

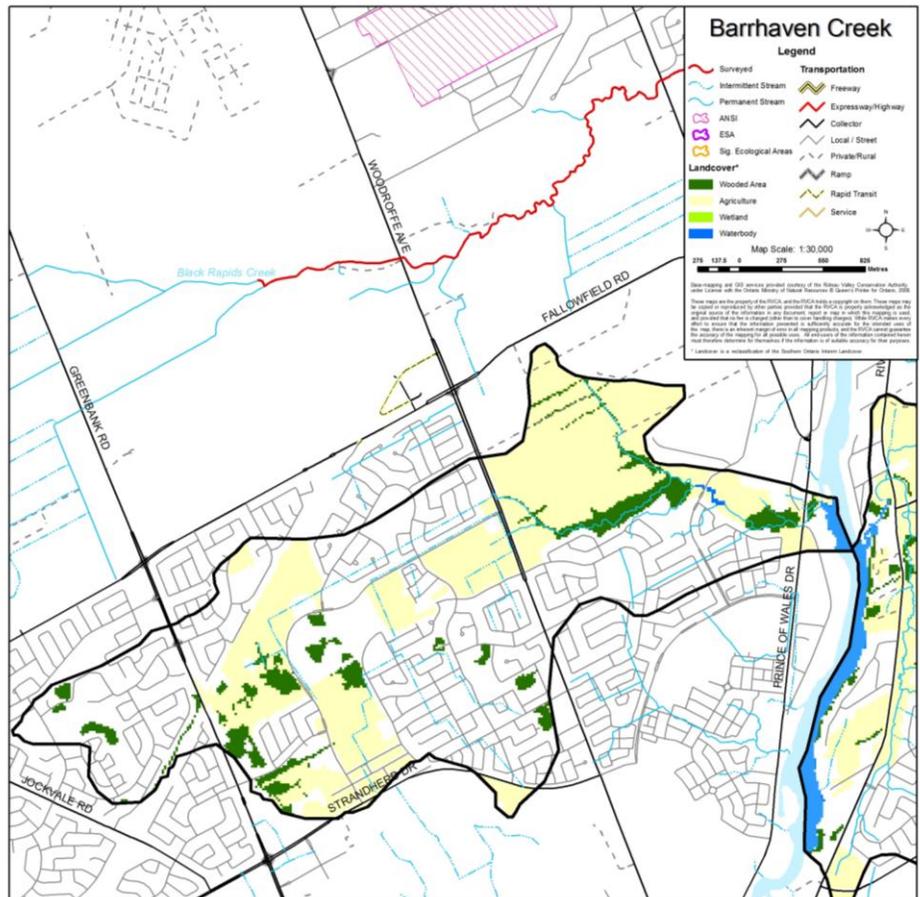


Barrhaven Creek 2009 Summary Report

The Rideau Valley Conservation Authority, in partnership with six other agencies in Ottawa (City of Ottawa, Heron Park Community Association, Ottawa Flyfishers Society, Ottawa South Community Association, Rideau River Roundtable and National Defense HQ – Fish and Game Club) initiated the City Stream Watch program in 2003.

Watershed Features

Area	7 square kilometres, 0.2% of the Rideau River watershed
Land Use	0.3% hedgerow, 19% mixed agriculture, 12% monoculture, 2% rural land use, 2% transportation, 0.3% unclassified, 58% urban, 6% wooded area, 0.4% waterbody
Surficial Geology	69% clay, 28% diamicton, 3% Paleozoic bedrock
Watercourse Length & Type	<i>Total length:</i> 10 km <i>Watercourse type:</i> 82% natural, 18% channelized <i>Flow type:</i> 30% permanent, 70% ephemeral
Dams & Barriers	There are a total of 5 permanent or seasonal fish migratory obstructions along Barrhaven Creek. These consisted mainly of log/sediment jams and woody material.
Spills	There were no spills reported by CSW staff in 2009.
Species at Risk	There were no species at risk observed during stream surveys in 2009.



Vegetation Cover Types		
Types	Hectares	% of Cover
Wetlands	0	0
Wooded areas	43	93
Hedgerow	3	7
TOTAL COVER	46	100%

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

Woodlot Size		
Size Category	Number of Woodlots	% of Woodlots
<1 ha	53	82
1-9 ha	11	17
10-30 ha	1	2
>30 ha	0	0



Figure 1. Volunteers attending a fish sampling demonstration on Barrhaven Creek

The headwaters of Barrhaven Creek begin at Woodroffe Avenue and flow east through a large two-celled stormwater management pond, before crossing Prince of Wales Drive and flowing into the Rideau River. Its headwaters used to begin near Greenbank but were lost to development. In late 1974, an experimental online-stormwater facility was first constructed at the location of the current stormwater facility on Leikin Drive to treat stormwater by impoundment. This pilot facility was replaced by the East Barrhaven Stormwater Facility in 1980/81 and subsequently upgraded in 1991/92, increasing storage volume and providing ultraviolet disinfection to the stormwater before discharge (Rooke, City of Ottawa, 2009). The surficial geology of the Barrhaven Creek subwatershed consists of silty clay, clay and silt. Most of the vegetation was cleared years ago for agricultural purposes, aside from the banks of the creek itself. The shoreline of the creek is mainly wooded, consisting of sugar maple, basswood, ash and elm. In a watershed planning study conducted in 1989, it was recommended that due to the amount of deforestation that had already occurred in that drainage area, there should be no further loss of forested buffer and that it would be beneficial to enhance the buffer with further plantings to improve the integrity of the stream. The benthic study done in 1989 suggested some organic pollution present (UMA Engineering Ltd., 1989). Twenty sections (two kilometres) of Barrhaven Creek were sampled in the 2009 season. The creek was surveyed in its entirety, with the exception of the stormwater treatment facility area. The following is a summary of the 20 macro-stream assessment forms completed by staff and volunteers.

Anthropogenic Alterations to Barrhaven Creek

Of the 20 sections sampled, only five percent of the stream remained without any anthropogenic alterations. Sixty-five percent were considered natural, with some anthropogenic changes, ten percent were considered "altered" but still had natural features and twenty percent were considered "highly altered" with few natural portions. Areas that were listed as "altered" or "highly altered" were associated with road crossings, culverts, stormwater inputs, channelized sections or areas that had little or no buffer or little aquatic or wildlife habitat.

Anthropogenic Alterations to Barrhaven Creek

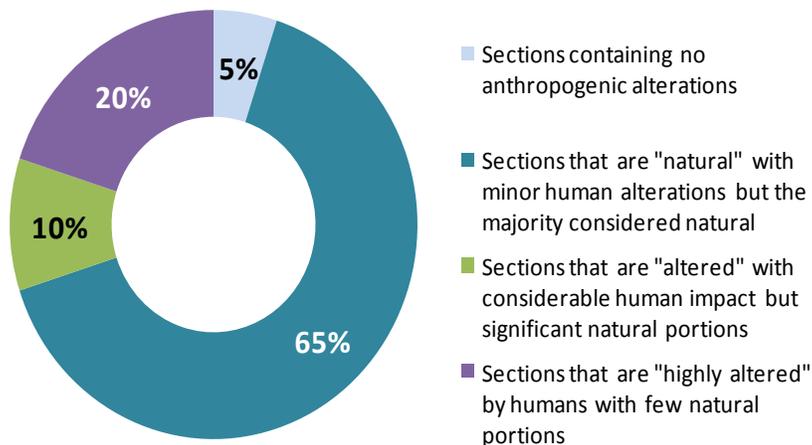


Figure 2. Channel and shoreline alterations along Barrhaven Creek

Land Use Adjacent to Barrhaven Creek

Fifty-two percent of Barrhaven Creek was considered natural, characterized by forest, scrubland and a bit of meadow. The two other major land uses were agricultural (21 percent) and residential (23 percent). The headwaters are mainly agricultural and residential areas run along the left bank, from the mouth to the headwaters. Four percent of the land use was infrastructure, which included road crossings, stormwater outlets and the stormwater treatment facility.

Land Use Adjacent to Barrhaven Creek

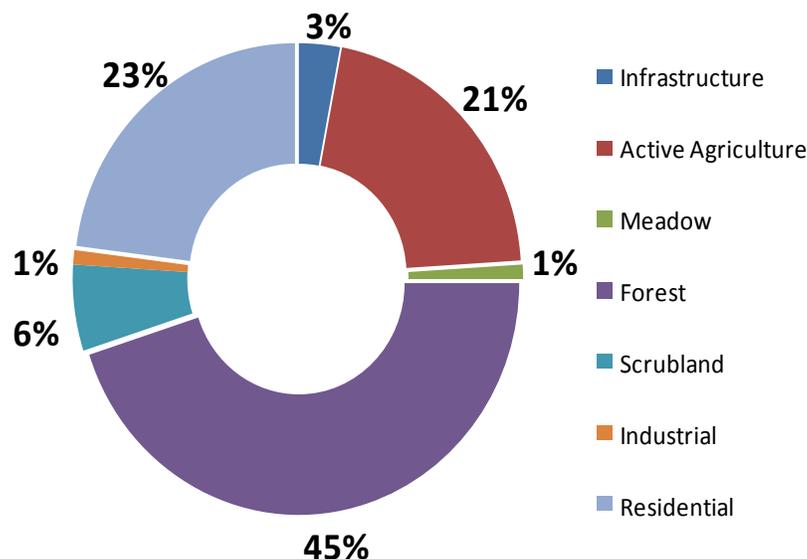


Figure 3. Landuse adjacent to Barrhaven Creek

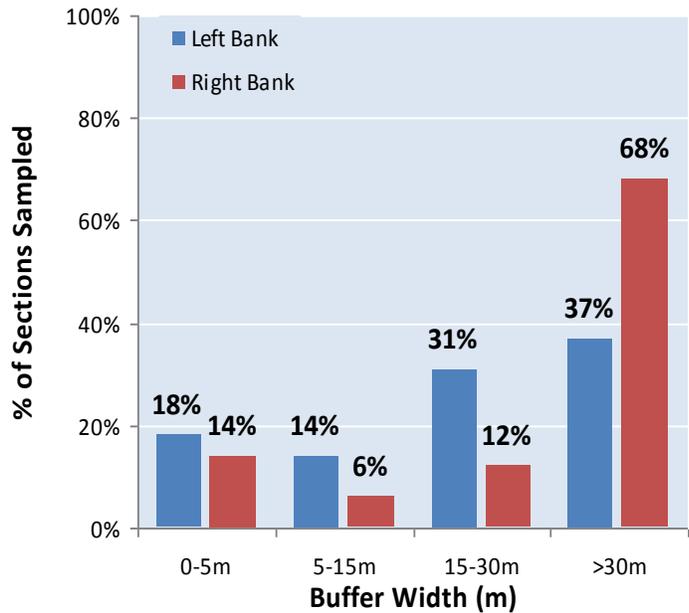
Buffer Evaluation of Barrhaven Creek

Natural buffers are extremely important for filtering excess nutrients running into the creek, infiltrating rainwater, maintaining bank stability, maintaining baseflow levels, keeping water temperatures cool and providing wildlife habitat. According to the document *How Much Habitat Is Enough*, a stream is recommended to have riparian areas of 30 metres minimum or more, depending on the site conditions. The right bank along Barrhaven Creek had a wider buffer for more stream length than the left bank.



Figure 4. Alterations to the natural buffer along Barrhaven Creek

Buffer Evaluation of Barrhaven Creek

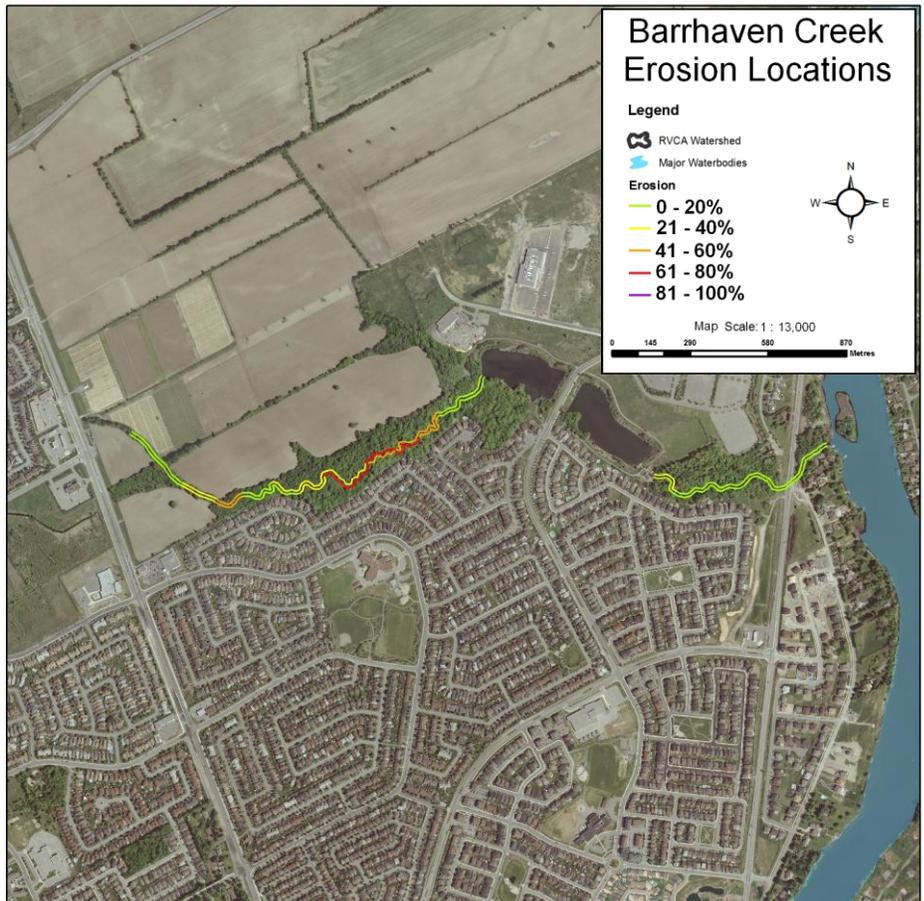


Erosion on Barrhaven Creek

Erosion is a normal, important stream process and may not negatively affect bank stability; however, excessive erosion and deposition of sediment within a stream can have detrimental effects to important fish and wildlife habitat. Along Barrhaven Creek, 73 percent of the sections surveyed were considered stable and 27 percent unstable; results were the same for both the left and right banks.



Figure 5. Eroded shoreline along Barrhaven Creek



Instream Morphology Features

Pools and riffles are important features for fish habitat. Riffles contribute higher dissolved oxygen to the stream and act as spawning substrate for some species of fish and pools provide shelter for fish and can be refuge areas. 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. Barrhaven Creek consists of large runs with 25 percent pools and 11 percent riffles. Overall, stream conditions are quite diverse.

Instream Morphology of Barrhaven Creek

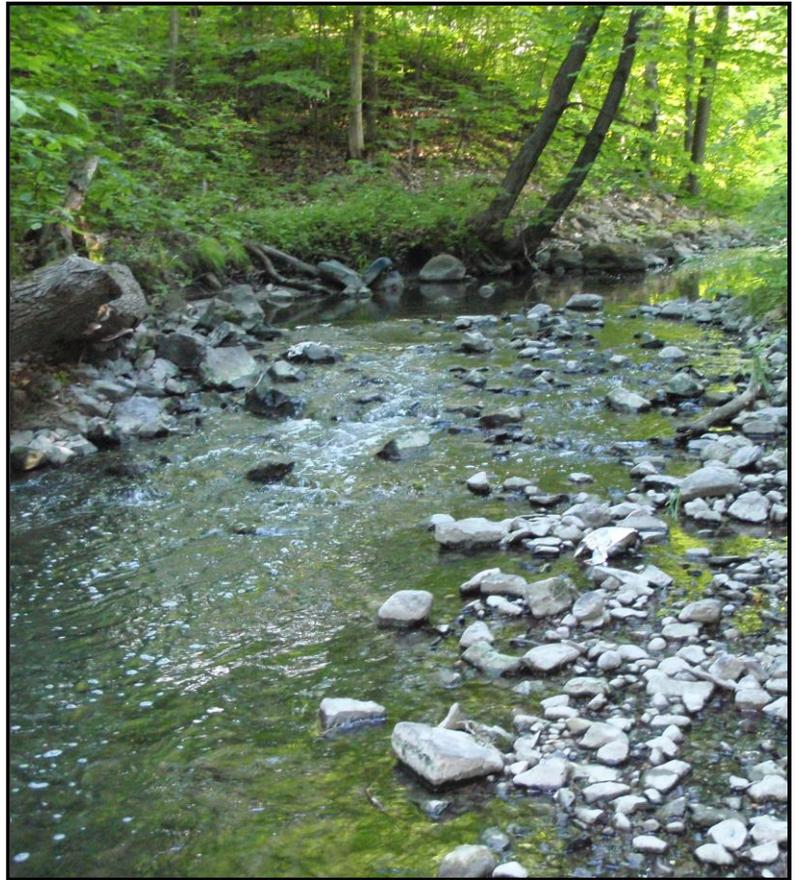
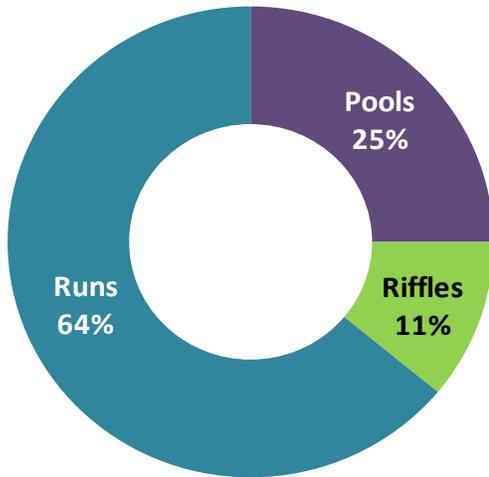


Figure 6. Instream morphology along Barrhaven Creek (riffle)

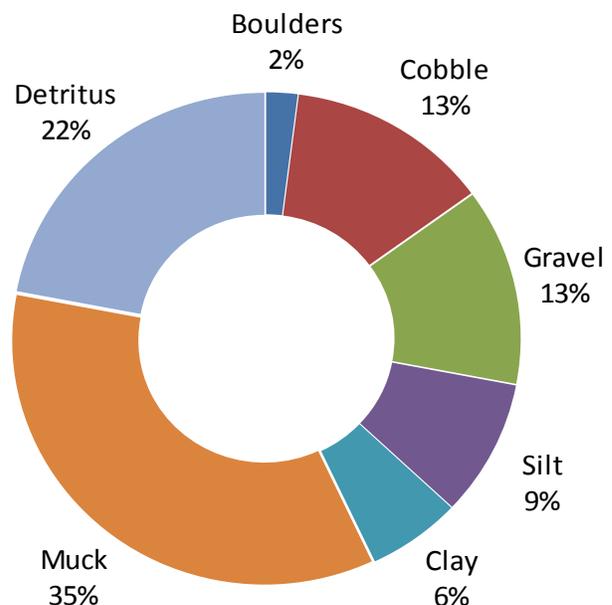
Types of Instream Substrate

Diverse substrate is important for fish and benthic macroinvertebrate habitat for spawning, resting, over wintering and feeding. Over half of the substrate observed in Barrhaven Creek was muck (mixture of clay, silt and sand) and detritus, most of which was found upstream of the stormwater treatment facility. A variety of other substrates were observed in smaller percentages.



Figure 7. Clay/muck substrate along Barrhaven Creek

Types of Instream Substrate Along Barrhaven Creek



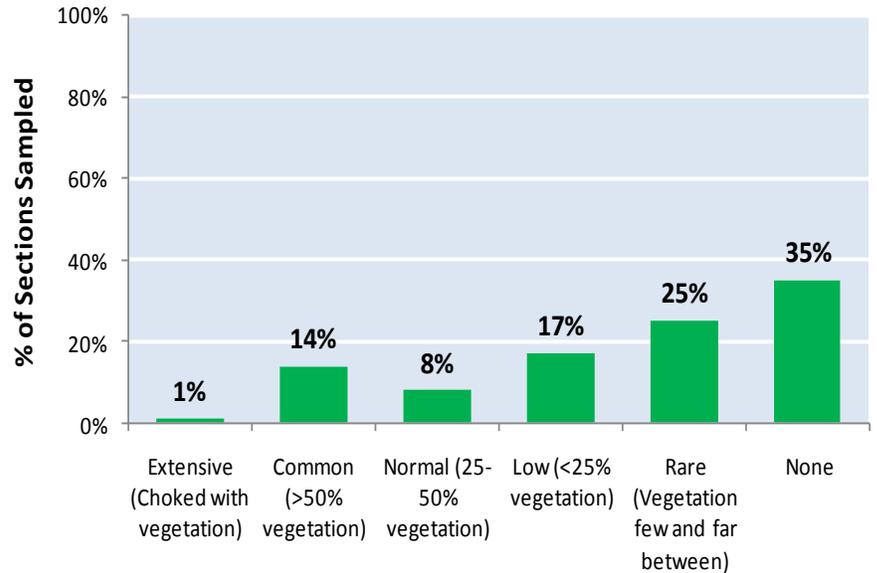
Instream Vegetation

Instream vegetation is an important factor for a healthy stream ecosystem; it helps to remove contaminants, contributes oxygen and provides habitat for fish and wildlife, although extensive vegetation can have negative impacts. A healthy level of vegetation was observed in only 22 percent of Barrhaven Creek; the majority of the stream had little to no vegetation. Areas upstream of the stormwater treatment facility were surveyed in April, before aquatic vegetation had a chance to grow. Extensive levels of vegetation were observed directly downstream of the stormwater treatment facility.



Figure 8. Instream emergent vegetation along Barrhaven Creek

Instream Vegetation of Barrhaven Creek



Pollution Observed in Barrhaven Creek

Pollution and garbage along Barrhaven Creek was assessed visually and noted for each section where it was observed. Only ten percent of the stream surveyed was free of pollution or garbage. Along the rest of the stream, 65% had floating garbage in the water and 40% had garbage on the stream bottom. In five percent of the sections, oil and gas trails were observed.

Pollution Observed in Barrhaven Creek

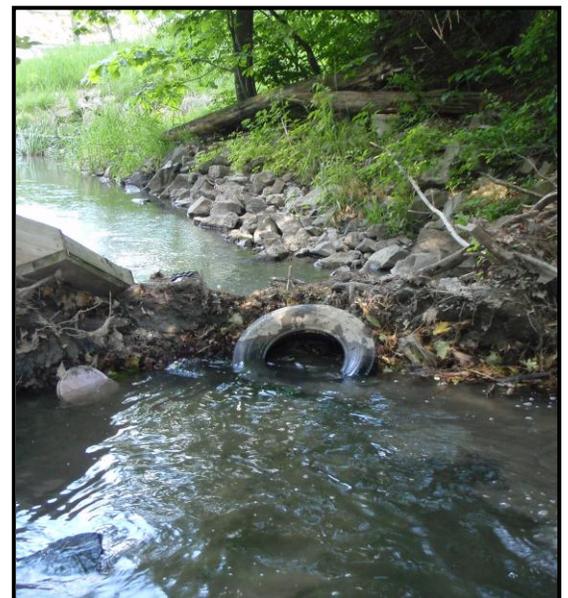
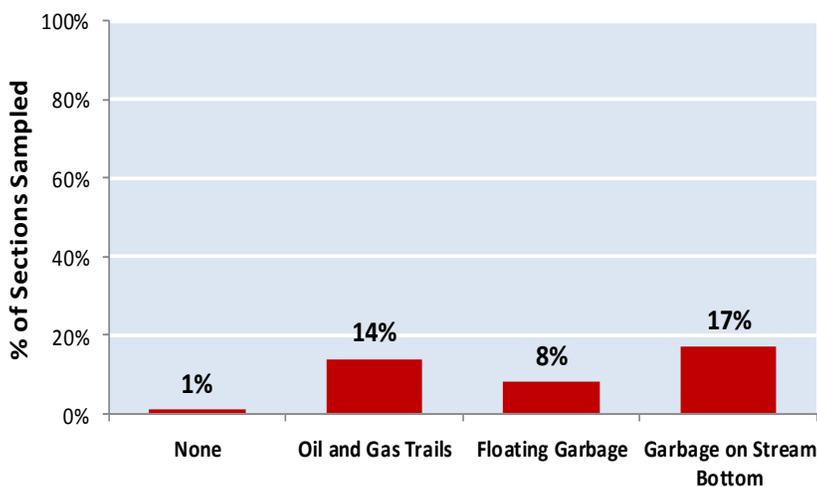


Figure 9. Pollution observed along Barrhaven Creek

Barrhaven Creek

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Wildlife Observed While Sampling

Wildlife	Observed While Sampling
Birds	ducks, geese, mallards, red-winged blackbird, hawk, woodpecker, blackbird, yellow finch, starling, chickadee
Mammals	muskrat, raccoons, red squirrel
Reptiles/Amphibians	frogs, tadpoles
Aquatic Insects	water striders, leeches, molluscs
Other	butterflies, mosquitoes, horseflies

Monitoring and Event History

Year	Accomplishment	Description
2009	Twenty macro stream surveys were completed on Barrhaven Creek	Volunteers began at the mouth of the creek and worked their way upstream (with the exception of the stormwater treatment facility), taking measurements and making observations on instream and riparian habitat, bank stability, land use, etc.
2009	OSAP (Ontario Stream Assessment Protocol) site established by City of Ottawa	City of Ottawa used the OSAP protocol to evaluate the reach directly downstream of the SWMF. Data collected included channel morphology data, benthos species and fish species.
2009	Fish Sampling	Fish sampling was carried out at three sites along Barrhaven Creek. Two of those three sites were sampled each month from April to July. A combination of fyke nets, windemere traps, a seine net and electrofishing were used to capture fish. A total of 19 species were caught.
2009	Temperature Profiling	RVCA staff placed a temperature probe upstream of Prince of Wales Drive to obtain thermal information for the system.

Local Actions for Improvement of Barrhaven Creek

Type of Project	Description
Stream Garbage Cleanups	Please see migratory obstruction removal.
Riparian Planting/Buffer Enhancements	Riparian plantings and buffer improvements with native species could be implemented to enhance wildlife habitat and help filter runoff from the surrounding area for approximately: -6km along the left bank -5km on the right bank -5km along the tributaries to Barrhaven -on the right bank of the stormwater treatment facility
Migratory Obstruction Removal	Two migratory obstructions could be removed. One obstruction has built up near Prince of Wales Drive. Game fish were caught downstream of the obstruction. The obstruction should be removed so that fish can access potential spawning and nursery habitat farther upstream.
Invasive Species Control	The only invasive species observed along Barrhaven Creek was rusty crayfish (<i>Orconectes rusticus</i>). Rusty crayfish are very difficult to control once introduced and can be spread via bait buckets. If you see a suspected rusty crayfish, you can report it to the Ontario Federation of Anglers and Hunters invading species hotline: 1-800-563-7711



Figure 10. Volunteers identifying fish during a sampling session (LEFT); Smallmouth bass captured in Barrhaven Creek (RIGHT)

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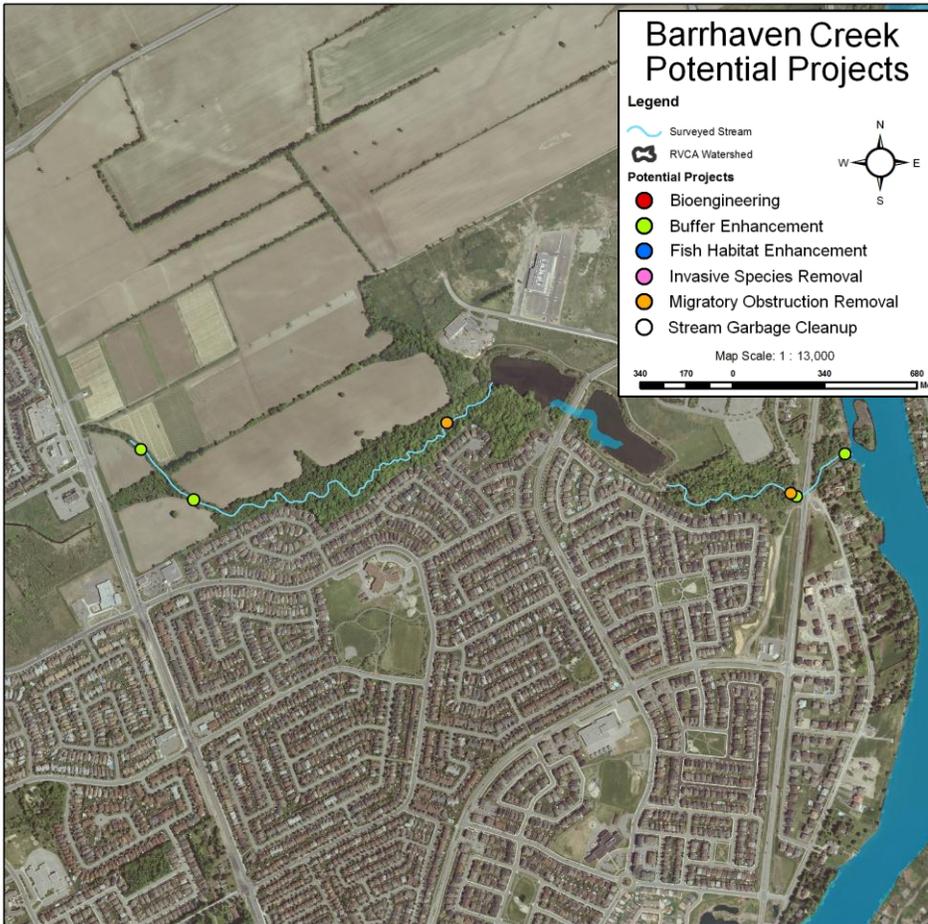


Figure 11. Fish collection using an electrofishing device in Barrhaven Creek (ABOVE); Migratory obstruction observed within Barrhaven Creek (BELOW)

Summary of Water Quality Data for Barrhaven Creek

During the surveys, a YSI probe was used to collect values on dissolved oxygen, conductivity and pH. Barrhaven is a relatively short creek, and the two kilometers that were surveyed were mainly completed in April; therefore there is no data for August or September. The data from the 2009 season is summarized in the following chart.

Dissolved Oxygen: A measure of the amount of oxygen dissolved into a medium, such as water

Conductivity: 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: A measure of relative acidity or alkalinity, ranging from 1 (most acidic) to 14 (most alkaline/basic), with 7 occupying a neutral point.

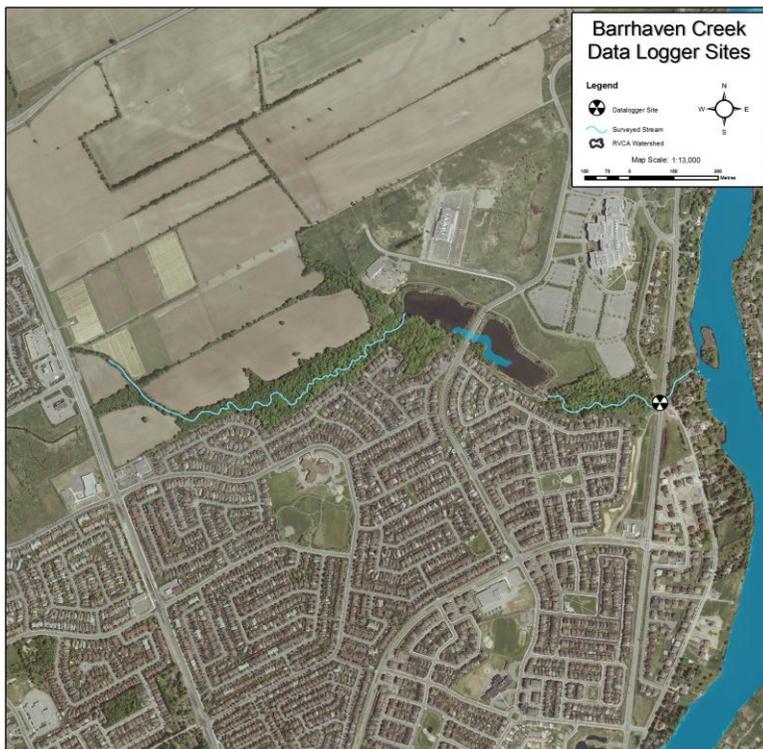
Month	Range	DO (mg/L)	Conductivity (µs/cm)	pH
April	low	7.46	430	7.43
	high	9.45	769	8.55
May	low	10.58	723	8.09
	high	12.07	730	8.35
June	low	7.4	1114	8.15
	high	12.79	1245	8.54
July	low	8.63	323	7.55
	high	9.59	870	7.79
August	low	N/A*	N/A*	N/A*
	high	N/A*	N/A*	N/A*
September	low	N/A*	N/A*	N/A*
	high	N/A*	N/A*	N/A*

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Temperature Profiling

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. One temperature datalogger was placed in Barrhaven Creek at Prince of Wales Drive. Water temperature values from July, August and September are colour coded for cold, cool and warm water classification and are listed in the chart under "class". Classification is based on the Ontario Stream Assessment Protocol. Based on the stream temperature classification and fish community structure, currently Barrhaven Creek can be classified as a cool water system with warm water reaches. The fish community results show a presence of mainly cool water species (11), three cool/warm water species and five warm water species. There may be stream temperature influences as the result of the upstream stormwater treatment facility which could result in a shift from a cool water system to a warm water system.

Month	Range	Datalogger 1 (°C) Prince of Wales
April	low	4.72
	high	17.66
May	low	8.45
	high	19.44
June	low	13.1
	high	27.78
July	low	17.5
	high	23.41
	class	none
August	low	15.91
	high	26.36
	class	25.48
September	low	13.87
	high	23.07
	class	none



Blue values represent coldwater (<19°C), green values coolwater (19-25°C) and red values (>25°C) warm water temperatures none-there were no days meeting the OSAP temperature classification criteria during this month
September**-Temperature loggers were removed September 22, therefore temperatures recorded do not include the entire month

Fish Sampling

Three sites were sampled on Barrhaven Creek using a fyke net, a windemere trap, a seine net and electrofisher. A total of 19 fish species were caught: black crappie, bluegill, bluntnose minnow, brassy minnow, brook stickleback, common shiner, creek chub, fathead minnow, finescale dace, largemouth bass, logperch, northern pike, northern redbelly dace, pumpkinseed, rock bass, smallmouth bass, walleye, white sucker, yellow perch. Although different species were captured at all sites, species diversity was the same for the first and third site. The trophic guild for each species was varied, ranging from herbivores and insectivores to omnivores and piscivores. The majority of the species found are moderately tolerant to sediment/turbidity for reproduction and feeding. Fish species such as bass, black crappie and walleye that are sensitive to sediment and turbidity for feeding were caught close to the Rideau River, although smallmouth bass were caught directly downstream of the stormwater treatment facility.

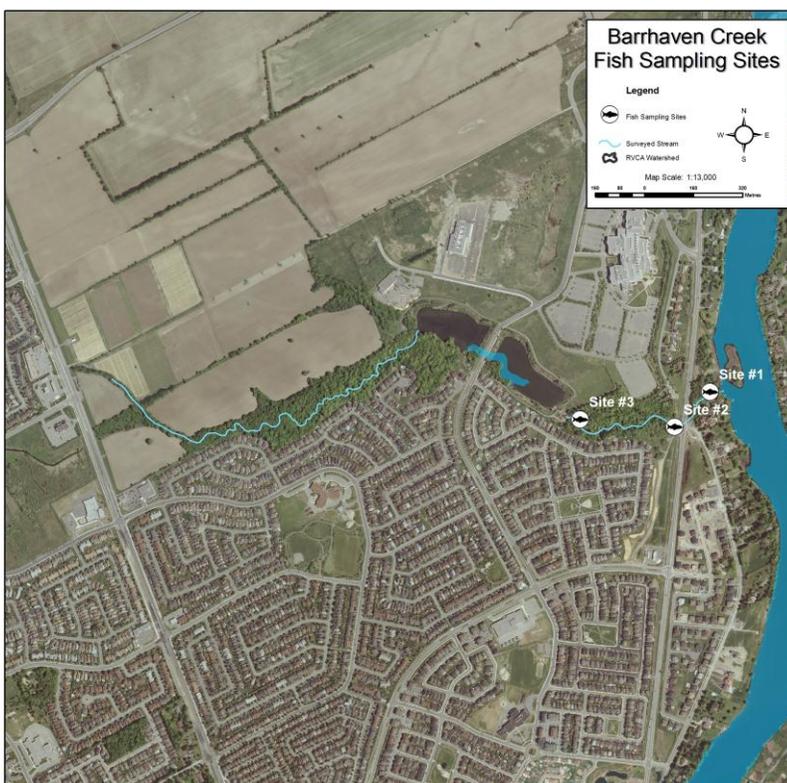


Figure 12. Juvenile walleye captured along Barrhaven Creek

Barrhaven Creek

City Stream Watch Report, 2009

Ontario Benthic Biomonitoring Network (OBBN) Data Summary for Barrhaven Creek

Freshwater benthic macroinvertebrates are animals without backbones that live on the stream bottom and include crustaceans such as crayfish, molluscs and immature forms of aquatic insects. Benthos represents an extremely diverse group of aquatic animals and exhibit wide ranges of responses to stressors such as organic pollutants, sediments and toxicants, which allows scientists to use them as bioindicators.

Family Biotic Index (Hilsenhoff):	2009 (Fall)	Rating
Barrhaven Creek	5.95	Fairly Poor

Family Biotic Index (Hilsenhoff)

Family Biotic Index	Water Quality	Degree of Organic Pollution
0.00 - 3.75	Excellent	Organic pollution unlikely
3.76 - 4.25	Very Good	Possible slight organic pollution
4.26 - 5.00	Good	Some organic pollution probable
5.01 - 5.75	Fair	Fairly substantial pollution likely
5.76 - 6.50	Fairly Poor	Substantial pollution likely
6.51 - 7.25	Poor	Very substantial pollution likely
7.26 - 10.00	Very Poor	Severe organic pollution likely

Please refer to the 2009 City Stream Watch Annual Report for more detailed information. The report is listed at:
<http://www.rvca.ca/programs/streamwatch/index.html>

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2009 City Stream Watch Sponsors

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- Fisheries and Oceans Canada for their financial contribution
- RBC Blue Water Project for their financial contribution
- TD Friends of the Environment for their financial contribution