

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 the Rideau River 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 Lower Rideau Subwatershed Report, please visit the RVCA website at [www.rvca.ca](http://www.rvca.ca).

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**Catchment Facts**

- An intensively, urbanized reach within the City of Ottawa with some large expanses of green space found along the river corridor; the only reach in the Lower Rideau that remains in its riverine form, without having been substantially altered for navigation
- Although the Rideau River remains largely in a natural state along this reach, most of the tributaries have been eliminated and replaced by storm sewers. Sawmill Creek is the only remaining tributary
- Development has been generally set back from the river and the banks along much of this reach are in public ownership. However, there are many areas where historic development, (including trail systems and former landfills) and transportation and utility corridors have encroached on the riparian zone
- Rideau Falls is a natural barrier that falls between the Rideau and Ottawa River; a dam at this location maintains operating head at Rideau Falls Generating Station and controls water levels upstream to Cummings Bridge at Montreal Road; summer low flows are somewhat augmented by releases from upstream storage reservoirs (for maintenance of

navigation levels on the Rideau Waterway)

- Flood vulnerable communities include portions of New Edinburgh, Vanier (Kingsview Park), Old Ottawa East and Old Ottawa South
- Risk of ice jam-induced flooding at spring break-up throughout the entire reach, but most notably at the Minto Bridges (Green Island), Cummings Bridge, near Highway 417 and near Billings Bridge. Annual preventive ice management operations include ice control boom at Strathcona Rapids and ice sheet removal before the spring freshet
- Flood control dykes with associated storm water pump stations protect communities in Old Ottawa South (Brewer Park, Windsor Park, Rideau River Lane)
- Drains 28 sq. km of land or 3.7% of the Lower Rideau Subwatershed and 0.7% of the Rideau Valley Watershed
- Dominant land cover is settlement (60%), followed by transportation (29%), woodland (7%) and water (4%)
- Riparian buffer (30 m. wide along both sides of the Rideau River and its tributaries) is comprised of woodland (41%), settlement (38%), transportation (18%) and wetland (3%)

- Contains a warm/cool water recreational and baitfish fishery with 40 fish species
- Water quality rating along the Rideau River is fair at Billings Bridge, over a six year reporting period (2006-2011). At the Cummings Bridge (in Vanier), the water quality rating is fair with no change observed over a 12 year reporting period (2000-2005 vs. 2006-2011)
- Woodland cover has increased by 2 percent (54 ha.) from 2002 to 2008
- Flood plain mapping has been available for the entire reach since 1972; last updated in 1984. Flood forecasting and warning services aim to give residents and municipality 48 hours notice prior to onset of flooding ("flood stage" based on elevation of access roads), enabling mobilization of emergency response measures, and evasive action to minimize damages and losses
- Major studies completed include: A Multidisciplinary, Community-Based Study of the Environmental Health of the Rideau River: Final Report. 2001 (Canadian Museum of Nature); Lower Rideau Watershed Strategy, Final Report. 2005 (Robinson Consultants for RVCA)
- Rideau River designated a UNESCO World Heritage Site

**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. Rideau River-Rideau Falls**

Surface water quality conditions in Rideau River-Rideau Falls catchment are monitored through the City of Ottawa's Baseline Water Quality Program (RRS-108C upstream side of Bank Street bridge, RRS-103C St Patrick Street bridge) (See Fig. 1 for their locations).

The water quality rating for Rideau River-Rideau Falls 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.

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

**Rideau River-Rideau Falls Nutrients**

Total phosphorus (TP) is used as a primary indicator of excessive nutrient loading and may contribute to abundant aquatic vegetation growth and depleted dissolved oxygen levels. The Provincial Water Quality Objectives (PWQO) of 0.030mg/l is used as the TP Guideline. Concentrations greater than 0.030 mg/l indicate an excessive amount of TP. Rideau River-Rideau Falls 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 85<sup>th</sup> percentile for the main channel of the Rideau River. 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 85<sup>th</sup> 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. Rideau River-Rideau Falls TKN results are shown in Figures 4a and 4b.

Tables 2 and 3 summarize average nutrient concentrations at monitored sites on Rideau River-Rideau Falls and shows the proportion of samples that meet guidelines. Highlighted values indicate averages that have exceeded the guidelines.

Table 2 Summary of total phosphorous results for Rideau River-Rideau Falls from 2000-2005 and 2006-2011

Total Phosphorus 2000-2005			
Site	Average (mg/l)	% Below	No. Samples
<i>RRS-108C</i>			
<i>RRS-103C</i>	0.046	25	57
Total Phosphorus 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
<i>RRS-108C</i>	0.038	47	70
<i>RRS-103C</i>	0.040	37	62

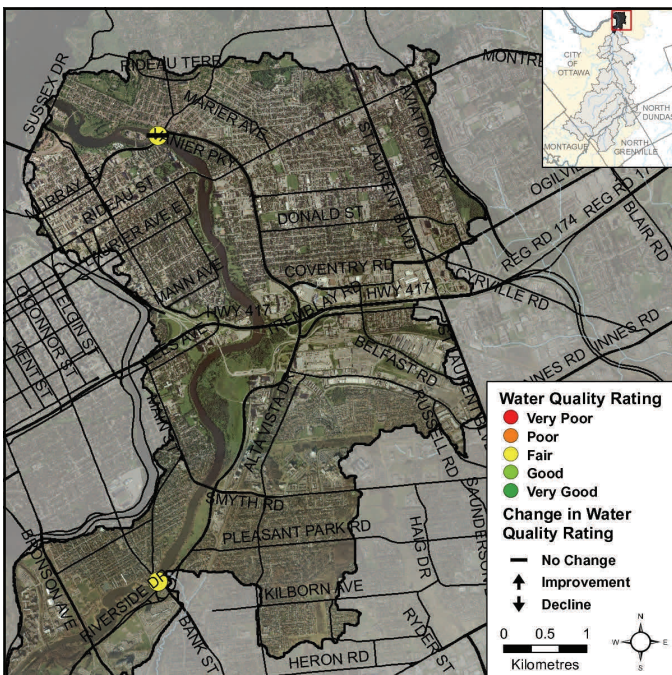


Figure 1. Sampling sites on Rideau River-Rideau Falls



Table 3. Summary of total Kjeldahl nitrogen results for Rideau River-Rideau Falls from 2000-2005 and 2006-2011

Total Kjeldahl Nitrogen 2000-2005			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C			
RRS-103C	0.648	4	57
Total Kjeldahl Nitrogen 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C	0.597	23	70
RRS-103C	0.611	13	62

**Rideau River-Rideau Falls Nutrients: Site RRS-108C**

The majority of samples at site RRS-108C exceeded the TP guideline of 0.030mg/l in the 2006-2011 time period (Fig. 2b), forty-seven percent of samples were below the guideline and average TP concentration exceeded the guideline at 0.046. Percentile plots of TP data shows that the target of a TP concentration of 0.030mg/l at the 85<sup>th</sup> percentile has not been achieved at this site, as concentration at the 85<sup>th</sup> equaled 0.050 mg/l (Fig. 3b) TKN is used as a secondary indicator of nutrient enrichment. Figure 4b shows that the majority of results exceeded the TKN guideline of 0.500 mg/l. Twenty three percent of samples are below the guideline and the average concentration is 0.597 mg/l.

**Rideau River-Rideau Falls Nutrients: Site RRS-103C**

The majority of samples at site RRS-103C were above the TP guideline of 0.030mg/l for both time periods (Fig. 2a, 2000-2005 and 2b, 2006-2011), twenty-five percent of samples were below the guideline in the 2000-2005

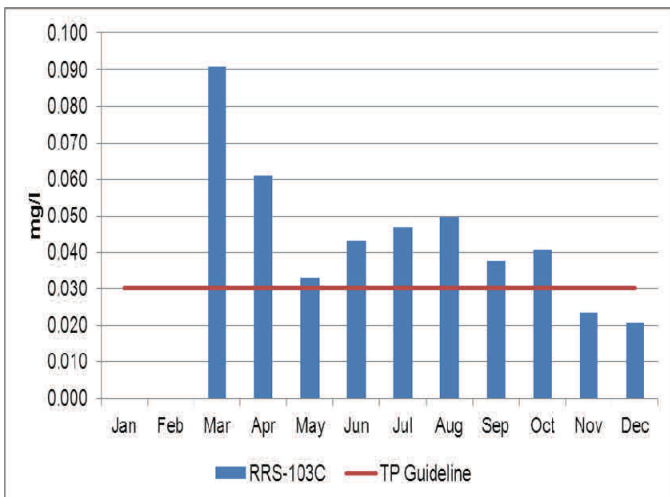


Figure 2a. Total phosphorous concentrations in Rider River-Rideau Falls from 2000-2005

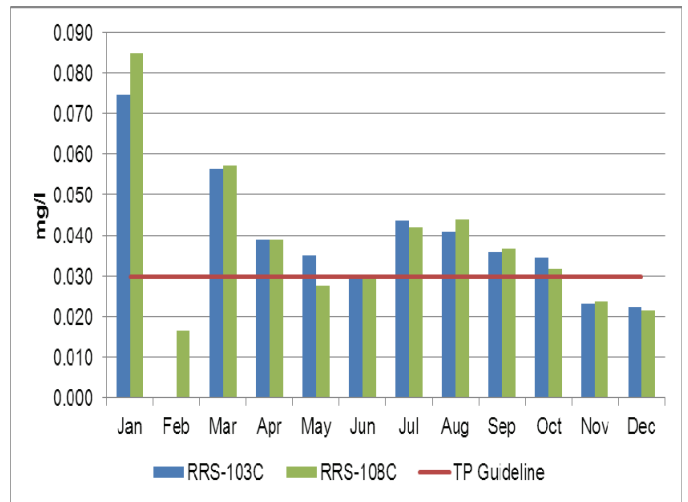


Figure 2b. Total phosphorous concentrations in Rideau River-Rideau Falls from 2006-2011

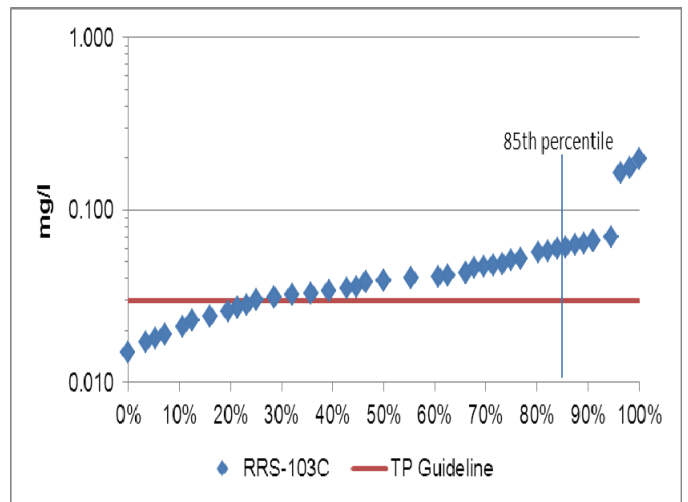


Figure 3a. Percentile plots of total phosphorous for Rideau River-Rideau Falls from 2000-2005

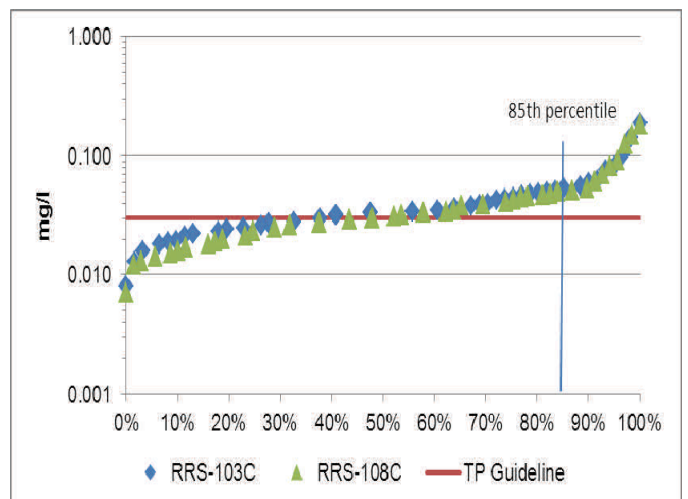


Figure 3b. Percentile plots of total phosphorous for Rideau River-Rideau Falls from 2006-2011

period and improved to thirty-seven percent of samples in the 2006-2011 period. Average TP concentration decreased slightly from 0.046 mg/l (2000-2005) to 0.040 mg/l (2006-2011).

TKN results show that the bulk of results exceeded the TKN guideline of 0.500 mg/l (Fig. 4a, 2000-2005 and Fig. 4b, 2006-2011), only four percent of samples were below the guideline in the 2000-2005 period and improved to thirteen percent in the 2006-2011 period. The average concentration decreased from 0.648 mg/l to 0.611 mg/l.

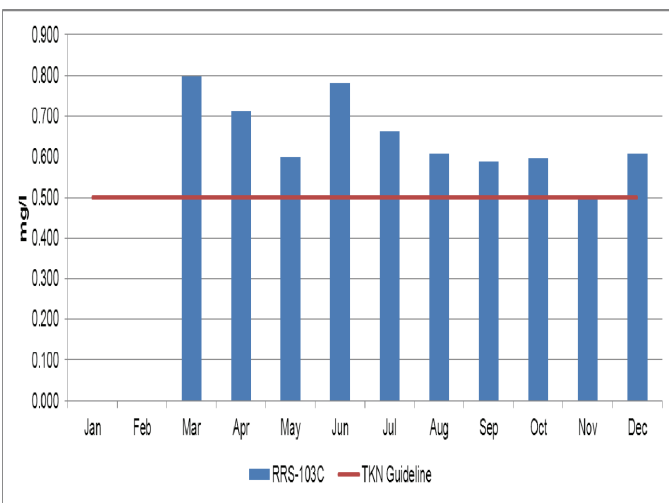


Figure 4a. Total Kjeldahl nitrogen concentrations in Rideau River-Rideau Falls from 2000-2005

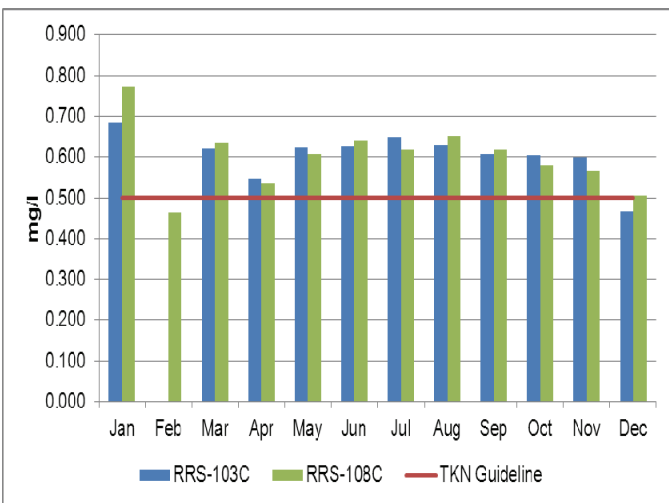


Figure 4b. Total Kjeldahl nitrogen concentrations in Rideau River-Rideau Falls from 2006-2011

**Rideau River-Rideau Falls Nutrients Summary**

Overall the data suggest that nutrient loading continues to be a problem at both these monitored sites. Efforts should be made to reduce sources of excess nutrients to the river wherever possible to improve water quality, habitat conditions and the aesthetics of this stretch of the Rideau River.

**Rideau River-Rideau Falls 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 Objectives 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. In addition to achieving the E. coli guideline, the LRWS also set a target of having no samples exceed a count of 500 CFU/100ml.

Table 5 summarizes the geometric mean at monitored sites on Rideau River-Rideau Falls and shows the proportion of samples that meet the E. coli guideline of 100 CFU/100ml.

Figure 5 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 80<sup>th</sup> percentile line (vertical) and above the guideline (horizontal) have failed to reach the LRWS target

Table 4. Summary of E. coli results for Rideau River-Rideau Falls

E. coli 2000-2005			
Site	Geometric Mean (CFU/100ml)	% Below Guideline	No. Samples
RRS-108C	-	-	-
RRS-103C	38	79	57
E. coli 2006-2011			
Site	Geometric Mean (CFU/100ml)	% Below Guideline	No. Samples
RRS-108C	36	83	70
RRS-103C	44	87	54

**Rideau River-Rideau Falls E. coli: Site RRS-108C**

E. coli counts above the guideline of 100 colony forming units per 100 mL (CFU/100mL) infrequent at site RRS-108C. Eighty-three percent of samples were below the guideline and the count at the geometric mean was 38 CFU/100ml in the 2006-2011 period (Fig. 5b). In addition to achieving the E. coli guideline the LRWS also set a target of having no samples exceed a count of 500 CFU/100ml. Figure 6b shows that only two samples exceeded this threshold at this site.

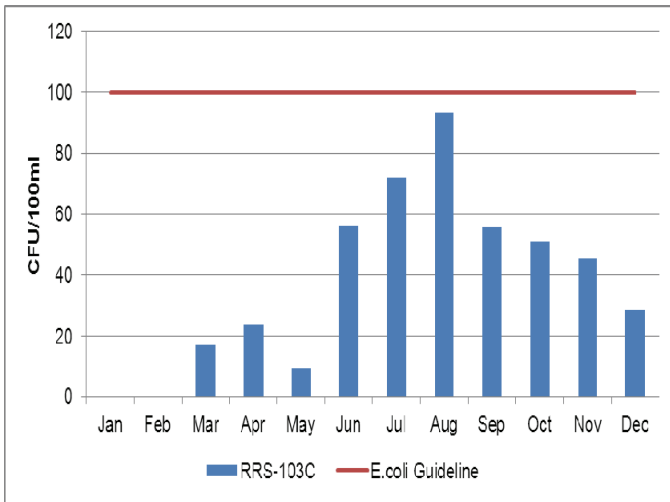


Figure 5a. *E. coli* concentrations in Rideau River-Rideau Falls from 2000-2005

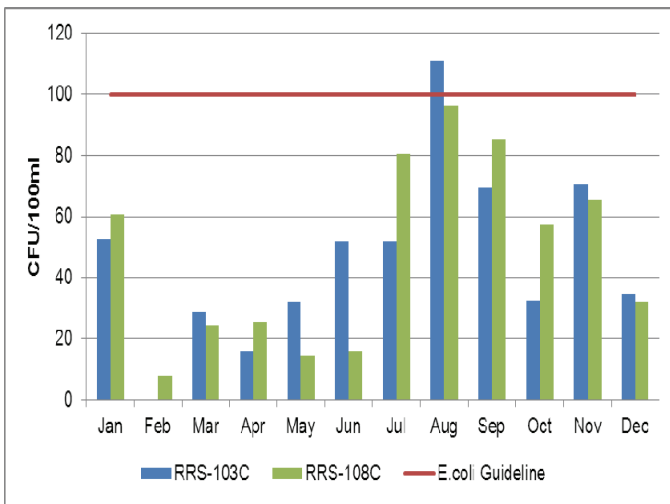


Figure 5b. *E. coli* concentrations in Rideau River-Rideau Falls from 2006-2011

**Rideau River-Rideau Falls *E. coli*: Site RRS-103C**

Site RRS-103C is located downstream of RRS-108C. The majority of samples were below the guideline at RRS-103C and this proportion improved from seventy-nine percent (Fig. 5a) to eighty-three percent between the two time periods (Fig. 5b). The count at the geometric mean was also low though did increase from 38 CFU/100 ml to 44 CFU/100 ml. In comparing the distribution of sample results in the percentile plots (Figures 6a and 6b) it can be observed that only one sample exceed the maximum target of 500 CFU/100 ml in both time periods.

**Rideau River-Rideau Falls *E. coli* Summary**

These statistics indicated that bacterial counts are typically below guidelines at site RRS-108C however efforts should be made to reduce any possible sources of contamination protect and improve water quality conditions.

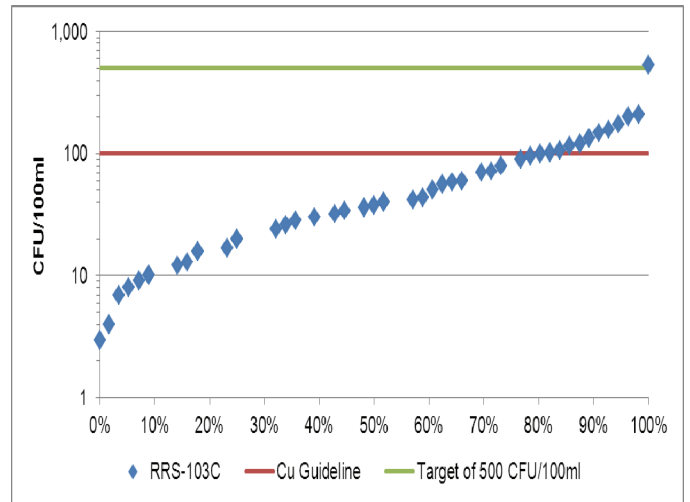


Figure 6a. Percentile plots of *E. coli* in Rideau River-Rideau Falls from 2000-2005

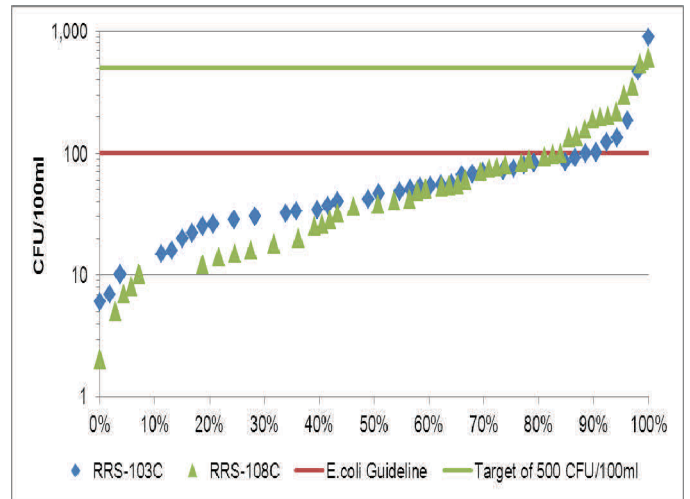


Figure 6b. Percentile plots of *E. coli* in Rideau River-Rideau Falls from 2006-2011

Similarly the data show that bacterial counts have increased at site RRS-103C though the majority of results are below the target of 100 CFU/100ml. Efforts should be continued to reduce any additional sources of contamination to the creek to protect overall water quality and aquatic life.

**Rideau River-Rideau Falls Metals**

Of the metals routinely monitored in Rideau River-Rideau Falls, aluminum (Al) and copper (Cu) were metals that occasionally reported concentrations above their respective PWQO. In elevated concentrations these metals can have toxic effects on sensitive aquatic species.

Table 5 summarizes average metal concentrations at monitored sites on Rideau River-Rideau Falls and shows the proportion of samples that meet guidelines. Highlighted values indicate averages that have exceeded the guideline.

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 Al 0.075 mg/l, and Cu 0.005 mg/l. The Lower Rideau Watershed Strategy set a target for Cu concentration of 0.005 mg/l (Cu guideline) at the 75<sup>th</sup> percentile for reaches of the Rideau River. Percentile plots of Cu data are shown for the 2000-2005 (Fig. 9a) and 2006-2011 (Fig. 9b) time periods. Any point to the left of the 75<sup>th</sup> percentile line (vertical) and above the guideline (horizontal line) have failed to reach the LRWS target.

Table 5. Summary of metal concentrations in Rideau River-Rideau Falls.

Aluminum 2000-2005			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C			
RRS-103C	0.166	61	57
Aluminum 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C	0.189	53	70
RRS-103C	0.172	53	62
Copper 2000-2005			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C			
RRS-103C	0.002	89	57
Copper 2006-2011			
Site	Average (mg/l)	% Below	No. Samples
RRS-108C	0.005	74	70
RRS-103C	0.004	79	62

**Rideau River-Rideau Falls Metals: Site RRS-108C**

Results for Al were generally below the guideline of 0.075 mg/l, fifty-three percent of samples were less than the guideline and average concentration was 0.189 mg/l in the 2006-2011 period (Fig. 7b).

Results for Cu concentrations were also occasionally above the guideline of 0.005 mg/l. In the 2006-2011 period seventy-four percent of samples were below and the average concentration was 0.005 mg/l (Fig. 8b). Percentile plots of Cu data are shown for the 2006-2011 (Fig. 9b) time period. The concentration at the 80<sup>th</sup> percentile was equal to the target at this site.

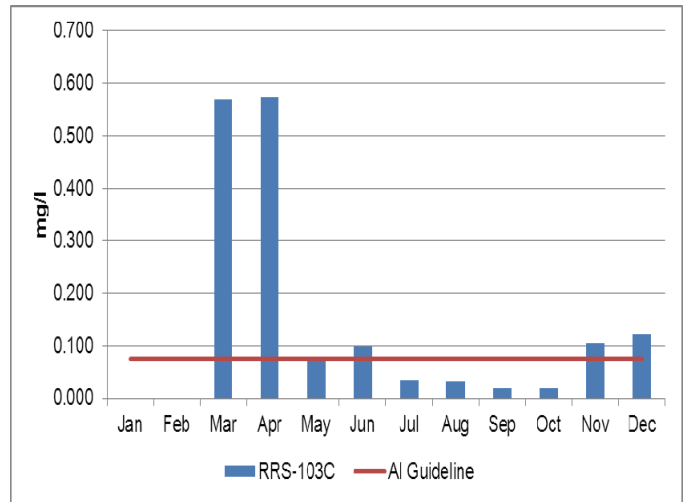


Figure 7a. Aluminum concentrations in Rideau River-Rideau Falls from 2000-2005

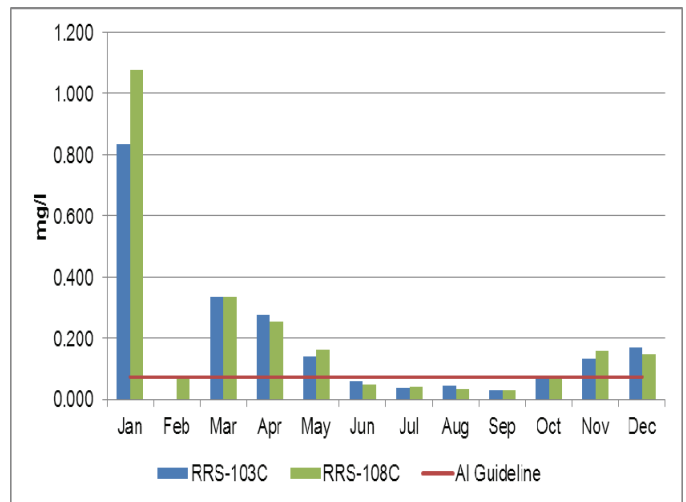


Figure 7b. Aluminum concentrations in Rideau River-Rideau Falls from 2006-2011

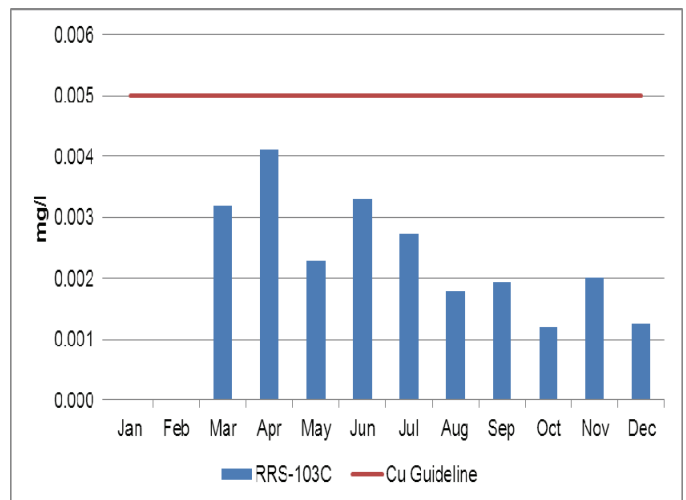


Figure 8a. Copper concentrations in Rideau River-Rideau Falls from 2000-2005

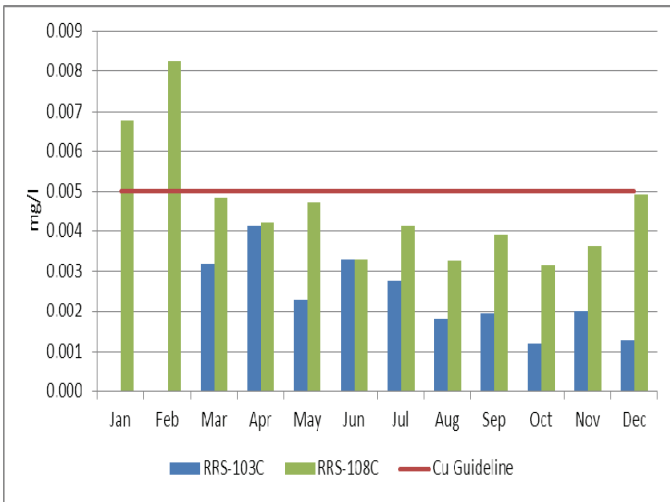


Figure 8b. Copper concentrations in Rideau River-Rideau Falls from 2006-2011

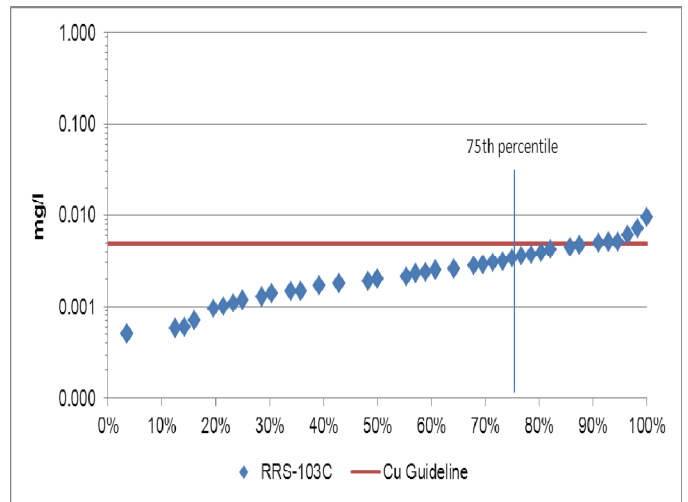


Figure 9a. Percentile plots of copper in Rideau river-Rideau Falls from 2000-2005

**Rideau River-Rideau Falls Metals: Site RRS-103C**

Results for Al were generally below the guideline at RRS-103C, sixty-one percent of samples were below the guideline in the 2000-2005 period and declined to fifty-three percent in the 2006-2011 period. There was a slight increase in the average Al concentration from 0.166 mg/l (Fig. 7a, 2000-2005) to 0.172 mg/l (Fig. 7b, 2006-2011).

Results for Cu concentrations were rarely above the guideline of 0.005 mg/l though exceedances did occur. The proportion of samples below the guideline decreased slightly from eighty-nine percent (Fig. 8a, 2000-2005) to seventy-nine percent (Fig. 8b, 2006-2011), the average concentration increased from 0.002 mg/l to 0.004 mg/l. Percentile plots of Cu data show that the target of a Cu concentration of 0.005 mg/l at the 75<sup>th</sup> percentile was achieved at this site, the concentration at the 75<sup>th</sup> percentile increased from 0.003 mg/l (2000-2005, Fig. 9a) to 0.005 mg/l (2006-2011, Fig. 9b) to just meet the target.

**Rideau River-Rideau Falls Metals Summary**

Overall the data shows that metal pollution may be present in this stretch of the river and efforts should be made to reduce concentrations wherever possible to improve water quality.

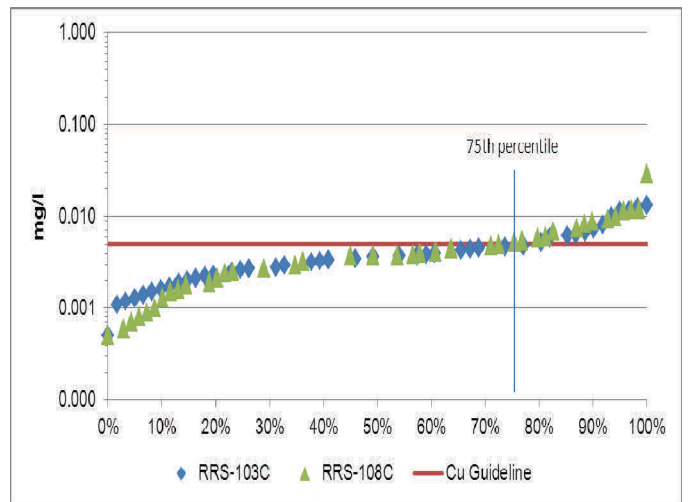


Figure 9b. Percentile plots of copper in Rideau River-Rideau Falls from 2006-2011



**2) a. Overbank Zone**

**Riparian Buffer along the Rideau Falls Reach of the Rideau River and Tributaries**

The riparian or shoreline zone is that special area where the land meets the water. Well-vegetated shorelines are critically important in protecting water quality and creating healthy aquatic habitats, lakes and rivers. Natural shorelines intercept sediments and contaminants that could impact water quality conditions and harm fish habitat in streams. Well established buffers protect the banks against erosion, improve habitat for fish by shading and cooling the water and provide protection for birds and other wildlife that feed and rear young near water. A recommended target (from Environment Canada's Guideline: How Much Habitat is Enough?) is to maintain a minimum 30 metre wide vegetated buffer along at least 75 percent of the length of both sides of rivers, creeks and streams.

Figure 10 shows the extent of the naturally vegetated riparian zone in the catchment, 30 metres on either side of all waterbodies and watercourses. Results from the RVCA's Land Cover Classification Program show that 44 percent of streams and creeks are buffered with woodland and wetland; the remaining 56 percent of the riparian buffer is occupied by settlement and transportation.

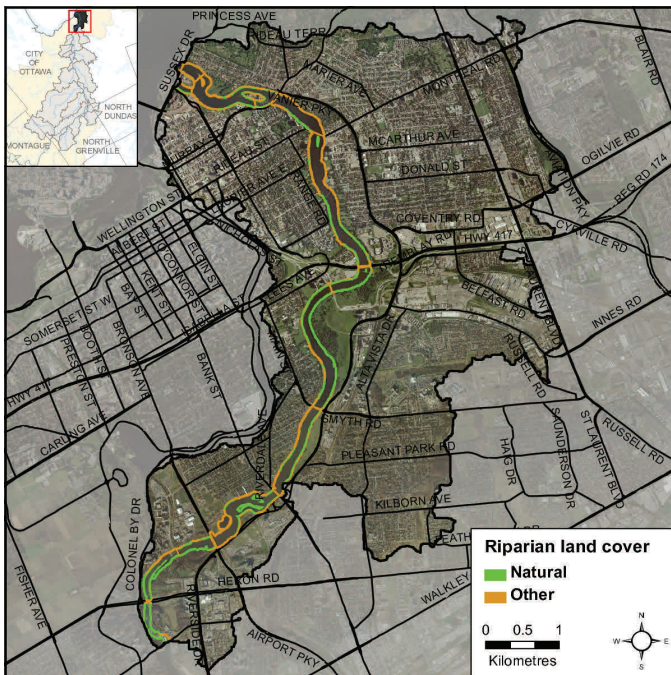


Figure 10. Catchment land cover in the riparian zone

**Fish Sampling**

Fish sampling sites located along Rideau Falls reach are shown in Figure 11. The provincial fish codes shown on the following map are listed (in Table 6) beside the common name of those fish species identified in the Rideau Falls reach of the Rideau River.

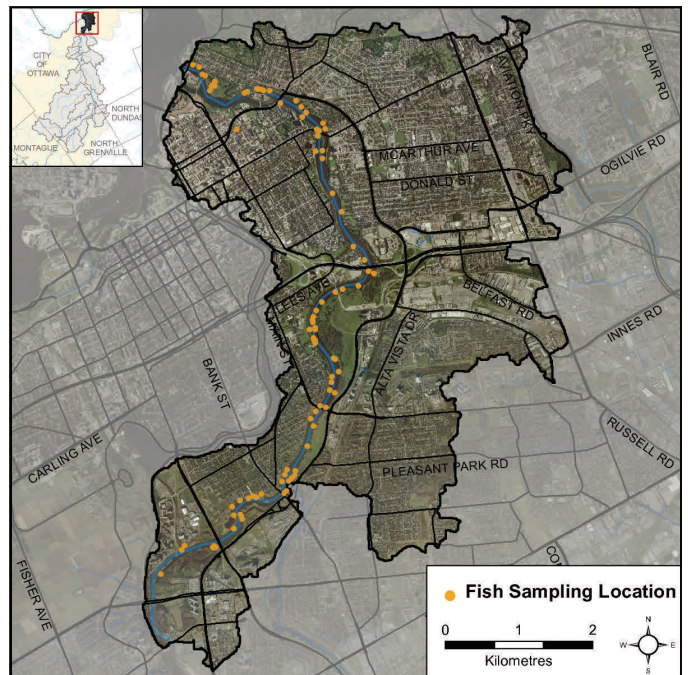


Figure 11. Fish sampling location along the Rideau Falls reach

Table 6. Fish species observed in the Rideau Falls reach

Wall walleye	NoPik northern pike	Muske muskel-lunge	Hy502 tiger muskel-lunge	ceMud central mud minnow	CoCar common carp
ESMin eastern silvery minnow	CoShi common shiner	GoShi golden shiner	EmShi emerald shiner	BcShi blackchin shiner	BnShi blacknose shiner
SpShi spottail shiner	MiShi mimic shiner	BnMin bluntnose minnow	Fallf fallfish	WhSuc white sucker	SiRed silver redhorse sucker
ShRed shorthead redhorse sucker	GrRed greater redhorse sucker	Redsp redhorse sucker species	BrBul brown bullhead	YeBul yellow bullhead	ChCat channel catfish
TaMad tadpole madtom	BaKil banded killifish	BrSil brook silverside	BrSti brook stickleback	MoScu mottled sculpin	RoBas rock bass
Pump pump-inseed	Blue bluegill	SmBas smallmouth bass	LmBas largemouth bass	BlCra black crappie	JoDar johnny darter
YePer yellow perch	LoPer log perch	TeDar tessellated darter			



**3) Land Cover**

Settlement is the dominant land cover types in the catchment as shown in Table 7 and displayed on the front cover of the report.

Table 7. Catchment land cover type

Cover Type	Area (ha)	Area (% of Cover)
Settlement	1706	60
Transportation	812	29
Woodland	203	7
Water	120	4

**Woodland Cover**

The Rideau River-Rideau Falls catchment contains 203 hectares of woodland (Fig.12) that occupies seven percent of the drainage area. This figure is less than the 30 percent of woodland area required to sustain forest birds, according to Environment Canada’s Guideline: “How much habitat is enough?” When woodland cover declines below 30 percent, forest birds tend to disappear as breeders across the landscape.

Fifty-seven (56%) of the 101 woodland patches in the catchment are very small, being less than one hectare in size. Another 43 (43%) the wooded patches ranging from one to less than 20 hectares in size tend to be dominated by edge-tolerant bird species. One woodland patch exceeds 20 hectares (at 22 ha.) and may support a few area-sensitive species and some edge intolerant species, but will be dominated by edge tolerant species.

No patch tops 100 hectares, which according to the Environment Canada Guideline will support 60 percent of edge-intolerant forest bird species (including most area sensitive species) that prefer interior forest habitat conditions.

**Forest Interior**

The same 101 woodlands contain 4 forest interior patches (Fig.12) that occupy less than one percent (2 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.

Three of these patches contain less than one hectare of interior forest habitat and the fourth patch is slightly larger than one hectare in size (at 1.2 ha.).

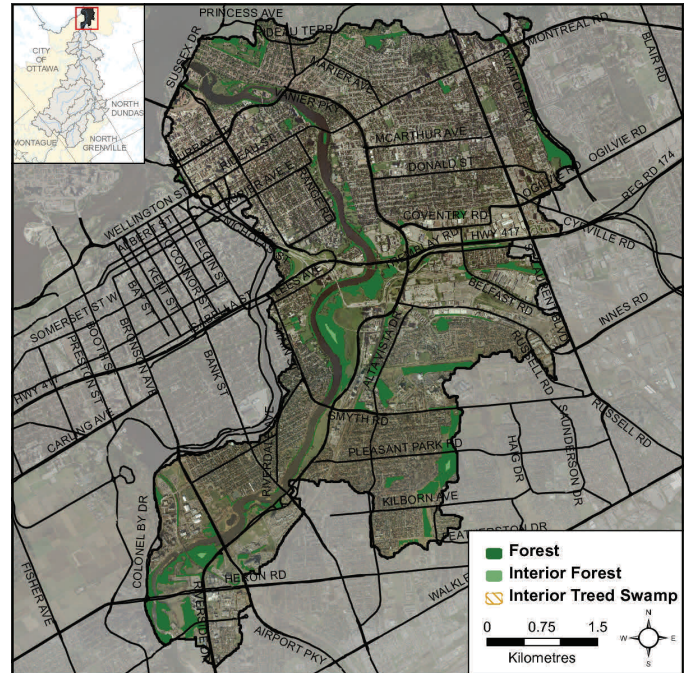
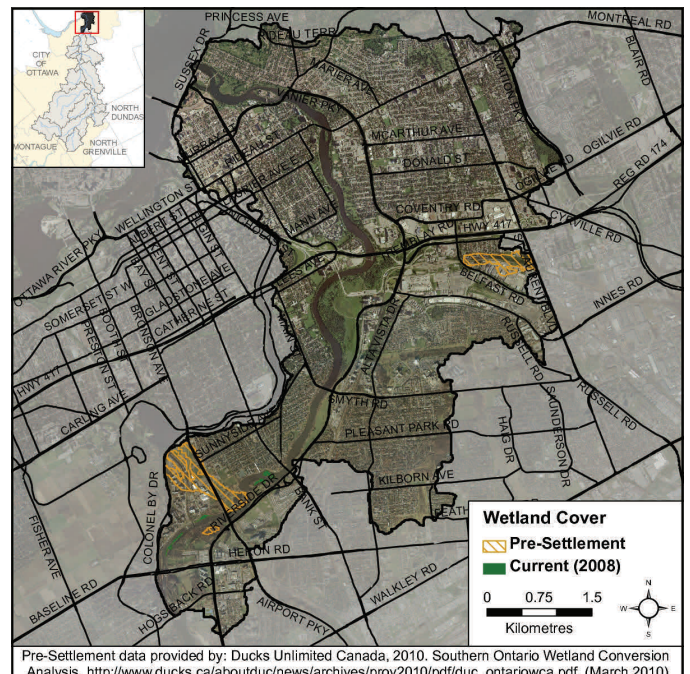


Figure 12. Catchment woodland cover and forest interior



Pre-Settlement data provided by: Ducks Unlimited Canada, 2010. Southern Ontario Wetland Conversion Analysis, [http://www.ducks.ca/aboutduc/news/archives/prov2010/pdf/duc\\_ontariowca.pdf](http://www.ducks.ca/aboutduc/news/archives/prov2010/pdf/duc_ontariowca.pdf), (March 2010)

Figure 13. Pre-settlement and current wetland cover

#### 4) Watershed Protection

##### Valley, Stream, Wetland and Hazard Land Regulation

Three square kilometres or 12 percent of the catchment drainage area is within the regulation limit of Ontario Regulation 174/06 (Fig. 14), giving protection to wetland areas and river or stream valleys that are affected by flooding and erosion hazards.

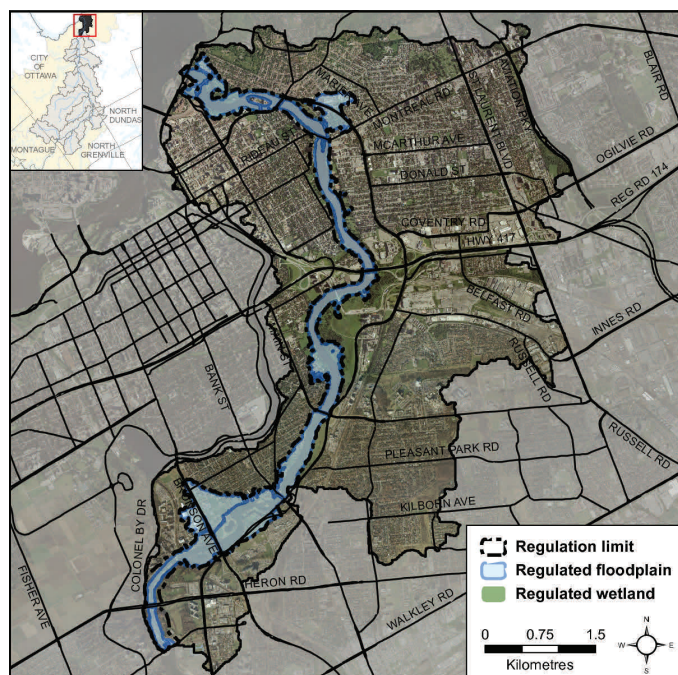


Figure 14. RVCA regulation limits

Natural features within the regulation limit include 11.7 kilometres of watercourse (representing 100 percent of all watercourses in the catchment).

Within the regulation limit, “development” and “site alteration” require RVCA permission, as do any proposed works to alter a watercourse, which are subject to the “alteration to waterways” provision of Ontario Regulation 174/06.

**5) *Issues***

- Loss and channelization of most tributaries in this reach due to historic urban drainage practices (that have been replaced by storm sewers)
- Most urban areas within the catchment predate modern stormwater management practices
- Many stormwater outfalls to the Rideau River are untreated and during extreme storm events, overflows may occur from combined sewers
- Removal of natural riparian vegetation along the shoreline of the Rideau River and remaining tributaries
- Reduced biodiversity
- Loss of most wetland and forest habitat due to urbanization

**6) *Opportunities for Action***

- The City of Ottawa is implementing combined sewer separation and flow management measures to reduce or eliminate stormwater overflows to the Rideau River through its municipal infrastructure renewal program
- Educate landowners about appropriate best management practices for lawn maintenance and yard waste disposal practices adjacent to the riparian corridor of the river and its tributaries
- Engage community associations and other interested groups and individuals in river and tributary clean up, invasive species removal and riparian planting