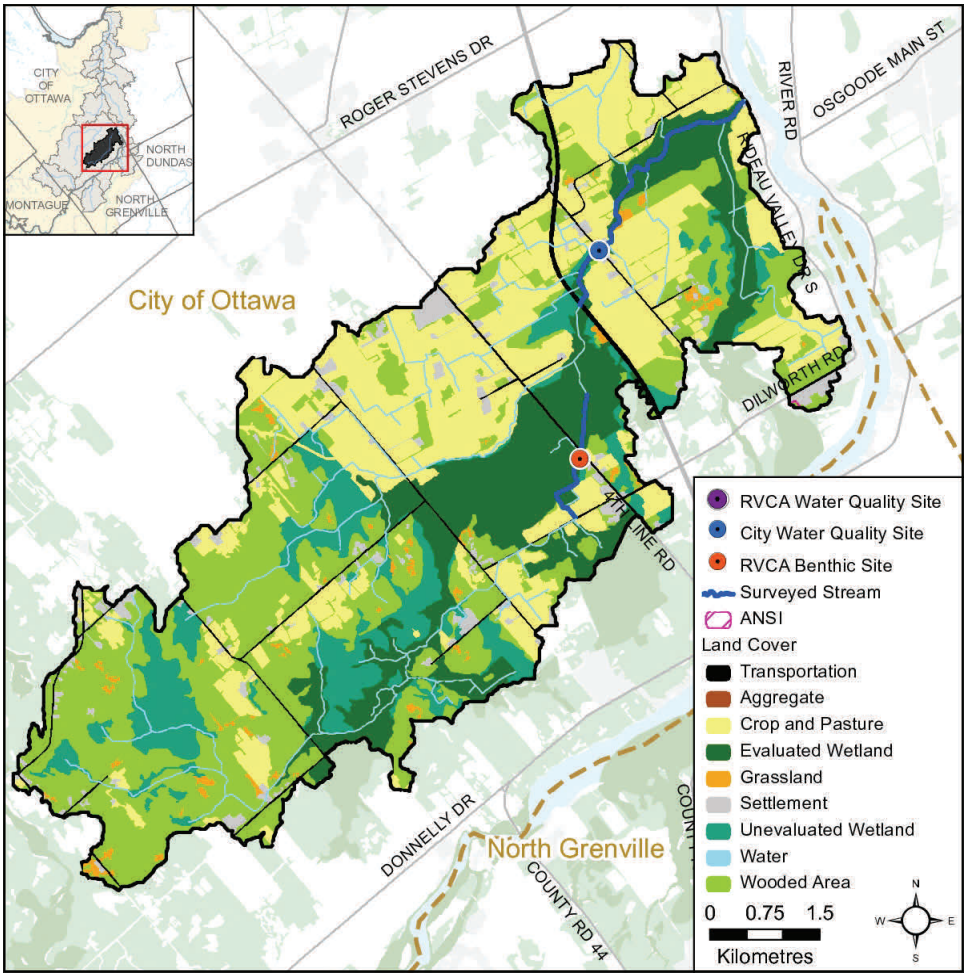
CRANBERRY CREEK CATCHMENT

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 Cranberry 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

- No artificial water level control on Cranberry Creek itself, but water levels throughout the catchment are affected by the managed water levels of the Rideau Waterway (as controlled at the dams in Manotick and flow releases from upstream reaches of the Waterway) as well as flood levels on the Rideau (with the dams at Manotick fully opened)
- Catchment is dominated by naturally occurring woodlands and wetlands and extensive areas along Cranberry Creek are identified as flood prone. Flood plain mapping originally produced in 1976 has been updated and extended in 2005, downstream of 3rd Line Road to its confluence with the Rideau River
- Few residential or farm buildings are in flood prone areas of the catchment
- Restrictive natural hazards zoning and development regulations have been in place since 1980
- Drains 52 sq. km of land or 6.8% of the Lower Rideau Subwatershed and 1.2% of the Rideau Valley Watershed
- Dominant land cover is woodland (33%), followed by crop and pastureland (32%), wetland (28%), settlement (4%), transportation (2%) and grassland (1%)
- Riparian buffer (30 m. wide along both sides of Cranberry Creek and its tributaries) is comprised of wetland (45%), crop and pastureland (33%), woodland (17%), transportation (3%), settlement (1%) and grassland (1%)
- Contains a warm/cool water baitfish and recreational fishery with 19 fish species
- Contains 14 municipal drains
- Water quality rating is fair along Cranberry Creek, with no change in the water quality rating observed over a 12 year reporting period (2000-2005 vs. 2006-2011)
- Woodland cover has decreased by 10.4 percent (536 ha.) from 2002 to 2008
- Thirty-one stewardship (landowner tree planting/clean water) projects have been completed
- Between 2007 and 2011, fish sampling has been conducted on Cranberry Creek and its tributaries by the RVCA, City Stream Watch and volunteers
- Every spring and fall since 2003, the RVCA has conducted benthic macroinvertebrate sampling downstream at Fourth Line Road
- In 2007, volunteers undertook macro stream surveys working upstream from the mouth of the creek taking measurements and recording observations on instream habitat, bank stability, land use, etc.
- In 2007, RVCA staff undertook temperature profiling to gain a better understanding of temperature and habitat variations throughout the system

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. Cranberry Creek

Surface water quality conditions in Cranberry Creek are monitored through the City of Ottawa's Baseline Water Quality Program (upstream of Third Line Road, south bridge, see Fig.1 for the location).

The water quality rating for Cranberry Creek is “Fair” as determined by the CCME Water Quality Index (CCME WQI); analysis of the data has been broken into two periods 2000-2005 and 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.

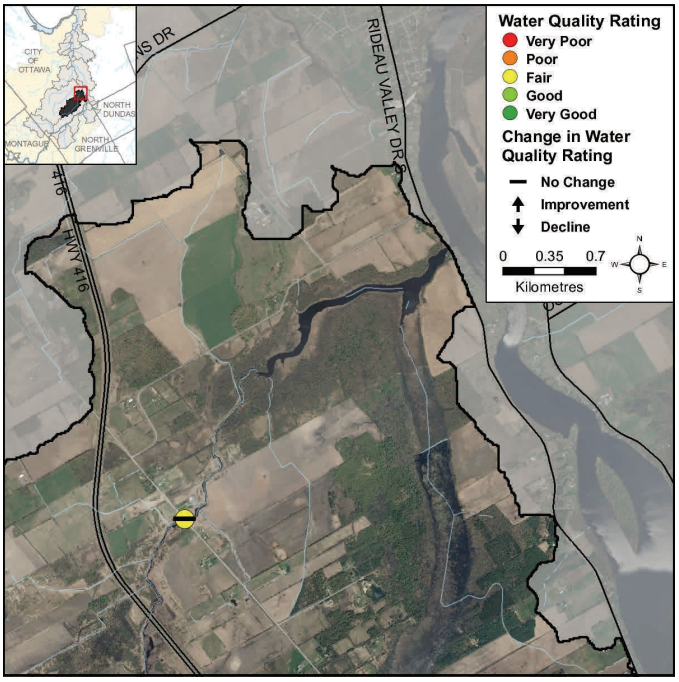


Figure 1. Sampling site in Cranberry Creek

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

Cranberry 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 0.030 mg/l is used as the TP Guideline. Concentrations greater than 0.030 mg/l indicate an excessive amount of TP. Cranberry Creek TP results are shown in Figures 2a and 2b. In addition to the TP guideline, the Lower Rideau Watershed Strategy set a target for TP concentration of 0.030 mg/l at the 85th percentile for tributaries of the Rideau River, such as Cranberry Creek. Percentile plots of TP data are shown for two time periods 2000-2005 (Fig. 3a) and 2006-2011 (Fig. 3b). 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. TKN results are shown in Figures 4a and 4b.

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

Table 2. Summary of total phosphorous results for Cranberry Creek from 2000-2005 and 2006-2011

Total Phosphorus 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	0.124	8	50
Total Phosphorus 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	0.121	18	55

Table 3. Summary of total Kjeldahl nitrogen results for Cranberry Creek from 2000-2005 and 2006-2011

Total Kjeldahl Nitrogen 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	1.740	0	50
Total Kjeldahl Nitrogen 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	1.560	0	55

Cranberry Creek Nutrients: Site CK43-02

The majority of samples at site CK43-02 were above the TP guideline of 0.030mg/l for both time periods (Fig. 2a, 2000-2005 and 2b, 2006-2011), only 8 percent of samples were below the guideline in the 2000-2005 period. This improved to eighteen percent of samples in the 2006-2011 period. The average TP concentration remained fairly constant, slightly decreasing from 0.124 mg/l (2000-2005) to 0.121 mg/l (2006-2011).The target of a TP concentration of 0.030mg/l at the 85th percentile has not been achieved at this site and the concentration at the 85th percentile increased from 0.210 mg/l (2000-2005, Fig. 3a) to 0.229 mg/l (2006-2011, Fig. 3b).

Total Kjeldahl nitrogen is used as a secondary indicatory of nutrient enrichment. Figures 4a and 4b show that all results exceeded the TKN guideline of 0.500 mg/l in both periods of interest. The average concentration decreased slightly from 1.740 mg/l to 1.560 mg/l, far exceeding the guideline.

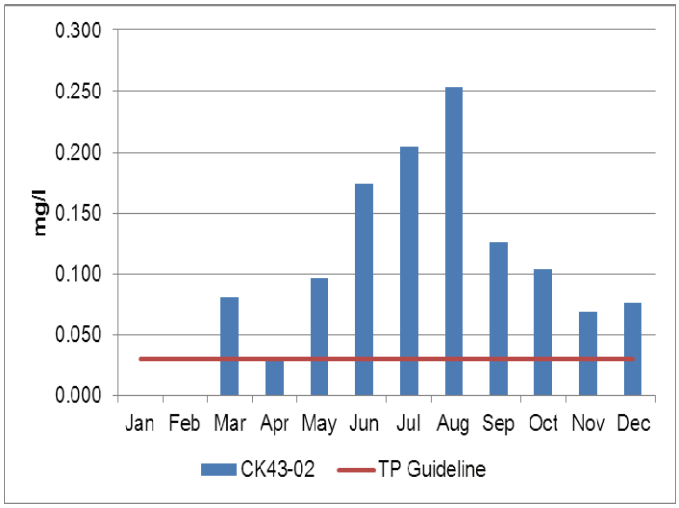


Figure 2a. Total phosphorous concentration in Cranberry Creek from 2000-2005

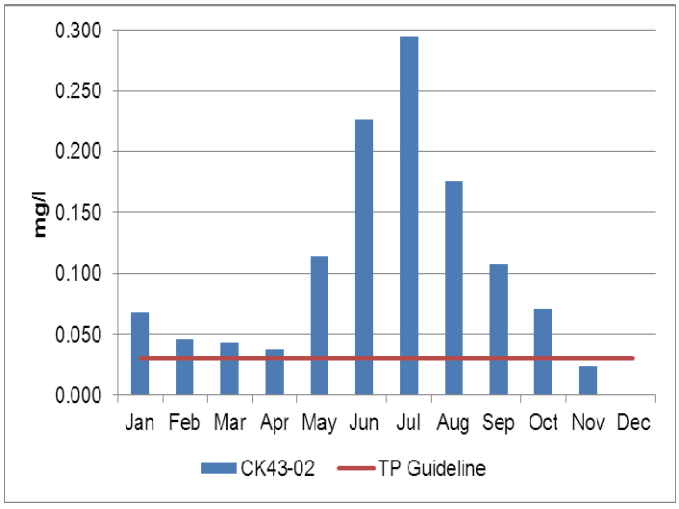


Figure 2b. Total phosphorous concentrations in Cranberry Creek from 2006-2011

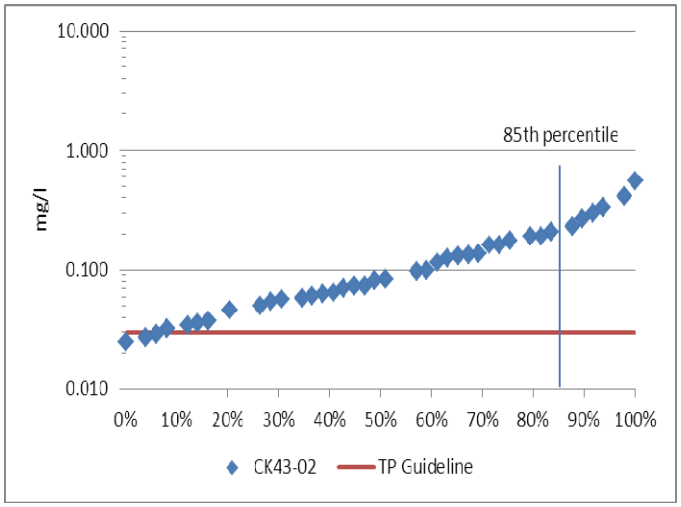


Figure 3a. Percentile plots of total phosphorous in Cranberry Creek from 2000-2005

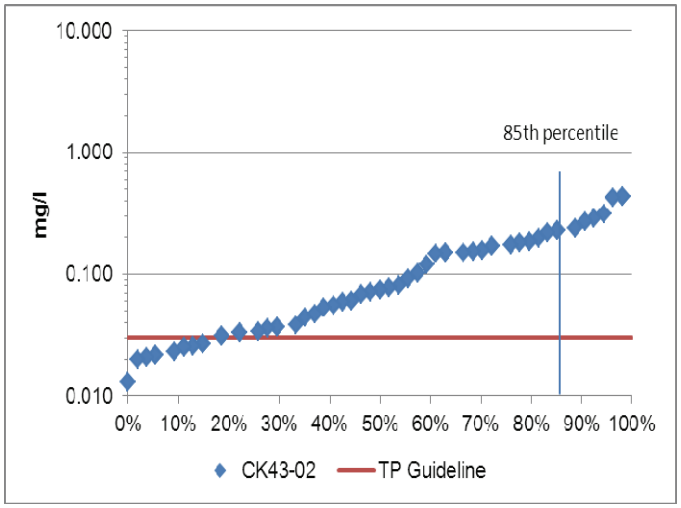


Figure 3b. Percentile plots of total phosphorous in Cranberry Creek from 2006-2011

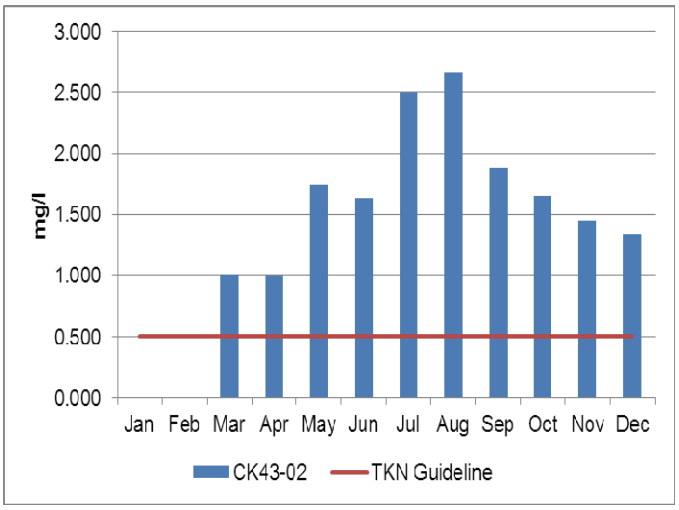


Figure 4a. Total Kjeldahl nitrogen concentrations in Cranberry Creek from 2000-2005

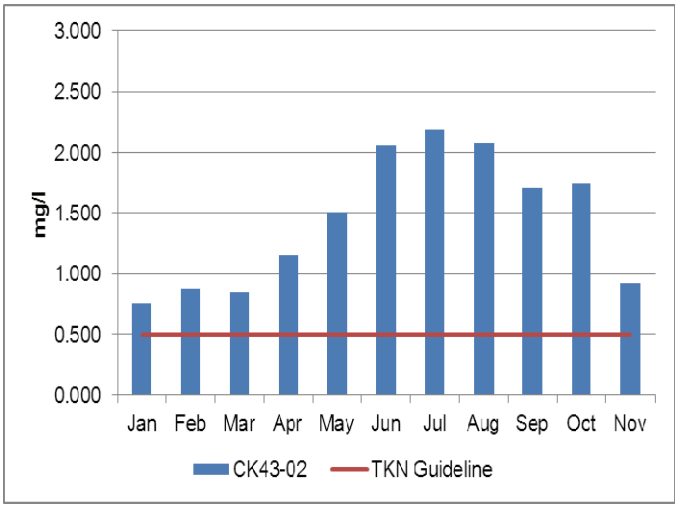


Figure 4b. Total Kjeldahl nitrogen concentrations in Cranberry Creek from 2006-2011

Cranberry 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.

Cranberry 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 risk to human health. The PWQO of 100 colony forming units/100 millilitres 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 also set a target for E. coli counts of 200 CFU/100 ml at the 80th percentile for tributaries of the Rideau River, such as Cranberry Creek.

Table 4 summarizes the geometric mean at monitored sites on Cranberry Creek and shows the proportion of samples that meet the E. coli guideline of 100 CFU/100ml.

Figure 5a and 5b shows the results of the geometric mean with respect to the guideline for the two periods 2000-2005 (Fig. 5a) and 2006-2011 (Fig. 5b). Figures 6a and 6b show percentile plots of the data for the two time periods of interest 2000-2005 (Fig. 6a) and 2006-2011 (Fig. 6b). 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 Steven's Creek

E. coli 2000-2005			
Site	Geometric mean (mg/l)	% Below Guideline	No. Samples
CK43-02	38	72	50
E. coli 2006-2011			
Site	Geometric mean (mg/l)	% Below Guideline	No. Samples
CK43-02	41	78	55

Cranberry Creek E. coli: Site CK43-02

E. coli counts above the guideline of 100 colony forming units per 100 mL (CFU/100mL) occasionally occurred at site CK43-02 on Cranberry Creek. In comparing the two time periods at site CK43-02, the proportion of samples below the guideline increased from seventy-two percent (Fig. 5a) to seventy-eight percent (Fig. 5b). The count at the geometric mean increased slightly from 38 CFU/100 ml to 41 CFU/100 ml. Percentile plots of E. coli data at site CK43-02 are shown for both periods. Figures 6a and 6b show that this target was achieved in both time periods; the E. coli count at the 80th percentile decreased from 136 CFU/100 ml to 105 CFU/100 ml.

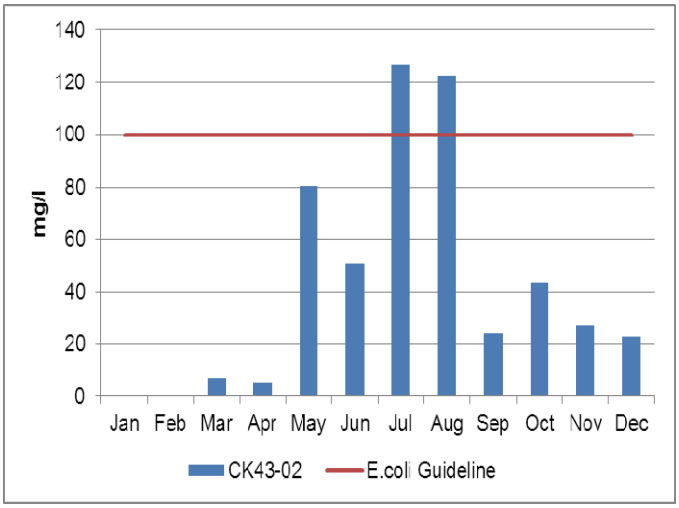


Figure 5a. E. coli counts in Cranberry Creek from 2000-2005

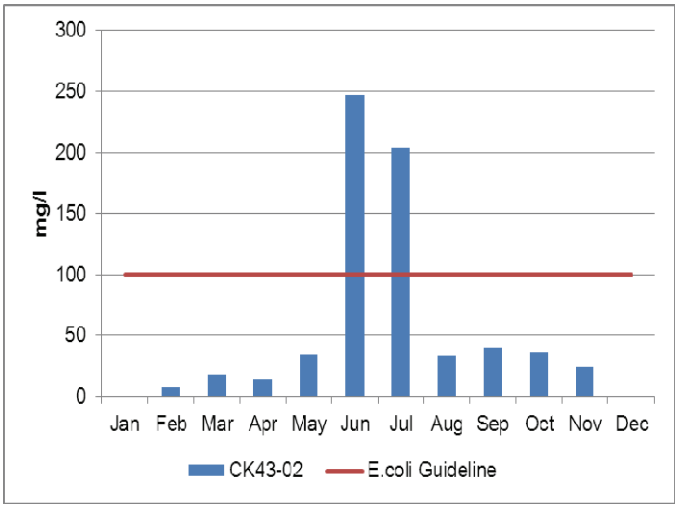


Figure 5b. E. coli counts in Cranberry Creek from 2006-2011

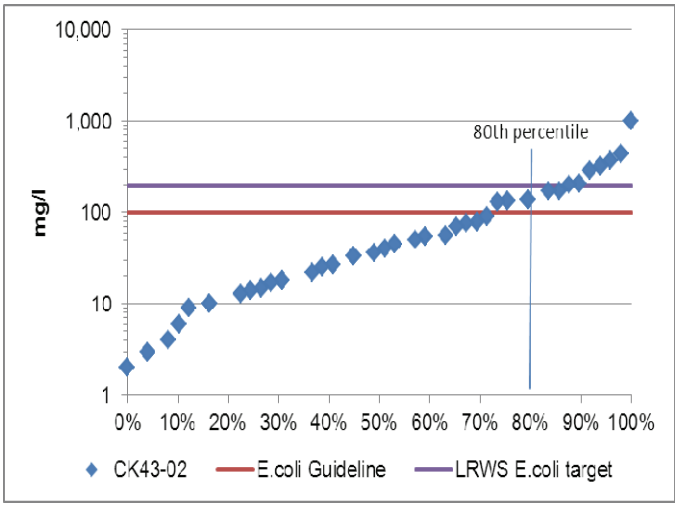


Figure 6a. Percentile plots of E. coli in Cranberry Creek from 2000-2005

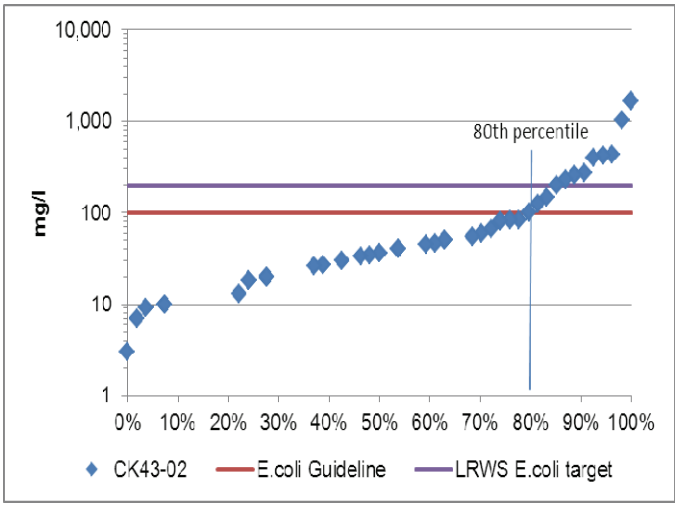


Figure 6b. Percentile plots of E. coli in Cranberry Creek from 2006-2011

Cranberry Creek E. coli Summary

These statistics indicated that bacterial counts are typically below guidelines, efforts should be made to prevent additional sources of contamination to the creek to protect overall water quality and aquatic life.

Cranberry Creek Metals

Targets metals (copper and iron) were set for tributaries of the Rideau River such as Cranberry Creek. Elevated metal concentrations are a concern as they may have cumulative toxic effect on aquatic species.

Table 5 summarizes average metal concentrations at monitored sites in Cranberry 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 each site with respect to guidelines for the two periods 2000-2005 (Figures 7a and 8a) and 2006-2011 (Figures 7b and 8b). The guidelines for each metal as stated by the PWQO are Cu 0.005 mg/l and Fe 0.300 mg/l. The Lower Rideau Watershed Strategy also set a target for Cu concentration of 0.005 mg/l (Cu guideline) at the 80th percentile. Figure 9 shows percentile plots of the data for the two time periods of interest (Fig. 9a, 2000-2005) (Fig. 9b, 2006-2011). 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 concentrations in Cranberry Creek

Iron 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	0.928	33	58
Iron 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	1.083	28	54
Copper 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	0.002	94	48
Copper 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
CK43-02	0.004	75	55

Cranberry Creek Metals: Site CK43-02

The majority of metals monitored at site CK43-02 were below guidelines however results for iron (Fe) and copper (Cu) were occasionally elevated.

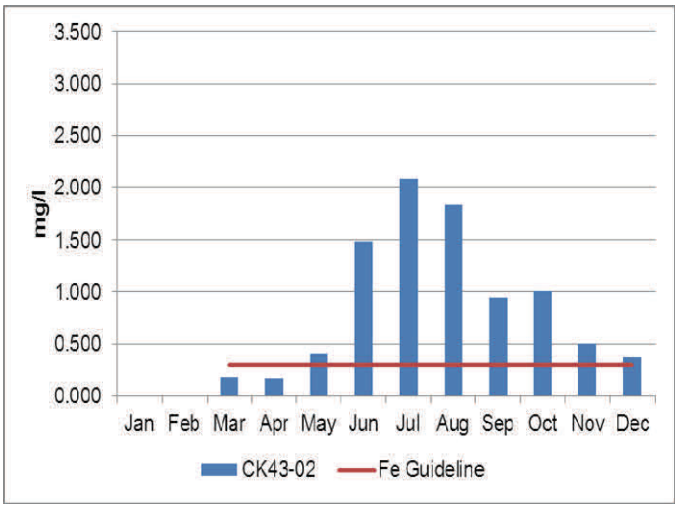


Figure 7a. Iron concentrations in Cranberry Creek from 2000-2005

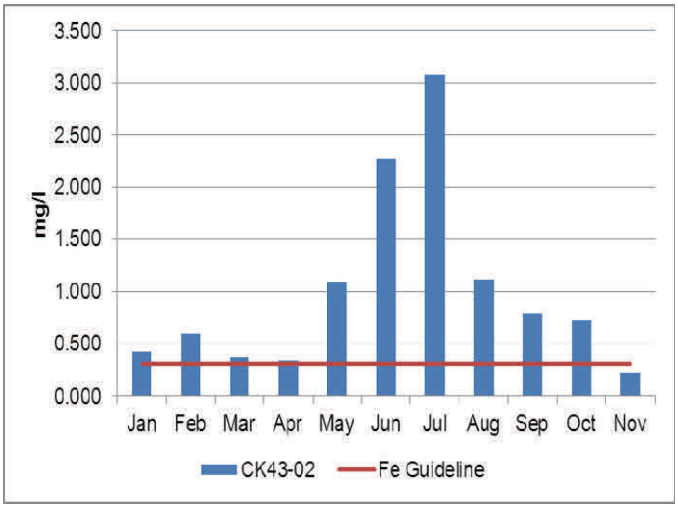


Figure 7b. Iron concentrations in Cranberry Creek from 2006-2011

Figures 7a and 7b show that the Fe results often exceed the guideline of 0.300 mg/l and there was an overall increase in concentrations over the periods of interest. Thirty-three percent of samples were below the guideline in 2000-2005 and decreased slightly to twenty-eight percent in the 2006-2011 period. The average concentration increased from 0.928 mg/l to 1.08 mg/l, exceeding the guideline.

Results for Cu concentrations were also occasionally above the guideline of 0.005 mg/l. The proportion of samples below the guideline decreased slightly from ninety-four percent (Fig. 8a, 2000-2005) to seventy-five percent (Fig. 8b, 2006-2011), the average concentration remained increased from 0.003 mg/l to 0.004 mg/l. The target of a Cu concentration of 0.005 mg/l at the 80th percentile was not achieved at this site in the 2006-2011 period, the concentration at the 80th percentile increased from 0.003 mg/l (2000-2005, Fig 9a) to 0.006 mg/l (2006-2011, Fig 9b).

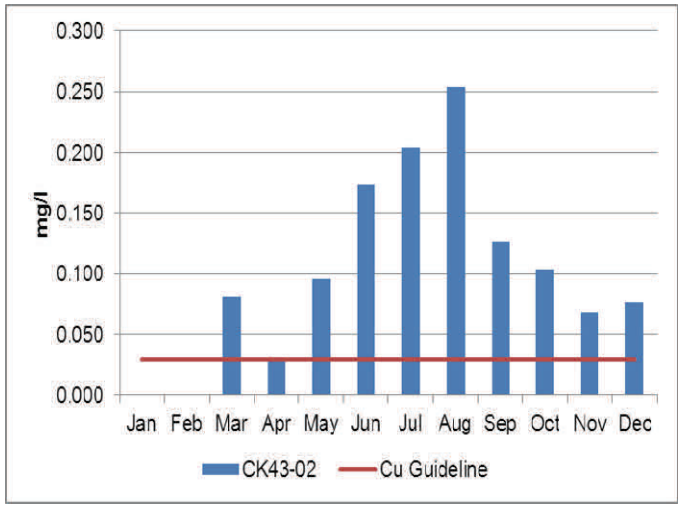


Figure 8a. Copper concentrations in Cranberry Creek from 2000-2005

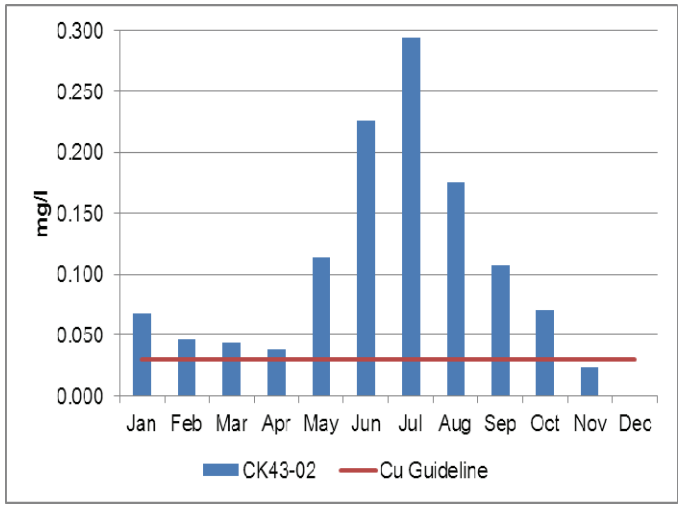


Figure 8b. Copper concentrations in Cranberry Creek from 2006-2011

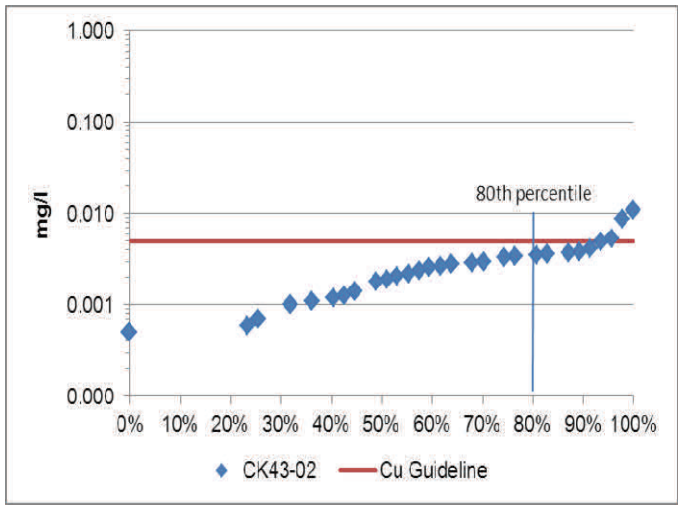


Figure 9a. Percentile plots of copper in Cranberry Creek from 2000-2005

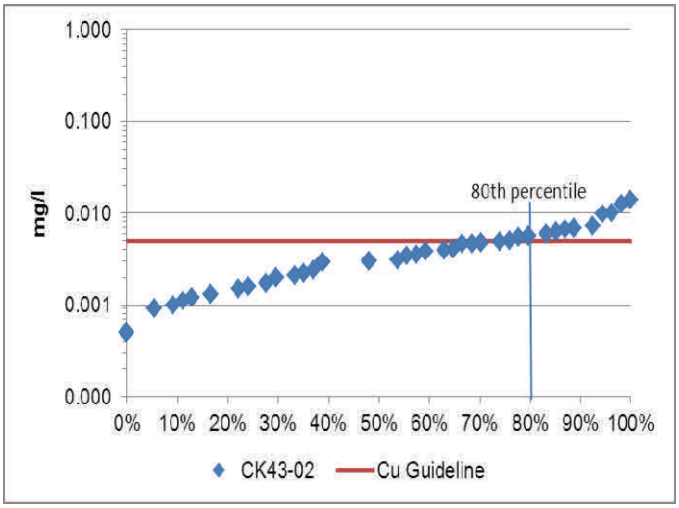


Figure 9b. Percentile plots of copper in Cranberry Creek from 2006-2011

Cranberry 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.

Cranberry Creek Benthic Invertebrates

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 represent 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.

As part of the Ontario Benthic Biomonitoring Network (OBBN), the RVCA has been collecting benthic invertebrates at one location on Cranberry Creek at Fourth Line Road since 2003. Monitoring data is analyzed and the results are presented using the Family Biotic Index, Family Richness and percent Ephemeroptera, Plecoptera and Trichoptera.

The Hilsenhoff Family Biotic Index (FBI) is an indicator of organic and nutrient pollution and provides an estimate of water quality conditions for each site using established pollution tolerance values for benthic invertebrates.

FBI results for Cranberry Creek show that it has “Poor” water quality conditions for the period from 2006 to 2011 (Fig.10) and scores an overall “Poor” surface water quality rating using a grading scheme developed by Conservation Authorities in Ontario for benthic invertebrates.

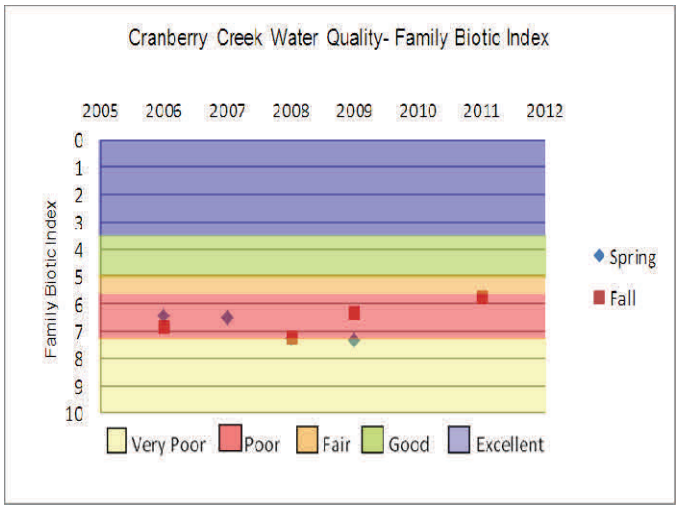


Figure 10. Surface water quality conditions in Cranberry Creek based on the Family Biotic Index

Family Richness measures the health of the community through its diversity and increases with increasing habitat diversity suitability and healthy water quality conditions. Family Richness is equivalent to the total number of benthic invertebrate families found within a sample.

Using Family Richness as the indicator, Cranberry Creek is reported to have “Fair” water quality (Fig.11).

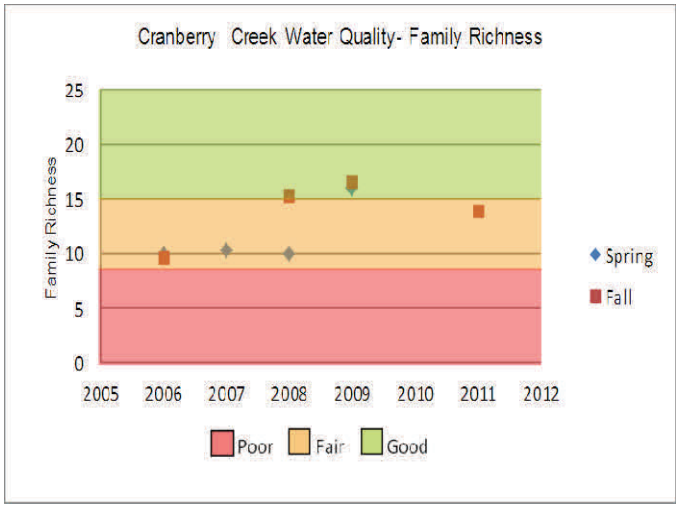


Figure 11. Surface water quality conditions in Cranberry Creek based on Family Richness

Ephemeroptera (Mayflies), Plecoptera (Stoneflies), and Trichoptera (Caddisflies) are species considered to be very sensitive to poor water quality conditions. High abundance of these organisms is generally an indication of good water quality conditions at a sample location.

With the EPT indicator, Cranberry Creek is reported to have “Poor” water quality (Fig.12) from 2006 to 2011.

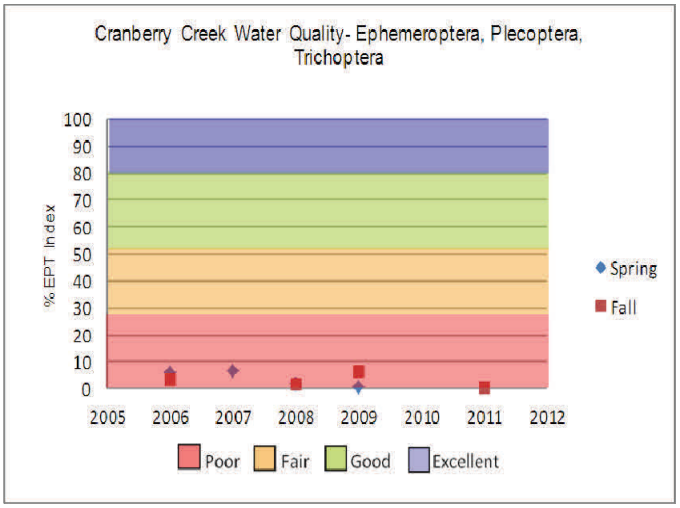


Figure 12. Surface water quality conditions in Cranberry Creek using the EPT Index

Using a “D” net to collect benthic invertebrates

Benthic sampling site replicate one on Cranberry Creek at Fourth Line Rd in the City of Ottawa, this image was captured in the spring of 2011.

Overall Cranberry Creek has a water quality rating of “Fair” from 2006 to 2011.

A Corydalidae collected on Cranberry Creek

2) a. Overbank Zone

Riparian Buffer along Cranberry Creek and Tributaries

Figure 13 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 63 percent of streams, creeks and lakes are buffered with woodland, wetland and grassland; the remaining 37 percent of the riparian buffer is occupied by settlements and crop and pastureland.

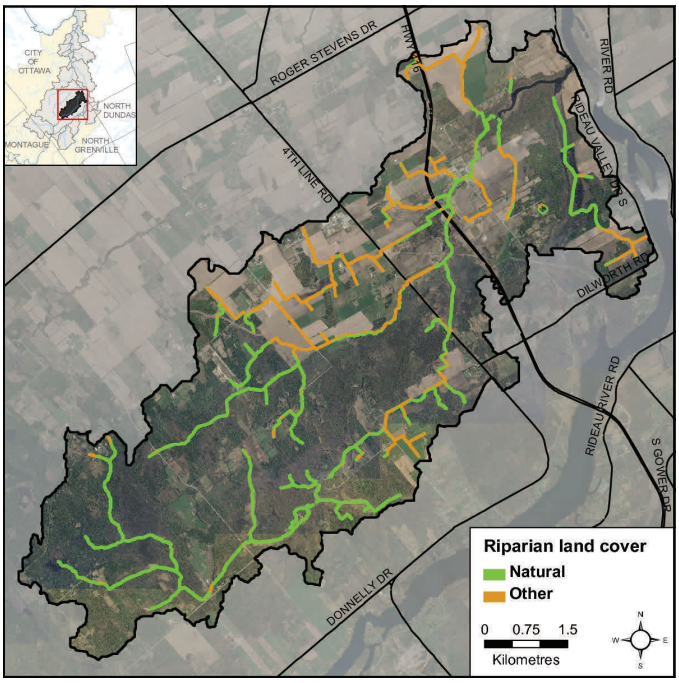


Figure 13. Catchment land cover in the riparian zone

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 61 (100 metre long) sections along Cranberry Creek in 2007.

Land Use beside Cranberry Creek

The RVCA's Macrostream Survey Program identifies nine different land uses beside Cranberry Creek (Figure 14). Surrounding land use is considered from the beginning to the 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 76 percent of the stream, characterized by wetland, forest, scrubland and meadow. The remaining land use consisted of residential, pasture, active agriculture, abandoned agriculture, infrastructure, and recreational.

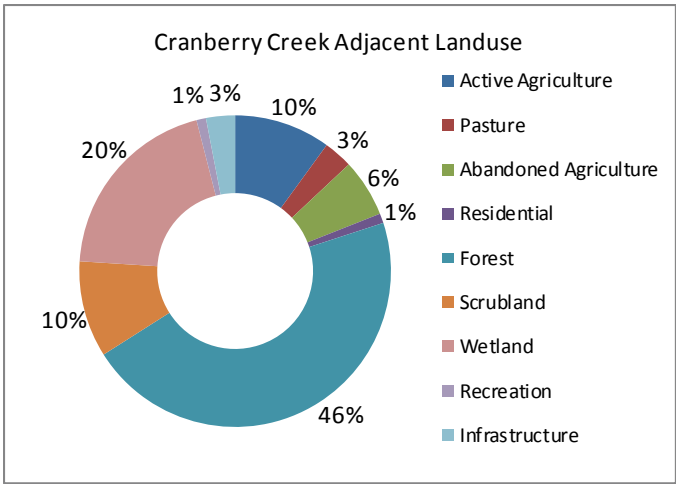


Figure 14. Land use alongside Cranberry Creek

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 15 shows the bank stability of the left and right bank along Cranberry Creek.

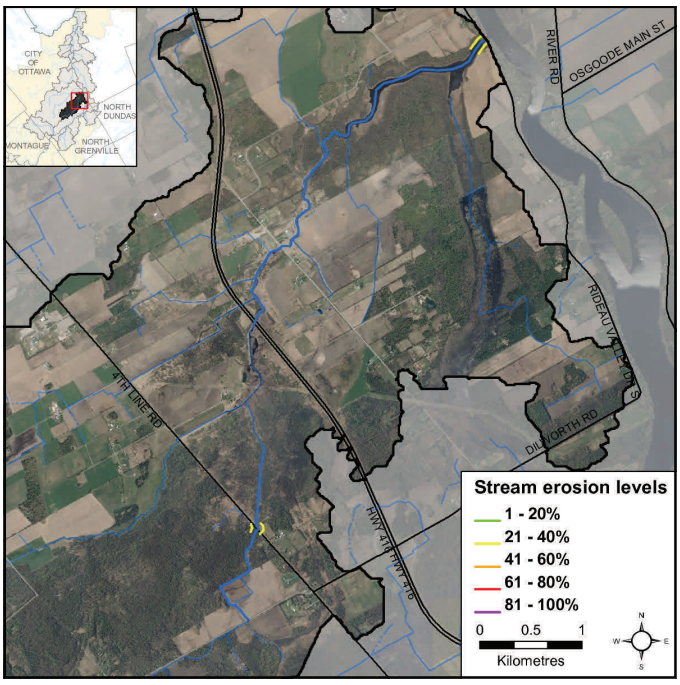


Figure 15. Erosion along Cranberry Creek

Streambank Undercutting

Undercut banks are a normal and natural part of stream function and can provide excellent refuge areas for fish. Figure 16 shows that Cranberry Creek had no locations with identified undercut banks.

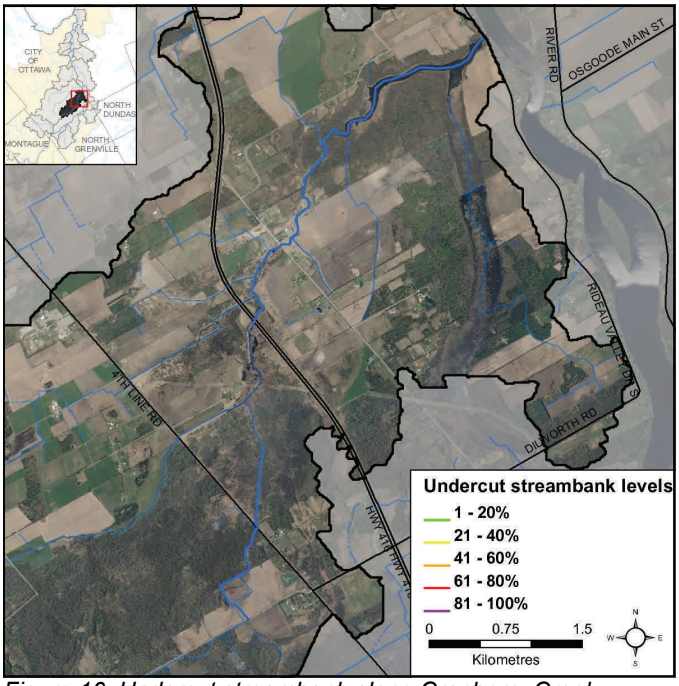


Figure 16. Undercut streambank along Cranberry Creek

Stream Shading

Grasses, shrubs and trees all contribute towards shading a stream. Shade is important in moderating stream temperature, contributing to food supply and helping with nutrient reduction within a stream. Figure 17 demonstrates a lack of stream shading along Cranberry Creek. This is largely due to open wetland habitat along the system.

A survey section of Cranberry Creek

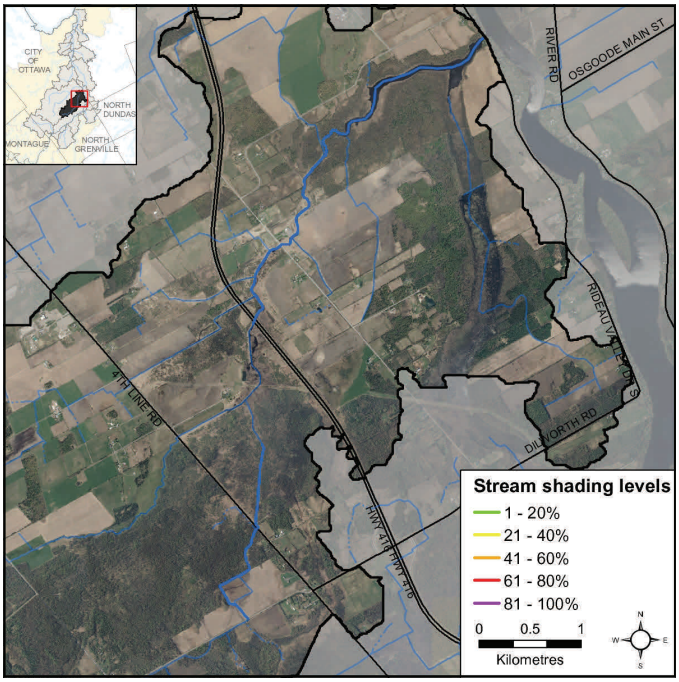


Figure 17. Stream shading along Cranberry Creek

Human Alterations

Figure 18 shows that 64 percent of Cranberry Creek remains “unaltered.” Sections considered “natural” with some human changes account for 25 percent of sections, with the remaining 11 percent of sections sampled being considered “altered” (e.g., with road crossings and little or no buffer). No areas were recorded as being "highly altered" along Cranberry Creek.

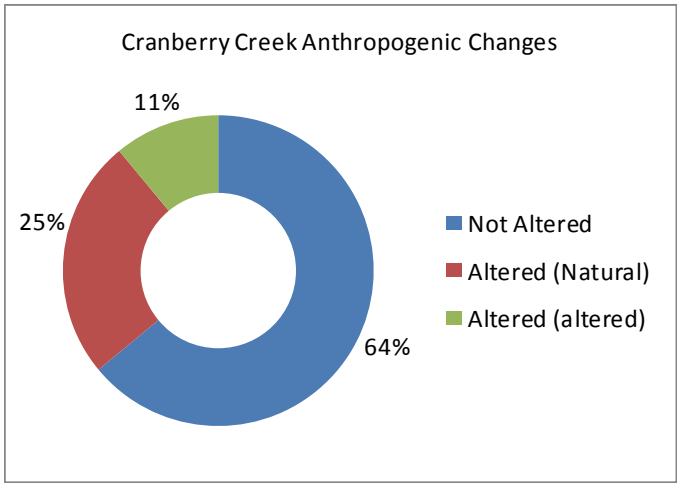


Figure 18. Alterations to Cranberry Creek

Overhanging Trees and Branches

There are no identified areas with overhanging trees and branches due largely to the amount of wetland habitat along the system.

2) c Instream Aquatic Habitat

Habitat Complexity

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

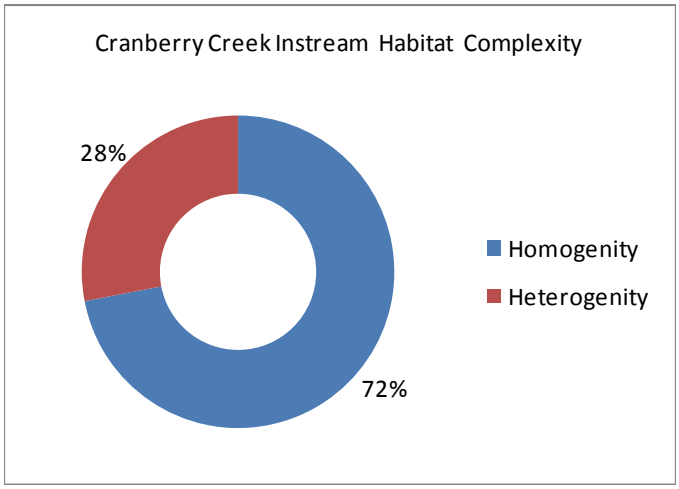


Figure 19. Instream habitat complexity in Cranberry Creek.

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. Figure 20 demonstrates the substrate diversity along Cranberry Creek. Detritus and muck substrate were dominant and were found in wetland habitats along the system.

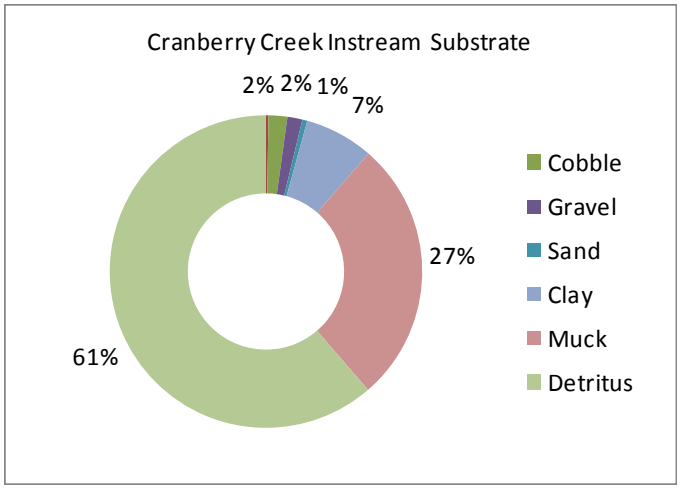


Figure 20. Instream substrate in Cranberry Creek

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 21 shows that Cranberry Creek was extremely uniform; 96 percent consisted of runs and four percent pools.

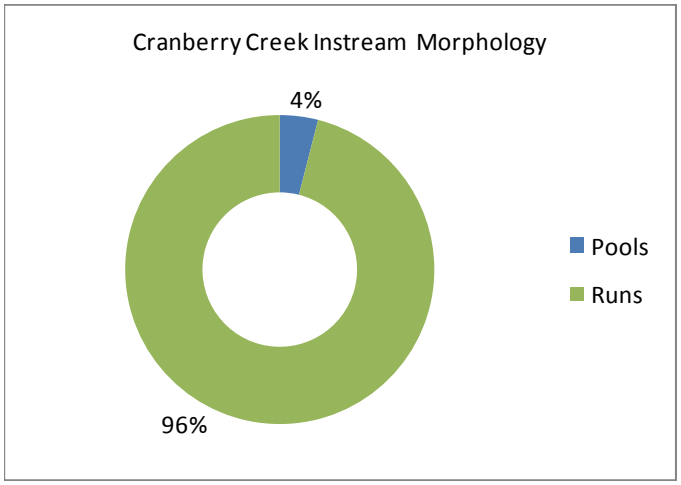


Figure 21. Instream morphology in Cranberry Creek

Types of Instream Vegetation

Cranberry Creek had fairly diverse instream vegetation types along most of the system (Figure 22). The dominant vegetation type recorded at forty-one percent consisted of submergent vegetation. Floating vegetation consisted of 23 percent of the vegetation community observed along the system. Narrow emergent vegetation was recorded at 17 percent. Algae was the next highest type of vegetation recorded at 14 percent. Broad emergents made up the remainder at five percent.

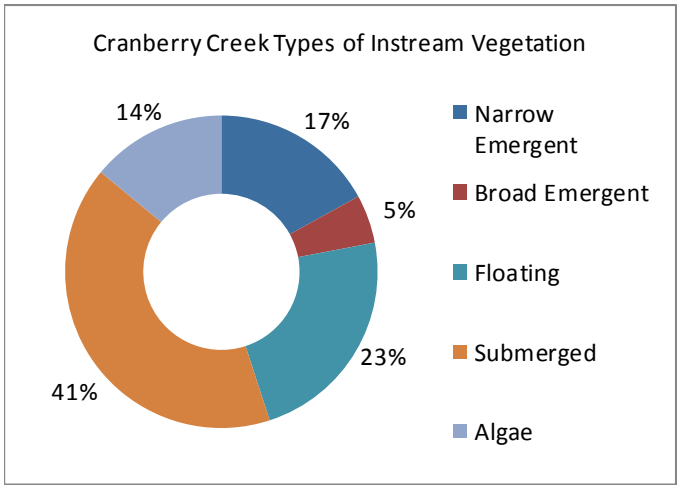


Figure 22. Instream vegetation types in Cranberry Creek.

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 23 demonstrates that Cranberry Creek had a variety of instream vegetation levels for most of its length. Sixty five percent had extensive levels of vegetation and this was primarily in wetland habitats.

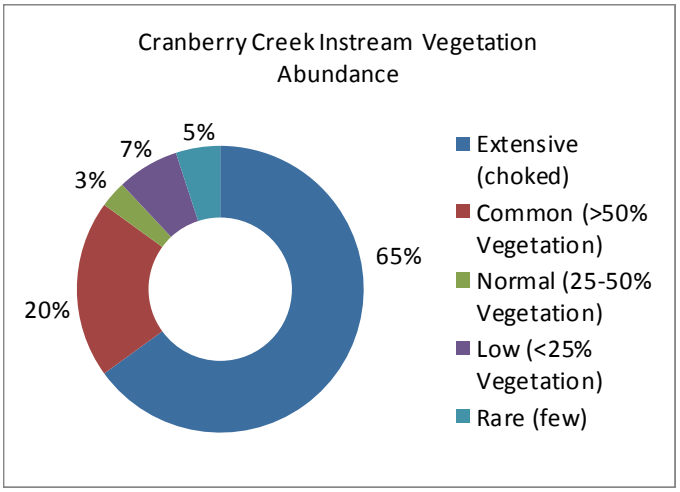


Figure 23. Vegetation abundance in Cranberry Creek

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. One hundred percent of the sections surveyed along Cranberry Creek had invasive species (Figure 24). The species observed in Cranberry Creek were purple loosestrife and European frogbit.

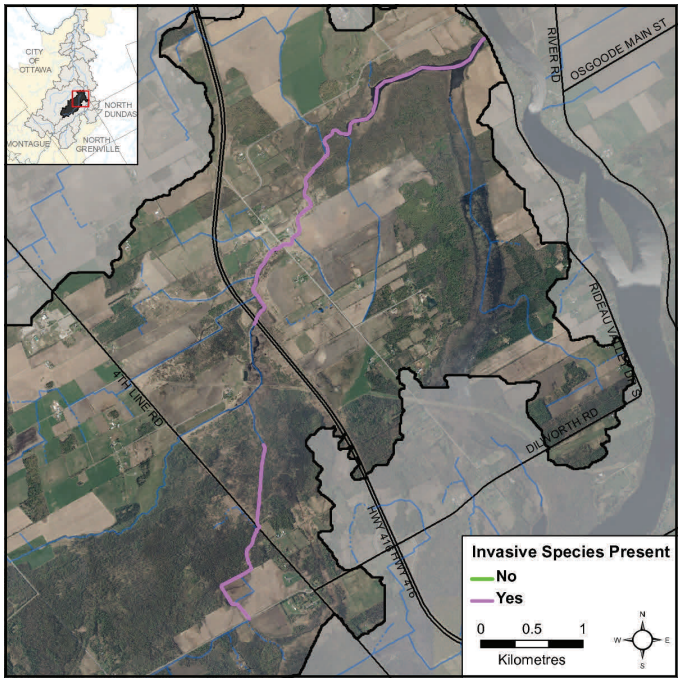


Figure 24. Invasive species along Cranberry Creek

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Three temperature dataloggers were deployed in Cranberry Creek from April to late September 2007(Figure 25) to give a representative sample of how water temperature fluctuates. 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 Cranberry Creek is a warmwater system.

A fyke net set on Cranberry Creek for fish sampling

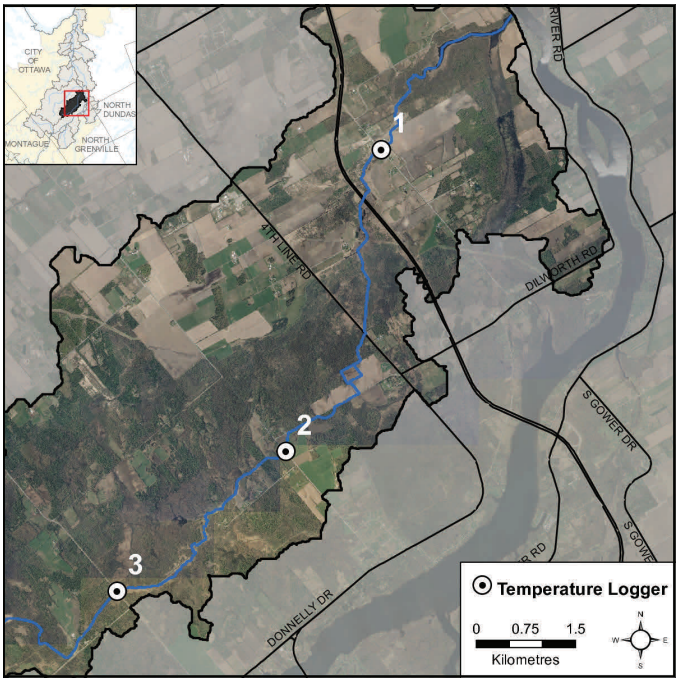


Figure 25. Temperature dataloggers along Cranberry Creek

Fish Sampling

Fish sampling sites located along Cranberry Creek are shown in Figure 26. The provincial fish codes shown on the map below are listed (in Table 6) beside the common name of those fish species identified in Cranberry Creek (Data source: RVCA and City of Ottawa).

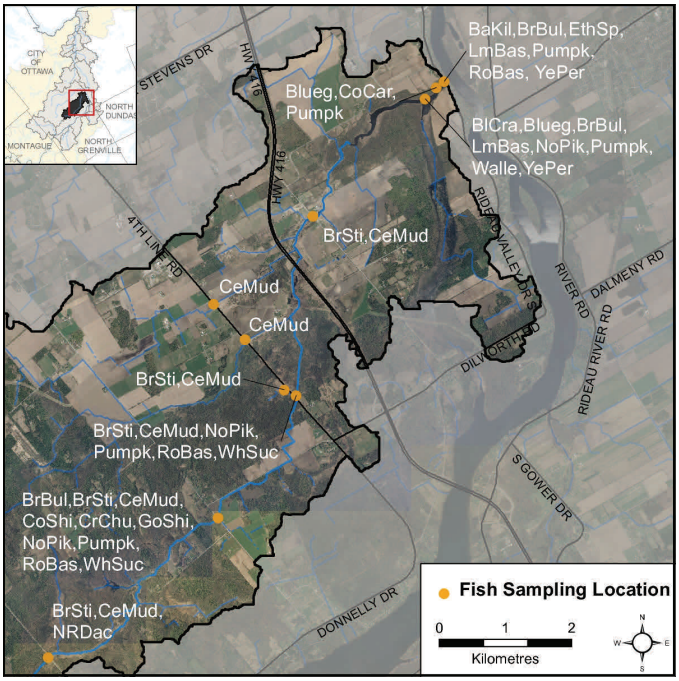


Figure 26. Fish species observed along Cranberry Creek

Table 6. Fish species observed in Cranberry Creek

BaKil-**banded killifish**	BlCra-**black crappie**	Blueg-**bluegill**	BrSti-**brook stick-leback**	BrBul-**brown bullhead**
CeMud-**central mudminnow**	CrChu-**creek chub**	GoShi-**golden shiner**	EthSp.-**etheostoma spp.**	LmBas-**largemouth bass**
NoPik-**northern pike**	Pumpk-**pumpkin-seed**	Robas-**rock bass**	Walle-**walleye**	WhSuc-**white sucker**
YePer-**yellow perch**	CoCar-**common carp**	CoShi-**common shiner**	NRDace **northern redbelly dace**	

Image of students electrofishing on Cranberry Creek

A young northern pike caught on Cranberry Creek

3) ***Land Cover***

Woodland, wetland and crop and pastureland are the dominant land cover types in the catchment as shown in Table 7 and displayed in the map on the front cover of

Table 7. Catchment land cover type

Cover Type	Area (ha)	Area (% of Cover)
Woodland	1710	33
Crop & Pasture	1633	32
Wetland	1472	28
Settlement	204	4
Transportation	119	2
Grassland	62	1

Woodland Cover

The Cranberry Creek catchment contains 1710 hectares of woodland (Fig.27) that occupies 33 percent of the drainage area. This figure is greater than 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.

Thirty-eight (34%) of the 113 woodland patches in the catchment are very small, being less than one hectare in size. Another 57 (50%) of the wooded patches ranging from one to less than 20 hectares in size tend to be dominated by edge-tolerant bird species. The remaining 18 (16%) woodland patches range between 22 and 598 hectares. Twelve of these patches contain woodland between 20 and 100 hectares and may support a few area-sensitive species and some edge intolerant species, but will be dominated by edge tolerant species.

Conversely, six (5%) of the 113 woodland patches in the drainage area exceed the 100 plus hectare size needed to support most forest dependent, area sensitive birds and is large enough to support approximately 60 percent of edge-intolerant species. Three of these patches top 200 hectares, which according to the Environment Canada Guideline will support 80 percent of edge-intolerant forest bird species (including most area sensitive species) that prefer interior forest habitat conditions.

Forest Interior

The same 113 woodlands contain 63 forest interior patches (Fig.27) that occupy seven percent (447 ha.) of the catchment land area. This is below the ten percent figure referred to in the Environment Canada Guideline that is considered to be the minimum threshold for supporting edge intolerant bird species and other forest dwelling species in the landscape.

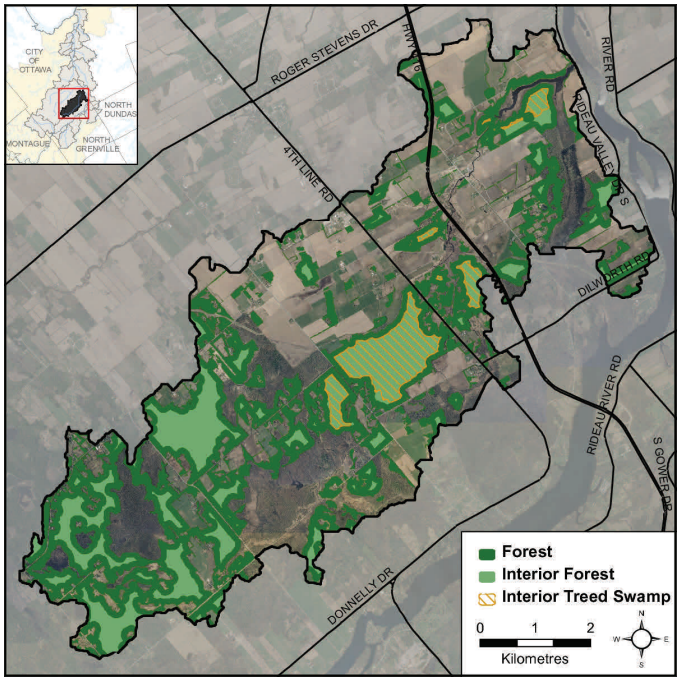


Figure 27. Catchment woodland cover and forest interior

Most patches (54) have less than 10 hectares of interior forest, 31 of which have small areas of interior forest habitat less than one hectare in size. Conversely, nine patches have greater than 10 hectares of interior forest, with three patches exceeding 50 hectares (at 56, 109 and 155 hectares).

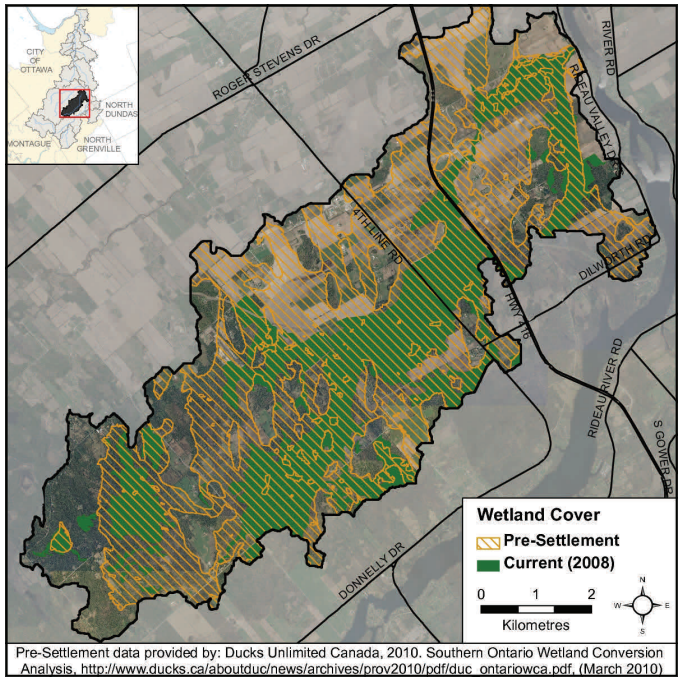


Figure 28. Pre-settlement and present day wetland cover

4) Stewardship and Protection

The RVCA and its partners are working to protect and enhance environmental conditions in the Lower Rideau River Subwatershed.

Rural Clean Water Projects

Figure 29 shows the location of all Rural Clean Water Projects in the Cranberry Creek drainage area. From 2006 to 2011, landowners completed 5 projects including 1 septic system repair/replacement, 2 well upgrades,1 well replacement and 1 well decommission. In total, RVCA contributed $6,000 in grant dollars valued at $27,195.

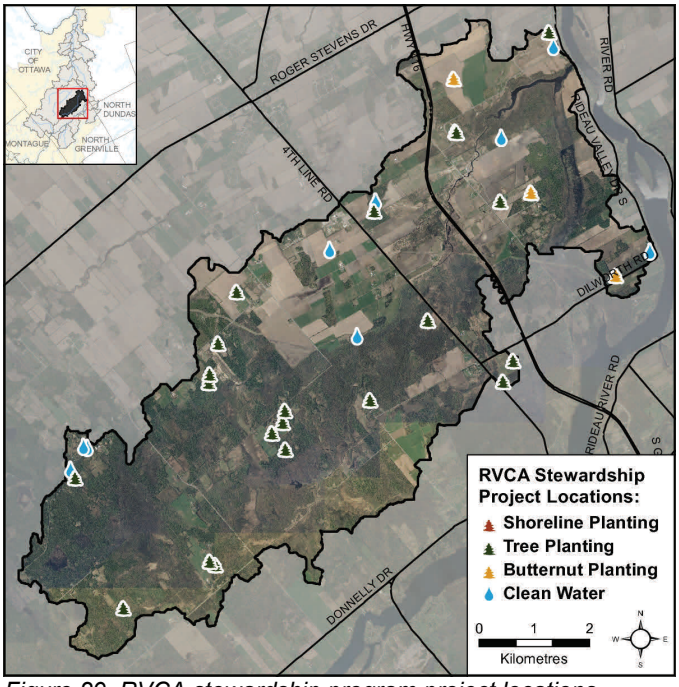


Figure 29. RVCA stewardship program project locations

Prior to 2006, the RVCA completed 6 projects in the area consisting of 2 septic system repairs/ replacements, 2 cropping practices, 1 well upgrade and 1 livestock fencing project. In total, RVCA contributed $8,397 in grant dollars to projects valued at $15,989.

Tree Planting Projects

The location of all tree planting and shoreline projects is also shown in Figure 29. From 2006 to 2011, 7,610 trees, valued at $12,392, were planted on 3 sites through the RVCA Tree Planting Program.

Before that, from 1984 to 2006, landowners helped plant 240,490 trees, valued at $265,140, on 17 project sites, using the RVCA Tree Planting Program, on 120 hectares of private land; fundraising dollars accounted for $189,704 of that amount.

Valley, Stream, Wetland and Hazard Land Regulation

Nineteen square kilometres or 37 percent of the catchment drainage area is within the regulation limit of Ontario Regulation 174/06 (Fig.30), giving protection to wetland areas and river or stream valleys that are affected by flooding and erosion hazards.

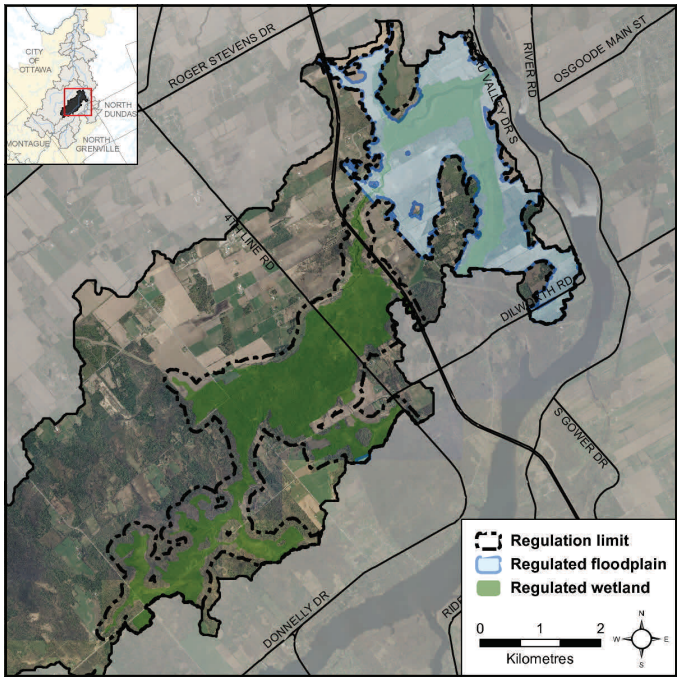


Figure 30. RVCA regulation limits

Natural features within the regulation limit include 8.8 sq. km. of wetlands (representing 60 percent of all wetlands in the catchment) and 38.8 kilometers of streams (representing 52 percent of all streams in the catchment). Most of these regulated watercourses (23.2 km or 31 percent of streams) flow through regulated wetlands.

Regulation limit mapping has been plotted along 15.7 km (or 21 percent) of the streams that are outside of wetlands. Plotting of the regulation limit on the remaining 35.3 km (or 47 percent) of streams requires identification of flood and erosion hazards and valley systems.

Within the regulation limit, “development” and “site alteration” require RVCA permission. The “alteration to waterways” provision of Ontario Regulation 174/06 applies to all watercourses.

5) Issues

- Some channelization of headwater tributaries due to rural drainage practices
- Removal of natural riparian vegetation on some tributaries
- Altered hydrology from drainage practices on tributaries causing in-stream erosion and impacts to aquatic habitats
- Increasing presence of invasive species
- Nutrient and metal exceedances observed in water samples taken
- Loss of forest and wetland habitat

6) Opportunities for Action

- Work with landowners to implement agricultural best management practices and pursue improvements to the riparian corridor along Cranberry Creek and tributaries (by increasing buffers through reforestation/riparian plantings and invasive species removal)
- Explore restoration and enhancement opportunities along the Cranberry Creek riparian corridor