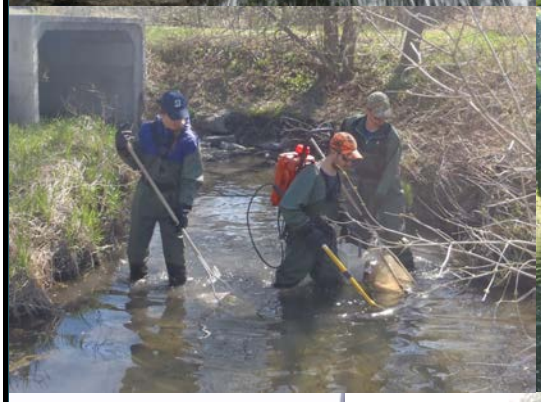
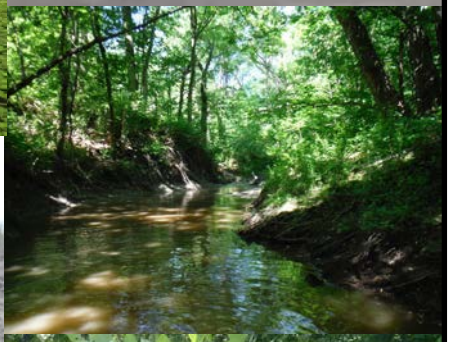
City Stream Watch 2018 Summary Report










City Stream Watch 2018

Summary Report

MVCA SNC RVCA

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GLOSSARY OF ACRONYMS			
CSW	City Stream Watch	**OBBN**	Ontario Benthos Biomonitoring Network
DUC	Ducks Unlimited Canada	**OFAH**	Ontario Federation of Anglers and Hunters
FCR	Friends of the Carp River	**OFS**	Ottawa Flyfishers Society
MNRF	Ministry of Natural Resources and Forestry	**OSAP**	Ontario Stream Assessment Protocol
MVCA	Mississippi Valley Conservation Authority	**RVCA**	Rideau Valley Conservation Authority
NCC	National Capital Commission	**SNC**	South Nation Conservation
NHIC	Natural Heritage Information Centre	**TRCA**	Toronto and Region Conservation Authority
NRVIS	Natural Resources and Values Information System		

Introduction

The City of Ottawa encompasses three separate watersheds: Mississippi Valley to the west, South Nation to the east, and Rideau Valley in between, each of which are monitored by respective conservation authorities. The City Stream Watch program, created in 2003, is a joint effort among these three conservation authorities. The program aims to do the following:

- Gather data and report on the state of the City of Ottawa's rivers and tributaries through the engagement of citizen scientists.
- Implement stewardship and restoration initiatives with the help of volunteers from the community.

City Stream Watch would not be possible without the help of our hard-working volunteers, some of whom return year after year to assist with monitoring and stewardship.

Area monitored by City Stream Watch. Photo courtesy of South Nation Conservation (modified).

Mississippi Valley, Rideau Valley, and South Nation Conservation Authorities have partnered with municipal and environmental organizations to form the City Stream Watch Collaborative. Together, we share information and exchange ideas related to the program in order to make informed decisions regarding watershed health.

City Stream Watch monitoring initiatives include stream characterization assessments, fish community sampling, headwater drainage feature surveys, and water temperature monitoring. Stewardship and restoration activities include bioengineering, shoreline naturalization (planting native trees and shrubs), stream garbage clean-ups, invasive species removals, educational workshops, and habitat creation, enhancement, or restoration projects. Detailed descriptions of our monitoring activities and a summary of projects for 2018 can be found on the following pages.

MVCA volunteers helping to survey Cody Creek

SNC volunteers helping with a garbage cleanup

RVCA volunteer helping with an invasive species removal

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 (MNRF) but was modified by the RVCA to increase monitoring efficiency and to be more volunteer-friendly.

The program monitors creeks throughout the Mississippi, Rideau Valley and South Nation watersheds. Many of these creeks are monitored on a six-year cycle to track long term changes, measure the effectiveness of past projects, and identify new threats. Staff and volunteers will survey 100m segments of a stream at a time, starting from the mouth and ending at the headwater reaches whenever possible. The following parameters are assessed and/or identified:

- General land use (agricultural, residential, forest, etc.).
- Stream morphology (wetted width, bankfull width, maximum depth, and flow velocity).
- Water chemistry (water temperature, dissolved oxygen, pH, and conductivity).
- Weather conditions (overhead cloud cover, air temperature).
- Photographs (upstream and downstream of section and any other notable features).
- Stream inputs (tributaries, groundwater sources, storm water drains and tile drains).
- Habitat type (pool, riffle or run).
- Instream habitat (substrate type, vegetation community, presence of organic debris, bank undercutting, overhanging riparian vegetation, and shade cover).
- Riparian habitat (extent of vegetated buffer, vegetation type).
- Migratory obstructions (presence of beaver dams, man-made dams and weirs, perched culverts, and natural features that impede fish migration).
- Bank composition, steepness, and stability.
- Human alterations/impacts (channelization, shoreline structures, culvert crossings, livestock access, garbage/pollution, etc.).
- Presence of fish and wildlife species.
- Enhancement and restoration opportunities (areas with garbage or invasive species to be removed, degraded shorelines in need of native vegetation, banks in need of erosion control, and areas requiring of wetland/fish habitat enhancement).

CSW volunteer measuring water chemistry using a YSI multi-parameter water quality meter while a summer student records

CSW volunteer measuring wetted and bankfull width

CSW volunteers conducting a stream survey via canoe

Headwater Drainage Feature Protocol

Headwater drainage features (HDFs) are depressions in the landscape in which water flows. HDFs include small streams, springs, wetlands, swales, and ditches, and they have variable flow conditions from perennial to ephemeral. Some HDFs are natural while others may be modified as with channelized drains. Regardless of their form, 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 (Stanfield et al., 2017).

HDFs have not traditionally been a component of monitoring efforts, and as such, little is known about their form and function in the landscape (Stanfield et al., 2017). These features may directly provide habitat for fish by the presence of refuge pools, seasonal flow, or groundwater discharge. They also provide indirect habitat contributions through the export of food in the form of detritus and invertebrates (Wipfli and Gregovich, 2002). These features are important sources, conveyors, or stores of sediment, nutrients, and flow (Stanfield et al., 2017).

As a result of their importance and a lack of information for headwater drainage features, City Stream Watch has incorporated monitoring of these systems for each catchment starting in 2013. The HDF protocol is one of several modules in the Ontario Stream Assessment Protocol (OSAP), which provides a framework for standardized stream assessment throughout Ontario. The HDF protocol is a rapid assessment method which characterizes the amount of water, sediment transport, and storage capacity within HDFs. Sites are visited first in spring and then again in summer to determine if the feature is permanent, intermittent or ephemeral. RVCA is working with other Conservation Authorities and the MNRF to implement the protocol with the goal of providing standard datasets to support science development and monitoring on headwater drainage features.

Additionally, this module provides means of characterizing the connectivity, form, and unique features associated with each HDF (Stanfield et al., 2017). An initiative is underway to evaluate how these data can help in understanding the cumulative contributions of individual HDFs on the downstream watershed state (see Stanfield et al., 2013).

Volunteer measuring hydraulic head, a measurement of velocity, in a headwater drainage feature during spring freshet (period of snow melt)

Headwater drainage feature that flows directly into Rideau River

Difference between seasons for one site that only flows during the spring and is dry during summer in the Long Island catchment of the Lower Rideau subwatershed

Fish Sampling Methodology

City Stream Watch staff use a variety of fish sampling methods depending on the habitat being sampled. With all sampling types, fish that are collected are identified to species (or lowest taxonomic rank possible), counted, weighed, and game fish are measured for length. Fish sampling is done in accordance with protocols and best practices in order to live-release fish after sampling is complete.

The following types of sampling methods are used:

Seine Net (OSAP module)

- Rectangular, with a three-dimensional box, or “purse” in the middle.
- The net is actively moved through the water, creating a wall.
- Fish are directed toward the purse in the middle and collect there.
- Ideal for pool habitat.

Electrofishing (OSAP module)

- Effective way to sample fish in a variety of habitats.
- Using an electrofishing “backpack”, the crew leader creates an electrical field in the water which causes a muscle response in fish, temporarily stunning them.
- Netters collect these fish using dip nets and place them 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.

Fyke Net

- Modified hoop net (series of hoops covered in mesh), with a lead line and wings that funnel fish inside.
- 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 are checked every 24 hours to release any fish that have been caught.

Windermere 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.

Thermal Classification Methodology (OSAP module)

Temperature is an important parameter in streams as it influences many aspects of physical, chemical, and biological health. Temperature data loggers are deployed in each of the monitored streams for the sample year from April to late October to give a representative evaluation 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 method in Stoneman and Jones, 1996) to classify a watercourse as either warm water, cool-warm water, cool water, cold-cool water or cold water.

Water temperature range classification based on a standardized 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/Users

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

- Watershed reporting.
- Identifying potential rehabilitation and restoration projects (riparian and instream).
- Subwatershed studies.
- Background data for planning and regulations reviews.
- Sharing information with other agencies (NCC, City of Ottawa, Fisheries and Oceans Canada, MNRF, Ministry of the Environment, Conservation and Parks, etc.), community groups, and non-governmental organizations.
- Reports to public landholders on potential projects, important issues, and current conditions
- Consultant information requests.
- Fish community information sent to MNRF; stored in National Heritage Information Centre (NHIC) and Natural Resource and Values Information System (NRVIS) databases.
- Species at risk information sent to MNRF (stored in NHIC database).
- Academic partners.

An RVCA summer student installing a temperature logger in Mud Creek in April

Invasive Species

Invasive species are animals, plants, or other living organisms that are introduced to environments in which they are not native, and thrive due to favourable conditions. Their success may result from a lack of predators, limited competition from other organisms, or from filling a niche that has otherwise been unfilled. Invasive species can be introduced to an area through a variety of pathways, including human activities that involve transportation of organisms and seeds from one location to another. This includes recreational boating, bait dumping, live-release of pets, planting non-native species, and commercial shipping. Once introduced, these species can easily spread via natural and human-induced methods. Invasive species can have major negative impacts on ecosystems by overcrowding, out-competing or even directly killing native organisms, which can often have major implications on industries and the economy. (Rutledge *et al.*).

There are a number of invasive species that have been observed along creeks in the City of Ottawa. Many invasive species are prolific and can be found along an entire stream length. In response to the growing number of invasive plants 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 to maintain control of these species and to encourage repopulation of the area by native plant species by spreading native seed mixes where appropriate.

City Stream Watch Targeted Invasive Species

European Water Chestnut
(Trapa natans)
Originating from Eurasia and Africa, it was introduced to North America as an ornamental plant in 1874. Aside from displacing native floating plants, dense mats of water chestnut block sunlight and prevent growth of submerged vegetation. It has detrimental effects on wildlife that relies on submerged plants as a food source and shelter and it depletes dissolved oxygen which can negatively impact sensitive fish species (Hummel and Kiviat 2004). Furthermore, European water chestnut produces large seeds with pointed barbs which can wash up on shore and cause injury to beach-goers (OFAH and OMNRF Invading Species Awareness Program, 2012a).

Japanese Knotweed
(Fallopia japonica)
An indigenous plant of Eastern Asia, Japanese knotweed was brought to North America as an ornamental and livestock forage in the late 18th century. Although its distribution has not been extensively documented in Canada until recent years, there have been many confirmed sightings in Ottawa. This perennial plant degrades riparian habitats by reducing native plant diversity which also leads to a decline in invertebrate, amphibian, reptile, bird, and mammal communities (Anderson 2012). Japanese Knotweed is one of the most aggressive plant invaders, so controlling it requires substantial amounts of labor.

Himalayan Balsam
(Impatiens glandulifera)
Himalayan balsam has been introduced around the world as a garden ornamental. It produces large amounts of nectar which attracts a disproportionate number of pollinators, and has a highly effective seed dispersal method: capsules that "explode" when touched, which can propagate seeds up to 5m away. This, along with the plant's large size and high seed count, help this plant take over shorelines (OFAH/OMNRF Invading Species Awareness Program, 2012b). In addition to reducing plant diversity, banks are susceptible to soil erosion as a result of Himalayan balsam's shallow root system, particularly when the plants die off in the fall (Clements et al 2008).

If you find an invasive species, report your findings to the Ontario Federation of Anglers and Hunters Invading Species Hotline (**1-800-563-7711**) or download the smartphone app to directly upload photos and location data. For more information on invasive species and how to identify them, please visit http://www.invadingspecies.com/.

RVCA City Stream Watch Monitoring Summary

The RVCA City Stream Watch program monitors 25 tributaries of the Rideau and Ottawa Rivers on a 6 year cycle. Approximately 15.1 kilometers of streams were surveyed and 12 fish sampling sites were visited as part of the 2018 cycle on Nepean Creek, Mud Creek, Black Creek and Taylor Creek. In addition, a total of 31 headwater drainage features were surveyed along these systems and in the Ottawa East Tributary. For more detailed findings for each tributary monitored in 2018, please see their individual catchment reports that are shared on our website at rvca.ca (Monitoring & Reporting > Reporting > City Stream Watch Reports).

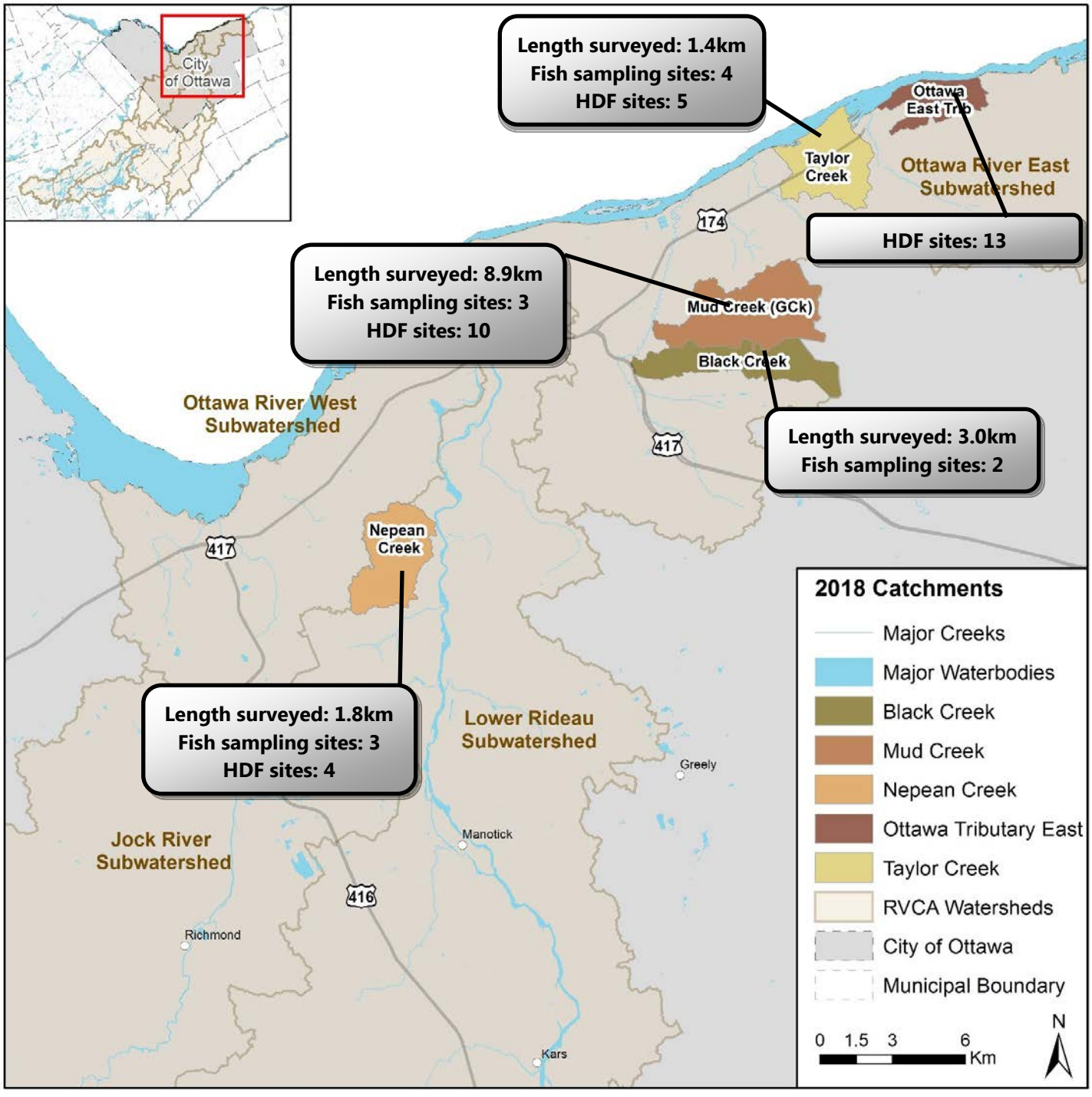


Figure 1 2018 Creek catchment areas with monitoring statistics

RVCA Community Response

This year, 193 volunteers from the community participated in the program, contributing a total of 579 hours toward stream surveys, restoration activities, and workshops. The following table demonstrates the hard work and dedication of our volunteers in 2018.

Metric	Nepean Creek	Taylor Creek	Mud Creek	Black Creek	Otta-wa East	Brew-er Park	Barr-haven	Ridea u Riv-er	Black Rapids	Sawmill Creek	Jock River	Billings Park	Graham Creek	Greens Creek	RVCA	Total
Headwater Drainage Feature Sites Surveyed	4	5	10		13											31
Number of Stream Sections Surveyed	18	14	89	30												151
Number of Fish Sampling Sites	3	4	3	2												12
Number of Temper-	3	2	2	2												9
Demonstration/ Training Events						1				1	1					3
Number of Garbage Clean-up Events	1	1	1				1			2		1	1			8
Kilometers (km) of Stream Cleaned	0.63	0.08	0.40				0.16			1.14		0.09	0.13			2.63
Invasive Species Removal Events	1	2				1		2		2			1			9
Squared Meters (m^2) of Invasive Plants Cleared	1260	1607				305		2418		700			5977			12267
Shoreline Planting Events									1					1		2
Number of Trees & Shrubs Planted									500					266		766
Number of Volunteers	14	15	28	13	3	8	9	0	8	43	20	5	8	8	11	193
Number of Volunteer Hours	34	38	99	51	21	26	18	0	40	100	80	10	24	16	22	579

Table 1 RVCA 2018 CSW accomplishments
*Many volunteers participated in more than one activity and thus were counted more than once in this table.



Some of RVCA's hardworking volunteers

Invasive Species Removals

July 7 and August 30
Sawmill Creek Japanese Knotweed Removal, Towngate Mall

This is the fifth year that CSW volunteers and staff have tackled this patch of Japanese knotweed, and progress has been made.
The density of this patch has diminished since 2016. It no longer appears to be spreading and the plants are starting to come back weaker than previous years (i.e. they are much easier to pull out) In total, an area of 700m^2 was cleared of knotweed. CSW staff will continue to monitor this patch in the coming years in the hope of removing it completely.

Volunteers tackling Japanese knotweed by digging up the roots

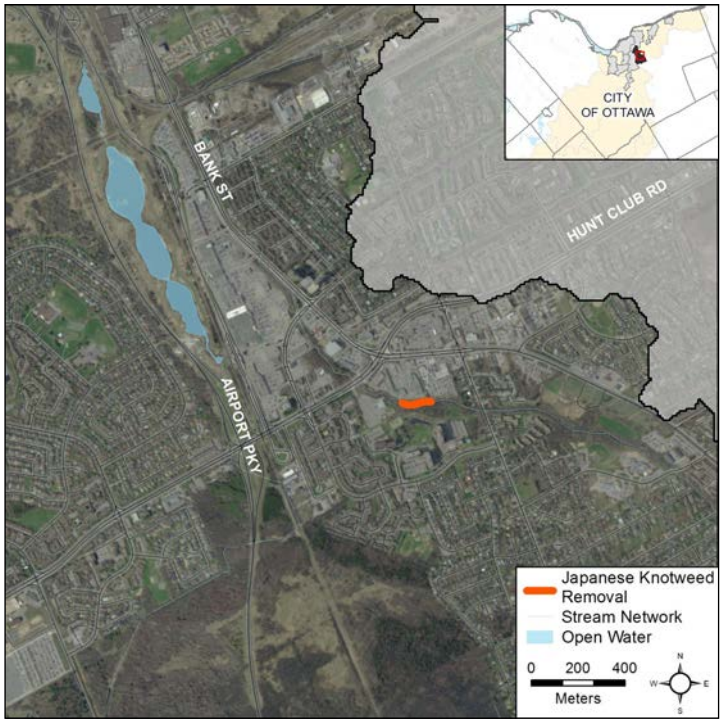


Figure 2 Location and range of Japanese knotweed removal on Sawmill Creek

July 21 and August 21
Himalayan Balsam Removal, Taylor Creek

During our stream assessment surveys of Taylor Creek this year, it was noticed that Himalayan balsam was widespread along the creek. In particular, it was most concentrated just downstream of Princess Louise Falls near St. Joseph Blvd. This area showed displacement of native plants, as the Himalayan Balsam had taken over as the dominant plant. Two rounds of removals took place and with the help of CSW volunteers and RVCA staff, 200m of shoreline was cleared.

Volunteers hard at work removing Himalayan balsam

Figure 3 Location and range of Himalayan balsam removal on Taylor Creek

July 28
Himalayan Balsam Removal, Nepean Creek

With our survey of Nepean Creek, we were also able to determine that Himalayan Balsam had dominated much of the shoreline along the creek. Three dedicated volunteers and two staff members removed the Himalayan balsam from the stormwater outlet in the creek to the pond. A total of 630m of shoreline was cleared and a total area of 1260m^2.

Himalayan balsam removal volunteer crew

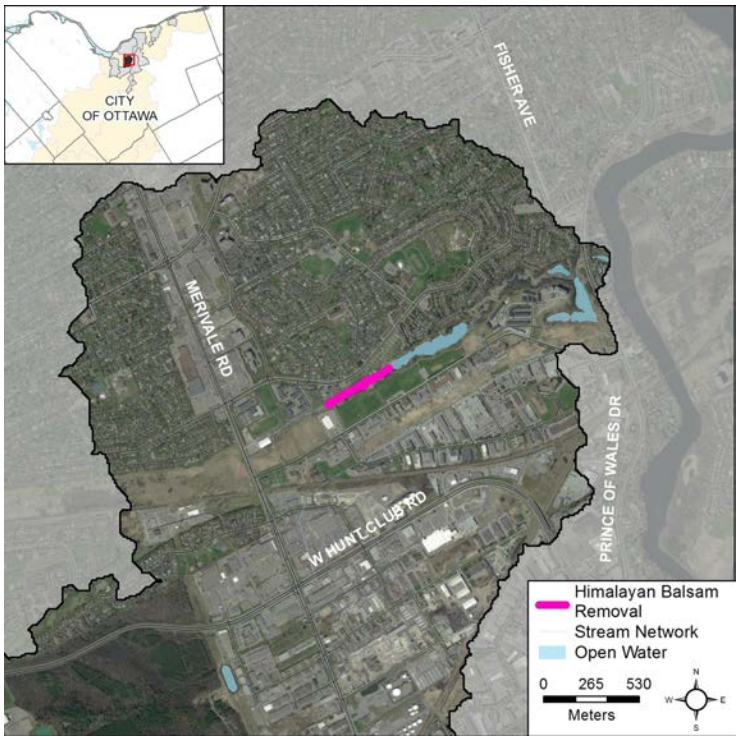


Figure 4 Location and range of Himalayan balsam removal on Nepean Creek

September 23
Tree Fest Ottawa—Flowering Rush Removal

2018 marks the third year that City Stream Watch has partnered with Tree Fest Ottawa, a fall festival that celebrates trees and inspires citizens of Ottawa to help protect the environment they live in. Participants help restore the native plant community surrounding the pond by removing the invasive flowering rush. This plant disrupts aquatic ecosystems by growing in dense patches and crowding out native plants, and it is becoming increasingly prevalent in Ontario, partly due to its various methods of reproduction (Invasive Species Council of BC, n.d.). Volunteers put on chest waders and dug out plants in the water and on shore. This is an area that we will continue to monitor in years to come.

Volunteers and staff removing flowering rush in Brewer Pond

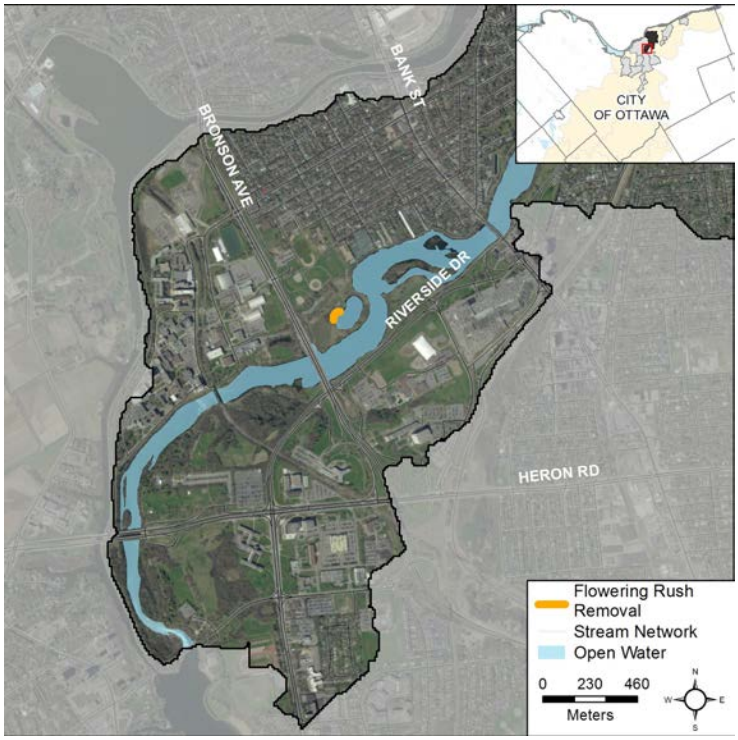


Figure 5 Location and range of flowering rush removal at Brewer Park

July 28 and August 10
European Water Chestnut Removal, Rideau River

RVCA and Ducks Unlimited Canada (DUC) joined forces once again this year to prevent the spread of European water chestnut on the Rideau River. The invasive plant was first found along the Rideau in 2014. The next summer, City Stream Watch assembled volunteers to help pull out as many plants as possible, which amounted to 2700kg of plant material. In 2016, with some plants still in the area, efforts were repeated and more plants were removed. We have continued with the removal in 2018, clearing an area of 21,023 m^2. Monitoring will continue to ensure that the plant remains under control.

RVCA staff removing a patch of European water chestnut

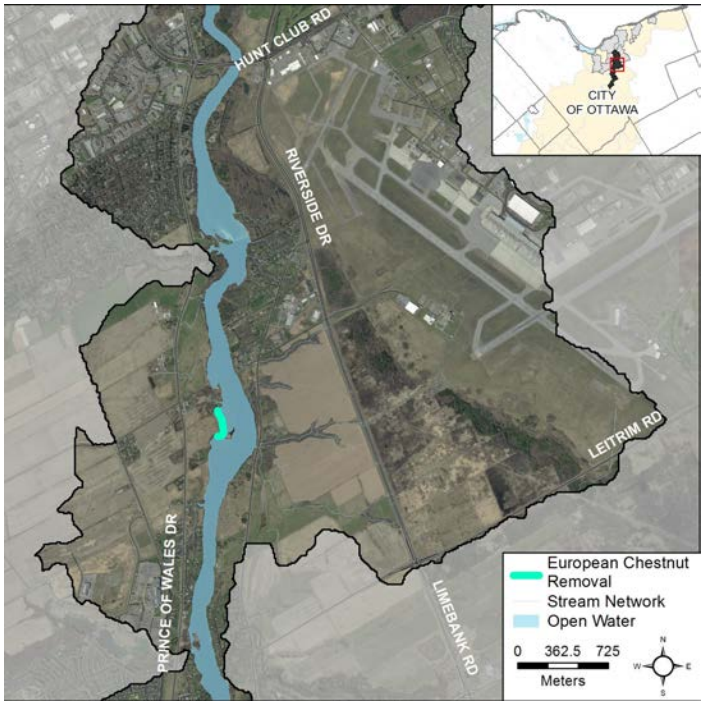


Figure 6 Location and range of European water chestnut removal on Rideau River in 2018

August 28
Himalayan Balsam Removal and Cleanup, Graham Creek

In 2016, Graham Creek was identified as a hot spot for Himalayan balsam within the City of Ottawa during stream surveys that year. This year, City Stream Watch volunteers and staff returned to this creek to remove the Himalayan balsam there once again. While there, City Stream Watchers also participated in a garbage cleanup, specifically near a residential neighborhood that the creek runs behind. Here, they were able to clear 130m of garbage along the shoreline, on top of removing 5977 m2 of the invasive species.

CSW volunteer holding a Himalayan balsam plant

Figure 7 Location and range of Himalayan balsam removal on Graham Creek

Garbage Cleanups

May 14th
GLAD Cleaning the Capital on Pinecrest Creek

Since 1994, *GLAD* and their partners have helped clear Ottawa's shorelines of garbage with their program *Cleaning the Capital*. In its twenty-four years, more than a million volunteers have removed an estimated 930 tons of trash which would otherwise lay to waste in our rivers or float into the ocean. City Stream Watch participated in the cleanup once again this year this time working with a local Girl Guide Group in Barrhaven. The focus here was the stormwater pond just west of Leikin Drive. There was a substantial amount of garbage here and both the volunteers and staff worked hard to remove everything they could along the pond.

Girl Guides removing garbage along stormwater pond

A few of the volunteers who helped with the cleanup

May 5
Sawmill Creek Spring Cleanup

In partnership with the Canadian Forces Ottawa Fish and Game Club, City Stream Watch hosted an event to clean up Sawmill Creek, a highly urbanized tributary of the Rideau River. Eighteen volunteers helped to clear 960m of shoreline behind an Ottawa South shopping center and fill 40 large garbage bags. City Stream Watch has hosted cleanups in this area in the past and will continue to monitor for garbage dumping.

May 18
Billings Park Garbage Cleanup

Several concerned citizens contacted the RVCA in the spring with regard to an increasing amount of litter in Billings Park, just south of the General Hospital. In response, City Stream Watch organized a cleanup to tackle the issue in 2017. This year, dedicated volunteers and staff returned once again to cleanup this area. Staff and volunteers covered an area of 3500 square meters.

An example of the severity of garbage dumping at Billings Park

CSW volunteers removing garbage from Mud creek

Oct 4
Mud Creek Cleanup

While surveying Mud Creek this year, it was noticed that the creek was littered with large debris behind a newly developed neighborhood. Here, one staff member and three dedicated volunteers waded along the creek to remove the debris. This included a couple tires and several large pieces of plank wood and plastic.

Shoreline Planting Events

May 17
Black Rapids Creek Shoreline Planting

In May, the Shoreline Naturalization Program and City Stream Watch volunteers joined forces to help restore the shoreline along Black Rapids Creek. Specifically, volunteers and staff were working to regenerate an area by planting native trees and shrubs where invasive buckthorn was previously removed. Eight Volunteers came out on a sunny spring day and planted a total of 500 trees and shrubs.

Planting event in full swing at Black Rapids Creek

Figure 8 Location of Black Rapids Creek planting event

June 15
Greens Creek Shoreline Planting

City Stream Watch and the Shoreline Naturalization Program partnered up with volunteers and OFS members to help plant approximately 200 native trees and shrubs at the site of the new fire station on Cyrville Road. This stretch of Greens Creek has received a lot of TLC from volunteers in the past with multiple garbage cleanups and shoreline planting projects. This particular project helped to continue greening this developed area.

Volunteers watching demonstration prior to planting

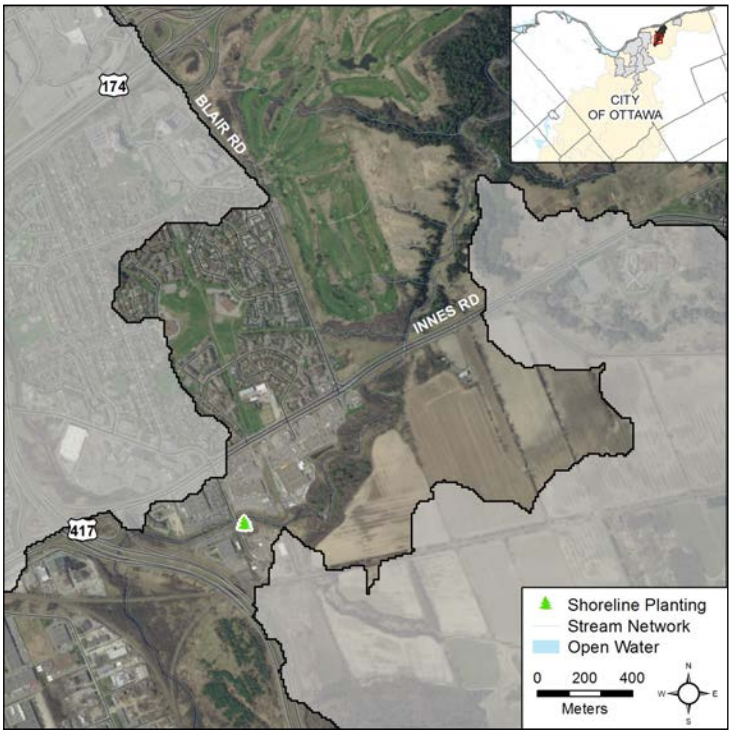


Figure 9 Location of Greens Creek planting event

Restoration Projects

Remic Rapids Restoration Project
2018 Monitoring Results

In 2015, the Rideau Valley Conservation Authority (RVCA) partnered with the National Capital Commission (NCC) to design and construct a wetland adjacent to the Ottawa River. The wetland feature is located close to Remic Rapids along the Sir John A. Macdonald Parkway. The feature is an area of 0.15 hectares consisting of a shallow water basin wetland that supports amphibian breeding and bird foraging and acts as a water supply for wildlife. The project required excavating a low lying grass/cattail area adjacent to the Ottawa River to create a functional wetland habitat feature in the Ottawa River watershed.

Remic Rapids wetland post construction, 2015 (top), and in August 2018 (bottom)

Figure 10 Location of Remic Rapids wetland

Since 2016, regular monitoring of the project has been underway. RVCA staff visit the wetland every month during the field season to collect water chemistry data and conduct visual assessments. Other monitoring activities such as invasive removals and amphibian surveys were also carried out. Now three years after construction, species observed at the wetland include American toads, fathead minnows, bats, song sparrows, Canadian geese, cedar waxwings, goldfinches, chickadees and mallards.

Fish and wildlife observed at Remic Rapids wetland in 2018. From left to right; large cluster of American toad tadpoles, fathead minnow, pair of mallards

RVCA Workshops and Demonstrations

Workshops and demonstrations are an important and popular part of the City Stream Watch program because they give volunteers the opportunity to learn about the importance of the monitoring and stewardship events in which they participate. The following workshops and demonstrations were held in 2018:

June 2

Spring Volunteer Orientation

In the spring, City Stream Watch held its annual pre-season volunteer orientation where volunteers are taught about the program and are introduced to the survey equipment and protocol they will be using in the field. This is a great event for first-timers to the program as well as those who may have never partaken in field work. This year, the orientation was held at Sawmill Creek where it outlets into the Rideau River

Demonstration on measuring wetted and bankfull width

August 11

Invasive Species Workshop

This was the second year City Stream Watch has put on this event. Once again it had a great turn-out. Twenty-one volunteers came to our office in Manotick to learn about the threat of invasive species in Ontario, how to identify some of the more common species, and what they can do help prevent their spread.

Workshop participants learning about invasive species in Ontario

September 23

Tree Fest Ottawa - Brewer Pond Exploration

At Tree Fest, City Stream Watch volunteers and other festival attendees get up close and personal with nature by wading into Brewer Pond and sampling some of its aquatic residents to learn about biodiversity. Participants also learned about the ecological benefits that resulted from reconnecting Brewer pond with the Rideau River in 2014.

City Stream Watch volunteers and Tree Fest attendees some of the residents of Brewer Pond (Photos obtained from Tree Fest Ottawa, n.d.)

The Ultimate Aquatics Workshop

Our longstanding Ultimate Aquatics Workshop once again proved to be one of our most popular events. In late October, 20 volunteers joined the Ottawa Flyfishers Society (OFS) and City Stream Watch at the Jock River Landing. The goal of this workshop is to learn about the relationship between conservation and recreation. Volunteers are given the unique opportunity to learn about fish and invertebrate identification and fly fishing all in the same day. Below is a summary of workshop activities.

Rideau Valley Conservation Authority staff:

- Introduced the basics of the OBBN protocol (Ontario Benthos Biomonitoring Network) used by RVCA to sample invertebrates.
- Demonstrated seine netting, a method used by RVCA staff to sample fish.
- Assisted volunteers in collecting and identifying fish and benthic invertebrates.

Ottawa Flyfishers Society members:

- Explained the relationship between stream habitat, invertebrates and fish and how they all relate to fly fishing.
- Gave an introduction to fly fishing including theory and technique.
- Displayed samples of hand-made flies.
- Provided one-on-one instruction in casting and retrieving.

"The [Ottawa Flyfishers] Society is dedicated to fostering and furthering the practice of activities associated with the art of flyfishing, conservation and resource renewal, and recreational activities."

Volunteers learning about fish, invertebrates, and the art of fly fishing with the Ottawa Flyfishers Society and City Stream Watch staff

RVCA Plans for 2019

In 2019 as part of our City Stream Watch program we will be monitoring the following creeks:

- Hunt Club
- Borthwick
- Ramsay
- Cranberry

There will be opportunities to assist with:

- Stream habitat assessment surveys
- Fish community sampling
- Stream garbage cleanups
- Invasive species removals
- Riparian tree and shrub planting
- Workshops and demonstrations
- Habitat enhancement and restoration

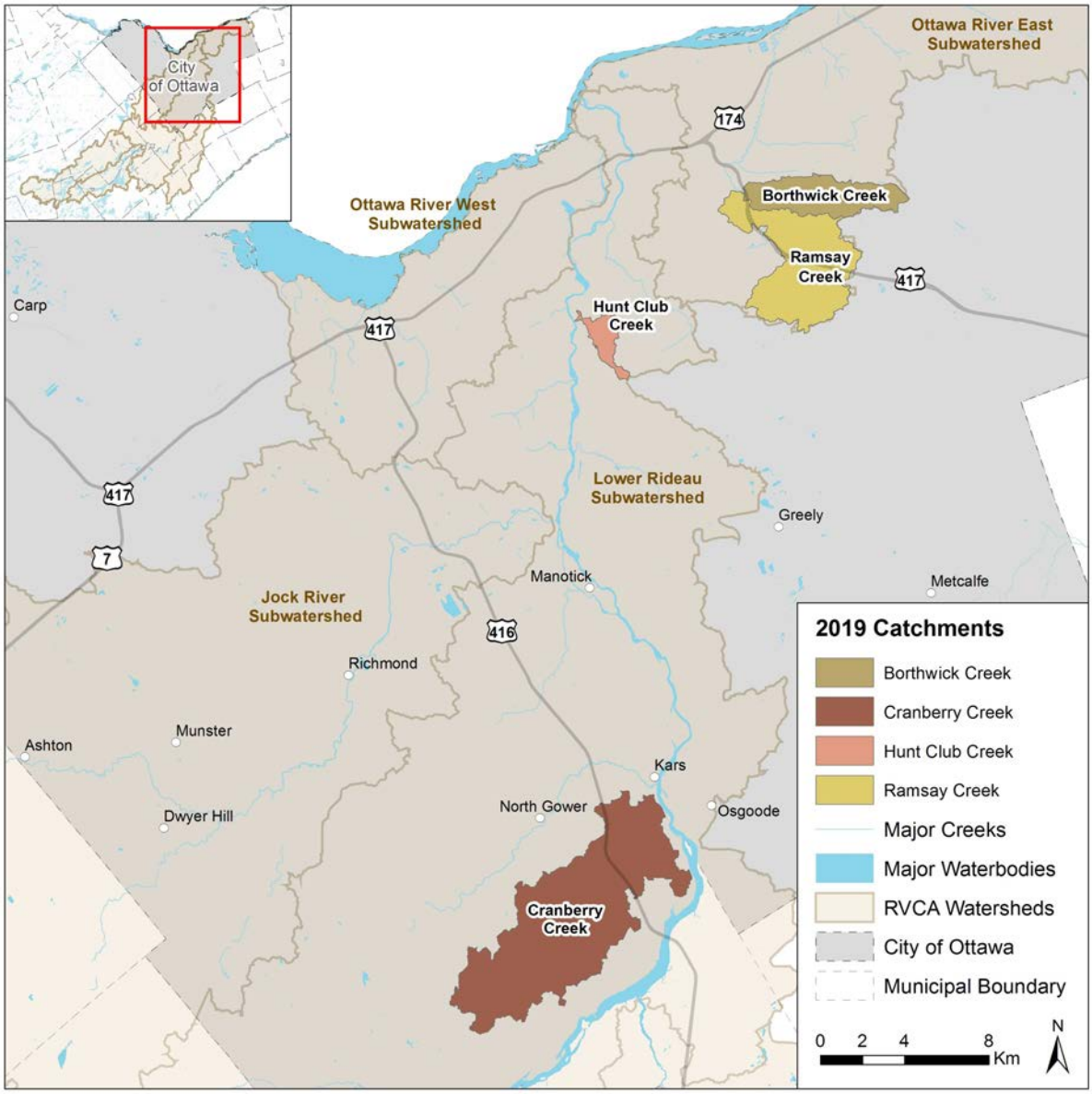


Figure 11 Catchments to be monitored in 2019

To volunteer with RVCA's City Stream Watch program, please visit rvca.ca or contact:
City Stream Watch Coordinator
(613) 692-3571
citystreamwatch@rvca.ca
https://www.rvca.ca/volunteer/city-stream-watch

RVCA City Stream Watch Monitoring Schedule

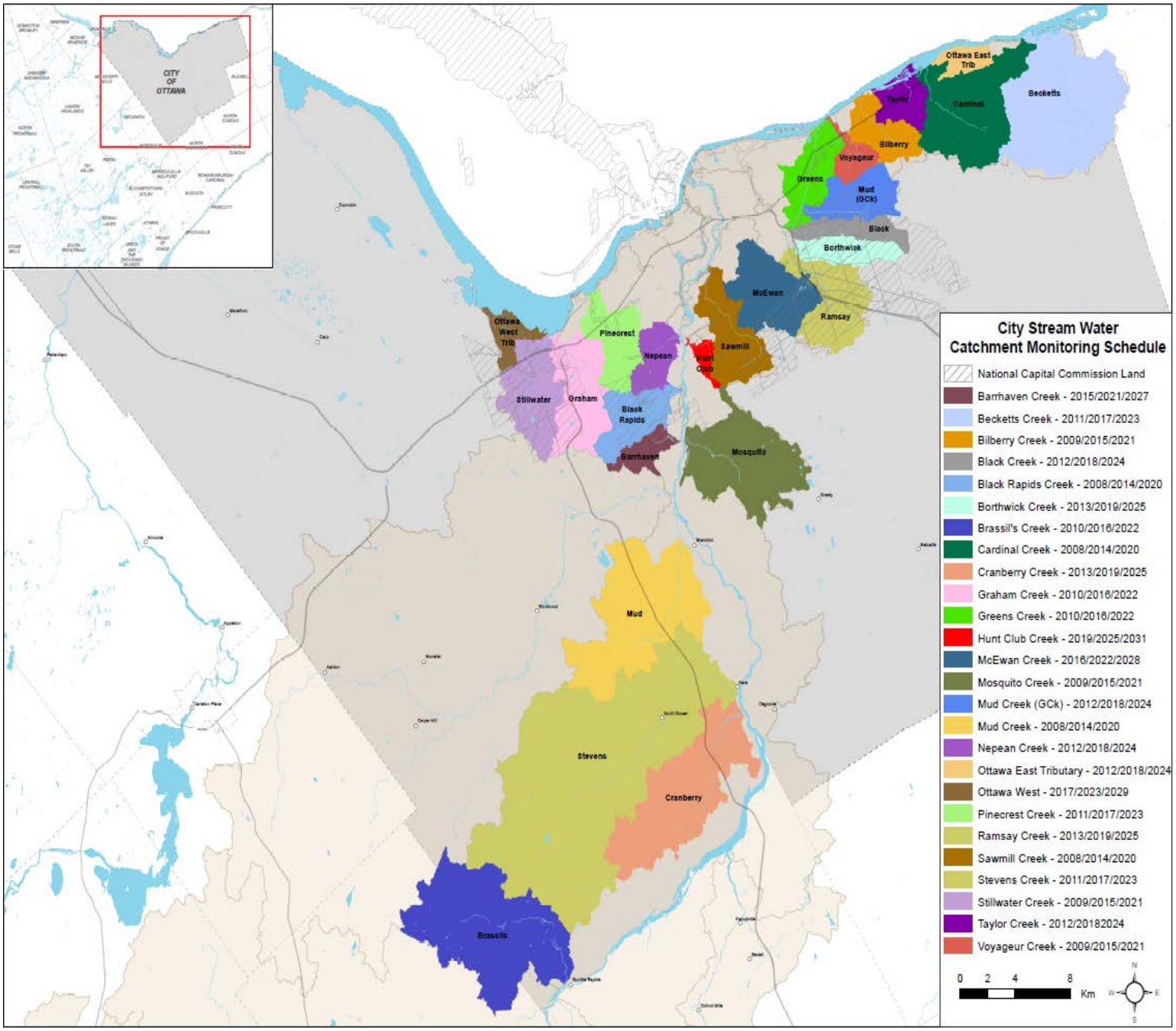


Figure 12 RVCA City Stream Watch catchment locations and monitoring schedule

MVCA City Stream Watch Monitoring Summary

The MVCA City Stream Watch (CSW) program monitors watercourses within the City of Ottawa boundaries in detail by wading the stream where possible and filling out survey sheets every 100 m. Our CSW rotation involves visiting 7 tributaries to the Carp River, 4 tributaries to the Ottawa River and 1 tributary to the Mississippi River within a 5 year rotation.

In 2018, over 10 km of stream was surveyed in the Cody Creek and Poole Creek Watersheds. To support these surveys, 5 temperature loggers were launched (plus one is pre-existing at an MVCA gauge station), 4 sites were electrofished, and 2 sites were sampled for benthic population analysis. Additionally, 22 sites across Cody Creek, Poole Creek and other Carp River tributaries were sampled using the Headwater Drainage Feature protocol.

For more detailed information on the sampling conducted in 2018, please refer to the individual catchment reports found on our website (mvc.on.ca/city-stream-watch/).

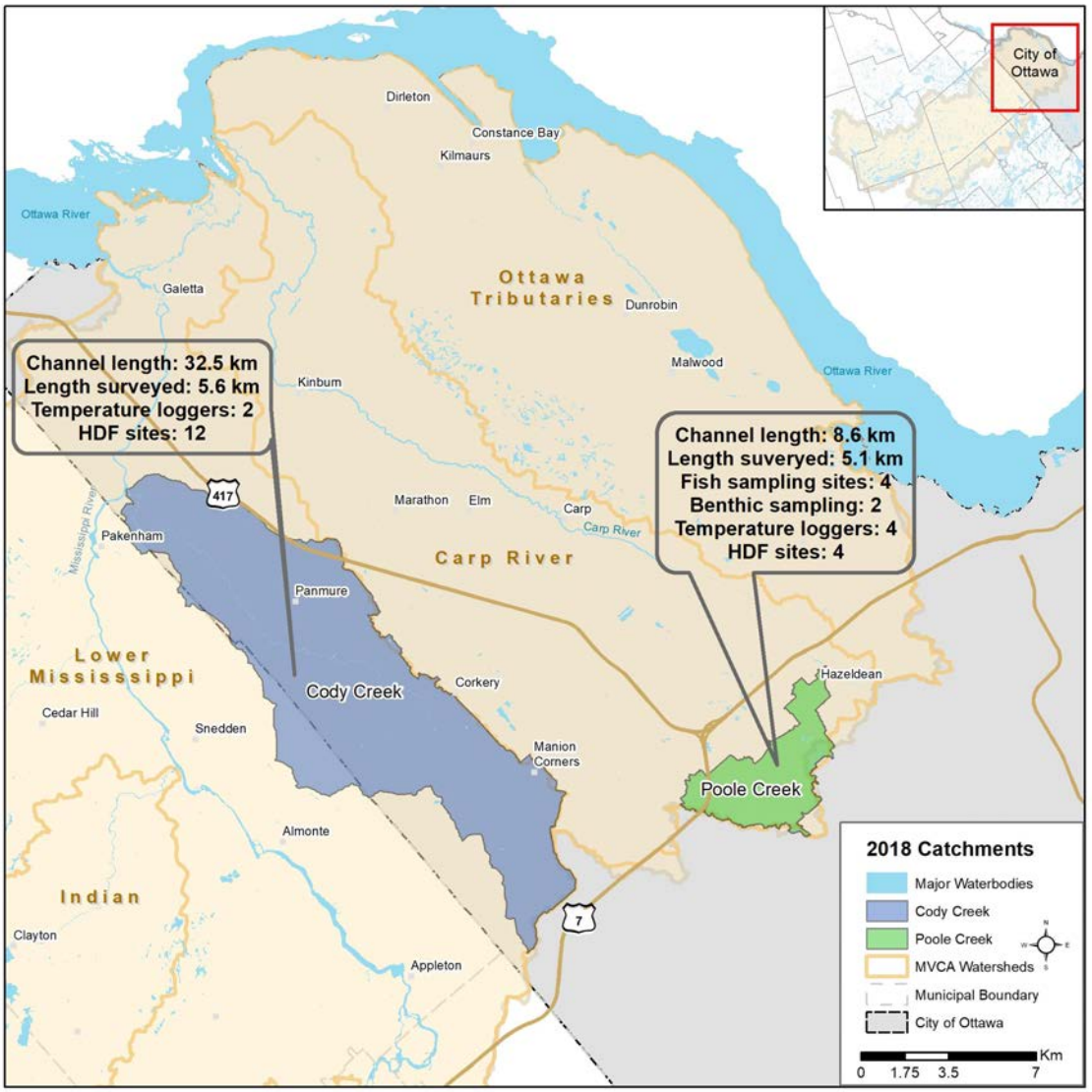


Figure 13 2018 MVCA surveyed creek locations with monitoring statistics

To the left: Crews performing stream surveys in Carp Creek (top two), and Poole Creek (bottom two).

Stewardship

MVCA coordinated two major shoreline planting events in the City in 2018. the first was along the banks of the Carp River in the newly restored reach south of Richardson Road. The second was conducted along the banks of Poole Creek near it's outlet to the Carp River. Both of these areas have very little canopy cover and it is hoped that as the plantings establish themselves they will provide a diversity of food and shelter resources as well as provide shade.

Volunteers

Due to some technical difficulties with our email system MVCA was not able to successfully co-ordinate the full use of the number of interested volunteers who contacted us over the summer. We were able to get six volunteers out who contributed 16 hours towards stream study efforts.

We are very thankful to all the volunteers for their interest and time and we look forward to working with them more in 2019.

If you are interested in volunteering with us, please contact our office at info@mvc.on.ca or 613-253-0006.

Invasive Species

The following invasive species were identified during our surveys of Cody Creek and Poole Creek in 2018. Continued efforts to identify and note these species will improve our understanding of the extent of their spread in our watershed and aid in planning stewardship actions to tackle them.

The Invasive Species Identified during City Stream Watch 2018	
common buckthorn	Manitoba maple
curly leaf pondweed	Norway maple
dog-strangling vine	Phragmites
flowering rush	poison parsnip
Himalayan knotweed	purple loosestrife
Japanese knotweed	rusty crayfish

For more information on invasive species in Ontario please contact: www.Invadingspecies.com or www.ontarioinvasiveplants.ca

Clockwise from top left: poison parsnip, dog-strangling vine, purple loosestrife, Japanese knotweed

Headwater Surveys

The headwater drainage protocol was conducted at 12 sites within the Cody Creek watershed, 4 sites within the Poole Creek watershed and 6 sites on other tributaries to the Carp River. Site visits were conducted both in April and in August.

A headwater site on a tributary to the Carp River, in April (left) and August (right)

Biological surveys

To better tie the water temperature monitoring results to the existing biological community, all four Poole Creek sites that had temperature loggers were also electrofished. Of those four sites two were then selected for an assessment of their benthic invertebrate populations. Details on the results of the surveys will be in the catchment reports.

One of five temperature loggers deployed

MVCA staff measuring an American eel

MVCA staff collecting a benthic sample

MVCA Plans for 2019

Our plans for 2019 will be to survey the A, B and C tributaries to the Carp River as well as surveying Constance Creek. The surveys will be enhanced with water temperature loggers, fish and benthic sampling as well as headwater drainage features assessments. It is also our intent to engage the local community to help us with a number of stewardship tasks identified for Poole Creek.

There will be opportunities for volunteers to help with stream surveys, tree and shrub planting, as well as possible invasive species and garbage clean up events.

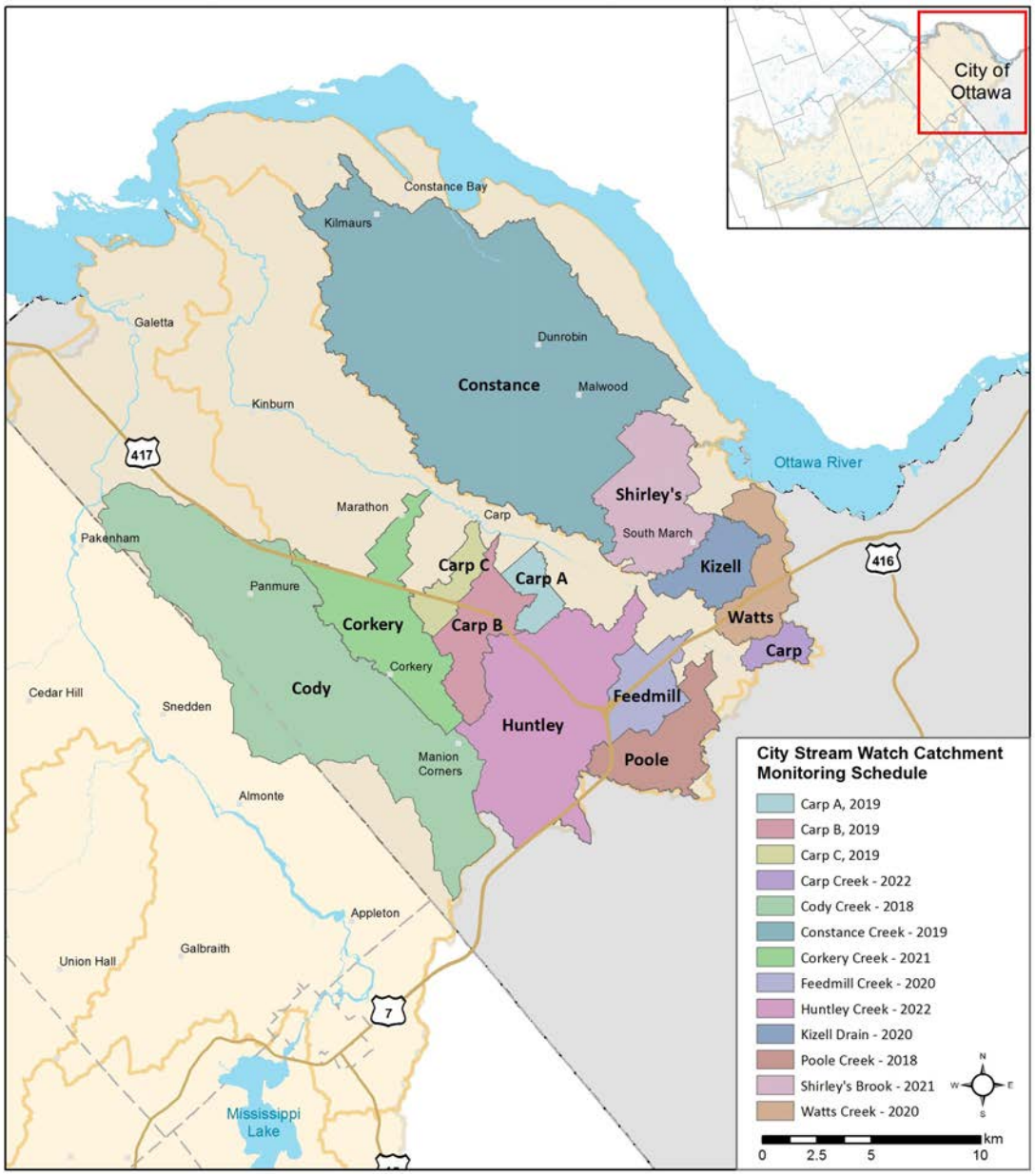


Figure 14 MVCA's CSW catchment monitoring cycle

For more information or to volunteer with MVCA's City Stream Watch program, please contact Kelly Stiles at:

kstiles@mvc.on.ca

613-253-0006

http://mvc.on.ca/city-stream-watch/

SNC City Stream Watch 2018 Summary

The *South Nation Conservation (SNC) City Stream Watch 2018 Summary Report* highlights achievements from the 2018 field season and describes the scope and magnitude of projects which were completed by SNC staff and community volunteers. This is the fifth year for the City Stream Watch program at SNC and we are very pleased with the degree of uptake by the local communities and the development of the program since its initiation in 2014. Overall, a total of 11 volunteers participated with City Stream Watch and contributed to the survey and monitoring of 5.6 km's on Shields and Findlay Creek combined. SNC's City Stream Watch Reports are available online at: http://www.nation.on.ca/water/reports.

Stream Study

For SNC's 2018 fieldwork season, the City Stream Watch program targeted Shields Creek and Findlay Creek, two tributaries of the North Castor River. The North Castor River begins northeast of Greely, ON at the confluence of Shield's Creek and Findlay Creek. It flows southeast towards Russell, ON across both agricultural and forested land before entering the main branch of the Castor River west of Russell, ON near Victoria Street.

Headwater Drainage Feature Assessments

In 2018, the SNC City Stream Watch program sampled 30 sites within the City of Ottawa in the Shields and Findlay Creek Subwatersheds

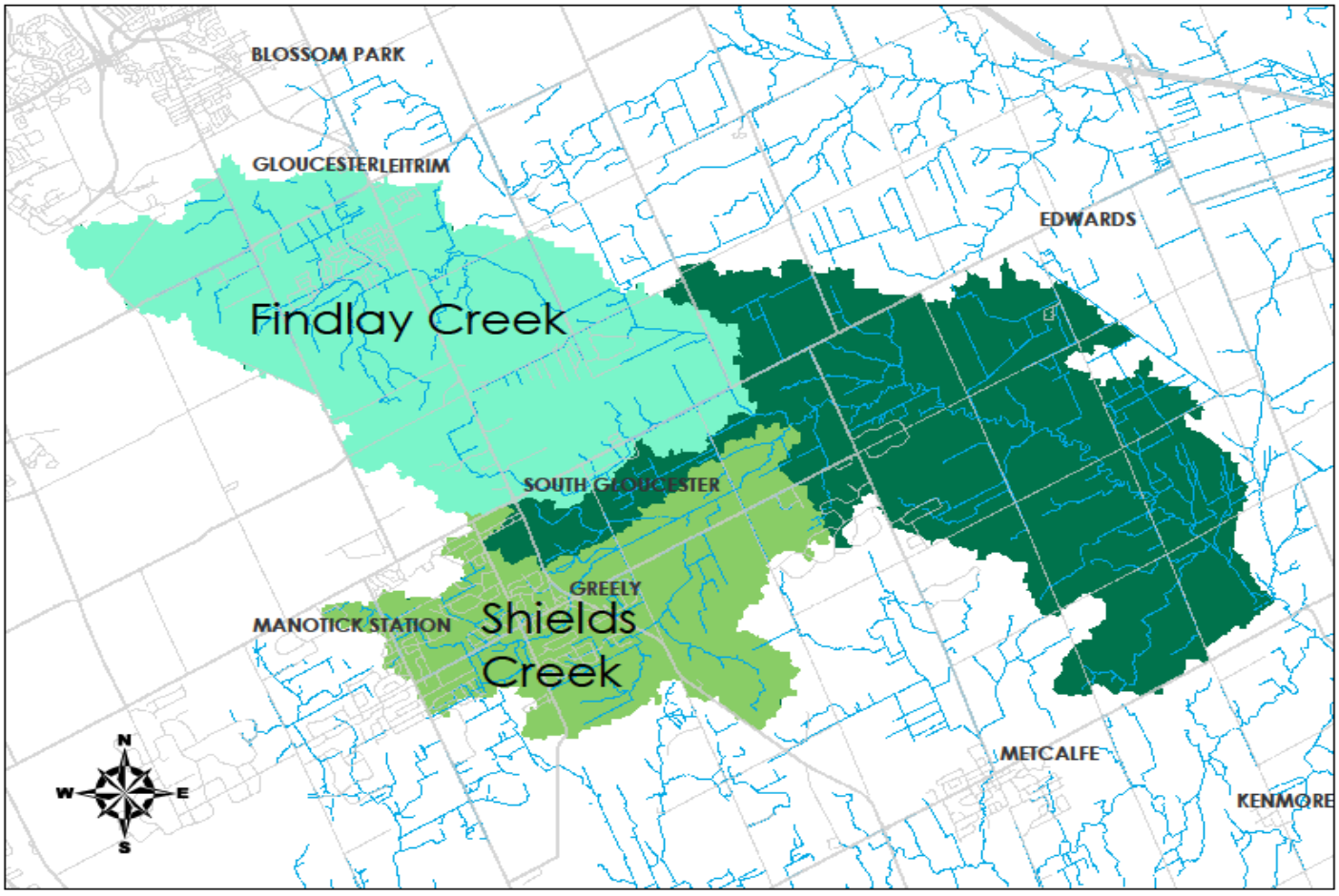


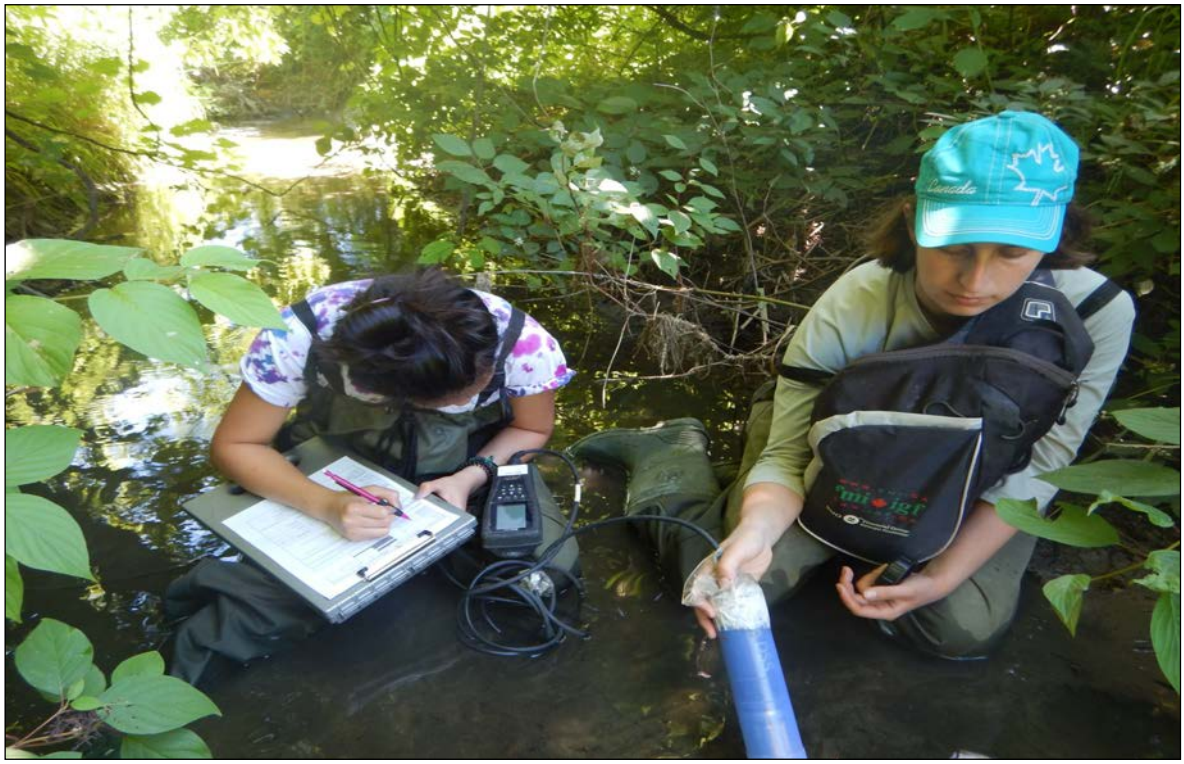
Figure 15 Subwatershed map of Findlay Creek and Shields Creek

Volunteer Contributions

A total of 11 volunteers assisted with the SNC City Stream Watch program in 2018 for over 60 hours of work. SNC staff and volunteers were able to sample a total of 56 sections within Shields and Findlay Creek. The amount of stewardship work accomplished was made possible with the volunteer assistance; SNC staff could not have accomplished this on their own. Table 5 displays a summary of the SNC City Stream Watch accomplishments for the 2018 field season and details of volunteer assistance.

Activity	Shields Creek	Findlay Creek	Total
Sections surveyed	34	22	56
Fish sites	2	2	4
Fish sampling sessions	2	2	4
Benthic monitoring sites	5	5	10
Baseflow monitoring sites	7	7	14
Temperature probes deployed	8	8	16
Demonstration events	1	1	1
Number of volunteers	6	5	11
Number of volunteer hours	32	29	61

Table 5 Summary of SNC's City Stream Watch accomplishments for the 2018 field season and volunteer contributions.



Volunteers and SNC staff taking water quality measurements within Shields Creek

Banded killifish were often captured in Shields Creek

SNC staff and a volunteer taking baseflow measurement in Findlay Creek

Fish Sampling in Shields Creek

Fish communities were sampled at 4 different sites along Shields and Findlay Creek and yielded interesting results. In total, over 1120 fish were sampled within the two creeks. This information will allow SNC to understand which species live in which sections of the river. Further, SNC can prioritize restoration work on areas where lowered fish diversity is discovered.

Electrofishing was the method used to sample for fish in Shields and Findlay Creek

Baseflow Monitoring

Baseflow monitoring was completed at sites within Shields and Findlay Creek. This type of monitoring allows SNC to gain an understanding of how much groundwater enters the creek during the dry periods of the summer.

SNC staff taking baseflow measurements with highly accurate scientific equipment

Dragonfly larva are a common resident within Shields and Findlay Creek

SNC staff sampling benthic invertebrates in Findlay Creek

SNC staff and a volunteer measuring and recording water levels in Shield's Creek

SNC Plans for 2019

In 2019, SNC City Stream Watch efforts will be focused on the headwater areas of the Bear Brook River (Figure 16). The South Indian Creek system begins near Vars in the City of Ottawa and flows east towards Limoges. Eventually, it flows north to become the Bear Brook River and flow further east to the South Nation River. The Bear Brook River enters the South Nation River near Ettyville, ON.

There will be many opportunities to assist with City Stream Watch in 2019 including:

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

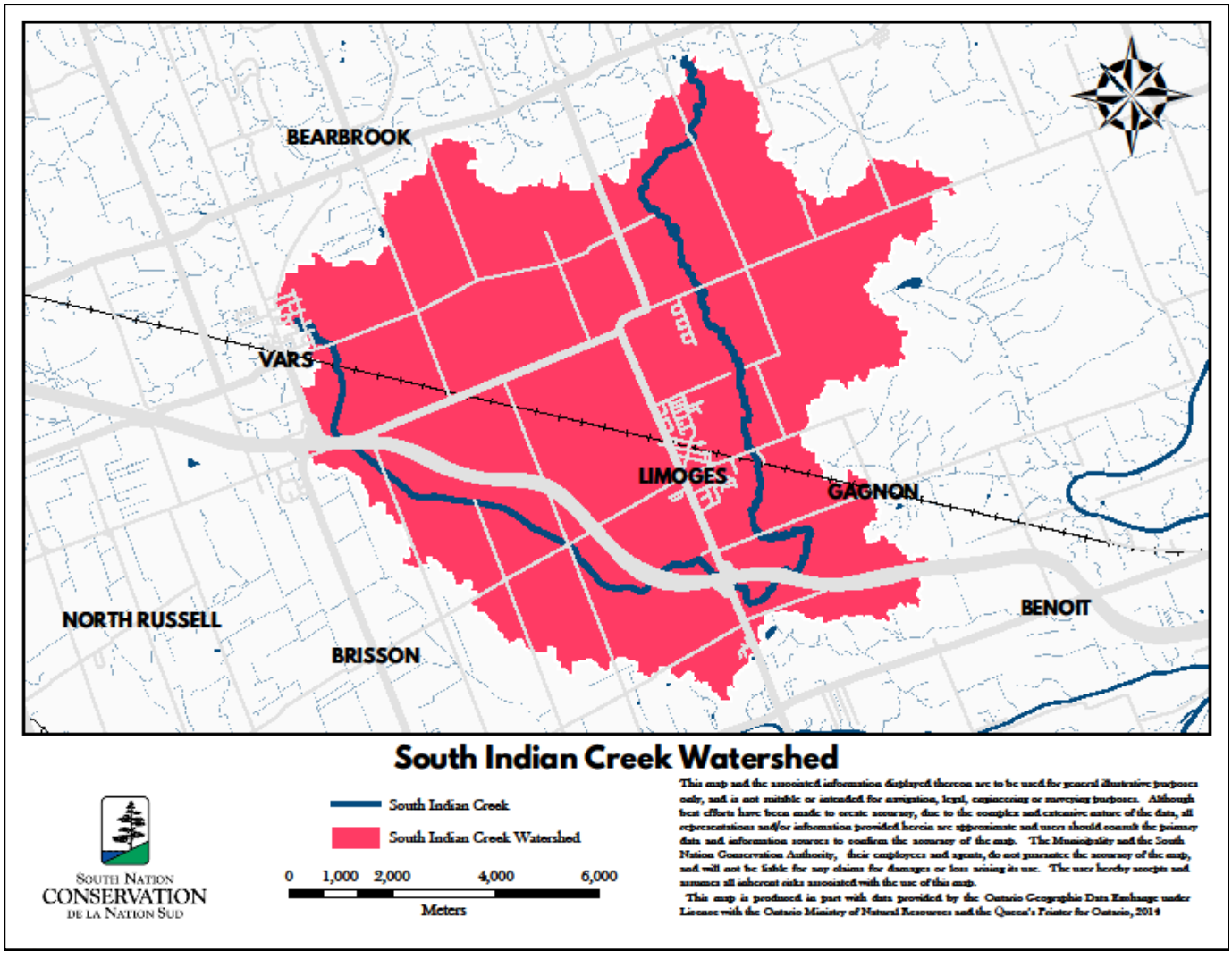


Figure 16 The headwater areas of the Bear Brook River and South Indian Creek are shown

Acknowledgements

A big thank you to all of our 2018 **volunteers**. You continue to make the program a success and contribute to important data collection and rehabilitation projects along our urban and rural streams within the City of Ottawa.

Thank you to all the **landowners** that granted us access to the creeks that flow through their properties.

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

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

References

1. Anderson, H. 2012. Invasive Japanese Knotweed (*Fallopia japonica* (Houtt.)) Best Management Practices in Ontario. Ontario Invasive Plant Council, Peterborough, ON. [accessed 2018 Jan 9]. https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/06/OIPC_BMP_JapaneseKnotweed.pdf.
2. Clements, D.R., K.R. Feenstra, K. Jones and R. Staniforth. 2008. The Biology of Invasive Alien Plants in Canada. 9. *Impatiens glandulifera* Royale. *Canadian Journal of Plant Sciences* **88**: 403-417.
3. Hummel, M. and E. Kiviat. 2004. Review of world literature on water chestnut with implications for management in North America. *Journal of Aquatic Plant Management* **42**: 17-28.
4. [ISCBC] Invasive Species Council of BC. c2014. *Weed of the Week: Flowering Rush*. [accessed 2018 Jan 9]. http://bcinvasives.ca/news-events/media/articles/weed-of-the-week-flowering-rush.
5. OFAH/OMNRF Invading Species Awareness Program. 2012a. *European Water Chestnut*. [accessed 2018 Jan 9]. www.invadingspecies.com.
6. OFAH/OMNRF Invading Species Awareness Program. 2012b. *Himalayan Balsam*. [accessed 2018 Jan 9]. from: www.invadingspecies.com.
7. Rutledge, K., M. McDaniel, D. Boudreau, T. Ramroop, S. Teng, E. Sprout, H. Costa, H. Hall and J. Hunt. c1996-2018. Invasive Species. In *National Geographic Society.* [accessed 2018 Jan 9]. https://www.nationalgeographic.org/encyclopedia/invasive-species/.
8. Stanfield, L., L. Del Giudice, E. Bearss and D. Morodvanschi. 2017. Constrained Headwater Sampling. In: Stanfield, L., editor. Ontario Stream Assessment Protocol. Version 10. Peterborough (ON): Ontario Ministry of Natural Resources and Forestry.
9. Stanfield, L.W., L. Del Giudice, F. Lutscher, M. Trudeau, L. Alexander, W.F. Fagan, R. Fertik, R. Mackereth, J.S. Richardson, N. Shrestha et al. 2013. A discussion paper on: Cumulative effects from alteration of headwater drainage features and the loss of ecosystem integrity of river networks. [accessed 2018 Jan 9]. http://trca.on.ca/the-living-city/water-flood-management/headwater-study.dot.
10. Stoneman, C.L. and M.L. Jones. 1996. A Simple Method to Evaluate the Thermal Stability of Trout Streams. *North American Journal of Fisheries Management* **16**: 728-737.
11. Tree Fest Ottawa. n.d. [accessed October 23 2018] via Christine Earnshaw.