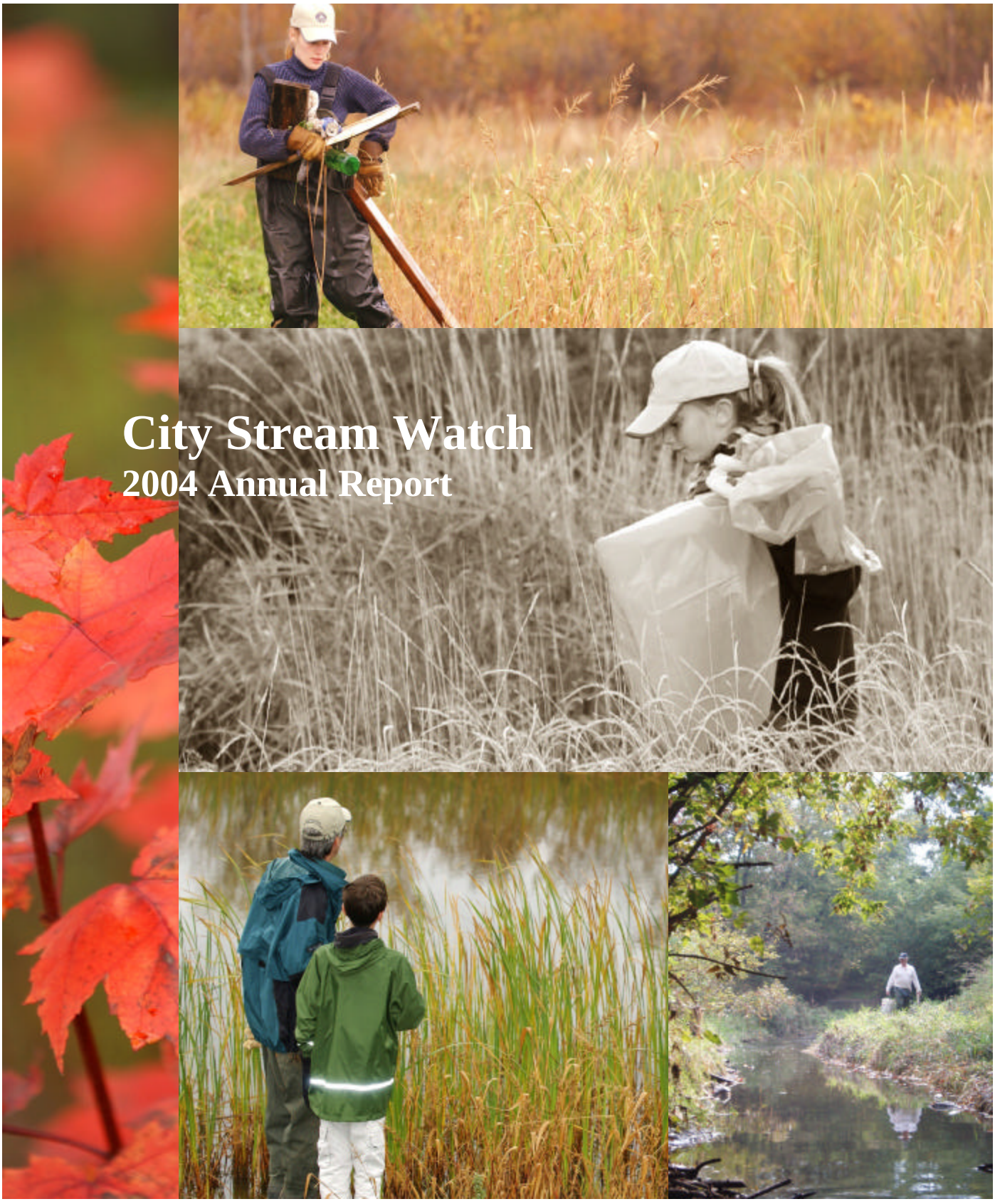


City Stream Watch
2004 Annual Report

City Stream Watch
2004 Annual Report

Prepared by:

Brian Bezaire
City Stream Watch Coordinator
Rideau Valley Conservation Authority

City Stream Watch Collaborative:
(alphabetically)

Charles Billington, Community Relations, Rideau Valley Conservation Authority
Marc Dupuis, President, Ottawa Flyfishers Society
Dawne Flaborea, Project Coordinator – Surface Water Quality, City of Ottawa
Jennifer Lamoureux, Fish Habitat Biologist, Rideau Valley Conservation Authority
Mike Lascelle, Environment Committee of Ottawa South
Dr. Francis Pick, Rideau River Roundtable
Lynn Preston, Watershed Planning, Rideau Valley Conservation Authority
Donna Silver, President, Heron Park Community Association

November 23, 2004

Executive Summary

This document summarizes the activities of the City Stream Watch program for the 2004 season. The program was established in April of 2003 through a partnership of six groups in the Ottawa area:

- The Heron Park Community Association;
- The Rideau Valley Conservation Authority;
- The Environmental Committee of Ottawa South;
- The City of Ottawa;
- The Ottawa Flyfishers Society;
- The Rideau River Roundtable.

Representatives from these organizations met, and together outlined a program that fulfills many of the needs of the community for environmental information and promotion of local streams within the municipality.

The goal of the program is to obtain, record, and manage valuable information on the physical and biological characteristics of creeks and streams in the City of Ottawa, while ensuring that they are respected and valued natural features of the communities through which they flow. To this end, the program relies on and encourages the interest and commitment of volunteers from the community, guided by an experienced coordinator, to learn and conduct macro stream assessments on local waterways, participate in sampling fish communities through seining, and assist in stream clean-ups and bioengineering rehabilitation projects.

The City Stream Watch program utilizes a macro stream assessment protocol originally developed by the Ontario Ministry of Natural Resources. Officials at the Rideau Valley Conservation Authority, to facilitate its use by community volunteers, have since altered the protocol. Development of the protocol was essential, as volunteer groups consist of people with a variety of educational backgrounds and experiences.

Four streams (Stillwater, Bilberry, Mosquito, and Monterey Creeks) were chosen for sampling in the 2004 season, based on community interest as well as the level and need for current information. A total of 65 volunteers from the community participated in the program, contributing a total of 427 hours. Approximately 20 kilometres of stream was surveyed, and all information is housed in the Rideau Valley Conservation Authority's Watershed Information Management System that is available interactively on the authority's website at www.rideauvalley.on.ca.

Volunteers assisted in sampling the fish communities of each creek and identifying different fish species. A total of 16 seining events occurred on Stillwater, Bilberry, Mosquito, Mud, Black Rapids, and Cardinal Creeks. In total, 25 different species were observed. The mouth of Stillwater Creek was identified as muskellunge nursery habitat.

Three creek clean-up initiatives were organized on Sawmill Creek resulting in five outings. Over 140 hours were given to help remove man-made garbage from the creek.

The program should further build on the successes achieved during its first two years. Through its ongoing implementation, temporal and spatial environmental trends of creeks in the Ottawa area may be observed and recorded. The data will complement work conducted by a few municipal and regional programs, most of which do not sample the smaller urban streams that is the focus of City Stream Watch. In addition, the intrinsic values of community based environmental monitoring, such as community involvement and social capital, will be further developed.

Acknowledgements

The achievements of this program could not be realized without the assistance of many organizations and individuals. Special appreciation is extended to the **Ontario Trillium Foundation**, to whom we are deeply thankful for the financial support they have provided.

Thank you to all the volunteers who helped out throughout the field season. The dedication and enthusiasm you conveyed to this project was incredible and very much appreciated.

Thank you to the **Canada Lands Company** for their extremely generous financial contribution to the program to enhance the riparian areas of Sawmill Creek.

Thank you to **Evergreen** for their contribution to the program to enhance riparian areas on Sawmill Creek.

Thank you to Jason Kelly, owner of the **Monterey Inn Resort and Conference Centre** at 2259 Prince of Wales Drive, for his involvement in the program and hosting an end-of-year luncheon for volunteers.

Thank you to Brian Smith, Area Manager with the **City of Ottawa Parks Department** for arranging dumpsters to be delivered and removed during the Sawmill Creek clean-ups.

Thank you to the **Ottawa RiverKeeper**, Meredith Brown, for her support in advertising the program and helping to recruit volunteers.

Thank you to Jacques Lanthier of the Canada Lands Company for his assistance in organizing and funding an extremely successful Community Stream Clean-Up Day on Sawmill Creek.

Thank you to Lorne Pennycooke and Peter Stewart-Burton of the **National Defence Headquarters Fish and Game Club** for their assistance in organizing a clean-up initiative on Sawmill Creek.

Thank you to Beverley Stead, Store Manager of **Farm Boy** at 2950 Bank Street for donating fruit and drinks for hungry and thirsty volunteers during our community clean-up initiative on Sawmill Creek.

Thank you to Tony Provenzano of **1414875 Ontario Ltd.** for allowing access to Sawmill Creek through the company's property on Hunt Club Road during our clean-up.

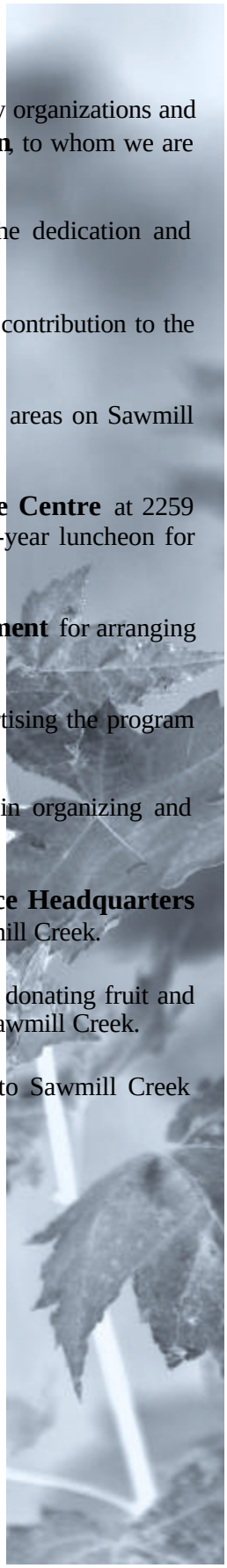
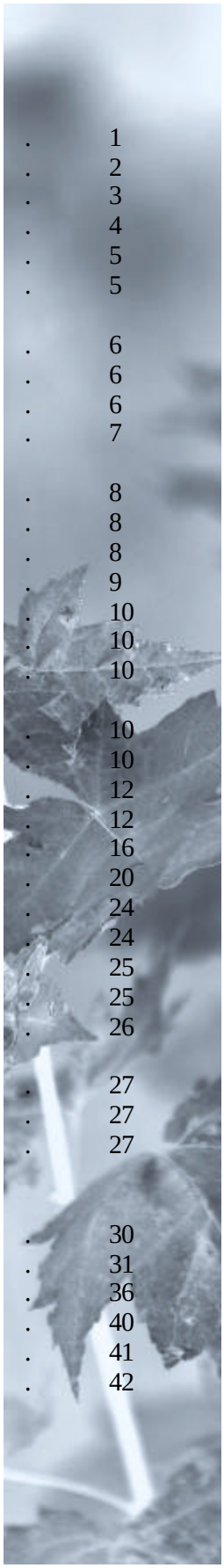
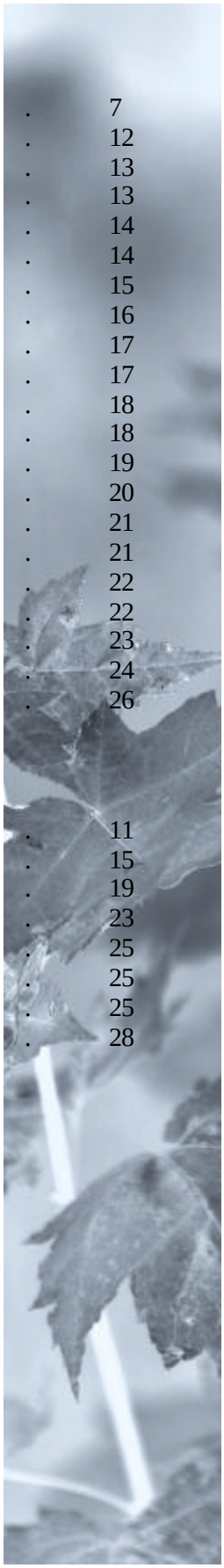


Table of Contents



Index of Figures

Index of Tables



1.0 Introduction

1.1 City Stream Watch – An Evolving Program

The health of Ontario's water resources is of paramount importance to its citizens. A dependable supply of clean freshwater is critical to a strong economy and high quality of life, and can only be achieved through proper management of all water supplies. Water resources are threatened by myriad stresses, including urbanization and development, pollution, and public apathy. The City Stream Watch program obtains, records, and manages valuable information on the physical and biological characteristics of creeks and streams in the City of Ottawa, with the goal of ensuring that they remain respected and valued natural features of the communities through which they flow.

1.2 Partners of the City Stream Watch Program

In April of 2003, the City Stream Watch program was initiated through a partnership of six groups in the Ottawa area:

The Heron Park Community Association
The Heron Park Community Association, created in the mid 1980's, functions as a representative body in protecting community interests, supports programs that provides safety and information for community residents, and encourages social and recreational community activities. The Association is the lead organization of the City Stream Watch program, and aids in training and recruiting volunteers.

The Rideau Valley Conservation Authority
Conservation authorities in Ontario ensure the protection and restoration of Ontario's water, land, and natural habitats through responsible management by providing programs that balance human, environmental, and economic needs. In 1966, in response to the above needs as they relate to the Rideau River watershed, the Rideau Valley Conservation Authority (RVCA) was established. The RVCA delivers a wide range of watershed management services to the community, including:

- Flood plain management;
- Aquatic environment monitoring and reporting;
- Land use and development review;
- Regulations administration and enforcement;
- Watershed management planning;
- Stewardship advice and incentives programs;
- Conservation information.

The RVCA provides technical management and supervision to the City Stream Watch program to ensure the environmental data is collected, managed, and stored to meet appropriate standards.

The Environmental Committee of Ottawa South
As a working committee of the Ottawa South Community Association, the Environment Committee of Ottawa South (ECOS) encourages members of its community to take an active role in improving the health of their natural environment. The Committee aids in training and recruiting volunteers of the City Stream Watch program.

The City of Ottawa

The City of Ottawa is dedicated to monitoring and improving the natural environment, including water resources, of the municipality. The City's evolving environmental strategy works to ensure that environmental management is an integral part of its practices and policies. The City aids in coordinating, recruiting, and training volunteers of the City Stream Watch program.

The Ottawa Flyfishers Society

The Ottawa Flyfishers Society, created in 1983, is dedicated to promoting flyfishing, as well as fish and fish habitat conservation. The Society aids in recruiting volunteers of the City Stream Watch program.

The Rideau River Roundtable

The Rideau River Roundtable consists of representatives from community groups, municipalities, government agencies, and private businesses. The Roundtable is dedicated to conducting research and coordinating projects to protect and improve the Rideau River watershed. The Roundtable aids in training and recruiting volunteers of the City Stream Watch program.

Representatives from these groups met and together outlined a program that fulfilled many of the needs of the community for information and promotion of local urban streams. Through a network of interested volunteers from the community, guided by an experienced coordinator for the project, urban streams were surveyed and valuable information was recorded between May and October of 2003. In 2004, the City Stream Watch program built on the successes it achieved during its first year.

1.3 Stream Selection in 2004

Three additional streams were selected for sampling in the 2004 season. These streams were chosen based on community interest, as well as the level of and need for current information. Figure 1 shows the locations of the three streams in the City of Ottawa, as well as those sampled in 2003.

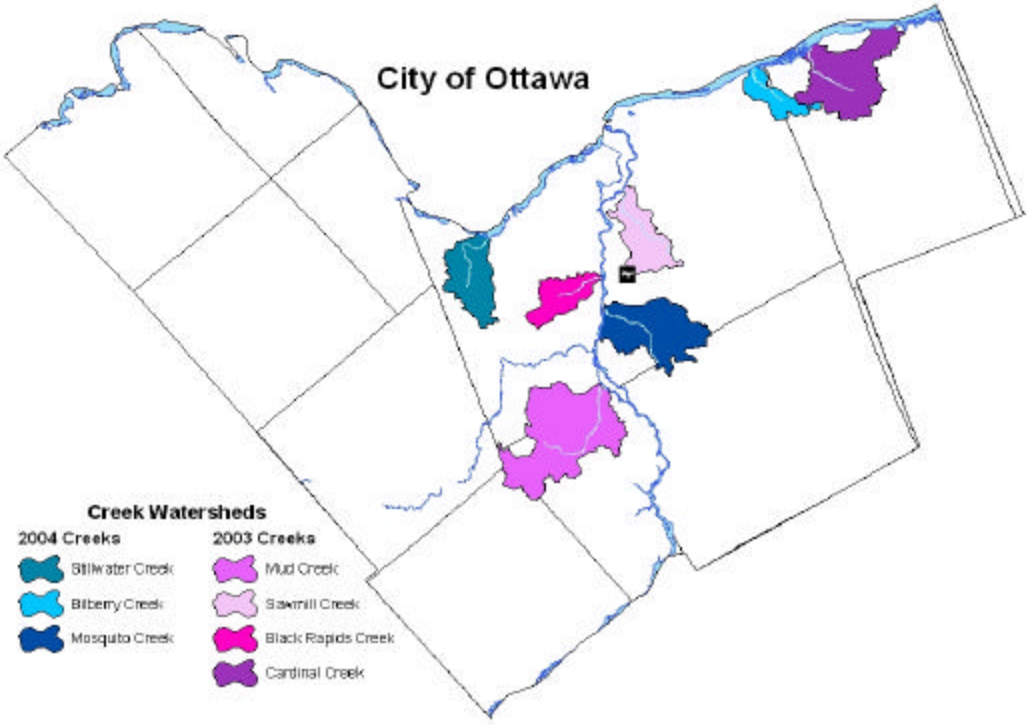


Figure 1. Locations of streams sampled during the 2003 and 2004 season of the City Stream Watch program.

A fourth stream, a tributary of the Rideau River just north of the Monterey Inn on Prince of Wales Drive, was of particular interest to the owner and staff of the Inn and was sampled as well.

2.0 Methodology

2.1 The Stream Watchers – The Heart of City Stream Watch

The City Stream Watch program relies on and encourages the interest and commitment of volunteers from the community in order to fulfill its goal. Two formal training sessions for interested volunteers were advertised and conducted in the spring of 2004. As well, informal training sessions for individuals or small groups were conducted throughout the field season to ensure that everyone had an opportunity to participate in the program. Volunteers were introduced to representatives from the various partners and the coordinator of the program. Ottawa city councillor Clive Doucet was also on hand at one of the training sessions, lending his support to the program and stressing its importance in communicating the social and environmental needs of the community to decision makers. Volunteers were given a waiver form to fill out (see appendix A) and were then guided through the protocol used for monitoring the streams (see appendix B). Volunteers were given a summary and definitions handout for future reference (see appendix C), shown the equipment used in sampling (see appendix D), and given a brief demonstration on how to use some of the more technical instruments. Representatives from the RVCA then demonstrated the entire process for sampling one section of stream.

2.2 The Macro Stream Assessment Protocol

The City Stream Watch program utilizes a macro stream assessment protocol. The protocol was originally used by the Ontario Ministry of Natural Resources, but has been developed by officials at RVCA so that community volunteers can easily apply it. Development of the original protocol for use by volunteer groups was essential, as they consist of people with a variety of educational backgrounds and experiences.

Streams are sampled in 100-meter sections. At the start of each section, the date, time and section number are recorded. GPS coordinates are taken using a Magellan SporTrak handheld GPS, pre-programmed for the NAD 83 Datum and displaying Universal Transverse Mercator (UTM) coordinates. These parameters were chosen to facilitate analysis and display of City Stream Watch data with other spatial information already digitally captured in the RVCA's existing spatial database. Overhead cloud cover is estimated and recorded as a percent, air temperature in ºC is recorded, and a photo is taken upstream. Water temperature is recorded to the nearest ºC. Stream width is measured to the nearest tenth

of a meter using the 50-meter polypropylene rope spread at right angles to the banks originating at water level. Stream depth is measured, using the meter stick, at the deepest point along the width of the stream. Where stream depth is greater then one meter, and can be accessed safely by the volunteers, stream depth is estimated using the meter stick.

After all necessary measurements are recorded for the start of the section, one volunteer stays at the start of the section and holds on to one end of the rope while the others begin walking upstream holding the other end. Volunteers walking upstream are asked to remember observations on land use, anthropogenic alterations of the stream, substrate characteristics and instream vegetation, bank characteristics and vegetation on the banks, tributaries, agricultural impacts, presence of wildlife and habitat, pollution, and other characteristics as outlined in the macro stream assessment form. When all of the rope is played out, the volunteer left behind joins the others at the 50-meter mark of the section, observing the stream characteristics while walking up.

Water temperature, stream width, and stream depth are again recorded at the mid-way point of the section. The same procedure for observing the first 50 meters of the section is repeated for the second 50 meters. Water temperature, stream width, and stream depth are recorded at the end of the section. The UTM coordinates are recorded for the end of the section, and a photo is taken downstream. The volunteers now discuss what they observed, and the macro stream assessment form is filled out for the section. The entire above procedure is repeated for each section of stream.

2.3 Fish Sampling through Seine Netting

The City Stream Watch program conducted seine netting again in 2004. The coordinator chose appropriate sampling sites, and volunteers assisted in pulling the net through the water column and processing the catch. The different species of fish were sorted and counted. Minnow species were counted and a round weight (the weight of all the individuals of a particular species) was measured. Game species were counted, a round weight was taken, and individuals were measured for total length (from the tip of the nose to the end of the caudal fin). Only certain stream habitats can be effectively seined, and so it is important to remember that the results may not represent the entire fish community of each creek. However, volunteers gained valuable insight into fish sampling methodology, as well as experience in identifying different fish species.

2.4 Stream Clean-Ups

In response to the recommendations from the 2003 City Stream Watch Annual Report, a number of stream clean-up activities were undertaken on Sawmill Creek in the autumn of 2004. Volunteers were guided in the safe and appropriate removal of garbage from the creek bed and riparian areas. Only human made material was removed, and protocols were followed for the safe removal of hazardous objects (broken glass, hypodermic needles, etc.).

2.5 Riparian Planting/Bioengineering Initiatives/Fish and Wildlife Habitat Rehab

Some funding has been obtained to coordinate and implement shoreline/fish and wildlife habitat restoration on City Stream Watch creeks. Special projects have been identified where opportunities exist for habitat rehabilitation. These projects will continue to be identified and developed as monitoring continues.

2.6 Data Management

All data collected, as well as photos taken, during the City Stream Watch program have been entered and are maintained in a digital spatial database by the RVCA. Information on each section of stream is made available through the Watershed Information Management System on the RVCA website www.rideauvalley.on.ca to facilitate data sharing while maintaining data integrity.

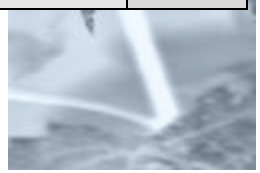
3.0 Results

3.1 The Community Response

A total of 65 volunteers from the community participated in the 2004 City Stream Watch program, consisting of people from a variety of backgrounds and experiences. Each volunteer approached the work in a slightly different way, contributing their own unique qualities in enhancing the program as well as the experiences of their fellow volunteers. The most significant quality they all brought with them was their concern for the welfare of the environment in which they live. As a result, over 420 volunteer hours were given to learning about and rehabilitating creeks in the Ottawa area. Table 1 summarizes volunteer activities for the 2004 season.

Creeks chosen in 2003		Sawmill Creek		Mud Creek		Cardinal Creek		Black Rapids Creek	
Creeks chosen in 2004	Stillwater Creek		Mosquito Creek		Bilberry Creek		Monterey Creek		Total
Volunteers 2004									
# of Volunteers involved in stream monitoring	-	-	-	-	-	-	-	-	40
# of Volunteers involved in stream clean-ups	-	-	-	-	-	-	-	-	31
Total # of Volunteers	-	-	-	-	-	-	-	-	65
Environmental Monitoring 2004									
# of Sections Monitored	65	22	28	31	45	4	3	0	198
# of Seining Events	5	0	1	1	6	1	0	2	16
# of Clean-up Outings	0	5	0	0	0	0	0	0	5
# of Riparian Planting Initiatives	0	2	0	0	0	0	0	0	2
# of Temperature Probe Readings	2	0	2	0	2	0	0	0	6
# of People Hours Monitoring	64	47	36	42	55	3	4	0	253
# of People Hours Seining	8	0	2	2	10	2	0	2	26
# of People Hours for Clean-up	0	148	0	0	0	0	0	0	148

Table 1. Summary table of the 2004 City Stream Watch program. In 2004, sampling continued on creeks that were chosen in 2003.



3.2 Environmental Monitoring

3.2.1 Stillwater Creek

Stillwater Creek is approximately 8.5 kilometres long, flowing from Stoney Swamp north through agricultural, recreational, and urban areas before entering the Ottawa River just east of the Nepean Sailing Club. Figure 2 shows air photos taken of the Stillwater Creek area in 2001.

Figure 2. Air photo of Stillwater Creek and surrounding area.

A total of 6.5 kilometres of Stillwater Creek was sampled during the 2004 season. The following is a summary of the 65 macro stream assessment forms filled out by volunteers. Observations concerning anthropogenic alterations, land use, instream vegetation, bank stability, wildlife, and pollution are discussed.

1. Observations of Anthropogenic Alterations and Land Use

Of the 65 sections of stream sampled, volunteers identified thirty two that displayed no human alterations. Of the remaining sections, only 6 were considered highly altered. These alterations include stream diversions, shoreline modification and armoring, storm water inputs, and lack of riparian vegetation due to development. Figure 3 illustrates the classes of anthropogenic alterations that volunteers observed on Stillwater Creek.

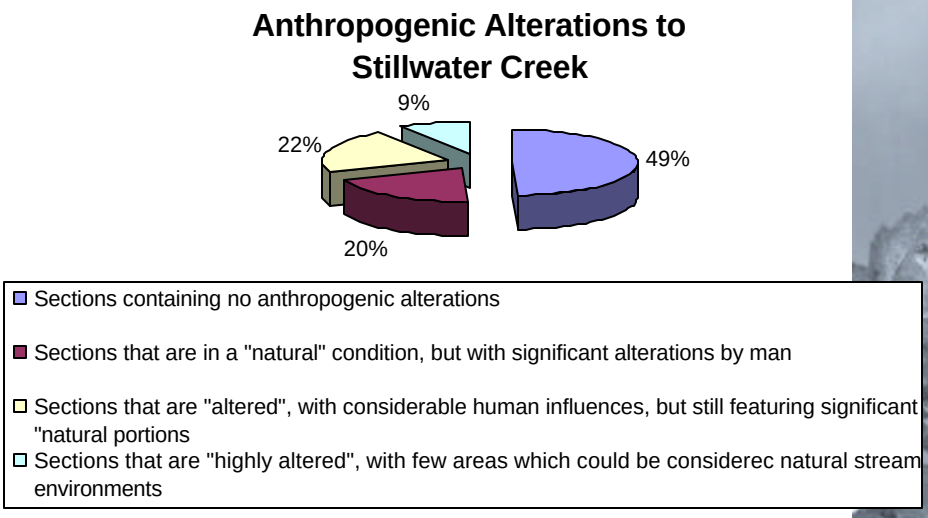


Figure 3. Classes of anthropogenic alterations occurring on Stillwater Creek.

Volunteers identified eight different land uses occurring adjacent to Stillwater Creek. Natural areas exist along over half of the creek, while residential, active and abandoned agricultural, pasture, industrial/commercial, roadways, and recreational areas comprise the remaining 47%. Figure 4 demonstrates the different land uses recognized adjacent to Stillwater Creek.

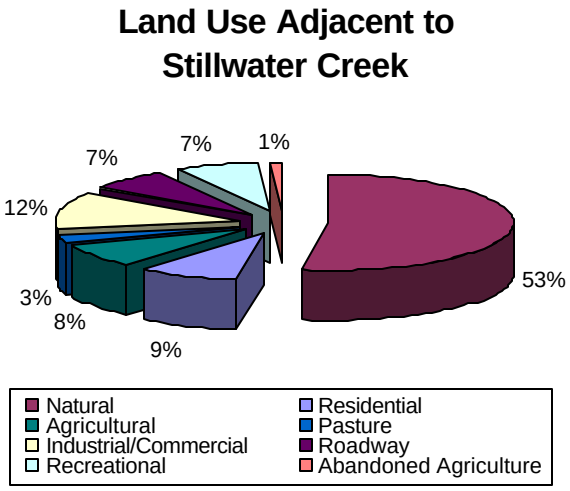


Figure 4. Land use volunteers identified along Stillwater Creek.

2. Observations of Instream Vegetation

Instream vegetation provides habitat for fish and wildlife, aids in removing contaminants from the water, and contributes oxygen to the stream. Figure 5 demonstrates the incidence of instream vegetation abundance in Stillwater Creek. Instream vegetation was categorized as being low in abundance in 26% of sections sampled, and either low or rare in abundance in over 40% of sections sampled. 34% of sections had extensive or common growth, and 22% had normal growth of instream vegetation.

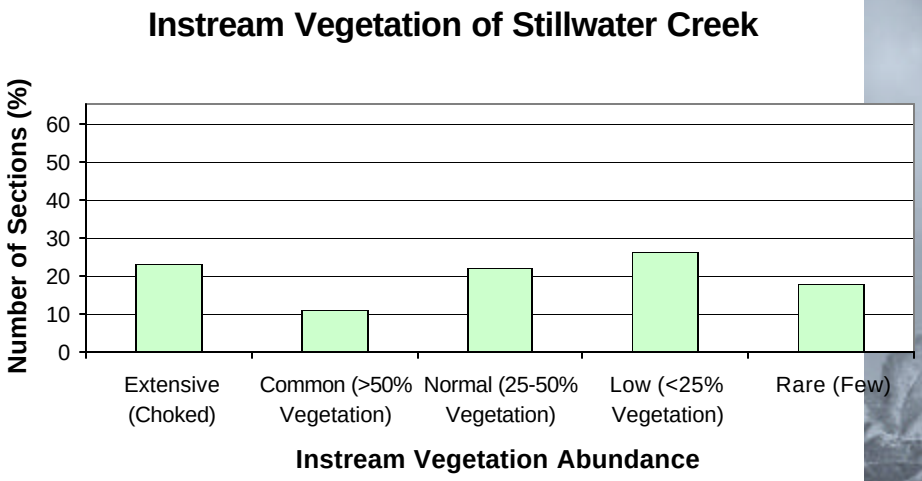


Figure 5. Frequency of instream vegetation abundance in Stillwater Creek.

3. Observations of Bank Stability

The level of bank stability indicates the occurrence of the removal of soil from the bank into the stream. High levels of bank instability can greatly contribute to the amount of sediment carried in a waterbody. Excessive excavation and deposition of sediment within a stream can have detrimental affects on its fish and wildlife populations. Figure 6 demonstrates the overall bank stability of Stillwater Creek. Evidence of excavation of material from the stream bank was observed along 12% of the shoreline, coinciding with areas of little or no vegetation.

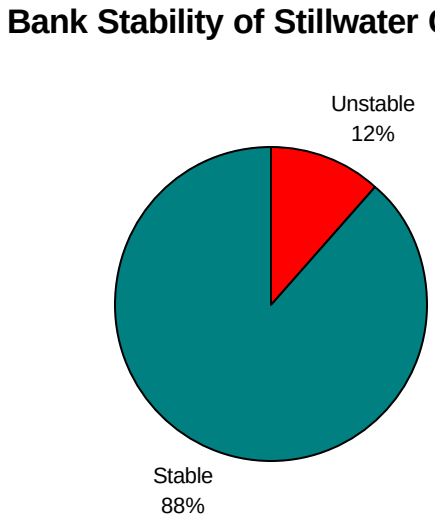


Figure 6. Bank stability of Stillwater Creek.

4. Observations of Wildlife

The presence or absence of diverse fish and wildlife populations can be an indicator of water quality and overall stream health. Volunteers recorded the presence of many types of wildlife in and around Stillwater Creek. Table 2 is a summary of all wildlife observed.

	Observed
Birds	*Red-wing blackbird, flicker, robin, sparrows, ring-billed gull, crow, goldfinch, chickadee, hairy woodpecker, blue jay, swallow, mallard duck, Canada goose, grackle, hawk, cedar waxwing, green heron, great blue heron, morning dove, killdeer, wood duck, cardinal, kingfisher, nuthatch*
Mammals	*Chipmunk, raccoon, groundhog, muskrat, mouse, deer, beaver, black squirrel*
Reptiles/Amphibians	*Green frog, tadpoles, painted turtle*
Fish	*Minnow species, gamefish species*
Aquatic Insects	*Water strider, whirligig beetle, damselfly, dragonfly, mosquitoes, sowbugs, black flies, scud*
Other	*Crayfish, clams, snails, leeches, butterflies*

Table 2. Wildlife observed on Stillwater Creek.

5. Observations of Pollution

Figure 7 demonstrates the incidence of pollution in Stillwater Creek. Pollution was observed in 72% of sampled sections. Of the 65 sections sampled, garbage on the stream bottom was observed in 48%, while floating garbage was observed in 46%.

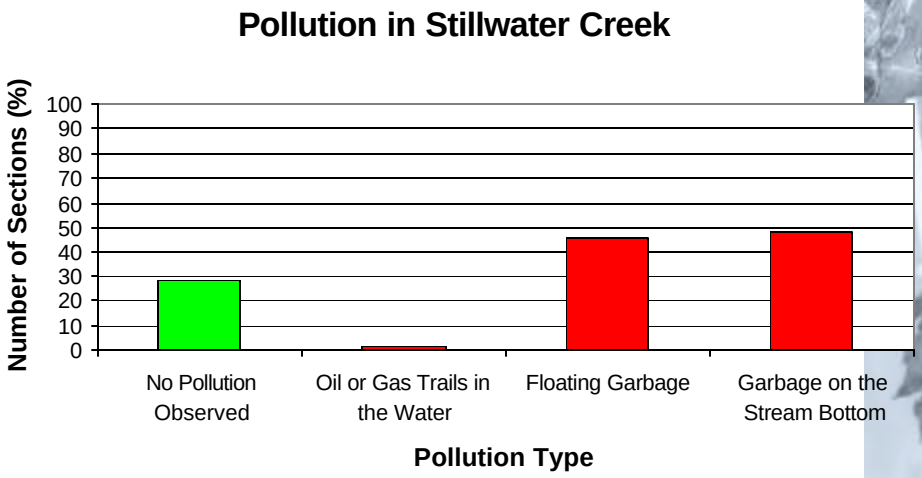


Figure 7. Frequency of pollution occurring in Stillwater Creek.

Garbage occurred singly, and did not accumulate in large amounts in certain parts of the stream. Floating garbage included plastic bags, plastic bottles, styrofoam, and lumber. Garbage on the stream bottom included tires, glass bottles, and pieces of metal.

3.2.2 Bilberry Creek

Bilberry Creek is approximately 6.0 kilometres long, flowing from Innus Road in Orleans north through mainly urban areas before entering the Ottawa River just west of Petrie Island. Figure 8 shows a more detailed look at the creek.

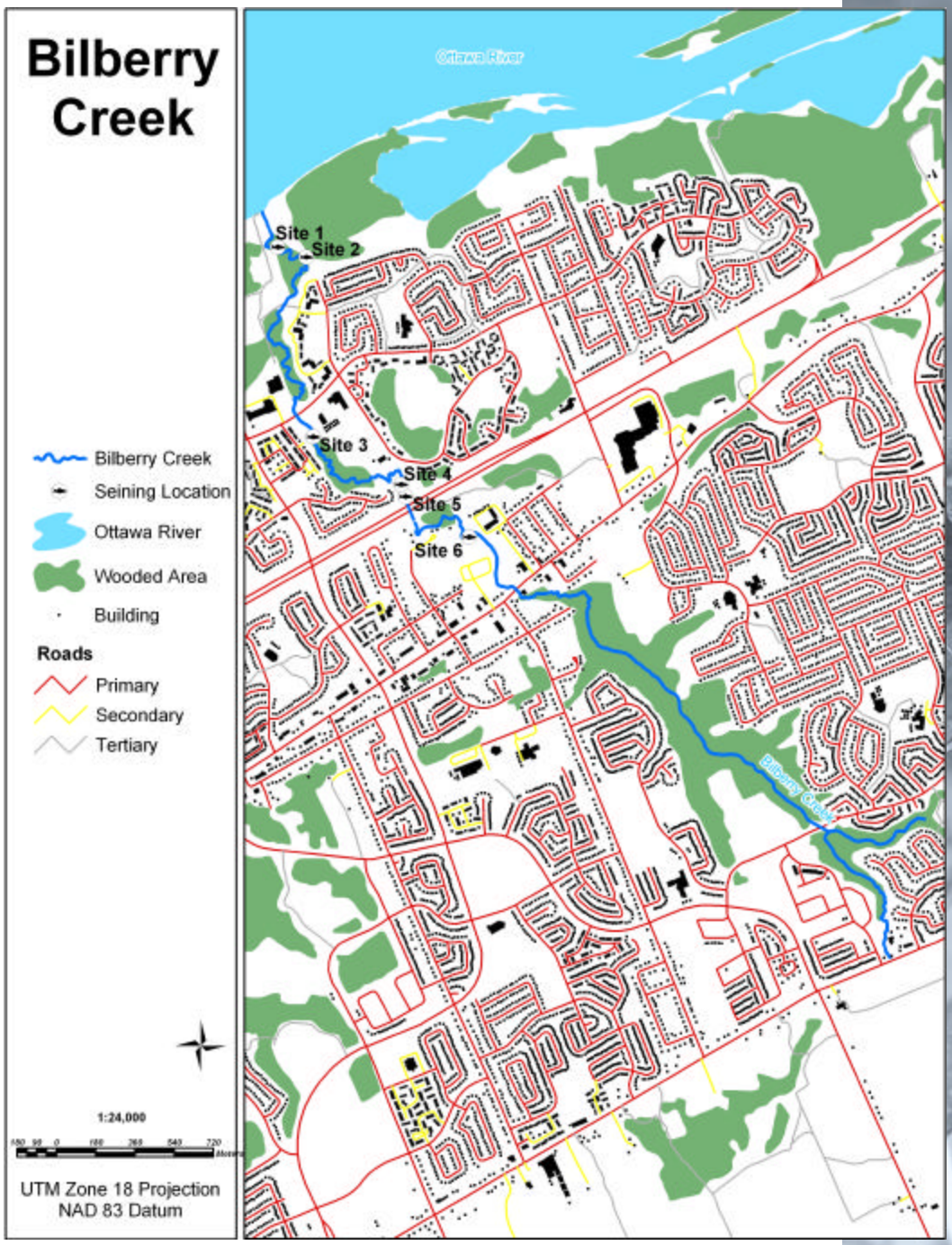


Figure 8. Map of Bilberry Creek and surrounding area.

A total of 4.5 kilometres of Bilberry Creek was sampled during the 2004 season. The following is a summary of the 45 macro stream assessment forms filled out by volunteers. Observations concerning

anthropogenic alterations, land use, instream vegetation, bank stability, wildlife, and pollution are discussed.

1. Observations of Anthropogenic Alterations and Land Use

Of the forty five sections of stream sampled, volunteers identified twenty six that displayed no human alterations. Of the remaining sections, none were considered highly altered. Only 13% of sections were considered altered by volunteers. These alterations include shoreline modification and armoring, bridges for roadways, and lack of riparian vegetation due to development. Figure 9 illustrates the classes of anthropogenic alterations that volunteers observed on Bilberry Creek.

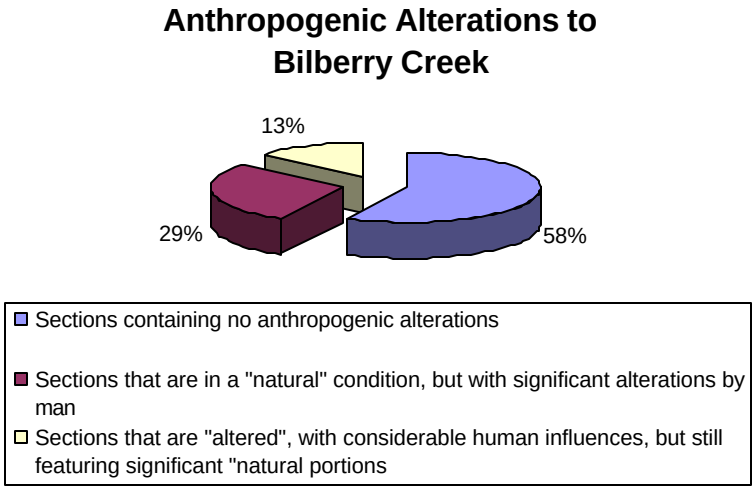


Figure 9. Classes of anthropogenic alterations occurring on Bilberry Creek.

Volunteers identified four different land uses occurring adjacent to Bilberry Creek. Natural areas exist along 89% of sampled creek, while residential, recreational, and industrial/commercial areas comprise the remaining 11%. Figure 10 demonstrates the different land uses recognized adjacent to Bilberry Creek.

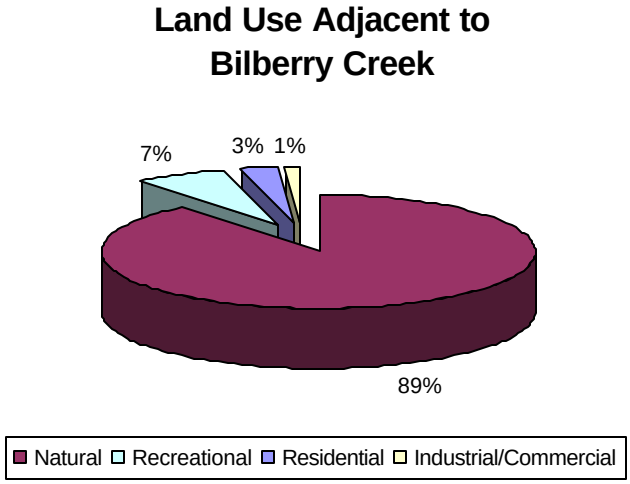


Figure 10. Various land use volunteers identified occurring on Bilberry Creek.

2. Observations of Instream Vegetation

Figure 11 demonstrates the incidence of instream vegetation abundance in Bilberry Creek. Instream vegetation was categorized as being rare in abundance in 60% of sections sampled, and either low or rare in abundance in 78% of sections sampled. No sections were sampled that had extensive growth in instream vegetation.

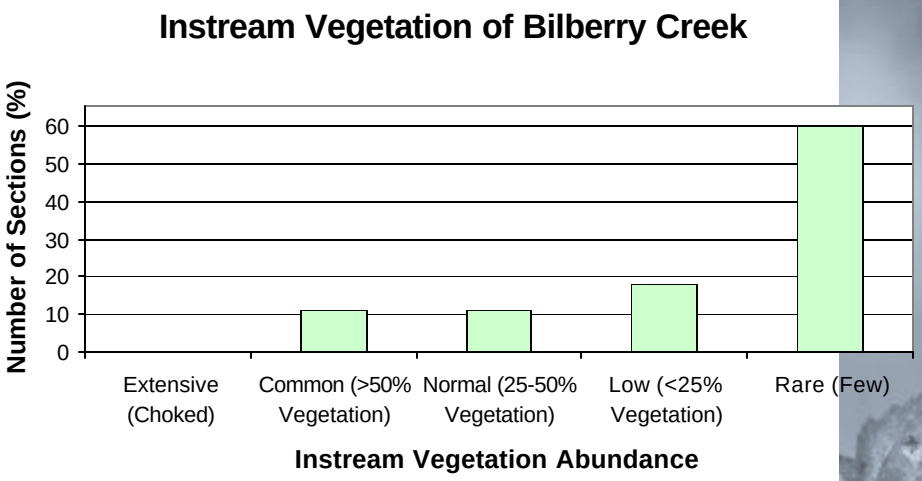


Figure 11. Frequency of instream vegetation abundance in Bilberry Creek.

3. Observations of Bank Stability

Figure 12 demonstrates the overall bank stability of Bilberry Creek. Evidence of excavation of material from the stream bank was observed along 56% of the shoreline, coinciding with areas of little or no vegetation.

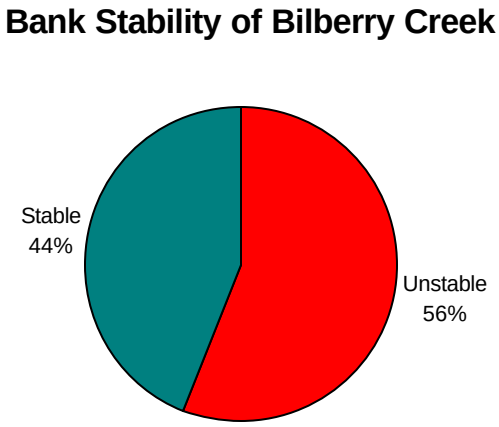


Figure 12. Bank stability of Bilberry Creek.

4. Observations of Wildlife

Volunteers recorded the presence of many types of wildlife in and around Bilberry Creek. Table 3 is a summary of wildlife observed.

	Observed
Birds	*Red-wing blackbird, flicker, robin, sparrows, crow, goldfinch, chickadee, blue jay, mallard duck, grackle, great blue heron, morning dove, , cardinal, sandpiper*
Mammals	*Chipmunk, raccoon, groundhog, muskrat, mouse, deer, black squirrel, red squirrel, rabbit*
Reptiles/Amphibians	*Leopard frog, painted turtle*
Fish	*Minnow species*
Aquatic Insects	*Water strider, whirligig beetle, damselfly, dragonfly, mosquitoes, black flies, water boatman, water scorpion, aquatic worms*
Other	*Crayfish, snails, leeches, butterflies, spiders*

Table 3. Wildlife observed on Bilberry Creek.

5. Observations of Pollution

Figure 13 demonstrates the incidence of pollution in Bilberry Creek. Pollution was observed in 98% of sampled sections. Of the 45 sections sampled, garbage on the stream bottom was observed in 93%, while floating garbage was observed in 69%. No oil or gas trails were observed.

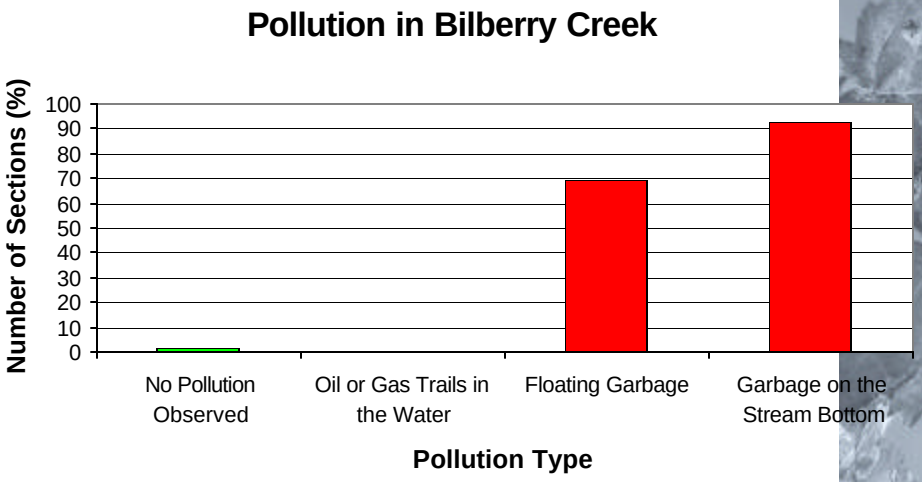


Figure 13. Frequency of pollution occurring in Bilberry Creek

Large amounts of floating garbage, including plastic bags, plastic bottles, styrofoam, and food wrappers. Diverse types of garbage on the stream bottom were observed, including tires, hubcaps, bikes, shopping carts, pieces of vehicle engines, pylons, broken glass bottles, lumber and building materials, chunks of concrete, and garbage cans.

3.2.3 Mosquito Creek

Mosquito Creek is approximately 10.5 kilometres long, flowing North West through agricultural and urban areas before entering the Rideau River just north of Manotick. Figure 14 shows air photos taken of the Mosquito Creek area in 2001.

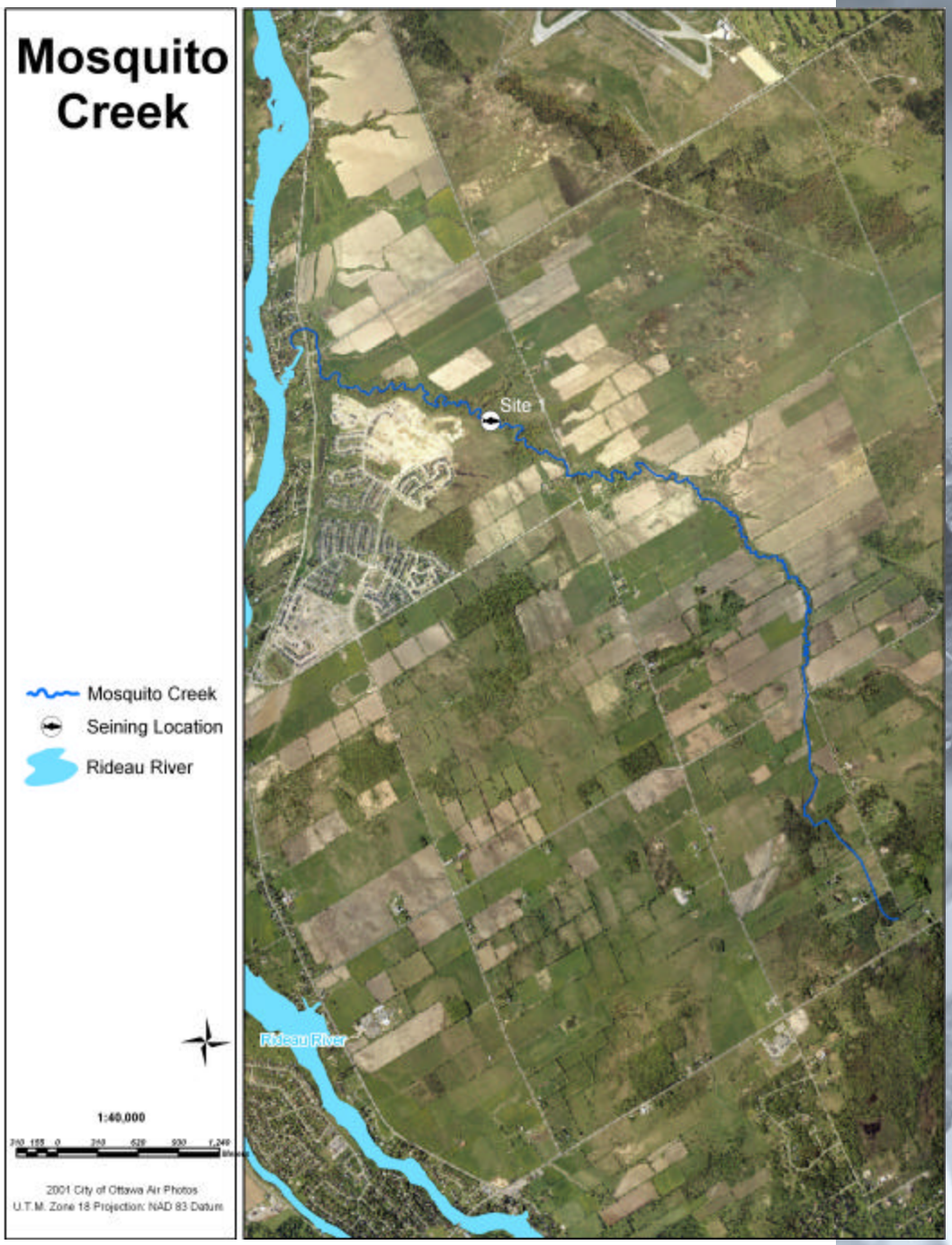


Figure 14. Air photo of Mosquito Creek and surrounding area.

A total of 2.8 kilometres of Mosquito Creek was sampled during the 2004 season. The following is a summary of the 28 macro stream assessment forms filled out by volunteers. Observations concerning

anthropogenic alterations, land use, instream vegetation, bank stability, wildlife, and pollution are discussed.

1. Observations of Anthropogenic Alterations and Land Use

Of the twenty eight sections of stream sampled, volunteers identified eighteen that displayed no human alterations. Of the remaining sections, none were considered highly altered. Only 11% of sections were considered altered by volunteers. These alterations include culverts and bridges for roadways. Figure 15 illustrates the classes of anthropogenic alterations that volunteers observed on Mosquito Creek.

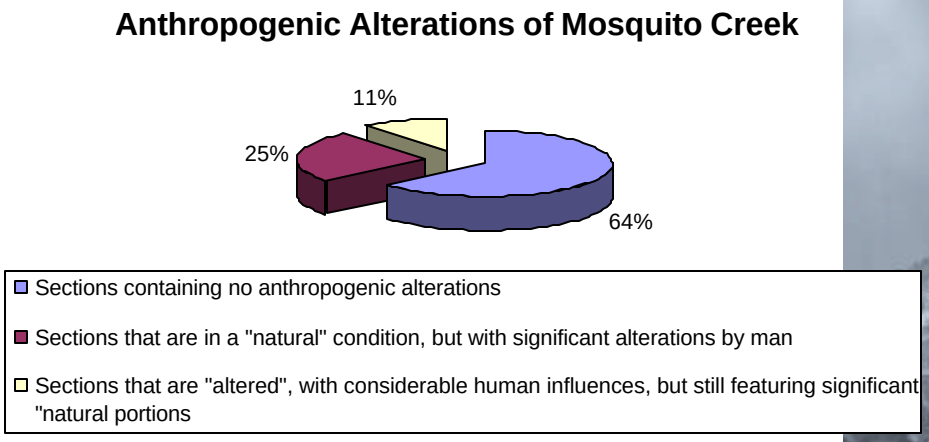


Figure 15. Classes of anthropogenic alterations occurring on Mosquito Creek.

Volunteers identified five different land uses occurring adjacent to Mosquito Creek. Natural areas exist along 76% of sampled creek, while residential, recreational, roadway, and agricultural areas comprise the remaining 24%. Figure 16 demonstrates the different land uses recognized adjacent to Mosquito Creek.

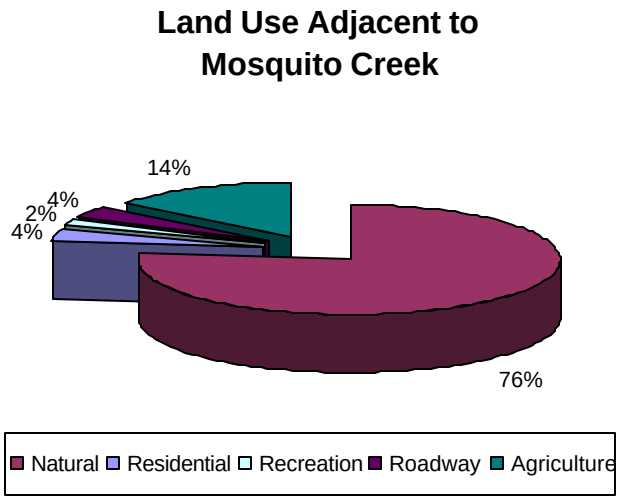


Figure 16. Various land use volunteers identified occurring on Mosquito Creek.

2. Observations of Instream Vegetation

Figure 17 demonstrates the incidence of instream vegetation abundance in Mosquito Creek. Instream vegetation was categorized as being rare in abundance in 11% of sections sampled, and either low or rare in abundance in 18% of sections sampled. Instream vegetation was normal in 64% of sections sampled. No sections were sampled that had extensive growth in instream vegetation.

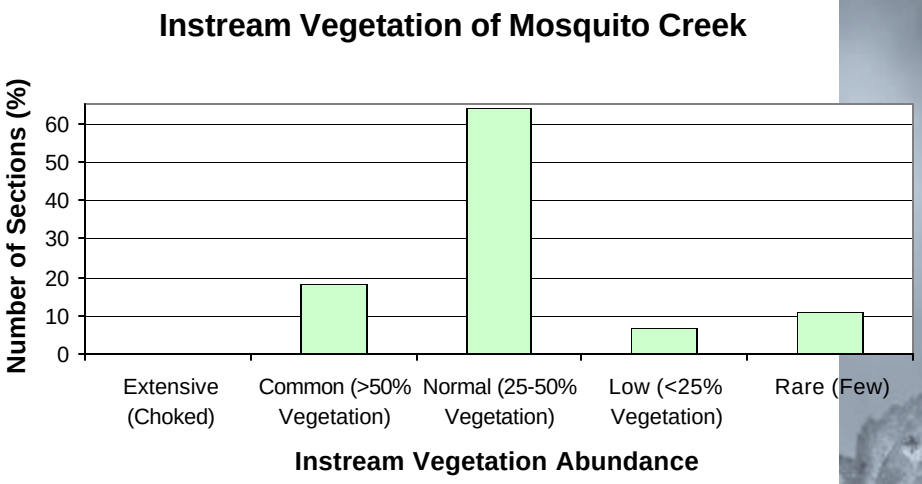


Figure 17. Frequency of instream vegetation abundance in Mosquito Creek.

3. Observations of Bank Stability

Figure 18 demonstrates the overall bank stability of Mosquito Creek. Evidence of excavation of material from the stream bank was observed along 28% of the shoreline, coinciding with areas of little or no vegetation.

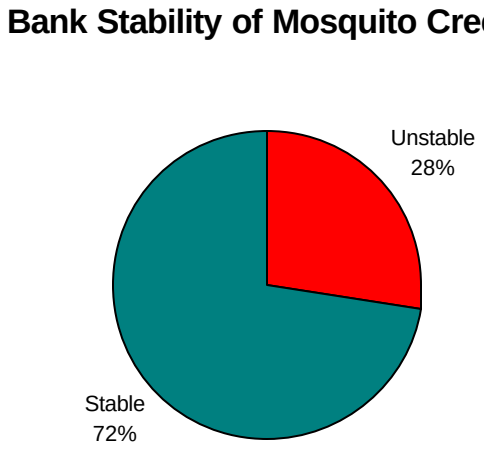


Figure 18. Bank stability of Mosquito Creek.

4. Observations of Wildlife

Volunteers recorded the presence of many types of wildlife in and around Mosquito Creek. Table 4 is a summary of wildlife observed.

	Observed
Birds	*Red-wing blackbird, flicker, robin, chipping sparrow, crow, american goldfinch, eastern kingbird, chickadee, blue jay, mallard duck, grackle, great blue heron, cardinal, sandpiper, kingfisher, house swallow, song sparrow, red-eyed vireo, baltimore oriole, hairy woodpecker*
Mammals	*Raccoon, deer*
Reptiles/Amphibians	*Green frog, snapping turtle, toad*
Fish	*Minnow species*
Aquatic Insects	*Water strider, whirligig beetle, damselfly, dragonfly, mosquitoes, black flies, sowbugs*
Other	*Crayfish, snails, butterflies, deer flies, freshwater clams*

Table 4. Wildlife observed on Mosquito Creek.

5. Observations of Pollution

Figure 19 demonstrates the incidence of pollution in Mosquito Creek. Pollution was observed in only 7% of sampled sections. Of the 28 sections sampled, no floating garbage or oil or gas trails were observed.

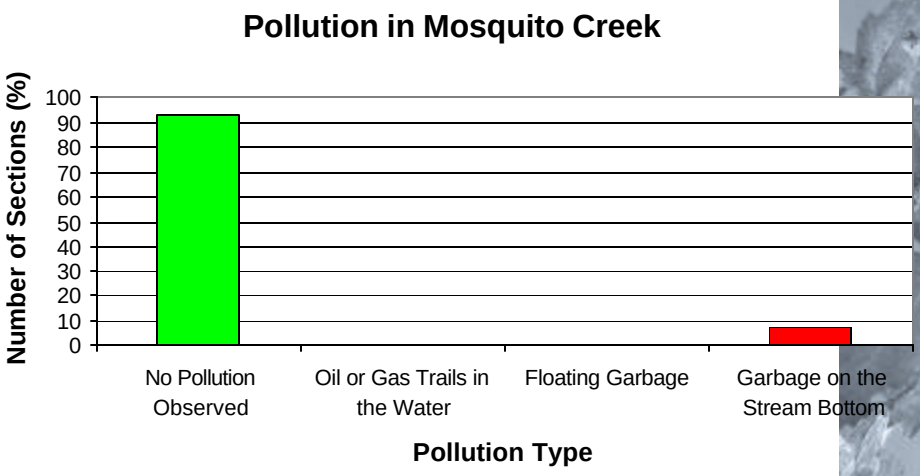


Figure 19. Frequency of pollution occurring in Mosquito Creek.

3.3 Fish Communities

3.3.1 Stillwater Creek

The mouth of Stillwater Creek was sampled five times over two days. Figure 20 shows the locations of the sampling sites, and table 5 is a summary of the fish caught in Stillwater Creek.

Figure 20. Air photo of the mouth of Stillwater Creek showing 5 seining site locations.

Location	Date	Fish Species (#) (round weight in grams) (total length in mm)
Site 1	July 7, 2004	Banded killifish (1), blackchin shiner (1), golden shiner (1), Johnny darter (1), muskellunge (1) (72mm), spottail shiner (72), yellow perch (1) (88mm)
Site 2	June 7, 2004	Bluegill (5) (15gm), johnny darter (1), spottail shiner (7), yellow perch (5) (30gm) (164mm, 65mm, 62mm, 64mm, 71mm)
Site 3	July 7, 2004	Brook stickleback (4), muskellunge (1) (50mm), yellow perch (4) (92mm, 87mm, 73mm, 78mm)
Site 4	June 7, 2004	Bluegill (11) (20gm), brook stickleback (1), emerald shiner (2), johnny darter (1), largemouth bass (1) (40gm) (150mm), pumpkinseed (3) (25gm), rock bass (1) (160), yellow perch (15) (50gm) (100mm, 75mm, 65mm, 115mm, 60mm, 65mm, 60mm, 55mm, 60mm, 60mm, 65mm, 60mm, 60mm, 60mm, 60mm)
Site 5	July 7, 2004	Black crappie (1) (85mm), blackchin shiner (51), bluegill (6), bluntnose minnow (5), brook stickleback (1), common shiner (3), golden shiner (8), Johnny darter (2), spottail shiner (140), yellow perch (8) (80mm, 87mm, 80mm, 75mm, 83mm, 100mm, 70mm, 100mm), white sucker (3)

Table 5. Fish sampled on Stillwater Creek.

3.3.2 Bilberry Creek

Bilberry Creek was sampled six times over three days. Figure 8 shows the locations of the sampling sites, and table 6 is a summary of the fish caught in Bilberry Creek.

Location	Date	Fish Species (#) (round weight in gm) (total length in mm)
Site 1	June 7, 2004	Black crappie (1) (73mm), emerald shiner (31) (15gm), golden shiner (16) (25gm), yellow perch (4) (210gm) (127mm, 209mm, 134mm, 147mm)
Site 2	June 7, 2004	Bluntnose minnow (1), logperch (3) (10gm), rock bass (1) (60gm), spotfin shiner (1), spottail shiner (8) (60gm), yellow perch (6) (175gm) (174mm, 144mm, 170mm, 147mm, 91mm, 95mm)
Site 3	September 7, 2004	Bluntnose minnow (2), brook stickleback (9), creek chub (32) (300gm), Johnny darter (1), longnose dace (58) (200gm), mimic shiner (5), white sucker (39) (300gm)
Site 4	September 7, 2004	Bluntnose minnow (1), brook stickleback (8) (25gm), longnose dace (2), white sucker (1) (50gm)
Site 5	September 7, 2004	Brook stickleback (1), creek chub (1) (25gm), white sucker (7) (75gm)
Site 6	July 21, 2004	Brook stickleback (10), creek chub (7) (250gm), white sucker (18) (685gm)

Table 6. Fish sampled on Bilberry Creek.

3.3.3 Mosquito Creek

Mosquito Creek was sampled just once in June. Figure 14 shows the location of the sampling site, and table 7 is a summary of the fish caught in Mosquito Creek.

Location	Date	Fish Species (#) (round weight in grams) (total length in mm)
Site 1	June 7, 2004	Blacknose shiner (2), bluntnose minnow (23) (30gm), bluegill (1) (40gm) creek chub (27) (350gm), common shiner (13) (200gm), emerald shiner (8), fathead minnow (1), finescale dace (3), rock bass (6) (60gm), white sucker (26) (325gm)

Table 7. Fish sampled on Mosquito Creek.

3.4 Community Creek Clean-Ups

Three clean-up initiatives were completed on Sawmill Creek during September and October of 2004, resulting in five organized outings. Figure 25 shows the stretches of creek that were successfully cleaned by the volunteers.

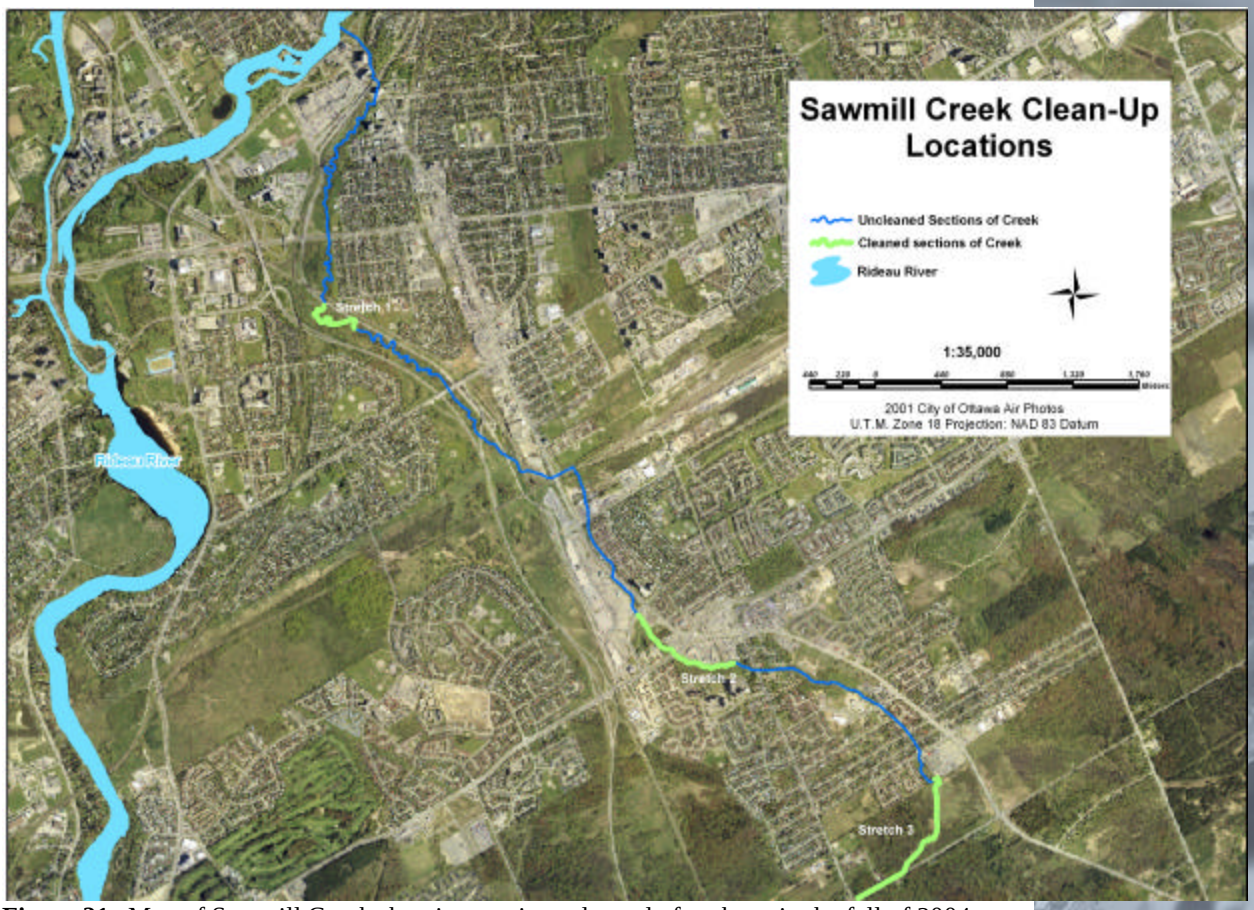


Figure 21. Map of Sawmill Creek showing sections cleaned of garbage in the fall of 2004.

Denise MacDonald, a local volunteer and resident of the Heron Park area, helped to organize and conduct a very successful clean-up day during the Great Canadian Shoreline Clean-Up week on September 19. The crew focused on stretch one of the creek, cleaning up approximately 600 metres of shoreline and creek bottom. Tires, plastic bags, plastic bottles, glass bottles, pieces of metal, and an old bike were just some of the things removed from the creek.

Members of the National Defence Headquarters Fish and Game Club made three four-hour trips to the creek on September 18th, September 25th, and October 30th. The club focused on stretch 2 of the creek, which is located just south of South Keys Shopping Centre. Approximately 750 metres of shoreline and creek bottom was cleaned. Shopping carts, plastic bags,

bottles, lumber, food wrappers, tires, and styrofoam were removed from the creek.

The Canada Lands Company sponsored a Community Creek Clean-up Day on October 16th focusing on section 3. Twenty volunteers from the community, as well as eight Canada Lands Company staff, descended on the creek and cleaned approximately one kilometre of shoreline and creek bottom. Shopping carts, a refrigerator, a microwave, a couch, old stereo equipment, plastic bags, bottles, lumber, food wrappers, tires, styrofoam, and pieces of metal were removed from the creek. Afterwards, the volunteers washed up and enjoyed a barbecue lunch of hamburgers and fresh fruit.

4.0 Recommendations

It is important that City Stream Watch be sustained in order to inform, involve, and educate community residents on the state of urban creeks and streams, as well as to encourage restoration projects and sound stewardship practices. To this end, the City Stream Watch program should further build on the successes achieved during its first two years. Through its ongoing implementation, temporal and spatial environmental trends of creeks in the Ottawa area may be observed and recorded. The data will complement work conducted by a few municipal and regional programs, most of which do not sample the smaller urban streams that are the focus of this program. As well, the intrinsic values of community based environmental monitoring, such as community involvement and social capital will be further developed.

4.1 Program Improvement

The following are recommendations to improve the program.

- Continue to develop creative means in order to contact, as well as insure the involvement and ongoing interest of, all concerned members of the community.
- Continue collaboration with other community groups, such as the Ottawa RiverKeeper and the National Defence Headquarters Fish and Game Club, to maximize community involvement, stream monitoring, and habitat restoration.
- Continue contacting community early in the year to maximize both the involvement and the diversity of participants.
- Foster relationships with environmentally oriented groups (i.e. The Sierra Club, Scouts Canada) to facilitate student involvement.
- Develop a more aggressive approach to youth recruitment to entice educators and students to participate in the program.
- Continue to insure that the needs of the participating community are satisfied as they relate to their continued involvement in the program.
- Complete the creeks that have not been entirely sampled as of November 2004.

4.2 Special Projects

The following are projects that have been developed from information obtained through monitoring, and could be implemented through City Stream Watch or other community based environmental initiatives.

Location	Issue	Picture	Remediation Strategy	Expected Results
The mouth of Sawmill Creek where it empties into the Rideau River near Billings Estate just east of the corner of Bank Street and Riverside Drive. Approximately 150m section of creek not including infrastructure.	The rock rubble that was used to armour the banks has proven to be incompetent due to the steepness of the slope and high flow rates. The banks are exposed and undercut, and much of the geotextile has been naturally removed by flows and is positioned in the channel bed or is exposed. The resulting excavation and deposition of the silty clay material from the banks is causing the deterioration of walleye spawning habitat at the mouth of the creek, which was created as compensation for a past project on sawmill creek.		Utilize existing volunteer base of the City Stream Watch program to participate in this rehabilitation effort. A combination of several bio-engineering systems (live staking, live fascines, bare root shrubs, coco matting, brush mats) should be applied to re-stabilize the slope. Due to periodic high-velocity flows, the toe of the slope requires protection against undercutting and resultant slumping of the existing rock rubble on the steep banks.	• Effective streambank protection from erosion; • Community involvement and ownership; • Reduce siltation of existing walleye spawning habitat; • The enhancement of conditions for natural colonization of existing plant community; • Produce streamside fish and wildlife habitat. • Reduction of sediment that negatively impacts benthic invertebrate community. • Overall net gain for the aquatic community

Location	Issue	Picture	Remediation Strategy	Expected Results
Many locations along Sawmill Creek and Bilberry Creek.	The accumulation of garbage and refuse at various sites along both creeks. This has resulted in the degradation of fish and wildlife habitat, the deterioration of water quality, and the deterioration of both creek's aesthetic appeal.		Utilize existing volunteer base of the City Stream Watch program to participate in this rehabilitation effort. Community clean-up days should be organized on both creeks to facilitate the safe and proper removal of human produced material from the creek bed and riparian zones. Natural material should be left undisturbed.	• Community involvement and ownership; • Enhancement of fish and wildlife habitat; • Enhancement of the creek's aesthetic qualities.

Location	Issue	Picture	Remediation Strategy	Expected Results
The mouth of Bilberry Creek where it empties into the Ottawa River.	A lack of shallow, back water areas suitable for spawning and nursery habitat for certain fish species (yellow perch, northern pike, and muskellunge).		Utilize existing volunteer base of the City Stream Watch program to participate in this rehabilitation effort. Construct a small embayment off of the main creek channel, creating additional aquatic habitat (including but not limited to fish spawning and nursery habitat).	• Community involvement and ownership; • Enhancement of aquatic habitat, in particular yellow perch, northern pike, and muskellunge spawning and nursery habitat. • Creation of quality habitat for amphibians.
Location	**Issue**	**Picture**	**Remediation Strategy**	**Expected Results**
Locations along Stillwater Creek and Bilberry Creek.	Un-vegetated unstable banks along both creeks. As a result, the excavation of material from the banks and the deposition of this material in the stream bed are having negative impacts on fish habitat and the benthic invertebrate community.		Utilize existing volunteer base of the City Stream Watch program to participate in this rehabilitation effort. Many opportunities exist for the facilitation of a combination of bioengineering techniques and riparian plantings.	• Community involvement and ownership; • Creation of additional sensitive fish habitat; • Enhancement of the creek's aesthetic qualities.

Table 8. Special projects developed through monitoring.

Appendix A

Waiver for Volunteers of the Rideau Valley Conservation Authority's City Stream Watch Program

I agree to indemnify and save harmless the Rideau Valley Conservation Authority from all claims or demands of any kinds due to personal injury to myself arising as a result of my volunteer work with the Rideau Valley Conservation Authority.

Date: _____

Volunteer: Signature: _____
Print Name: _____
Phone #: _____
E-mail: _____

RVCA Representative: _____

1. **Do you have a particular stream or streams that you would prefer to work on?**
   - ❑ **Yes** **Please Circle:** **Sawmill Creek**, **Mud Creek**, **Black Rapids Creek**, **Cardinal Creek**
   - ❑ **No**

2. **Are there other volunteers with whom you would prefer to sample with?**
   - ❑ **No, please group me with other volunteers.**
   - ❑ **Yes** **Specify:** _____
     _____

3. **Are there specific days you would prefer to sample?**
   - ❑ **Weekends**
   - ❑ **Weekdays**
   - ❑ **No Preference**

4. **Are there specific times you would prefer to sample?**
   - ❑ **Mornings**
   - ❑ **Afternoons**
   - ❑ **Evenings**
   - ❑ **No Preference**

Appendix B

MACRO STREAM ASSESSMENT

Date:_____
Time: Start_____ Photo Upstream_____
Section:_____ Photo Downstream_____
Start: UTM Easting _____ Northing _____
End: UTM Easting_____Northing_____

Stream Survey Overview (100m)

Name of Stream/River/Drain:_____

Water Temp (ºC): S_____ M_____ E_____ Overhead Cloud Cover (%): dense(75-100)____

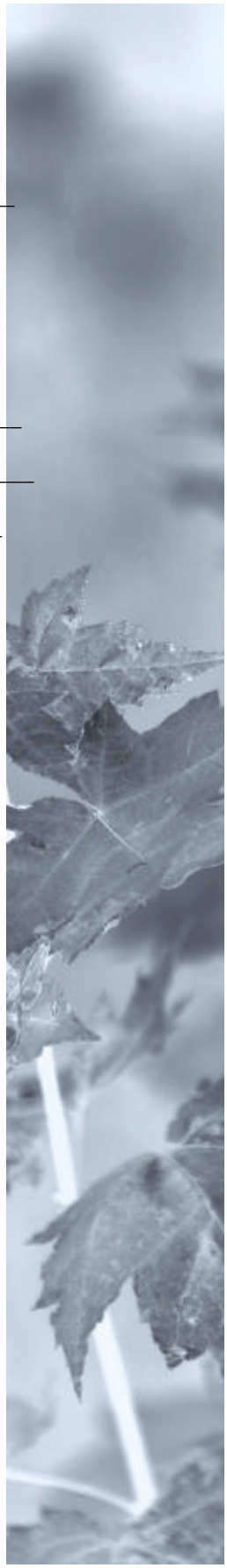
Stream Width (m): S_____ M_____ E_____ part open(25-75)___

Stream Depth (m): S_____ M_____ E_____ open (0-25) ____

Air Temp (ºC): _____

Overall

1.	Has this section of water been altered? If yes, would you generally characterize this altered section as being:	Yes	No
	In a "**natural"** condition, but with significant alterations by man?		_____
	An "**altered"** waterway, with considerable human influences, but still featuring significant "natural" portions?		_____
	A "**highly altered"** stream section, with few areas which could be considered natural stream environments?		_____
2.	What would you say is the general land use pattern along this 100m section?		%
	Active agriculture		_____
	Pasture		_____
	Abandoned agricultural fields		_____
	Residential		_____
	Natural (i.e forests, meadows, wetlands, etc.)		_____
	Industrial/Commercial		_____
	Recreational		_____
	Other (please specify) _____		_____



INSTREAM SUBSTRATE

3. Having surveyed the substrate, how would you characterize overall the type of substrate in the stream? %

Bedrock-exposed rock	_____
Boulders-rock over 25cm (10in)	_____
Rubble-8-25cm (3-10in)	_____
Gravel-0.2-8cm (1/8-2in)	_____
Sand- >0.05-0.10 will feel some grit	_____
Silt- 0.05 feels soft like a powder	_____
Clay- 0.01 greasy between fingers	_____
Muck-combo of sand, silt, clay, marl, organic	_____
Detritus-organic material	_____
Other (i.e. marl)	_____

4. Is the substrate type fairly: Homogenous/Heterogeneous?

INSTREAM STRUCTURE

5. How would you characterize the type of major structures in this 100m stretch? (Relative to each other) %

Woody debris	_____
Downed trees	_____
Boulders	_____

B) How would you characterize the stream morphology in this 100m segment? %

Pools	_____
Riffles	_____
Reaches	_____

6. A) Active beaver dams #_____
Abandoned beaver dams #_____

B) Tree cropping: (Check one)

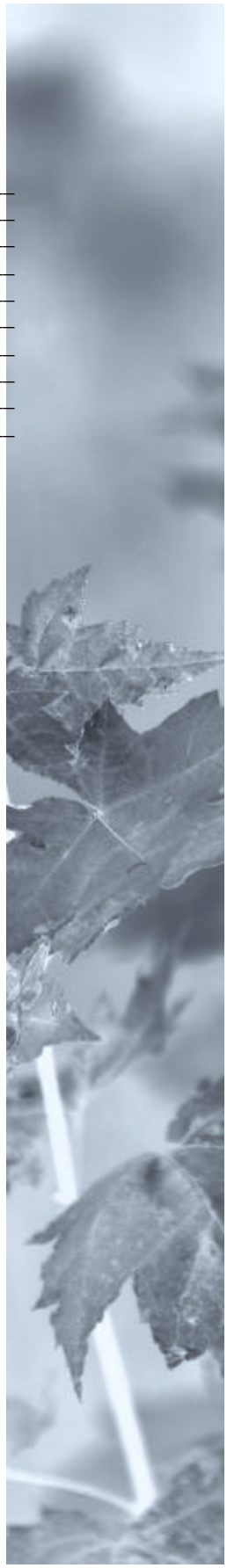
Extensive	_____
Common	_____
Low	_____
None	_____

C) Beaver Lodges #_____

INSTREAM VEGETATION

7. How would you characterize the abundance of aquatic vegetation? (Check one)

Extensive (choked with weeds)	_____
Common (more than 50% vegetation)	_____
Normal (25-50% vegetation)	_____
Low (less than 25 % vegetation)	_____
Rare (instream plants Afew and far between@)	_____



8. Are there dominant types of instream vegetation? Yes No

	%
Algae	_____
Leafed submergents	_____
Narrow submergents	_____
Lily-type plants	_____
Narrow emergents	_____
Leafed emergents	_____
Other (please Specify) _____	_____

TRIBUTARIES

9. Are there any major tributaries? Yes No

10. If yes: How many does this 100m section have? #_____

11. Do any of these tributaries obviously alter the character of the stream after they enter it? Yes No

12. If yes: In what way (i.e. pollution) _____

13. What are the types of tributaries? (Check one)

Small intermittent natural streams _____
Large permanent natural streams _____
Other: (eg. Ditch/ravine) _____

14. Are any of the tributaries worthy of being surveyed further? Yes No
If Yes, Which one(s): _____

15. Is this tributary flowing at present? Yes No

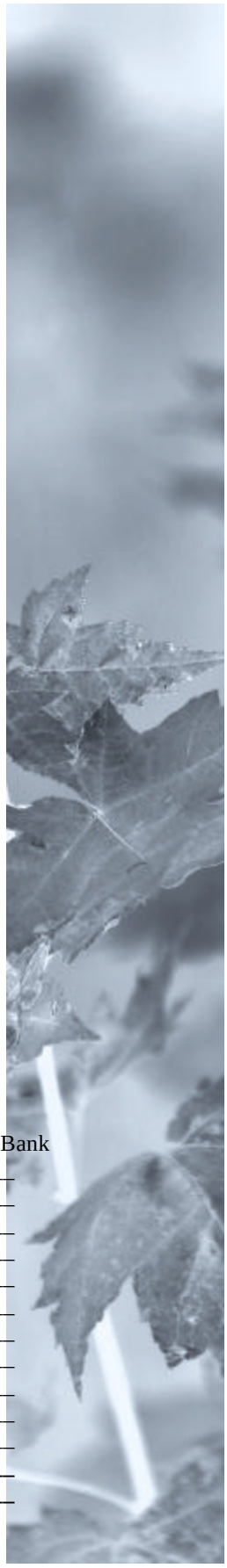
BANK CHARACTERISTICS

16. In terms of erosion of banks, how would you generally characterize this section? %

Stable (little or no erosion) _____
Unstable (eroding, little or no vegetation) _____
Undercut banks _____

17. In general, what is the composition of banks along this section? %

	Left Bank	Right Bank
Bedrock - exposed rock	_____	_____
Boulders - rock over 25 cm (10in)	_____	_____
Rubble - 8-25cm (3-10in)	_____	_____
Gravel - 0.2-8cm (1/8-2in)	_____	_____
Sand - >0.05-0.10 will feel some grit	_____	_____
Silt - 0.05 feels soft like a powder	_____	_____
Clay - 0.01 greasy between fingers	_____	_____
Organic	_____	_____
Gabion Cage	_____	_____
Rip Rap Stone	_____	_____
Logs and Trees	_____	_____
Bridge Structures	_____	_____
Other: (please specify) _____	_____	_____



18. How would you characterize the general steepness of banks along this section? %

	Left Bank	Right Bank
Very Steep (>25%)	_____	_____
Steep (16%-25%)	_____	_____
Moderate (9%-15%)	_____	_____
Low (4%-8%), gently sloping banks	_____	_____
Broad flat banks, (0-3%) little slope	_____	_____

19. What are the dominant vegetation type along the banks? %

	Left Bank	Right Bank
Coniferous trees	_____	_____
Hardwood trees	_____	_____
Dead trees	_____	_____
Woody Shrubs	_____	_____
Tall grasses	_____	_____
Short grasses	_____	_____
Agricultural crops	_____	_____
Wetland vegetation	_____	_____
Ferns	_____	_____
Mosses	_____	_____
Other (please specify) _____	_____	_____

20. Are their any agricultural impacts? Yes No

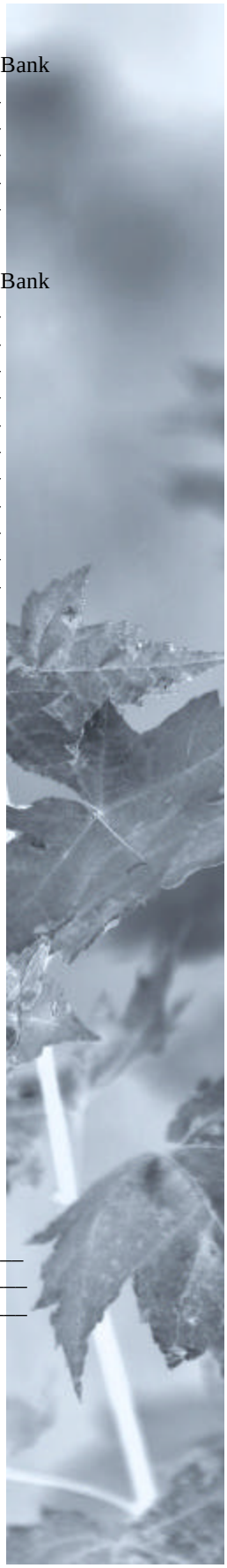
If yes, what kinds:

a) **Cattle access**	Yes	No	extreme (>20m) moderate (10-20m) low (<10m)
b) **Field erosion**	Yes	No	observed / potential
c) **Agricultural drain**	Yes	No	
d) **Barnyard runoff**	Yes	No	
e) **Tile Drain**	Yes	No	How Many?_____
f) **Distance to field from stream**	_____m		

21. Did you notice any wildlife? Yes No
If yes, what kinds? (Check one or more)

Waterfowl	_____
Birds	_____
Mammals	_____
Reptiles/amphibians	_____
Fish	_____
Aquatic Insects	_____
Other	_____

Observed: _____
_____
_____



22. Is this 100m section fish habitat? Yes No
If yes, what class? (Check one or more)

1. **Critical** (nursery) _____
2. **Normal** _____
3. **Degraded** (drainage) _____

23. Did you observe any springs in this 100m stretch? Yes No

If yes, how many? #_____

24. Did you notice any pollution in the stream or entering the stream? Yes No
If yes, which kinds:

a) Oil or gas trails in the water Yes No
b) Floating Garbage Yes No
c) Garbage on the stream bottom Yes No

Observed_____
_____

25. Are there any invasive species in the stream? Yes No
If yes, list them_____
_____
_____

26. Dominant types of instream vegetation, if present, are_____
_____
_____

27. Are there any observed invertebrate species present in the stream? Yes No
If yes, identify_____
_____

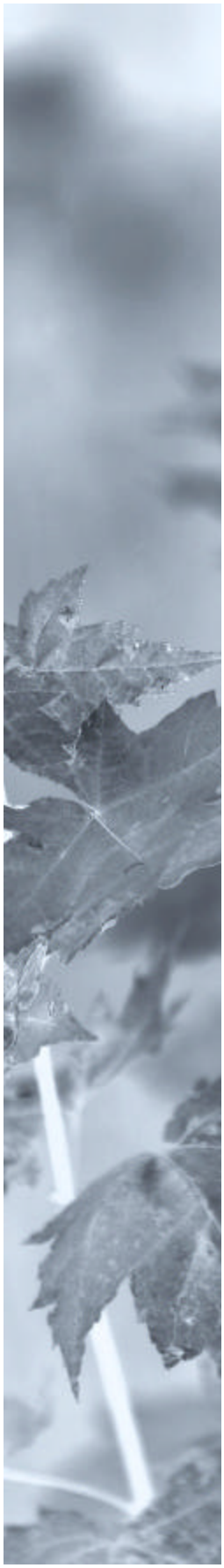
28. Is there any visible angling pressure present within this section? Yes No
If yes, identify_____
_____

COMMENTS

_____
_____
_____
_____

NAME OF SURVEYORS:_____
_____
_____
_____

DATE INPUTTED INTO DATABASE _____



Appendix C

Protocol Summary and Definitions

Descriptive Information at Top

Date is the date sampling occurred.

Time is the time sampling started.

Section is the section # of the current 100m of stream being sampled.

Starting and Ending UTM coordinates: UTM coordinates are needed for both the starting and ending points of the 100m sections. These are taken using the GPS receivers. The GPS supplies both an easting and northing. The UTM grid number is 18 for all of Eastern Ontario.

Upstream and Downstream Photos: Photos are taken at the starting and ending points of each 100m section. Please record the camera name and exposure number for each photo.
(ie. Sawmill 1, exposure 25).

Stream Survey Overview (100m)

Water temperature in °C at the starting point, middle, and end of the 100m section.

Stream width in meters at the starting point, middle, and end of the 100m section.

Stream depth in meters at the starting point, middle, and end of the 100m section.

Air temperature in °C

Overhead cloud cover in percent.

Overall

1. An **unaltered natural section of stream** is one characterized as having a series of meanders, pools, and riffles, with a significant amount of riparian (transitional zone between aquatic and terrestrial habitats that contains moist soils and lush plant growth) area.

   A **natural stream** can be altered in a number of ways:
   - shoreline can be armored to varying extents (retaining walls, rip-rap);
   - can be diverted;
   - riparian vegetation replaced by lawn, beaches, etc;
   - docks or other structures extending into the stream.

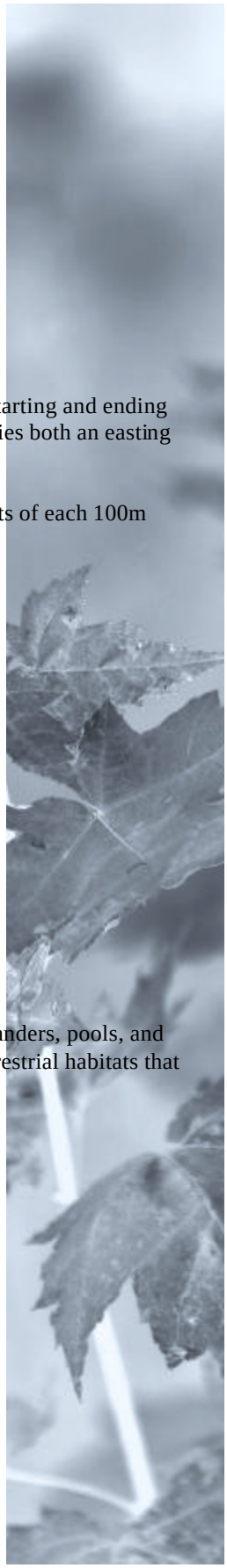
2. **Active agricultural:** refers to land that is currently being farmed.

   Pasture: refers to land being used by grazing livestock.

   Abandoned agricultural fields: refers to land previously, but not currently, farmed.

   Residential: refers to land occupied by homes.

   Natural: refers to unaltered land free from human development.



Industrial/Commercial: refers to land occupied by industry/businesses.

Instream Substrate

3. **Instream substrate** is the material that constitutes the stream bed.

4. It can be **homogenous** (all of one type), or **heterogenous** (diverse types).

Instream Structure

5. **Stream morphology** refers to the physical structure and shape of the stream.

6. **Active beaver dams** are those which are still functioning, while abandoned beaver dams are visible but are not holding back water.

   Tree cropping is the cutting down of trees by beavers.

   Beaver lodges are homes built by beavers out of sticks and muck.

Instream Vegetation

7. **Aquatic vegetation** refers to vegetation occurring within the stream.

   Extensive: weeds within entire stream

   Common: >50%

   Normal: 25-50%

   Low: <25%

   Rare: weeds very sparse

8. **Dominant types of instream vegetation** are dominant plant types that occur in the waterway.

   Algae: simple photosynthetic organisms, often covering substrate; feels slimy.

   Leafed submergents: completely underwater, these plants have leaves branching from the main stem.

   Narrow submergents: completely submerged sedges/grasses

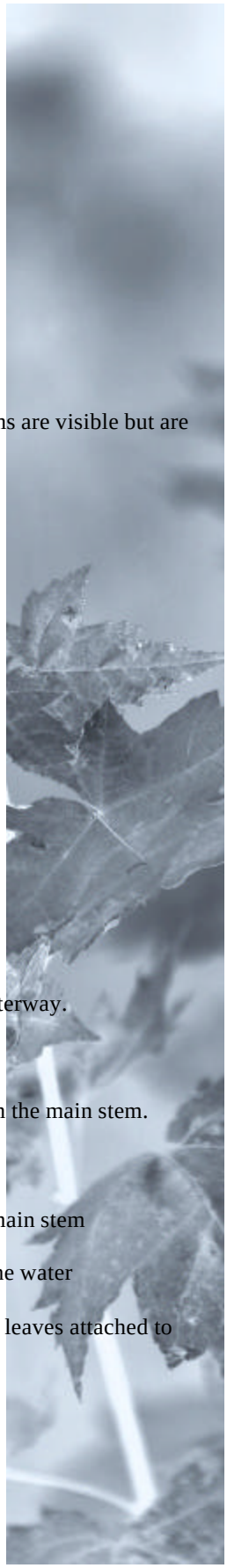
   Lily-type plants: characterized by having a leaf floating on the surface attached to a main stem

   Narrow emergents: sedges/grasses with submerged roots and stems emerging from the water

   Leafed emergents: plants with submerged roots, stems emerging from the water with leaves attached to main stem.

Tributaries

9. **Tributaries** are waterways that flow into/enter the stream.



10. Total number of tributaries flowing into current 100m section.

11. Tributaries drain water into the stream, as well as anything suspended or dissolved in the water. Tributaries can alter the character of the stream in a number of ways, including **sediment deposition**, **nutrient loading**, **and other pollutants**.

12. How is the tributary altering the character of the stream.

13. **Intermittent natural streams** are natural streams that flow periodically throughout the year, usually in the spring and in times of high amounts of precipitation.

    Permanent natural streams are natural streams that flow year round.

14. Is the tributary significant enough to justify further surveying?

15. Is water entering the stream from the tributary?

Bank Characteristics

16. **Stable** means no sign of erosion.

    Unstable means signs of erosion.

    Undercut banks refers to the excavation of material under the vegetation on the bank by the stream.

17. **Bedrock** – exposed rock.

    Boulders – rock over 25 cm (10 in) in diameter.

    Rubble – rock between 8 cm and 25 cm (3 – 10 in) in diameter.

    Gravel – rock between 0.2 cm and 8 cm (1/8 – 2 in) in diameter.

    Sand – rock between 0.05cm and 0.2cm in diameter (feels gritty between fingers)

    Silt – approximately 0.05 cm in diameter (feels powdery/velvety between fingers)

    Clay – approximately 0.01cm in diameter (feels greasy between fingers)

    Organic – not of mineral origin.

    Gabion Cage – a square or rectangular cage filled with rocks used to armor a shoreline.

    Rip Rap Stone – chunks of broken concrete/brick used to armor a shoreline.

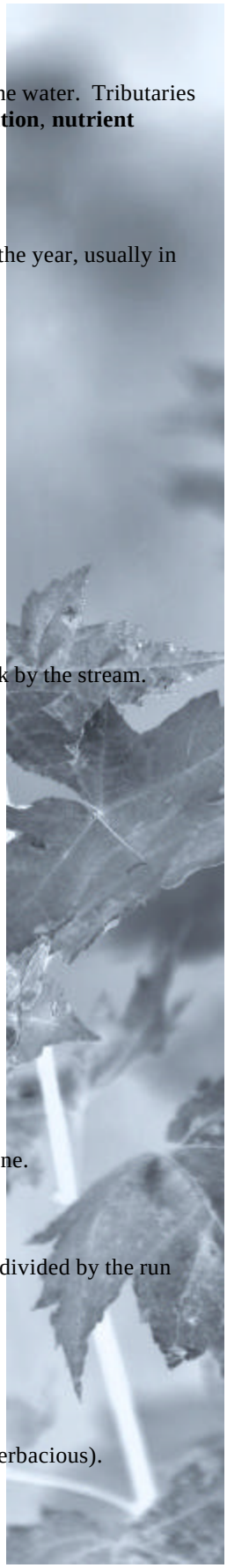
18. **Steepness** of the shoreline is represented by the general slope, calculated by the rise divided by the run multiplied by 100%.

19. **Coniferous trees**: evergreens

    Hardwood trees: deciduous

    Woody shrubs: shrubs with stems that are brown, hard and woody (not green and herbacious).

    Tall grasses: >1m



Short grasses: <1m

Agricultural crops: wheat, corn, soybeans, etc.

20. **Cattle access:** evidence of cattle using the stream, such as tracks or manure.

    Field erosion: evidence of excavation/deposition of material from fields in or around the stream

    Agricultural drain: a drainage ditch from agricultural fields entering the stream.

    Barnyard runoff: evidence of runoff from agricultural outbuildings entering the stream.

    Tile Drain: a tile is a perforated pipe buried under ground that drains an area. It usually drains water into the stream by a protruding pipe from the bank.

    What is the approximate distance from the stream to the field (if present).

21. **Waterfowl:** Ducks, geese, etc.

    Birds: Osprey, king fisher, etc.

    Mammals: Beaver, muskrat, weasels, mink, etc.

    Reptiles/amphibians: snakes, turtles, frogs, toads, salamanders, etc.

    Fish: minnows, bass, pike, perch, sunfish, etc.

    Aquatic Insects: water striders, whirligig beetles, dragonflies/nymphs, etc.

22. **Critical fish habitat** are areas that are directly responsible for the level of recruitment of individuals into a population. **Spawning habitat** are areas fish utilize for laying eggs.
    Pike spawning habitat includes submerged vegetation ie. grasses/sedges
    Nursery habitat are areas where young of the year individuals live. These are usually backwater areas out of current with vegetation/cover for protection against predators.

23. Springs are areas where groundwater flows out of the ground.

24. Is there any pollution in the stream, entering the stream, or near the stream?

25. **Invasive species** are non-native plant and animal species. See attached notes for invasive species in our area.

26. Are there any dominant types of instream vegetation species that you can identify?

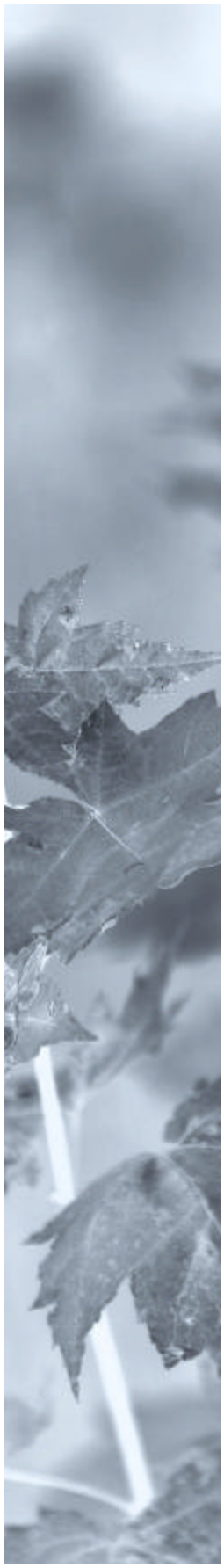
27. Are there any invertebrate animals that you can identify ie. Crayfish, insects, etc?

Visible angling pressure includes presence of anglers, used/old fishing line, bait containers, lures, etc.

Appendix D

Equipment List / Stream Watch Crew

1 handheld GPS unit
1 50-meter length of polypropylene rope
1 meter stick
1 thermometer
1 clipboard with several stream assessment forms
2 Pencils
Insect repellent
Sunscreen
1 waders/person
1 camera
2 extra batteries for GPS unit
Bottled water
1 garbage bag



Appendix E

Landowner Permission Form

Dear Landowner:

The Rideau Valley Conservation Authority, in partnership with a collaborative of five other agencies, is conducting surveys that are designed to document basic geomorphological and biological characteristics of four city streams. The program is designed to increase public participation and awareness concerning the state of streams within the city. These efforts will provide officials with valuable information needed to better manage stream resources. We seek your permission to carry out these surveys on your lands. The work will involve a crew of 3-5 people working for approximately 1 hour on the site. We will respect all private property and leave the site clean and with minimal disturbance.

We ask that you sign two copies of this form and keep one for yourself. Please indicate whether you have any special considerations or conditions and whether you would consider future visits an option. We may wish to repeat the surveys at a later date. If you would like more information on the project or have any concerns, feel free to contact me.

Thank you for your cooperation.

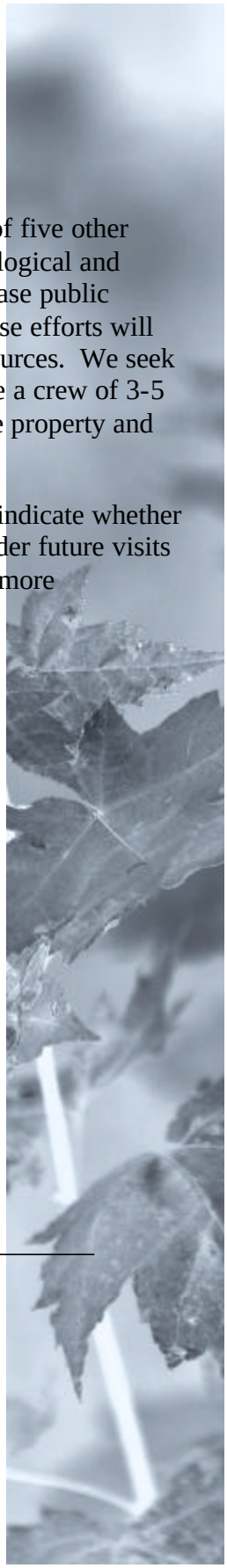
Brian Bezaire
City Stream Watch Coordinator
580-2424 Ext. 33550
Brian.Bezaire@ottawa.ca

Landowner Name: _____
Phone Number: _____
E-mail: _____
Address: _____
City/Town: _____
Postal Code: _____
Special Considerations:

Please check all that apply:
One Visit Only Please: ___ Repeat Visits: ___ Call First: ___ Other: _____

Landowner Signature: _____
Date: _____

RVCA Signature: _____
Stream Name: _____



Appendix F

City Stream Watch 2004 Organizational Chart

Rideau Valley Conservation Authority

Jennifer Lamoureux
Aquatic and Fish Habitat Biologist
613-692-3571 Ext. 1108

Lynn Preston
Watershed Planning/Com. Mon. Coord
613-692-3571 Ext. 1171

Charles Billington
Director of Community Relations
613-692-3571-1116

City of Ottawa

Dawne Flaborea
Project Coordinator
Surface Water Quality
613-580-2424 Ext. 22824

Rideau River Roundtable

Dr. Francis Pick
Biology Dept. UofO
613-562-5700 Ext. 6364

Ottawa Flyfishers Society

Marc Dupuis
613-781-1784

Environment Committee of Ottawa South

Mike Lascelle
613-737-6480

Heron Park Community Association

Donna Silver
613-580-2487

City Stream Watch Coordinator

Brian Bezaire
City Stream Watch Coordinator
580-2424 Ext 24352