



Field Crew Supervisor's Report 2022

Prepared for the Wheatley River Improvement Group

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Table of Contents

1. Introduction	1
2. The Acadian Forest	3
2.1 Private Property Plantings	3
3. Stream Restoration	6
3.1 Brush Matting	6
3.2 Live Staking	6
3.3 Invasive Species Control	7
3.4 Stream Clearing	7
4. Community Involvement	9
4.1 Cavendish Beach Hut	9
4.2 Environmental Fun Day	9
4.3 Project SculptShore	9
4.4 Canada Day in North Rustico	9
4.5 Beach Clean-up	10
4.6 River Duck Race	10
5. Rackham's Pond	11
5.1 Maintenance and Trail Improvement	11
5.2 Dredging Rackham's Pond	11
6. Water Quality Monitoring	12
6.1 Estuary Anoxia Monitoring	12
7. Watershed Surveys	13
7.1 Headwater Surveys	13
7.2 Nesting Box Surveys	13
7.3 Stream Crossing Surveys	13
7.4 Macroinvertebrate Sampling	14
7.5 Electrofishing	15
8. Conclusion	15

Figure 1. Areas and land use percentages of watersheds managed by the Wheatley River Improvement Group. 1

Figure 2. Map showing the stream section that was cleared in 2022. 8

Table 1. The number and type of native trees and shrubs planted on properties in 2022. 4

Table 2. Common advantageous traits of invasive species. 7

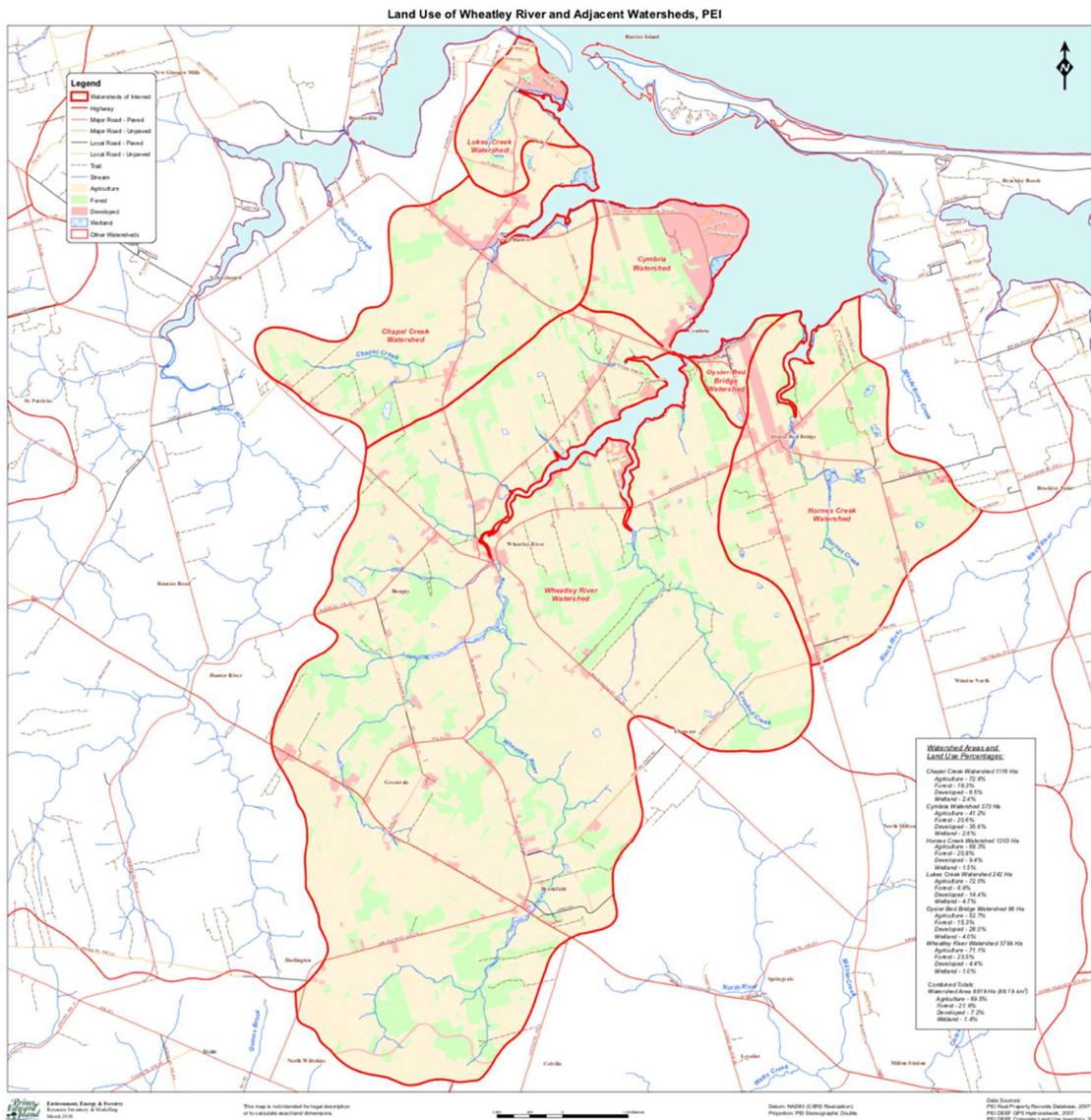
Table 3. Results of macroinvertebrate sampling in 2022. 14

1. Introduction

The Wheatley River Improvement Group (WRIG) is a non-profit watershed group based in Cymbria, Prince Edward Island, responsible for six local catchments totalling 8991.1 hectares. This includes the Wheatley River, Horne’s Creek, Chapel Creek, Cymbria, Luke’s Creek, and Oyster Bed Bridge Watersheds, listed by decreasing area. The following statement, from the 2007 Watershed Stewardship Plan, outlines the purpose and vision of the improvement group:

“The primary purpose of the group is to restore and protect the environmental quality of the Wheatley River and its tributaries. Its vision is one of a healthy watershed with a rich diversity of aquatic and terrestrial plant and animal life. Since the early years, the group has recognized the need to engage other community members, to encourage their sense of being connected and their shared responsibility for maintaining and enhancing the health of the watershed.”

Figure 1. Areas and land use percentages of watersheds managed by the Wheatley River Improvement Group.



The 2022 field season began on May 24th with the arrival of myself, Robyn Caseley, Ella Boyes, and Marika Dykstra. I am a recent graduate from the Wildlife Conservation Technology program at Holland College and joined WRIG as the Field Crew Supervisor/Project Lead. Ella is a student at Holland College taking the Environmental Applied Science Technology program and Marika is a recent high school graduate; they are both watershed technicians. We were welcomed by Maggie McConnell, who is in her fifth year as watershed manager. On June 28th, we were joined by the final member of our team, and watershed technician: high school graduate Daphne Gallant.

The 2022 WRIG team had a very successful summer season, accomplishing native tree and shrub plantings, major stream restoration, water quality, depth, and anoxia monitoring throughout the watershed areas, macroinvertebrate sampling, as well as the enhancement of Rackham's Pond and more.

2. The Acadian Forest

Canada is home to eight major forest regions characterized by the composition of dominant tree species. Prince Edward Island (PEI) belongs to the Acadian Forest Region, which ranges from the maritime provinces and southern Quebec to the northern New England states. Being an incredibly diverse forest, it has many dominant conifers and deciduous trees. Key species of old growth Acadian Forests include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), eastern hemlock (*Tsuga canadensis*), red spruce (*Picea rubens*), eastern white pine (*Pinus strobus*), yellow birch (*Betula alleghaniensis*), and white ash (*Fraxinus americana*). Planting tree and shrub species that evolved to succeed in this area helps restore native ecosystems and improve ecological stability. WRIG aims to re-establish Acadian Forest species within our area, with help from the MacPhail Woods Ecological Forestry Project, the PEI J. Frank Gaudet Nursery, and the PEI Watershed Alliance (PEIWA).

WRIG's motto this summer was "plant less, plant better". In early July, we took part in Woodland Ecology Training at MacPhail Woods led by Gary Schneider. WRIG joined a few other local watershed groups in learning about native plant identification, planting techniques, and the importance of pruning and staking correctly. The team implemented the techniques in our work: we assessed each sapling we planted and established one main vertical stem, or leader.

Native tree and shrub species were planted on private properties. We regularly returned to each planting site as well as previous planting sites to water, prune and weed as needed. The team devoted around one month planting and caring for the 672 trees and shrubs purchased from the PEI J. Frank Gaudet Nursery.

2.1 Private Property Plantings

Collaborating with local landowners helps WRIG monitor and manage a higher proportion of the watersheds' areas. As an Island watershed group, we have access to information, resources, and programs that can help reduce barriers the public faces when planting trees and shrubs. WRIG assists local land stewards with assessing their property, creating remedial action plans, and providing the tools and labour to help actualize said improvements.

This season, WRIG chose two main sites to plant the majority of the native tree and shrub species. The sites were chosen based on stream surveys conducted the previous fall. Among other things, these surveys provided information on which areas had narrow or non-existent buffer zones. Both sites were agricultural fields that had little to no riparian protection from topsoil erosion. Planting trees helps prevent erosion by reducing the impact of rain onto the ground and by acting as a sediment trap between the field and waterway. Additional benefits include beautification, supporting wildlife, increasing biodiversity, and improved air, water, and soil quality. Hedgerows for privacy or wind protection also act as conservation corridors, providing food, habitat, and cover for wildlife. WRIG also did a small amount of planting on five private properties (Table 1).

Table 1. The number and type of native trees and shrubs planted on properties in 2022.

Property ID	1077668 280024 280040	280636	996660	1100924	1027598
Reason for planting	Agricultural field buffer	Agricultural field buffer	Windbreak/Hedgerow	Wildlife & diversity	Windbreak/Hedgerow
SHRUBS					
<i>Aronia melancarpa</i>		18			
<i>Aronia prunifolia</i>	18				
<i>Spiraea latifolia</i>	12	4		2	
<i>Spiraea tomentosa</i>	12	6			
Sweet Gale	18	18			
Willow	18	18			
EVERGREENS					
Cedar	24	30			6
Hemlock, Eastern	12	48			
Larch, Eastern	30	30			
Spruce, Black	30	30			
DECIDUOUS					
Birch, White		30			6
Maple, Red (#15s)	56		4		
Maple, Sugar			3	5	6
Mountain Ash	12	18			6
Oak, Red (#15s)				3	
TOTALS:	242	250	7	10	24

Parcel: 1077668, 280024, & 280040

Our first planting site was adjacent to an agricultural field that sloped towards the stream and consisted of 3 parcels of land. The crew planted nearly 250 different native tree and shrub species along a section of a stream that lacked vegetation. The stream runs through farmland and is susceptible to sediment build-up and high nitrate levels. Planting trees and shrubs will help build up a healthy riparian area that will reduce the amount of run-off, help lower the water temperature and in turn, create a healthy ecosystem.

As a dry area receiving full sun, the native tree species we chose were eastern cedar, eastern hemlock, mountain ash, eastern larch, black spruce, red maple and shrubs. At this location, the grass grew tall so we established planting sites by creating patch cuts 12-feet apart. Once planted, we placed tree guards around the hardwoods. Some of the established species present were mountain ash, willow, and spruce. In the shady areas, we planted eastern hemlock. Each day that we returned to the site to continue planting, we would bring equipment to allow us to water the newly planted trees on this property.

Parcel 280636

At this property we created a windbreak and filled gaps in an existing hedgerow with eastern cedar, eastern hemlock, eastern larch, black spruce, white birch, mountain ash and native shrub species. Thickening the hedgerows provides more wind protection for the property, cover for wildlife and helps prevent silt run-off into the waterway. Reintroducing a variety of Acadian Forest species will help this farmland re-establish more diversely. A total of 250 native tree and shrub species were planted at this site. Once planted, we placed tree guards around the hardwoods. Some of the established tree species present were spruces, willows, and birch. We returned throughout the season for tree checks.

Parcels 996660, 1100924 & 1027598

A total of 41 tree and shrub were planted on personal properties. Seven maples were planted along the edge of the first property to create a windbreak and hedgerow. Five sugar maples, three red oaks, and 2 shrubs were planted on the second property to increase species diversity and attract wildlife. Finally, 6 each of white birch, sugar maple, mountain ash and cedar were planted on the third private property to fill in the hedgerow and replace some trees that were damaged from the previous year's planting.

3. Stream Restoration

Natural streams typically have a meandering path and alternating riffle-pool pattern. Human activity can disrupt this configuration, thereby weakening the ecosystem and impeding local wildlife populations. Severely degraded streams may require intervention to help restore a natural stream pattern. This summer, stream restoration techniques employed were brush matting, planting dogwood cuttings in the riparian zone (live staking), invasive species control and stream clearing (alder removal).

3.1 Brush Matting

Sediment influx is one of the primary concerns for most PEI watersheds. Soil erosion leads to sediment deposition in waterways, which in excess, can overwhelm stream reaches, by filling in pools, aggrading streams, and degrading fish and invertebrate habitat. When soil erosion prevention and uncontained sediment interception have failed, habitat remediation is necessary. Brush mats capture in-stream sediment and accelerate its deposition on the inside of stream bends. They can also narrow streams, encourage sinuosities, and provide fish and invertebrate habitat. Over time, successful brush mats are naturalized by bank encroachment. Brush mats were constructed on point bars and made using wooden stakes, biodegradable twine, and branches of coniferous trees and alders.

During the 2022 summer season, WRIG installed seven brush mats on point bars at four separate locations. The sites were chosen after a sediment survey was conducted within the Wheatley River watershed. These sites were considered high-priority due to the sediment input from these locations.

The first two brush mat sites were constructed on point bar erosion sites. They were constructed instream on parcel 240192 and parcel 229971. A total of two brush mats were constructed and each was 10.2 meters in length.

The third brush mat site was on parcel 240689 on the streambank directly under a bridge. This site was chosen because of the mud, sand and silt built up below the structure. Due to the bridge, the area was deemed too shady to live-stake. The entire stream edge area beneath the bridge had brush mats installed. On one side, the brush mat was 11.7 meters and on the other was 10.2 meters.

The fourth brush mat site was on parcel 867507. This site was chosen due to the heavy amount of bank erosion. Three brush mats were constructed along this stream. The lengths were 4.6 meters, 9 meters, and 10.6 meters.

3.2 Live Staking

Approximately 500 red osier dogwood cuttings collected in the spring and stored at the PEI J. Frank Gaudet Nursery were planted at 3 separate sites. 150 stakes were planted along a section of stream in Greenvale, 150 stakes were planted along a section of stream off the Art Ford Cross Road, and 200 stakes were planted downstream of Rackham's Pond.

3.3 Invasive Species Control

Any species that is not native to an area, tends to spread, and threatens the area's environmental, economic, or social health is considered invasive. On PEI, the introduction of invasive terrestrial vegetation is closely related to the importation of exotic plants for ornamental gardening or agriculture. Aquatic invasive species generally arrived via ballast water. Key characteristics of invasive species that promote their success are listed below in Table 2.

Table 2. Common advantageous traits of invasive species.

Trait	Advantage
Habitat generalists	More likely to find suitable habitat
Opportunists	Establishment in disturbed environments
Early germination	Early use of limited resources
High seed production	Rapid population growth
Small seed mass	Facilitated seed dispersal
Seed adaptations	Enhanced dispersal ability
Vegetative reproduction	Rapid population growth
Vine-like growth	Out-compete other vegetation

The monitoring and management of invasive species can help minimize their ecological impacts; however, they are inherently difficult to eradicate. Invasive species can outcompete native species, thereby reducing biodiversity, degrading wildlife habitat, and compromising ecosystem structure and function.

Within our watershed, we encountered the invasive species “yellow flag iris” (*Iris pseudacorus*). It can invade stream margins, choking out native vegetation in the riparian zone. It propagates either by stems, seeds, and roots spreading via wind and/or water. While wearing gloves to prevent irritation, we cut off the flowers before they went to seed. This prevents the spread of the species from flowing further down river. The flowers were placed in clear plastic bags and labelled as “invasive species”. Further management of this species will be discussed before next season.

3.4 Stream Clearing

WRIG successfully completed 1.5km of stream clearing and assessing the health of the accompanying riparian zone. Beginning at the Art Ford Cross Road crossing and walking upstream, we followed the stream towards the Compost Road. The crew walked the stream and removed large blockages and islands that had formed in response to the blockages. The blockages include fallen trees, alders, bittersweet nightshade, and large amounts of debris.

Figure 2. Map showing the stream section that was cleared in 2022.



4. Community Involvement

Over the years, WRIG has focused on stream enhancement and restoration. With help from the community, watershed groups can achieve their goals and work towards creating healthier waterways. In order to work towards a positive change, the community must shift both their thinking and actions regarding land and water management practices. This change will happen when they become aware of their impacts, get involved in watershed planning, and have a chance to learn and discuss environmental problems. Community involvement and public outreach events are a great way for watershed groups to meet with their communities and discuss different challenges they face.

4.1 Cavendish Beach Hut

Beach Hut is an event that takes place in Cavendish National Park. Local watersheds including Hunter Clyde Watershed Group, Trout River Environmental Committee, and Wheatley River Improvement Group team up with staff from Parks Canada along the boardwalk at Cavendish beach. This summer, WRIG participated every second Tuesday and presented different topics to the locals and tourists. The topics included: native tree species in the Acadian forests, bat monitoring, shorebirds, nesting boxes, and the work/projects watershed groups undertake. In total, the crew spoke with over 200 people at these events.

4.2 Environmental Fun Day

This summer we teamed up with HCWG as we hosted the 12th annual Environmental Fun Day. We welcomed nearly 100 kids from 3 local schools to Campbell's Pond, New Glasgow PE for an active learning day. The children had a chance to learn about nature, in nature, as they visited different presenters set up around the pond. Among the presenters were: Bedeque Bay Environmental Management Association, Nature PEI, PEI Watershed Alliance, Fish and Wildlife PEI, and Island Falconry. The children were given an electrofishing demonstration and able to see different species of falcons. Other topics included information about trees, bats, species at risk, and the migration of fish.

4.3 Project SculptShore

This summer a 20-foot baby North Atlantic Right Whale sculpture made its way around the Maritimes to encourage shoreline clean-ups and to spread awareness about the entanglement of whales in fishing gear. The project originated in Nova Scotia. One of the project leaders, Liz is a previous employee of the Hunter Clyde Watershed Group. On July 17th, the whale sculpture came to Charlottetown where we joined with the HCWG and TREC to welcome Liz and her team to PEI.

4.4 Canada Day in North Rustico

North Rustico has an annual celebration for Canada Day including a parade. WRIG continued the partnership with HCWG to provide an information booth in the town to connect with community members and share information about watershed-related topics and give away trees. This year, we were successful in giving community members 30 red maples, 22 sugar maples and 87 red oaks and raising over \$900 in donations.

4.5 Beach Clean-up

On Thursday, August 4th, the WRIG, HCWG, and TREC teams joined forces for a beach clean-up at Barachois Beach. We removed plastic mesh bags, rope segments, plastics, and litter left behind. This beach was especially important to crew this year to ensure it is well maintained for the piping plover inhabitants in the area.

4.6 River Duck Race

At Rackham's Pond, WRIG hosted the annual Wheatley River Duck Race. The WRIG crew prepared for the duck race by installing barrier nets to catch the rubber ducks, constructing a "summer report" board, counting and numbering all the rubber ducks, selling tickets, and placing signs in Wheatley River. The race was held on Saturday August 20th and over 300 rubber ducks raced down Rackham's Pond to the finish line. The WRIG crew was there to provide information to community and answer questions about watershed activities and the duck race.

5. Rackham's Pond

WRIG has been maintaining Rackham's community pond for almost 20 years. 2022 was a big year with the dredging of the pond, this process takes away extra silt and deepens the pond to support more biodiversity. Monarchs were seen feasting on the pollinator garden planted in 2019, and weekly trail upkeep was done by the summer 2022 staff.

5.1 Maintenance and Trail Improvement

The summer season began when the new team worked together to place the floating dock back into the pond. Once a week during the summer, the WRIG crew cut the grass and pulled weeds in the garden at Rackham's Pond. We emptied the garbage cans regularly, and also removed trash from the trail and stream. In the summer, WRIG whipper snipped the trail at Rackham's Pond and laid fresh new mulch, and it was greatly appreciated by the community. This summer, we had children from Immanuel Christian School visit Rackham's Pond to help place signs they had created around the trails to discourage littering and to keep the area clean.

5.2 Dredging Rackham's Pond

Ponds naturally accumulate sediment as the reduction in flow facilitates the settling out of suspended particles. Each year, the level of sediment rises causing the body of water to become shallower at Rackham's Pond. This results in higher water temperatures and creates a poor environment for fish to breed and survive.

This summer the crew prepped Rackham's Pond for it to be dredged. The process began by conducting cross section surveys above the pond. This included taking water depth, sediment depth, and bank measurements every 10 centimetres across the stream. A 200-foot silt boom was borrowed from the PEI Watershed Alliance and the crew installed it instream. The excavator removed silt from 3 sections of the pond. Each section required moving and reinstalling the silt boom. The excavator remained on the left side of the pond and dug 10-foot deep holes into the bank to place the sediment removed from the pond. The excavator removed vegetation from the bank to create a work space. Throughout the procedure, we spread straw from bales along the bank to prevent erosion. When the dredging was completed, we spread oat seed along the bank to promote the growth of vegetation.

6. Water Quality Monitoring

For the 12th summer in a row, WRIG performed weekly water quality testing in the main tributaries of the Wheatley River watershed. A YSI, borrowed from the Watershed Alliance, was used to monitor temperature, dissolved oxygen, specific conductance, conductivity, total dissolved solids, salinity, pH, and nitrates at 20 different sites. By tracking short- and long-term changes in water quality parameters, WRIG is better equipped to make informed management decisions.

This season, we chose 5 sites out of the 20 to gather more data and measurements. The new data includes taking measurements for bankfull depth, water depth, velocity, sediment depth, instream debris percentage, and the average flow.

This marks the 12th consecutive field season that WRIG has monitored water quality at these sites. A lot of data has been recorded over this time, yet long-term analyses have not occurred. This winter, WRIG aims to upload the data to a secure online platform (Atlantic Data Stream) that simplifies its analysis. This program will also facilitate the sharing of our data with other groups of interest.

6.1 Estuary Anoxia Monitoring

Soil erosion and surface water runoff can lead to an influx of nitrogen in bodies of water. In PEI waterways, the increased nitrogen levels let sea lettuce grow profusely. After a bloom, the dead algal material is broken down by bacterial decomposers that deplete dissolved oxygen. In extreme cases, this can create hypoxic or anoxic conditions that are often lethal for fish, shellfish, and invertebrates.

The Wheatley River estuary turned anoxic in the beginning of July. The WRIG staff conducted a monthly canoe survey of the Wheatley River estuary to monitor for signs of anoxia. Nine sites between Wheatley River and Oyster Bed Bridge were assessed using the qualitative survey from the citizen scientist anoxia tracker program. We recorded water clarity and colour, sea lettuce coverage and condition, and the strength of sulphuric odour. We also measured water temperature, dissolved oxygen, specific conductance, conductivity, total dissolved solids, salinity, and pH using a YSI borrowed from the PEI Watershed Alliance.

7. Watershed Surveys

Carefully designed watershed research improves the reliability of knowledge that is the basis of the watershed management strategies. Watershed technicians can apply scientific methods and make use of techniques in survey sampling. Estimates, comparisons, and models are an effective tool for predicting management choices and long-term monitoring. When possible, we must apply observational and experimental studies to provide a more reliable basis for interpretation and conclusions. Surveys are a great technique associated with the management of watersheds.

7.1 Headwater Surveys

At the beginning and end of the summer season, the WRIG crew used a GPS to navigate their way to the headwater locations. Once at the headwater location, a new waypoint was created to indicate the location of the headwater for the spring season. A visual survey is conducted that described the condition of the water in the stream which is based on a numbering system. Notes were made and photos taken of upstream and downstream.

7.2 Nesting Box Surveys

At the beginning of the summer season, we checked the tree swallow nest box for inhabitants and eggs. The crew used a GPS to find all 25 tree swallow nesting boxes and some of the American kestrel boxes as well. To find out if the nest box was being used, a crew member would peek inside the entrance hole, observe tree swallows flying in/out of the nest box or observe a tree swallow perched on top. In some instances, American red squirrels will make use of the nesting box. If so, the WRIG crew cleans out the squirrel's nest and places a reinforced entrance hole onto the box to ensure the squirrels cannot damage the box.

This summer, we built more nesting boxes to provide them to members of the community, replace damaged boxes, and to encourage community involvement and membership purchases.

7.3 Stream Crossing Surveys

Having accessible fish passage is important to watersheds so that native fish species have a healthy ecosystem for breeding and survival. They play an important role for a community of anglers and are a large part of the food chain.

Crossing assessments entail measuring and surveying any stream crossing to ensure they will not negatively impact fish passage. Stream crossings such as culverts, bridges, or other man-made structures can impede fish's ability to navigate a waterway for breeding purposes. The crew surveyed 124 crossing structures. Measurements were taken to indicate if the flow of water was adequate or not. Culverts were examined for blockages, signs of damage, and overhang. Bridges were examined for rot, integrity, and signs of impeding passage. While conducting these surveys, two barred owls were heard calling to each other so we followed the "who-whos" and spotted a barred owl perched on an old birch tree.

7.4 Macroinvertebrate Sampling

WRIG took macroinvertebrate samples from different streams within the watershed. The sites chosen were the same 5 sites from water quality monitoring in which the extra measurements were taken. The macroinvertebrates were collected using the kick net method. The samples were collected from the net and properly stored for the sorting and identifying of each species. Macroinvertebrates are important for stream assessments because certain species represent either poor stream conditions or good stream conditions. Four samples were taken and sorted using dissecting microscopes on rainy days throughout the season. We did not return to 2 sites. We collected two samples from Rackham's Pond because the first sample (#3) became compromised. The EPT results indicate that the streams tested are healthy. See Table 3 below for results.

Table 3. Results of macroinvertebrate sampling in 2022.

Macroinvertebrates	Sample #1: Little Bungay	Sample #2: Crooked Creek	Sample #3: Rackham's Pond 1	Sample #4: Rackham's Pond 2
Coleoptera (Beetles)	42	26	7	4
Diptera (True flies)	34	17	15	21
Ephemeroptera (Mayflies)	4	35	2	29
Plecoptera (Stoneflies)	0	24	7	19
Trichoptera (Caddisflies)	81	19	10	33
Lepidoptera (Butterflies/Moths)	5	1	0	0
Odonata (Dragonflies/Damselflies)	1	0	0	0
Megaloptera (Alderflies/dobsonflies/fishflies)	0	0	0	2
Hemiptera (True bugs)	0	0	0	0
Snails	0	0	0	0
Clams	17	0	0	0
Midges	16	63	35	57
Worms	0	9	6	2
Totals:	200	194	82	167
EPT Index:	42.5%	40.2%		48.5%

7.5 Electrofishing

Electrofishing is a fish survey technique that uses direct current electricity flowing between a submerged cathode and anode. The fish become stunned for approximately 2 seconds, allowing a person to net them quickly. When netted, the fish are placed into holding bins for surveying and released shortly after.

This season, we teamed up with HCWG to assist them with electrofishing in their watershed. Nicole (watershed coordinator) operated the electrofisher, while her crew and ours assisted in netting, measuring, identifying and monitoring the fish species captured. Brook trout were among the main species captured, along with rainbow trout and stickleback. In October, WRIG will borrow the necessary equipment from the PEI Watershed Alliance to conduct electrofishing surveys in their watershed.

8. Conclusion

The Wheatley River Improvement Group had a very successful 2022 summer season, thanks to the hard work of watershed manager Maggie McConnell and our team: Robyn, Ella, Marika and Daphne. We achieved our tree planting, stream clearing, and riparian health assessment goals, as well as surpassing our fundraising and community engagement expectations. I thoroughly enjoyed my time as WRIG's field crew supervisor and have a newfound appreciation for watersheds and their stewards. I am grateful for being offered this position and all the incredible learning opportunities I have had along the way. I am so excited to see what we accomplish in the seasons to come.