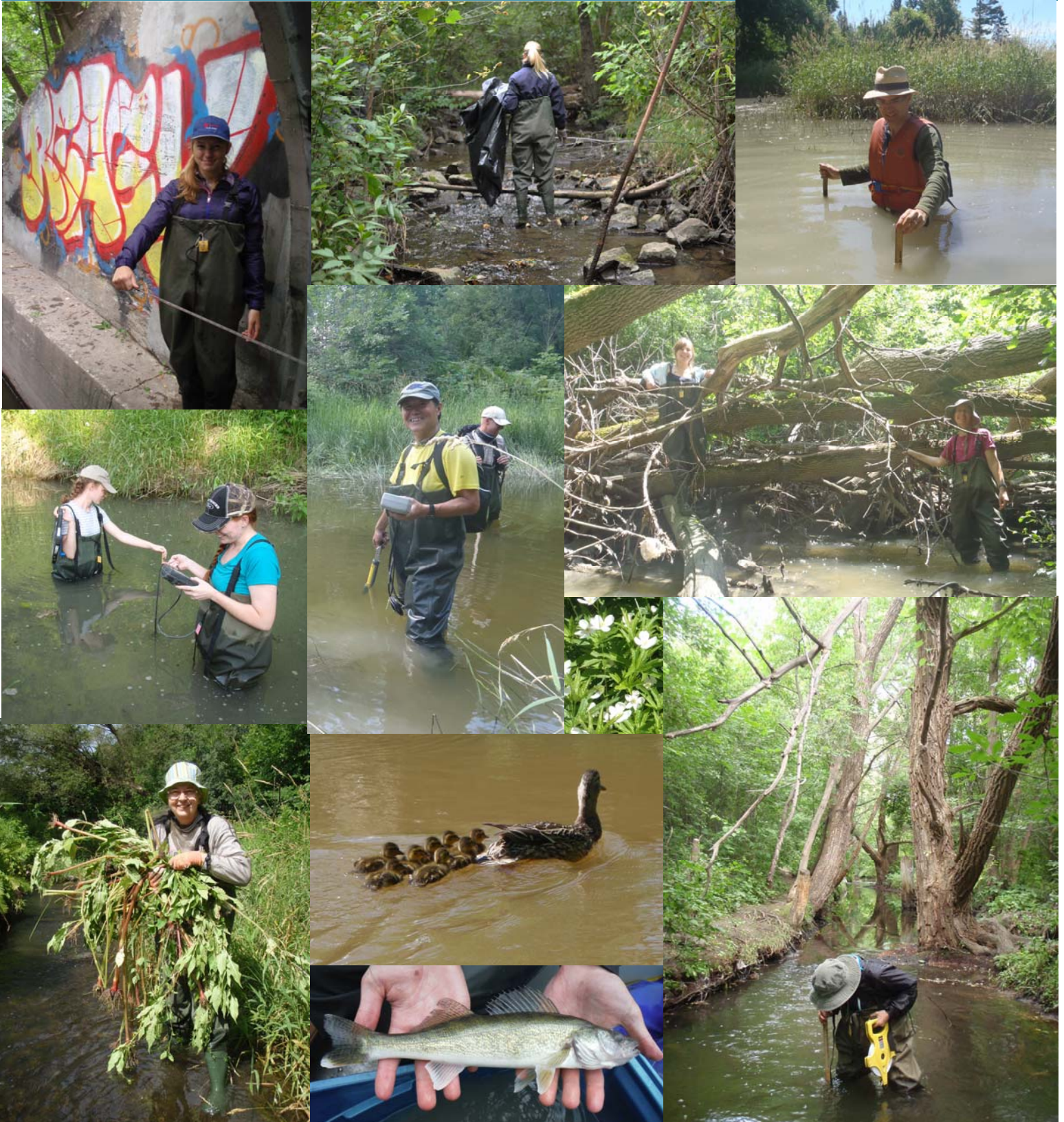




City Stream Watch 2014

Summary Report





City Stream Watch 2014

MVCA RVCA SNC

Prepared By:

Kelly Stiles
Biologist
Mississippi Valley Conservation Authority

Chelsey Ellis
City Stream Watch Coordinator
Rideau Valley Conservation Authority

Philip Duncan
Fish and Wildlife Technician
South Nation Conservation

City Stream Watch Collaborative:

- Brian Bezaire, Coordinator Environmental Monitoring and Assessment, City of Ottawa
- Bruce Clarke, Ottawa Flyfishers Society
- Tracy Dannell, Ottawa Stewardship Council
- Philip Duncan, South Nation Conservation
- Greg, Heron Park Community Association
- Eva Katic, National Capital Commission
- Jennifer Lamoureux, Rideau Valley Conservation Authority
- Dr. Frances Pick, Rideau Roundtable
- Peter Stewart-Burton, Canadian Forces Fish and Game Club
- Kelly Stiles, Mississippi Valley Conservation Authority



Thank you to our 2014 Funding Partners:

TD Friends of the Environment Foundation: TD Friends of the Environment Foundation awarded \$5,000 for the RVCA City Stream Watch Invasive Species Removal Project. These funds supported the six invasive species removal projects that took place this year.

RBC Blue Water Project: The RBC Blue Water Project awarded \$50,000 to support the City Stream Watch Program at the Rideau Valley Conservation Authority and the expansion of the program to the Mississippi Valley Conservation Authority.

RBC Blue Water Project: The RBC Blue Water Project awarded \$78,650 to support the City Stream Watch Program at South Nation Conservation Authority.





Introduction

The collective goals of the City Stream Watch Program at the three Conservation Authorities are to:

- Provide consistent data collection, data management and reporting of urban and rural stream health across the City
- Target restoration initiatives and landowner stewardship actions based on monitoring results

Mississippi Valley Conservation

With the recent focus on development and restoration activities in the Kanata West Development area, Mississippi Valley Conservation (MVCA) and the Friends of the Carp River (FCR) have undertaken several initiatives aimed at assessing and furthering the health of the Carp River Watershed. The Carp River Watershed/Subwatershed Study (2004) recommended enhancements to habitat and flow, and targeted stewardship activities as key objectives in restoring the overall health of the river. In 2012, MVCA staff and FCR undertook a field study to identify priority areas for restoration and stewardship actions, to assess expanding upon the monitoring efforts downstream of the Kanata West Area and to test a pilot citizen science based volunteer monitoring program in the Carp Watershed. Based on the success of this initial work, there is interest in continuing and expanding upon these efforts by offering the City Stream Watch program in the Carp River watershed and other watersheds within the City which are subject to similar changes in land use and associated impacts.

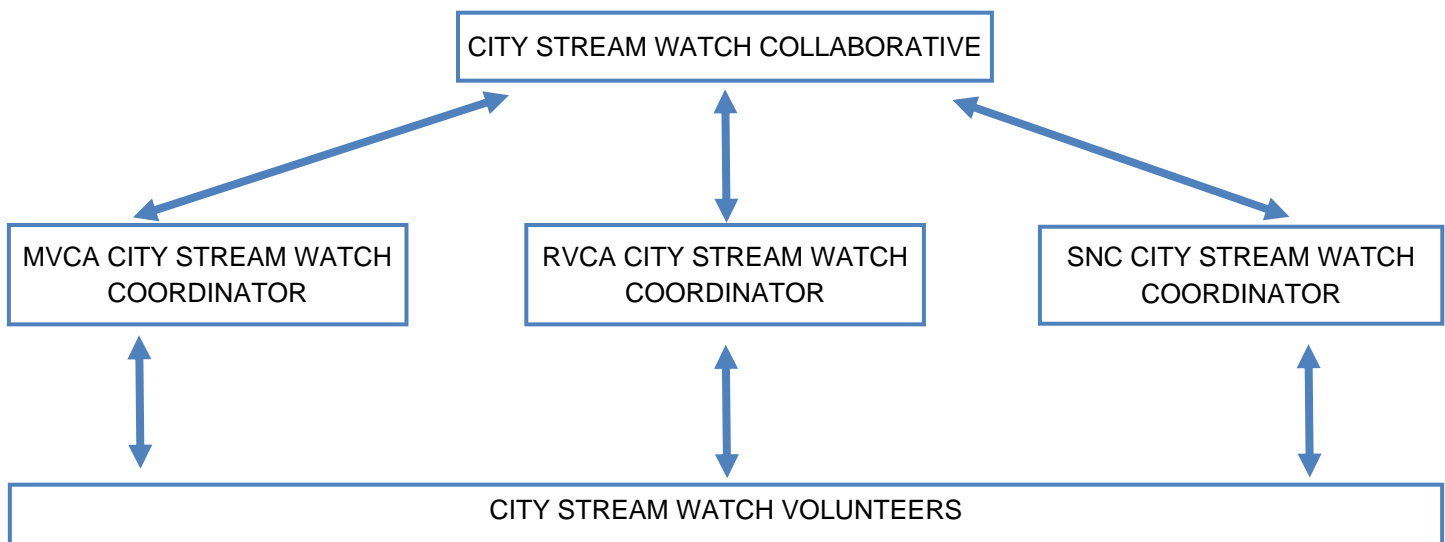
Rideau Valley Conservation Authority

The RVCA and key partners collaborated to develop the *Lower Rideau Strategy* which lists a number of environmental issues and/or threats along many of the tributaries. These include poor water quality, loss of vegetation (including wetlands and forest), loss of biodiversity, changes in hydrology and stream alterations. The report recommended that to improve conditions along these tributaries, local agencies need a coordinated approach to promote good land stewardship practices and provide public educational opportunities. These recommendations are objectives of the City Stream Watch program. Although the *Lower Rideau Strategy* does not include all of the tributaries that City Stream Watch works on, the tributaries of the Ottawa River face the same issues and threats, and the same recommendations apply.

South Nation Conservation

Within SNC's jurisdiction in the City of Ottawa there are a number of urban streams which have been impacted by development and urbanization. These streams have limited or no riparian green space which negatively impacts water quality and the aquatic habitat due to increased runoff, erosion, pollution, and water temperature. Implementing the City Stream Watch Program in the SNC watershed will address these issues while also addressing recommendations from the City of Ottawa's Water Environment Strategy to improve program consistency between the three Conservation Authorities within the City of Ottawa.

City Stream Watch Organizational Chart





Stream Habitat Assessment Methodology

The City Stream Watch program uses a stream characterization assessment protocol for surveying streams. The protocol was originally developed by the Ontario Ministry of Natural Resources and Forestry (MNR), but was modified by the RVCA to make it more effective for monitoring purposes and more easily performed with volunteers.

In 2008 and 2014, changes were made to the field sheets to provide more detail in the stream data. Each stream is monitored on a cyclical basis every six years to help track changes over the long term and measure success of stewardship and restoration efforts. Throughout the field season, for each stream being surveyed, staff and volunteers begin at the mouth of the stream and survey to its headwaters. The following data is recorded for each 100 metre segment:

- Stream width and depth, bankfull width and depth
- UTM coordinates for the start and end of each 100 metre section
- Water quality parameters: dissolved oxygen, conductivity, pH, temperature
- Air temperature
- Overhead cloud cover
- Photographs of start and end of section
- Human alterations, land use, bank stability, bank composition, shoreline vegetation types
- Instream morphology, instream habitat (substrate, vegetation abundance and type, woody debris, vascular plants, undercut banks)
- Details on beaver dams, stormwater outlets, tributaries and migratory obstructions to fish passage
- Pollution/garbage observed
- Wildlife observed
- Enhancement and restoration opportunities



Measuring wetted width



Measuring 50 metres upstream



Recording beaver dam features on Cardinal Creek



Measuring water quality parameters

Headwater Drainage Feature Protocol (OSAP)

The City Stream Watch program added the Headwater Drainage Feature (OSAP) protocol to the program in 2013. This protocol measures zero, first and second order headwater drainage features (HDF). It is a rapid assessment method characterizing the amount of water, sediment transport, and storage capacity within headwater drainage features (HDF). RVCA is working with Toronto and Region Conservation Authority (TRCA) and the MNRF to implement the protocol with the goal of providing standard datasets to support science development and monitoring on both the interim guideline for headwater drainage features and existing mitigation strategies.

Additionally, this module provides a means of characterizing the connectivity, form and unique features associated with each HDF (OSAP Protocol, 2013). An initiative is underway to evaluate how these data can help in understanding the cumulative contributions of individual headwater drainage features on the downstream watershed state (see Stanfield et al., 2013).

Headwater drainage features have not traditionally been a component of monitoring efforts, and as such, little is known about their form and function in the landscape (OSAP, 2013). These features may provide direct, both permanent and seasonal, habitat for fish by the presence of refuge pools, seasonal flow, or groundwater discharge. They may also provide indirect habitat through the contribution of exported food (detritus/invertebrates) (Wiplfi and Gregovich 2002). These features may be important sources, conveyors or storers of sediment, nutrients and flow, and may have an important role for terrestrial species, such as amphibians (OSAP, 2013).

HDFs include small streams, springs, wetlands, swales and ditches and have variable flow conditions from perennial to ephemeral streams. Regardless of the form of the HDF (natural or human made), new science is suggesting that they play an important role as the interface between land and water for water and sediment transport and as corridors for the migration of biota (OSAP, 2013). As a result of their importance and a lack of information for headwater drainage features the City Stream Watch program has incorporated monitoring of these systems for each catchment.

In 2014 the RVCA City Stream Watch program sampled 61 sites on the four systems that were studied in the Rideau Valley watershed. For more information regarding sample locations please see the individual 2014 catchment reports for each subwatershed.



A HDF sampling site in the Mud Creek catchment



Left: Measuring wetted width



Right: Measuring slope



Fish Sampling Methodology

Due to different habitat characterizations along the length of a stream, a variety of fish sampling methods are used to identify which species are present at each site sampled. This allows a number of different habitat types to be sampled. Fish sampling is done in accordance with protocols or best practices in order to live-release the fish after sampling is finished.

Seine net (OSAP module)

- Rectangular, with a three-dimensional box in the middle
- One person holds net on shore and other pulls net through water column
- Fish are directed towards the purse in the middle and collect there



Windemere trap

- Resembles a lobster trap but has a metal frame covered in mesh
- Mesh funnels at either end guide the fish into the trap
- Used in shallow areas, with slow or fast moving water
- Used on electrofishing sites in peak spawning periods



Fyke net

- Modified hoop net (series of hoops and funnels covered in mesh, with a lead line and wings)
- Depending on size, can be used in shallow or deeper waters and are good alternatives in places that are difficult to seine or electrofish
- Nets can be set up from 24 hours to multiple weeks, but checked every 24 hours to release any fish that have been caught



Electrofishing (OSAP module)

- Effective way to sample fish in a variety of habitats
- One of the key tools used to effectively sample fish communities
- Electricity is passed through the water which causes a muscle response reaction in fish, temporarily stunning them
- Netters scoop fish from the stream and place in a recovery bucket
- Electrofishing very seldom kills fish if the correct procedures are used
- Electrofishing is completed by staff that have been certified according to provincial standards





Thermal Classification Methodology (OSAP module)

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Temperature dataloggers are deployed in each of the creeks from April to late September 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 revised Stoneman and Jones method) to classify a watercourse as either warmwater, cool-warmwater, coolwater, cold-coolwater or coldwater .

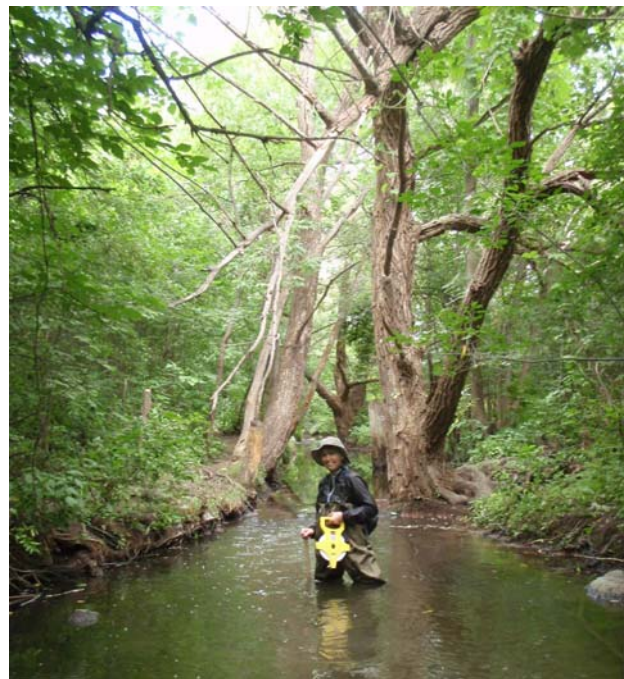
Table 1. Water temperature range classification based on an air temperature of 25 °C

Status	Water Temperature °C
Cold	< 15
Cold-cool	15-17
Cool	17-20
Cool-warm	20-23
Warm	> 23

Data Management

All data collected is maintained in databases at MVCA, RVCA and SNC. Data collected is valuable and is used on a variety of levels. Various agencies and community organizations throughout the City of Ottawa use City Stream Watch data for:

- Watershed reporting
- Identifying potential rehabilitation projects (riparian and instream)
- Analyzing program success
- Background data for planning and regulations reviews
- Sharing information with other agencies (NCC, City of Ottawa, Fisheries and Oceans Canada, MNRF, MOECC, etc.), consultants and non-governmental organizations
- Other projects
- Fish community information sent to MNRF (stored in NHIC/NRVIS databases)
- Reports to public landholders on potential projects, important issues and current conditions
- Sharing with the public on websites
- Species at risk information sent to MNRF (stored in NHIC database)





MVCA City Stream Watch 2014 Summary

The *City Stream Watch 2014 Summary Report* highlights accomplishments from the 2014 field season and describes the nature and extent of volunteer projects. To find information collected on the MVCA 2014 streams surveyed (Huntley Creek and Watts Creek), please see their individual reports. These are shared on our website at: <http://mvc.on.ca/city-stream-watch/>

Approximately 14.6 kilometres of stream were surveyed in 2014. A total of 22 volunteers from the community participated in the program throughout the field season, contributing a total of 104 hours working on various projects.

Stream Study Details

The following chart is a summary of monitoring activities done on Poole Creek, Carp Creek, Huntley Creek and Watts Creek since MVCA began implementing the program in 2013. It can be seen in Table 2 that as the program has been adopted and developed within the MVCA watershed the number of volunteers involved and the number of stream sections surveyed has increased.

The number of sections surveyed in each creek is dependent on the number of landowners that give us permission to access their land each year. The two creeks surveyed in 2013 flowed mostly through City of Ottawa owned park land, while the portion of Watts Creek that was targeted in 2014 flows through National Capitol Commission land. Huntley Creek was a different situation with most landowners having private residences, farm land, or business properties backing onto the creek. MVCA gained permission from 36 of the 61 landowners contacted to survey 57% of the stream channel length.

Table 2. MVCA stream survey numbers since 2013

Activities	Poole Creek 2013	Carp Creek 2013	Huntley Creek 2014	Watts Creek 2014
Number of Sections Surveyed	28	22	118	28
Number of Volunteers	13		17	5
Total Volunteer Hours	54		79	25
Number of Fish Sampling Sessions			1	
Number of Temperature Probes	2		2	

Volunteer Projects

In 2014 MVCA's City Stream Watch (CSW) participated in two volunteer projects for educational and rehabilitation purposes. With Royal Bank of Canada funding, a shoreline planting event was held on June 18, 2014 to enhance the shores on Poole Creek with the help of volunteers from Abraar Islamic School in Ottawa. MVCA's CSW team also did a garbage clean up and enhanced fish habitat in Poole Creek with half log structures during the summer of 2014.

Right: RBC Poole Creek planting day, and the installation of a half log structure for fish habitat.





MVCA City Stream Watch Plans for 2015

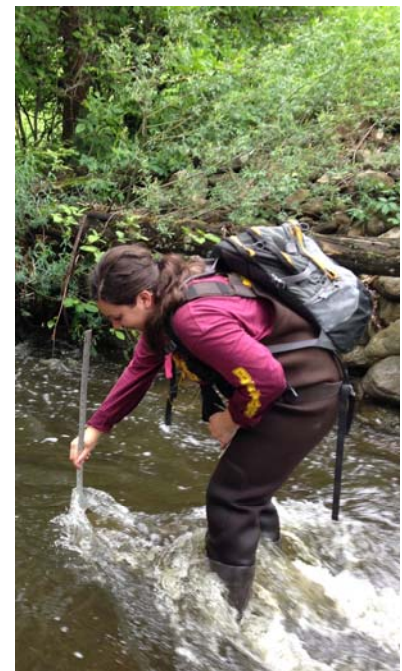
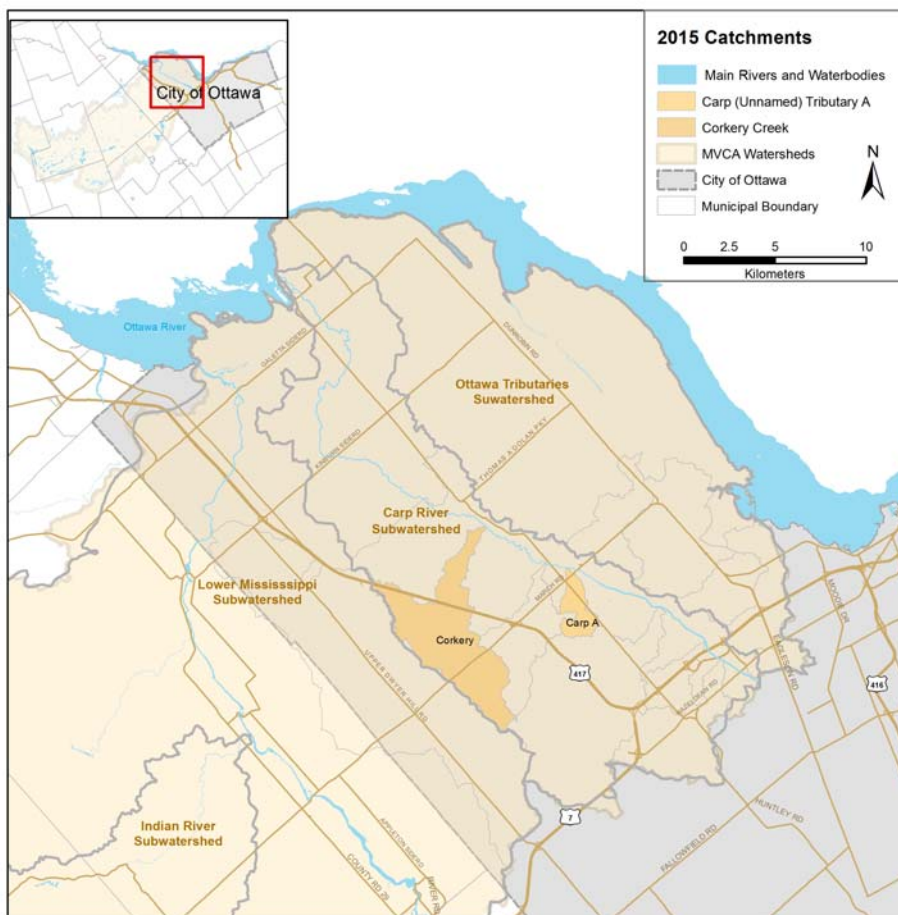
In 2015 City Stream Watch plans to:

- Survey Corkery Creek
- Survey unnamed tributary "Carp A"
- Initiate contact with Huntley Creek landowners for potential shoreline planting opportunities
- Hold an invasive species removal event along Carp Creek targeting Himalayan Balsam

There will be volunteer opportunities to assist with:

- Stream habitat surveys
- Garbage cleanups
- Riparian planting
- Invasive species removal

If you are interested in volunteering with MVCA's City Stream Watch program please call our office 613-253-0006 or go online at: <http://mvc.on.ca/volunteer-contact/>



Measuring hydraulic head

Figure 1. MVCA 2015 monitoring activities





City Stream Watch 2014 Summary Report

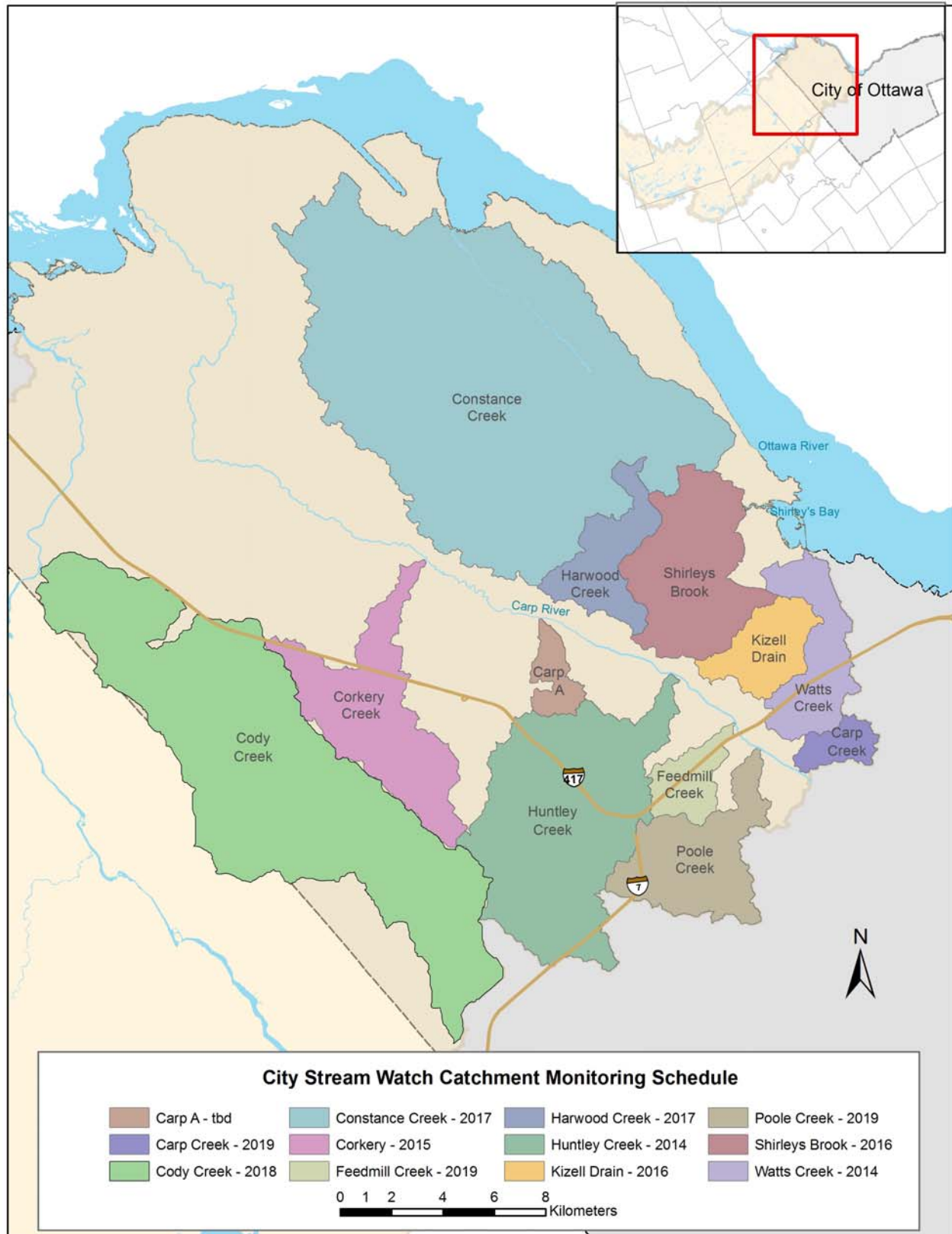


Figure 2. Locations and schedule of MVCA City Stream Watch monitoring activities

RVCA City Stream Watch 2014 Summary

The *City Stream Watch 2014 Summary Report* highlights accomplishments from the 2014 field season and describes the nature and extent of volunteer projects. To find information collected on the RVCA 2014 streams surveyed (Black Rapids Creek, Cardinal Creek, Mud Creek, Sawmill Creek), please see their individual reports. These are shared on our website at: <http://www.rvca.ca/programs/streamwatch/index.html>

A total of 288 volunteers from the community participated in the program throughout the field season, contributing a total of 1,116 hours working on various projects. Approximately 33.5 kilometres of stream were surveyed in 2014.

Stream Study/Comparison

The following table is a comparison summary of monitoring activities done on Black Rapids Creek, Cardinal Creek, Mud Creek and Sawmill Creek in 2003, 2008 and 2014. Each year the number of sections surveyed is different dependent on the number of sections where permission to access the creek is granted. For Mud Creek, limited access resulted in 17 fewer sections surveyed in 2014. In contrast, both Black Rapids Creek and Sawmill Creek saw an increase in the number of sections surveyed in 2014. On Cardinal Creek, 74 sections were surveyed overall in both 2008 and 2014 but the sections surveyed were different each year depending on where permission was granted. On all four creeks, volunteer numbers and hours decreased in comparison to the numbers seen in 2008. This phenomenon was true even on Black Rapids Creek and Sawmill Creek where more sections were added in 2014. The decrease in volunteer hours and numbers can be attributed to improvements that were made to the Stream Characterization protocol and field sheets for the 2014 field season. The changes have made the stream survey process more efficient resulting in less time spent surveying each 100 metre section. Increased efficiency in stream surveys allowed more volunteer effort to be spent on restoration and stewardship projects as volunteer involvement in City Stream Watch did not see a marked decrease in 2014.

Table 3. Stream study comparison between 2003, 2008 and 2014
N/A: in 2003 volunteer numbers were not tracked by creek

Activities	Black Rapids Creek 2003	Black Rapids Creek 2008	Black Rapids Creek 2014	Cardinal Creek 2003	Cardinal Creek 2008	Cardinal Creek 2014	Mud Creek 2003	Mud Creek 2008	Mud Creek 2014	Sawmill Creek 2003	Sawmill Creek 2008	Sawmill Creek 2014
Number of sections surveyed	57	56	73	51	74	74	37	95	78	54	98	110
Number of volunteers	N/A	38	26	N/A	34	28	N/A	32	21	N/A	84	63
Total volunteer hours	35	180	92	53	148.5	124	31.5	164	90	47.5	458.5	215
Number of fish sampling sessions	1	10	14	2	6	21	1	9	16	0	5	9
Number of temperature probes	N/A	3	3	N/A	3	4	N/A	3	4	N/A	3	3



Measuring water depth on Sawmill Creek



Measuring 50 metres upstream on Cardinal Creek



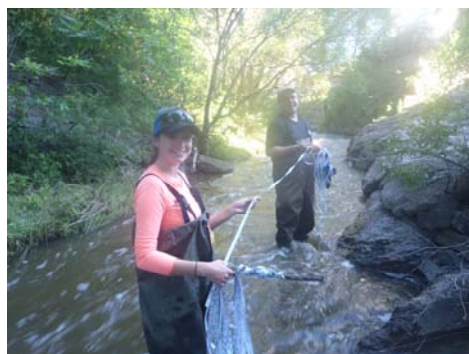
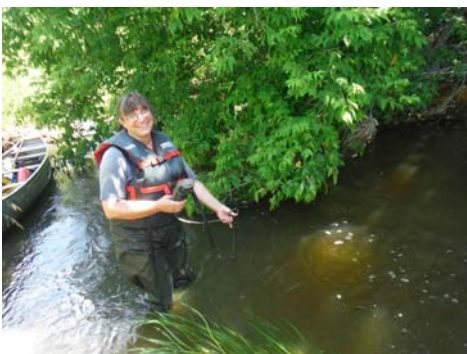
City Stream Watch 2014 Summary Report

The Community Response

A total of 288 volunteers spent 1116 hours with the RVCA City Stream Watch program in 2014. The volunteers are the backbone of the program. Many volunteers participated in surveys and events on more than one creek.

Table 4. RVCA City Stream Watch Accomplishments 2014

Creek name	Black Rapids	Cardinal	Mud	Sawmill	Graham	Hunt Club	Nepean	Pinecrest	Jock	Greens	Total
Sections surveyed	73	74	78	110							335
Fish sites	7	7	8	6							28
Fish sampling sessions	14	21	16	9							60
Temp probes	3	4	4	3							14
Demonstration events	0	0	1	0							1
Training sessions	0	0	0	1							1
Stream garbage cleanups	0	0	0	6							6
Kilometres (km) Cleaned	0	0	0	3							3km
Invasive species removal	2	0	1	0	1	1	1	1			7
Square meters (m ²) of shoreline cleared of invasives	1,500	0	750	0	4,000	300	1,750	2,500			10,800m ²
Adopt a Stream				yes		yes				yes	3
Restoration projects									1		1
Number of Volunteers (total for all events)	26	31	29	147	5	3	3	30	14	0	288
Number of Volunteer Hours	92	142	114	389	10	6	9	60	294	0	1116



Volunteer Projects

Volunteer projects are carried out either for educational or rehabilitation purposes. City Stream Watch in the Rideau Valley watershed carries out the following types of volunteer projects:

- Planting trees and shrubs along stream corridors
- Removing invasive species that will outcompete native plants
- Learning about and participating in fish sampling/identification
- Learning about and participating in benthic invertebrate sampling/identification
- Stream garbage clean ups
- Bioengineering (erosion control using structures made from native plant material)
- Learning about flyfishing

The following is a summary of volunteer projects carried out by the RVCA in 2014. Over the course of the field season, RVCA City Stream Watch ran 15 special events outside of regular sampling.

Invasive Species Removal

Invasive species can be introduced into the environment through a variety of human activities including aquarium and horticultural activities, pet trades, live bait industry, recreational boating, global shipping containers and ballast water. These species are known to have major implications for stream habitat as they can outcompete native species negatively affecting local wildlife, fish and plants.

There are a number of invasive species that have been observed along creeks in the City of Ottawa. Many are known to be very prolific and can be found along an entire stream length. In response to the growing number of invasive species observed during stream surveys, the City Stream Watch Program began removing targeted species in 2010. Removal efforts have been focused on certain species in targeted areas where volunteer removal efforts can halt the spread along the shoreline and make a significant difference in stream habitat. Special effort is made to return to targeted areas for additional removals in subsequent years and to encourage repopulation of the area by native plant species by spreading native seed mixes where appropriate.

In 2014, seven invasive species removals were carried out on six creeks by the City Stream Watch Program with support from TD Friends of the Environment Foundation. The species targeted for removal were Yellow Iris and Himalayan Balsam. The removal methods for invasive species were taken from the Ontario Federation of Anglers and Hunters (OFAH) website and local community members that have been involved in various types of removals.



City Stream Watch Staff and volunteers removing Yellow Iris and Himalayan Balsam along City creeks



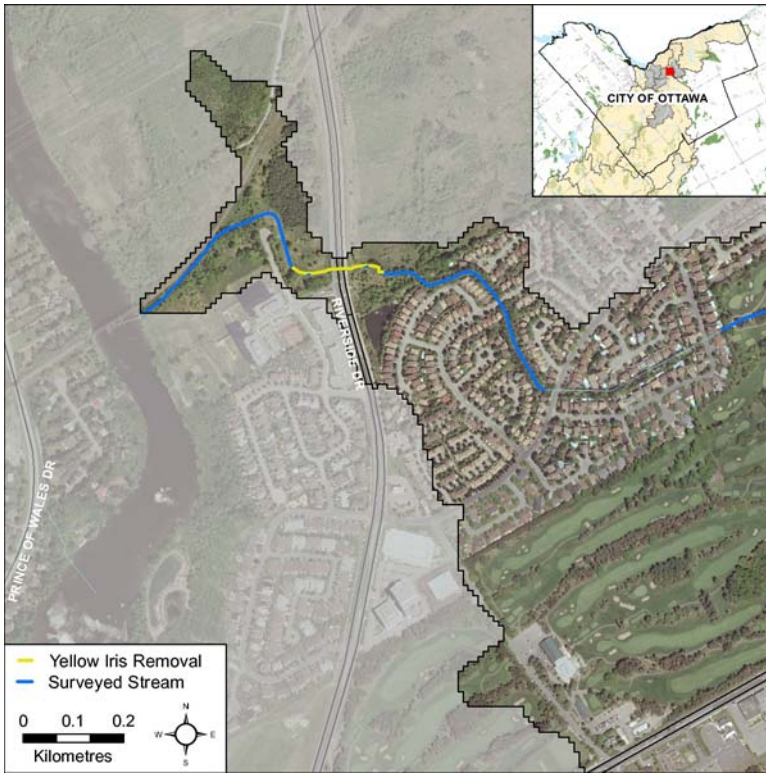


Figure 3. Yellow Iris removal on Hunt Club Creek

Hunt Club Creek Yellow Iris Removal

Three City Stream Watch volunteers joined staff to remove Yellow Iris from Hunt Club Creek near Riverside Drive. The invasive species was discovered on the creek during stream surveys in 2013. Volunteers spent six volunteer hours removing Yellow Iris from the creek. This removal was planned as follow up to removal efforts last year.



City Stream Watch volunteers at Hunt Club Creek Yellow Iris removal

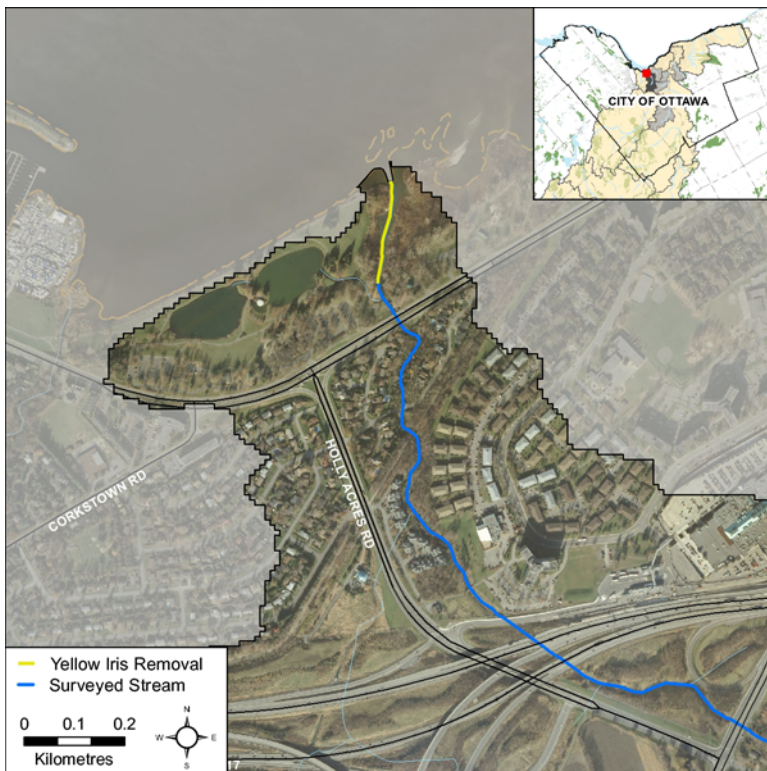


Figure 4. Yellow Iris removal on Graham Creek

Graham Creek Yellow Iris Removal

This was the fourth consecutive year that City Stream Watch volunteers have returned to Graham Creek to remove Yellow Iris near the Ottawa River. Each year there have been fewer plants to remove indicating that removal efforts are having a positive impact. This year, five volunteers spent a total of 10 volunteer hours removing the invasive species from an area of approximately 4000 m².



City Stream Watch volunteers at the Graham Creek Yellow Iris removal

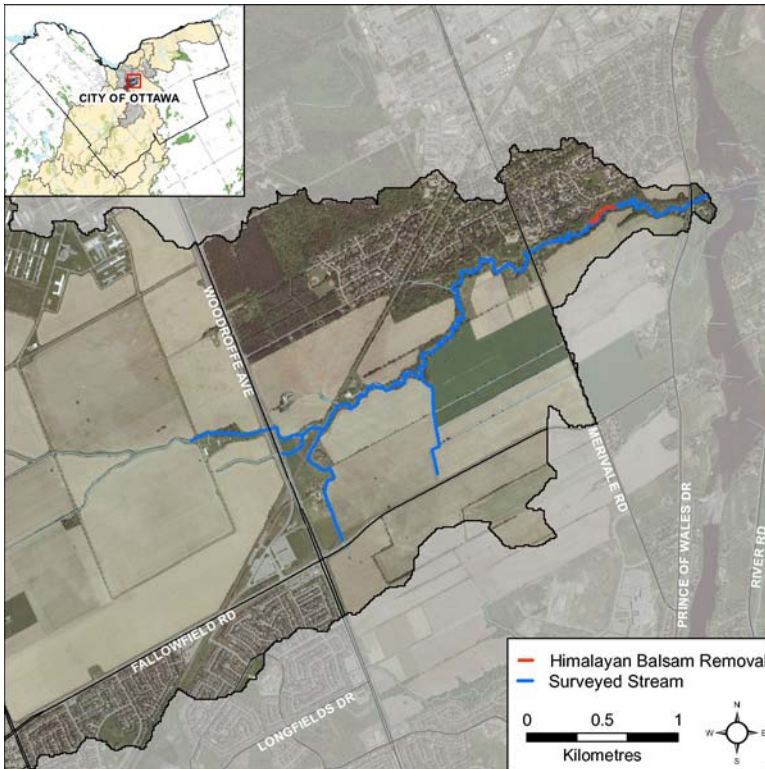


Figure 5. Himalayan Balsam removal on Black Rapids Creek

Black Rapids Creek Himalayan Balsam Removal
 Patches of Himalayan Balsam were observed along Black Rapids Creek during stream surveys this season. A removal effort was planned to stop the spread of this prolific species along the shoreline. Three volunteers spent nine volunteer hours removing the invasive species from 300m of shoreline.



City Stream Watch volunteers removing Himalayan Balsam from Black Rapids Creek

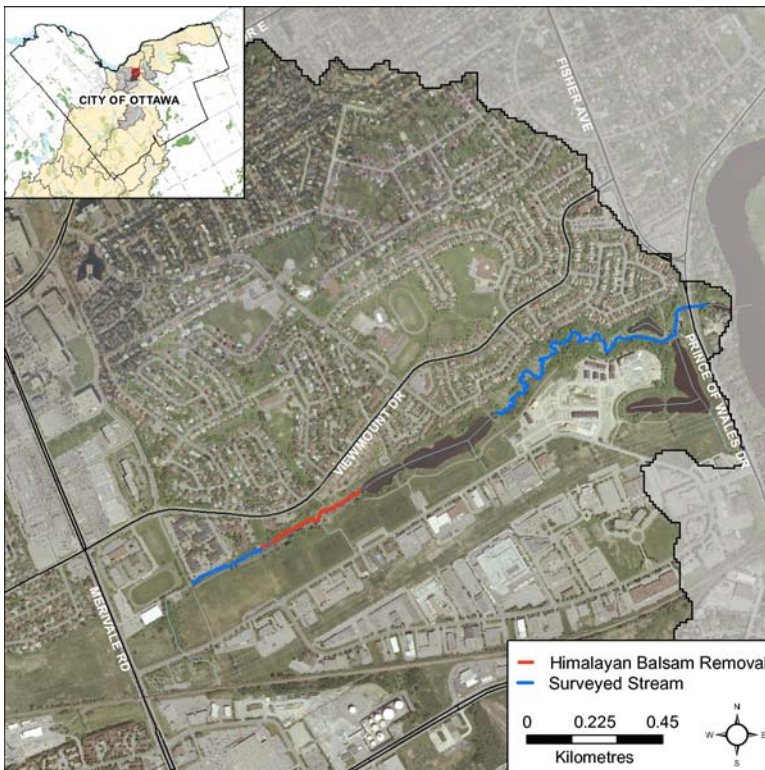


Figure 6. Himalayan Balsam removal on Nepean Creek

Nepean Creek Himalayan Balsam Removal
 Three volunteers spent nine volunteers hours removing Himalayan Balsam from the shoreline of Nepean Creek. The group was able to cover 350m of the stream removing balsam from approximately 1,750 m² of shoreline.



Volunteers removing Himalayan Balsam at Nepean Creek



Figure 7. Himalayan Balsam Removal on Pinecrest Creek

Pinecrest Creek Himalayan Balsam Removal

A group of 30 volunteers from a local business, Spartan Bioscience, were up to the challenge of removing Himalayan Balsam on Pinecrest Creek. The invasive species has covered large sections of shoreline on this creek and is spreading rapidly. The 30 volunteers spent 60 volunteer hours clearing Himalayan Balsam from 2500m² of shoreline. Eighty paper yard bags were filled and brought to the City facility for disposal!



Volunteers removing Himalayan Balsam along Pinecrest Creek

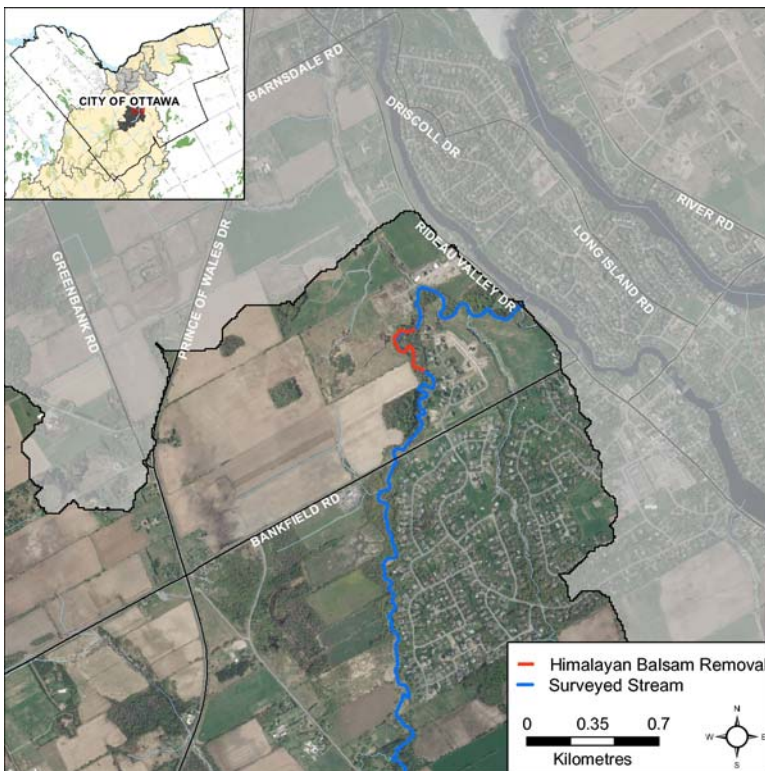


Figure 8. Himalayan Balsam Removal on Mud Creek

Mud Creek Himalayan Balsam Removal

A small patch of Himalayan Balsam was observed during stream surveys this year on Mud Creek. City Stream Watch staff returned to the site with one volunteer for three hours to remove the plants. Ten paper yard waste bags were filled with Himalayan Balsam plants and 50m of shoreline was successfully cleared of the invasive species before it spread any further.



Volunteer and staff removing Himalayan Balsam along Mud Creek

Stream Garbage Cleanups

Sawmill Creek was the focus for City Stream Watch stream cleanups in 2014. Sawmill Creek is heavily influenced by its proximity to urban development and is subject to garbage accumulation from frequent litter and dumping. Since the entire length of Sawmill Creek was being monitored this year by City Stream Watch it was the perfect opportunity to target the sections of the creek that needed cleanups the most and make a difference in overall stream health by cleaning up large sections of the creek.

Six stream garbage cleanups took place on Sawmill Creek this year. In total, approximately 3km of the creek was cleared of garbage and some areas were cleaned twice over the course of the season.

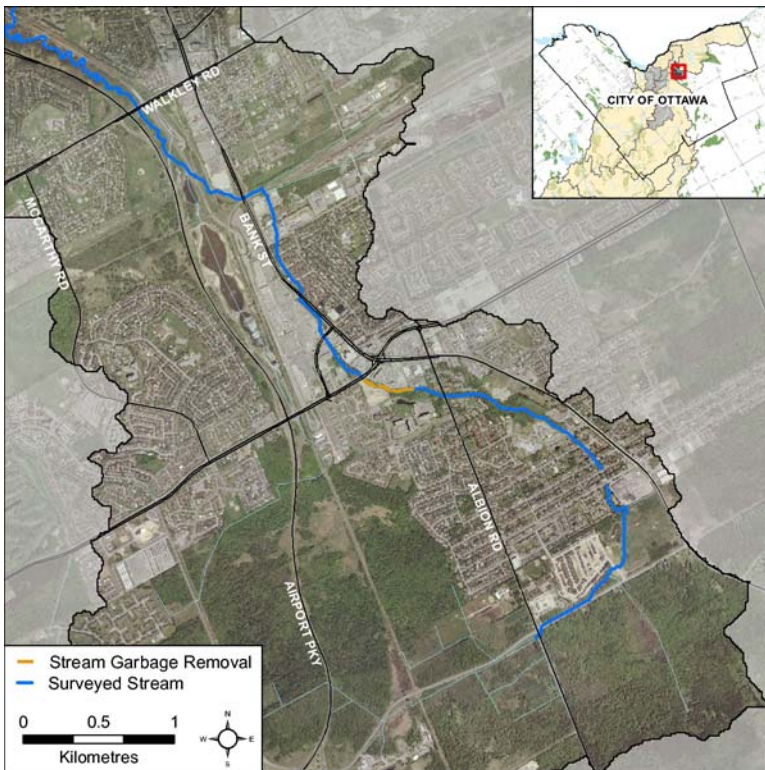


Figure 9. Stream garbage cleanup on Sawmill Creek

Sawmill Creek Cleanup - Towngate Shopping Centre

Two cleanups took place on Sawmill Creek near the Towngate shopping center this year. This area is subject to frequent garbage accumulation due to the foot and car traffic from people accessing the shopping center. In the spring City Stream Watch volunteers were joined by volunteers from Telus for a cleanup. Eight volunteers spent 16 volunteer hours cleaning up the site. In the fall, City Stream Watch volunteers were joined by members of the Girl Guides of Canada to clean up the site for a second time. Ten volunteers spent 20 volunteer hours on the cleanup efforts.



Left: Volunteers cleaning up around the pedestrian bridge

Right: volunteers at the spring and fall cleanups

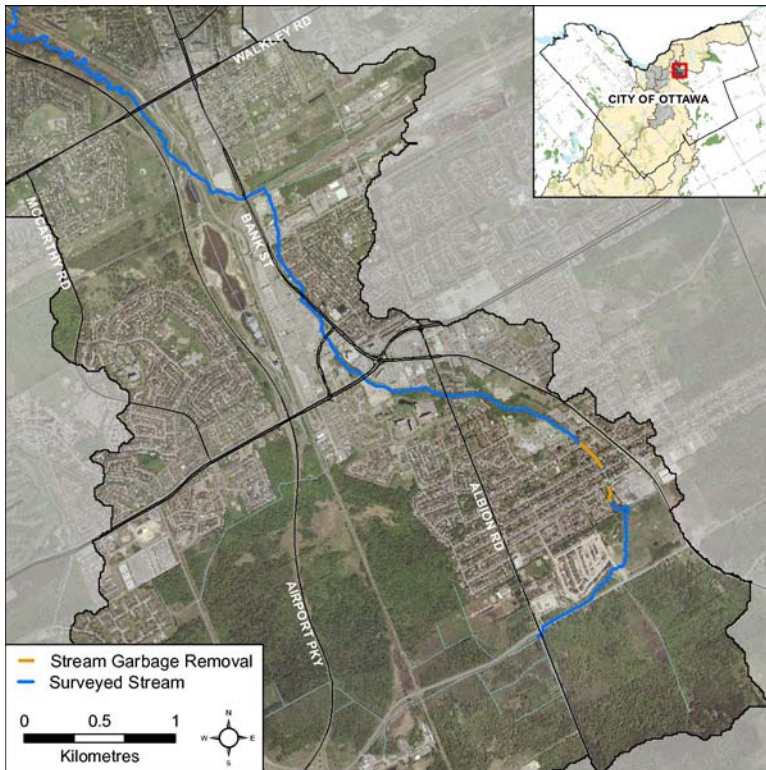


Figure 10. Stream garbage cleanup on Sawmill Creek

Sawmill Creek Cleanup - Blossom Park

For the second year in a row CIMA+ organized a cleanup in partnership with City Stream Watch. The group of eight volunteers from CIMA+ cleaned up 500m of shoreline. They filled 15 garbage bags and also pulled a scooter, a lawnmower, a vacuum, a tire, a shovel and four sign posts out of the creek!



Volunteers from CIMA+ Ottawa

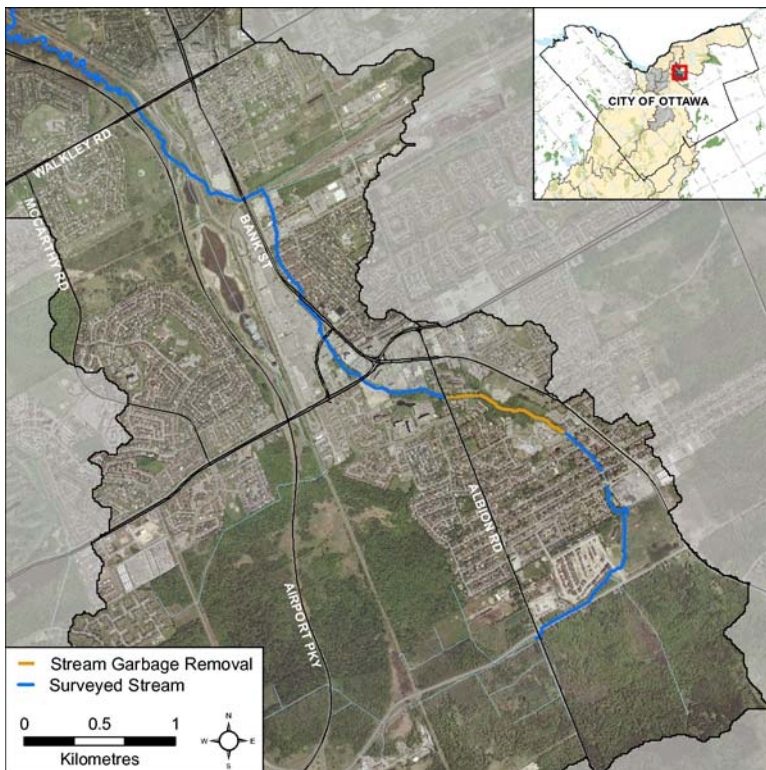


Figure 11. Stream garbage cleanup on Sawmill Creek

Sawmill Creek Cleanup - Sawmill Creek Pool

In June, a group of 16 City Stream Watch volunteers spread out along the creek to clean up the section of Sawmill Creek behind the Sawmill Creek Community Centre and Pool on D'Aoust Ave. The group spent 32 volunteer hours cleaning up garbage that had accumulated in the creek and along the banks.



City Stream Watch volunteers

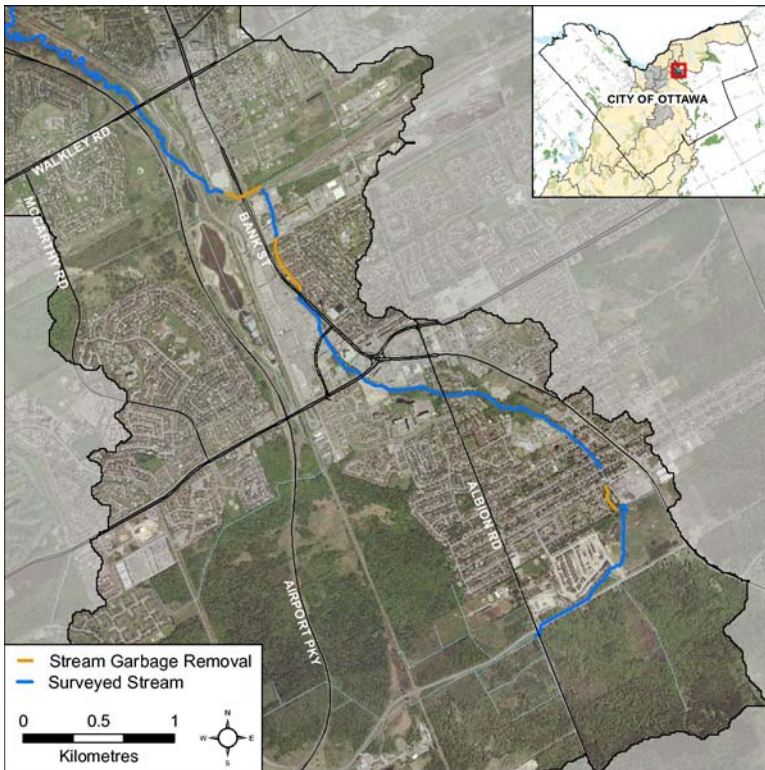


Figure 12. Stream garbage cleanup on Sawmill Creek

Adopt a Stream Cleanup - Sawmill Creek
 The Adopt-a-Stream leader for the South end of Sawmill Creek lead a stream cleanup effort targeting various sections of the creek that are common “hotspots” for garbage accumulation. Three volunteers did a great job ensuring these sections were free from garbage.



Adopt-a-Stream leader for Sawmill Creek South

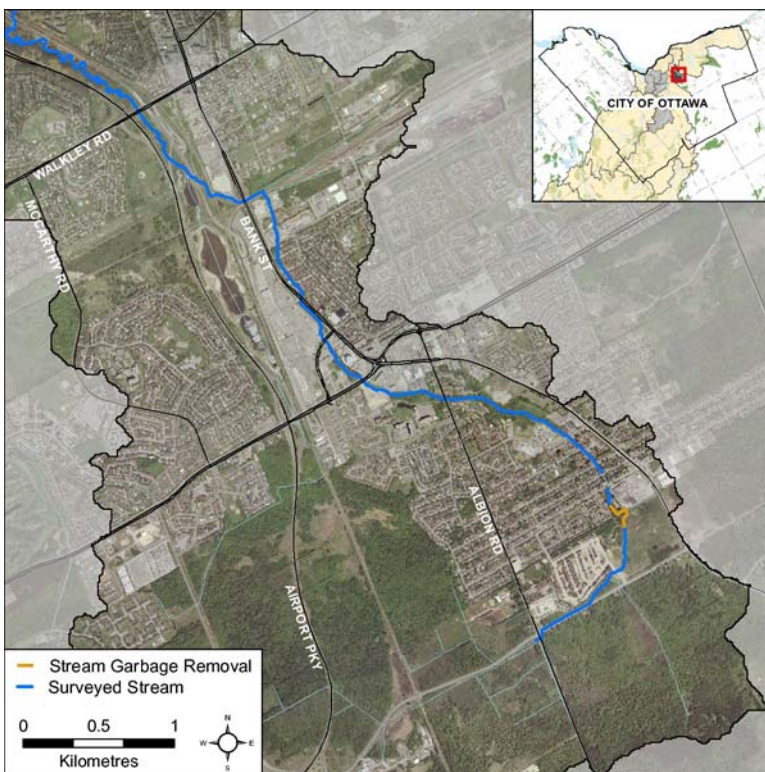


Figure 13. Stream garbage cleanup on Sawmill Creek

Sawmill Creek Cleanup - South end

During City Stream Watch monitoring activities staff and volunteers discovered a stretch of Sawmill Creek where dumping had occurred and there was a large accumulation of garbage. Six volunteers showed up with bags in hand to help clear the area of garbage. In addition to filling numerous bags of garbage, two microwaves, five shopping charts, patio furniture, stacks of newspapers, lumber, tires, scrap metal and a bicycle were pulled from the creek.



Volunteers at the cleanup



Bioengineering/Restoration Projects

Jock River Fish Habitat Embayment Creation Project

The RVCA in partnership with Fisheries and Oceans Canada, Environment Canada, Shell Fuelling Change, Muskies Canada Ottawa Chapter, National Defence Fish and Game Club, Community Foundation of Ottawa, Fendock and the Ottawa Flyfishers Society constructed a fish habitat embayment at the Richmond Conservation Area in October 2014. The project involved converting an existing grassed park area into a small wetland embayment along the shoreline of the Jock River. Raab Construction Ltd. was retained to help construct the wetland feature alongside a group of dedicated volunteers. Although this project did not take place on a City Stream Watch monitored creek, two CSW collaborative groups (Ottawa Flyfishers Society and National Defence Headquarters Fish and Game Club) were key partners in the project and volunteers from both groups were involved in the embayment construction.

The area underwent a dramatic transformation over the course of 9 days. 108 truckloads of fill were removed and 1000m² of new spawning, nursery, rearing, and feeding habitat to support the 40 species of fish that reside in the Jock River was created. Fourteen volunteers participated in the construction of the embayment for a total of 294 volunteer hours



Evolution of the Jock River fish habitat embayment

Jock River Landing Shoreline Restoration

A second site along the Jock River got some much needed rejuvenation this year. In October, RVCA's Shoreline Naturalization Program completed work to help minimize the problem of erosion from wave action at the Jock River Landing. This public site was identified for restoration by the City Stream Watch program as we visit the site frequently for the popular Ultimate Aquatics workshop with the Ottawa Flyfishers Society.

The rejuvenation included re-grading the shoreline to a more stable slope; as well as installing bioengineering materials such as coir logs, erosion control blankets and live stakes to protect the shoreline from wave impact and erosion. Native trees, shrubs and wildflowers were planted to increase vegetation while still maintaining views and public access including a canoe/kayak access point.



Jock River Landing before



Jock River Landing after

RVCA Plans for 2015

In 2015, City Stream Watch will be monitoring the following creeks:

- Barrhaven Creek
- Bilberry Creek
- Mosquito Creek
- Stillwater Creek

There will be many opportunities to assist with:

- Stream habitat surveys
- Fish community sampling
- Bioengineering projects
- Stream garbage cleanups
- Riparian planting
- Invasive species removals
- Workshops and demonstrations

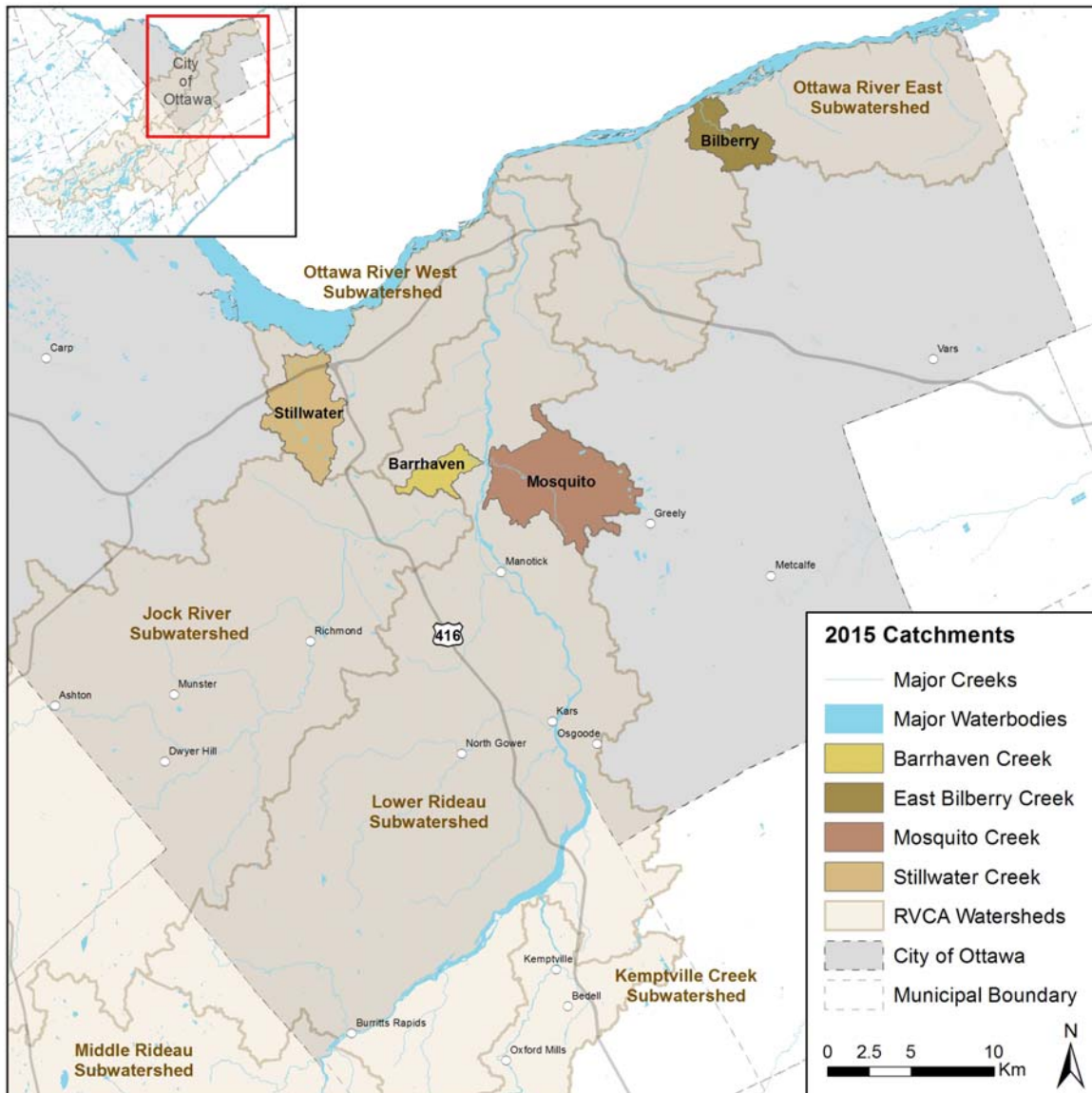


Figure 14 Location of RVCA 2015 monitoring activities

To volunteer with RVCA's City Stream Watch program, please contact:
 City Stream Watch Coordinator
 613-692-3571
citystreamwatch@rvca.ca
<http://www.rvca.ca/programs/streamwatch/index.html>

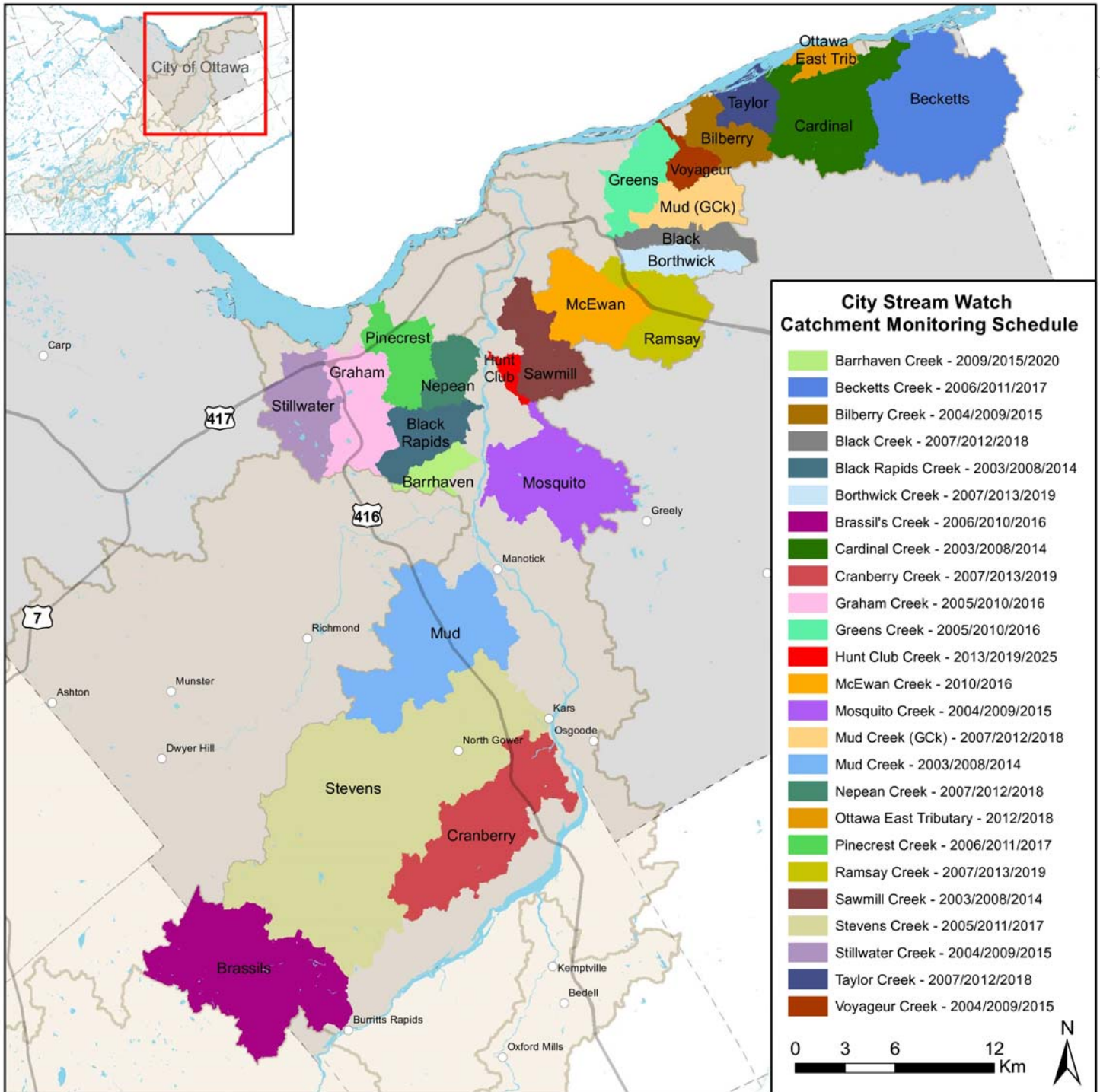


Figure 15. Locations and schedule of RVCA City Stream Watch monitoring activities



SNC City Stream Watch 2014 Summary

The *City Stream Watch 2014 Summary Report* outlines projects which were completed by community volunteers and SNC staff in the South Nation Watershed. This was the first year of the program for SNC and we are pleased with the community uptake in the program. A total of 152 volunteers from the community participated in various environmental projects throughout the field season. Approximately 6.5 kilometers of stream were surveyed in 2014.

Stream Study

This year marked the first year for the City Stream Watch Program for SNC. We were pleased with the success of the program as demonstrated by our volunteer participation and uptake in the program. Our sampling efforts were focused in the Castor Sub-watershed. SNC targeted 4 streams in Ottawa, Greely, Embrun, and Russell. In an effort to promote the program across the area, streams were selected in urban areas to garner public interest. A total of 6.5 kilometers of stream were sampled where landowner permission was granted. Fisheries sampling occurred on each stream during the month of July. The most notable catch was a Brown Trout in Shields Creek. Other sport fish that were caught include Northern Pike, Largemouth Bass, Perch, Pumpkinseed, and Bluegill.

Table 5. SNC City Stream Watch Accomplishments 2014

Creek Name	Findlay	Shields	Little and Cherry	Castor Trib.	Total
Sections Surveyed	22	14	11	18	65
Fish Sites	1	2	2	1	6
Fish sampling sessions	1	2	2	1	6
Demonstration Events	0	1	0	0	1
Stream Garbage Cleanups	1	1	0	0	2
Kilometers cleaned	1.5	1.3	0	0	2.8
Invasive Species removals	2	0	1	0	3
Restoration Projects		1	1	1	3
Number of Volunteers	44	49	10	49	152



Fish sampling using electrofishing



Findlay Creek Monitoring, MOE students



Volunteer Opportunities

The City Stream Watch Program relies on volunteer support to help monitor streams and complete environmental projects. Interested volunteers are encouraged to participate in the following activities:

- Tree planting
- Invasive Species Removals
- Bio-engineering
- Participating in watershed monitoring activities with SNC staff

Invasive Species Removal

Invasive species can be introduced into the environment through a variety of human activities. Once established, invaders can have drastic impacts on local wildlife and watercourses. These species impact our local environment in many ways by out-competing native plants and animals.

A variety of invasive species are known to exist in the Castor Sub-watershed. Many are known to be very prolific and can be found along the riparian zones of many streams. In 2014, SNC completed 2 invasive species removal events along two separate streams in an effort restore the riparian zones along the stream, and stop the spread of these species. Both Japanese Knotweed and Glossy Buckthorn were identified during the stream sampling sessions this year.

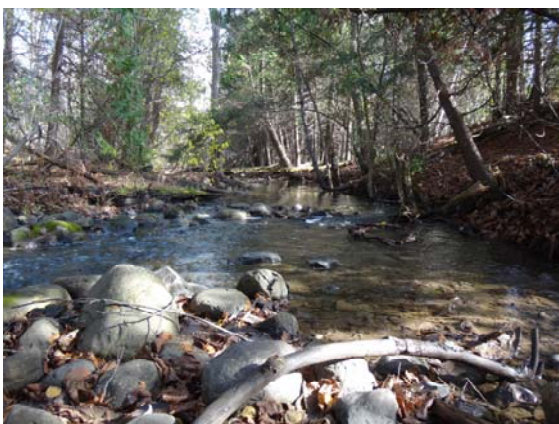
Removal efforts have been focused on certain species in targeted areas where volunteer removal efforts can halt the spread along the shoreline and make a significant difference in stream habitat. SNC will ensure the monitoring of the removal sites in subsequent years to ensure the effectiveness of the invasive removals.



Volunteers removing Japanese Knotweed.

Japanese Knotweed Removal

8 volunteers helped to remove Japanese Knotweed from a Castor River Tributary in Russell. This invasive plant forms dense colonies along river banks where seeds are readily transported to other areas downstream. Japanese Knotweed can reach a height of 4 meters in a single growing season. The dense canopy layer limits biodiversity as it crowds out native species in the immediate area. Although the plant is non-toxic, it provides poor wildlife habitat for our native insects and birds. This site will be monitored in 2015 and successional removals completed if warranted.



Brown Trout caught on Shields Creek, Greely

Stream Garbage Cleanups

Garbage clean-ups were completed on 2 streams this year with help from interested community members. Findlay Creek and Shields Creek were the streams we focused on this year. Findlay Creek is heavily impacted by construction debris from adjacent development. As a result, there is an abundance of litter in this heavily urbanized area. Shields Creek runs through Andy Shields Park and this park is a frequently used recreational area. With sports fields, walking trails, and playgrounds along the stream, there is a constant need for garbage removal. Stream Watch participants and community members will return to these sites each year to remove garbage from the stream.



32 Volunteers helped to remove garbage along Findlay Creek

Findlay Creek Clean-up

In June, as part of RBC's Blue Water Day, 32 volunteers removed garbage from 1.5 kilometers of Findlay Creek. All the volunteers were from various RBC branches across the city. It was a wet and rainy day but they still managed to collect more than 40 industrial garbage bags full of trash.

Findlay Creek is located adjacent to a highly urbanized area and as a result there is an abundance of garbage in the stream. Most notable is the construction debris such as insulation and plastic wrap. A collection of tires, signs, bicycles and old toys were also removed from in the stream.



14 Volunteers helped to remove garbage along Shields Creek

Shields Creek Clean-up

In September, as part of the Cleaning the Capital initiative, 14 volunteers from the Greely Community helped to pick up garbage along 1.3 kilometers of Shields Creek.

Shields Creek runs through a City of Ottawa park in Greely. Many people walk, play sports, and enjoy this beautiful stream. As a result, lots of litter accumulates in the stream over the summer. Most notable is the section along the ball diamonds, where an abundance of water bottles, snack bags, and baseballs collect in the stream. Tires, garbage bins, and Styrofoam coolers were also



Volunteers at Shields Creek Clean-up in September as part of the Cleaning the Capital initiative.

Habitat Enhancement Projects

As part of the stream Watch Program, SNC aimed to improve local wildlife habitat along streams in the Castor Sub-Watershed. Riparian zones around a stream act as important wildlife corridors. These areas allow for wildlife to pass from one habitat to another with minimal disturbance in highly urbanized areas. During our sampling sessions, wildlife such as River Otters, Eastern Cottontail, Mallard and Wood Ducks, and a variety of songbirds were identified. As part of a habitat creation effort, volunteers aided with habitat enhancement projects throughout the summer and well into the fall. Projects included tree planting and the placement of nesting boxes which target Wood Ducks, Mallards and Eastern Bluebirds. Planting trees along a stream provides numerous benefits to the stream and wildlife in the area. Maintaining an adequate buffer around a stream ensures that a natural aquatic environment is sustained. Also, the installation of these nesting boxes can increase local populations of waterfowl and songbirds in an area.



Volunteers for Tree Plant, Embrun

Embrun Tree Plant

SNC kicked off its field season with a tree planting event in the town of Embrun. In May, 46 students from two local schools came out to help with the event. A total of 875 trees were planted on property owned by a local landowner.

A variety of species were planted such as Cedar, Nannyberry, High Bush Cranberry, Oak, and Maple. These trees will fill in the riparian zone along the stream and help reduce excess run-off and erosion. Some of these plants also provide cover and food for wildlife species in the area. Volunteers were also treated to a lunch prepared by Le Club Richelieu for all their hard work.



Students from St. Thomas Aquinas and École De la Rivière Castor joined together to plant trees along this tributary. Potted shrubs were planted along the stream bank to help secure the bank as well as promote the colonization of the banks to form an expansive root system.



Figure 16. A total of 875 trees were planted along 700 meters of a Castor River Tributary. This area is equivalent to 1.5 hectares.



Bluebird Box Build, Greely Scouts

Bluebird Box Build

Greely Scouts were ambitious to help out with building bluebird boxes. A total of 10 boxes were built and installed along Shields Creek in Andy Shields Park. Groups of 3 worked together to build the boxes. At the end of the evening, SNC staff conducted an introduction to backyard birds course. This was used to teach basic identification of common birds they would see in urban areas. This served as an educational opportunity for many and provided the scouts with the basic skills to identify new birds.



Figure 17. Location of Bio-engineering work on Shields Creek

Shields Creek Stream Restoration

During our sampling efforts on Shields Creek, a number of previous bio-engineering work was discovered. Wing deflectors had been placed in order to direct water in an effort to create a more hospitable stream for Brown Trout by creating a pool-riffle sequence. A number of the structures were found to be failing and were acting as sediment traps. As a result, fine sediments were building up in the stream where a gravel/cobble substrate used to exist. A total of 74 t-posts and 25 logs were removed from the stream bed along a 700 meter section.



Left: Failing Wing Deflectors in Shields Creek
Above: Sediment loading

Volunteers helped with the removal of the old logs and t-posts. The logs were placed along the stream and piled in groups of 5. Although they are no longer needed in the stream, the logs will still play an important role for other wildlife. A variety of different species of salamanders, frogs, and toads will utilize the protection offered by these log piles. They mimic natural processes of woody debris on the forest floor and will provide refuge for many animals.



Leitrim Wetland/ Findlay Creek Wetland Enhancement

The Leitrim Wetland is located adjacent to Findlay Creek. This wetland serves as a stopover and nesting area for migrating waterfowl. Upon sampling the stream, a variety of different species of waterfowl were observed including Mallard, Wood Duck, Blue and Green-winged Teal, and Canada Geese. Other species such as Great Blue Heron and American Bittern were also observed. Leitrim Wetland provides excellent habitat for waterfowl as Canada Geese have also been observed nesting there. The proximity of the wetland to Findlay Creek also allows for the dispersal of young ducks after they have hatched. This wetland is currently under threat from Glossy Buckthorn which has taken over much of the wetland. Efforts have been made in the remaining fen to remove Buckthorn from crowding out native Pitcher Plants.

Figure: Leitrim Wetland, red indicates Wood Duck Boxes and yellow indicates Hen Houses



Peter Stewart-Burton (NDHQ) and Frederick Guse (Delta Waterfowl) with a Wood Duck Box



Volunteer installing Mallard Hen House in Leitrim Wetland

The installation of Wood Duck Boxes is a great way for SNC to interact with the community: Projects like this help enhance urban wildlife and serve as an educational opportunity for volunteers to become actively involved in wildlife management. Wood Ducks normally nest in tree cavities; when there are none available, hens will settle for man-made boxes with openings facing the water. Deployment of several boxes in a given area can be used to increase the local population of waterfowl. A total of 8 volunteers came out to help transport materials, install mounting posts, and attach the boxes and predator guards to keep out unwanted occupants such as raccoons. Each box is filled with wood shavings to provide adequate bedding for the ducks. These boxes don't only cater Wood Ducks since a variety of other species will utilize them for cover such as Eastern Screech Owls. Volunteers also take part in annual maintenance of the boxes, including providing fresh shavings. Often, the nests of opportunists such as the European Starling have to be removed.

SNC Plans for 2015

In 2015, SNC plans on monitoring the North Branch of the Castor River. This branch of the Castor is influenced by current development in the headwater region. Understanding the functions of the headwater region is critical as urbanization can have a substantial impact on the watershed. Hence the reason to study these features in an effort to protect these valuable resources. SNC plans on monitoring headwater drainage features for the first time this year in the Castor Sub-Watershed.

Volunteers are encouraged to participate in the following activities in 2015:

- Tree Planting Projects
- Invasive Species Removal
- Habitat Enhancement Projects
- Fish and Benthic Sampling Activities
- Stream Monitoring
- Garbage Clean-ups

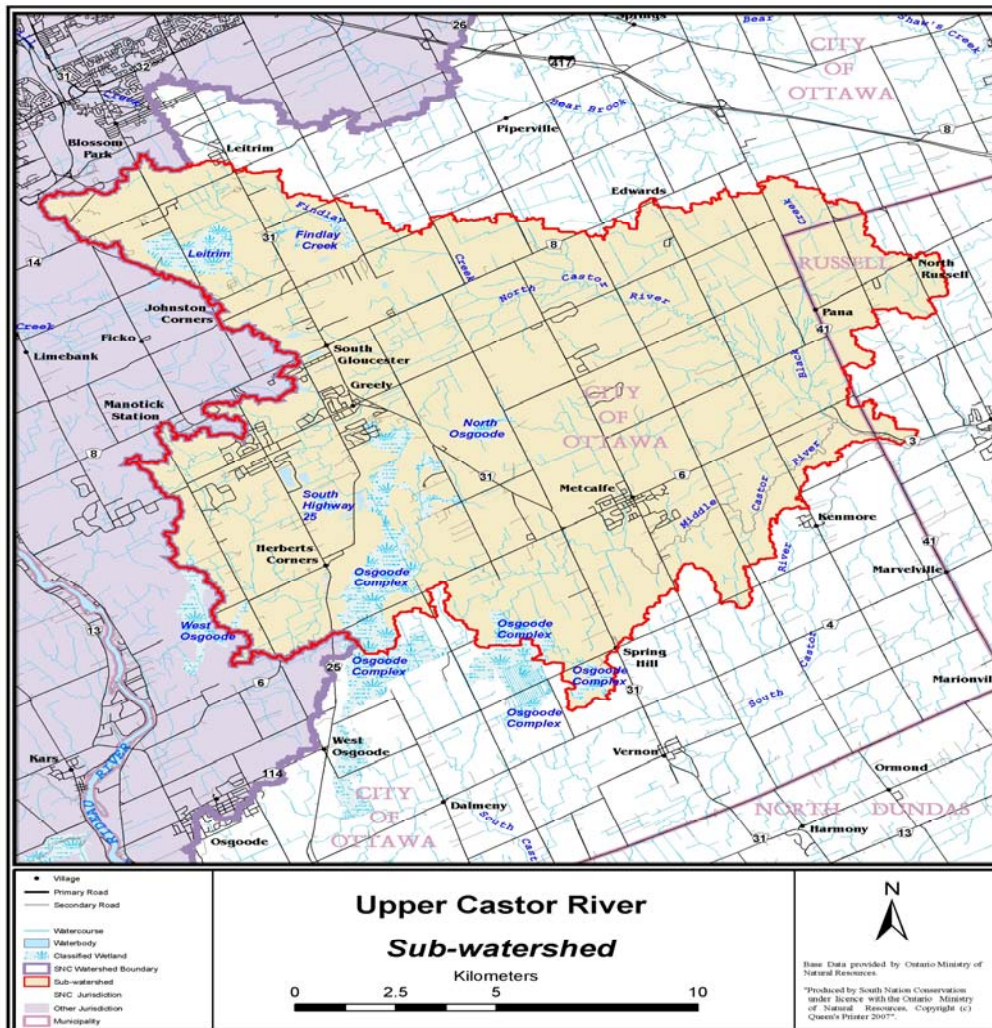


Figure 18. Upper Castor River Sub-Watershed

To volunteer with SNC City Stream Watch, please contact:
 Philip Duncan
 City Stream Watch Coordinator/ Fish and Wildlife Technician
 613-984-2948 ext. 292
pduncan@nation.on.ca



Acknowledgements

A big thank you to all of our 2014 volunteers. You continue to make the program a success and contribute to important rehabilitation and data collection projects along our urban and rural streams within the City of Ottawa.

Thank you to the City Stream Watch collaborative for continuing with their program guidance, ideas, volunteer recruitment and help!

Thank you to all media outlets for helping to spread the word about City Stream Watch events.

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