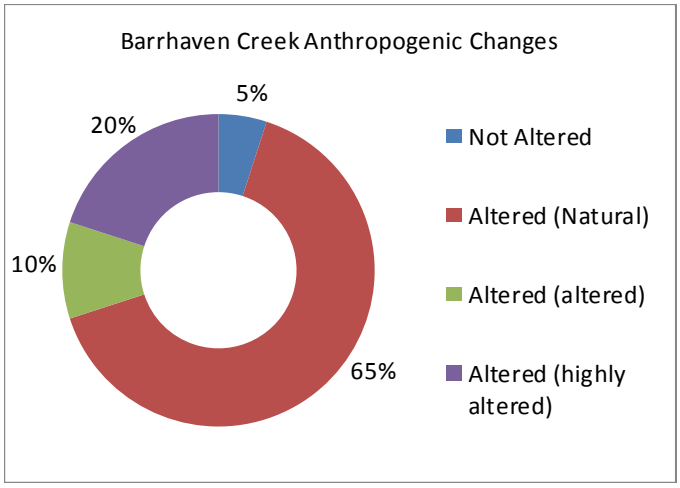


Figure 16. Alterations to Barrhaven Creek

Overhanging Trees and Branches

Figure 17 shows that the majority of Barrhaven Creek had varying levels of overhanging trees and branches. Overhanging trees and branches provide a food source, nutrients and shade which helps to moderate instream water temperatures.

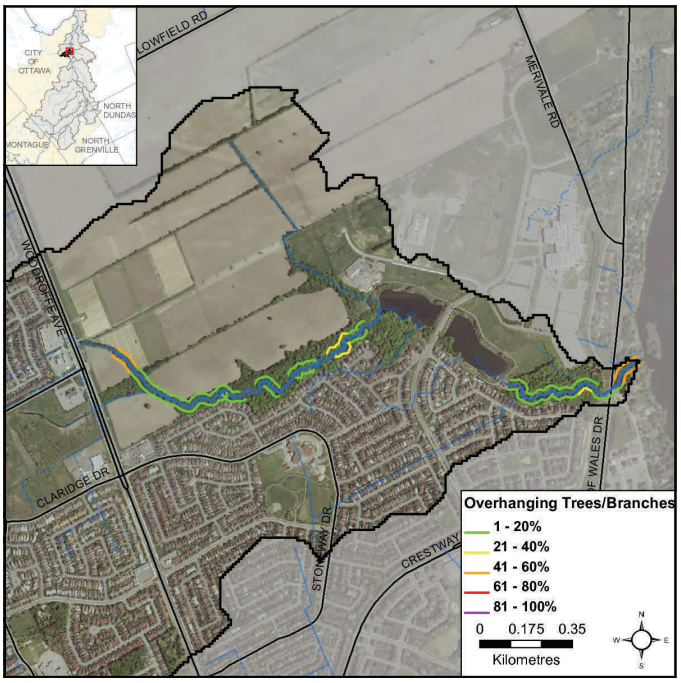


Figure 17. Overhanging trees and branches

2) c. Instream Aquatic Habitat

Instream Woody Debris

Figure 18 shows that the majority of Barrhaven Creek had varying levels of instream woody debris in the form of trees and branches. Instream woody debris is important for fish and benthic habitat, by providing refuge and feeding areas.

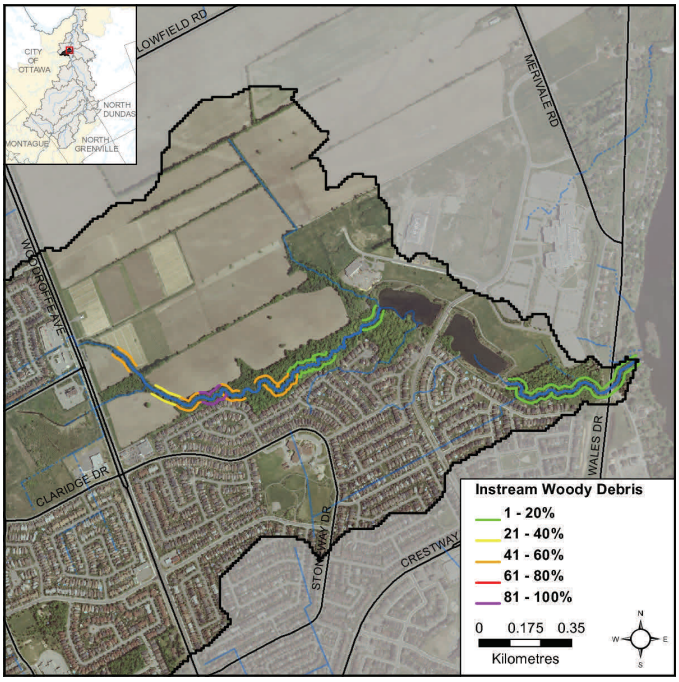


Figure 18. Instream woody debris

Habitat Complexity

Streams are naturally meandering systems and move over time; there are varying degrees of habitat complexity, depending on the creek. A high percentage of habitat complexity (heterogeneity) typically increases the biodiversity of aquatic organisms within a system. One hundred percent of Barrhaven Creek was considered heterogeneous, as shown in Figure 19.

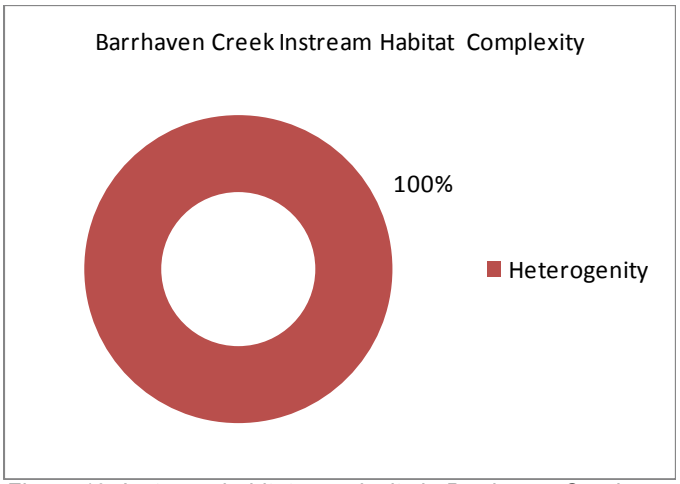


Figure 19. Instream habitat complexity in Barrhaven Creek.

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 20 shows the instream substrate along Barrhaven Creek.

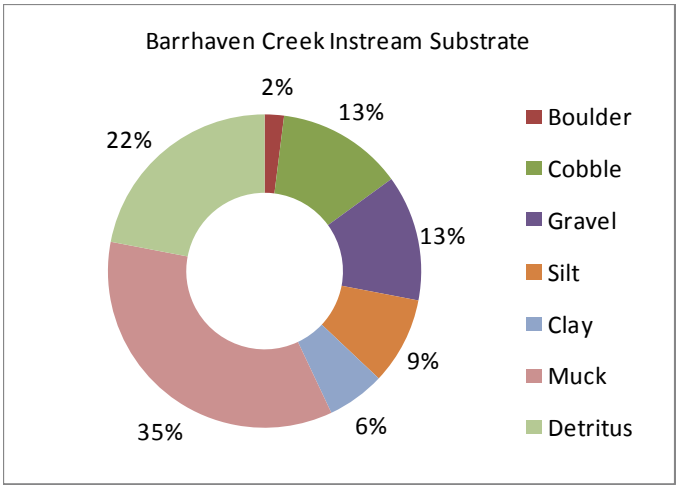


Figure 20. Instream substrate in Barrhaven Creek

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 21 shows where cobble and boulder substrate was found in Barrhaven Creek.

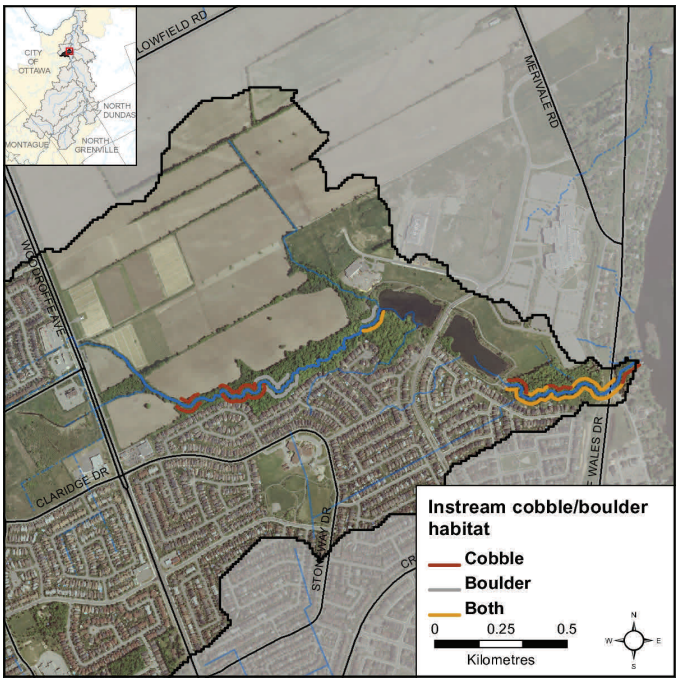


Figure 21. Instream cobble and boulder habitat along Barrhaven Creek

Instream Morphology

Pools and riffles are important features for fish habitat. 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 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 22 shows that Barrhaven Creek was fairly variable; 64 percent consisted of runs, 25 percent pools and 11 percent riffles.

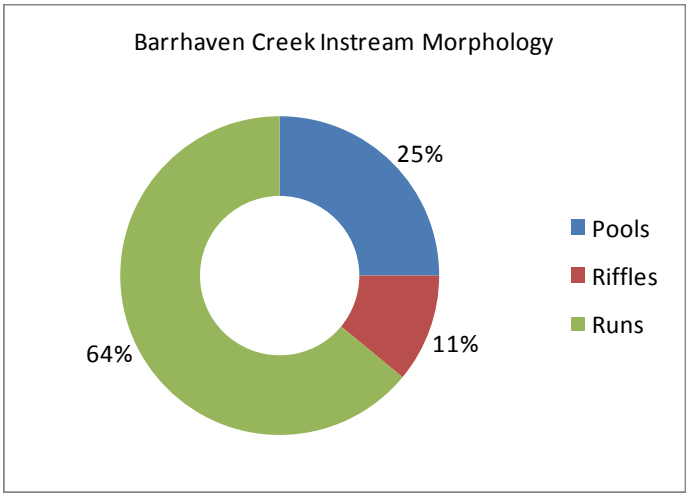


Figure 22. Instream morphology in Barrhaven Creek

Types of Instream Vegetation

Barrhaven Creek had limited diversity of instream vegetation, which is likely a function of substrate type and shallow depths. The dominant vegetation type recorded at fifty-seven percent consisted of narrow emergent. Algae was the next highest type of vegetation recorded at 26 percent. Submerged vegetation was recorded at 13 percent. Broad emergents made up the remainder at four percent as seen in Figure 23.

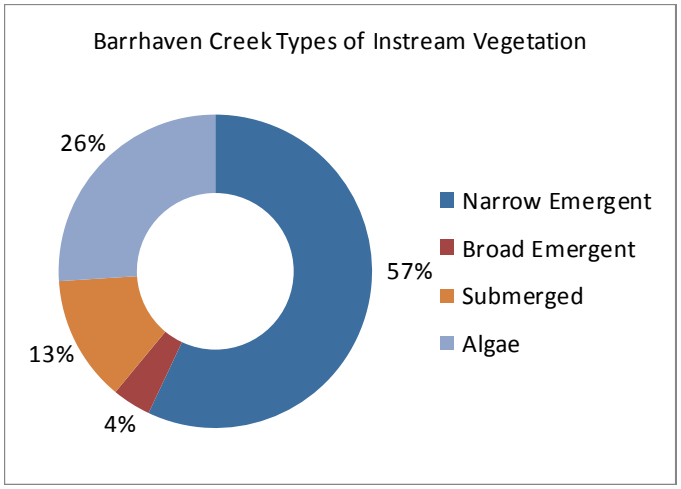


Figure 23. Instream vegetation types in Barrhaven Creek.

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 24 demonstrates that Barrhaven Creek had low to no vegetation levels for most of its length.

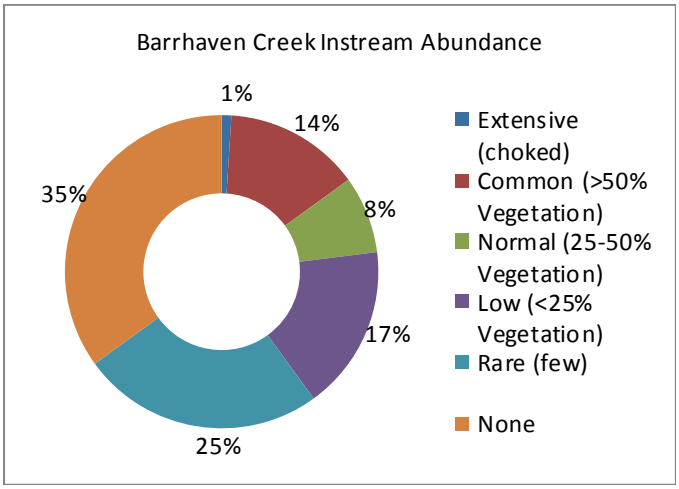


Figure 24. Vegetation abundance in Barrhaven Creek

Riparian Restoration

Figure 25 depicts the locations where various riparian restoration activities can be implemented as a result of observations made during the stream survey assessments.

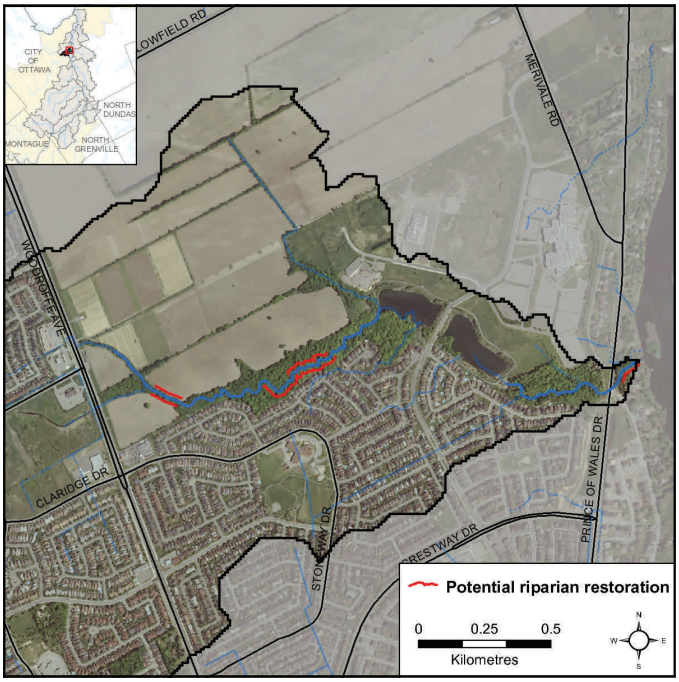


Figure 25. Riparian restoration opportunities

Instream Restoration

Figure 26 depicts the locations where various instream restoration activities can be implemented as a result of observations made during the stream survey assessments.

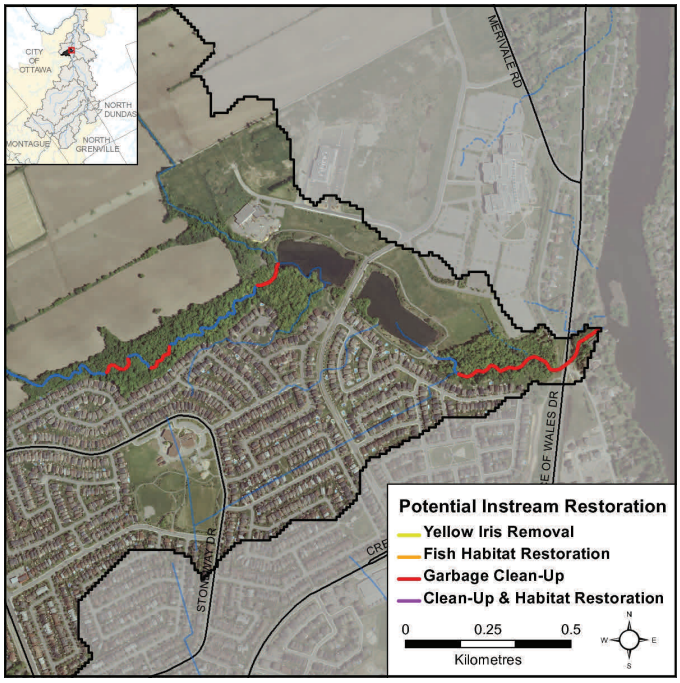


Figure 26 Instream restoration opportunities

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. Five percent of the sections surveyed along Barrhaven Creek had invasive species (Figure 27). The only species observed in Barrhaven Creek was the rusty crayfish.

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. One temperature datalogger was deployed in Barrhaven Creek from April to late September 2009 (Figure 28). 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. Analysis of the data collected indicates that Barrhaven Creek is a coolwater system.

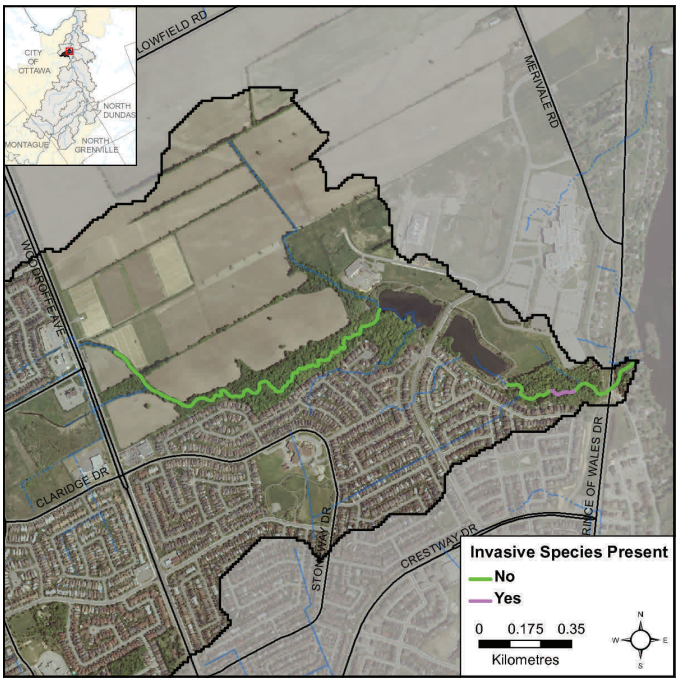


Figure 27. Invasive species along Barrhaven Creek

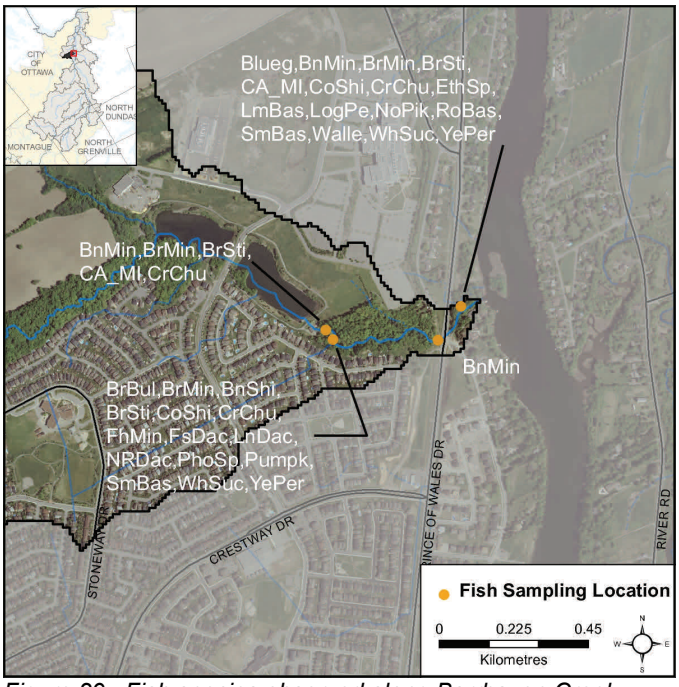


Figure 29. Fish species observed along Barrhaven Creek

Figure 28. Temperature dataloggers along Barrhaven Creek

Fish Sampling

Fish sampling sites located along Barrhaven Creek are shown in Figure 29. The provincial fish codes shown on the map are listed (in Table 6) beside the common name of those fish species identified in Barrhaven Creek (Data source: RVCA and City of Ottawa).

Table 6. Fish species observed in Barrhaven Creek

BlCra- black crappie	**Blueg-** blue gill	**BnMin-** bluntnose minnow	**BrMin-** brassy minnow	**BrSti-** brook stickleback
CoShi- common shiner	**CrChu-** creek chub	**EthSp-** etheostoma spp.	**FsDac-** finescale dace	**LmBas-** largemouth bass
LoPer- logperch	**NoPik-** northern pike	**Pumpk-** pumpkin-seed	**RoBas-** rock bass	**SmBas-** smallmouth bass
Walle- walleye	**WhSuc-** white sucker	**YePer-** yellow perch	**CA_MI-** carps and minnows	**BrBul** brown bull-head
BnShi blacknose shiner	**FhMin** fat-head minow	**LnDac** longnose dace	**NRDac** northern redbelly dace	**PhoSp** phoxinus species

Migratory Obstructions

It is important to know the locations of migratory obstructions because they can prevent fish from accessing important spawning and rearing habitat (Figure 30). Migratory obstructions can be natural or manmade, and they can be permanent or seasonal. There were four debris dams within Barrhaven Creek catchment at the time of the survey.

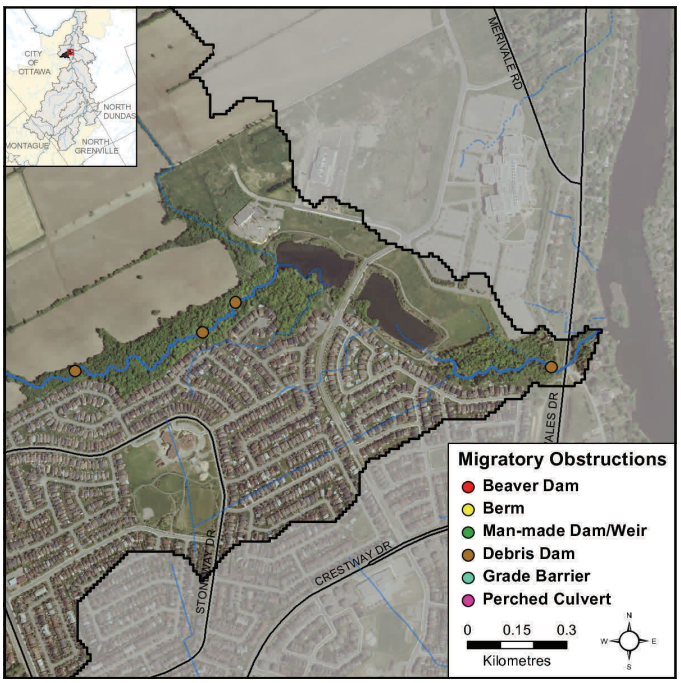


Figure 30. Migratory obstructions in Barrhaven Creek

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 concentration of oxygen in water) 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

- 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.

2009 data for these three parameters is summarized in Table 7.

Table 7. 2009 Water chemistry collected along Barrhaven Creek

Month	Range	DO (mg/L)	DO (%)	Conductivity (µs/cm)	pH
May-09	low	10.53	102	723	8.09
	high	12.07	102	730	8.35
Jun-09	low	7.4	87	1114	8.15
	high	12.21	119	1245	8.54
Jul-09	low	8.63	99	323	7.55
	high	9.59	102	870	7.79
Aug-09	low	-	-	-	-
	high	-	-	-	-

A young of the year northern pike caught on Barrhaven Creek

A seine net being retrieved and fish identified on Barrhaven Creek

3) Land Cover

Settlement is the dominant land cover type in the catchment as shown in Table 8 and displayed in the land cover map on the front cover of the report.

Table 8. Catchment land cover type

Cover Type	Area (ha)	Area (% of Cover)
Settlement	401	56
Transportation	163	23
Crop & Pasture	93	13
Woodland	56	8

Woodland Cover

The Barrhaven Creek catchment contains 56 hectares of woodland (Fig.31) that occupies eight percent of the drainage area. This figure is below the 30 percent of woodland area required to sustain forest birds, according to Environment Canada's Guideline: "How much habitat is enough?" When forest cover declines below 30 percent, forest birds tend to disappear as breeders across the landscape.

Thirteen (50%) of the 26 woodland patches in the catchment are very small, being less than one hectare in size.

The other 13 (50% of) wooded patches range between one to less than 20 hectares in size. The two largest forest patches in this grouping are 10 and 12 hectares in size respectively, followed by 11 smaller patches ranging from one to five hectares in size; all of which tend to be dominated by edge-tolerant bird species.

Forest Interior

Figure 31 also shows that there are no forest patches of sufficient size to support forest dependent, edge intolerant, area sensitive birds and other forest dwelling species that prefer interior forest habitat conditions.

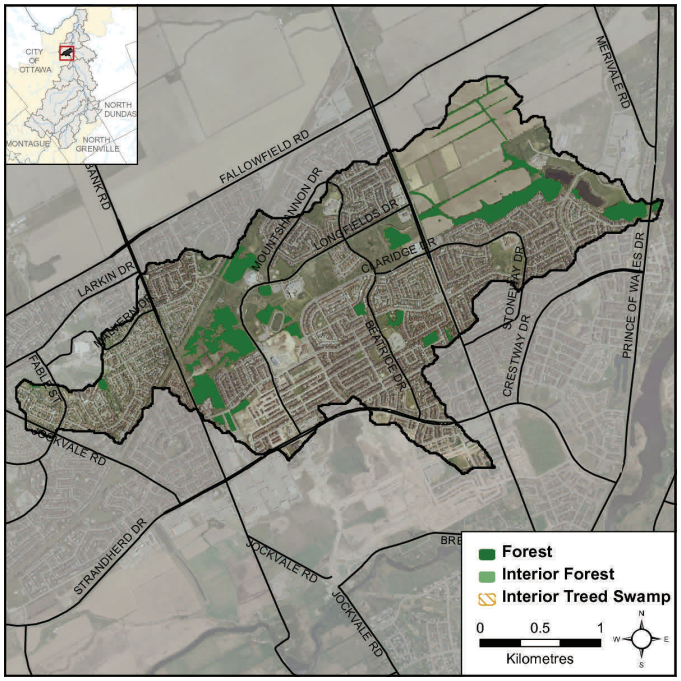


Figure 31. Catchment woodland cover and forest interior

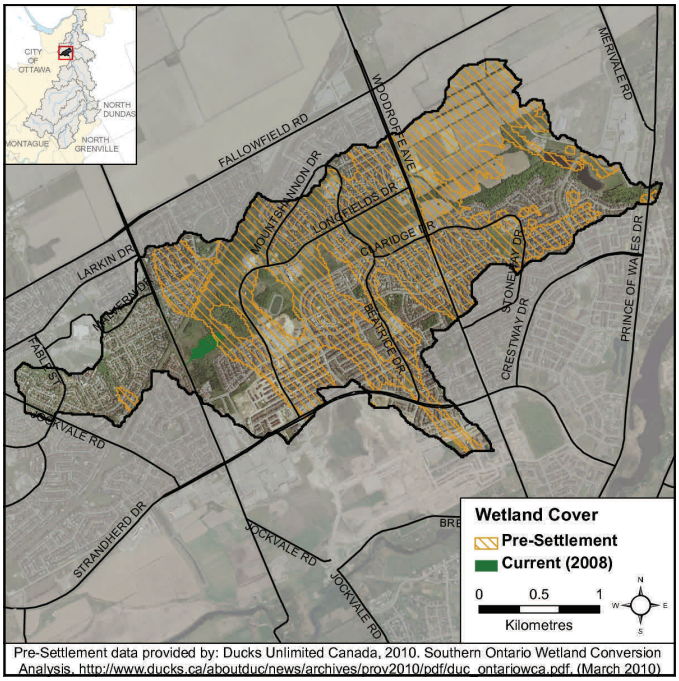


Figure 32. Pre-settlement and present day wetland cover

4) Issues

- Loss of main channel and headwater tributaries west of Woodroofe Avenue due to urban drainage practices
- Slope stability hazards upstream of the stormwater management facility
- No hazard land mapping
- Altered hydrology causing in-stream erosion and loss of aquatic habitat
- Loss of forest habitat
- Reduced biodiversity
- Increasing presence of invasive species
- Nutrient, E.coli and metal exceedances observed in water samples taken

5) Opportunities for Action

- Engage community associations and other interest groups for creek clean up, invasive species removal and riparian planting
- Target riparian and instream restoration at sites identified in this report (as shown in Figures 26 and 30) and explore other restoration and enhancement opportunities along the Barrhaven Creek riparian corridor
- Add an Ontario Benthos Biomonitoring Network site to monitor stream health from a biological perspective
- Require geotechnical investigation for new development or redevelopment on adjacent table lands to ensure adequate slope stability