Field Crew Supervisor's Report 2019

Prepared for the Wheatley River Improvement Group

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Introduction

On June 17th, the Wheatley River Improvement Group (WRIG) 2019 season began with the arrival of myself, Charlotte Large, as field crew supervisor. This is my first year working with WRIG and I will be starting my Masters in Resource and Environmental Management at Dalhousie University in the fall. I hope to focus on conservation in Northern Canada. Taylor Gallant joined us for this third year at WRIG as our Field Crew Technician, and having just graduated from Bluefield High School, he will be entering his first year at the UPEI to pursue sustainable engineering. Our third crew member was Garett MacDougall as Riparian Health Technician, joining WRIG for the first time as well having also just graduated from high school, and he will be pursuing computer science at Holland College.

WRIG is a non-profit watershed group working out of an office in Cymbria PEI, and we are responsible for four watersheds in the local area. They include the Wheatley River, Hornes Creek, Chapel Creek, and Lukes Creek. Our accomplishments this season include planting 1300 native trees and shrubs within different riparian zones in the area. Stream clearing was done along the Wheatley River, encompassing 5.8 kilometers of stream, which involved the removal of blockages by dead wood and the thinning of alders along the stream bank in order to improve the flow of water and passage of fish in the area. Eight brush mats were installed to repair the stream banks and help prevent silt from gathering in the stream bed. A patch cut was done in this same area in order to facilitate healthier growth of forest in the chosen riparian zone. Water quality monitoring was done weekly in order to assess the quality of fish habitat within our watershed, as well as monthly estuary/anoxia monitoring. A 500 square foot pollinator garden was installed at Rackham's Pond to encourage pollinators such as bees, butterflies, beetles, flies, wasps, hummingbirds, and others to congregate in the area. The new flowers will enrich the soil, create better habitat for pollinators, and overall improve the health of the area. A depth survey was also performed at Rackham's Pond in order to monitor the silting and changes to the pond bed year to year. All this work was accomplished in addition to many community and collaborative events held throughout the season

Tree Planting

We completed our native tree planting between July 2nd and July 19th, allowing the saplings to have a better chance of survival come the dry, hot weather in August. We received a total of 1300 native trees and shrubs comprised of 17 different species from the island tree nursery (see Table 1) and planted them at 3 separate sites throughout the watershed. Of these 1300 trees, 150 were given away by donation on Canada Day in Rustico.

Figure 1: WRIG Tree Planting Sites in the 2019 season. The yellow polygons indicate individual sites.

Table 1: Species Received from the Island Nursery in 2019

Species	Amount
White Pine	100
Balsam Fir	100
Hemlock	50
Wild Apple	25
White Ash	75
Yellow Birch	100
Red Maple	150
Bayberry	50
Red Osier Dogwood	125
Winterberry	100
Wild Rose	50
Pussy Willow	50
Heartfelt Willow	100
Larch	75
White Birch	50
Red Berried Alder	50
Willow Mix	50
Total	1300

Our first site consisted of two properties off the Stead Rd (#1016971 and #240325) that were treated as a single site. One of the landowners had contacted WRIG with concerns regarding the erosion along the estuary bank and potentially problematic deadwood. As such, are main goal was erosion prevention along the estuary bank, as well as wetland protection and extension of the already wooded area. 337 trees and shrubs were planted, varying from water tolerant species such as red osier dogwood or bayberry along the estuary bank to less water tolerant species like red maple, balsam fir, and yellow birch higher up in the field.

Our second site was a large property (#240481) that included an agricultural field with a small stream running adjacent to it, but very few trees or shrubs providing stability and shade amongst the tall grasses and other plants. 288 trees were planted in order to prevent runoff and silting in the small stream, as well as eventually provide shade to stabilize the temperature of the stream.

Our third site was on property #993394, which consisted of a large wetland area that appeared to have once been a beaver habitat. The small stream running through this area opened into a small pond housing a small family of ducks, bordered by a sloped field nearly devoid of trees. 502 trees in total were planted at this site, with water tolerant species such as

larch and red osier dogwood planted in the former beaver habitat and wetland area, while water intolerant species such as red maple, birch, and willow were planted farther up field. A large variety of species were planted at this site to encourage better diversity, as there were only a couple different species along the borders of the site already.

Patch Cut

Figure 2: WRIG Patch Cut (indicated by yellow polygon)

This year, WRIG performed a patch cut within a property #280420. Using our newly acquired chainsaw, we removed a large, sprawling stand of alders from the streambank and planted a variety of water tolerant tree and shrub species in its place. With the area cleared of alders, sunlight can now reach the newly planted trees and shrubs that will grow and strengthen the stream bank to help prevent erosion. We also worked father back within the patch cut to remove dead branches and logs, planting shade tolerant trees such as birch and hemlock in order to try and promote healthy new growth and diversity within the forest.

Stream Restoration

Figure 3: WRIG Stream Restoration Sites in the 2019 season (indicated by yellow path)

This year WRIG restored 5.8 kilometers of stream to encourage native fish passage and spawning habitat, as well as improve the health and water flow of the stream. Our work began directly off Rt 2 (see Figure 3), with property #280396 and ended with property #395352 adjacent to the confederation trail. This section of stream had not been addressed in at least five years. From property #280396 to #715110, this section had very little tree cover aside from an abundance of alders and the stream was directly adjacent to open fields with very high stream banks. There are virtually no root systems at all between these fields and the stream, with only long grasses providing any stabilization and runoff protection aside from the overgrown alders. As a result, the stream bed was comprised mostly of silt 1-2 feet on top of the substrate. This area also contained multiple old beaver habitats that had created a small marsh with almost no water flow at all.

The section of stream on property #280412 was more forested, with many large spruce trees interspersed with young maples. The stream banks, however, were virtually nonexistent and the root systems of these trees provided very little stability or erosion prevention, often being far back from the stream. The stream bed alternated between cobbles and no more than 1 foot of silt on top of the substrate. The areas of the stream with no banks were quite silted and there were signs of heavy erosion. Eight brush mats were installed along this section of stream in order to mitigate the silting and build up the stream banks to a healthier height.

Figure 4: Brushmat Installed on Property #280412 on Wheatley River Tributary to Stabilize Stream Bank

Property #280420 to #280768 was quite healthy, with plenty of trees providing adequate buffer zones and deep root structures to stabilize the high stream bank. There were fewer alders to remove. The stream bed was comprised of cobble rocks, with many excellent areas for fish habitat. However, due to the abundance of large trees in this area and the long interval between when it was last restored, there were many fallen trunks and large root structures that blocked the passage of water and caused the stream to divert itself, causing silt buildup and creating shallower streams. Property #280412 in particular had several large fallen trees that required extensive time to remove. The stream going through property #1033968 to property #295352 had dried up to the point of their being no water flow at all, and there were signs that this had been the case for a long period of time. The crew walked the stream,

removing large logs and branches that could potentially block the stream in the fall and spring when the water levels rise.

From property #298562 to #280057, the stream bed was cobbled with almost no silt buildup, save for a few pockets around large blockages. There were also no alders along this area. Instead, the stream cut through a significant length of old growth forest so that the stream was bordered by large trees with strong root systems preventing erosion and stabilizing the bank. The consequence to this was that there were many large blockages of the stream due to fallen trees and five years worth of buildup against those trees. We removed those blockages using our chainsaw, opening the stream and allowing what little water was present to flow more easily.

We also cleared a section of stream within property #993394 (See Figure 4). This area had a few small blockages due to fallen trees, but was blocked primarily by vegetation that had grown within the stream bed. Once this vegetation was removed, the stream could flow much more easily from the pond on the property in order for small fish to swim downstream.

Figure 5: WRIG Stream Restoration Site on Property #993394 (indicated by yellow path)

CAMP (Community Aquatic Monitoring Program)

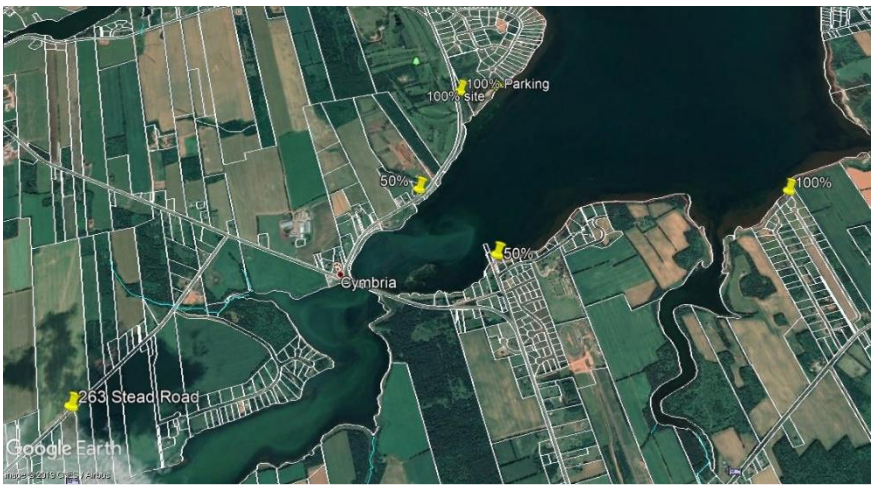

Figure 6: CAMP Assessment Sites for 2019.

This year, WRIG participated in the Department of Fisheries and Ocean's (DFO) Community Aquatic Monitoring Program (CAMP), which is a program that works with environmental community groups to assess and monitor the health of local watersheds in the Gulf

region of Canada. Data was collected monthly (June 13th, July 10th, and Aug 13th) at six different stations along the Wheatley River estuary. Using a beach seine net, fish, shrimp, crabs, and other aquatic life are collected, identified, counted, and released. Data is also collected using a YSI meter, and qualitative assessments of water conditions, aquatic plant life, and sediment are performed. Using this data, DFO conducts analyses to determine what sort of indicators can be used to assess the health of our bays and estuaries. Within the Wheatley River estuary, a close eye is kept on anoxia levels and the amount of sea lettuce present within the estuary in particular, as both are quite serious problems.

Water Quality Monitoring

Figure 7: Water Quality Monitoring Sites Across the Wheatley River Watershed (Luke's Creek not shown)

Water quality monitoring was done every week in the main tributaries of the Wheatley River Watershed, assessing points along Luke's Creek, Hornes Creek, Crooked Creek, the Wheatley River, and Rackham's Pond. WRIG shared the YSI water quality monitoring meter with HCWG, which measures temperate, dissolved oxygen, specific conductance, conductivity, total dissolved solids, salinity, and pH. A total of 22 points were monitored this season, keeping in line with previous years, and this allows WRIG to better understand the changes happening in the watershed, both short term and long term as we continue to monitor these tributaries year after year. This will allow us to make more informed, beneficial decisions regarding future projects and the management of our watershed. All results from this monitoring can be viewed in Appendix A.

Estuary/Anoxia Monitoring

Figure 8: Estuary/Anoxia Monitoring Sites in the Wheatley River Estuary

Estuary monitoring was performed monthly in order to evaluate the severity of anoxic events happening within the Wheatley River estuary. This was done through observational surveys of the colour, cloudiness, and odor of the water, sea lettuce coverage and health, as well as quantitative assessments done with the YSI measuring temperature, dissolved oxygen, specific conductance, conductivity, total dissolved solids, salinity, and pH. Full anoxia occurred at the end of July this year, coinciding with a severe heat wave on the island, with anoxia levels being at an all time high. Quantitative results from estuary monitoring using the YSI can be viewed in Appendix B.

Rackham's Pond

Pollinator Garden Project

A major project this season was the installation of a 500 square foot pollinator garden within the community park at Rackham's Pond on August 5th-6th. The goal of this project is to create more food sources, pesticide protection, and habitat for local pollinators such as bees, butterflies, wasps, flies, beetles, hummingbirds, and other insects. Pollinators are an essentially aspect of local ecology and unfortunately, their habitats are often threatened or destroyed by pesticide use and urban planning. By planting a variety of flowering species that bloom at

different times of the year, this ensures that pollinators have their needs met during the spring, summer, and early fall. This garden will also go a long way to enriching the soil, as it is currently has little to no nutrients needed to sustain plants or grasses. The pollinator garden includes species such as milkweed, butterfly flower, rock cress, creeping phlox, kobold, wild rose, bee balm, and cone flowers of different varieties.

Figure 9: WRIG Pollinator Garden Installed at Rackham's Pond.

In order to serve our local pollinators, the pollinator garden will demand careful maintenance in the coming years. It will require regular watering, particularly within the drier months of July and August. The soil will need to be monitored, turned up and mixed with compost and mulch regularly in order to foster a nutrients rich environment for the flowers. As it currently stands, the soil cannot sustain the plants without significant help. As all the species in the garden are perennials, they will die back in the late fall and return in the spring sprouting more blooms. With regular attention and care, the pollinator garden should grow quite dense with blooming plants within four to five years.

Figure 10: Example of Signage Posted within the Pollinator Garden at Rackham's Pond

The garden has also been installed with signage explaining what a pollinator garden is, why it is planted a certain way, and some information regarding a handful of the flowers we have chosen to plant. In this way, we can engage with the community at Rackham's Pond by offering a small learning opportunity and hopefully encourage some people to plant their own pollinator gardens on their own properties.

Depth Survey

On Aug 28th, WRIG conducted a depth survey of Rackham's Pond, based on a rough outline created last season. The goal of this survey is to examine how the pond bed changes from year to year and observe where silt accumulates and to what degree. Although this assessment of Rackham's Pond is new and only been done two years so far, we can easily examine how the pond has changed during that short time (see Table 2). The average depth of the pond has experienced little change according to these results, however, individual points within the pond have shifted as much as 0.6 meters. This indicates that the silt along the pond bed has not increased or decreased significantly, but merely been displaced by the water current.

2018											
Lengths	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7	Transect 8	Transect 9		Average
5m	1.25	0.59	0.35	0.44	0.66	0.54	0.67	0.755	0.69		0.660555556
10m	1.6	0.45	0.55	0.885	1.21	0.24	0.365	0.305			0.700625
15m	0.59	0.43	0.81				0.705	0.705			0.648
20m	0.71	0.44									0.575
25m	0.49										0.49
2019											
Lengths	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7	Transect 8	Transect 9		
5m	1.28	1.28	0.45	0.35	0.37	0.43	0.48	0.58			0.6525
10m	0.59	0.48	0.3	0.54	0.65	0.84	0.16	0.23			0.47375
15m	0.45	0.35	0.37	0.72	1.7	1.01	0.44	0.84			0.735
20m											n/a
25m											n/a

Table 2: WRIG Depth Survey Results of Rackham's Pond for 2018 Compared to 2019

Community Involvement

Environmental Fun Day

Increasing public awareness about our environment and the current issues that surround it is incredibly important, especially with regards to youth education, as it is our youth that will be tackling the issues of our future. On June 14th, WRIG in collaboration with the Hunter-Clyde Watershed Group (HCWG) hosted Environmental Fun day for approximately 80 students from Gulf Shore Consolidated School, Central Queens Elementary School, and home school. This event, held at the Garden of Hope in New Glasgow, provided students with the opportunity to engage with different aspects of their natural environment. Divided into six teams led by teachers and volunteers, the students went from station to station learning about fly fishing, forestry, monarch butterflies, endangered wildlife, water quality monitoring, and falconry. Each topic was taught by specialists within relevant fields, and at lunch, we were privileged to experience a flying demonstration put on by Jamie Stride from Island Falconry. At the end of the day, students went home with a small tree seedling to plant in their backyards or around their communities. Plenty of students were engaged with the material, asked good questions, and were ecstatic to receive their own trees to plant.

Celebrate Our River Day

On August 24th, WRIG hosted out annual Celebrate Our River Event at Rackham's Pond. This event gives the community a chance to come and learn about their watershed and what WRIG does to maintain and improve the watershed, as well as an opportunity to support WRIG financially and get involved through annual memberships. A booth was set up with information on our work during the 2019 season, the boundaries of our watershed, and offered the opportunity to ask questions and discuss issues within the community. At 12:00pm, we held a barbecue and at 1:00pm, we held our annual duck race. People from the community and beyond participate in the race by buying tickets to sponsor a rubber duck in the race, competing for cash prizes. The race began at the mouth of Rackham's Pond and finished approximately 20 meters downstream.

Collaborations

Canada Day Native Tree Giveaway

On July 1st, WRIG partnered up with HCWG in order to participate in our annual native tree giveaway at the North Rustico Canada Day celebrations. The parade having been cancelled due to rain, WRIG and HCWG set up our booth early at Seawalk Park, which included not only 200 trees to be given away by donation, but also educational information on what watershed groups do, HCWG's PIT tagging project, and opportunities to support our watershed groups through memberships. WRIG contributed 150 trees to the event, with a variety of species such as wild apple, white ash, yellow birch, red maple, and wild rose. This event provides us with the opportunity to engage with a wider community outside of our immediate localities and allows us to try and educate a wider audience about what we do and why we do it. At the end of the day, all 200 trees were given away by donation to be planted in the local community.

Beach Hut

Every alternate Tuesday from 1:00pm-4:00pm, WRIG joined with Parks Canada to participate in an educational booth set up at Cavendish Beach. We presented different environmental topics to the public using various visual aids and provided information about watershed groups and what we do. Some of the topics included: island amphibians, native ducks and waterfowl, water quality monitoring, mammals of PEI, fish in our local streams, and more divided between WRIG and HCWG.

Beach Cleanup

On July 12th, WRIG partnered up again with HCWG to spend a day cleaning up various shorelines and beaches within the WRIG watershed area. The first location that was combed for trash to remove was Barachois beach in Cymbria, North Rustico, and the second location was along the shoreline adjacent to the Oyster Bed Bridge, also in North Rustico. Although these

areas had already been fairly clean already due to the efforts of environmentally conscious local community members, we still removed an entire truck bed's worth of garbage from these locations.

Hedge Removal at Campbell's Pond

From August 12th- 20th, WRIG worked with HCWG in order to remove trees and brush necessary for the construction of a new fishway at Campbell's Pond. This was the first of two pre-construction phases for this major project, and with the removal of these trees, a new pathway will be created to allow fish to more easily access the pond. The current fish ladder does not allow enough access to the pond from the river, but with a new fishway with less of a slope, hopefully many species of fish of all sizes will be better served. This should allow for healthier migration and breeding within the area.

APPENDIX A
Water Quality Monitoring Results

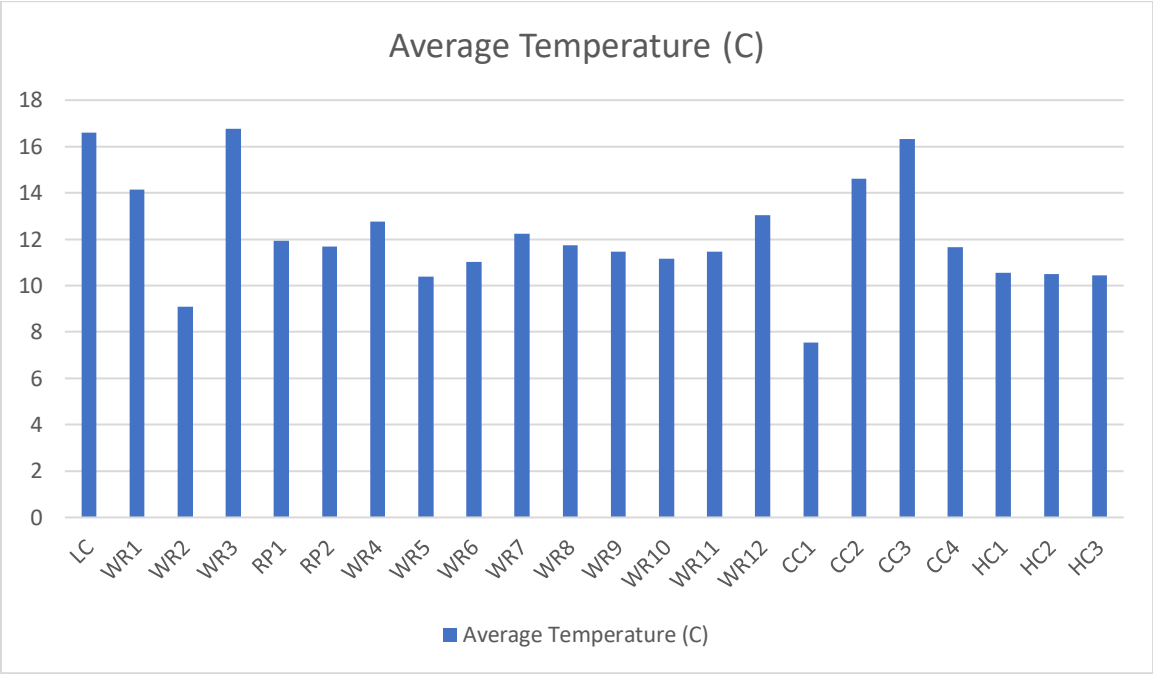

Figure A- 1: Average Temperature Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

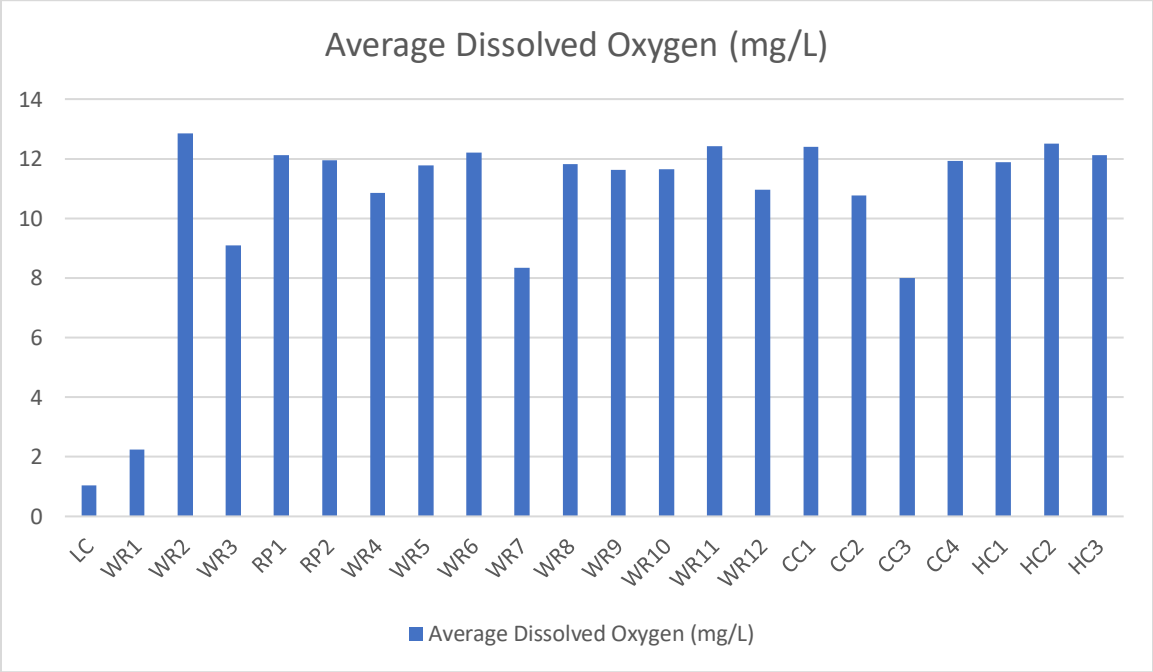

Figure A- 2: Average Dissolved Oxygen (DO) Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

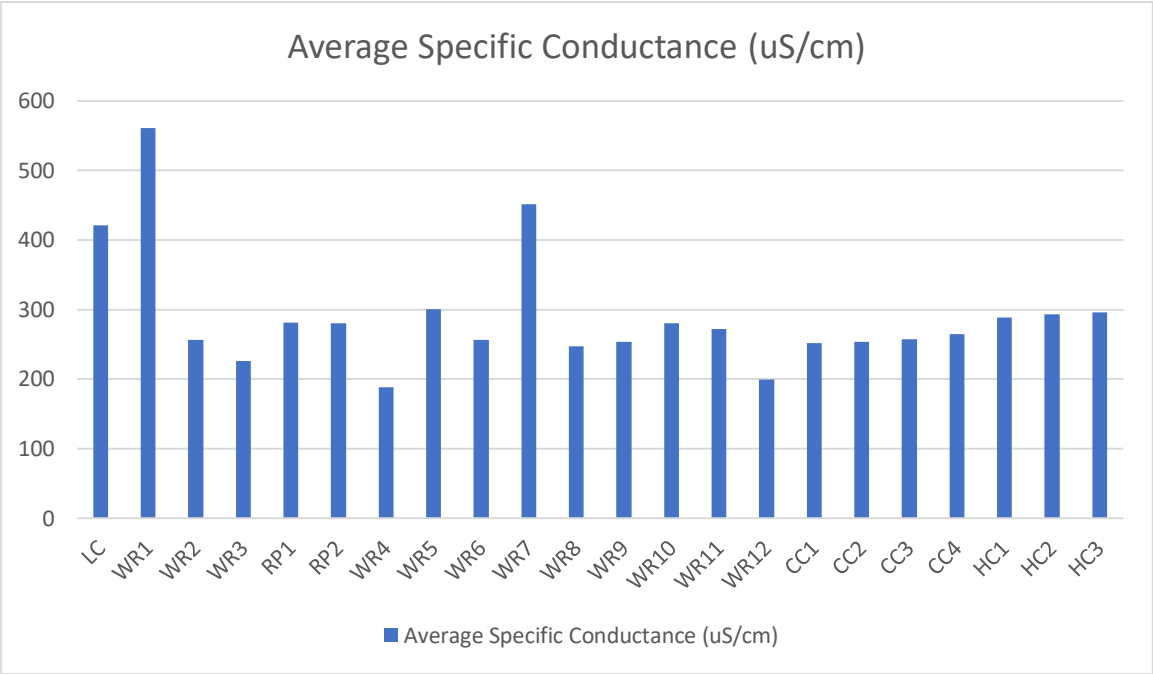

Figure A- 3: Average Specific Conductance (SPC) Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

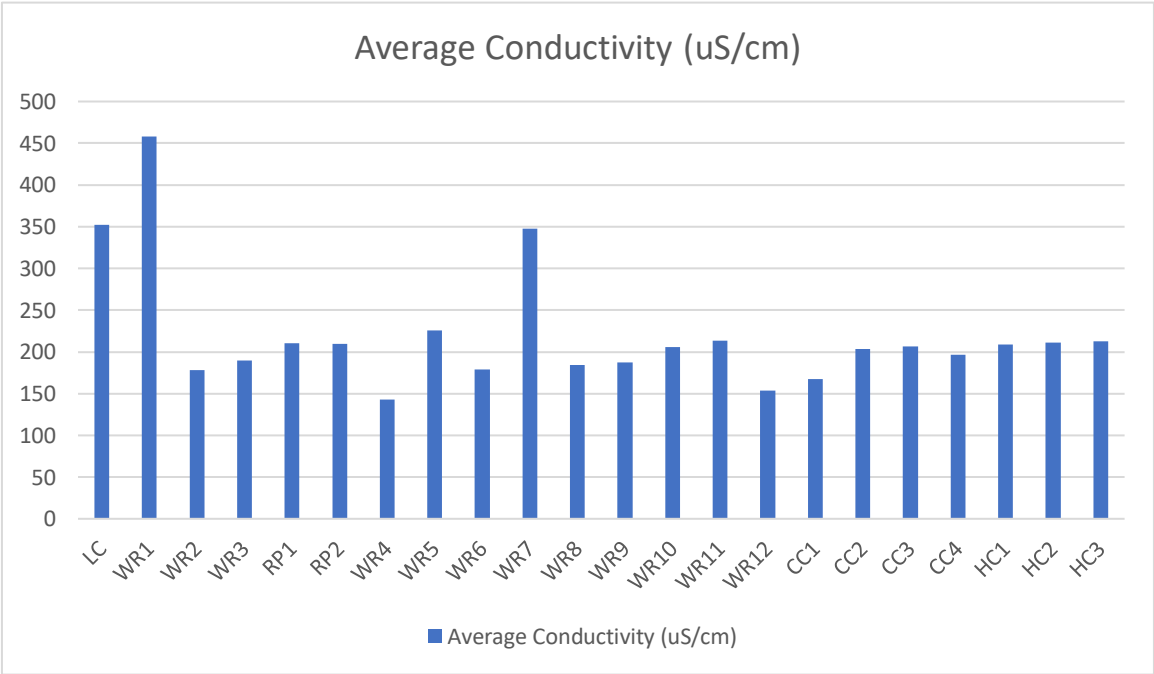

Figure A- 4: Average Conductivity (C) Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

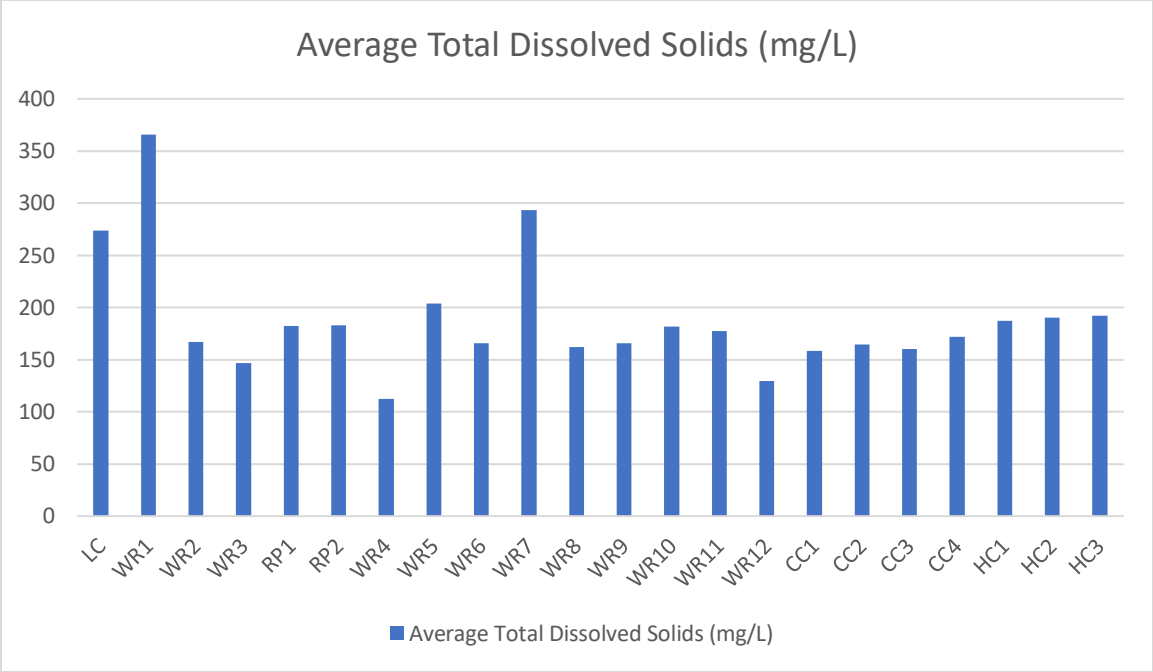

Figure A- 5: Average Total Dissolved Solids (TDS) Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

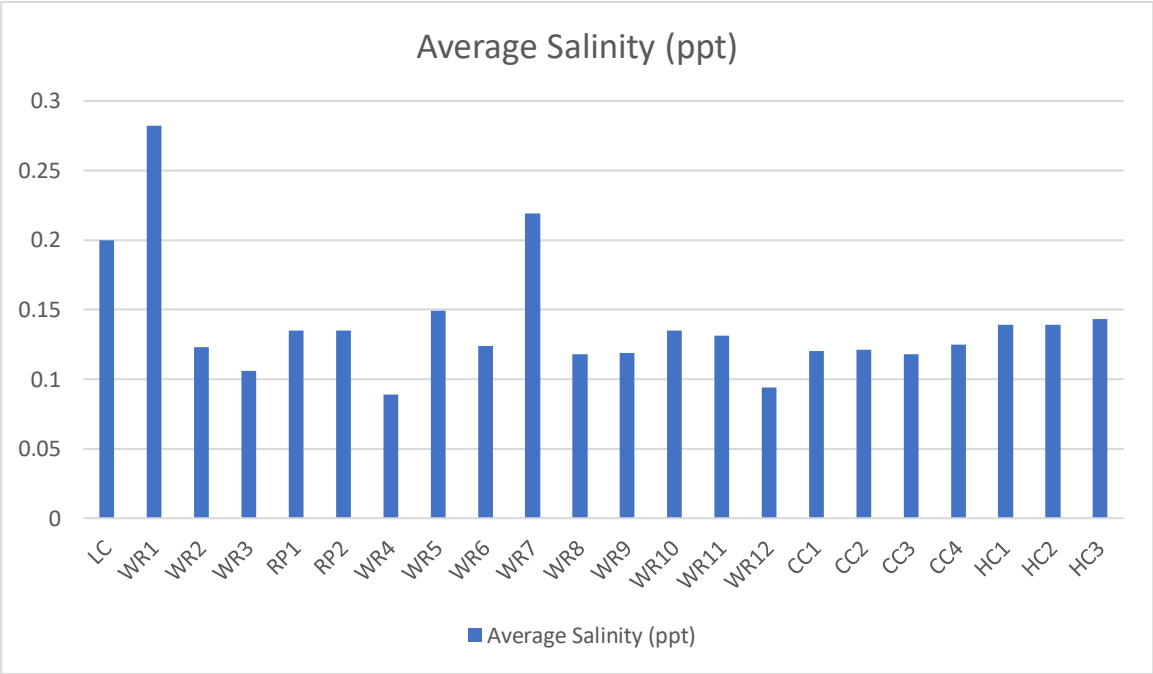

Figure A- 6: Average Salinity Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

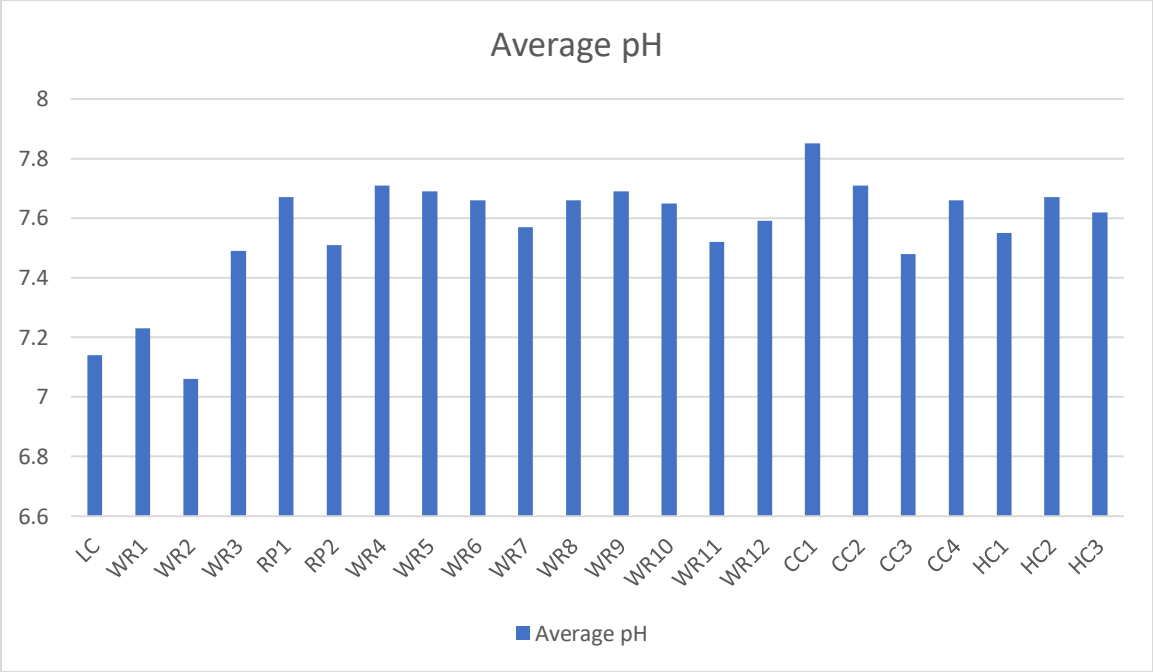

Figure A- 7: Average pH Across Water Quality Monitoring Sites in the Wheatley River Watershed. Data Accumulated Using YSI Sampling Meter.

APPENDIX B
Estuary/Anoxia Monitoring Results (Quantitative)

Date	Station ID	Latitude	Longitude	Temperature (*C)	Dissolved Oxygen (mg/L)	Specific Conductance (uS/cm)	Conductivity (uS/cm)	Total Dissolved Solids (mg/L)	Salinity (ppt)	pH
9-Jul-19	AS-1	46.373390	-63.288854	11	10.85	304.3	223.2	199.55	0.15	7.48
9-Jul-19	AS-2	46.376271	-63.291364	11.6	13.14	269.3	199.7	174.85	0.13	9.12
9-Jul-19	AS-3	46.381115	-63.285959	15.8	10.13	225	5713	4615	4.05	7.85
9-Jul-19	AS-4	46.385520	-63.278077	20	12.8	214448	19156	13422	12.82	8.63
9-Jul-19	AS-5	46.391554	-63.264804	20.4	13.87	28545	26919	19976	17.66	8.82
9-Jul-19	AS-6	46.395084	-63.254072	20.2	12.5	31278	28419	20332	19.5	8.78
9-Jul-19	AS-7	46.397553	-63.254553	20.4	10.49	35495	32363	23198.5	22.57	8.55
9-Jul-19	AS-8	46.401919	-63.252829	20.5	8.01	38600	35262	25090	24.6	8.11

Table B- 1: Estuary/Anoxia Monitoring Results of the Wheatley River Estuary Assessed July 9th, 2019. Data Accumulated Using YSI Sampling Meter.

Date	Station ID	Latitude	Longitude	Temperature (*C)	Dissolved Oxygen (mg/L)	Specific Conductance (uS/cm)	Conductivity (uS/cm)	Total Dissolved Solids (mg/L)	Salinity (ppt)	pH
31-Jul-19	AS-1	46.373390	-63.288854	18.8	7.64	9982	8683	6539.5	5.68	8.03
31-Jul-19	AS-2	46.376271	-63.291364	14.7	9.75	737	609	500.5	0.4	7.75
31-Jul-19	AS-3	46.381115	-63.285959	23.4	1.61	30132	30704	19571	18.01	7.18
31-Jul-19	AS-4	46.385520	-63.278077	23.2	5.37	21775	23647	15996	15.44	7.51
31-Jul-19	AS-5	46.391554	-63.264804	25.3	4.41	32537	32830	21203	20.38	7.61
31-Jul-19	AS-6	46.395084	-63.254072	25.1	7.39	33806	33880	21963	21.17	8.02
31-Jul-19	AS-7	46.397553	-63.254553	24.8	5.81	35818	35600	23270	22.59	7.82
31-Jul-19	AS-8	46.401919	-63.252829	25.8	9.98	33844	34611	22145.6	21.36	8.01

Table B- 2: Estuary/Anoxia Monitoring Results of the Wheatley River Estuary Assessed July 31st, 2019. Data Accumulated Using YSI Sampling Meter.

Date	Station ID	Latitude	Longitude	Temperature (*C)	Dissolved Oxygen (mg/L)	Specific Conductance (uS/cm)	Conductivity (uS/cm)	Total Dissolved Solids (mg/L)	Salinity (ppt)	pH
28-Aug-19	AS-1	46.373390	-63.288854	14.5	13.29	287.7	229.4	186.55	0.14	7.8
28-Aug-19	AS-2	46.376271	-63.291364	13	13.75	850	749	611	0.43	7.33
28-Aug-19	AS-3	46.381115	-63.285959	18.9	8.6	26678	23862	17485	16.69	7.25
28-Aug-19	AS-4	46.385520	-63.278077	19.2	14.3	18468	16478	12038	11.04	7.92
28-Aug-19	AS-5	46.391554	-63.264804	20.6	9.28	28169	25822	18356	17.42	7.9
28-Aug-19	AS-6	46.395084	-63.254072	21.5	13.33	31594	29506	20546	19.78	8.04
28-Aug-19	AS-7	46.397553	-63.254553	20.9	7.8	30791	28347	20078	19.17	7.94
28-Aug-19	AS-8	46.401919	-63.252829	22.1	7.35	32954	31120	21417	20.64	7.47

Table B- 3: Estuary/Anoxia Monitoring Results of the Wheatley River Estuary Assessed Aug 28th, 2019. Data Accumulated Using YSI Sampling Meter.