

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 urbanized reach with a number of large scale residential developments along the shoreline, individual lot redevelopments, agricultural and commercial lands and the Macdonald-Cartier International Airport
- Contains many tributaries, including Nepean, Hunt Club, Black Rapids, Barrhaven, Mosquito and Mud Creeks; the Jock River also discharge into this Reach
- Rideau Canal (Parks Canada) operates the Hogs Back and Black Rapids Dams to maintain water levels for navigation from mid-May to mid-October
- Much of the shoreline around Mooney's Bay and upstream to the Black Rapids Dam has been hardened, or otherwise altered by urban development
- This reach is under shoreline development pressure and is intensively used for boating and Parks Canada - Rideau Canal Office is working on education and awareness around the boat speed/wake problem, in cooperation with police
- Contains seven municipal drains
- Drains 38 sq. km of land or 4.9% of the Lower Rideau Subwatershed and 0.9% of the Rideau Valley Watershed
- Dominant land cover is settlement (44%), followed by crop and pastureland (23%), woodland (13%), transportation (11%), water (6%), grassland (2%) and wetland (1%)
- Riparian buffer (30 m. wide along both sides of the Rideau River and its tributaries) is comprised of woodland (33%), settlement (30%), crop and pastureland (29%), transportation (6%), wetland (2%) and grassland (1%)
- Contains a warm/cool water recreational and baitfish fishery with 40 fish species
- Water quality rating along the Rideau River is fair at the Strandherd Bridge, fair at Blacks Rapids Lock Station and fair immediately downstream of the Hunt Club Creek outlet, over a six year reporting period (2006-2011). At Mooney's Bay, the water quality rating is poor with no change observed over a 12 year period (2000-2005 vs. 2006-2011)
- Woodland cover has increased by 2.4 percent (90 ha.) from 2002 to 2008
- Between 2002/2003 and 2009/2010, 21.3 percent of the natural/regenerative vegetation cover along the Rideau River shoreline was converted to ornamental/degraded shoreline; over the same period, 10.3 percent of the ornamental/degraded shoreline converted to natural/regenerative vegetation cover
- Twenty-six stewardship (landowner tree planting/clean water/shoreline naturalization) projects have been completed
- Fish habitat compensation project completed and footbridge installed at the Chapman Mills Conservation Area in 2011 and 2013 respectively
- Floodplain mapping has been available since 1972; last updated in 1989
- Major studies completed include: Hunt Club Creek Watershed Environmental Study Report. 1995 (R.V. Anderson for City of Ottawa); 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-Hogs Back**

Surface water quality conditions in Rideau River-Hogs Back catchment are monitored through the City of Ottawa's Baseline Water Quality Program (RRS127 near Rideau Road and Earl Armstrong intersection, RRS117B Black Rapids lock station, RRS126 immediately downstream of the Hunt Club Creek outlet, RRS167B mid channel at Mooney's Bay) (See Fig. 1 for their locations).

The water quality rating for Rideau River-Hogs Back ranges from "Good" to "Fair" as determined by the CCME Water Quality Index (CCME WQI); analysis of the data has been broken into two periods 2000-2005 and

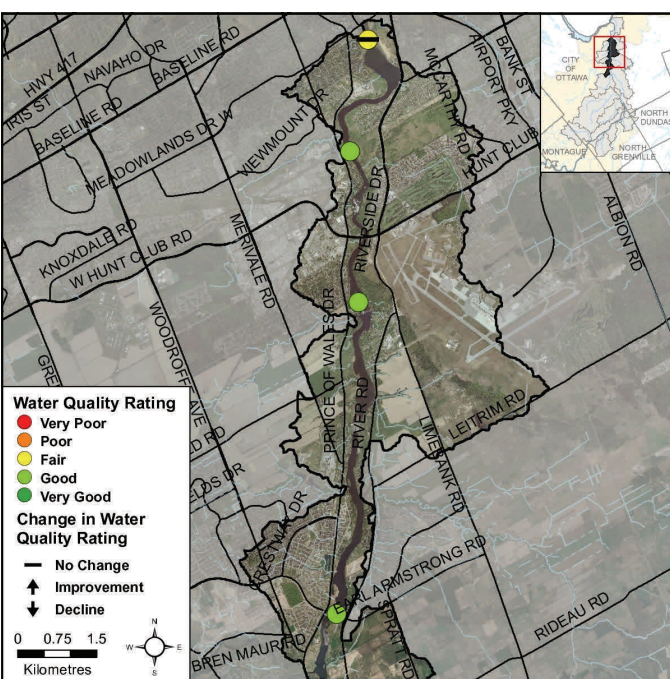


Figure 1. Sampling sites on Rideau River-Hogs Back

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-Hogs Back 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-Hogs Back 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-Hogs Back TKN results are shown in Figures 4a and 4b.

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

**Rideau River-Hogs Back Nutrients: Site RRS-127**

At site RRS-127 only twenty percent of samples were below the guideline and the average TP concentration exceeded the guideline at 0.038 mg/l (Fig. 2b). Percentile plots of TP data show that the target set by the LRWS has not been achieved as the concentration at the 85<sup>th</sup> percentile is equal to 0.044 mg/l (Fig. 3b).

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

Total Phosphorus 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-167B	0.044	13	32
Total Phosphorus 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-127	0.038	20	10
RRS-117B	0.039	21	33
RRS-126	0.037	25	12
RRS-167B	0.054	25	34

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

Total Kjeldahl Nitrogen 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-167B	0.655	0	32
Total Kjeldahl Nitrogen 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-127	0.648	0	10
RRS-117B	0.645	3	33
RRS-126	0.632	0	12
RRS-167B	0.651	3	34

TKN results show that all results exceeded the TKN guideline of 0.500 mg/l (Fig. 4b). The average concentration exceeded the guideline at 0.648 mg/l.

**Rideau River-Hogs Back Nutrients Site: RRS-117B**

TP results at site RRS-117B were comparable to RRS-127, twenty-one percent of samples were below the guideline and the average TP concentration exceeded the guideline at 0.039 mg/l (Fig. 2b). Percentile plots of TP data show that the target set by the LRWS has not been achieved as the concentration at the 85<sup>th</sup> percentile is equal to 0.052 mg/l (Fig.3b).

TKN results show that only three percent of samples were below the TKN guideline of 0.500 mg/l (Fig. 4b). The average concentration exceeded the guideline at 0.645 mg/l.

**Rideau River-Hogs Back Nutrients: Site RRS-126**

TP results at site RRS-126 were similar to the sites immediately upstream, twenty-five percent of samples were below the guideline and the average TP

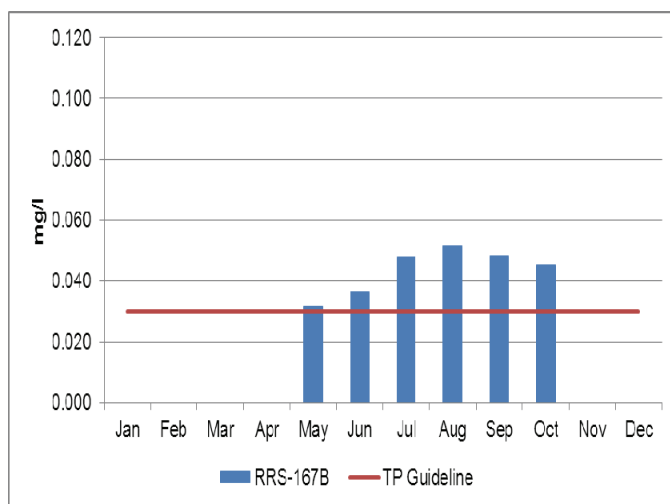


Figure 2a. Total phosphorous concentrations in Rideau River-Hogs Back from 2000-2005

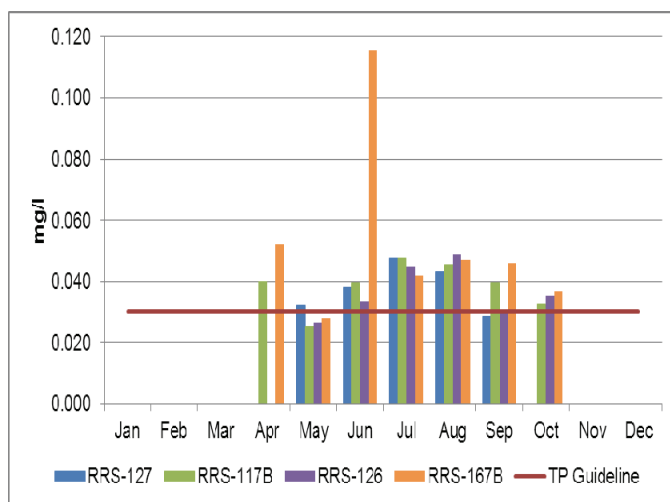


Figure 2b. Total phosphorous concentrations in Rideau River-Hogs Back from 2006-2011

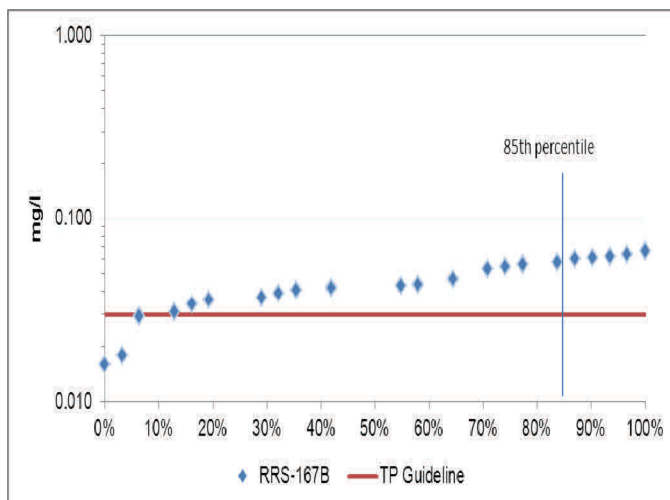


Figure 3a. Percentile plots of total phosphorous concentrations in Rideau River-Hogs Back from 2000-2005

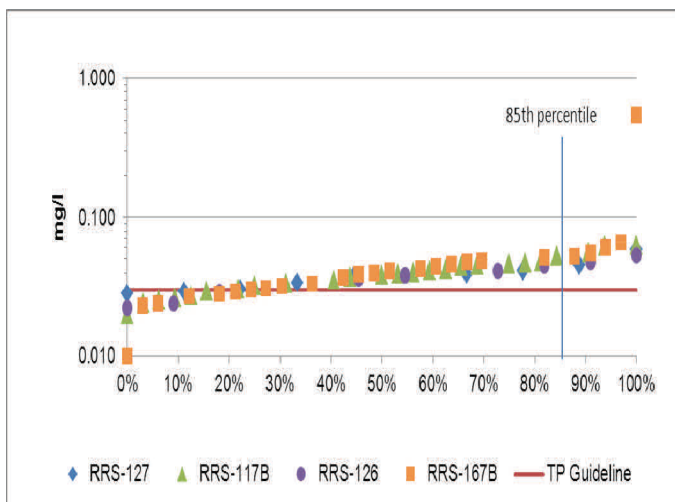


Figure 3b. Percentile plots of total phosphorous concentrations in Rideau-River-Hogs Back from 2006-2011

concentration exceeded the guideline at 0.037 mg/l. Percentile plots of TP data show that the target set by the LRWS has not been achieved as the concentration at the 85<sup>th</sup> percentile is equal to 0.046 mg/l. TKN results show that all results exceeded the TKN guideline of 0.500 mg/l (Fig. 4b). The average concentration exceeded the guideline at 0.632 mg/l.

**Rideau River-Hogs Back Nutrients: Site RRS-167B**

The majority of samples at this site were above the TP guideline of 0.030mg/l for both time periods (Fig. 2a, 2000-2005 and 2b, 2006-2011). Thirteen percent of samples were below the guideline in the 2000-2005 period; this improved to twenty five percent of samples in the 2006-2011 period. Average TP concentration decreased from 0.044 mg/l (2000-2005) to 0.054mg/l (2006-2011). Percentile plots of TP data are shown for two time periods 2000-2005 (Fig. 3a) and 2006-2011 (Fig. 3b) and show that the target set by the LRWS has not been achieved. The concentration at the 85<sup>th</sup> percentile decreased from 0.059 mg/l (2000-2005, Fig. 3a) to 0.051 mg/l (2006-2011, Fig. 3b).

TKN results show that the majority of results exceeded the TKN guideline of 0.500 mg/l (Fig. 4a and 4b), there were no samples below the guideline in the 2000-2005 period and improved slightly to three percent in the 2006-2011 period. The average concentration decreased from 0.655 mg/l to 0.651 mg/l.

**Rideau River-Hogs Back Nutrients Summary**

Overall the data suggest that nutrient loading continues to be a problem at all four monitored sites. Efforts should be made to reduce sources of excess nutrient to the river wherever possible to improve water quality, habitat

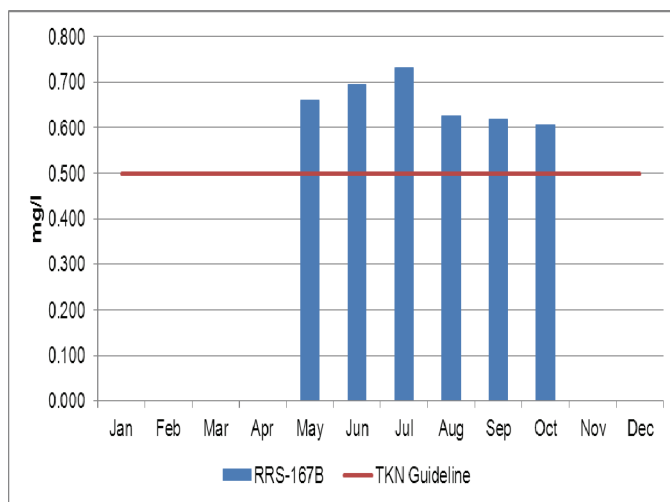


Figure 4a. Total Kjeldahl nitrogen concentrations in Rideau River-Hogs Back from 2000-2005

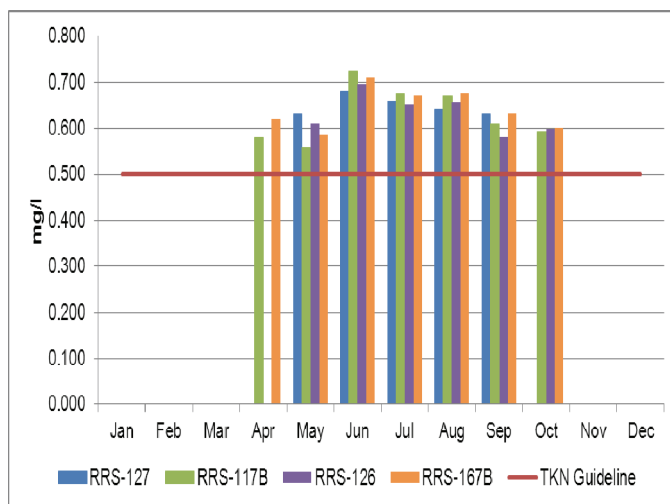


Figure 4b. Total Kjeldahl nitrogen concentrations in Rideau River-Hogs Back from 2006-2011

conditions and the aesthetics of this stretch of the Rideau River.

**Rideau River-Hogs Back 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 (CFU/100ml) 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 5000 CFU/100ml.

Table 4 summarizes the geometric mean at monitored sites on Rideau River-Long Island and shows the proportion of samples that meet the E. coli guideline of 100 CFU/100ml.

Figures 5a and 5b show 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 line) have failed to reach the LRWS target.

Sites RRS-127B to RRS-167B have low E. coli counts with the majority of results below the guideline. Please note that data was only available for the 2006-2011 period, with the exception of site RRS-167B.

**Rideau river-Hogs Back E. coli: Site RRS-127**

At site RRS-127, ninety percent of samples were below the guideline with a count at the geometric mean equal to 23 CFU/100ml (Fig. 5b).

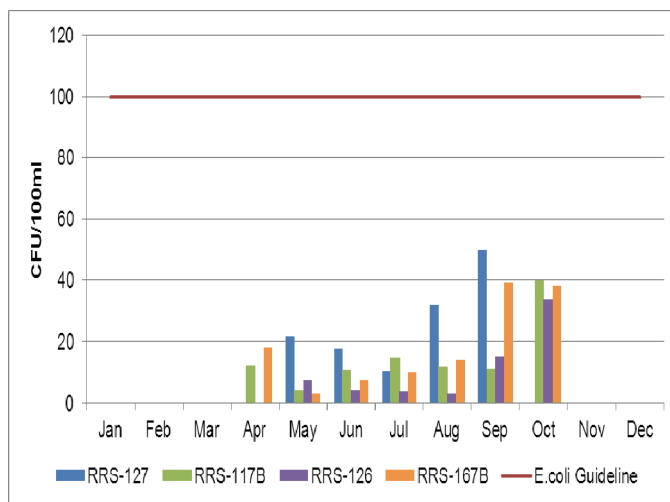


Figure 5b. E. coli counts in Rideau River-Hogs Back from 2006-2011

**Rideau River-Hogs Back E. coli: Site RRS-117B and RRS-126**

At Site RRS-117B and RRS 126 all samples were below the guideline of 100 CFU/100ml with counts at the geometric mean of 12 CFU/100ml and 8 CFU/100ml respectively (5b).

**Rideau River-Hogs Back E. coli: Site RRS-167B**

The furthest downstream site in this reach, RRS-167B showed a slight reduction in the proportion of samples below the guideline dropping from ninety-four percent (2000-2005, Fig. 5a) to ninety-one percent (2006-2011, Fig. 5b). The count at the geometric mean was quite low and increased from 11 CFU/100ml at 13 CFU/100ml during the two periods of interest. Figures 6a and 6b show that all samples results were below the maximum target of 500 CFU/100ml at all four sites.

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

E. coli 2000-2005			
Site	Geometric Mean	% Below Guideline	No. Samples
RRS-167B	11	94	32
E. coli 2006-2011			
Site	Geometric Mean	% Below Guideline	No. Samples
RRS-127	23	90	10
RRS-117B	12	100	33
RRS-126	8	100	12
RRS-167B	13	91	34

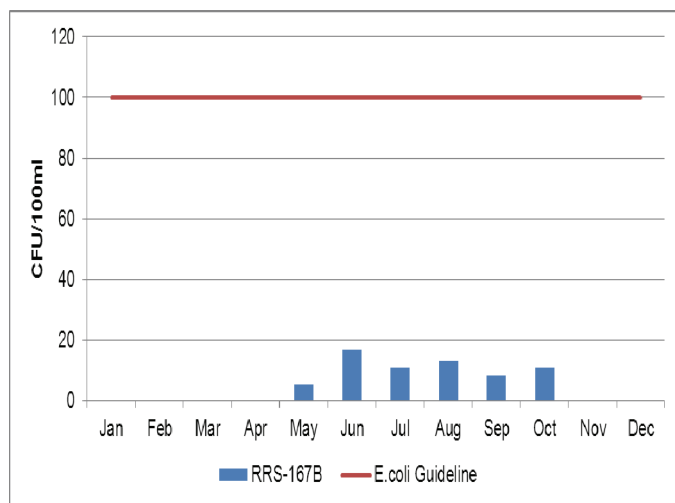


Figure 5a. E. coli counts in Rideau River-Hogs Back from 2000-2005

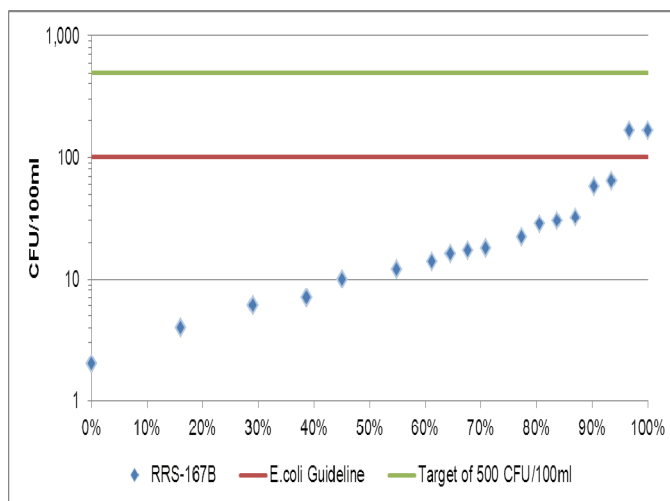


Figure 6a. Percentile plots of E. coli in Rideau River-Hogs Back from 2000-2005

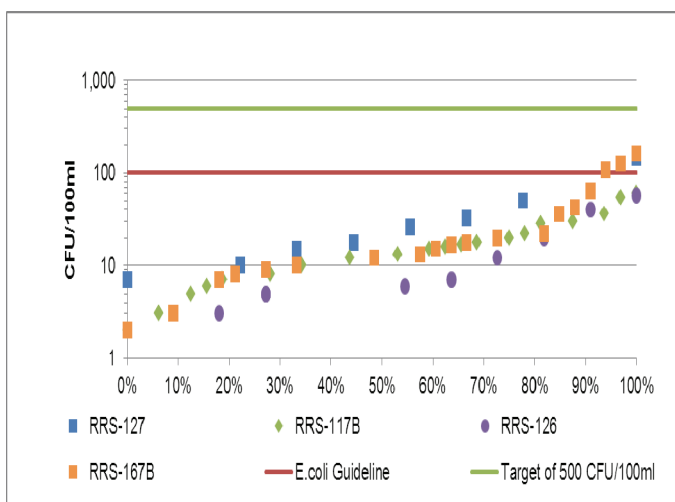


Figure 6b. Percentile plots of *E. coli* in Rideau river-Hogs Back from 2006-2011

**Rideau River-Hogs Back *E. coli* Summary**

Overall there is little evidence in bacterial contamination in this stretch of the Rideau River however efforts should be continued to reduce any additional sources of contamination to the creek to protect overall water quality for recreational use and aquatic life.

**Rideau River-Hogs Back Metals**

The majority of metals monitored at sites in the Rideau River were below guidelines, however results for aluminum (Al) were occasionally elevated in the reach between sites RRS-127 to RRS-167B. Please note that for these sites data was only available for the 2006-2011 period with the exception of site RRS-167B.

Table 5 summarizes average metal concentrations at monitored sites on Rideau River-Rideau Falls and shows the proportion of samples that meet guidelines.

Figure 7 shows the results for each site with respect to guidelines for the two periods 2000-2005 (Fig. 7a) and 2006-2011 (Fig. 7b). The aluminum guideline as stated by the PWQO is Al 0.075 mg/l.

**Rideau River-Hogs Back Metals: Site RRS-127**

At site RRS-127, ninety percent of samples were below the guideline with an average concentration of 0.068 mg/l (Fig. 7b).

**Rideau river-Hogs Back Metals: Site RRS-117B**

Site RRS-117B had fewer samples below the guideline (seventy-three percent) but had a comparable average concentration of 0.067 mg/l (Fig. 7b).

Table 5. Summary of Aluminum concentrations in Rideau River -Hogs Back

Aluminum 2000-2005			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-167B	0.059	77	30
Aluminum 2006-2011			
Site	Average (mg/l)	% Below Guideline	No. Samples
RRS-127	0.068	90	10
RRS-117B	0.067	73	33
RRS-126	0.069	58	12
RRS-167B	0.057	82	34

**Rideau River-Hogs Back Metals: Site RRS-126**

Only fifty-eight percent of samples at site RRS -126 were less than the guideline, the average concentration was 0.069 mg/l (Fig. 7b).

**Rideau River-Hogs Back Metals: Site RRS-167B**

The furthest downstream site in this reach, RRS-167B showed an improvement from its nearest upstream site. In the 2000-2005 period seventy-seven percent of samples were below the guideline (Fig. 7a) and improved to eighty-two percent of samples in the 2006-2011 period (Fig. 7b). The average concentrations remained fairly constant between the two periods decreasing slightly from 0.059 mg/l to 0.057 mg/l.

**Rideau River-Hogs Back Metals Summary**

Overall the data indicates that metal pollution occasionally occurs in Rideau River-Hogs Back and efforts should be made to reduce sources where possible.

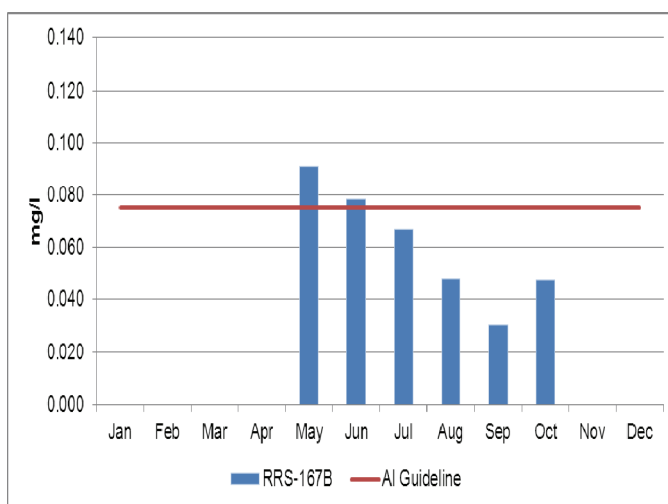


Figure 7a. Aluminum concentrations in Rideau River-Hogs Back from 2000-2005m

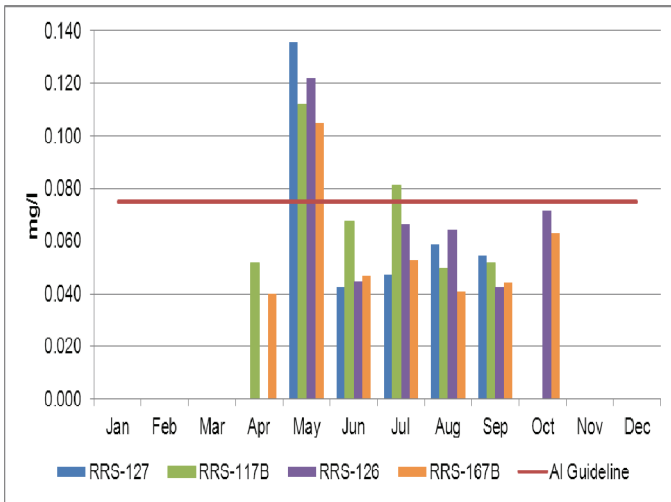


Figure 7b. Aluminum concentrations in Rideau river-Hogs Back from 2006-2011



A juvenile northern pike



A dragon fly nymph caught in the Rideau



Fish sampling demonstration for volunteers along the Rideau



A reach along the Rideau

**2) a. Overbank Zone**

**Riparian Buffer along the Hogs Back 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 8 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 36 percent of streams, creeks and lakes are buffered with woodland, wetland and grassland; the remaining 66 percent of the riparian buffer is occupied by settlement, crop and pastureland and transportation.

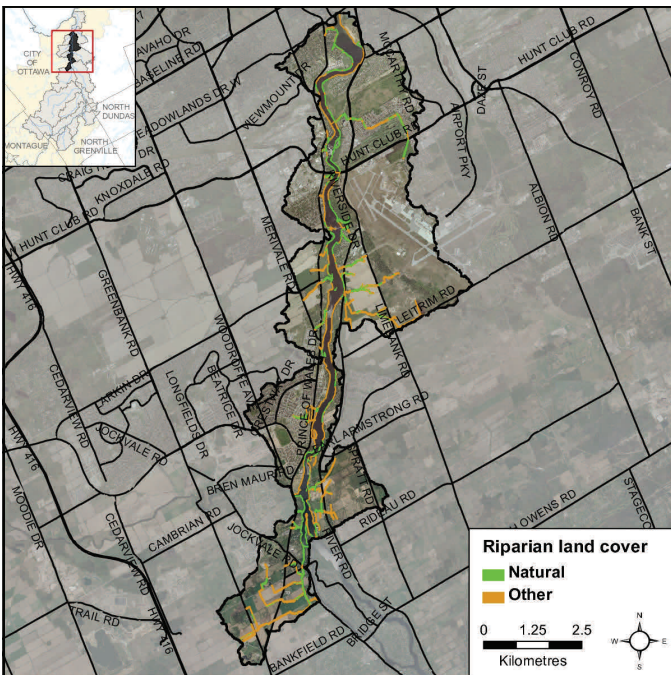


Figure 8. Catchment land cover in the riparian zone

**Fish Sampling**

Fish sampling sites located along the Hogs Back reach are shown in Figure 9. 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 Hogs Back reach of the Rideau River.

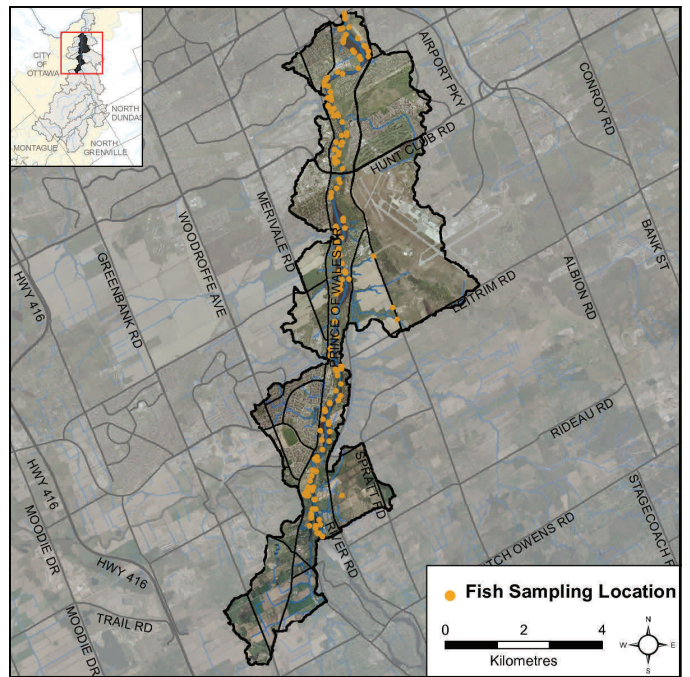


Figure 9. Fish sampling locations along the Hogs Back reach

Table 6. Fish species observed in the Hogs Back reach

Wall walleye	NoPik northern pike	Muske muskel-lunge	Hy502 tiger 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 logperch	TeDar tessellated darter			



**3) Land Cover**

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

Table 8. Catchment land cover type

Cover Type	Area (ha)	Area (% of Cover)
Settlement	1639	44
Crop & Pasture	876	23
Woodland	498	13
Transportation	422	11
Water	236	6
Grassland	64	2
Wetland	17	1

**Woodland Cover**

The Rideau River-Hogs Back catchment contains 498 hectares of woodland (Fig.12) that occupies 13 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 forest cover declines below 30 percent, forest birds tend to disappear as breeders across the landscape.

Eighty-one (50%) of the 163 woodland patches in the catchment are very small, being less than one hectare in size. Another 75 (46%) 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 seven (4 percent of) woodland patches range between 21 and 37 hectares 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 conditions.

**Forest Interior**

The same 163 woodlands contain 17 forest interior patches (Fig.12) that occupy one percent (32 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.

All woodland patches with interior forest habitat contain less than 10 hectares of interior forest, 10 of which have small areas of interior forest habitat less than one hectare in size. Conversely, seven patches have greater than 1 hectare of interior forest, ranging from two to nine hectares in size.

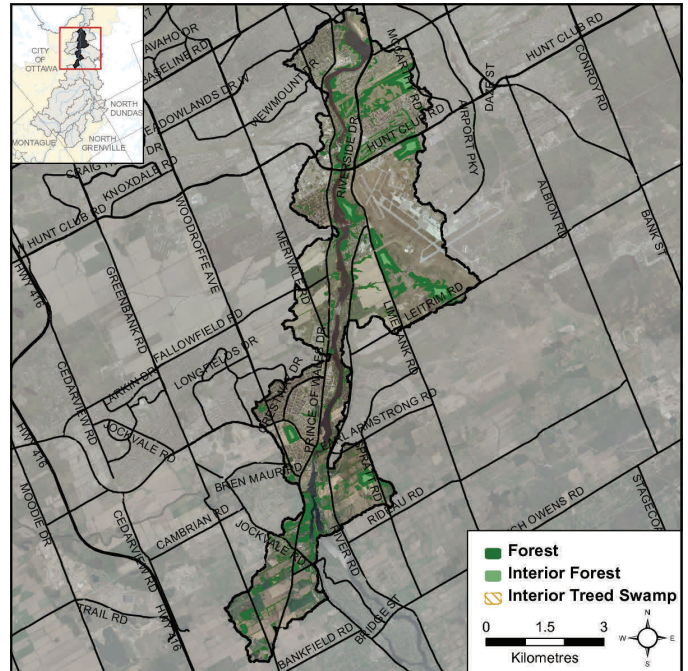


Figure 12. Catchment woodland cover and forest interior

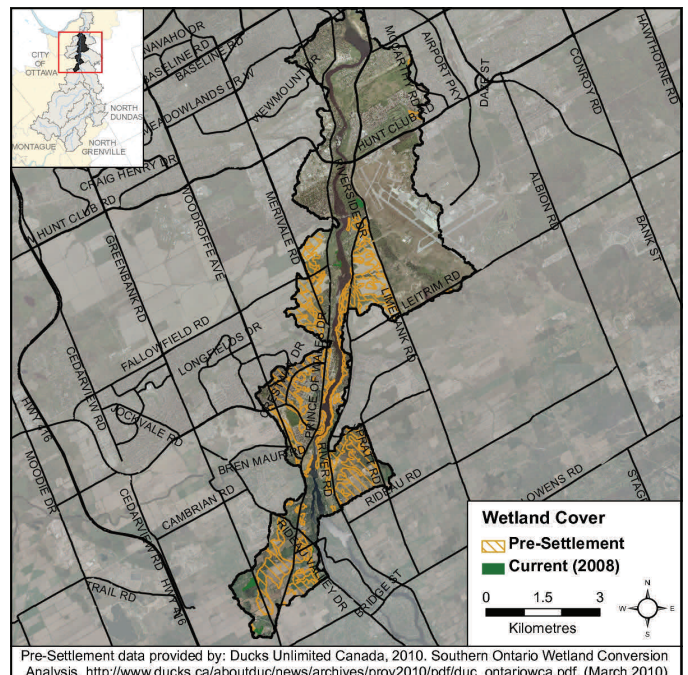


Figure 13. Pre-settlement and present day wetland cover

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)

**4) Stewardship and Protection**

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

**Rural Clean Water Projects**

Figure 14 shows the location of all Rural Clean Water Projects in the Hogs Back drainage area. From 2006 to 2011, landowners completed 7 projects including 3 septic system repair/replacements, 2 well upgrades and 2 well decommissionings. In total, RVCA contributed \$9,826 in grant dollars to projects valued at \$61,192.

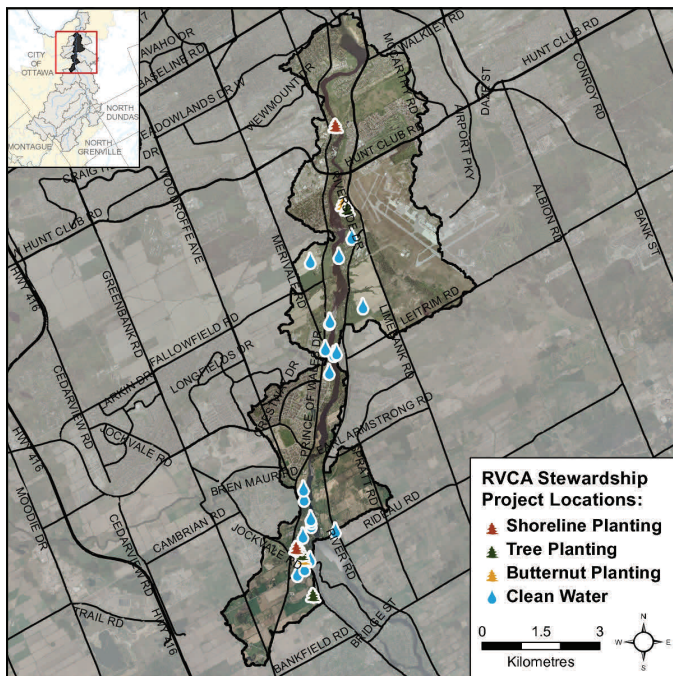


Figure 14. RVCA stewardship program project locations

Prior to 2006, the RVCA completed 14 projects in the area consisting of 11 septic repairs/replacements, 1 well upgrade, 1 well decommissioning and 1 surface wastewater treatment. In total, RVCA contributed \$25,187 in grant dollars to projects valued at \$77,145..

**Tree Planting Projects**

The location of all tree planting and shoreline projects is also shown in Figure 14. From 2006 to 2011, 650 trees, valued at \$1,396, were planted on 2 sites through the RVCA Tree Planting Program.

Before that, from 1984 to 2006, landowners helped plant 500 trees, valued at \$875, on 1 project site, using the RVCA Tree Planting Program, on 0.2 hectares of private land.

**Shoreline Naturalization Projects**

Through the Shoreline Naturalization Program, 2 shoreline planting projects were completed in partnership with private landowners. 425 tree and shrub seedlings were planted along 465 m of the Rideau River shoreline at a total project value of \$2,285.

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

Six square kilometres or 16 percent of the catchment drainage area is within the regulation limit of Ontario Regulation 174/06 (Fig.15), giving protection to wetland areas and river or stream valleys that are affected by flooding and erosion hazards.

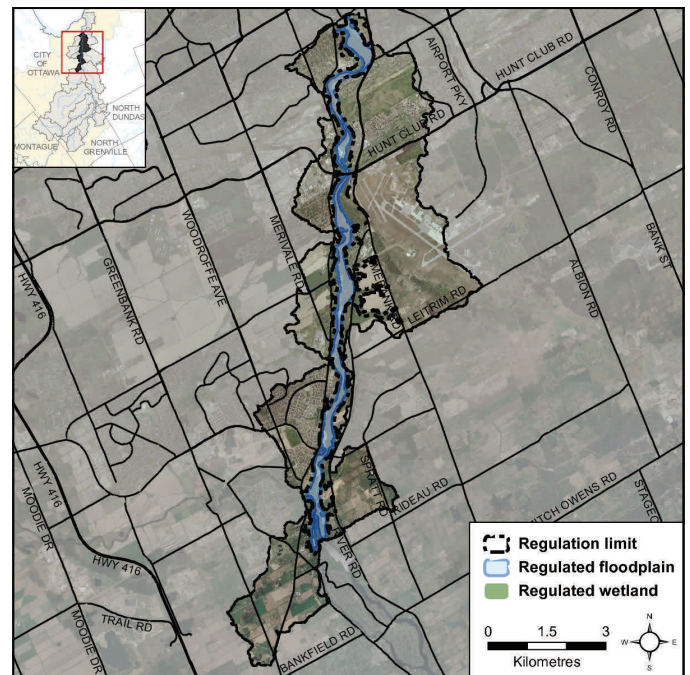


Figure 15. RVCA regulation limits

Natural features within the regulation limit include 31.9 kilometres of watercourse (representing sixty percent of all streams in the catchment).

Plotting of the regulation limit on the remaining 21 km (or 40 percent) of streams requires identification of flood and erosion hazards and valley systems.

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 headwater tributaries due to urban and rural drainage practices
- Removal of natural riparian vegetation along the shoreline of the Rideau River and its tributaries
- Altered hydrology causing erosion and impacts to aquatic habitat
- Reduced biodiversity
- Increasing presence of invasive species
- Nutrient and occasional metal exceedances observed in water samples taken
- Shoreline is susceptible to erosion due to boat wake and wave action, if not protected by shoreline stabilization methods (riparian plantings, bioengineering or healthy stands of emergent wetland vegetation in the littoral zone)
- Many (but not all) riverfront property owners have installed erosion protection (shoreline hardening) works that have detrimental effects on shoreline vegetation and aquatic habitat
- Boat speed and wake rules are in place but are only as effective as the level of effort applied to enforcement
- This reach receives significant boat traffic and is under shoreline development pressure. It also has higher and steeper river banks that are, in general, marginally stable and prone to undercutting, over-steepening and eventually, shallow failures due to streamflow, boat wake and wave action at the toe, if not protected; in some locations, depending on soil and groundwater characteristics, deep-seated failures are possible

**6) *Opportunities for Action***

- Engage landowners in invasive species removal, tree and riparian planting. The RVCA and its partners continue to promote shoreline naturalization efforts along this reach. Shoreline landowners are eligible for assistance under the Clean Water and Shoreline Naturalization Programs, if they use shoreline naturalization and/or bio-engineering methods to remedy erosions problems
- Continue with efforts made by the Parks Canada - Rideau Canal Office and its partners to work on education and awareness around the boat wake and speed problems