Corkery Creek 2015 Summary Report

Monitoring Activity in the City of Ottawa

In 2012, Mississippi Valley Conservation Authority (MVCA) and the Friends of the Carp River (FCR) collaborated to undertake a broad scale assessment of potential restoration and stewardship opportunities along the Carp River and to test the implementation of a citizen science based volunteer monitoring program. The following year, with funding from Shell Canada, MVCA initiated a pilot City Stream Watch Program which uses a combination of detailed monitoring, education, outreach, and targeted rehabilitation to improve the overall understanding of and guardianship over the health of the watershed. Volunteer "citizen scientists" are trained to collect technical information on creek conditions. Volunteers also participate in special stewardship initiatives that include shoreline planting, fish habitat enhancement projects, stream clean-up and invasive species removal events.

The City Stream Watch Program has three broad goals:

- To provide long-term documentation of the aquatic and riparian conditions in our watershed;
- To enhance public awareness about the condition and value of fresh water streams;
- To use the information collected to encourage community driven restoration projects.

Since 2013, the first year of our City Stream Watch Program, MVCA staff and volunteers have surveyed more than 200 sections of Poole Creek, Carp Creek, Huntley Creek, Watts Creek, Corkery Creek and an Unnamed Tributary of the Carp River near the Carp airport. This information has fed into the planning of 13 riparian planting sites, 4 habitat improvements, 1 stream garbage pick-up in Poole Creek and an invasive species removal event along Carp Creek; all on streams within the Carp River watershed.

This year (2015), 3 riparian plantings, an invasive species removal, a stream garbage pick-up, and more than 50 sections of stream were surveyed.

MVCA will continue to expand the City Stream Watch Program by implementing a six year monitoring and reporting rotation on a number of main tributaries within the City.

Figure 1 shows the location of the Corkery Creek subwatershed within MVCA's City Stream Watch program area.

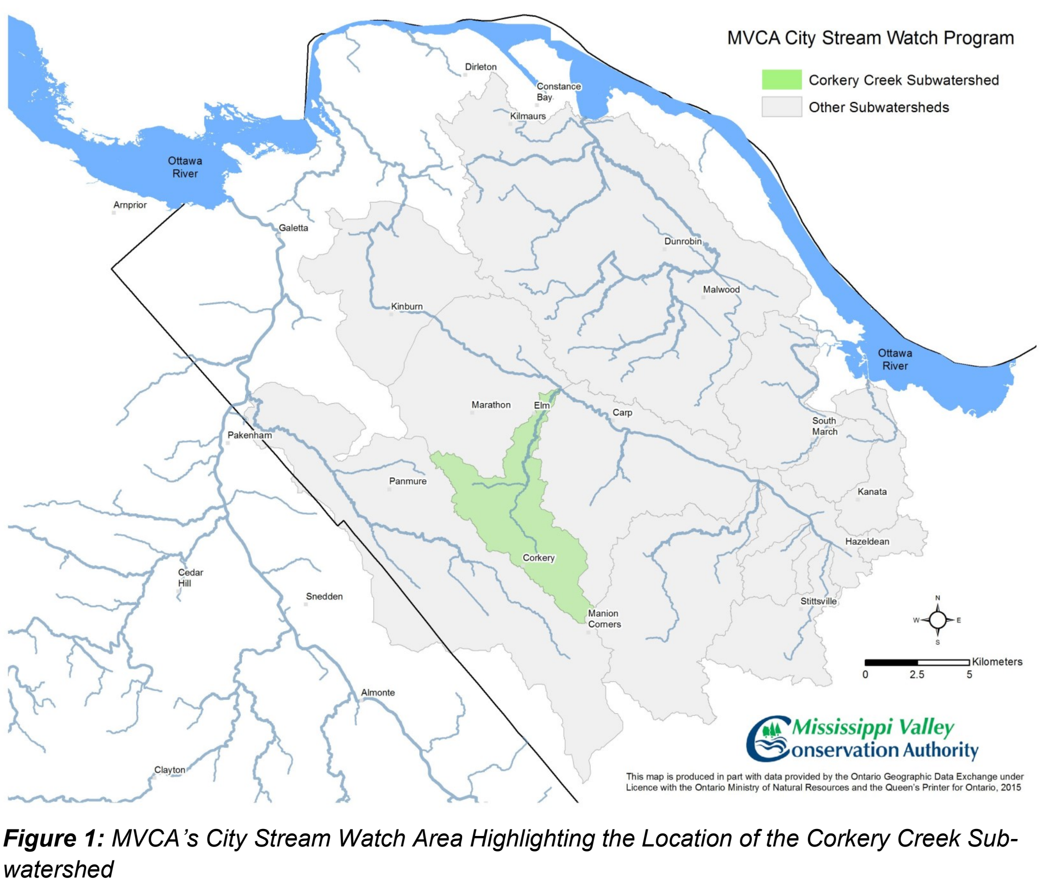


Figure 1: *MVCA's City Stream Watch Area Highlighting the Location of the Corkery Creek Sub-watershed*

Corkery Creek

Located in the west end of the City of Ottawa, Corkery Creek is one of eight major tributaries of the Carp River. With a length of almost 15 kilometers (km) and draining an area of 29 square km, it is one of the larger Carp River tributaries.

Corkery Creek's headwaters originate in the Corkery Creek wetland located south of March Rd and east of Corkery Road. From there it flows to the northwest where it crosses under the 417. It then travels north and meets the Carp River near Old Coach Road.

Table 1 presents a summary of some key features of the Corkery Creek Subwatershed.

Table 1: Subwatershed Features

Area	29.24 square kilometers
Land Use	24.8% agriculture 7.2% rural land-use 23.3% wooded area 2.3% aggregate sites 37.9% wetlands 3.3% roads 1.2% water
Surficial Geology	12.7% clay 0.1% diamicton 24% organic deposits 30.5% bedrock 24.1% sand 8.6% gravel
Watercourse Length and Type	*Total Length:* 14.6 kilometers *Watercourse Type:* 100% natural 0% channelized *Flow Type:* 100% permanent
Fish	There is a great diversity of species including Creek Chub, Central Mudminnow, Bluntnose Minnow, Brook Stickleback, Blacknose Dace, Northern Redbelly Dace, White Sucker, Brown Bullhead, Fathead Minnow, Logperch, Rock Bass, Common Shiner and Emerald Shiner.

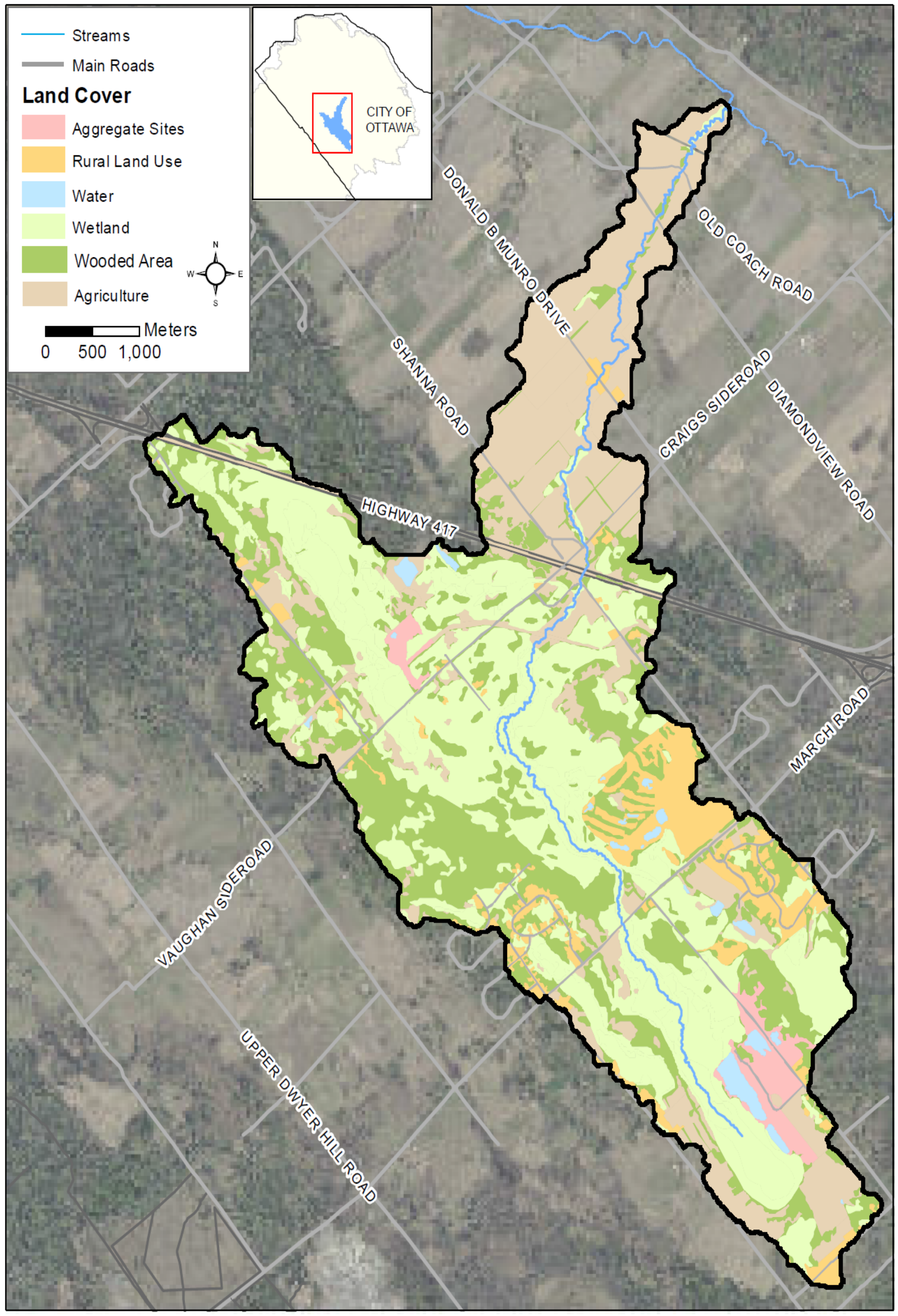


Figure 2: *Land use in the Corkery Creek subwatershed*

The Corkery Creek Subwatershed

As shown in Figure 2, the Corkery Creek subwatershed is dominated by a mix of wetland, agricultural, and wooded areas. Concentrated largely in the southern section of the stream, below Highway 417, wetlands make up the largest part (37.9%) of the overall land cover. This is followed by agricultural land at 24.8%, mostly in the northern area, and interspersed sections of woodland (23.3%). The remaining area is a mix of rural land, aggregate sites, roads, and water.

Monitoring in Corkery Creek

In 2015, permission was granted to survey the 40 sections of Corkery Creek, shown on Figure 3, which cover approximately 4 km of the main creek. While these 40 sampled sections provide a good representation of the overall condition of Corkery Creek it should be noted that several large sections of the creek which flow through un-wadeable wetland areas, or through properties where permission was not granted are not represented in this assessment. These areas provide additional diversity of habitat with valuable natural functions.

This report presents a summary of the observations made along the 40 sampled sections. For presentation purposes on some of the following diagrams, the surveyed sections have been separated into the sample sites east of Diamondview Road (Corkery North) and sites west of Donald B. Munro Road (Corkery South).

Methodology

The macro stream assessment is completed using a protocol that divides the entire length of the creek into 100 meter sections. Starting at the downstream end, a monitoring crew wades the creek and completes a detailed assessment at the end of each 100 meter section. If a section of the creek is un-wadeable, that section is bypassed and the assessment is continued once the creek becomes wadeable again. The parameters that are assessed include general land use, in-stream morphology, human alterations, water chemistry, plant life, and other features presented in this report.

Table 2: Corkery Creek Assessment Facts

	Minimum	Maximum	Average
Air Temperature (°C)	19.0	27.6	21.8
Water Temperature (°C)	10.3	21.9	19.0
Stream Width (m)	1.0	30	5.9
Stream Depth (m)	0.2	1.2	0.5

Corkery Creek flows over bedrock in large areas, especially between Donald B. Munro and Bearhill Road, resulting in a stream morphology that is quite wide and shallow. The surveyed sections had an average stream width of 5.9 meters (m) and an average depth of 0.5 m (Table 2). When this monitoring took place, the average air temperature and water temperature were both around 20°C**.** A more in-depth analysis of water temperature and the streams thermal regime can be found on Page 13.

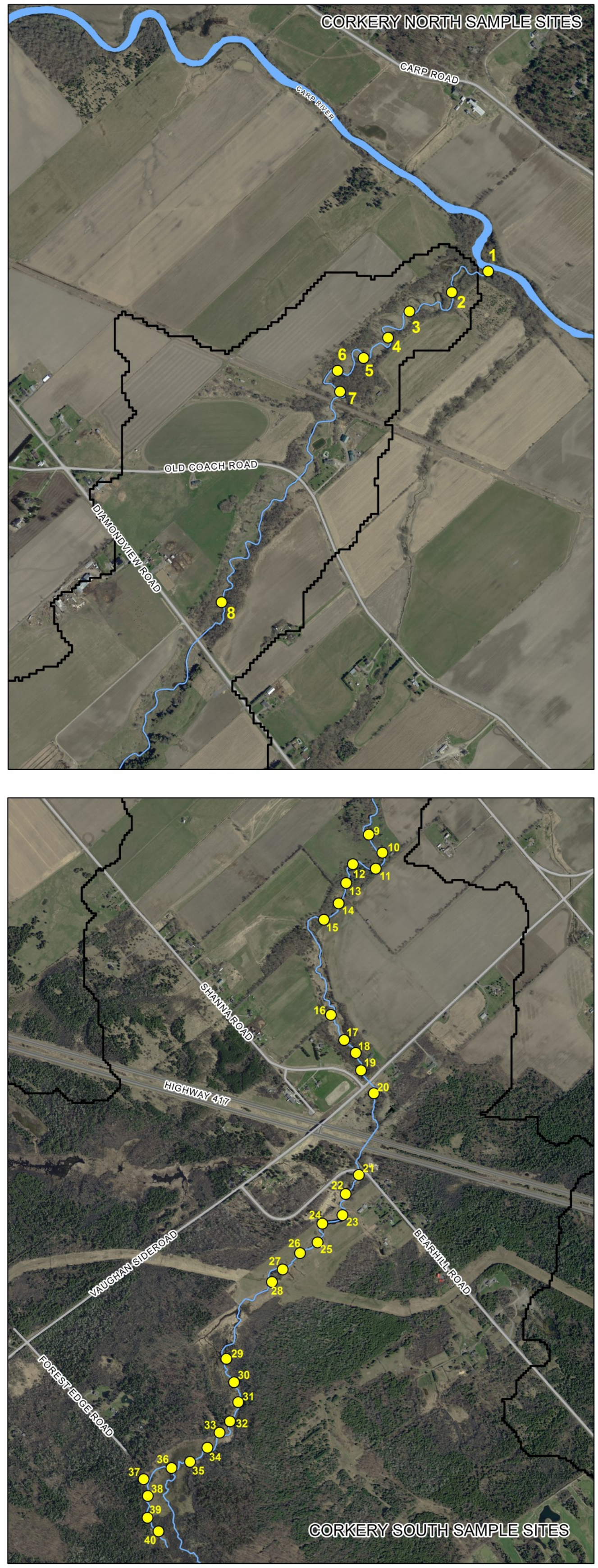


Figure 3(a) and (b): *Maps depicting the North and South*

General Land Use Adjacent to Corkery Creek

General land use along each surveyed section of Corkery Creek is considered from the beginning to the end of each survey section (100 m) and extending outward 100 m on each side of the creek. Land use outside of this area is not included in the surveys but is nonetheless part of the subwatershed and will influence the creek (Castelle et al, 1994).

The categories of land use include infrastructure, active agriculture, pasture, abandoned agricultural fields, residential, forests, scrubland, meadow, and wetland. Figure 4 shows the overall percent of land use that was observed adjacent to Corkery Creek.

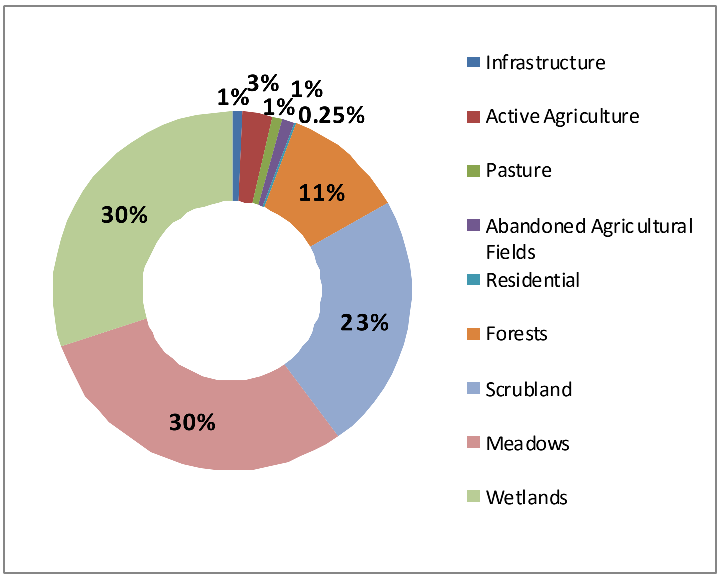


Figure 4: *Land use alongside Corkery Creek.*

Of the eleven categories, industrial and recreational were not found to be present. Wetland and meadow represented the predominant land uses at 30% each. Scrubland was also common at 23%, followed by forest at 11%. The high percentage of meadow, scrubland and forest is a good characteristic as the presence of plants with extensive roots act as ideal vegetated buffers.

The high level of wetland can be explained by the very large, yet wadeable, wetland area assessed between Bearhill Road and Forest Edge Road.

Human Alterations to Corkery Creek

In this assessment, human alterations refer to artificial changes to the actual channel of the watercourse either by straightening or relocation. Such alterations can be made in streams and rivers for many reasons including to accommodate development, such as road crossings and culverts, to make more land available for agriculture, to allow navigation of large boats, and to minimize natural erosion caused by the meandering pattern of flowing water. As seen in Figure 5, 67% of Corkery Creek was found to be natural (with minor alterations), while 33% was considered unaltered with no channelization. No sections that were surveyed were found to be altered or highly altered.

The minimal impact to the creek channel is a positive attribute and is largely a result of the area through which the creek runs – farmland, wetlands, and wooded area. With less urbanization surrounding a creek, the smaller the need is to straighten the channel for building purposes.

The alterations that were seen on Corkery Creek were mostly for road crossings or culverts, including large culverts crossing Vaughan Sideroad and Bearhill Road, and for accommodating agricultural fields, seen in multiple small areas all along.

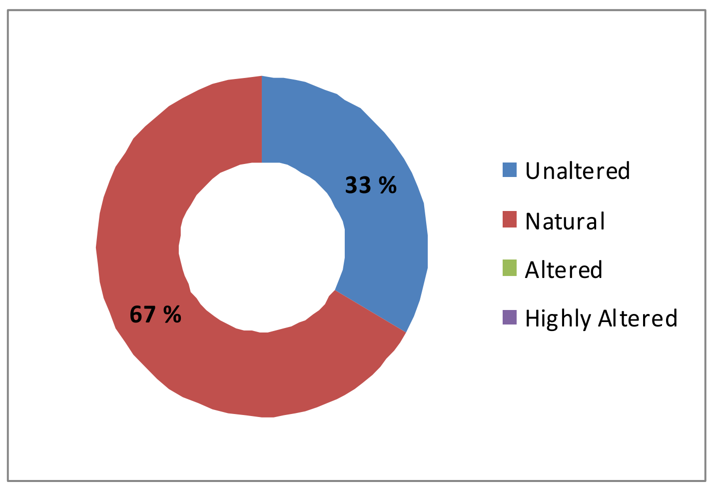


Figure 5: *Extent of human alterations to Corkery Creek.*

A large culvert where Corkery Creek crosses Vaughn Side Rd.

Riparian Buffer along Corkery Creek

The riparian buffer refers to the amount of vegetated area along the edges of the stream banks. It can consist of a variety of vegetation types including trees, shrubs, grasses and other plants. Vegetated buffers are important for protecting water quality and creating healthy aquatic habitats. They intercept sediments and contaminants as well as protect the stream banks against erosion. Buffers also improve habitat for aquatic species by shading and cooling the water and providing protection for birds and other wildlife that need to be near water for feeding or rearing young. Riparian buffers along the creek corridor also provide a natural area for wildlife movement and dispersal. While riparian buffer is not the only factor affecting stream health, studies assessing adjacent land use largely show a positive relationship between buffer size and stream health (Stanfield and Kilgour, 2012).

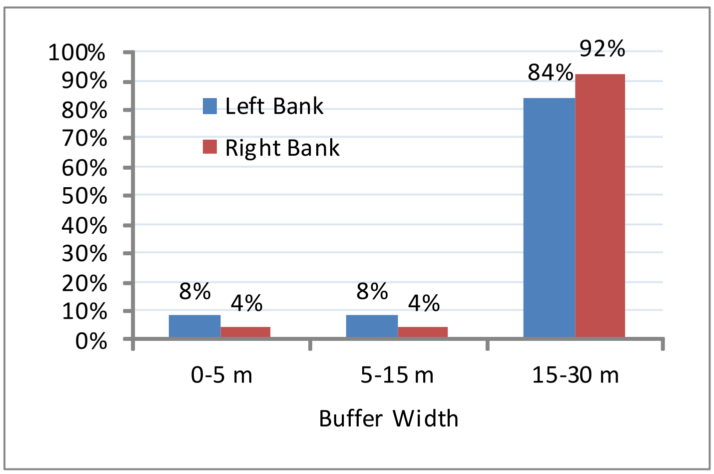


Figure 6: *Corkery Creek buffer evaluation.*

Environment Canada's Guideline: *How Much Habitat is Enough?* recommends a minimum 30 m wide vegetated buffer along at least 75% of the length of both sides of a watercourse. Therefore, for this assessment, we record the width of the riparian buffer within 30 m of either side of the watercourse. As summarized in Figure 6, we found that the sections of Corkery Creek that were surveyed have a relatively good riparian buffer. Results show that 84% of the left bank and 92% of the right bank havebuffer width greater than 15 meters, and only 8% of the left and 4% of the right bank havebuffer of 5 m or less.

Figure 7 (a) and (b) show the differences in riparian buffer widths along Corkery Creek. The best buffers were seen along the surveyed sections at the south where the stream flows through uncultivated wetland with large borders of meadow and forest. At the downstream end the buffer varies, with many sections having 15-30 meters and other sections that run beside farm fields and residential lots being constrained to a 0–5 metre width.

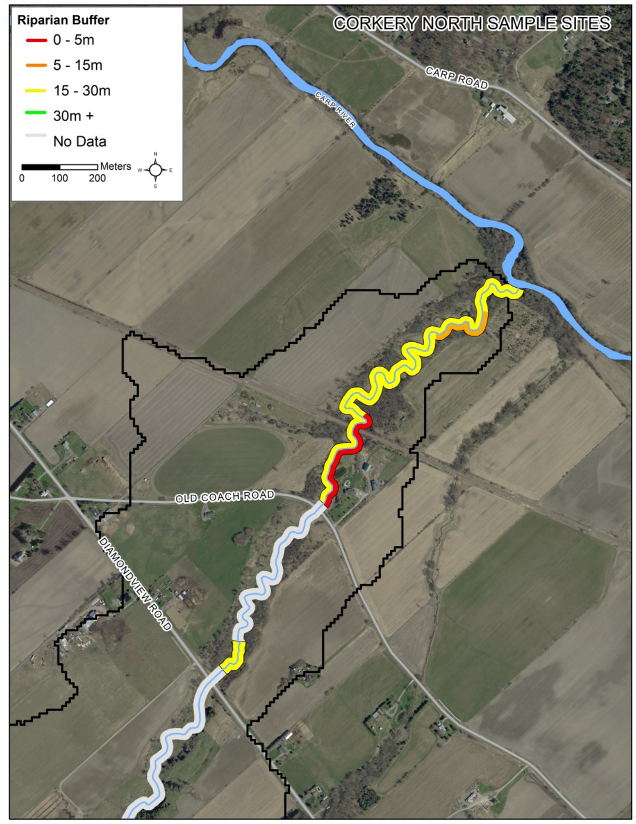
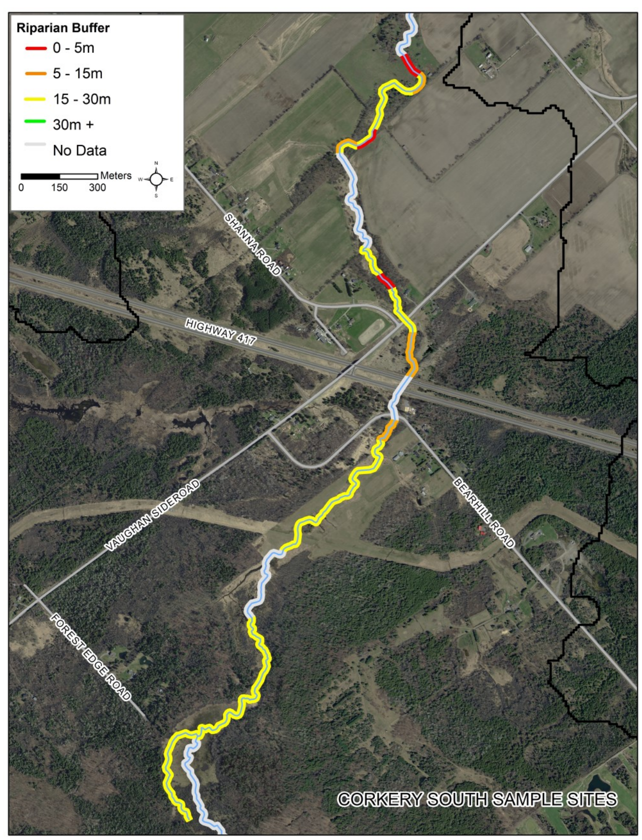


Figure 7(a) and 7(b): *Vegetated buffer width along Corkery Creek .*



Overhanging Trees and Branches

Overhanging branches and trees, a byproduct of a good riparian buffer, provide crucial nutrients, in the form of coarse particulate organic matter (leaves, insects, seeds etc.), to small streams (Vannote et al. 1980). This organic matter is broken down and eaten by aquatic insects, phytoplankton and zooplankton, which are important prey items of fish and wildlife. Overhanging branches also provide stream shading and fallen logs create excellent habitat for fish.

Changes in the amount of overhanging branches and trees along Corkery Creek can be seen in Figures 9(a) and (b). Overall, Corkery Creek has a measurable lack of overhanging trees and branches. In some areas this reflects the surrounding natural vegetation community, where the creek passes through sections of open wetland, and in some areas it reflects over-clearing of the vegetation too close to the creek. Those are the areas that would greatly benefit from planting.

Figure 8 shows the data quantified as the percent of creek sections classified according to the various amounts of overhanging trees and branches. Of the 40 surveyed stream sections, 25% of the left bank and 27.5% of the right bank were classified as having zero overhanging trees and branches. The majority of the stream had from 0—20% overhanging branches.

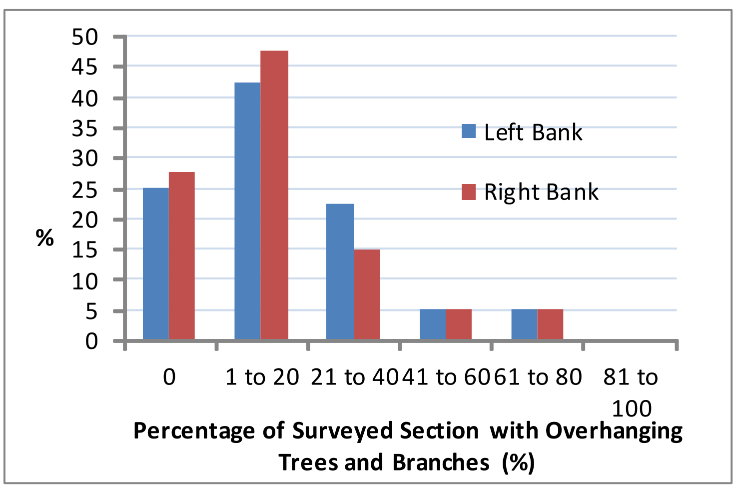


Figure 8: *Percentage of each surveyed section of Corkery with overhanging trees and branches.*

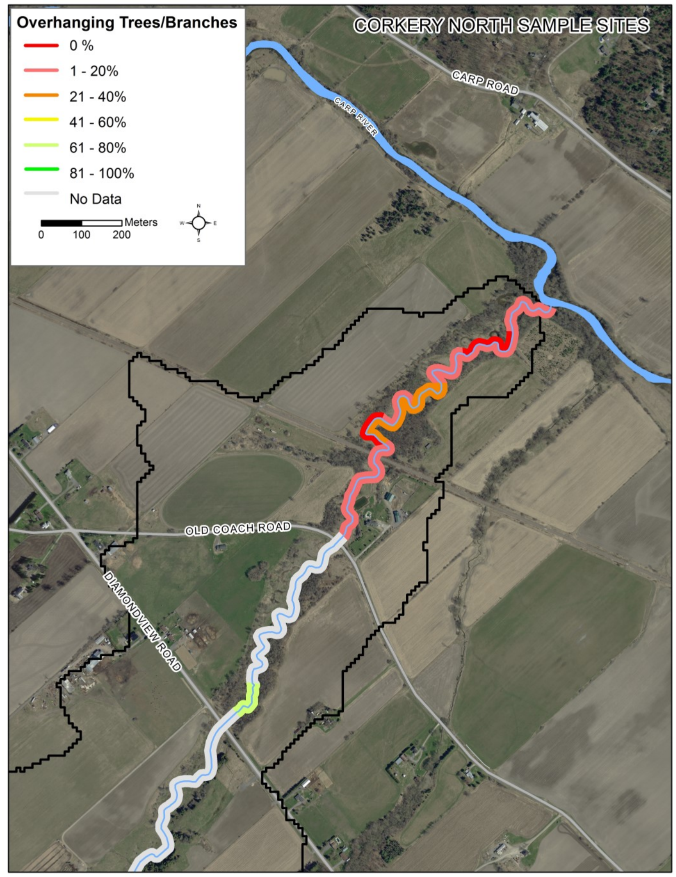
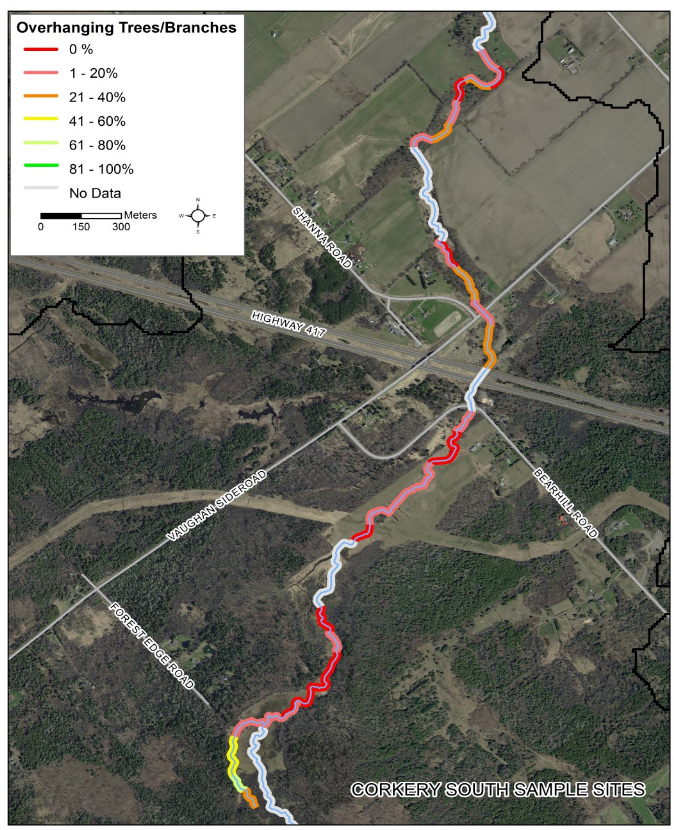


Figure 9(a) and (b): *Overhanging trees and branches along Corkery Creek.*



Stream Shading

Shade is important in moderating stream temperature, contributing to food supply and helping with nutrient reduction within a stream. Grasses, shrubs and trees can all provide shading to a stream, with trees providing more full coverage and grasses providing much needed shade directly along the edges where shading from trees may not be available.

Figure 10 shows the data quantified as the percentage of creek sections classified according to the various levels of shading. For example, 47.5% of the 40 stream sections that were surveyed were classified as having 1 to 20% shading along the entire section. With 10% at zero shading, 47.5% at 1 to 20 percent, and 7.5% at 21 to 40 percent, more than half of the surveyed stream has less than 41% shading. This lack of shading may lead to warmer water temperatures and decreased organic matter in a stream that is an important tributary to the Carp River.

Figure 11(a) and (b) show the variability in the amount of stream shading along different sections of Corkery Creek. There are pockets of well shaded areas near Diamondview Road and on either side of Vaughan Side Road. There are also large sections of the creek, namely south of Highway 417, that have little to no shading. This section represents an area where the creek passes through open wadeable wetland dominated by low growth vegetation that doesn't offer shade but offers other beneficial features.

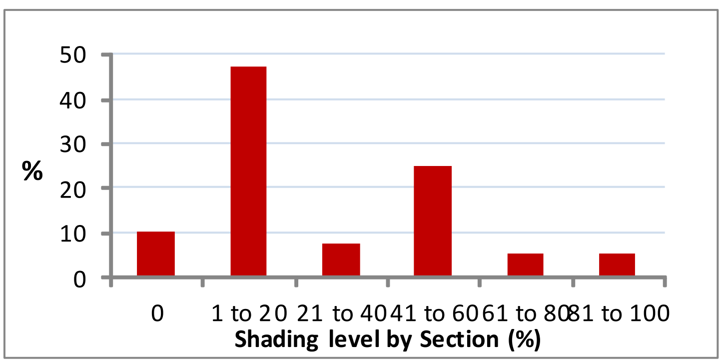
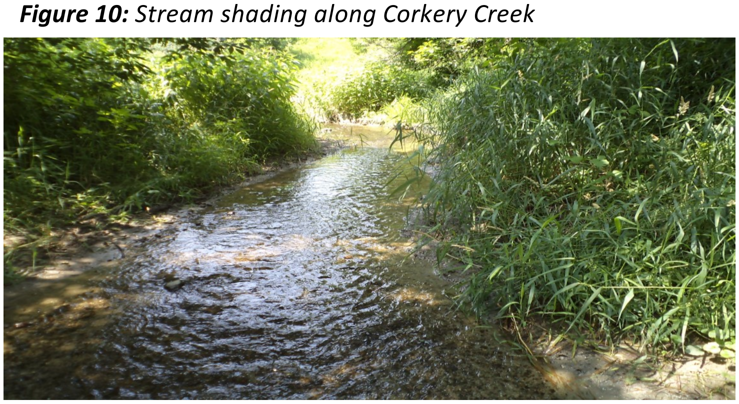


Figure 10: *Stream shading along Corkery Creek*



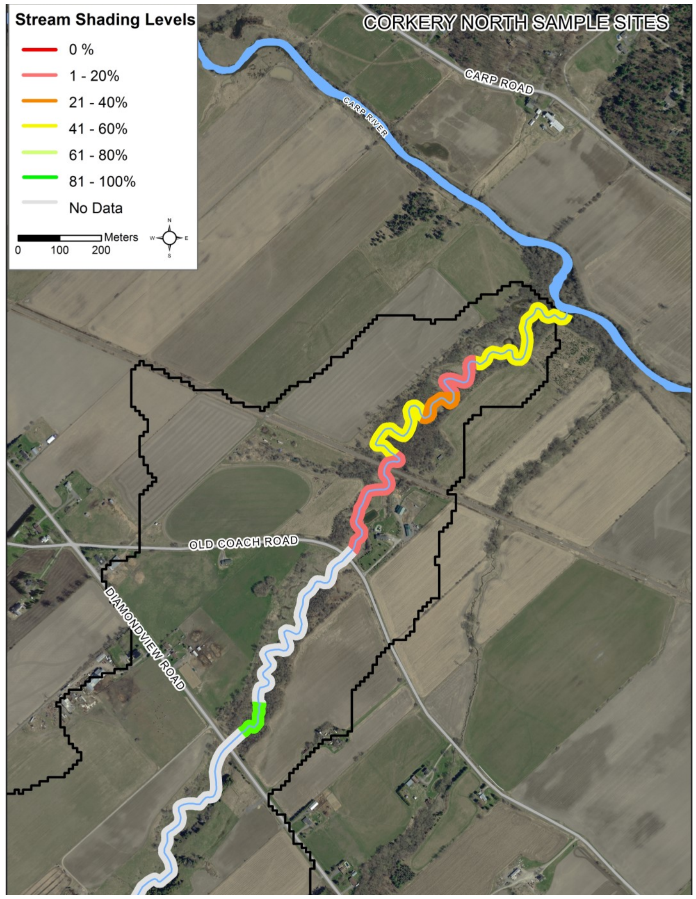
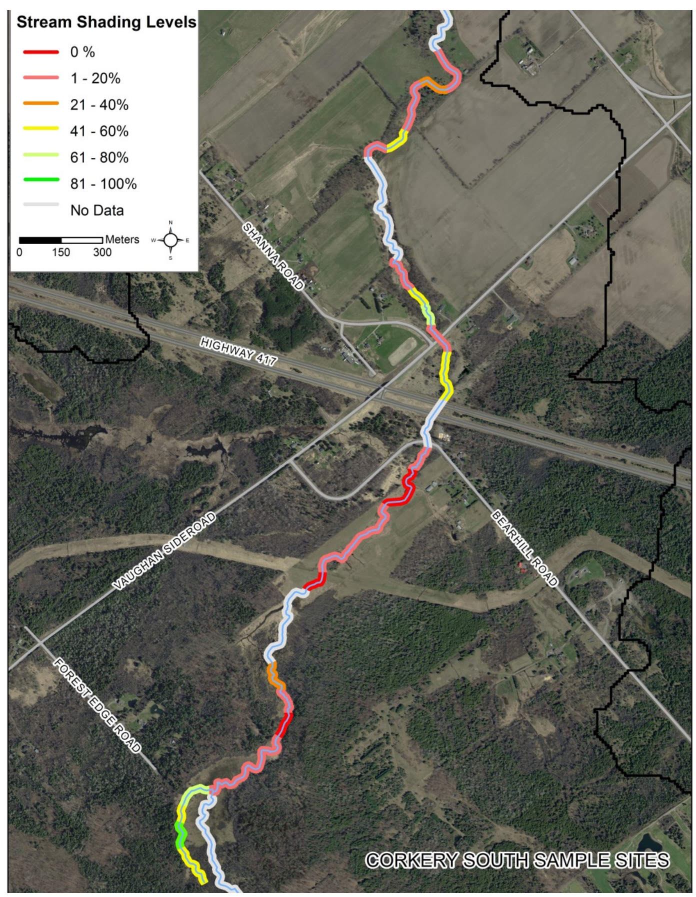


Figure 11(a) and (b): *Stream shading along Corkery Creek.*



Erosion and Streambank Undercutting

Rivers and streams are dynamic hydrologic systems, which are constantly changing in response to changes in the watershed. Streambank erosion is a natural process that can produce beneficial outcomes by helping to regulate flow and shape a variety of habitat features. When the natural rate of erosion is accelerated or changed through human activities, such as stream straightening and over-clearing of catchment and stream bank vegetation, the system is thrown off balance. The acceleration of the natural erosion process can lead to stream channel instability, land loss, sedimentation, habitat loss and other adverse effects that negatively impact water quality and important fish and wildlife habitat.

Erosion also has the ability to create undercut stream banks. While some undercutting of stream banks can be a normal stream function and can provide excellent refuge for fish, too much undercutting can become harmful if it is resulting in instability, erosion and sedimentation.

Figures 12(a) and (b) show the percentage of undercut stream bank along each surveyed section of Corkery Creek. Overall, the Corkery North sample sites have relatively high levels of undercut banks; the sites between Diamondview Road and Hwy 417 have isolated pockets of undercut; and the wetland sections south of the highway have very little undercut banks. While the isolated pockets of streambank undercutting provide a habitat function and should be left to provide refuge, the sections of extensive undercutting result in high sedimentation and erosion and may be a candidate for stabilization through shoreline planting or other restoration work to prevent further damage.

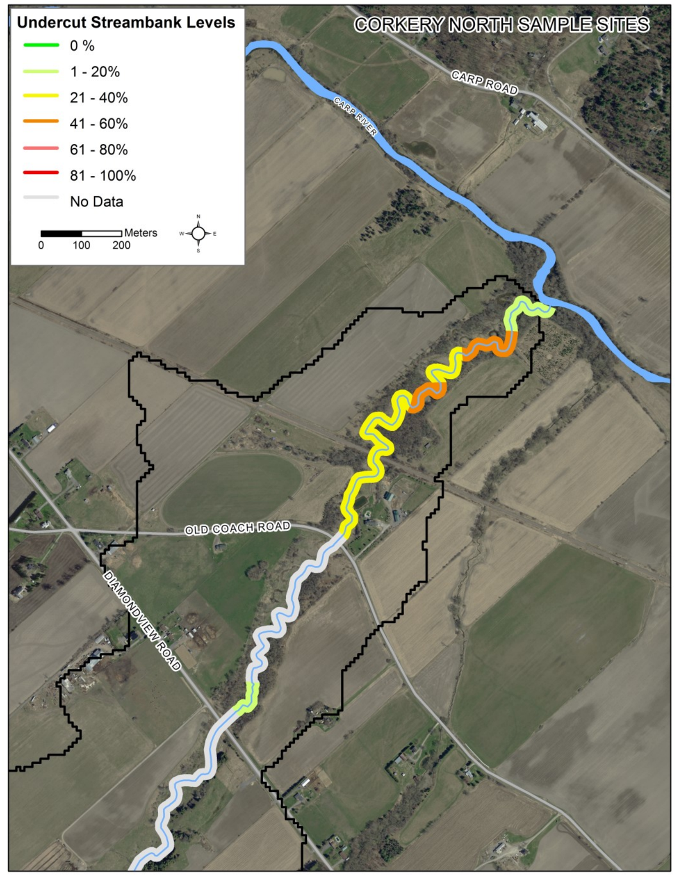
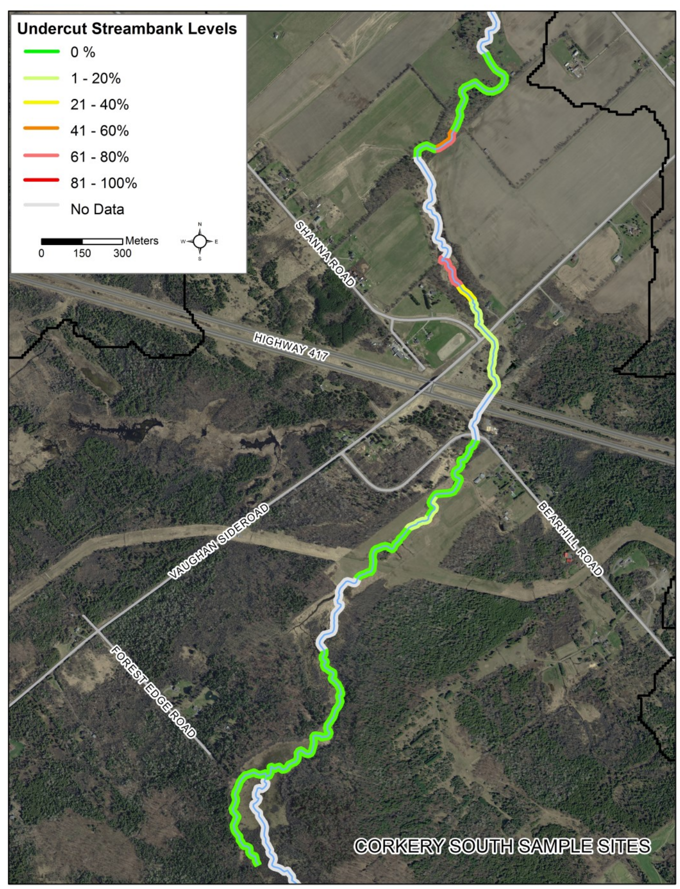


Figure 12(a) and (b): *Undercut stream banks along Corkery Creek.*



In-Stream Morphology

In-stream morphology is categorized as pools, riffles, and runs. Pools and riffles are both particularly important for fish habitat. Pools, which are deeper and usually slower flowing sections in the stream, provide shelter for fish, especially when water levels drop or when water temperatures increase. Riffles are sections of agitated and fast moving water that add dissolved oxygen to the stream and provide spawning habitat for some species of fish. Runs are areas along a creek that are typically shallow and have un-agitated water surfaces. The in-stream morphology for Corkery Creek can be seen in Figure 13.

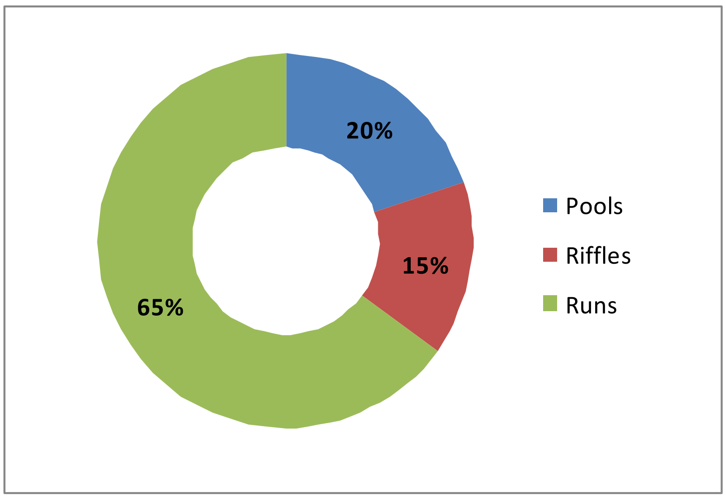


Figure 13: *In-stream morphology along Corkery Creek.*

It is beneficial for the health of the ecosystem if there is a variety of pools, riffles and runs. This allows oxygen to flow through the creek, provides habitat, and generally results in a well-connected watercourse. As seen in Figure 13, Corkery Creek was found to consist of 65% runs, 15% riffles and 20% pools. Stewardship efforts could be focused at creating more in-stream pool/riffle sequences to enhance fish habitat.

In-Stream Substrate

In-stream substrate describes the composition of the bed of the watercourse. A diversity of substrates is important for fish and benthic invertebrates because some species have specific habitat requirements and will only reproduce on certain types of substrate. A healthy stream will generally have a large variety of substrate types which will support a greater diversity of organisms.

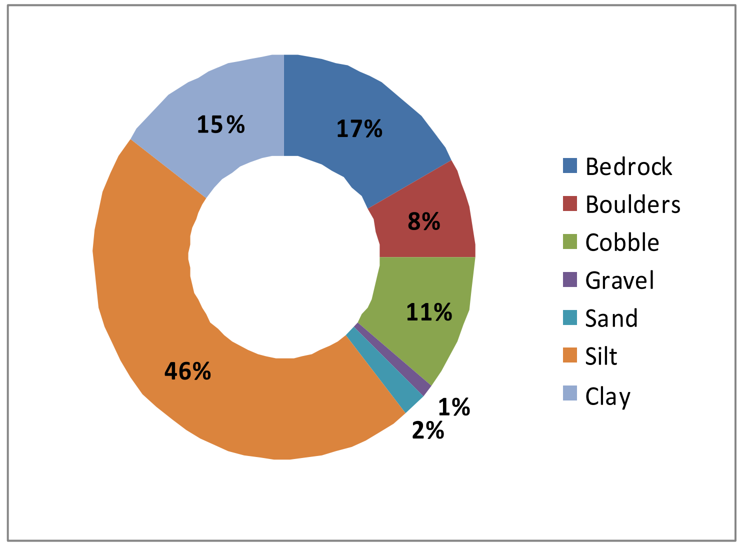


Figure 14: *Percentages of in-stream substrate types in Corkery Creek.*

Figure 14 summarizes the different types of substrate which make up the bed of Corkery Creek.

Corkery Creek has a relatively good diversity of substrate but is composed largely of silt, clay, and bedrock. Silt, which makes up 46% of the in-stream substrate, often settles in pools which provide hiding areas for fish. Boulders and Cobble, 8% and 11% of Corkery Creek's substrate respectively, provide spawning habitat for fish. These rocky areas also provide habitat for benthic invertebrates (organisms that live on the bottom of a water body or in the sediment) that are a key food source for many fish and wildlife species.

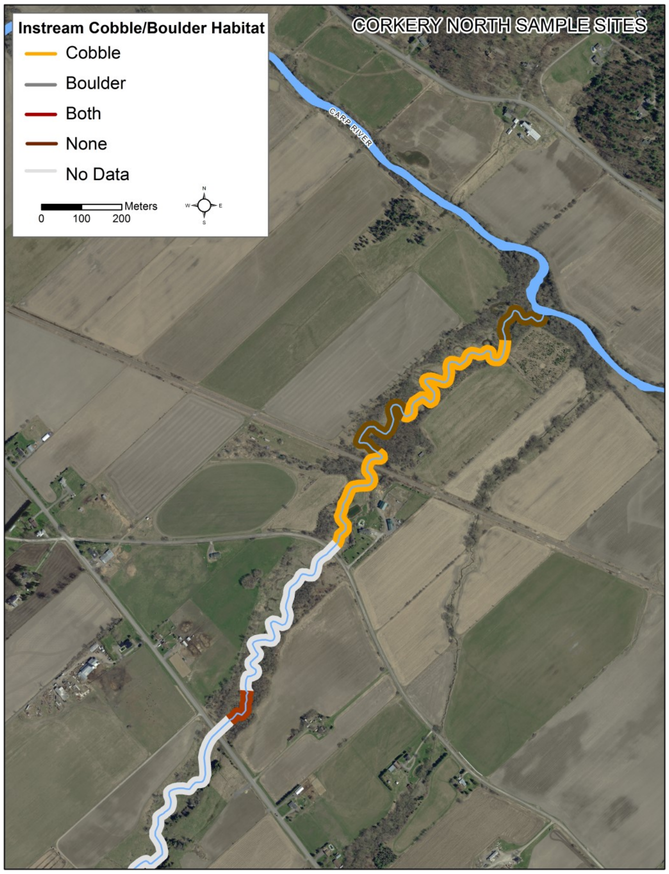
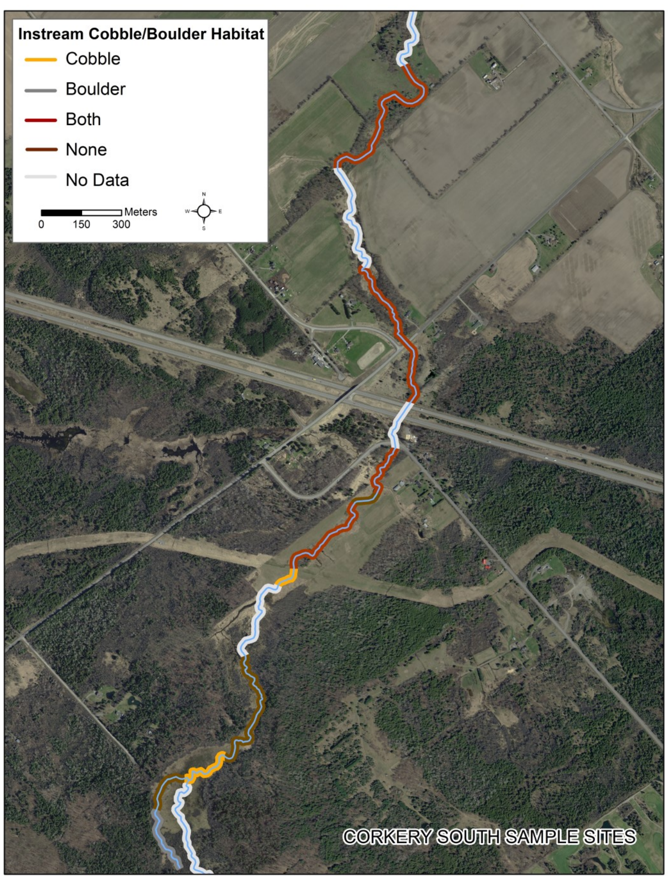


Figure 15(a) and (b): *Cobble and boulder habitat along Corkery Creek.*



Cobble and Boulder Habitat

As discussed, cobble and boulders both provide important fish habitat. Figure 15(a) and (b) show the sections of Corkery Creek where cobble and boulders were found to either be present or not present on the stream bed and shows that the creek has a healthy amount and distribution of cobble and boulder substrate.

Type and Abundance of In-Stream Vegetation

A well-balanced amount and suitable variety of in-stream vegetation is important for a healthy stream ecosystem. Aquatic plants provide habitat for fish and wildlife, contribute oxygen to the stream, and help to remove contaminants from the water. However, too much in-stream vegetation can be detrimental and can signify an unhealthy stream. Excessive amounts of certain types of vegetation, such as algae, can also be indicative of poor stream health, as it is often seen in streams with high nitrogen and phosphorous inputs (from runoff or wastewater).

Types of In-stream Vegetation

There are many factors that can influence the presence of aquatic plants, some of which include the substrate type, increases in air and water temperature, and the time of year the assessment was completed. The in-stream vegetation that was observed in each surveyed section was divided by type into eight categories; narrow-leaved emergent, broad-leaved emergent, robust emergent, free floating plants, floating plants, submerged plants, algae and no plants.

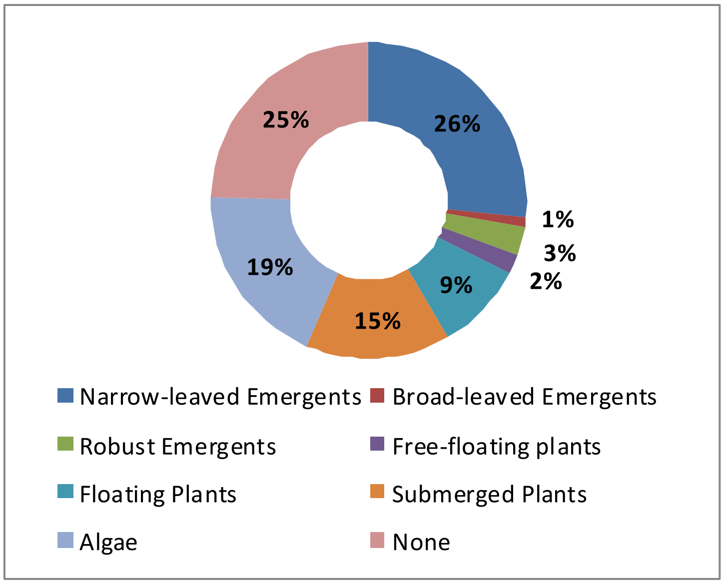


Figure 16: *Types of In-stream vegetation in Corkery Creek.*

Figure 16 shows the percentage breakdown of the aquatic vegetation types present in Corkery Creek. Narrow-leaved emergents were recorded as the most prevalent type of aquatic vegetation at 26%, followed by algae at 19%, and submerged plants at 15%. There were also substantial areas with no plants. This diversity is indicative of a healthy stream.

Amount of In-stream Vegetation

In-stream vegetation helps to remove contaminants from the water, contribute oxygen to the stream, provide habitat for fish and wildlife, and reduce water velocities, however too much vegetation can be detrimental. For this assessment, the amount of in-stream vegetation is measured according to five categories, ranging from “extensive”, where the stream is choked with vegetation, to “rare”, where there are very few plants.

Figure 17 shows the amounts of in-stream vegetation in Corkery Creek. The creek was found to have a good diversity of vegetation abundance with each category being represented. Overall however, the creek had more sections with high vegetation amounts, with 12% normal, 21% common, and 27% with extensive vegetation.

High in-stream vegetation levels in Corkery Creek are likely due to substrate type. For example, the high percentage of silt substrate provides excellent areas for plants to grow. Furthermore, the low levels of riffles in the streams allows slower flowing water, which is ideal for plant growth.

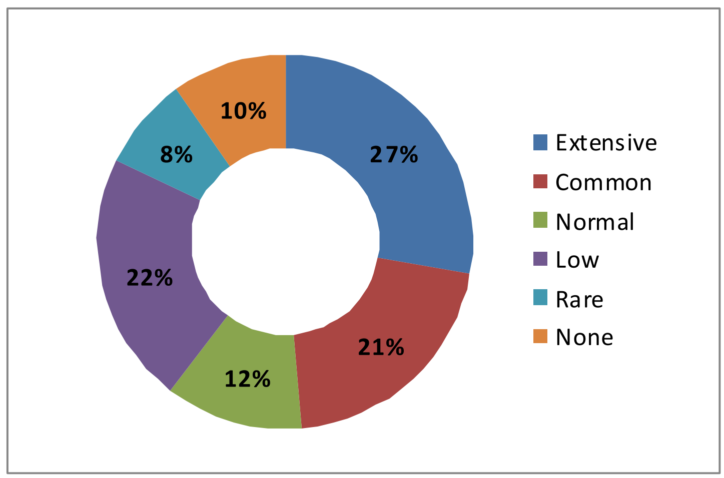


Figure 17: *In-stream vegetation abundance in Corkery Creek.*

Wildlife Observed

There were many species of wildlife observed during this assessment of Corkery Creek. Various bird species including herons, songbirds and woodpeckers were seen. Tracks from raccoons and deer were seen along with sightings of Green Frogs and Snapping Turtles. There were also many dragonflies and butterflies, and aquatic invertebrates such as crayfish and giant water beetles.

Horned Clubtail (left), Mourning Cloak Caterpillar (right).

Water Chemistry and Quality

A YSI probe was used to collect water quality data including pH, dissolved oxygen, and conductivity, at each site assessed. The maximum, minimum and average readings for each of those parameters are presented in Table 3.

Dissolved oxygen measures the amount of available oxygen within the water that is accessible to wildlife. According to the Canadian Water Quality Guidelines for the Protection of Aquatic Life, the guideline value for the concentration of dissolved oxygen in freshwater for early life stages is 6.0 mg/L (milligrams/liter) for warm water ecosystems and 9.5 mg/L for cold water ecosystems. The average amount of dissolved oxygen in Corkery Creek measured at 6.3 mg/L, making it healthy for warm water fish, but well below the requirements for cold water fish.

Table 3: Corkery Creek Water Quality Data

	Minimum	Maximum	Average
pH	7.4	8.7	8.1
Dissolved Oxygen (mg/L)	2.7	10.5	6.3
Conductivity (µS/cm)	431	584	492

Conductivity is defined as the ability of water to pass an electrical current, and is an indirect measure of the saltiness of the water caused by dissolved ions. Fish cannot tolerate large increases in saltiness in the water. Factors that can change the conductivity of freshwater include climate change and human activity. Warmer climate conditions increase the evaporation of water, leaving existing water with higher concentrations of dissolved ions (higher conductivity). Use of road salt in and around streams can also elevate ion levels, along with industrial and human wastewater. Because of all these factors, conductivity of a stream can fluctuate greatly with readings between 0 and 10,000 µS/cm (microSiemens/centimeter). The United States Environmental Protection Agency notes that streams supporting good mixed fisheries generally fall between 150 and 500 µS/cm. The average conductivity of Corkery Creek is 492 µS/cm, putting it within the ideal range. This can have an effect on the wildlife present.

The measurement of pH tells us the relative acidity or alkalinity of the creek. The scale ranges from 1 (most acidic) to 14 (most basic) and has 7 as the middle and most neutral point. The average pH of Corkery Creek is 8.1, a nearly neutral condition, which is good for many species of fish to thrive.

Thermal Classification

Temperature is an important parameter in streams as it influences many aspects of physical, chemical and biological health. Figure 18 shows where three temperature dataloggers were deployed in Corkery Creek from April to late October 2015 to give a representative sample of how water temperature fluctuates.

Many factors can influence fluctuations in stream temperature, including springs, tributaries, precipitation runoff, discharge pipes and stream shading from riparian vegetation. Water temperature is used along with the maximum air temperature (using the revised Stoneman and Jones method by Cindy Chu *et al*) to classify a watercourse as either warm, cool-warm, cool, cold-cool, or cold water. Figure 19 shows the thermal classifications of Corkery Creek.

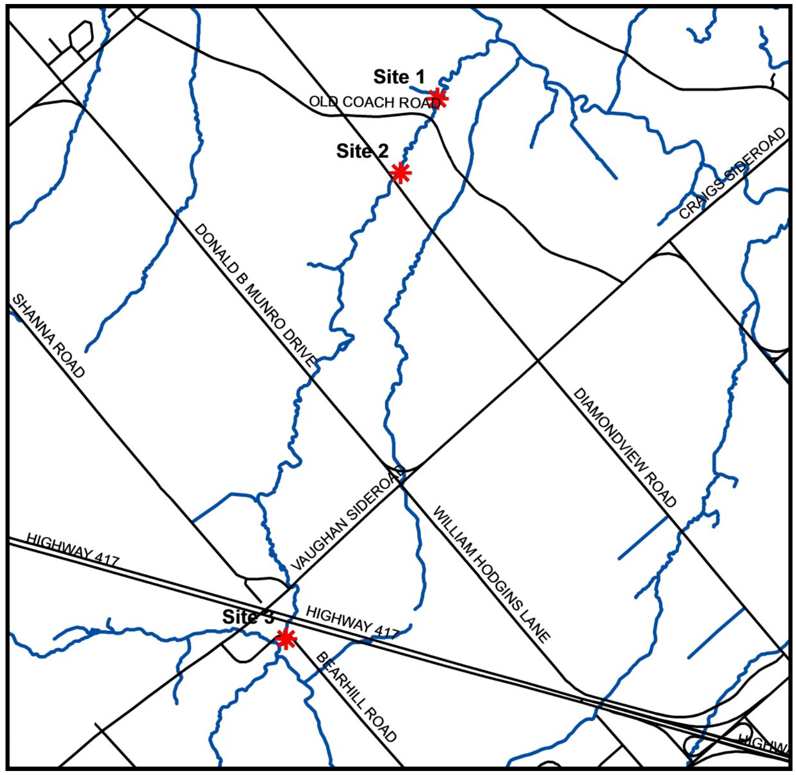


Figure 18: *Three sites along Corkery Creek where temperature loggers were located and fishing occurred. Benthic samples were also taken at Sites 1 and 3.*

Analysis of the data collected indicates that at two stations (Site 1 & 2) the habitat is predominantly warm water and Site 3 is more accurately described as cool-warm water. These results are substantiated by the fish species found (see Table 5); at site 3 we caught a higher number of cool and cool-warm species, whereas more warm water species, such as the bluntnose minnow, were caught at sites 1 and 2. These results give us a better idea of the fluctuations in temperature, upstream and downstream, in Corkery Creek.

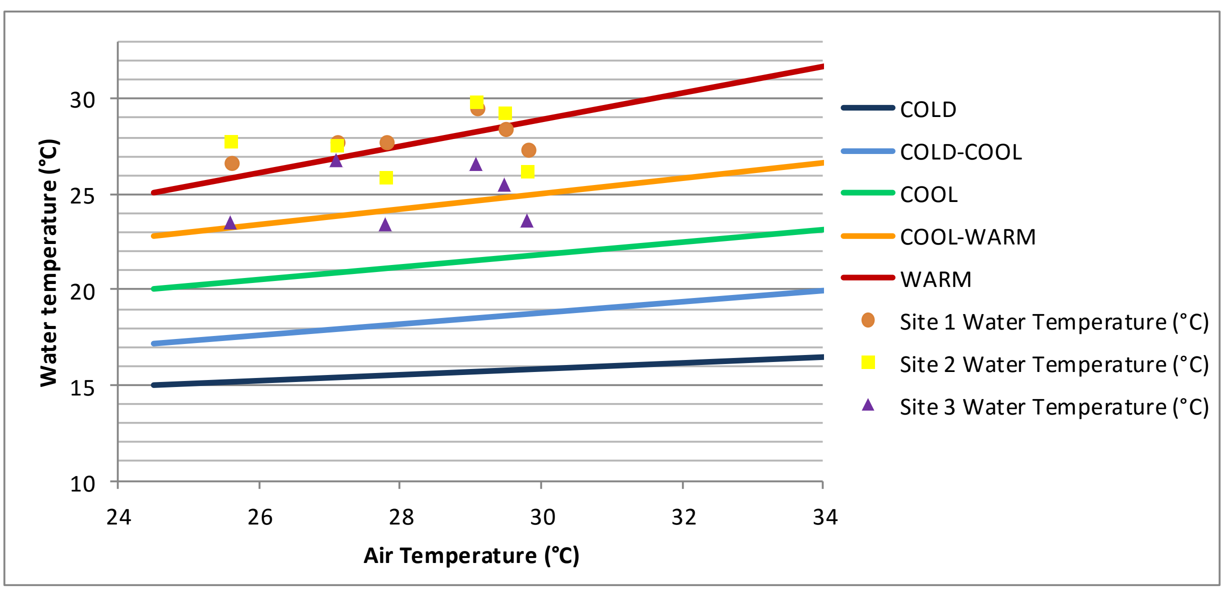


Figure 19: *Thermal Classification of Corkery Creek based on data from three temperature loggers.*

Each point on the graph represents a water temperature that was taken under the following conditions:

- Sampling dates between July 1 and August 31.
- Sampling date has a maximum air temperature ≥ 24.5 ^{o}C and was preceded by two consecutive days with a maximum air temperature ≥ 24.5 ^{o}C during which time no precipitation occurred.
- Water temperature is taken at 4:00 pm.

Benthic Sampling

Benthic invertebrates (small organisms that live in or on the bottom sediments of streams) have limited habitat and mobility and thus are strongly influenced by the environment around them, including water quality, sediment abundance and quality, and substrate type. This sensitivity makes benthic community composition an excellent biological indicator of overall stream health. Because these communities encompass a large number and diversity of species, we often use indices to highlight different aspects of their composition. For Corkery Creek, we performed three different transect kick-and-sweep samples (according to the Ontario Benthos Biomonitoring Network protocol) at two sites (see Figure 18) along the stream, for a total of six samples.

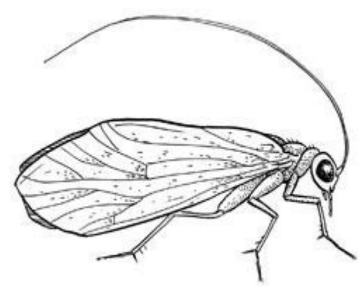
The first index studied was the Hilsenhoff biotic index. This metric gives a tolerance value to each benthic family, with a higher value indicating higher tolerance to human-induced stressors. For each family, this value is multiplied by the number of individuals of that family, and then the sum of all these values is divided by the total number of individuals in the sample. The scale runs from zero to ten, with a higher score indicating more tolerant species and thus probably a more polluted stream. The Hilsenhoff scores for the Corkery sites were 5.69 and 5.38. This suggests 'fair' water quality with 'fairly substantial pollution likely' (Hilsenhoff, 1988).

The %Ephemeroptera, Plecoptera, Trichoptera (%EPT) index measures the percentage of individuals from these three orders, which are sensitive to human-induced stressors. The score of 11.1 for site 1 is considered 'fair', while the 28.0 score for site 2 is considered 'good', indicating high water quality (NCDENR, 1997).

The Shannon-Weiner index is a means to calculate diversity. It is a preferred index in many disciplines because it weighs each species exactly according to its frequency without favouring common or rare species. This is in exact contrast to species richness which gives one 'point' to each species present, no matter how many individuals of that species there are. This index ranges on a scale of 0.0 to 5.0, with anything over 3.0 being highly diverse with a probably stable habitat, and anything under 1.0 being low diversity with possible degraded habitat. The results of 1.64 and 1.40 are between the two conditions, trending slightly towards the former.

Table 4: Corkery Creek Benthic data Indices

	SITE 1 (MVC-CC01)	SITE 3 (MVC-CC03)
Species Richness	15	16
Hilsenhoff BI score (order level)	5.69	5.38
%EPT	11.1	28.0
Shannon-Weiner Index	1.64	1.40



Fish Sampling

Fish sampling was performed downstream of Old Coach Road (Site 1), downstream of Diamondview Road (Site 2) and upstream of Bearhill Road (Site 3) on Corkery Creek (see Figure 18 for site locations). At each site 40 meters of Corkery Creek was sampled. The thermal classifications for each fish species found are listed in Table 5 beside the common name of those fish species identified in Corkery Creek. Fish were sampled in July using a single pass electrofishing method as outlined by the Ontario Stream Assessment Protocol.

In total, 14 fish species were found in the three sample locations on Corkery Creek. All species found are considered bait fish or forage fish with the exception of Rock Bass and Brown Bullhead, both of which are game fish.

At Site 1 the fish community is dominated by White Sucker and Johnny Darters. Rock Bass, Emerald Shiner, Bluntnose Minnow and Log Perch were also caught at Old Coach Road.

Just upstream of Site 1 fish were sampled again at Diamondview Road (Site 2). The species found here were the same as the downstream site with the exception that Brown Bullheads were found at Site 2 and Emerald Shiners were not. Creek Chub, Rock Bass and Blacknose Dace were the most abundant fish in Site 2.

At Site 3, Brook Stickleback, Northern Redbelly Dace and Central Mudminnow were the most abundant fish found. This is likely due to the much slower moving water in this sample area and the beaver pond just upstream which these species tend to frequent.

Many factors can effect the fish community found at any site. Some of these factors occur in the immediate area around the site such as habitat available or water temperature. Other factors, like barriers to fish passage, occur far outside of the site boundaries but still influence the fish found.

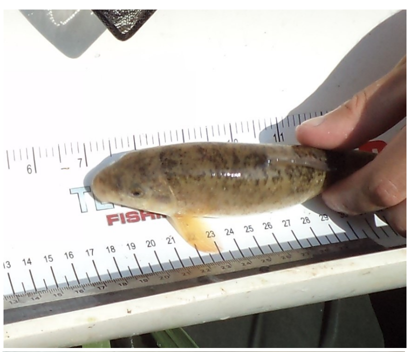


Table 5: Fish Species Found In Corkery Creek

Species Common Name	Thermal Group	Species Present at		
		Old Coach Rd Site 1	Diamondview Rd Site 2	Bearhill Rd Site 3
Blacknose Dace	cool	3	46	3
Brook Stickleback	cool	X	X	21
Central Mudminnow	cool	6	3	33
Common Shiner	cool	7	10	1
Creek Chub	cool	1	57	4
Emerald Shiner	cool	1	X	X
Johnny Darter	cool	46	25	2
Rock Bass	cool	1	11	X
White Sucker	cool	15	6	2
Northern Redbelly Dace	cool-warm	X	X	24
Bluntnose Minnow	warm	5	10	X
Brown Bullhead	warm	X	1	X
Fathead Minnow	warm	X	X	3
Logperch	warm	2	7	X

Potential Riparian Restoration Opportunities

Naturally vegetated shorelines help reduce erosion, filter pollutants from entering the watercourse, assist in flood control and provide food and habitat for a diversity of wildlife. Figure 20(a) and (b) depict the locations identified by MVCA staff and volunteers, as areas for potential riparian restoration activities. We found intermittent areas that could be improved through riparian planting, erosion control, cattle access restriction and invasive species removal.

The next steps will be to approach the landowners and work with them on a voluntary basis to enhance their shorelines through a number of potential activities, such as increasing the unmowed areas along the shore or agreeing to plant and maintain native shoreline species of trees or shrubs.

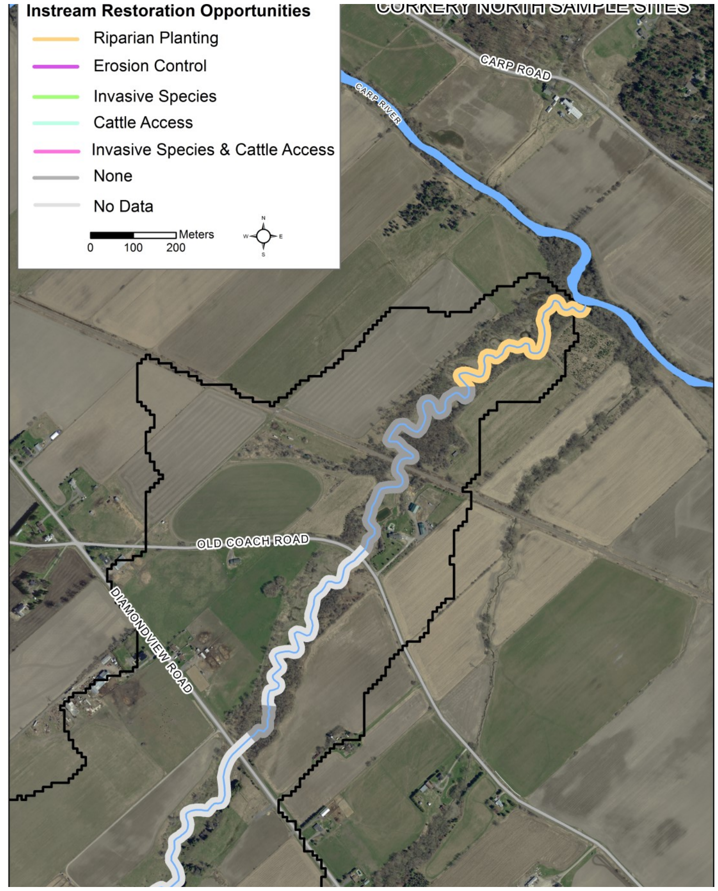
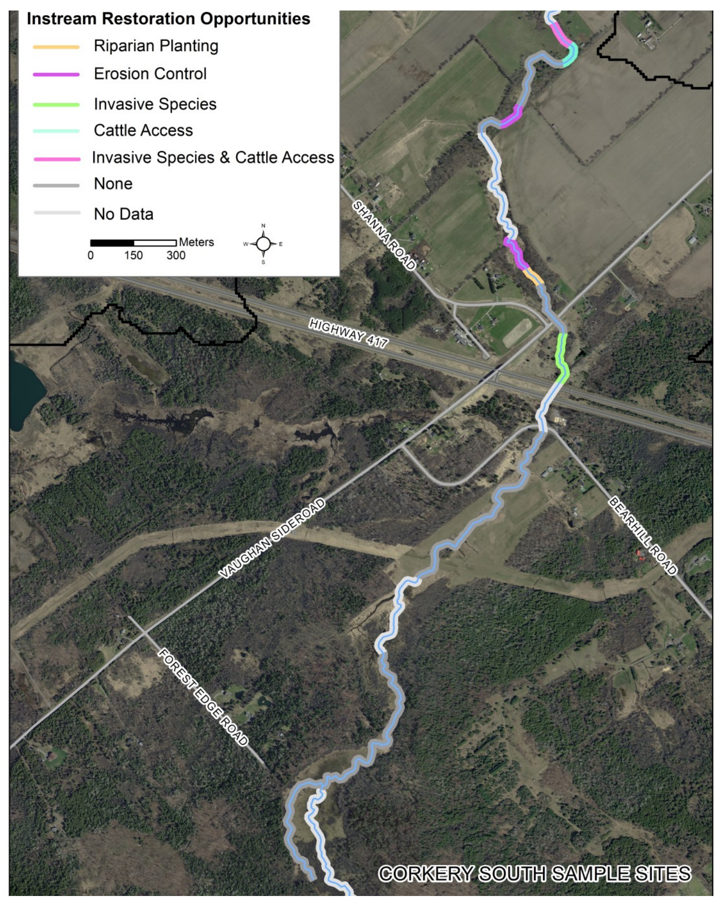


Figure 20(a) and (b): Potential areas for riparian restoration projects.



How Does This Information Get Used?

The City Stream Watch Program is an excellent monitoring program that allows MVCA to be able to assess the condition of subwatersheds over time. Stewardship activities in areas that need further work are completed and improve the health of the ecosystem.

MVCA uses stream surveys to target specific areas that need restoration work. Stream garbage clean ups are carried out, blockages are removed, and shoreline planting, erosion control and habitat enhancements are organized.

Volunteer projects that are carried out as a result of the City Stream Watch Program are:

* Planting trees and shrubs along the shoreline
* Removing invasive plant species
* Stream garbage clean ups
* Learning about and participating in monitoring the streams
* Learning about and participating in fish sampling/identification and wildlife identification
* Learning about and participating in benthic invertebrate sampling/identification
* Participating in natural photography

MVCA is always looking for volunteers to help with monitoring and stewardship programs!
Call 613-253-0006 ext. 253, if you are interested!

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