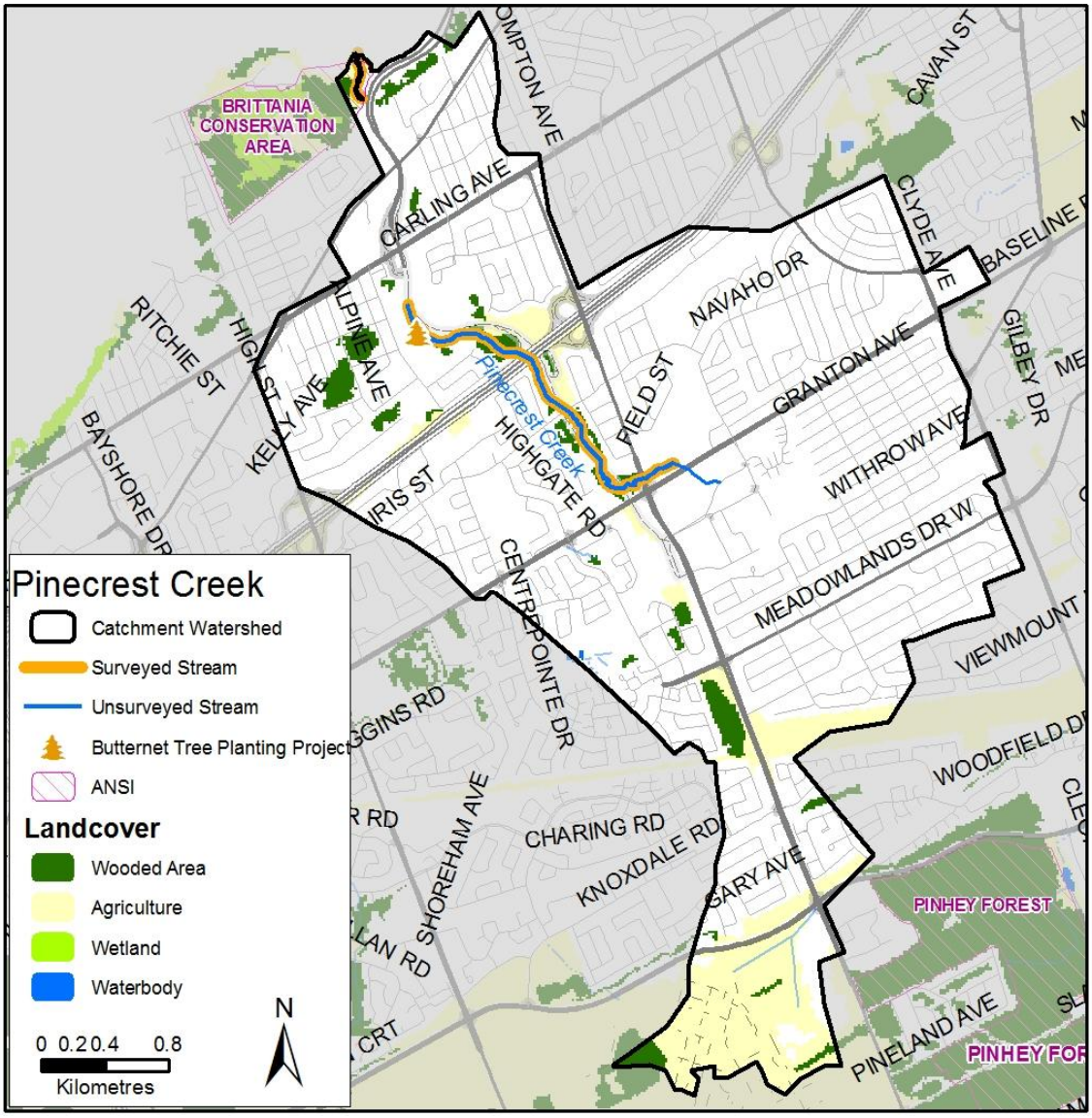
Pinecrest Creek 2011 Summary Report

Watershed Features

Area	14 square kilometres, 0.3% of the Rideau River watershed
Land Use	8.43% agriculture 86.35% urban 3.18% forest 1.38 % rural land-use 0.01 % waterbody 0% wetlands 0.65% unclassified
Surficial Geology	49% clay 26% diamicton 0% gravel 3% organic deposits 2% bedrock 20% sand
Watercourse Length and Type	*Total length*: 5 km *Watercourse type*: 65% natural 35% channelized *Flow type*: 100% permanent
Invasive Species	There were four invasive species identified along Pinecrest Creek.
Fish Community	10 fish species were sampled near the mouth in 2011. Only one species was captured above the migratory obstruction. Game fish captured include brown bullhead, silver redhorse and longnose gar.
Species at Risk	Species at risk known to be present in the Pinecrest Creek subwatershed include chimney swift, butternut, American eel, Blanding's turtle and milksnake.



Vegetation Cover

Types	Hectares	% of Cover
Wetlands	0	0
Wooded areas	43.8	98
Hedgerow	0.25	1
Plantation	0.5	1
TOTAL COVER		**100%**

Wooded Area

Size Category	Number of Woodlots	% of Woodlots
<1 ha	24	63
1-9 ha	14	37
10-30 ha	0	0
>30 ha	0	0

Wetland Cover

None of the watershed is in wetland cover.

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 Roundtable and National Defense HQ – Fish and Game Club), initiated the City Stream Watch program in 2003.

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Pinecrest Creek is considered to be one of Ottawa's most urbanized streams. Land use within the subwatershed has been transformed from forest to agricultural to urbanized, its current state. The past land use changes have altered the creek considerably (Sabourin, J.F. & Associates, Inc., 2011). Pinecrest Creek is 4.2 kilometres long, beginning south of Hunt Club Road as agricultural drains, and flows north, emptying into the Ottawa River just west of Westboro Beach. Although it is 4.2 kilometres long, only 2.5kilometres of the stream is open to air; the rest of the creek is entombed. The stream is piped from the headwaters to Baseline and then Carling Avenue to just north of the Ottawa River Parkway. Much of the past development occurred without any stormwater management implementation, and this has heavily impacted proper stream function, accelerated erosion and led to degradation of water quality and fish habitat. A field inventory conducted by J.F. Sabourin and Associates Inc. (2011) identified 52 outfalls within the watershed. There is also a culvert near the mouth of the creek that is an obstruction to fish passage; as a result, only a small population of white sucker can be found upstream of the culvert, in the main stem of the creek. The City of Ottawa is currently working on a stormwater management plan for Pinecrest Creek to help improve water quality, address erosion issues and increase fish habitat. In 2008, the NCC carried out seven restoration projects on Pinecrest Creek to help decrease bank erosion, increase floodplain access and improve stream functions. Post-project monitoring has indicated the restoration has been successful and conditions are improving (JTB Environmental Systems Inc., 2011). In 2011, 26 sections along the open areas of Pinecrest Creek were surveyed by City Stream Watch staff and volunteers. The areas along the stream that were not surveyed were sections where the creek is entombed. The following is a summary of the 26 macro-stream assessment surveys.

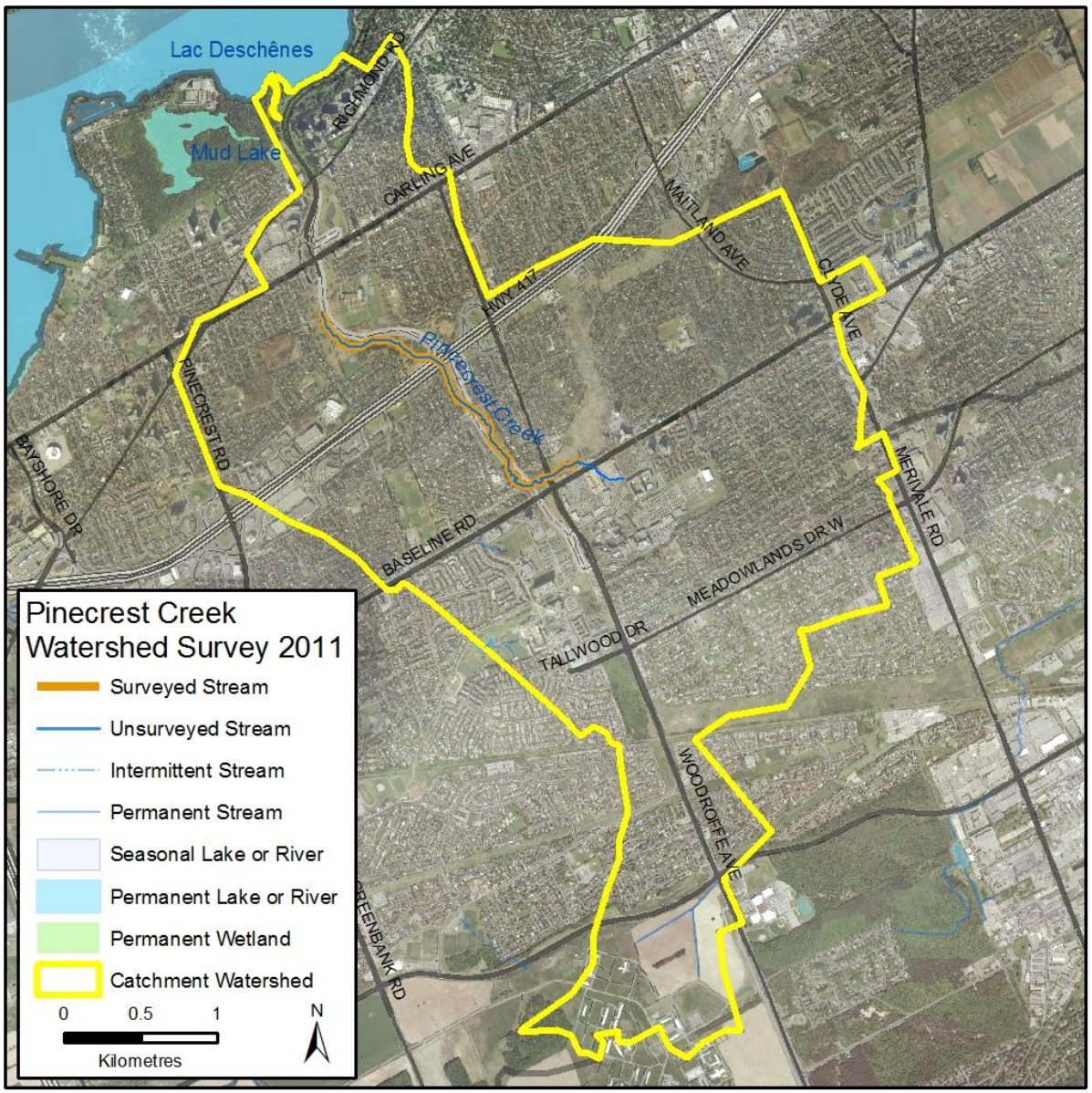

Figure 1. Air photo of Pinecrest Creek Subwatershed and Surveyed Area

Anthropogenic Alterations to Pinecrest Creek

Figure 2 illustrates the classes of anthropogenic alterations observed along Pinecrest Creek. Of the 26 sections sampled, only three percent of the stream remained without any human alteration. Sections considered natural, but with some anthropogenic changes made up 31 percent of the sections sampled, and 12 percent accounted for sections that were considered "altered" but still had natural features. Fifty-four percent of the sampled areas were "highly altered" with few natural portions. Areas that were listed as "altered" or "highly altered" were associated with road crossings, culverts, channelized sections or areas that had little or no buffer and little aquatic or wildlife habitat. Only one section was considered not altered (three percent), and this section was at the confluence with the Ottawa River.

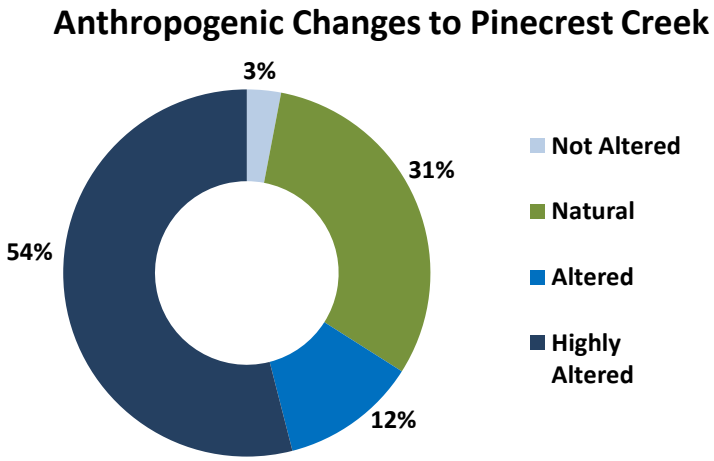

Photo of gabion baskets, a bank alteration

Figure 2. Classes of Anthropogenic Alterations Occurring along Pinecrest Creek

Land Use Adjacent to Pinecrest Creek

Nine different land uses were identified along the banks adjacent to Steven's Creek. 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 they surveys but is nonetheless part of the subwatershed and will influence the creek. Natural areas made up 49 percent of the stream (30 percent forest, 12 percent meadow and 5 percent scrubland), characterized by forest, scrubland, meadow with a small amount of wetland identified at the mouth. The other major land uses observed were residential, infrastructure and recreational. The remaining land uses that made up a small percentage of the stream were industrial/ commercial and "other". "Other" was where the adjacent land use was the banks of the Ottawa River.

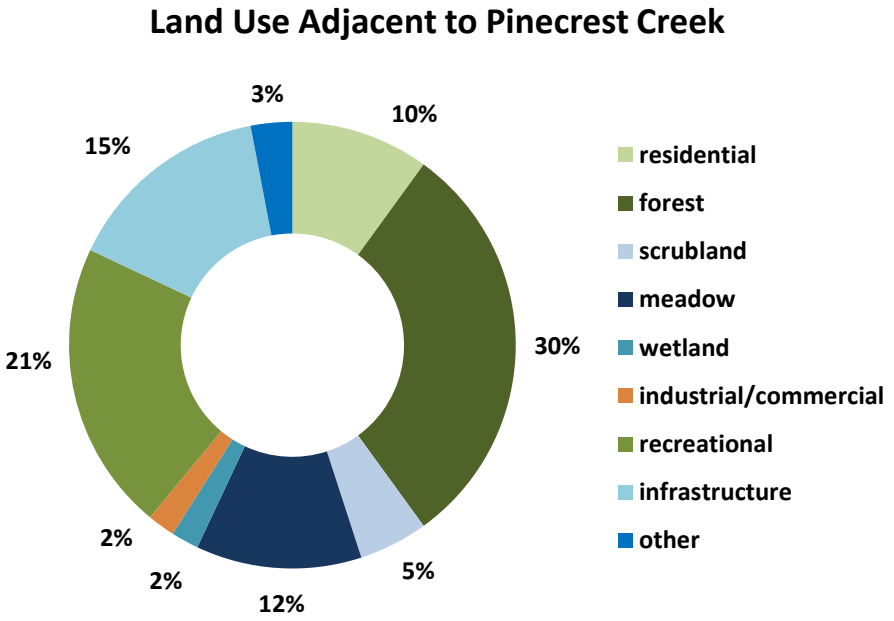

Photo of land use at the confluence with the Ottawa River

Figure 3. Land Use Identified Along Pinecrest Creek

Channel Type

Streams are naturally meandering systems and move over time, and there are varying degrees of sinuosity (curviness), depending on the creek. However, in the past, humans have altered creeks and straightened areas, which can be quite detrimental to stream function and health. Out of the 26 sections surveyed, 35 percent were considered channelized.

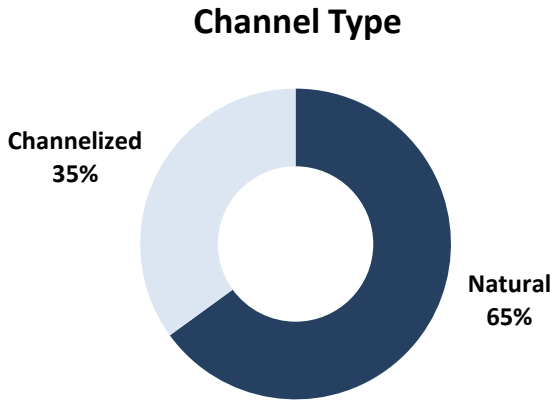

Figure 4. Channel Type Observed Along Pinecrest Creek

Instream Morphology of Pinecrest Creek

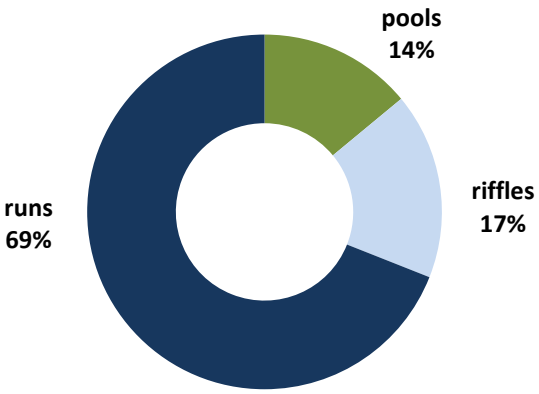

Figure 5. Instream Morphology of Pinecrest Creek

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 provide refuge 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 water surfaces, and areas where the thalweg (deepest part of the channel) is in the center of the channel. Pinecrest Creek had a good variety of runs, pools and riffles as, illustrated in Figure 5.

Types of Instream Substrate

Diverse substrate is important for fish and benthic invertebrate habitat because some species will only occupy certain types of substrate and will only reproduce on certain types of substrate. Boulders create instream cover and back eddies for large fish to hide and/or rest out of the current, and cobble provides important over wintering and/or spawning habitat for small or juvenile fish. Other substrates also provide instream habitat for fish and invertebrates. Ten different substrates were found instream along Pinecrest Creek. The substrates found in highest abundance were bedrock, cobble, gravel and sand, for a total of 77 percent. Clay, muck, silt, detritus and "other" were observed in smaller amounts. "Other" refers to culverts where the bottom does not have any sediment deposition and is therefore unnatural (metal or concrete).

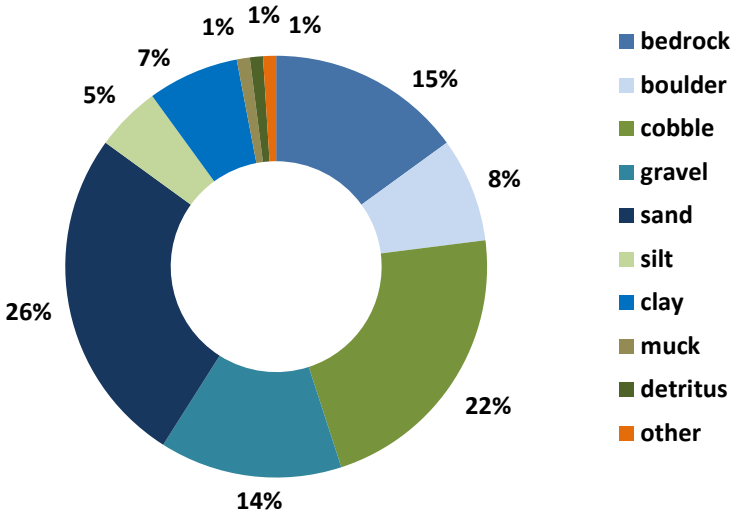

Figure 6. Types on Instream Substrate Along Pinecrest Creek

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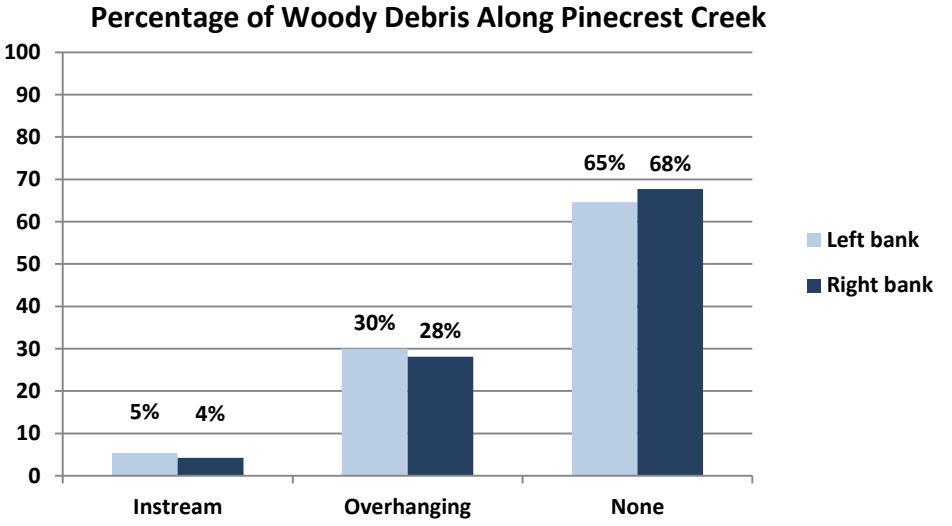

Figure 7. Amount of Woody Debris Observed Along Pinecrest Creek

Woody debris (logs, branches) are important for fish and benthic habitat, by providing refuge and feeding areas. Overhanging branches and trees provide a food source, nutrients and shade. The majority of Pinecrest Creek has no woody debris instream. Pinecrest Creek experiences flashy flows during which woody material could be flushed out of the system. Twenty-eight to 30 percent of the stream had overhanging woody material.

Photo of overhanging and instream woody debris

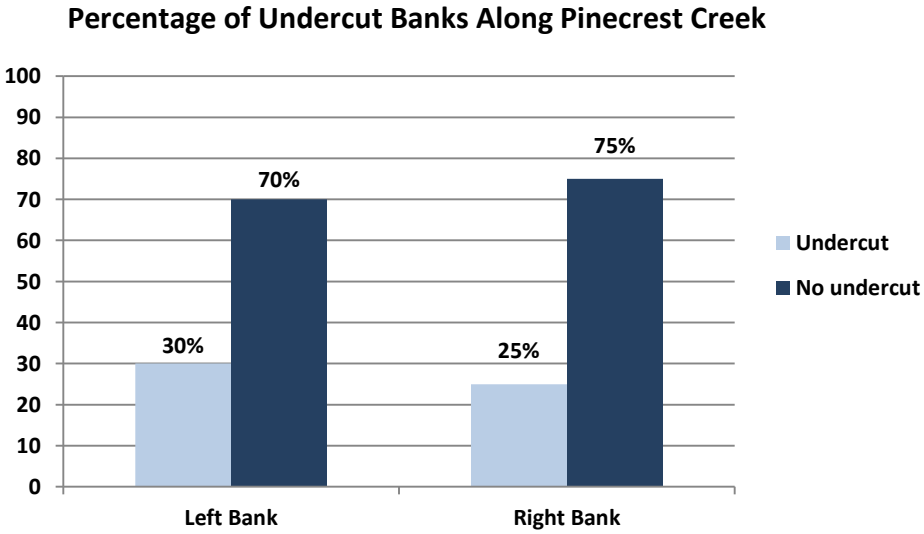

Figure 8. Amount of Undercut Banks Along Pinecrest Creek

Undercut banks are a normal and important part of stream function. The overhanging banks provide excellent refuge areas for fish. Of the sections surveyed, 30 percent of the left bank and 25 percent of the right bank were considered undercut.

Photo of shaded area along Pinecrest Creek

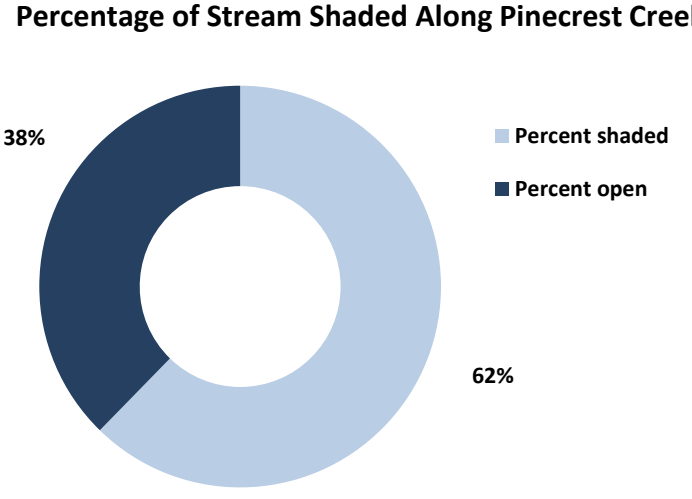

Figure 9. Overall Shading Along Pinecrest Creek

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. Pinecrest Creek is fairly shaded, with only 38 percent considered open.

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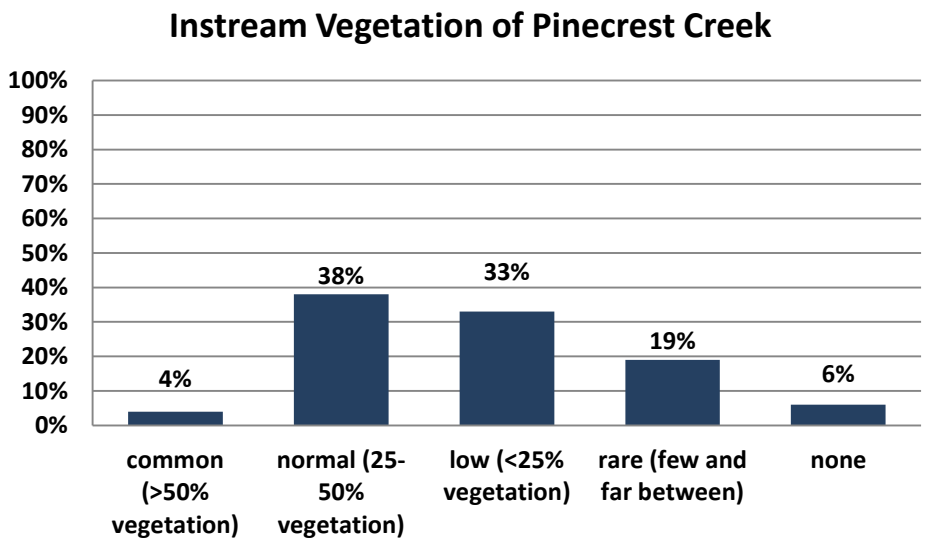

Figure 10. Amount of Instream Vegetation in Pinecrest Creek

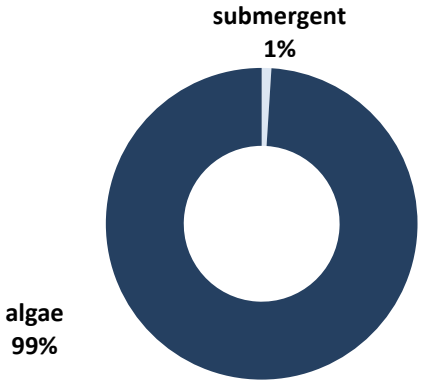

Figure 11. Types of Instream Vegetation in Pinecrest Creek

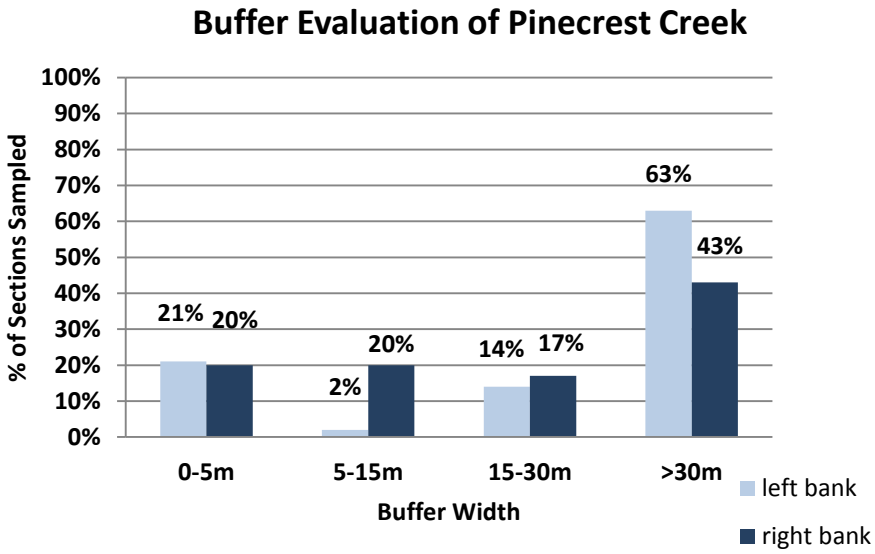

Figure 12. Buffer Evaluation of Pinecrest Creek

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. However, too much vegetation can be detrimental. Figure 10 demonstrates the frequency of instream vegetation in Pinecrest Creek. Pinecrest Creek did not have a healthy level or variety of instream vegetation for most of its length; only 42 percent was considered to have common or normal levels, and in these areas, the majority of the vegetation observed was algae. Fifty-two percent of the stream was considered to have low or rare levels, and six percent of the surveyed areas had no vegetation at all. Pinecrest Creek has flashy water level fluctuations that could make it challenging for instream vegetation to establish itself.

Types of Instream Vegetation

Different types of vegetation are required for different species of fish, birds and wildlife. A healthy stream will have a variety of instream vegetation. Pinecrest Creek did not have a healthy diversity of instream vegetation. Ninety-nine percent of sections surveyed consisted of algae, and only one percent had submergent vegetation which was located at the mouth of the stream.

Buffer Evaluation

Natural buffers between watercourses and human alterations are extremely important for filtering excess nutrients running into the creek, infiltrating rainwater, maintaining bank stability and providing wildlife habitat. Natural shorelines also shade the creek, helping maintain baseflow levels and keeping water temperatures cool. According to the document *How Much Habitat Is Enough*, it is recommended that a stream have a minimum of 30 metres of riparian area or more (the more the better). Along Pinecrest Creek, 20 to 21 percent had a buffer of only zero to five metres. Two percent of the left bank and 20 percent of the right bank had a buffer of five to 15 metres. Fourteen to 17 percent had a buffer of 15 to 30 metres. Sixty-three percent of the left bank met the minimum buffer recommendation from the Environment Canada document; however, this was only achieved on 43 percent of the right bank.

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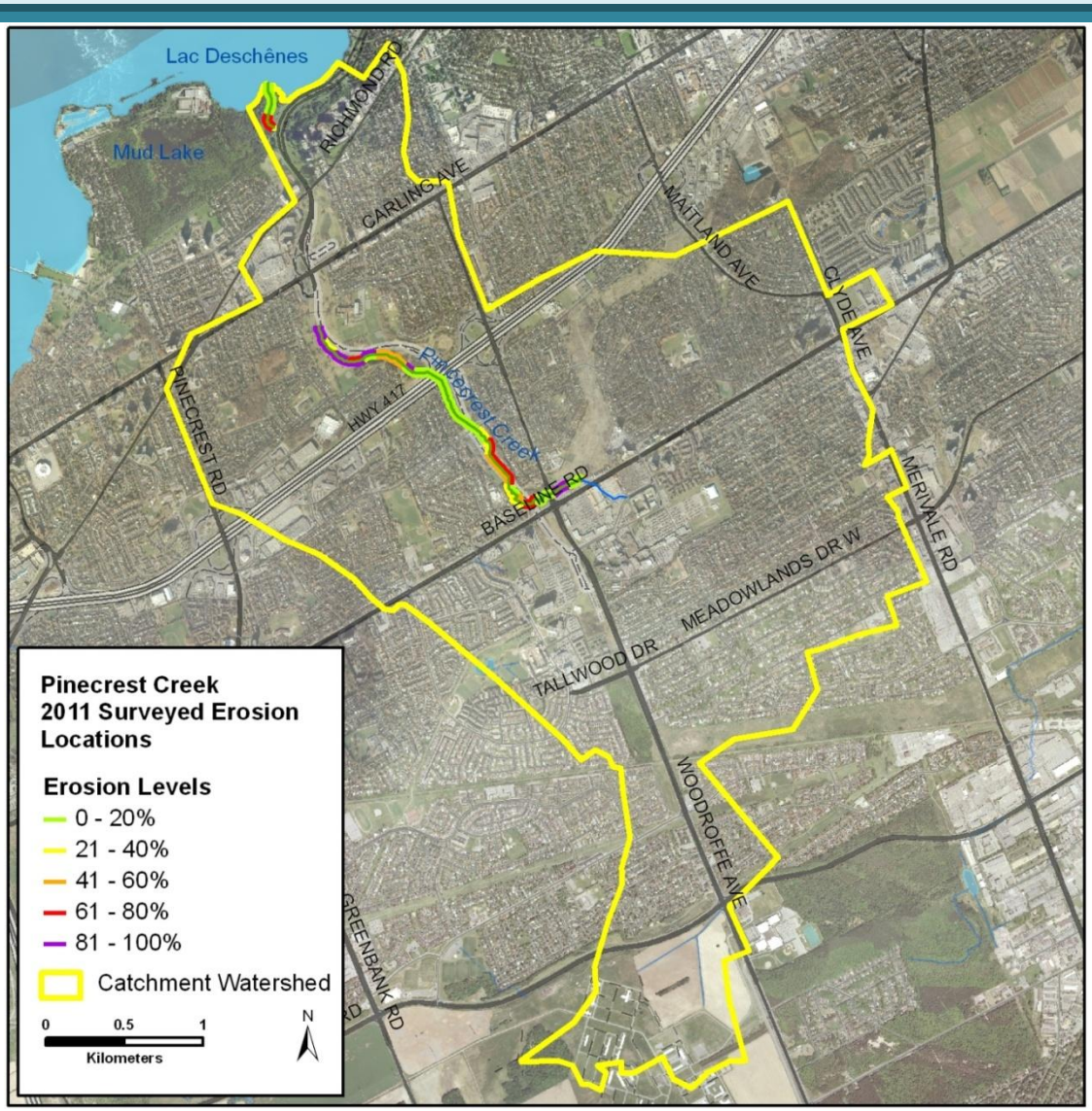

Figure 13. Left and Right Bank Stability of Pinecrest Creek

Erosion Along Pinecrest Creek

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 detrimental effects to 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 removal of aquatic plants, which provide habitat. Overall, the left bank of Pinecrest Creek was considered 58 percent stable and 42 percent unstable. The right bank was 50 percent stable and 50 percent unstable.

Photo of technician installing a temperature probe

Wildlife Along Pinecrest Creek

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. A low diversity of wildlife was observed along Pinecrest Creek. The amphibians were observed only at the mouth of the creek where there is a higher amount and diversity of instream vegetation.

Wildlife	Observed
Birds	ducks, mallards, ring-necked gull, crows, cardinal, American goldfinch, red-winged blackbird
Mammals	black squirrels
Reptiles/Amphibians	snake, leopard frog, snapping turtle, frogs
Aquatic Insects	water striders, aquatic sowbugs
Other	dragonflies, ebony jewelwing, earthworms, bumblebees, mosquitoes, cicada

Table 1. Wildlife Observed Along Pinecrest Creek

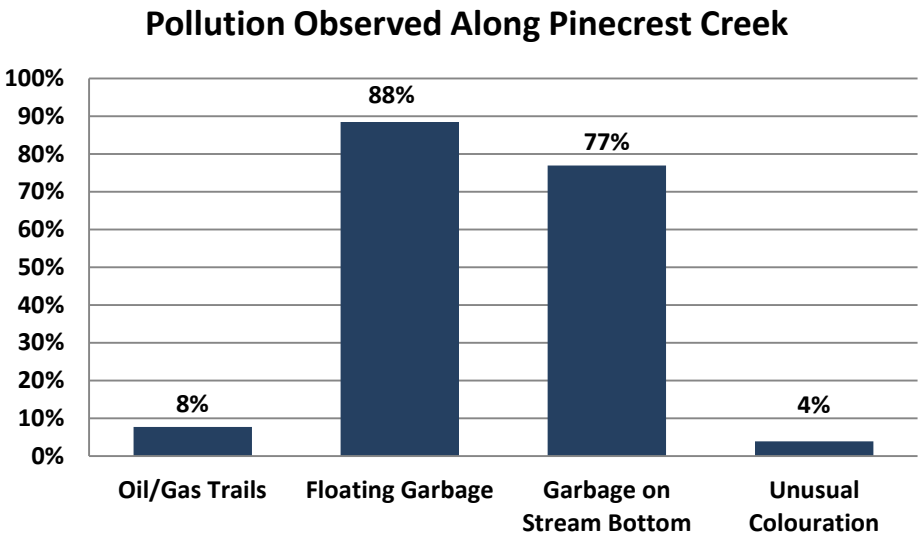

Figure 14. Frequency of Pollution/Garbage Occurring in Pinecrest Creek

Pollution/Garbage

Figure 14 demonstrates a high incidence of pollution/garbage found along Pinecrest Creek. Pollution and garbage in the stream is assessed visually and noted for each section where it is observed. All sections surveyed had some type of garbage. Eighty-eight percent had floating garbage and 77 percent had garbage on the stream bottom. In eight percent of the sections, oil and gas trails were observed, and in four percent of the sections, there was unusual colouration of the stream channel. Pinecrest is a very accessible creek, surrounded by residential, commercial and recreational areas, resulting in a higher level of garbage found. There were many different types of garbage seen along Pinecrest Creek. There is a significant problem with fast food waste (bags, wrappers, drink cups) and smashed beer bottles in certain areas of the creek. There were also hundreds of cigarette butts and an abundance of plastic (containers, bags, wrappers, bottles). More interesting items included action figure and dolls, clothing, scrap metal, tires, shopping carts, bicycles, rubber, caution tape, election signs, skis, jump rope and bags of carrots.

Invasive species can have major impacts 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 vegetation populations. Costs to control and mitigate damage from 16 invasive species is estimated to between $13.3 and $34.5 billion (Government of Canada, 2004). Over 180 non-native species have been found in the Great Lakes area, with a new aquatic species arriving in the Great Lakes on average of every six to nine months (Government of Canada, 1999). These species originate from other countries and are introduced through global shipping containers, ship ballast water, pet trades, aquarium and horticultural activities, the live bait industry, recreation boating, fishing gear and more (OMNR, 2008). Invasive species were observed along 100 percent of the surveyed sections of Pinecrest Creek, and often more than one species was present in the same area. The four species observed were purple loosestrife (*Lythrum salicaria*), Manitoba maple (*Acer negundo*), garlic mustard (*Alliaria petiolata*), and Himalayan balsam (*Butomus umbellatus*). Out of the four species, garlic mustard and Himalayan balsam were observed in the majority of sections and are of greater concern. Garlic mustard interferes with the relationship between tree roots and the soil, affecting the growth of the trees. It spreads aggressively and needs constant pulling for several years in order to control. There is little information on Himalayan balsam, but it appears to be spreading rapidly and forming dense colonies, outcompeting other native plants.

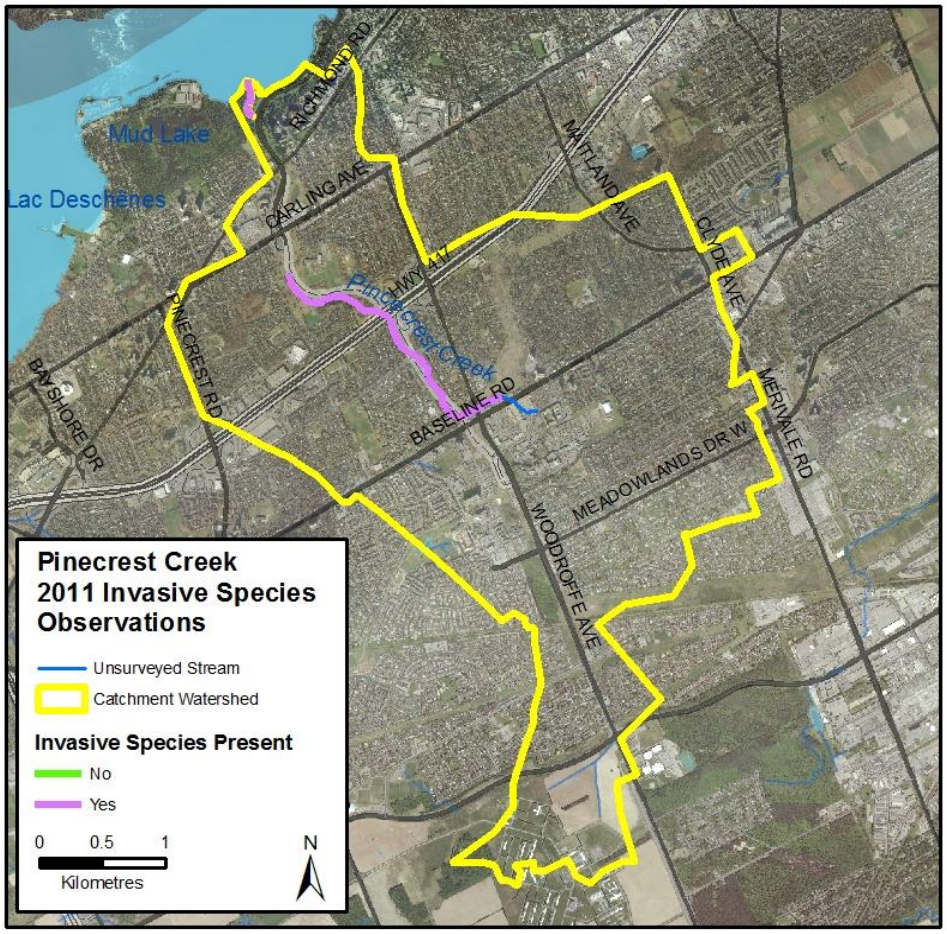

Figure 15. Locations of Invasive Species Along Surveyed Sections of Pinecrest Creek

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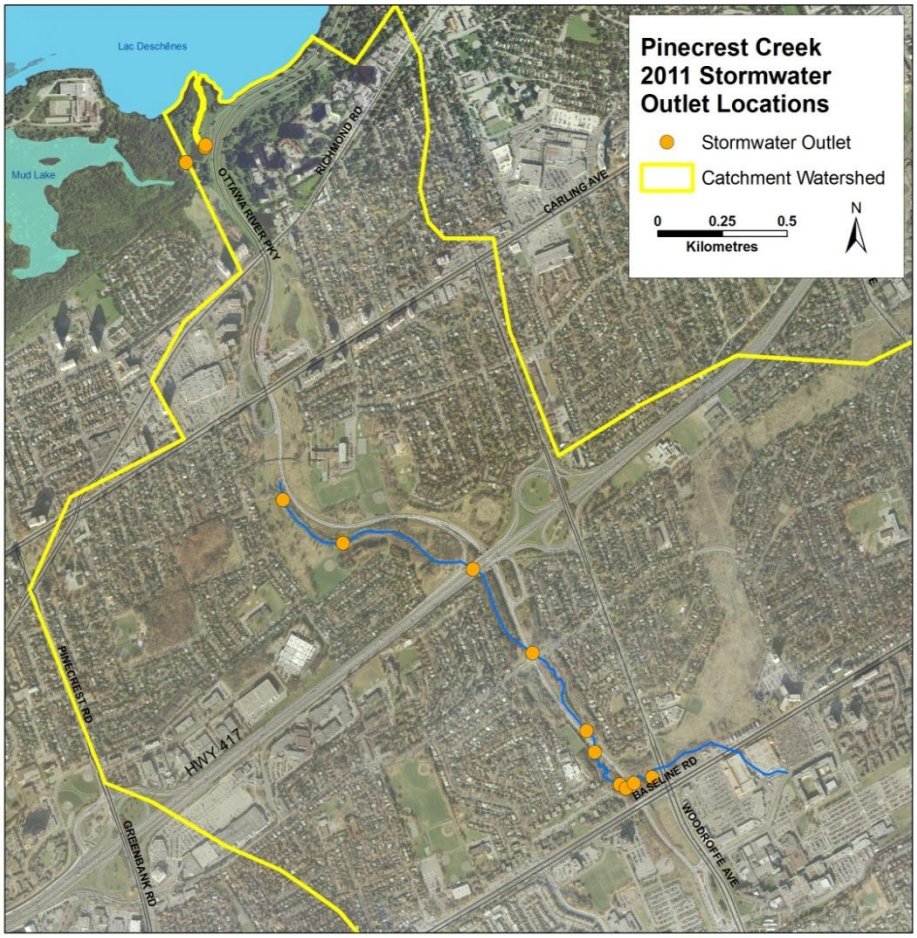

Figure 16. Location of Stormwater Outlets Along Pinecrest Creek

Stormwater Outlets

There are three stormwater outlets at the migratory obstruction area near the mouth of Pinecrest Creek. One of the three is located slightly west of the creek but still outlets into it. In the open section of Pinecrest Creek between Carling Avenue and Baseline Avenue, a distance of only 2.2 kilometres, a total of ten stormwater outlets into Pinecrest Creek were recorded. Overall, this is a high number of stormwater outlets for such a short section of stream. This creates high water level fluctuations and can increase erosion along the shoreline. There may be more stormwater outlets contributing to the creek, but these would not be visible from the shoreline.

Photo of stormwater outlet in Section 22

Photo of stormwater outlet in Section 4

Migratory Obstructions

Only one migratory obstruction was observed along Pinecrest Creek. This obstruction occurs approximately 300 metres upstream of the mouth, where the creek becomes entombed. The barrier is a set of concrete ledges that were installed to slow water velocity and help mitigate erosion (MMM, 2010). This barrier prevents fish from the Ottawa River from accessing areas upstream for potential spawning, feeding and rearing. A photo of the migratory obstruction is shown in the right inset of the map.

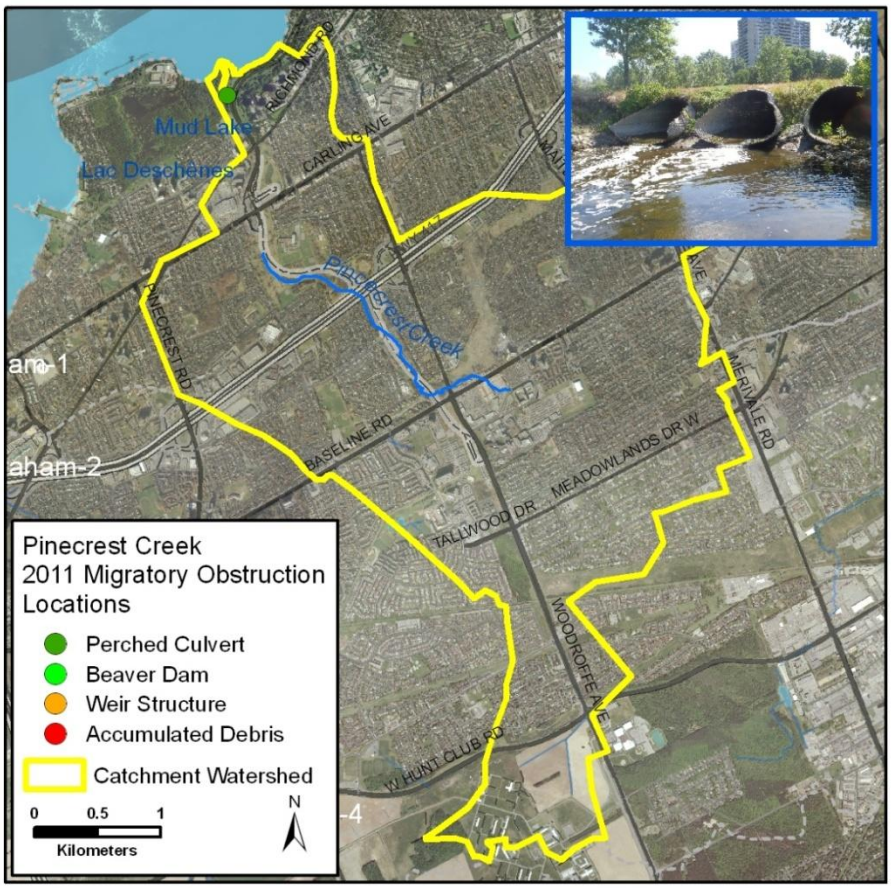

Figure 17. Location of Migratory Obstructions to Fish Passage Along Pinecrest Creek

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Many factors can influence fluctuations in stream temperature such as:

- Springs (groundwater and surface water interaction)
- Tributaries
- Precipitation runoff
- Discharge pipes
- Stream shading from riparian vegetation

The greatest factor of fluctuating temperature is solar radiation and runoff from developed areas. Typically, streams with large amounts of riparian canopy cover will yield lower temperatures while areas with no trees may be warmer. The method for temperature classification is taken from Stoneman and Jones, which is an accepted method by both Ministry of Natural Resources and Department of Fisheries and Oceans for assigning thermal classification. Classification is based on temperature data for each stream, taken at 4:00pm, anywhere between July 1 and August 31, on days where maximum air temperature exceeds 24.5°C and the previous two or three days have had similar temperatures. Although dataloggers are set to record temperatures between April and October, only the days that meet the temperature requirements are used in classification. The water temperature is used along with the maximum temperature of those days to classify as warmwater, coolwater or cold water.

Another important methodology of temperature classification is through fish community data. Fish have different temperature requirements, and these are also considered when classifying the stream. For example, if a species is recorded in a stream that requires cold water, there could be cold water inputs influencing that stream at that location.

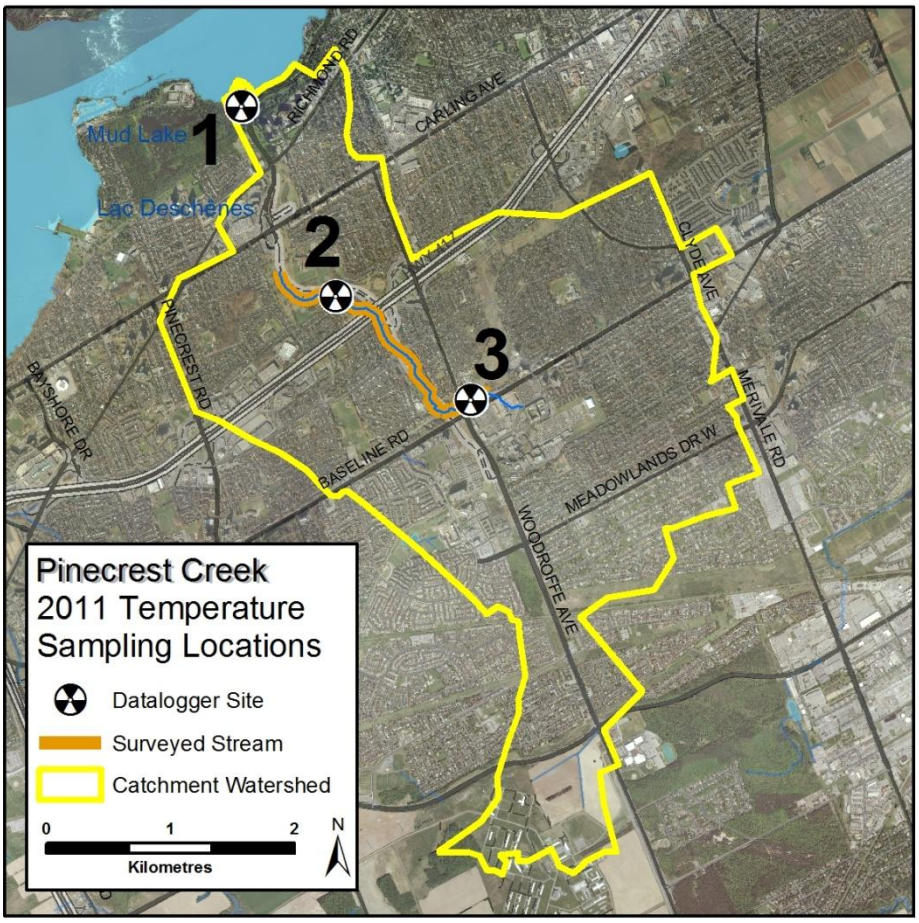

Figure 18. Temperature Datalogger Locations Along Pinecrest Creek

Three temperature dataloggers were deployed in Pinecrest Creek to give a representative sample of how temperature fluctuates and differs along the stream. The dataloggers were installed in early May and retrieved in late September. Dataloggers are either secured to blocks on the bottom of a stream or attached to rebar secured to the bottom. Out of the three dataloggers, only one was retrievable, which was located between Woodroffe and Baseline. The other two had disappeared, likely due to intentional removal.

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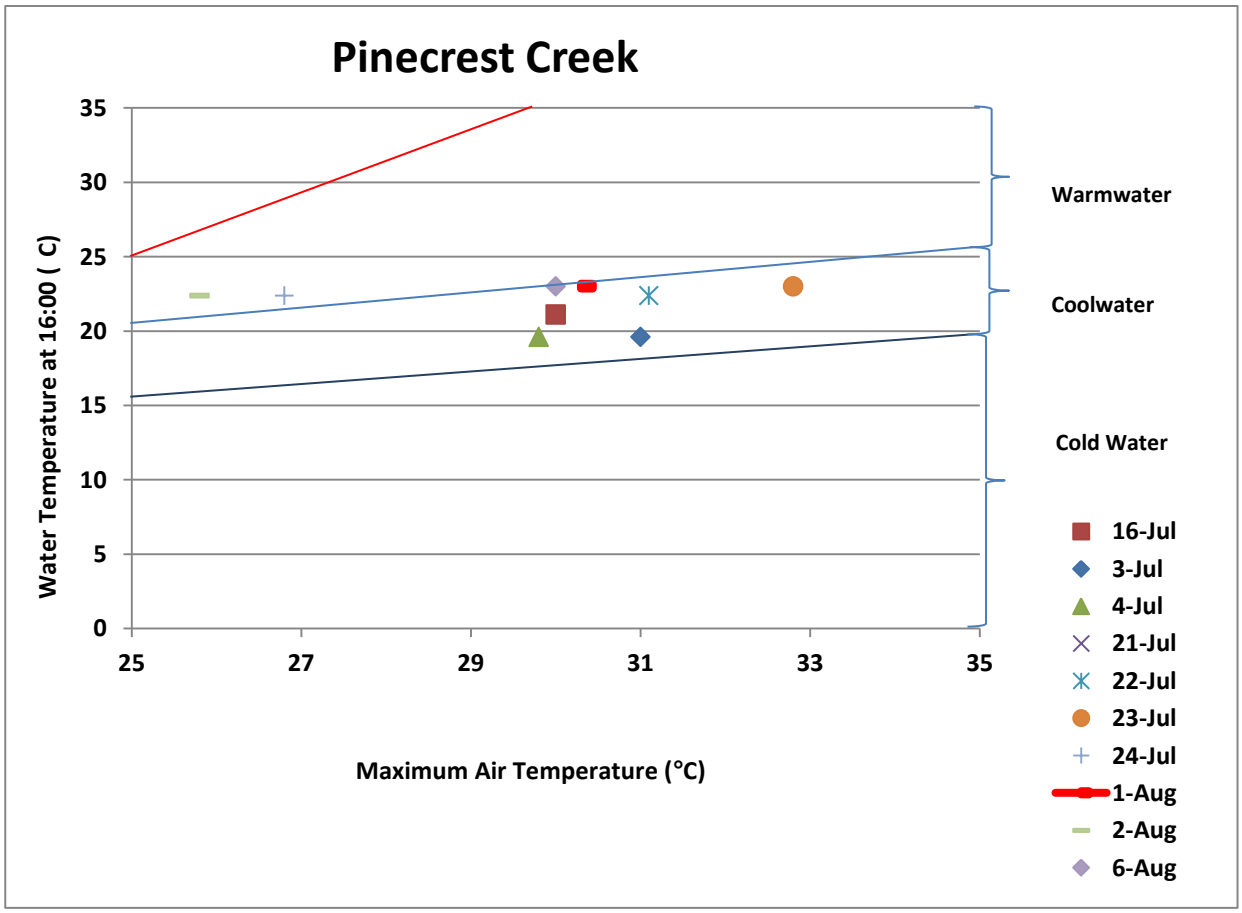

When analyzed on the nomograph (Figure 19), it appears that Pinecrest Creek is a coolwater system. All temperature dataloggers were within that range, aside from two which were in the warmwater range.

Figure 19. Thermal Classification for Temperature Dataloggers on Pinecrest Creek

Month	Range	DO (mg/L)	DO (%)	Conductivity (µs/cm)	pH
May	low	9.95	90	1202	7.92
	high	10.84	103	1258	8.27
June	low	7.51	87	100.9	7.72
	high	10.48	100	1418	8.41
July	low	9.3	94	1074	8.04
	high	9.96	100	1246	8.34
August	low	7.49	84	396	7.89
	high	9.78	100	981	8.41

Table 2. Maximum and Minimum Levels of Dissolved Oxygen, Conductivity and pH in Pinecrest Creek During 2011 Surveys

Water Chemistry

During surveys, a YSI probe was used to collect values on dissolved oxygen, conductivity and pH. In 2011, RVCA issued a Level 1 Drought for the watershed, beginning September 26, 2011 and ending January 10, 2012. Low water levels were observed during monitoring. Drought conditions would have had an effect on the parameters below. The 2011 data is summarized in Table 2.

Dissolved Oxygen: A measure of the amount of oxygen dissolved into a medium, such as water. The lowest acceptable concentration of dissolved oxygen is 6.0 mg/L for early stages of warmwater fish and 9.5mg/L for cold water fish (CCME, 1999). A saturation value of 90% or above is considered healthy (WOW, 2004).

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.

Photo of low water levels at the mouth of Pinecrest Creek in August, 2012

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

Freshwater benthic invertebrates 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.

Replicate	FBI	FR	% EPT
1	7.43	8	0
2	7.92	6	0
3	7.67	9	0
Total family richness at site: 11			

Table 3. Family Biotic Index, Family Richness and Percent EPT Values for Pinecrest Creek

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

Table 4. FBI Reference Table

The City of Ottawa collected benthic invertebrates on Pinecrest Creek at one location (3 replicates) in 2009. Results for family richness, family biotic index (FBI) and percent EPT are defined and shown below. From the FBI results, it appears Pinecrest Creek has very poor water quality. Family richness is fairly low, and there were no *Ephmeroptera*, *Plecoptera* or *Trichoptera* found in Pinecrest Creek and therefor received a value of zero. Regular benthic monitoring would help track changes over the long-term and indicate whether conditions are changing as more efforts are made to restore Pinecrest Creek.

Family Richness (FR) indicates the health of the community through its diversity, and increases with increasing habitat diversity suitability, and water quality (Plafkin et al., 1989). FR is equivalent to the total number of families found within the sample. The healthier the community is, the greater the number of families found within the community.

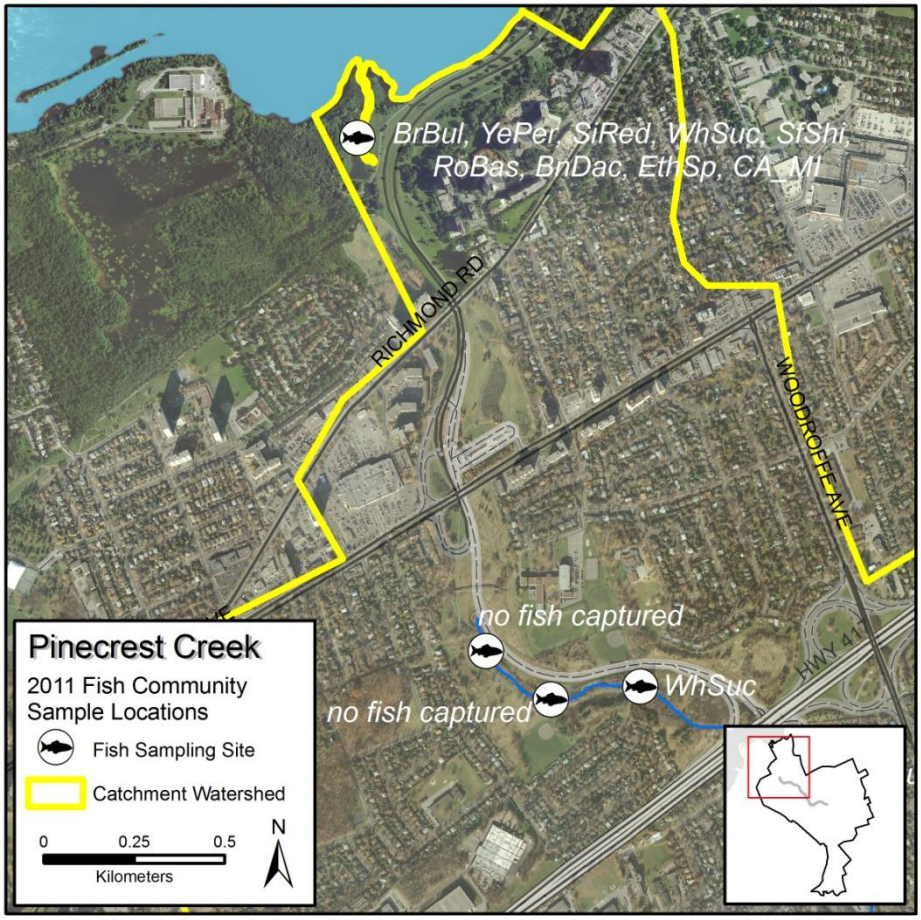
Ephemeroptera, Plecoptera, Trichoptera Richness Index (% EPT) *Ephemeroptera* (Mayflies), *Plecoptera* (Stoneflies), and *Trichoptera* (Caddisflies) are all species that are considered to be very sensitive to poor water quality conditions, therefore the presence of these organisms are indicators of good water quality sites. Higher populations of these organisms in a sample typically indicate improved conditions at the site.

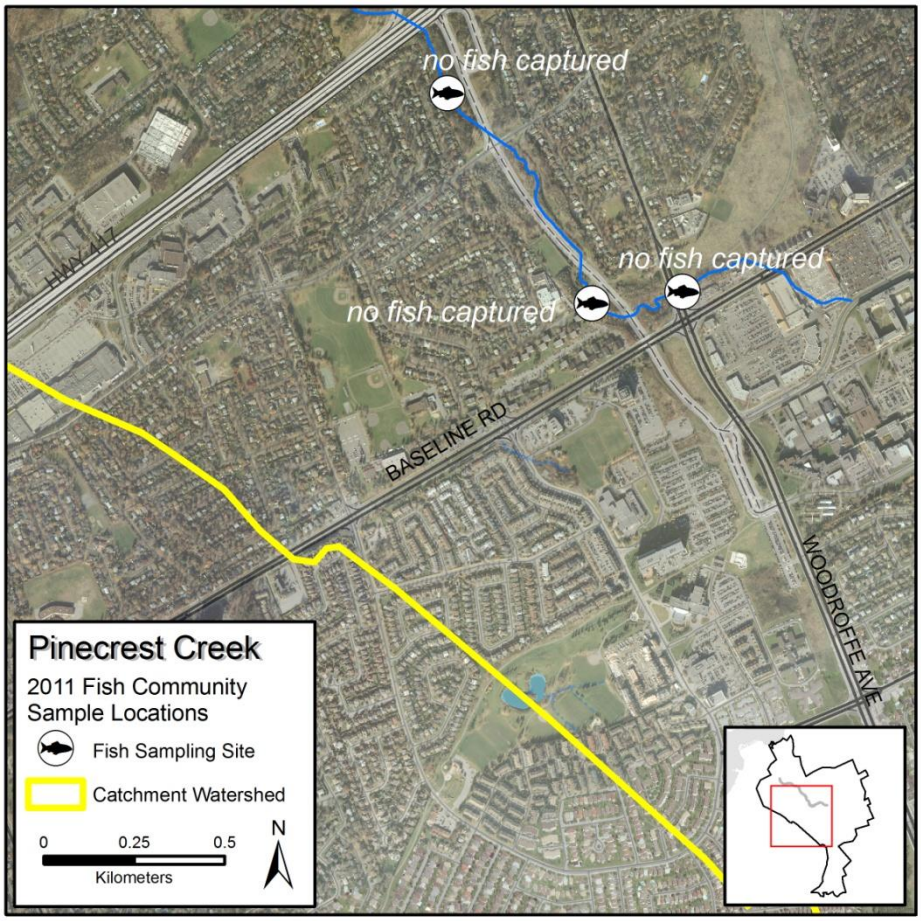
Photo of RVCA staff electrofishing along Pinecrest Creek

Fish Sampling

A total of seven sites between the mouth and headwaters of Pinecrest Creek were sampled for fish between May and August. Site one, near the confluence with the Ottawa River, was sampled once, for a five day period in June using a large fyke net. Later, in the season, site one was sampled with a seine net and an electrofisher. The fish sampling sites are shown in Figures 20 and 21. Habitat and spawning information on the species captured are listed in Table 5.

Pinecrest Creek 2011 Summary Report





Figures 20 &21. Locations and of Fish Sampling and Species Recorded on Pinecrest Creek

Species Legend

BrBul - brown bullhead
BnDac - blacknose dace
CA_MI - *Cyprinid spp*.
EthSp - *Etheostoma spp*.
RoBas - rock bass
SfShi - spottail shiner
SiRed - silver redhorse
WhSuc - white sucker
YePer - yellow perch

Fish Community Summary

A total of 10 different fish species were collected. Part of Pinecrest Creek is entombed, and the outlet near the Ottawa River is a major migratory obstruction to fish. Although Pinecrest has an excellent variety of substrate for fish, they are not able to access these areas. Only one site upstream of the obstruction had fish. The other nine species were all captured at site one, below the entombment. All fish were live released back to the stream after fish sampling. *Etheostoma spp.* indicates that either Johnny darters or tessellated darters were captured. To differentiate between those species, the fish must be removed from the system and brought back to lab; to avoid this, they are only identified to genus level. Minnow species that were caught but too small to identify are classified as *Cyprinid spp*. Four volunteers spent a total of 11 hours fish sampling on Pinecrest Creek.

Photo of City Stream Watch volunteer holding a silver redhorse, caught at the mouth of Pinecrest Creek

Species Name	Latin Name	General Habitat	Spawning Period	Spawning Temp (°C)
brown bullhead	*Rhinichthys obtusus*	bottom of shallow, warmwater bays, lakes or ponds and larger slow-moving rivers with abundant aquatic vegetation	spring	14-29
blacknose dace	*Ameiurus nebulosus*	riffle areas of clear, small streams of gravel substrate	spring	12-27
emerald shiner	*Notropis atherinoides*	prefers larger rivers or lakes	spring	20-23
longnose gar	*Lepisosteus osseus*	shallow, warm rivers or lakes with abundant aquatic vegetation	late spring to early summer	19-29
rock bass	*Ambloplites rupestris*	rocky areas of shorelines along lakes or warm water reaches of streams	May to July	14-24
silver redhorse	*Moxostoma anisurum*	lakes but prefers calm streams with large, deep pools	spring	13
white sucker	*Catostomus commersonii*	warmer, shallow bays, lakes or large tributaries	spring	6-23
yellow perch	*Perca flavescens*	warm or cool ponds, lakes or rivers with moderate levels of aquatic vegetation	spring	7-22

Table 5. Species List with Habitat and Spawning Requirements for Pinecrest Creek Fish Community

Fish Species Status, Trophic and Reproductive Guilds and Sensitivity to Sediment/Turbidity – Pinecrest Creek

Table 6 was generated by taking the fish community structure of Pinecrest Creek and classifying the fishery type, Species at Risk status, thermal classification, trophic guild (feeding preference) and their sensitivity to sediment and turbidity for reproduction, feeding, and respiration. Three game fish species were captured at site one. According to Cudmore-Vokey and Minns (2002), most species within Pinecrest Creek are significant to the baitfish fisheries aside from three species that are significant to the recreational industry and one that has limited commercial significance. The fish community structure consists of four cool water species, and four warm water species. No species at risk fish were captured. All species captured in Pinecrest Creek had low to medium sensitivity to turbidity for reproduction. Most species had a low to medium sensitivity to turbidity for feeding, aside from rock bass and yellow perch, which have a high sensitivity. For respiration, most species had high sensitivity to turbidity except for brown bullhead that has a low sensitivity. The sensitivity for yellow perch and rock bass for respiration is unknown.

Left photo: white sucker, the only fish species captured upstream of the fish barrier, middle photo: City Stream Watch staff with a silver redhorse captured at the mouth, right photo: young of the year longnose gar, captured at the mouth

MNR Code	Common Name	Scientific Name	Fishery Type	Status	Thermal Class	Trophic Guild	Sensitivity to Sediment/Turbidity		
							Reproduction	Feeding	Respiration
210	blacknose dace	*Rhinichthys obtusus*	Bait	none	cool	insectivore/ generalist	M	M	H
233	brown bullhead	*Ameiurus nebulosus*	recreational/ limited commercial	none	warm	insectivore	L	L	L
196	emerald shiner	*Notropis atherinoides*	Bait	none	cool	herbivore	M	L	H
41	longnose gar	*Lepisosteus osseus*		none	warm	piscivore	M	M	H
311	rock bass	*Ambloplites rupestris*	recreational	none	warm	insectivore	L	H	unknown
168	silver redhorse	*Moxostoma anisurum*		none	warm	insectivore	M	L	H
163	white sucker	*Catostomus commersonii*		none	cool	insectivore/ omnivore	M	L	H
331	yellow perch	*Perca flavescens*	recreational	none	cool	insectivore/ piscivore	M	H	unknown

Table 6. Summary of Status, Sensitivity and Classification for Fish Community in Pinecrest Creek

Comparison of Pinecrest Creek Between 2006 and 2011

Anthropogenic Alterations	2006	2011
None	0	3
"Natural" conditions with minor human alterations	19	31
"Altered" with considerable human impact but significant natural portions	46	12
"Highly altered" by humans with few natural portions	35	54

Table 7. Comparison of Anthropogenic Alterations Between 2006 and 2011

Bank Stability	2006 (%)	2011 (%)
Stable	38	42LB, 50RB
Unstable	62	58LB, 50RB

Table 8. Comparison of Bank Stability Between 2006 and 2011

Between 2006 and 2011, anthropogenic alterations along Pinecrest Creek have changed. Part of the change may be related to a difference in the macro stream protocol used. In 2010, anthropogenic alterations were further defined, which may have caused some land uses to shift categories. Most of the alterations along Pinecrest Creek can be attributed to its reduced buffer between the creek and human influence, which occurs in many areas that were surveyed. Other areas classified as “altered” or “highly altered” were associated with road crossings, culverts, channelized sections. Overall, there were increases to categories “none”, “natural” and “highly altered” category, and sections considered “altered” decreased.

Erosion is now separated into left and right bank, whereas in 2006, the banks were not separated. Erosion levels have improved since 2006, and this could be the result of the stream restoration work carried out by the National Capital Commission in 2008.

Level of Instream Vegetation	2006	2011
Extensive	0	0
Common	0	4
Normal	0	38
Low	15	33
Rare	85	19
None	n/a	6

Table 9. Comparison of Instream Vegetation Levels Between 2006 and 2011

The amount of instream vegetation has increased significantly since 2006. The percentages of common and normal levels of vegetation have increased, although so have low levels. The percentage of rare levels has decreased. Despite the increased amount of vegetation in 2011, it was still 99 percent algae, which is indicative of high nutrient enrichment.

Pollution/Garbage	2006 (%)	2011 (%)
None	8	0
Floating Garbage	4	88
Garbage on Stream Bottom	88	77
Oil or Gas Trails	0	8
Unusual Colouration	n/a	4

Table 10. Comparison of Pollution/Garbage Levels Between 2006 and 2011

The incidence of garbage has increased. In 2006, eight percent of the sections surveyed were free from garbage. In 2011, no sections surveyed were garbage free. There was a significant increase in floating garbage and a slight decrease in garbage on the stream bottom. In 2006, no sections had oil or gas trails, and in 2011, eight percent of the sections did. In 2011, unusual colouration of the stream bed was observed in four percent of the sections surveyed. This category was added to the field protocol in 2008, and therefore cannot be compared with 2006.

In 2006, a fish sampling demonstration was held for City Stream Watch volunteers, and no fish were captured. In 2011, eight fish species were captured; however, seven of those species occurred below the obstruction to fish passage.

Left photo: Pinecrest Creek in 2006, right photo: Pinecrest Creek in 2011

Pinecrest Creek 2011 Summary Report

The following table highlights past monitoring and restoration efforts that have been carried out in the Pinecrest Creek subwatershed.

Highlight of Monitoring and/or Restoration Work

Year	Accomplishment	Description
2000	3 sites along Pinecrest Creek were sampled by City of Ottawa staff.	All fish sampling occurred above the entombment. A total of 16 white sucker were caught over 3 sites.
2006	City Stream Watch staff held fish sampling demonstration for volunteers	No species were captured during sampling.
2006	26 macro stream surveys were completed on Pinecrest Creek by City Stream Watch staff and volunteers	Volunteers spent time carrying out stream habitat surveys on Pinecrest Creek.
2006	City Stream Watch staff and volunteers carried out one stream garbage cleanup	21 volunteers participated in a day-long event, cleaning up a total of 2km of Pinecrest Creek
2007	Two sites sampled for fish by City Stream Watch staff and volunteers; a total of 17 fish species were captured	Seven volunteers spent a total of 21 hours assisting with seine netting. All fish were released live back into the creek.
2008	NCC restoration	NCC completed seven restoration projects on Pinecrest Creek to help decrease bank erosion, increase floodplain access and improve stream functions
2010	City Stream Watch staff and volunteers carried out one riparian planting	32 volunteers spent a total of 77.5 hours planting 300 native shrubs and trees at two sites along Pinecrest Creek.
2011	Pinecrest Creek Stormwater Retrofit Plan, City of Ottawa	J.F. Sabourin and Associates was contracted to produce the Stormwater Retrofit Plan which will target future restoration, stewardship and educational opportunities.
2011	26 macro stream surveys were completed on Pinecrest Creek by City Stream Watch staff and volunteers	19 volunteers spent a total of 61 hours carrying out stream habitat surveys on Pinecrest Creek.
2011	7 sites along Pinecrest Creek were sampled by City Stream Watch staff and volunteers.	4 volunteers spent a total of 11 hours assisting with fish sampling (seining and electrofishing). All fish were released live back into the creek. A total of 10 fish species were captured; nine of the ten were caught below the entombment. Only one species was caught upstream of the obstruction.
2011	Two stream garbage cleanups were held on Pinecrest Creek	8 City Stream Watch volunteers spent a total of 28.5 hours cleaning the upper portion of Pinecrest Creek, and a group of staff from SNC Lavelin completed a garbage cleanup on the lower portion of Pinecrest Creek, resulting in 2.2 kilometres of stream cleaned.
ongoing	RVCA Stewardship projects	One butternut planting has been carried out in the Pinecrest Creek subwatershed.

Table 11. Monitoring and Restoration Highlights in the Pinecrest Creek Subwatershed

Photos from Pinecrest Creek Cleanup

Based on data collected by City Stream Watch staff and volunteers, a variety of projects have been identified along Pinecrest Creek to help improve environmental conditions. Figure 22 illustrates the potential instream projects, and Figure 23 illustrates the potential shoreline restoration projects. Table 12 summarizes the numbers and details of the projects identified on both maps.

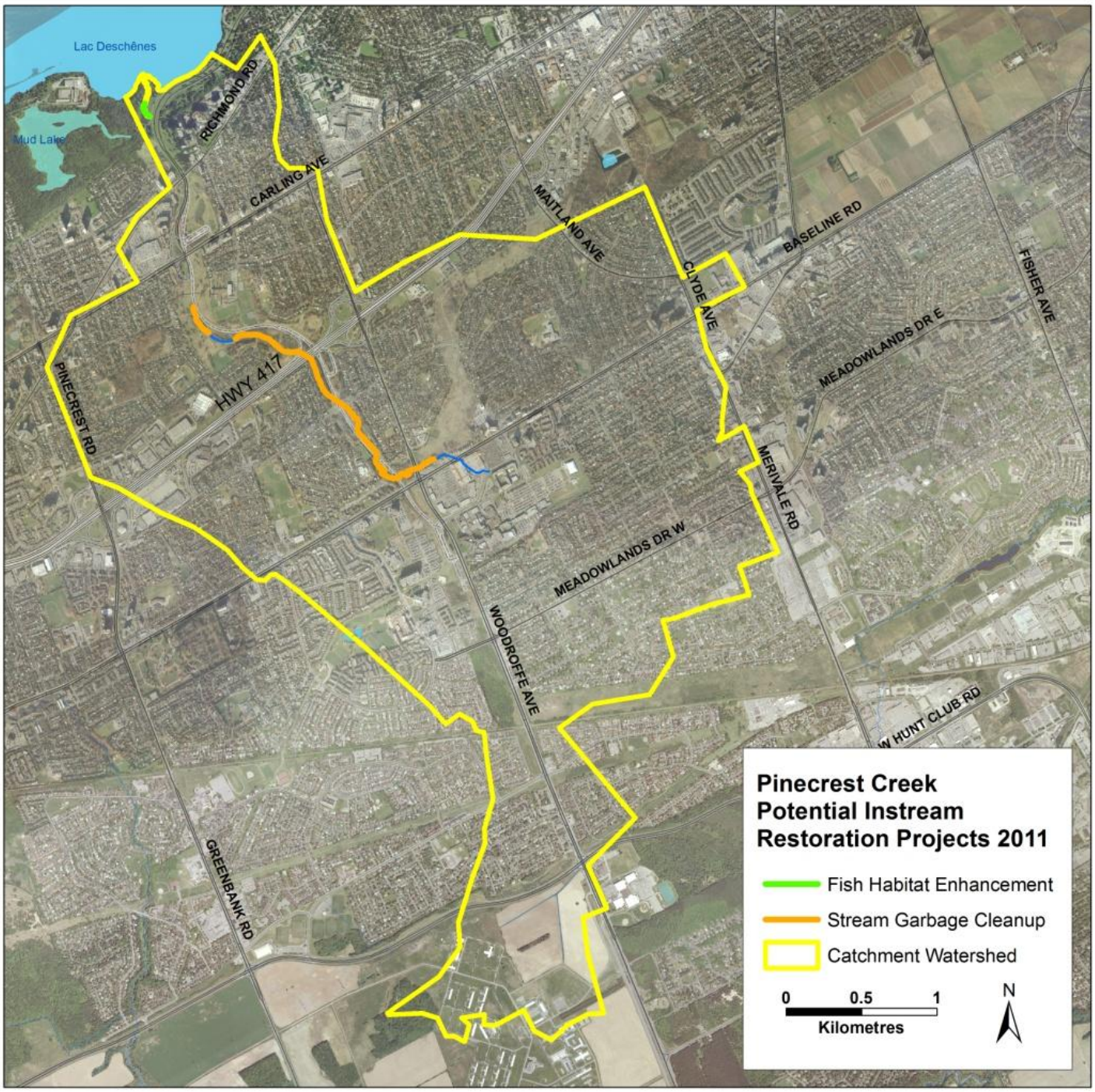


Figure 22. Map of Potential Instream Projects Along Pinecrest Creek

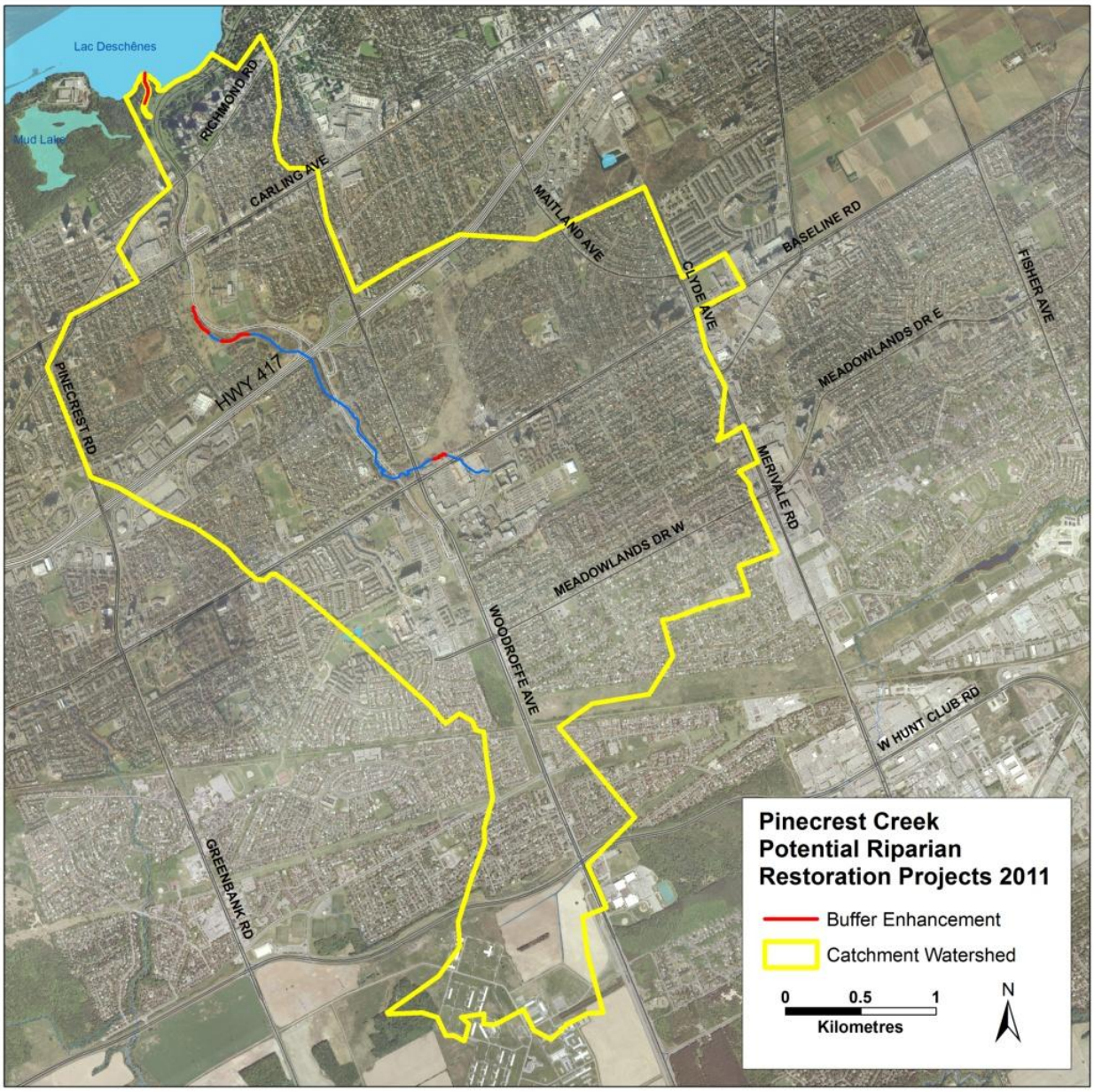


Figure 23. Map of Potential Shoreline Projects Along Pinecrest Creek

Local Actions for Improvement of Pinecrest Creek

Type of Project	Description
Riparian Planting/Buffer Enhancement	Riparian plantings and buffer improvements with native species have been identified for 2 sites, for a total of 700m of stream
Fish Habitat Enhancement	1 site has been identified for fish habitat improvements, for a total of 100m of stream; these sites include creating instream structure (root wads, etc.).
Stream Garbage Cleanup	There have been two sites identified for a stream garbage cleanup, for a total of 1.9km
Invasive Species Removal	The four species observed were purple loosestrife (Lythrum salicaria), Manitoba maple (Acer negundo), garlic mustard (Alliaria petiolata), and Himalayan balsam (Butomus umbellatus). Pilot projects on Himalayan Balsam removals could be started, by following the most up-to-date information on removal methods. If you see a suspected invasive species, you can report it to the Ontario Federation of Anglers and Hunters **invading species hotline: 1-800-563-7711**

Table 12. Potential Improvement Projects for Pinecrest Creek



For information on the overall 2011 City Stream Watch Program and the volunteer activities, please refer to the City Stream Watch Summary report, 2011. To view the macrostream protocol used, please see the City Stream Watch website: http://www.rvca.ca/programs/streamwatch/index.html

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