Northeast Avalon ACAP's Wetland Survey Project
Final Report for the 2011-2012

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Executive Summary

During 2011- 2012 the Northeast Avalon ACAP (NAACAP) conducted a Wetland Survey project. The purpose of the project was to gain baseline knowledge of the wetlands located throughout the Northeast Avalon Peninsula of Newfoundland and Labrador, with emphasis placed on those wetlands that were potentially at risk from the rapidly increasing development within the region. It was determined that there were six main threats to the wetlands on the Northeast Avalon: agriculture; impervious surfaces; residential, commercial/institutional or industrial building lots; roadways; culverts; and dams. In total 22 wetlands were visited. Plant inventories and invertebrate identification sampling provided information on the flora and fauna present in the surveyed wetlands, including the presence of non-native plants. Water quality parameters (temperature, dissolved oxygen, pH, salinity, conductivity and total dissolved solids (TDS)) were recorded for water bodies adjacent to the surveyed wetlands. A strategy for analyzing potential stressors, the *Stress Evaluation Rubric*, a threat calculator, was developed and applied to each of the 22 wetlands surveyed based on wetland boundaries delineated in Google Earth.

Our study found that targeted wetlands encompassed a range of both native and non-native flora and fauna reflecting both wetland species and species found in the surrounding area, which reflected a range of stressors associated with human developments. The water quality data obtained were, with a few exceptions, within recommended ranges for the protection of aquatic life.

The information obtained during the 2011-2012 Wetland Survey project is beneficial baseline data, which to date had not been investigated, for more in-depth projects. Using the established survey template and Stress Evaluation Rubric, this project has a great potential to expand into the future, with more wetland sites visited and improved methodologies, to link wetland health with intensity of disturbance caused by human development.

Acknowledgements

This project was made possible by a number of people and organizations. First of all, the NAACAP board members and staff who helped to design the project and provide assistance throughout its life. The collection of field data was completed by a Conservation Corps Green Team who devoted most of their summer employment time to the project. The Department of Biology at Memorial University of Newfoundland provided assistance with survey methodology. The Memorial University Botanical Garden provided assistance with plant identification. John Maunder and Luise Hermanutz provided assistance with the identification of non-native plants for the region. The Kelligrews Ecological Enhancement Program and the Conservation Corps Green team employed by the town of Conception Bay South provided assistance with the collection of field data from the sites in the Kelligrews area. The city of Mount Pearl provided insight on wetlands of interest in Mount Pearl and provided maps of their locations. Last but not least, Environment Canada provided the main source of funding for this project.

Table of Contents

List of Figures and Tables

1.0 Introduction

1.1 Project Focus

The purpose of NAACAP's 2011-2012 Wetland Survey was to increase knowledge on the existing wetlands located on the Northeast Avalon Peninsula of Newfoundland and Labrador, as to date there has not been a systematic survey of wetlands to determine the link between wetland health and persistence and anthropogenic disturbance. Plant life, invertebrate life and water quality parameters were recorded for the surveyed wetlands in order to provide a preliminary estimate of composition of the wetland ecosystems of the Northeast Avalon Peninsula. A ranking of the wetlands was intended to provide a score of the overall threat level to a particular wetland, based on the hypothesis that overall wetland health decreases as anthropogenic development ("threats") increase in the surrounding. This project was designed to provide preliminary insight into wetlands of the Northeast Avalon Peninsula, and can be used as a foundation for future studies. Additionally, as this is a preliminary investigation, there is also an opportunity to improve upon methodologies for future studies.

1.2 What is a wetland?

The definition of a wetland can vary among different sources. Environment Canada (2012) defines wetlands as:

> "Lands that are seasonally or permanently covered by shallow water, including lands where the water table is at or close to the surface. The presence of abundant water causes the formation of hydric soils and favors the dominance of either hydrophytic or water-tolerant plants. The five major types of wetlands are: marshes, swamps, bogs, fens, and shallow open waters."

From the above definition, the term hydric soils are saturated soils. There are distinct variations between the types of wetlands given in the definition, but detail was not given to the wetland types in this study and therefore no further definition will be given.

1.3 Functions and Benefits of Wetlands

In the past, wetlands were sometimes viewed as wasteland areas that served no important function and actually hindered important land uses. In some cases, wetlands were even viewed as areas that were dangerous or carried disease (Moore, 2008). However, wetlands carry out critical ecological functions and provide ecosystem services within watersheds and offer numerous natural benefits to human society.

Wetland ecosystems are very diverse. They provide habitat for many species of flora and fauna, some of which are found only in wetlands, and some of which are at risk or endangered. Some species rely on wetlands for their whole lifecycle, and others only for a part of it, for

example for reproduction. Wetlands serve as vital ecosystems for sustaining a wide variety of flora and fauna populations.

Wetlands are an important component of a watershed, and interact with nearby ponds, rivers, and ground water. They are often referred to as nature's kidneys because of their ability to filter various pollutants, including those from surface water runoff (Natural Resources Canada, 2009). This filter ability becomes increasingly important as deforestation and increases in impermeable surfaces occur as a result of increased anthropogenic land use. Wetlands intercept the direct path of pollutant laden surface waters to local ponds and rivers from impermeable and bare surfaces. Wetland vegetation removes nutrients from the water and cycles them through the food chain (Natural Resources Canada, 2009). The slowing of water movement as it passes through wetland vegetation can also result in silt settling out of the water (Natural Resources Canada, 2009), minimizing the threats to both water quality and aquatic life, such as salmon species, that can be associated with siltation and increased water turbidity.

Wetlands can also be viewed as sponges, retaining water during wet periods and releasing it during dry periods (Ducks Unlimited Canada, 2011). In this regard, wetlands can be a natural defense against flash floods of water bodies by retaining water and releasing it slowly into nearby rivers and ponds. This also minimizes erosion of stream banks, reducing the threat of water siltation and its possible negative effects on water quality and aquatic life. A decrease in the flood potential of waterways means that human development and infrastructure are at a decreased risk of flood damage, minimizing the significant costs related to damage repair. The sponge-like nature of wetlands can also potentially contribute to ground water level recharge, with water slowly dissipating into the water table from the wetland (Ducks Unlimited Canada, 2011). This in turn is important in maintaining surface water levels, as ground water is often a source of surface water refuel.

Wetland environments help improve air quality by acting as carbon sinks. Carbon released from decaying organic matter remains in the wetland rather than being released into the atmosphere as carbon dioxide, which is a greenhouse gas (Natural Resources Canada, 2009).

Wetlands also serve as recreational and educational venues. Their high ecological diversity makes them ideal locations for outdoor education activities. They are also common bird watching locations, and are attractive natural locations for walking trails.

1.4 Wetland Threats and Pressures

There are multiple factors that can negatively affect wetland health and place pressure on the wetland ecosystem, many of which are directly human induced. As noted above, wetlands were, and can often still be, seen as valueless lands that can be put to better usage. Oftentimes, these better uses include urban development and agriculture. In Canada, over 80% of wetlands near urban areas have been converted for use in urban expansion or agriculture (Natural Resources Canada, 2009). Wetlands can also be drained to obtain valuable peat (Moore, 2008). Toxic inputs resulting from surface water runoff have the potential to alter the water quality of a wetland and damage its overall health. Non-native aquatic and plant species can also threaten the

biodiversity of wetlands, by out-competing native species and altering hydrology patterns and nutrient regimes.

Built infrastructure such as roads that allow access to various types of human development also pose threats to wetland ecosystem health. Research has shown that the density of roads impact the biodiversity of wetlands, and not only when the road runs directly through or alongside a wetland (Forman et al., 2003). Roads interrupt natural connectivity between water flows and habitat and provide a direct passageway for contaminants that are related to ice control, road construction, and automobile function (Forman et al., 2003).

1.5 Study Area

The project study area is the most eastern portion of the province of Newfoundland and Labrador, the Northeast Avalon Peninsula. The Northeast Avalon Peninsula encompasses fifteen rural and urban municipalities, with a total human population of just over 200,000 (approximately 40% of the province's total population). The fifteen municipalities are: Pouch Cove; Flatrock; Bauline; Portugal Cove- St. Philip's; Torbay; Paradise; St. John's; Mount Pearl; Conception Bay South; Logy Bay- Middle Cove- Outer Cove; Petty Harbour-Maddox Cove; Bell Island; Bay Bulls; Witless Bay; and Holyrood. These municipalities are of varying sizes and populations, some of which have a mainly urban composition, while others are primarily rural, or a mix of the two. As a result, there are varying levels of infrastructure development and agricultural activity amongst these municipalities. This wide distinction of municipal characteristics is the foundation for a large number of different watershed issues. The Northeast Avalon area has experienced a population increase. From 1981 to 2006 the population of the area increased, while the population of the province decreased (Government of Newfoundland and Labrador, 2008). In that same time frame, the Northeast Avalon experienced a population increase of 17.2% (Government of Newfoundland and Labrador, 2008).

Increases in population are usually met with an increase in the infrastructure associated with development to accommodate the growth. As such, the Northeast Avalon as a whole has and continues to experience increased development. This includes new highways, new housing developments, and new commercial areas. Agriculture represents a small component of some municipalities in the region, and there are instances of land conversions to agricultural grounds, including sod farms and forage fields. Abrupt changes in land use often negatively impact wetlands. Wetlands are routinely filled in and disrupted, which decreases biodiversity and harms the overall ecosystem health.

2.0 Methodology

A list of wetlands on the Northeast Avalon Peninsula threatened by development was compiled in the spring of 2011. Selected wetlands were those that were located in close proximity to development already in existence, and developments planned for the future. Members of municipal councils also suggested wetland sites during consultations with NAACAP. Throughout the summer of 2011 these locations were visited in no particular order or

priority level. Wetland visits included conducting a plant identification survey, collecting water samples for invertebrate identification, and recording water quality parameters of waterways located adjacent to each wetland. Site sketches were drawn with plant survey and invertebrate sampling locations indicated so these sites could be potentially revisited in the future. At the end of the field season 22 sites had been visited. Wetlands visited were not all listed on the preliminary list that was prepared in the spring, but were thought to be appropriate study areas when they were visited based on the potential for adjacent developments to cause stress to the wetland ecosystem.

2.1 Plant Survey Methodology

Plant inventory data were collected using a belt transect survey method. At each studied wetland, a transect was laid from an easily definable point such as a roadside, tree line, riverbank or trail way. The length of each transect varied depending on the size and accessibility of the wetland, but was always a multiple of five. A one meter squared quadrat was centered on the transect line at five meter intervals. The number of transects surveyed varied between wetlands, as they were based on relative wetland size (wetland area was not calculated).

Plants found within each quadrat were counted and percent cover estimated. Plants were identified by their common names. Grasses, sedges, rushes and ferns were not identified to species due to difficulty in correctly identifying species. Plant identification was determined on site using identification field guide booklets including: *A Field Guide to Wildflowers Northeastern and North-central North America* by Roger Tory Peterson and Margaret McKenny; and *Native Trees and Shrubs of Newfoundland and Labrador* by A. Glen Ryan. Plants that could not be identified in the field were noted, sketched or photographed and later identified with the help of botanists. Data obtained during the field visits were later transferred to digital format.

Using the plant survey data collected, a richness value was obtained that was indicative of the number of different plants or plant groups identified at each site. The values would be underestimates of the true richness, as species were grouped by plant type, as described above. The number of non- native plant type at each site was also determined. Non-native plants were identified based on correspondence with local authorities (J. Maunder, personal communication, August 15, 2011; L. Hermanutz, personal communication, February 13. 2012), and lists of non-native plant species developed by the Memorial University of Newfoundland Botanical Gardens and Newfoundland and Labrador's Department of Environment and Conservation.

2.2 Invertebrate Sampling Methodology

In addition to plant inventories, invertebrate sampling was conducted at each studied wetland. Samples were collected from open water that was located near the plant survey transect. In some cases, the samples were taken from an adjacent water body, for example a river or a pond, due to a lack of open water within the main wetland area, or safety issues associated with accessing open water areas.

A dip bucket was used to obtain the water, which was then transferred to another bucket through a dip net to remove large debris and sediment. After transfer, the net and the debris contents were gently swiped through the water to release invertebrates that may have been entangled in the net.

Invertebrates were identified, counted and recorded in the field. Identification was completed by common name, using Charlotte E. Holmes' guidebook *Common Insects of Oxen Pond Botanic Park.* Any organisms that could not be identified in the field were noted, sketched and later identified using various reference material that was not suited to field use. Organisms that were observed outside of the collected sample were also noted, for example flying invertebrates. A measure of invertebrate richness was assigned to each studied wetland as the number of different invertebrate types identified.

2.3 Water Quality Analysis

General water quality parameters were assessed onsite at each studied wetland. A Hydrolab Quanta G multiparameter sonde was used; anda Hydrolab MS5 multiparameter sonde was also used at some sites when the Quanta G had to be repaired. Both of these instruments were calibrated according to manufacturer specifications prior to going into the field.

The water quality parameters analysed by the Quanta G were: temperature; pH; total dissolved solids (TDS); dissolved oxygen (DO); conductivity; and salinity. The MS5 sonde analyzed the same parameters, with the exception of salinity. Salinity values were calculated for those sites where the MS5 was used with an online calculator, Salinometry.ca. Inputs for this calculator were temperature, conductivity and pressure. The accuracy of the salinity calculator was tested using salinity values previously recorded using the Quanta G.

In most cases the multiparameter sonde was not deployed in the wetland itself. This was due to unsuitable conditions in the consistency and composition of wetland open waters and their substrates for sonde deployment. Water was often cloudy, making it difficult to identify any objects in the water that could damage the sensors of the sonde. Additionally, detritus matter that is often found in wetland waters could coat the sensors and give inaccurate readings, or potentially cause damage to the sensors. The multiparameter sonde was therefore deployed in a nearby water body in which sonde use was considered safe.

2.4 Determination of Wetland Boundaries

The wetland boundaries were identified using Google Earth satellite imagery. Many wetland boundaries are distinct and evident from visual inspection while other wetland areas are difficult to delineate due to unclear transition zones. A consistent set of criteria was required to identify the boundaries of wetland areas. This study used forest borders, topographic borders, deep-water pond boundaries, developed borders, and wetland complexes to delineate the wetland sites.

2.4.1 Forest Borders

A well-defined tree line indicates a wetland boundary. There may be a transition zone of stunted, chlorotic (i.e. lacking green color due to chlorophyll deficiency) trees. This transition zone was included within the wetland boundary when the trees are sparse, and excluded when the tree line is dense and defined as per Buchanan & Ringius (1993).

2.4.2 Topographic Borders

Wetlands occur where the land slopes into a depression. Slopes may be abrupt or gradual in nature. The boundary was chosen where the topography clearly showed a visible depression (Buchanan & Ringius 1993).

2.4.3 Deep Water Pond Boundaries

A wetland bordering a lake or pond is arbitrarily chosen to coincide with water greater than two meters in depth (Buchanan & Ringius, 1993). Information regarding water depth was unavailable at the time of analysis. Therefore, wetland boundaries around deep water ponds were delineated at the shoreline.

2.4.4 Developed Borders

Development contiguous to the wetland area indicated a boundary for this study. Development was defined to include roadways, building lots, and farm fields; development does not include walkways, foot bridges, or other similar small developmental features (Buchanan & Ringius, 1993).

2.4.5 Wetland Complexes

Wetland areas that are close in proximity to each other or hydrologically connected were treated as a single unit (Buchanan & Ringius 1993).

2.5 Ranking of Wetlands' Stressors

The wetlands studied during the summer of 2011 were ranked based primarily on the threats surrounding them to give a score that represents the potential for stress to the wetland ecosystem to occur. These threats were recorded in field notes taken during site visits and were further identified using satellite imagery.

There were six stressors found to commonly occur in the Northeast Avalon region: agriculture; impervious surfaces; residential, commercial/institutional or industrial building lots; roadways; culverts; and dams. In order to clarify which stressors were included in each category, a description was necessary. For this study, pasture lands and farm fields fall under the agriculture category. Areas of continuous asphalt, concrete, roofs, or other similar impermeable surface, greater than 1000 m^2 are considered an impervious surface feature. This area value is an

approximate measured total area of continuous impermeable surface. In this study, building lots that are less than 1000 m^2 fall under the distinction of residential, commercial/ institutional or industrial development features. Under this definition, each continuous lot will fall within this size limit and will be bordered by a natural landscape of trees or grasses. Only culverts that are transporting water into a wetland were included in this study.

Features identified as stressors were quantified using the Google Earth measure and elevation profile tools. The distance between the delineated wetland boundary and the nearest boundary of the feature was measured in metres, and the approximate area of each feature was determined with this tool as well. The slope between the wetland and the feature was obtained using the elevation profile tool.

A rubric was developed to assign each wetland site a value based on these stressors. This rubric will be referred to as the *Stress Evaluation Rubric* in the remainder of this report and can be found in Appendix A. A different value was assigned in each stressor category based on the distance of the stressor from the wetland boundary. The size of the stressor was also a factor in the case of agriculture, impermeable surfaces, residential building lots and roads. Sparsely developed areas, those with no more than one building lot within 100 meters of roadway, are given a lower value than those building lots more densely developed. Larger roadways have a higher stress value. If the stressors are located at a higher elevation than the wetland, the value assigned for that stressor was multiplied by two, as there could be a greater potential for negative impact on the wetland as runoff that flows down slope to the wetland area could carry contaminants with it. A change in elevation of 3% over 100m or greater was considered to be a higher elevation.

The values given to each stressor category were then summed to give a total value for the wetland. A higher score indicates a higher level of stress the wetland is facing due to development near its boundaries.

Differences in wetland size and data outcomes meant that they could not be compared directly to one another. However, a general sense of what an area with a high level of potential stress would score compared to a low level was possible.

3.0 Results

A total of 22 wetland sites were visited during the 2011-2012 project year. Figure 1 presents the location of each site. Each individual wetland location and its boundary delineation can be found in Appendix B.

Figure 1: The locations of the 22 wetlands surveyed during the 2011- 2012 project year throughout the Northeast Avalon Peninsula of Newfoundland and Labrador represented by red markers. (Northeast Avalon. (2006, 6th August). Google Earth Image. [Accessed 23 April 2012]. Available from: http://www.google.com/earth/index.html)

3.1 Wetland Survey Results

As the wetlands studied during the summer of 2011 cannot be compared to one another because of incongruities in sampling effort and individual wetland properties, the results of the field season are presented as a summary of findings from each wetland (Table 1). The order in which the wetland results are presented is not intended to represent any patterns or groupings. The summary description given for each wetland site in Table 1 includes: plant richness (total number of plant types identified); the number of non-native plant types found at each site; invertebrate richness (total number of invertebrate types identified); and the total score obtained when the wetlands stressors were ranked using the stress evaluation rubric. Data collected for each wetland and the completed stress evaluation rubrics with reasoning can be found in Appendix C.

Table 1: Summary of results from 22 wetland sites surveyed during the 2011- 2012 project year. Plant and invertebrate richness are indicative of the number of species groups present. Non-native plants present are based on a list of species deemed to be non-native to the Northeast Avalon Peninsula of Newfoundland and Labrador. The higher the score in the stress evaluation rubric, the higher the impact on the wetland ecosystem from surrounding human developments.

Wetland Study Site	Plant Richness	Non-Native Plants Present	Invertebrate Richness	Stress Evaluation Rubric Score
Mundy Pond	10	2	3	33
Kent's Pond	12	3	2	48
Firdale Drive	17	1	4	9
Outer Cove Brook	10	1	2	27
Gosse's Pond	14	2	2	11
Terrace Road	19	1	6	74
Juniper Ponds	30	2	9	63
Ashkay Drive	12	3	5	43
Geo Centre	19	0	4	18
Messenger Drive	21	0	5	4
Goldeneye Place	22	0	3	53
Waterford River @ Krown	6	0	4	83
Corisande Drive	6	1	1	64
Pouch Cove Highway	14	2	3	40
Windgap Road	16	1	4	4
Kelligrews Pond Wetland	20	1	NA	4
Oxen Pond	20	0	3	6
Kelsey Drive	12	0	4	24
Lower Gully River Wetland	25	1	3	30
Georges Pond	14	0	3	0
Nut Brook	5	1	2	105
Power's Pond	21	1	4	53

Overall, the plant richness values ranged from 5 to 30, the number of non-native plant types ranged from 0 to three, the invertebrate richness ranged from 1 to 9 and the total scores for the Stress Evaluation Rubric ranged from 0 to 105.

3.2 Water Quality

Table 2 displays the water quality of a nearby water body for each wetland visited during the 2011- 2012 project season.

Table 2: Water quality results from water bodies adjacent to the surveyed wetlands. Any values that are not within the guidelines for the protection of aquatic life are in bolded red font.

Site Name	Location	Date (mm/dd/yy) & Time	Parameters Measured						
			pH	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Temperature (ºC)	Salinity (PSS)	Total Dissolved Solids (g/L)
Mundy Pond	Southern side of Pond	08/22/11 @ 11:45 am	6.55	0.481	6.9	n/a	22.24	0.23	0.3
	Near Pond Inlet	08/22/11 @ 11:20 am	6.87	0.368	7.45	84.9	20.04	0.18	0.2
	Near Pond Outlet	08/22/11 @ 12:00 pm	7.21	0.415	8.34	90.9	20.22	0.2	0.3
Kent's Pond	Kent's Pond Dock	08/23/11 @ 12:00 pm	7.08	0.766	6.85	76.2	21.25	0.37	0.5
Firdale Drive	End of Firdale Drive	08/22/11 @ 1:05 pm	**6.12**	0.047	7.86	83.2	17.84	0.03	n/a
Outer Cove Brook	Outer Cove Brook, downstream of Torbay Rd	09/30/11 @ 1:15 pm	**6.24**	0.1945	9.31	88.3	12.94	0.12*	0.1244
Gosse's Pond	Southern side of Gosse's Pond	09/30/11 @ 11:45 am	**6.32**	0.0415	10.77	102.9	13.34	0.02*	0.0266
Terrace Road	Kenmount Brook, upstream of Great Eastern Avenue	08/29/11 @ 10:45 am	**5.92**	0.091	6.16	63.4	17.11	0.05	0.1
	Kenmount Brook, upstream of Kelsey Drive	08/29/11 @ 10:25 am	6.84	0.272	9.23	96.2	17.31	0.13	0.2
Juniper Ponds	Juniper Ponds, southern side, near dam	08/30/11 @ 11:10 am	**6.15**	0.235	**5.47**	62.4	21.16	0.11	0.2
Ashkay Drive	Coaker's River, downstream of Ashkay Drive	09/30/11 @ 10:25 am	7.17	0.3038	11.35	105.1	11.95	0.19*	0.1961
Geo Center	Stream flowing north from northern end of wetland, upstream of path	09/30/11 @ 9:35 am	**5.92**	0.1935	7.13	65.1	11.45	0.12*	0.1236
Kelsey Drive	Yellow Marsh Stream – downstream of Kelsey Drive	07/28/11 @ 11:30 am	**6.2**	0.077	8.22	n/a	14.4	0.04	0.1
Goldeneye Place	North side of Branscombes Pond	10/01/11 @ 11:00 am	**5.76**	0.0715	**4.97**	49.5	15.34	0.04*	0.0456

Table 2 *(continued):*

Site Name	Location	Date (mm/dd/yy) & Time	Parameters Measured						
			pH	Conduct-ivity (mS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Temper-ature (ºC)	Salinity (PSS)	Total Dissolved Solids (g/L)
Waterford River at Krown	Waterford River, downstream of foot bridge at Forest Avenue	10/01/11 @ 10:35 am	6.82	0.3247	9.23	90.6	14.45	0.19*	0.208
Corisande Drive	Waterford River, upstream of Corisande Drive	10/01/11 @ 9:50 am	6.98	0.3586	9.3	91.2	14.25	0.21*	n/a
Pouch Cove HWY	Big River, downstream of Pouch Cove Hwy.	09/30/11 @ 12:40 pm	6.48	0.0403	10.93	106	13.88	0.02*	n/a
Windgap Road	Stream flowing southward into wetland, downstream of Windgap Rd.	09/30/11 @ 12:15 pm	**5.72**	0.0428	9.9	96.1	14.01	0.02*	0.0275
Kelligrews River Wetland	Eastern side of Kelligrews Pond	10/12/11 @ 2:45 pm	7.6	**21.883**	15.14	148.8	10.49	18.54*	**14.01**
Oxen Pond	North of Oxen Pond, on pole line	09/30/11 @ 2:10	**5**	0.0332	8.2	85.1	17.07	0.02*	0.0214
Messenger Drive	Yellow Marsh Stream upstream of Kelsey Drive	07/28/11 @ 12:06pm	**6.11**	0.064	7.35	n/a	14.49	0.03	n/a
Lower Gully River Wetland	Lower Gully River, upstream of old bridge	08/08/11 @ 11:30 am	6.86	0.062	10.45	99	12.98	0.03	n/a
Georges Pond	Northern side of Georges Pond	09/30/11 @ 2:45 pm	**5.24**	0.0219	10.1	100.3	15.1	0.01*	0.0141
Nut Brook	DS of culvert crossing Incinerator Rd	08/16/11 @ 10:00 am	7.87	0.349	**4.02**	38.9	14.34	0.16	0.2
Power's Pond	Power's Pond	10/01/11 @ 9:25 am	**6.43**	0.3307	7.01	70.2	15.44	0.19*	0.2117

**This salinity value was calculated using the online calculator Salinometry.ca*

Some of the water quality parameters recorded are not within guidelines related to the protection of aquatic life (Table 2). The pH values recorded for the adjacent water bodies to the Firdale Drive, Outer cove Brook, Gosse's Pond, Terrace Road, Juniper Ponds, Geo Centre, Kelsey Drive, Goldeneye Place, Windgap Road, Oxen Pond, Messenger Drive, Georges Pond

and Power's Pond wetland sites were all below the range of 6.5-9 suggested in the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2006). The conductivity, and TDS recorded for the Kelligrews Pond wetland site were higher than the recommended ranges of 0.050-1.5mS/cm and 0-1g/L respectively (Province of British Columbia, 1998). The dissolved oxygen levels recorded for water bodies adjacent to the Juniper Ponds, Goldeneye Place and Nut Brook wetlands were below the lowest acceptable level in warm waters of 6.0mg/L for early life stages and 5.5mg/L for other life stages suggested in the CCME Guidelines for the Protection of Aquatic Life (CCME, 1999).

4.0 Discussion

The 22 wetlands surveyed during the 2011-2012 project year were surrounded by a diverse selection of potential stressors and were found to have varying plant and invertebrate richness, and numbers of non-native plants.

The sites with the lowest plant richness were Nut Brook (5), Waterford River at Krown (6), and Corisande Drive (6). These areas are all surrounded by industrial and commercial human activity, which could have contributed to low plant richness which is usually affected by inputs of nitrogen. The Nut Brook wetland site was located on Incinerator Road, directly across from the old landfill site, and surrounded by other industrial activities located upstream of the small stream that flows through it, a tributary to Nut Brook. The site showed evidence of past sedimentation events that blanketed the area. The Corisande Drive and Waterford River at Krown sites were both located on the Waterford River, with the Corisande Drive site upstream of the Waterford River at Krown site. The Waterford River flows through Donovans Industrial Park before it passes through these sites, which could potentially transport contaminants from the various industries to the wetland sites. The Corisande Drive site is adjacent to Topsail Road and Corisande Drive, and the Country Ribbon plant for farm animal feed. The Waterford River site is adjacent to an automotive garage and close to Topsail Road and is downstream from a number of commercial establishments located on Topsail Road to the east of Corisande Drive. Without previous plant richness data for comparison the degree of impact on the wetland cannot be quantized.

The site with the highest plant richness was Juniper Ponds, which had a plant richness of 30. This site also had the highest invertebrate richness of 9. The Juniper Ponds site was located adjacent to the Outer Ring Road and the Team Gushue Highway, and it is very likely that the construction of these highways destroyed much of the original extent of the wetland. It is possible that runoff from these highways had not negatively impacted plant and invertebrate biodiversity for the portion of the wetland surveyed at the time of this project. Juniper Ponds itself is the headwaters for Leary's Brook, and is fed from a series of wetlands in the area. As such, there is little opportunity for contaminants to be carried by water to the wetland site surveyed. Without ecological data from before the two highways were built, it is not possible to conclude that the plant and invertebrate biodiversity was greater in the past.

The largest number of non-native plant types identified was 3, at the Kent's Pond and Ashkay Drive sites. Non-natives identified at the Kent's Pond site were: Common Speedwell;

Creeping Buttercup; and Lady's Smock. The Kent's Pond site was located between the parking lots for the Confederation Building and the Xwave building and is in close proximity to Allandale Road. These developments could have contributed to the introduction of non-native plant types as the cars that utilize them could have acted as vectors for seed transport. Non-natives identified at the Ashkay Drive site were: Common Speedwell; Creeping Buttercup; and Bittercress. The Ashkay Drive site could have had input of non-native plant types from the Stavanger Drive housing and commercial developments that would also facilitate seed transport via cars.

The broad range of scores for the *Stress Evaluation Rubric* illustrate the varying degree to which the wetlands on the Northeast Avalon Peninsula could potentially be impacted by surrounding human developments. The lowest score on the *Stress Evaluation Rubric* was at the Georges Pond site, which was located in a wooded area with perhaps the least anthropogenic disturbance. The highest score was calculated for Nut Brook, which also had the lowest plant richness, and is surrounded by industrial activity. The scores in the Stress Evaluation Rubric are an indicator of the potential stress from development that fit within the criteria for the rubric, but in reality developments that did not fit the rubric could also cause stress to the wetland ecosystem, including those located upstream from wetlands. There are also developments that were at the proposal stage, and had not materialized at the time of this project. These would certainly have the potential to negatively impact a wetland ecosystem, but were not included in the stress evaluation rubric. Data collected will form an important baseline to evaluate the impacts of future developments.

The water quality of water bodies adjacent to the wetland sites was, for the most part, within guidelines for the protection of aquatic life. The water quality parameter that was not within these guidelines the most was pH, which was lower than the guidelines for some sites. This indicated that the water was acidic, which is common for the water in Newfoundland and Labrador, especially in rivers that flow through wetlands. Therefore, these pH values are not necessarily an indication of poor water quality. Further monitoring would be necessary to determine what the normal pH levels are for a particular area.

The Kelligrews Pond wetland site had conductivity and TDS levels that were not within the guidelines suggested for the protection of aquatic life in freshwater. These exceedances may not be indicators of poor water quality, as they are likely because of salt water influence at the site, which is supported by the high salinity value for the site. There were three readings of dissolved oxygen levels that were below those suggested for the protection of aquatic life. Two of these, from the Goldeneye Place and Juniper Ponds wetland sites, were taken from ponds, where the dissolved oxygen levels could have been low because of a lack of flowing water along their edges. The third, from the Nut Brook wetland site, was taken from water that had pooled downstream of the culvert that crossed Incinerator Road, and the low dissolved oxygen reading there could also be because of a lack of water flow. These low dissolved oxygen levels cannot be said to be indicative of poor water quality without more monitoring of the levels over time, but they do indicate areas that should be monitored.

All of the data collected for this project were intended to serve as baseline data on the composition of the wetlands located on the Northeast Avalon Peninsula of Newfoundland and

Labrador. To make clear statements on the health of these wetlands more data are needed over time so that comparisons of conditions can be made.

5.0 Future Research

The 2011-2012 project year was the first for the Wetland Survey project, and actions for the future have been made apparent by the end of this project year.

The intention is to expand the Wetland Survey project to include more of the many wetlands on the Northeast Avalon Peninsula. Determining which wetlands to visit will be decided upon based on input from municipal councils, citizens, and environmental NGOs. There is also the potential to revisit the sites visited in 2011-2012 so that a comparison of change over time can be made; a sampling interval of 5 years would allow sufficient time for changes to be evident. Additionally, training of citizen volunteers on how to conduct a wetland survey in their area could potentially increase the number of wetlands surveyed in the region.

Future wetland visits will provide an opportunity to modify and improve field data collection methodologies. One such change could be to utilize more transects to sample plant composition in a larger portion of each wetland surveyed, and to identify all plants to species level. The *Stress Evaluation Rubric* can be altered to include different features and different distances. With the right inputs, the scoring of wetlands could be completed using GIS software in the future. This would allow a more comprehensive scoring of the sites and could also facilitate in ranking the wetlands in comparison to one another. Statistical analysis of wetland data over time would also be possible for the future with an increase in the amount of field data collected.

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Appendix A
Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			

	TOTALS
Table 1	
Table 2	
Table 3	
Score	

Appendix B
Delineated Wetlands

Mundy Pond Wetland Site:

The Mundy Pond wetland study site was located on the southern side of Mundy Pond in St. John's. Water flows into the main pond through a culvert system that originates in a wetland area to the north of Empire Avenue. Water flows east from this wetland, through residential neighbourhoods and into Mundy Pond at the west end of the pond. The surveyed site and the pond were connected by a small channel of water. Due to both sites being hydrologically connected and in close proximity to each other, the wetland boundary was delineated to include Mundy Pond. Mundy Pond Road runs closely along the north shoreline of the site.

Figure 1: Mundy Pond wetland study site with the boundary indicated in red.
(St. John's. (2006, 6th August). 36_92 20.84E, 5 26_78 69.56N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Kent's Pond Wetland Site:

The Kent's Pond wetland study site was located to the east of Allandale Road, St. John's. The wetland site boundary was mostly defined by the development that is contiguous to the wetland. Higgin's Line, Allandale Road and the paved parking lots of the XWave building and the Confederation Building marked all but a small section of the wetland boundary. The boundary in the northeast corner was marked by the beginning of a forest stand that ended at the Kent's Pond shoreline.

Figure 2: Kent's Pond wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (St. John's. (2006, 6th August). 37_00 90.84E, 5 27_15 00.55N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/ index.html**)**

Firdale Drive Wetland Site:

The Firdale Drive wetland study site was located in a wooded area at the end of Firdale Drive in Airport Heights, St. John's. It was a small part of a large wetland area that extended west until it reached the developed border of Thorburn Road. For purposes of analysis the Firdale Drive study site was delineated by forest borders, with a disregard for the nearby wetland areas. The northeastern wetland boundary was partially made up of a developed border.

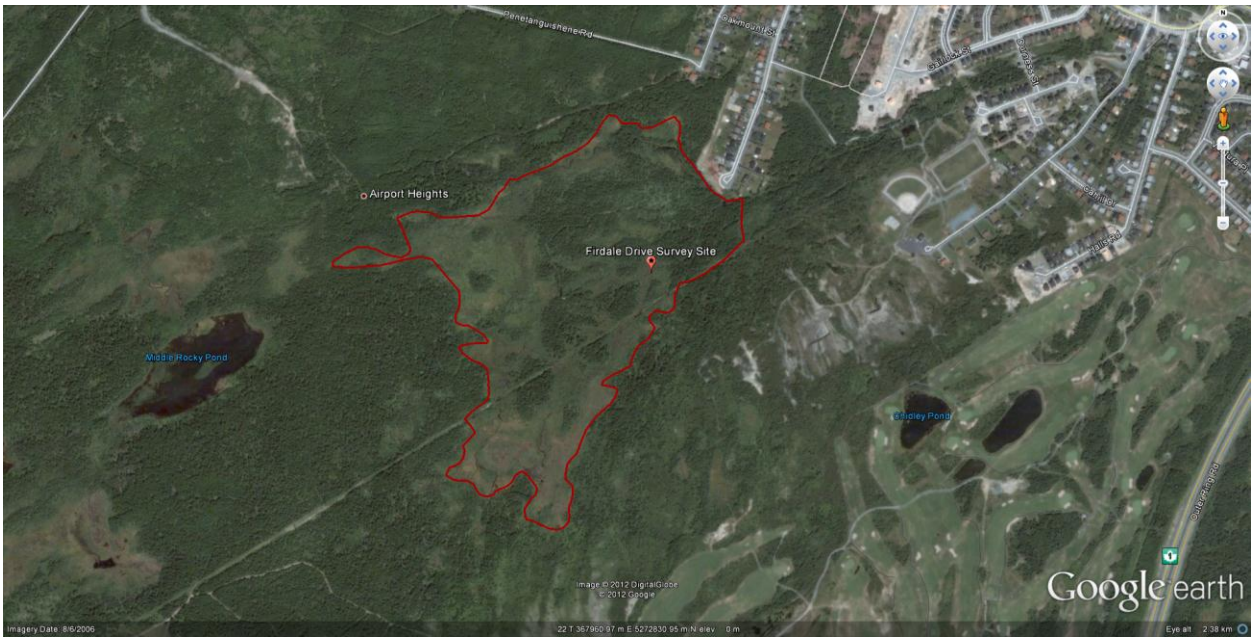

Figure 3: Firdale Drive wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (St. John's. (2006, 6th August). 36_79 60.97E, 5 27_28 30.95N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/ index.html).

Outer Cove Brook Wetland Site:

The Outer Cove Brook wetland study site was located east of Torbay Road and west of the Clovelly Golf Course in St. John's. It was adjacent to Outer Cove Brook. The wetland study site was delineated based on forest and developed borders. Torbay Road formed the western boundary and the golf course formed the eastern boundary. The southern boundary was a developed border, composed partially of the RONA Building Supplies property.

Figure 4: Outer Cove Brook Wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (St. John's. (2006, 6th August). 37_07 01.66E, 5 27_56 61.36N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com/earth /index.html).

Gosse's Pond Wetland Site:

The Gosse's Pond wetland site was located in the municipality of Torbay, and is a component of the Big River system. The site was delineated by development, forest, and topographic borders. Camp Carey Road formed a small portion of the wetland boundary at its northern end. The other wetland boundaries were defined by forest and topographic borders. The Gosse's Pond site was linked to Big Three Corner Pond by Big River. As these areas were close in proximity and hydrologically connected, both sites fall within the boundary that was evaluated.

Figure 5: Gosse's Pond wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (Torbay. (2006, 6th August). 36_74 95.49E, 5 28_13 76.90N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Terrace Road Wetland Site:

The Terrace Road wetland study site was located on the north side of Kenmount Road, St. John's. Terrace Road itself was indicated on the aerial images used to delineate the wetland site but did not exist as a road used for vehicles at the time of the wetland survey. It had been decommissioned, the asphalt removed and the land had been in a state of plant regrowth at the time of the site visit in 2011. Many roadways were indicated on the aerial images as an overlain layer and were not represented in the satellite image. The Terrace Road wetland study site was delineated based on developed and forest borders. Great Eastern Avenue, Iceland Place and the residential development on the south side of Gil Eannes Drive, Roberts Lane, and Kenmount Road formed the developed borders of the site.

Figure 6: Terrace Road Wetland study site with the boundary indicated in red. (St. John's. (2006, 6th August). 36_49 03.20E, 5 26_72 94.97N. Google Earth Image. [Accessed 10 April 2012]. Available from: http://www.google.com /earth/ index.html).

Juniper Ponds Wetland Site:

The Juniper Ponds wetland study site was located to the south of the Outer Ring Road and to the west of the Team Gushue Highway in St. John's and was delineated based on developed borders. The development along the north side of Thorburn Road created a jagged southern border to the wetland.

Figure 7: Juniper Ponds Wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (St. John's. (2006, 6th August). 36_52 89.95E, 5 26_97 52.16N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/ index.html).

Ashkay Drive Wetland:

The Ashkay Drive wetland study site was located east of Stavanger Drive, on the municipal boundary of St. John's and Logy Bay-Middle Cove-Outer Cove. The Ashkay Drive wetland study site was delineated based on forest and developed borders. Snows Lane formed the southern boundary of the site, and Ashkay Drive formed the eastern boundary. The wetland study site boundary extended west to Stavanger Drive along the shore of Coaker's River.

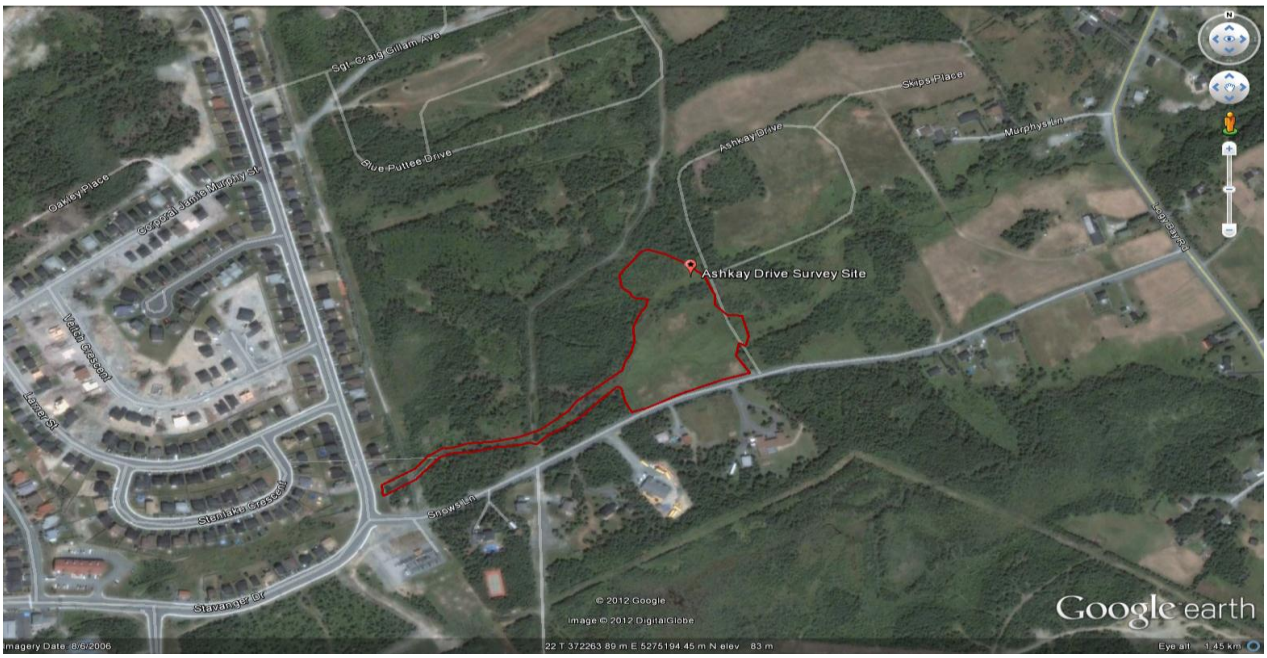

Figure 8: Ashkay Drive Wetland study site with the boundary indicated in red (St. John's. (2006, 6th August). 37_22 63.89E, 5 27_51 94.45N. Google Earth Image. [Accessed 10 April 2012]. Available from: http://www.google.com/earth /index.html).

Geo Centre Wetland Site

The Geo Centre wetland study site was located adjacent to the Johnson Geo Centre on Signal Hill Road in St. John's. This wetland occupied a depression in the land, with steep slopes on three sides, so the boundaries of this site were defined by topographic borders.

Figure 9: Johnson GEO CENTRE wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (St. John's. (2006, 6th August). 37_30 74.46E, 5 27_02 44.97N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Messenger Drive Wetland and Kelsey Drive Wetland:

The Messenger Drive wetland study site was located off Messenger Drive, a side street of Kelsey Drive, St. John's. The aerial imagery used to delineate this wetland site and evaluate potential stressors to the ecosystem did not show the construction that has occurred there in recent years and showed Messenger Drive as an overlain road layer. The Messenger Drive wetland study site was delineated based on forest borders.

The Kelsey Drive wetland study site was located alongside of Yellow Marsh Stream, between Kelsey Drive and the Team Gushue Highway. The wetland boundary was delineated by forest borders and developed borders using Google Earth. The aerial imagery used to delineate the wetland and complete the stress evaluation rubric did not show the construction of commercial establishments that had occurred in recent years, but did have the roadways in this area shown as an overlain layer.

Figure 10: The Messenger Drive Wetland study site and the Kelsey Drive Wetland study site with the boundaries indicated in red. (St. John's. (2006, 6th August). 36_53 61.90E, 5 26_81 45.85N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com /earth /index.html).

Goldeneye Place Wetland:

The Goldeneye Place wetland study site was located at Branscombes Pond in Mount Pearl. This pond was located east of the intersection of Blackmarsh Road and Topsail Road. The wetland study site was delineated using forest and developed borders. The residential development located on the north side of Goldeneye Place formed the developed border of the site.

Figure 11: Goldeneye Place Wetland study site with the boundary indicated in red. (Mount Pearl. (2006, 6th August). 36_57 51.03E, 5 26_52 28.78N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com /earth /index.html).

Waterford River at Krown Wetland:

The Waterford River system covers a large area with many wetland type areas along its length. One wetland site visited for this project was located along the Waterford River behind Krown Automotive on Topsail Road. The Waterford River at Krown wetland study site was delineated based on development borders. The boundary of the surveyed wetland was marked by bridges that cross the Waterford River at the east and west ends of the site. There were commercial developments to the north of the wetland site, along Topsail Road.

Figure 12: Waterford River at Krown wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary ro areas of increased potential of impact from run off. (Mount Pearl. (2006, 6th August). 36_49 73.86E, 5 26_48 13.60N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Corisande Drive Wetland:

The Corisande Drive wetland site was located adjacent to the Waterford River at the corner of Topsail Road and Corisande Drive in Mount Pearl. This wetland site was delineated based on topographic and developed borders. The south boundary of the site was bordered by a large developed lot; the western side of the site is also bordered by a large development.

Figure 13: Corisande Drive wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (Mount Pearl. (2006, 6th August). 36_21 76.06E, 5 26_57 06.01N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Pouch Cove Highway Wetland Site:

The Pouch Cove Highway site was located in Flatrock, north of Pouch Cove Highway and west of Old Flatrock Road. It was located to the east of Big River, which flows in a south to north. The Pouch Cove Highway wetland study site was delineated in Google Earth based on tree line and contiguous development . An area of dense trees marked the northern wetland boundary. The southern and eastern boundaries were marked by Pouch Cove Highway, a paved two lane road. Old Flatrock Road, a dirt or unmaintained roadway, formed the western boundary

Figure 14: Pouch Cove Highway wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off. (Flatrock. (2006, 6th August). 37_00 52.73E, 5 28_32 58.95N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Windgap Road Wetland Site:

The Windgap Road site was located in the municipality of Flatrock, south of Windgap Road. The site boundary was delineated in Google Earth based on forest and topographic borders. Dense stands of trees and areas of higher elevation defined the outer wetland boundaries.

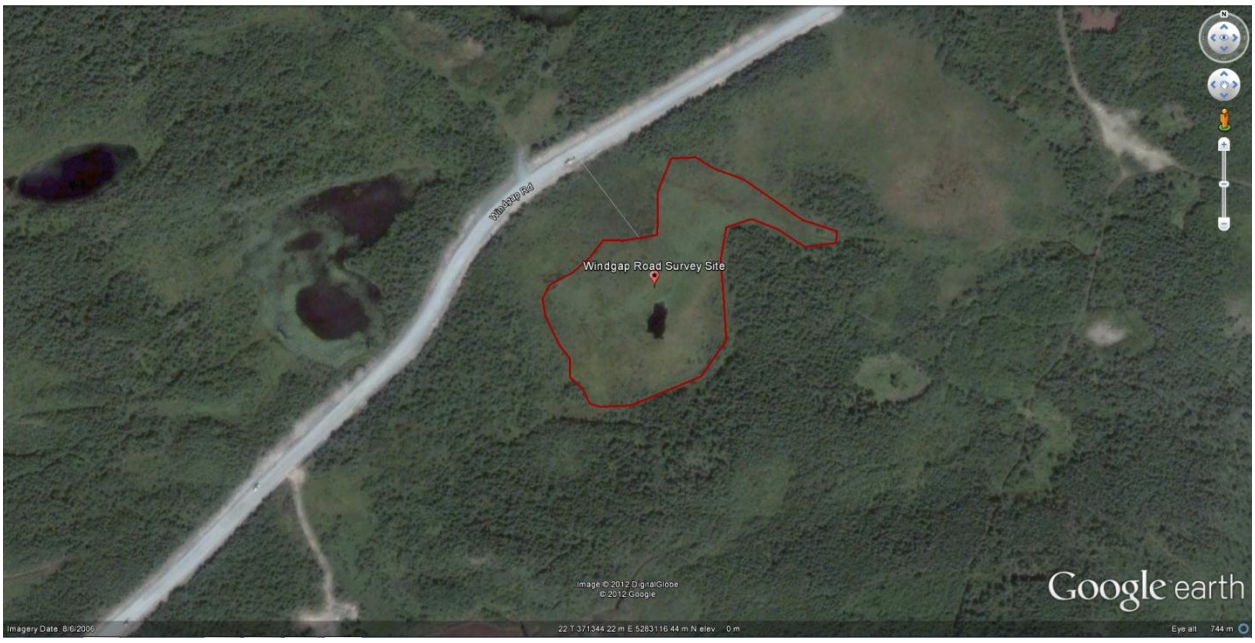

Figure 15: Wind Gap Road wetland study site with the boundary indicated in red. The thin grey lines are drawn from wetland boundary to areas of increased potential of impact from run off . (Flatrock. (2006, 6th August). 37_13 44.22E, 5 28_31 16.44N. Google Earth Image. [Accessed 26 March 2012]. Available from: http://www.google.com/earth/index.html).

Kelligrews Pond Wetland Site:

The Kelligrews wetland study site was located in Kelligrews, Conception Bay South near the coastline and adjacent to Kelligrews Pond. The Kelligrews wetland site was delineated based on developed borders, deep water pond borders, and visual clues of wetland boundary. Kelligrews Pond was included in the wetland boundary as it is hydrologically connected with the wetland. The southern border of the wetland was contiguous with a commercial lot. The western boundary was a deep water pond border. Northern and eastern boundaries were delineated based on the appearance of the land and vegetation. Conception Bay Highway formed a border where the Kelligrews River flowed under the Conception Bay Highway.

Figure 16: Kelligrews Wetland study site with the boundary indicated in red. (Conception Bay South. (2006, 6th August). 34_79 55.12E, 5 26_23 57.10N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com /earth /index.html).

Oxen Pond Wetland Site:

The Oxen Pond Wetland study site was located north of Oxen Pond, and south of the Outer Ring Road. The study site was delineated by forest borders. The wetland border extended across the transmission line at the east and west boundaries.

Figure 17: Oxen Pond Wetland study site with the boundary indicated in red. (Mount Pearl. (2006, 6th August). 36_72 65.85E, 5 27_04 03.48N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com/earth /index.html).

Lower Gully River Wetland:

The Lower Gully River wetland study site was located in Conception Bay South, east of Roberts Road, and south of Forest Road. This wetland site is adjacent to the Lower Gully River system, which flows northward from Black Mountain Pond. The river was included within the wetland boundary delineation because the wetland is hydrologically connected to it. This site was delineated based on several criteria. Forest borders indicated the boundary of the wetland along the eastern side. The western boundary was marked by forest and topographic borders that corresponded with the western shore of the Lower Gully River. The southern boundary was drawn across the river to provide a manageable study area, the wetland likely extends further south than this boundary. The northern boundary of the wetland site was placed based on forest borders on the eastern side of the river, and topographic borders on the western side.

Figure 18: Lower Gully River Wetland study site with the border indicated in red. (Conception Bay South. (2006, 6th August). 34_72 13.50E, 5 26_00 67.84N. Google Earth Image. [Accessed 10 April 2012]. Available from: http://www.google.com/earth /index.html).

Georges Pond Wetland:

The Georges Pond wetland study site was located at Georges Pond, south of Kenmount Road and north of Blackmarsh Road, in St. John's. The wetland boundaries were based on forested area.

Figure 19: Georges Pond Wetland study site with the border indicated in red. (St. John's. (2006, 6th August). 36_54 83.46E, 5 26_63 94.66N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com/earth /index.html).

Nut Brook Wetland Site:

The Nut Brook wetland study site was located off Incinerator Road, St. John's. Due to limitations in the images used for site delineation because of cloud cover, the site was delineated based on forest, developed and deep water pond borders. It was recognized however, that Nut Brook, and associated wetland areas, extended beyond the study site boundaries. The southern border of the delineated site was mainly a developed border. Incinerator Road, and the industrial and commercial developments along this roadway, were contigious to the wetland. A deep water pond border comprised a small portion of the southwest boundary. The remaining study site was delineated by a forest border.

Figure 20: Nut Brook Wetland study site with the border indicated in red. (St. John's. (2006, 6th August). (St. John's. (2006, 6th August). 34_93 38.63E, 5 25_65 32.12N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com /earth/ index.html).

Powers Pond Wetland Site:

The Powers Pond wetland study site was located adjacent to Powers Pond, south of the Donovan's Industrial Park development in Mount Pearl. Water flows from Powers Pond to the northeast into the Waterford River. The site was delineated to include two bodies of water that are hydrologically connected to the wetland site. Forest borders were used to delineate the western boundary of the site.

Figure 21: Powers Pond Wetland study site with the boundary indicated in red. (Mount Pearl. (2006, 6th August). 36_20 52.67E, 5 26_45 53.13N. Google Earth Image. [Accessed 25 April 2012]. Available from: http://www.google.com/earth /index.html).

Appendix C
Data for each Wetland Site

Mundy Pond Wetland Study Site- Plant and Invertebrate Data

Plants

Site Name: Mundy Pond	Date/Time: July 11th, 2011 at 10:42am
Monitored By: RS, JP, NC	General Site Area/Nearest Road:
Transect Number: 1 of 1	Mundy Pond Park

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*		7	6	3	5					
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*		1								6
Ferns										
Fraser's Marsh SJW										
Goldenrod					11					
Labrador Tea										
Lady's Smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed										
Northern Rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale		1	3							
White Bog Orchid										
Fireweed										
Black Knapweed*										
Yellow Hawkweed*										

* Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	80	70	60	70	40	90	50	25	60	70
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw	<1	<1	5	<1	<1					
Peat Mosses		<1	<1	<1						
Rushes			25	15	5	5		5		
Sedges					25	5	10	5	5	5
Small Cranberry										
Large Cranberry										
Typha					5		35	65	35	25
Three Leaved False SS										

Inverts

Organism	Total Counts
Water Beetle	1
Snails	4
Damselfly larvae	1

Mundy Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Mundy Pond Park Parking Lot	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6				6
	Mundy Pond Road Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6			6
	Connors Avenue Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6			4
	Melville Place Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6			6
	Skateboarding Facilities	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		4			4
								26

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Mundy Pond Road	2	6				6
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	1	Inflow	1
			1

	TOTALS
Part 1	26
Part 2	6
Part 3	1
Score	33

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure1) was used for the analysis of potential stressors in the stress evaluation rubric. Development on Mundy Pond Road was within 30 meters of the wetland boundary and was densely developed. A parking lot was located at the east corner of Mundy Pond that was within 15 meters of the wetland boundary. The pond outflow culvert runs under this parking lot. A residential neighbourhood, Connors Avenue, was located south of this parking lot, within 30 meters of the wetland boundary. Another residential neighbourhood, Melville Place, was located within 30 meters of the wetland boundary near the survey site. The park's skateboarding facilities were located within 30 meters of the wetland boundary. This site obtained a score of 33 in the stress evaluation rubric.

Kent's Pond Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Kent's Pond	Date/Time: July 12, 2011 at 10:00am
Monitored By: RS, JP, NC	General Site Area/Nearest Road:
Transect Number: 1 of 2	Confederation Building

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*						2				
Cotton Grass										
Cracker Berry										
Creeping Buttercup*					3	3				
Ferns							1			
Fraser's Marsh SJW										
Goldenrod							7			
Labrador Tea										
Lady's Smock*				3	23	15	14	1		
Larch										
Larger Blueflags								4		
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed										
Northern Rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale						3	9	5		
White Bog Orchid										
Fireweed										
Black Knapweed*										
Yellow Hawkweed*										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	30	100	95	95	80	25	30	65		
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses										
Rushes					10		5			
Sedges						<1		<1		
Small Cranberry										
Large Cranberry										
Typha										
Three Leaved False SS										
Bittercress					<1	5		<1		
Common Speedwell					5					
Creeping Buttercup			<1							

Site Name: Kent's Pond	Date/Time: July 12, 2011 at 10:00am
Monitored By: RS, JP, NC	General Site Area/Nearest Road:
Transect Number: 2 of 2	Confederation Building

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*	5	7		2	15	27	25	38		
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	11			1	25			1		
Ferns										
Fraser's Marsh SJW										
Goldenrod	8		8	11	2			1		
Labrador Tea										
Lady's Smock*	14		36	44	100					
Larch										
Larger Blueflags				1		19	3			
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed										
Northern Rose					1					
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale	8		11	2						
White Bog Orchid										
Fireweed										
Black Knapweed*										
Yellow Hawkweed*										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	<1	85		15	5	85	70	50		
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw				<1	10	<1				
Peat Mosses										
Rushes				25		5	5			
Sedges				<1	<1					
Small Cranberry										
Large Cranberry										
Typha										
Three Leaved False SS										
Bittercress	5		<1	<1						
Creeping Buttercup			<1			<1	<1			

Inverts (and some aquatic verts)

Organism	Total Counts
Snails	19
Leech	7

Kent's Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	XWave Office Building	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6			12	12
	Confederation Building	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9				9
								21

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
4 Lane Road	Higgin's Line	3	9			X2	18
	Alandale Road	3	9				9
							27

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	21
Part 2	27
Part 3	0
Score	48

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 2) was used for the analysis of potential stressors in the stress evaluation rubric. Higgin's Line, Allandale Road and the paved parking lots of the XWave building and the Confederation Building were all within 50 meters of the wetland boundary. The elevation of the land showed a slope toward the southeast meaning there is potential for a greater impact of runoff from the impervious surfaces of Higgin's Line and the Xwave parking lot. The Kent's Pond wetland study site obtained a total score of 48 in the stress evaluation rubric.

Firdale Drive Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Firdale Drive	Date/Time: Aug. 12th, 2011 at 3:30pm
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	End of Firdale Drive

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet				27						
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear						1				
Club Spur Orchid			1	1						
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*										
Ferns						6				
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags						1				
Leatherleaf						1				
Lousewort										
Meadow Rue	8			6		3				
Meadowsweet										
Nothern Bugleweed										
Northeastern rose	2		1			1				
Pink Bog Orchid										
Purple Bog Aster	70	79	59	151	84	54				
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale	22	9	23	1	36	21				
White Bog Orchid										
Black Knapweed*										
Yellow Hawkweed*	14			2						

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	30	5	10	20	5	10				
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses	60	10	5	60	10	30				
Rushes		15	15	<1						
Sedges	<1	5	<1		<1					
Small Cranberry	<1	<1								
Typha										
Three Leaved False SS	<1	<1	<1	<1	<1	<1				

Inverts

Organism	Total Counts
Dragonfly larvae	1
Water Boatmen	1
Water Strider	1
Mosquito Larvae	1

Firdale Drive Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Impervious Surfaces	Residential Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	 9				9
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								9

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					
							0

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	9
Part 2	0
Part 3	0
Score	9

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 3) was used for the analysis of potential stressors in the stress evaluation rubric. The residential neighbourhood of Firdale Drive bordered the wetland. The Firdale Drive wetland study site was given a score of 9 in the stress evaluation rubric. There were some potential threats or stressors to the wetland ecosystem that were not included as part of the stress evaluation rubric but are worth mentioning. One is a pole line that runs through the area. This pole line has opened the area to easy access by ATVs which can cause habitat damage when used irresponsibly. There is also potential for the Airport Heights housing development area to expand in the future into the wetland area.

Outer Cove Brook Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Outer Cove Brook	Date/Time: 15/07/2011 at 12:00pm
Monitored By: RS, JP, NC	General Site Area/Nearest Road:
Transect Number: 1 of 1	Behind new RONA on Torbay Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*				15	15	14				
Ferns		13								
Fraser's Marsh SJW										
Goldenrod	5		3	41	41	27				
Labrador Tea										
Lady's Smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue	5		30	27	14	17	6			
Meadowsweet			5							
Northern Bugleweed										
Northern Rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale		2	4	5	5					
White Bog Orchid										
Black Knapweed*										
Yellow Hawkweed*										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses		25	15	5	5	10	95			
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw			<1	<1		5				
Peat Mosses										
Rushes										
Sedges	95			5						
Small Cranberry										
Large Cranberry										
Typha										
Three Leaved False SS										
Water Starwort		60								

Inverts

Organism	Total Count
Damselflies	1
Mayfly Larvae	1

Outer Cove Brook Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	RONA Building Center Property	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
								18

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
4 Lane Road	Torbay Road	3	9				9
							9

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	18
Part 2	9
Part 3	0
Score	27

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 4) was used for the analysis of potential stressors in the stress evaluation rubric. Torbay Road and the RONA property were contiguous to the wetland boundary. The RONA property was at an elevation above the wetland, which could increase the potential impact of run-off from this feature into the wetland site. Golf course features were not included in the stress evaluation rubric. The golf course to the east of the Outer Cove Brook wetland was located downstream from the wetland site at an elevation that is not likely to cause a significant impact from run-off into the wetland site. The stress from this feature was thought to be negligible. The Outer Cove Brook wetland received a value of 27 in the stress evaluation rubric.

There are some potential threats or stressors to the wetland ecosystem that were not included in the stress evaluation rubric that should be noted. The aerial images used to delineate the wetland and assess the potential stressors for this site did not reflect recent construction and development, including the Stavanger Drive/ Aberdeen Avenue commercial area that is expanding towards Outer Cove Brook. Also, the airport is located upstream of the wetland site and there is potential for contaminants from there to be transferred to the wetland. Likewise, any development along the river upstream of the wetland would have the potential to impact the wetland as the river could transport contaminants.

Gosse's Pond Wetland Study Site- Plant and Invertebrate Data

Plants

Site Name: Gosse's Pond	Date/Time: July 18th, 2011 at 10:00am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Off Bauline Line

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf										
Cotton Grass										
Labrador Tea										
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's smock*				1	2	2	1			8
Meadow sweet	8	5	13	3						
Sweet Gale	6	3		2	1	4	2			
Canadian Burnette										
Asters										
Creeping Buttercup*							1	6	1	12
Larger Blueflags		2		1	7	6	7		1	
Goldenrod	3	4	8	1	1	3	23	5	1	14
Spotted Joe-Pye	6	6		13						
Ferns	11		8							

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses	75	20	70	5	85	40	80	90	95	85
Sedges				1	5					
Rushes						35		5		1
Peat Mosses										1
Typha										
Marsh Bedstraw	1		1	1		1		1		1
Bindweed										
Water Starwort				1	5	5		5	5	

Inverts

Organism	Total Count
Water Boatmen	5
Mayfly larvae	5

Gosse's Pond Wetland Study Site- Stress Evaluation Rubric:

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Agriculture	Farm Field	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								0

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	Comment	TOTALS
		Value	3	2	1			
Dirt Road	Camp Carey Road	1	3					3
2 Lane Road	Bauline Line	2		4		X2		8
4 Lane Road		3						
								11

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
			0

	TOTALS
Part 1	0
Part 2	11
Part 3	0
Score	11

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 5) was used for the analysis of potential stressors in the stress evaluation rubric. Camp Carey Road, formed the north boundary and appeared to be unpaved. Bauline Line, a two lane roadway, ran from east to west within 30 meters of the southern wetland boundary. This roadway was at a slope above the wetland site, meaning that there could be increased potential impact from run off. The Gosse's Pond wetland study site obtained a score of 11 in the stress evaluation rubric.

There are some possible stressors to the wetland ecosystem that did not fit within the criteria of the stress evaluation rubric but should still be mentioned. There have been proposals for housing developments to the north of Gosse's Pond, which could impact the wetland not only because of a potential increase in surface runoff, but also because these homes would have septic fields which could result in fecal contamination in the area of the wetland.

Terrace Road Wetland Study Site- Plant and Invertebrate Data:

Plants

Site Name: Terrace Road	Date/Time: July 19th,2011 at 10:30 am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 2	Off Kenmount Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass	2			2		1		2		
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW						7	2	5	3	1
Goldenrod										
Labrador Tea										
Lady's Smock*		13		7	6		4			8
Larch										
Larger Blueflags										
Leatherleaf		67	12		26	5	11	6		
Lousewort										
Meadow Rue										
Meadowsweet	5	4		5	1		4			4
Northern Bugleweed								1		
Northern Rose		2					1			
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew				50	16		22		21	12
Sweet Gale	24	12	14		6	16	12	3	41	44
White Bog Orchid										
Black Knapweed*										
Yellow Hawkweed*										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	30	5	5		5	65	10	20	15	<1
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw		<1								
Peat Mosses	10	30	20	30	30	5	10		35	40
Rushes						<1	<1	<1	<1	
Sedges	<1	<1				<1	<1	<1	<1	
Small Cranberry		<1		<1	<1		<1			
Large Cranberry										
Typha										
Three Leaved False SS	10	15	60	30	25	10	15	<1	20	10
Bog Laurel		10	5	<1	<1	<1	<1		<1	
Bog Violet		<1		<1	<1	<1	<1		<1	<1
Purple Bog Aster	10				<1		<1		<1	

Site Name: Terrace Rd.	Date/Time: July 19th,2011 at 1:25pm
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 2 of 2	Off Kenmount Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass							2	8		
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea										
Lady's Smock*	3	2								
Larch										
Larger Blueflags										
Leatherleaf		22	77	1	48		4			38
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed	18									
Northern Rose							2	2		
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew			16							
Sweet Gale		25	45	18	15	7	7			13
White Bog Orchid										
Black Knapweed*										
Yellow Hawkweed*										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry					<1	<1	<1		5	<1
Grasses	50	5	15	10	10	<1	5	5	5	<1
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses		10	35		20	25	80	80		15
Rushes	<1	<1	10	<1	<1	<1			<1	<1
Sedges	<1	<1	<1	<1	<1	<1		<1	<1	<1
Small Cranberry										
Large Cranberry										
Typha										
Three Leaved False SS	<1	5	10	<1	10	35	15	10	5	10
Bog Laurel	<1		<1		<1	<1	<1	<1		
Bog Violet	<1		<1		<1		<1			
Purple Bog Aster	5	<1	<1	<1	<1	<1				

Inverts

Organism	Total Counts
Back Swimmers	2
Water Boatmen	3
Mosquito Larvae	2
Unknown #1^	5
Water beetles	7
Scuds	2

^This invertebrate was not identified, it is considered a separate species.

Terrace Road Wetland Study Site - Stress Evaluation Rubric:

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Impervious Surfaces	Gil Eannes Drive Subdivision	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	9			X2	18
	Commercial Development, South of Kenmount Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2			3	X2	6
	Irving Gas Station	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	6				6
	Electricity Yard	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2			2		2
								32

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
2 Lane Road	Great Eastern Avenue	2	6			X2	12
2 Lane Road	Iceland Place	2	6			X2	12
4 Lane Road	Kenmount Road	3	9			X2	18
							42

	TOTALS
Part 1	32
Part 2	42
Part 3	0
Score	74

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 6) was used for the analysis of potential stressors in the stress evaluation rubric. The stress evaluation rubric for this wetland site was based on the overlain roadways and the features that were present in the satellite image from Google Earth. Great Eastern Avenue, Iceland Place and the residential development on the south side of Gil Eannes Drive, Roberts Lane, and Kenmount Road formed the developed borders of the site. All developmental features, with the exception of Roberts Lane, were at an elevation above the wetland site and may have had an increased potential impact of run-off from the feature into the wetland. This site received a score of 74 in the stress evaluation rubric.

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Juniper Ponds Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Juniper Ponds (south end)	Date/Time: July 20, 2011 at 10:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 3	Accessed by path off Thorburn Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf		8	12	43						
Cotton Grass										
Labrador Tea										
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry		1								
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's smock*										
Sweet Gale	37	12	17	21						
Meadowsweet										
Canadian Burnette										
Asters										
Creeping Buttercup*										
Northeastern rose		17								
Larger Blueflags										
Wild Mint										
Spotted Joe-Pye										
Ferns										
Canadian Burnet		4								
Lily pads			3							
Red Leaf^			15							
3 spiked leaf^	5									

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses	<1	<5	15	10						
Sedges			<1	<1						
Rushes	<1	<1								
Peat Mosses	5	45	5	15						
Typha										
Marsh Bedstraw										
Bindweed										
False solomons seal										
Small Cranberry										
Starred leaf^	<1	5	<1							
Kidney Leaf^										

^This plant was not identified properly, it is considered a separate plant

Site Name: Juniper Ponds (south end)	Date/Time: July 20, 2011 at 10:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 2 of 3	Accessed by path off Thorburn Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf		3	6							
Cotton Grass			3							
Labrador Tea										
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's Smock*	1	6	8			8				
Sweet Gale	13	16	7	22	10	5				
Meadowsweet	1	1	19		16	8				
Canadian Burnette					9					
Asters										
Creeping Buttercup*										
Bog Laurel				42	1					
Larger Blueflags					2					
Northeastern Rose					1	4				
Wild Mint										
Spotted Joe-Pye										
Meadow Rue										
Ferns										
Canadian Burnet										
Yellow Hawkweed*	1									
Serated tongue leaves^	33	4	4							
Red Leaf^			1		4					

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses		10	<1	20	5	15				
Sedges		<1			<1					
Rushes						<1				
Peat Mosses		25	60	40	35					
Typha										
Marsh Bedstraw										
Bindweed										
False solomons seal										
Small Cranberry										
Starred leaf^		<1	<1	<1	<1	5				

^This plant was not identified properly, it is considered a separate plant

Site Name: Juniper Ponds (south end)	Date/Time: July 20, 2011 at 10:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 3 of 3	Off Thorburn Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf	4	32	14		9	12				
Cotton Grass	2	4	1	8		6	17			
Labrador Tea	10									
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew		22	32	36	11	70	16			
Lady's Smock*	6			2						
Sweet Gale	13	4	20	9	17	28	29			
Meadowsweet										
Canadian Burnette										
Asters										
Creeping Buttercup*										
Larger Blueflags		1					1			
Wild Mint		1								
Northeastern rose	2				3	2				
Spotted Joe-Pye										
Bog laurel	43			11		4	8			
Meadow Rue										
Ferns										
Cracker Berry	5									
Sheep Laurel	1				1	2				
Tall yellow bud^					1	1				
Red leaf^				1						

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses	5	15	25	10	25	5	5			
Sedges	<1				<1	<1	5			
Rushes							5			
Peat Mosses	80	75	40	90	60	75	15			
Typha										
Marsh Bedstraw										
Bindweed										
False solomons seal		<1	<1				<1			
Small Cranberry	<1	<1	<1	<1	<1	5				
Kidney Leaf^				<1						
Starred leaf^		<1	<1	<1		<1	<1			

^This plant was not identified properly, it is considered a separate plant

Inverts

Site 1- North

Organism	Total Count
water boatmen	2
Tadpole	2
Scud	12
Water mite	2
Unknown 2^	7
Mosquito larvae	3

^This species was not identified properly, it is considered a separate species

Site 2- South

Organism	Total Count
Clam	1
Scud	5
Leech	1
Mayfly Larvae	1

Juniper Ponds Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Impervious Surfaces	Commercial Development at Southwest Boundary	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6				6
	Commercial Development at Thorburn Road	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
	Commercial Development at South Boundary	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2			2	X2	4
Residential	Thorburn Road Lot	2 1	Dense Sparse			1		1
Residential	Thorburn Road Lot	2 1	Dense Sparse			1	X2	2
								31

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
4 Lane Road	Team Gushue Highway	3	9				9
	Outer Ring Road		9			X2	18
							27

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	4	Inflow	4
Dam	1		1
			5

	TOTALS
Part 1	31
Part 2	27
Part 3	5
Score	63

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 7) was used for the analysis of potential stressors in the stress evaluation rubric. The Outer Ring Road and the Team Gushue Highway were both within 15 meters of the wetland site. The Outer Ring Road exit ramp was at a slope that may increase the impact potential of run off. A commercial development occurred at the southwest boundary of the site. A commercial development on Thorburn Road was adjoining with the wetland boundary and was at a slope that may have increased the impact of potential run off. Another commercial development occurred near the south boundary of the site, also with a slope that may increase the impact of the potential run off. Two residential properties occurred within 50 meters of the wetland boundary. Four culverts are directing water into the site, and one dam is present within the wetland boundary. The Juniper Ponds wetland study site obtained a score of 63 in the stress evaluation rubric.

Ashkay Drive Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Ashkay Drive	Date/Time: July 21, 2011 at 3:30pm
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Ashkay Drive new home construction

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf										
Cotton Grass										
Labrador Tea										
Common Speedwell*						6	1	3		1
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's smock*										
Sweet Gale						1	7		5	
Meadowsweet										
Bittercress*	15	16	18	31	12	10	14	29	8	10
Canadian Burnette										
Asters										
Creeping Buttercup*	4									
Larger Blueflags										
Goldenrod	64		9				8	9		
Meadow Rue										
Spotted Joe-Pye										
Ferns										
Butter and Eggs			2	2			1	5		
Spikey red leaf^								18		

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses	15	90	95	90	90	15	90	65	70	85
Sedges	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Rushes	5	5				65	<1			
Peat Mosses										
Typha										
Marsh Bedstraw	<1	<1	<1	<1	5	5	<1	5	<1	10
Bindweed										
Three Leaved False SS	5	<1		<1		<1	<1	<1		
Small Cranberry										

Inverts

Organism	Total Counts
Water Boatmen	2
Syrphid Larvae	1
Mosquito larvae	3
Stonefly larvae	1
Bloodworm (midge larvae)	1

Ashkay Drive Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Residential Development, Snows Lane	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	6				6
	Commercial Development, Snows Lane	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2			2		2
	Residential Development, Stavanger Drive	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
Residential	Snows Lane	2 1	Dense Sparse	3				3
								29

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Ashkay Drive	2	6				6
2 Lane Road	Snows Lane	2	6				6
							12

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	2	Inflow	2
Dam			
			2

	TOTALS
Part 1	29
Part 2	12
Part 3	2
Score	43

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 8) was used for the analysis of potential stressors in the stress evaluation rubric. Two roadways (Snows Lane and Ashkay Drive) and several developed lots were within 15 meters of the wetland boundary. The residential area of Stavanger Drive was located within 15 meters of the wetland boundary and at an elevation that may increase the potential impact of run-off from this feature into the wetland site. A culvert was releasing water into the northern portion of the wetland site.. The Ashkay Drive Wetland study site received a value of 43 in the stress evaluation rubric.

There are some potential stressors to the Ashkay Drive wetland site that were not included in the stress evaluation rubric. The area of Ashkay Drive had undergone major construction and development in recent years, but the aerial images used to assess potential stressors to the wetland ecosystem did not reflect the new housing developments. A roads layer had been added to the satellite imagery as overlain data. As a result, the location of roadways was known and included in the stress evaluation rubric but the housing developments were not.

Geo Centre Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: GEO CENTRE	Date/Time: July 28th, 2011 at 10:00am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 2	Geo Centre Walking trail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf	107	64	78	90	68		3		18	46
Cotton Grass										
Labrador Tea	12	4	13	15	9					18
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's smock*										
Sweet Gale		17	10			10	8	3	5	8
Meadowsweet							29	6	6	6
Canadian Burnette										
Asters										
Creeping Buttercup*										
Larger Blueflags										
Wild Mint										
Spotted Joe-Pye										
Bog Laurel	6	6	5	3	2					
Ferns							13	18		
False Leather^				7	3	1				
Mint wood^	1			6			3	1	6	
Clover shrub^	1									2

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses	20	10	5	<1	20	60	<1	<1	70	40
Sedges	<1	<1		<1		<1				
Rushes										
Peat Mosses	65	40			65					
Typha										
Marsh Bedstraw										
Bindweed										
False solomons seal										
Small Cranberry										

Site Name: Geo Center	Date/Time: July 28th, 2011 at 12:00pm
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 2 or 2	Geo Centre Walking Trail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Rosemary										
Leatherleaf			17	4			5			
Cotton Grass										
Labrador Tea										
Common Speedwell*										
Purple Pitcher Plant										
Small Cranberry										
White Bog Orchid										
Pink Bog Orchid										
Sundew										
Lady's smock*										
Sweet Gale				6	10	9	10			
Meadowsweet				5	9	7				
Canadian Burnette										
Asters										
Creeping Buttercup*										
Larger Blueflags										
Wild Mint										
Sheep Laurel	16	33	10	16						
Chuckely Pear	3	1								
Cracker berry	2									
Spotted Joe-Pye										
High bush blueberry	4	2								
Ferns										
Clover leaf^				50	1					
Mint wood^			4		8					

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Grasses				<1	5	45	70			
Sedges					<1	<1	<1			
Rushes										
Peat Mosses										
Typha										
Marsh Bedstraw										
Bindweed										
False solomons seal										
Black crowberry	50									
Low bush blueberry	5									

Inverts

Organism	Total Count
Mosquito larvae	4
Water Mite	2
Black fly larvae	2
Scud (amphipod)	2

Geo Centre Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Utility Building and Parking Lot	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6			X2	12
	Geo Center Building and Parking Lot	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6			6
								18

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					
							0

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	18
Part 2	0
Part 3	0
Score	18

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 9) was used for the analysis of potential stressors in the stress evaluation rubric. A utility building was located within 15 meters of the southern wetland boundary. This building was also on a steep slope above the wetland, which may have increased the impact of potential run off into the wetland. The Johnson Geo Centre building was located within 30 meters of the wetland boundary. The Geo Centre wetland site obtained a score of 18 in the stress evaluation rubric.

Messenger Drive Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Messenger Drive	Date/Time: August 4th, 2011
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Near new Metrobus Building

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir	1									
Bittercress*										
Bog Laurel				7						
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass			1	1						
Cracker Berry	1									
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea				2						
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf			26	14						
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed										
Northeastern rose	9	2	10	2						
Pink Bog Orchid										
Purple Bog Aster	34	28	24	1						
Purple Pitcher Plant										
Sheep Laurel			1							
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew	19		7	8						
Sweet Gale	25		19	11						
White Bog Orchid										
False Choke Cherry	7									
Black Spruce				4						
Solomon Family^		6								

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	<1	30	<1	<1						
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses	80	55	45	75						
Rushes		<1		<1						
Sedges			<1							
Small Cranberry	<1		<1	<1						
Typha										
Vernal Water Starwort	<1			<1						
Three Leaved False SS	5	<1	5	10						

Inverts

Organism	Total Count
Water boatmen	3
Water strider	2
Dragonfly larvae	3
Grub^	1
Unknown aquatic worm^	8

^This species was not identified properly, it is considered a separate species

Messenger Drive Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road		1					
2 Lane Road	Messenger Drive	2			2	X2	4
4 Lane Road		3					
							4

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			

	TOTALS
Part 1	0
Part 2	4
Part 3	0
Score	4

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 10) was used for the analysis of potential stressors in the stress evaluation rubric. Messenger Drive was the only developed feature within 50 meters of this site. This feature had an elevation that may have increased the impact of potential run-off from the roadway into the wetland site. The Messenger Drive Wetland study site received a value of 4 in the stress evaluation rubric.

As previously mentioned, the recent development in this area was not represented on the satellite imagery and was therefore not included in the stress evaluation rubric for this site. This increased development, mainly commercial, could be another potential stressor to the wetland ecosystem. There was a large amount of garbage noted in the area at the time of the visit for the survey. The construction of Messenger Drive allowed easy access to the wooded area for the people who illegally dumped this garbage there.

Goldeneye Place Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Goldeneye Place	Date/Time: Aug. 09, 2011 at 10:30am
Monitored By: JP + RS	General Site Area/Nearest Road:
Transect Number: 1 of 2	Branscombes Pond walking trail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet						12				
Buckbean			4		35					
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid			2							
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW				4		2				
Goldenrod										
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags		4	8	5	8	13	10			
Leatherleaf	107	30	48	10	6	16	73			
Lousewort										
Meadow Rue										
Meadowsweet		2	8		9	7	18			
Nothern Bugleweed				5	9	5				
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster	4	8	16	45	59	51	22			
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale	14	16	20	7	7	8	10			
White Bog Orchid										

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	10	25	15	50	70	20	5			
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw		<1		<1						
Peat Mosses	60		5			5				
Rushes		<1			<1	<1				
Sedges										
Small Cranberry	<1									
Typha										
Three Leaved False SS										

Site Name: Goldeneye Place	Date/Time: Aug. 09, 2011 at 11:00am
Monitored By: JP + RS	General Site Area/Nearest Road:
Transect Number: 2 of 2	Branscombes Pond walking trail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet									3	
Buckbean								37	132	70
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid							2			
Common Speedwell*										
Cotton Grass									1	
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW			1		5		2		4	
Goldenrod		3							1	
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags		4	6	3	17	21	17		3	8
Leatherleaf		3				17	40	18		
Lousewort		3						3		
Meadow Rue										1
Meadowsweet		7								
Nothern Bugleweed	3	16	4					5	11	3
Northeastern rose	5				1	1	2			
Pink Bog Orchid										
Purple Bog Aster					1	3	90	68	74	60
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale		4	4	7	2	6		11	10	7
White Bog Orchid										
White cluster^	4									

*Non-native plant

^This plant was not properly identified, it is considered a separate plant type

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	70	40	80	25	10	5	5	15	25	50
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses							10	5		
Rushes										
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS										
Small fern-like^	1								1	1

^This plant was not properly identified, it is considered a separate plant type

Inverts

Organism	Total Count
Water boatmen	10
Scud	2
Water beetle	1

Goldeneye Place Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Gadwell Place Residential Development	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9			 X2	18
	Cemetary	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	 9				9
	Goldeneye Place Residential Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	 9			 X2	18
								45

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Blackmarsh Road	2		4		X2	8
							8

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			

	TOTALS
Part 1	45
Part 2	8
Part 3	0
Score	53

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 11) was used for the analysis of potential stressors in the stress evaluation rubric. The residential developments located on Gadwell Place and Goldeneye Place were within 15 meters of the wetland boundary and were at an elevation above the wetland that may have increased the potential impact of run-off into the wetland. Blackmarsh Road, located to the north, was also at an elevation that may have increased the potential impact of run-off from this feature into the wetland site. A cemetery was within 15 meters of the western wetland boundary. The Goldeneye Place Wetland study site received a value of 53 in the stress evaluation rubric.

There are other potential stressors to the wetland ecosystem that were not mentioned in the stress evaluation rubric. For example, there has been ongoing residential development on Blackmarsh Road to the north of Branscombes Pond since the site was visited for this project. This development is located upslope of the pond.

Waterford River at Krown Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Waterford River at Krown	Date/Time: Aug. 24th, 2011 at 10:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Near intersection Blackmarsh & Topsail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod	11									
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale										
White Bog Orchid										
Black knapweed*	2									
Lesser blue flag	18									
Common buttercup	2									

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses		100	100	100	100	100	100			
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses										
Rushes										
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS										
Black knapweed*	35									

*Non-native plant

Inverts

Organism	Total Count
Back swimmer	1
Water boatmen	4
Mosquito larvae	1
Water beetle	1

Waterford River at Krown Wetland Study Site – Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Commercial Development, North of River	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		4		X2	8
	Commercial Development, North of River	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
	Commercial Development, North of River	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6			X2	12
	Residential Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6			X2	12
	Residential Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6		X2	12
Residential	North of River	2 1	Dense Sparse		4		X2	8
Residential	North of River	2 1	Dense Sparse	3			X2	6
Residential	West End	2 1	Dense Sparse			1		1
								77

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
4 Lane Road	Topsail Road	3			3	X2	6
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	77
Part 2	6
Part 3	0
Score	83

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 12) was used for the analysis of potential stressors in the stress evaluation rubric. Most of the commercial developments on Topsail Road were within 15 meters of the wetland boundary. The slope of the land was such that the potential impact from run off could be increased. Homes along Topsail Road occurred within 30 meters of the wetland boundary. These homes had spaced lots with natural features providing a buffer between the lot and the wetland. The land was sloped towards the wetland and may have had increased potential impact of run off from these features. A residential neighbourhood was within 15 meters of the southeastern boundary of the wetland. Houses there were densely developed. That development was at an incline above the wetland. The residential neighbourhood of Municipal Avenue ran east to west within 30 meters of the wetland boundary and was also at a steep incline above the site. This site obtained a score of 83 in the stress evaluation rubric.

Corisande Drive Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Corisande Drive	Date/Time: Aug. 25th, 2011 at 11:40am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Corner of Corisande Drive and Topsail Rd

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	3									
Ferns										
Fraser's Marsh SJW										
Goldenrod	11									
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags			3							
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet		6								
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale										
White Bog Orchid										

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	90	55	100	100						
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses										
Rushes	<1	40								
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS										

Inverts

Organism	Total Count
Water strider	1

Corisande Drive Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Topsail Road Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		6		X2	12
	Corisande Drive Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2		4			4
	South Boundary Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9				9
	West Boundary Development	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
								43

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Corisande Drive	2	6				6
4 Lane Road	Topsail Road	3	6			X2	12
							18

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	3	Inflow	3
			3

	TOTALS
Part 1	43
Part 2	18
Part 3	3
Score	64

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 13) was used for the analysis of potential stressors in the stress evaluation rubric. Topsail Road, a four lane roadway, was within 15 meters of the wetland boundary. The development on the far side of Topsail Road was within 30 meters of the wetland boundary. The slope of the land indicates there may be an increased impact of run off from this feature. The development on the eastern side of Corisande Drive was within 30 meters of the wetland boundary. The south boundary of the site was bordered by a large developed lot; the western side of the site is also bordered by a large development. This development is at a slope above the site that may increase the impact of run off. There are several culverts that are allowing water into the site, two from under Topsail Road and one in the south between the two developed lots. Water flows out of the site through a culvert under Corisande Drive. This site obtained a score of 64 in the stress evaluation.

Pouch Cove Highway Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Pouch Cove Highway	Date/Time: Aug. 26th, 2011 at 10:00am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Pouch Cove Hwy/ Torbay Bypass Construction

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*				1						
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	1	2								
Ferns										
Fraser's Marsh SJW										
Goldenrod	2	3	2	12	2	2	2	1	5	
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags									1	1
Leatherleaf										
Lousewort										
Meadow Rue					3	3	4	5	2	8
Meadowsweet	7	5	4		3	2	2	5	5	6
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale				4	3	3	3	1	2	5
White Bog Orchid										
Fireweed			1							
Black Knapweed*										
Yellow Hawkweed*										

* Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses		<1	<1					25	20	30
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw			<1	<1	<1					
Peat Mosses						20	25		15	20
Rushes			10							
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS							<1			
Lobed^	5	<1	5	15	<1					

^ This plant was not identified properly, it is considered a separate plant

Inverts

Organism	Total Count
Dragonfly nymph	1
Mosquito larvae	16
Scuds	14

Pouch Cove Highway Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Agriculture	Farm Field	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2			3	X2	6
Impervious Surfaces	Building Lot	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6				6
Residential	Single Home Lots	2 1	Dense Sparse	3				3
								15

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
Dirt Road	Old Flatrock Road	1	3			X2	6
2 Lane Road	Torbay Bypass Road	2	6				6
	Pouchcove Higway		6			X2	12
							24

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	1	Inflow	1
			1

	TOTALS
Part 1	15
Part 2	24
Part 3	1
Score	40

Description of the stress evaluation rubric:
The wetland delineation found in Appendix B (Figure 14) was used for the analysis of potential stressors in the stress evaluation rubric. The southern and eastern boundaries were marked by Pouch Cove Highway, a paved two lane road. Old Flatrock Road, a dirt or unmaintained roadway, formed the western boundary. A farm field was located approximately 35 meters outside of the eastern wetland boundary. These three features showed an elevation more than three percent higher than the wetland area, indicating a possible increased impact from run off and therefore received more weight in the stress evaluation rubric. One building lot occurred within 15 meters of the wetland boundary. There were other residential lots along Pouch Cove Highway within 15 meters of the wetland boundary. Construction of the Torbay Bypass Road was occurring within 15 meter of the wetland boundary at the time of the site survey. This road is now in place. An inflow culvert was present along the Pouch Cove Highway boundary of the site. This site obtained a score of 40 in the stress evaluation rubric.

There is also the potential for Big River to transport contaminants from upstream to the wetland site. Possible upstream stressors were not included in the stress evaluation rubric.

Windgap Road Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Flatrock (Windgap Rd.)	Date/Time: Aug. 30th, 2011 at 10:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road: Windgap Road
Transect Number: 1 of 1	

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel							4	4	10	9
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod	1	3			3		2			
Labrador Tea					1	3	1	1		3
Lady's smock*										
Larch						2		2		1
Larger Blueflags				8	4		4	3		
Leatherleaf			11	10		38	32	44	76	37
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed		34								
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster		113	22		10	36	21	23	10	25
Purple Pitcher Plant										
Sheep Laurel						1				
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale		8	7	12	12	17	4	9	3	6
White Bog Orchid										
Yellow Hawkweed*							1			
Black Knapweed*										

^ This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	5	25	30							<1
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses						75	30	85	10	80
Rushes	30		<1	<1	<1	15	<1	<1		
Sedges					15	<1				
Small Cranberry										<1
Typha										
Three Leaved False SS										

Inverts

Organism	Total Counts
Dragonfly nymph	2
Scud	2
Mosquito larvae	1
Water spider	1

Windgap Road Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								0

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
Dirt Road		1					
2 Lane Road	Windgap Road	2			2	X2	4
4 Lane Road		3					
							4

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	0
Part 2	4
Part 3	0
Score	4

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure1) was used for the analysis of potential stressors in the stress evaluation rubric. Windgap Road was the only developmental feature in this area. The slope of this feature above the wetland boundary indicated there may be an increased potential for impacts from run off. It was therefore given more weight in the stress evaluation rubric. This site obtained an overall score of 4 in the stress evaluation rubric.

There are residential properties and agricultural areas on Windgap Road, but they were not located within the distances from the wetland boundary that were used in the stress evaluation rubric. The wetland ecosystem could also potentially be threatened by developments upstream on Big River, as the river could carry contaminants to the wetland.

Kelligrews Pond Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Kelligrews Wetland	Date/Time: Aug. 10th, 9:00am
Monitored By: Josh, Patrick, Damian, Alex (CBS GT &KEEP summer employee)	General Site Area/Nearest Road:
Transect Number: 1 of 2	Between Station Rd and Pond Rd.

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	3	1	1							
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea										
Lady's Smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed										
Northern Rose					6	6	9	1	5	7
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale										
White Bog Orchid										
Yellow Hawkweed*										
Dandilion	4									
Stalky(starish)^							57	2	4	
Yellow Flowerweed^	1									
Star Flower^	11								1	8
Round leaf^						6	10	17	12	
Small long leaf (purple)^						4				

*Non-native plant

^This plant was not properly identified, it is considered a separate plant type

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses										
High Bush Blueberry	15	75	25	10	10	5	5	50	<1	
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses									10	
Rushes	<1	<1						<1		
Sedges			25	30	20					25
Small Cranberry										
Large Cranberry										
Typha										
Three Leaved False SS										
Serrated leaves^	50	20	5	10	10					
Pointy leaf^					20	10				

^This plant was not properly identified, it is considered a separate plant type

Site Name: Kelligrews Wetland	Date/Time: Aug. 10th, 9:00am
Monitored By: Josh, Patrick, Damian, Alex (CBS GT &KEEP summer employee)	General Site Area/Nearest Road:
Transect Number: 2 of 2	Between Station Rd and Pond Rd.

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	7				2		8	8		
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea										
Lady's Smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Northern Bugleweed										
Northern Rose			6							
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Spottted Joe-Pye										
Sundew										
Sweet Gale										
White Bog Orchid										
Yellow Hawkweed*										
Dandelion	8		4				3	9	55	15
Strawberry		6								
Round Leaf^	6	6								
Spikey leaf Stalk^			2							
Yellow Flower^									1	
Purple Pollen^										1
Long leaf^									5	1

*Non-native plant

^This plant was not properly identified, it is considered a separate plant type

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	5	80		50	5	10	1	10	20	5
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses										
Rushes						5	5	5		
Sedges	5		10	10	15					
Small Cranberry		30								
Large Cranberry										
Typha										
Three Leaved False SS										
Serrated^	25		5	5	15	40	40	30	5	

^This plant was not properly identified, it is considered a separate plant type

Inverts

Organism	Total Counts
No recorded spp.	

Kelligrews Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	St. Edward's Road Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
	Station Road	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	6			X2	12
	Commerical Development; RV Sales	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
Residential	Station Road	2 1	Dense Sparse		4			4
Residential	CBS Highway	2 1	Dense Sparse		4			4
Residential	Craig's Lane	2 1	Dense Sparse	6			X2	12
Residential	Ponds Road	2 1	Dense Sparse		4		X2	8
								76

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Ponds Road	2	6			X2	12
2 Lane Road	CBS Highway	2	6				6
							18

	TOTALS
Part 1	76
Part 2	18
Part 3	0
Score	94

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 16) was used for the analysis of potential stressors in the stress evaluation rubric. A commercial development was contiguous with a portion of the wetland boundary. Conception Bay Highway formed a border where the Kelligrews River flowed under this roadway. Pond Road formed the western wetland boundary. Residential developments occurred on the far side of Pond Road. The northern wetland boundary was marked by the beach and the decommissioned railway bed. In the east, residential lots were near the wetland boundary, within 50 metres in most cases. This site received a total score of 94 in the stress evaluation rubric.

This wetland site could also potentially be affected by development upstream on the Kelligrews River, as the river has the potential to transport contaminants. Upstream developments include numerous housing areas and the industrial area of Incinerator Road. Other possible threats to the Kelligrews Pond wetland site that were not included in the stress evaluation rubric are contaminants that might be in Conception Bay, as there is salt water influx to the wetland area. There is a wastewater treatment facility located to the west of the wetland that discharges its effluent into the bay, and the bay often contains various ships, creating a potential threat of contamination by oil spillage.

Oxen Pond Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Oxen Pond	Date/Time: August 2nd, 2011 at 11:30am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 2	ATV trail / powerlines

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel		2	5		5	1	33			
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry							3			
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW	3									
Goldenrod										
Labrador Tea	9		1		12	10	11			
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf	10	5	28	11	26	25	89			
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed										
Northeastern rose		3								
Pink Bog Orchid										
Purple Bog Aster	25	40	10	51	23	65	25			
Purple Pitcher Plant	7	4	7	4						
Sheep Laurel	2	18	29	4						
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew	11	8	5	3						
Sweet Gale	12	24	13	24	12	18	8			
White Bog Orchid										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	<1	20	<1	<1	<1	<1	<1			
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses	80	40	85	70	55	30	70			
Rushes		5	5		<1	<1	<1			
Sedges										
Small Cranberry	5	<1	<1	<1		<1	<1			
Typha										
Three Leaved False SS	<1	<1	<1	<1						

Site Name: Oxen Pond	Date/Time: August 8th, 2011 at 12:00pm
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 2 of 2	ATV trail/powerlines

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass		8								
Cracker Berry										
Creeping Buttercup*										
Ferns		1								
Fraser's Marsh SJW	5	13	3							
Goldenrod										
Labrador Tea	1									
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf						4				
Lousewort										
Meadow Rue										
Meadowsweet	6	6								
Nothern Bugleweed										
Northeastern rose		1								
Pink Bog Orchid										
Purple Bog Aster	35	51	42	18	57	18				
Purple Pitcher Plant					2	1				
Sheep Laurel		2								
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew		63	34	34		35				
Sweet Gale	15	1	10	13	11	18				
White Bog Orchid										

*Non-native Plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses		<1	<1	5	<1	<1				
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses	75	15	60	45	65	95				
Rushes	5	75	<1	<1	30	<1				
Sedges			<1	<1	<1					
Small Cranberry	<1	<1	<1	<1	<1	<1				
Typha										
Three Leaved False SS										

Inverts

Organism	Total Count
Water Boatmen	17
Mosquito larvae	7
Unknown larvae^	8

^This species was not identified properly, it is considered a separate species

Oxen Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								0

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road	Outer Ring Road	3			3	X2	6
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	0
Part 2	6
Part 3	0
Score	6

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 17) was used for the analysis of potential stressors in the stress evaluation rubric. The Outer Ring Road was within 50 metres of the wetland study site boundary and was at an elevation that could increase the potential impact of run-off from this feature into the wetland site. The Oxen Pond site received a value of 6 in the stress evaluation rubric.

There are possible stressors to the wetland ecosystem at the Oxen Pond site that did not fit into the criteria used in the stress evaluation rubric. One such potential stressor is the transmission line that runs through it. This transmission line has also opened the area to hikers and recreational vehicles.

Kelsey Drive Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Kelsey Drive	Date/Time: Aug. 1st, 2011 at 11:20am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Yellow Marsh Stream, off Kelsey Dr.

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel	2									
Bog Rosemary		3	6							
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea		3								
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf			15	56						
Lousewort										
Meadow Rue				7	2					
Meadowsweet					5					
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale	12				20					
White Bog Orchid										
Opposite leaf^	9									

*Non-native Plant

^This plant was not identified properly, it is considered a separate plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	75	55	<1	30	40					
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses		40	90	20	<1					
Rushes										
Sedges	<1	<1	<1	<1	<1					
Small Cranberry		<1	<1							
Typha										
Three Leaved False SS										

Inverts

Organism	Total Count
Water Strider	1
Mosquito Larvae	5
Egg sack	2
Unknown^	3

^This species was not identified properly, it is considered a separate species

Kelsey Drive Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								0

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Messenger Drive	2	6				6
4 Lane Road	Kelsey Drive	3	9				9
4 Lane Road	Team Gushue Highway	3	9				9
							24

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	0
Part 2	24
Part 3	0
Score	24

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 10) was used for the analysis of potential stressors in the stress evaluation rubric. Three developmental features were within 15 metres of the wetland study site; Kelsey Drive, the Team Gushue Highway, and Messenger Drive. The Kelsey Drive Wetland study site received a value of 24 in the stress evaluation rubric.

As mentioned, the commercial developments in the area were not represented on Google Earth, and were therefore not included in the stress evaluation rubric. They are however, possible stressors to the wetland ecosystem. Other potential stressors are a cleared area that was likely the location of a water main because there were manholes visible along it. This area was adjacent to the wetland but was not on the satellite imagery. Also, Yellow Marsh Stream could transport contaminants to the wetland area from upstream.

Lower Gully River Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Lower Gully River	Date/Time: Aug. 08, 2011
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 2	Opposite river from Roberts Rd. S, upstream of old bridge

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel					3					
Bog Rosemary			6	1						
Bog Violet		1		2						
Canadian Burnet										
Cedar			10			3				
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass						8				
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf			19	7	5	9				
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed		3								
Northeastern rose	1									
Pink Bog Orchid										
Purple Bog Aster	4	16	6							
Purple Pitcher Plant			3	3		7				
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale	10	14	3	7	2	2				
White Bog Orchid										
Potentilla	7	9	13	9	20	19				
Yellow Hawkweed*				11	5	7				
Black Knapweed*										

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	20	30	15	20	20	5				
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses			45	5	10	5				
Rushes	30	25	25	55	50	70				
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS										

Site Name: Lower Gully River	Date/Time: Aug. 08, 2011
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 2 of 2	Opposite river from Roberts Rd. S, upstream of old bridge

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary	16		5		1		8			1
Bog Violet				8						
Canadian Burnet										
Cedar				4			1	2		2
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass					6		2	30	1	
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW										
Goldenrod		1				1	1			
Labrador Tea										
Lady's smock*										
Larch					1					
Larger Blueflags										
Leatherleaf				1	4	5	13	6		12
Lousewort										
Meadow Rue	9	6		13	7			1	2	1
Meadowsweet										
Nothern Bugleweed										
Northeastern rose										1
Pink Bog Orchid										
Purple Bog Aster				2	3					
Purple Pitcher Plant			4	2	3		6		1	2
Sheep Laurel		8								
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew							11			
Sweet Gale	11	9	4	5	8	4		6	8	4
White Bog Orchid			1	1						
Potentilla	28	11	6	12	13	11	10	6	7	6
Yellow Hawkweed*	9			8	6					1
Alder		1								
Juniper		2								
Christmas Leaves^		1								
Black knapweed*										

*Non-native plant

^This plant was not properly identified, it is considered a separate plant type

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	10			5		15	10	10	5	10
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses		80			30	25	20			
Rushes	25	5	30	50	25		50	50	70	<1
Sedges					<1	30				
Small Cranberry										
Typha										
Three Leaved False SS										

Inverts

Organism	Total Count
Damselfly nymph	2
Scud (Amphipod)	4
Unknown darting^	2

^ This organism was not properly identified, it is considered a separate species

Lower Gully River Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces	Residential Lot	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	9			X2	18
Residential	Robert's Road South	2 1	Dense Sparse	6			X2	12
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								30

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			

	TOTALS
Part 1	30
Part 2	0
Part 3	0
Score	30

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 18) was used for the analysis of potential stressors in the stress evaluation rubric. Residential development on Roberts Road South was contiguous to a portion of the western wetland study site boundary at an elevation that may increase the potential impact of run-off from this feature into the wetland site. The Lower Gully River wetland study site received a value of 30 in the stress evaluation rubric.

There are some potential stressors to the wetland that were not included in the stress evaluation rubric. The area to the east of the wetland is to be developed to contain commercial establishments. This area is at a higher elevation than the river and wetland area. This commercial development scheme could not only infringe on the wetland boundary, but runoff from the buildings and parking lots there could carry contaminants into the wetland and negatively affect the ecosystem. The Lower Gully River could also carry contaminants to the wetland from any sources upstream.

Georges Pond Wetland Study Site - Plants and Invertebrates

Plants

Site Name: Georges Pond	Date/Time:Aug. 11, 2011 at 11:00am
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Georges Pond Road / Redmonds Road

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet							20	3		
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass		1								
Cracker Berry										
Creeping Buttercup*										
Ferns										
Fraser's Marsh SJW		12	4		12	29	7	20	7	11
Goldenrod						8				
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf	61	29		4	17		18	8		12
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed					2					
Northeastern rose					2					
Pink Bog Orchid										
Purple Bog Aster	88	107	85	4	93	157	134	98	97	225
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										9
Sweet Gale	8	30	21		7	12	25	25	26	12
White Bog Orchid										

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses	15	30	50	40	25	50	20	10	40	10
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Rushes			<1	<1				<1	<1	
Sedges	<1	<1					<1	<1	<1	10
Small Cranberry										
Typha										
Three Leaved False SS					<1		10	10		

Inverts

Organism	Total Count
Damselfly larvae	4
Dragonfly larvae	1
Water mite	2

Georges Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature	Value	Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
				3	2	1	X 2	
Agriculture		1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2					
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								0

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					
							0

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	0
Part 2	0
Part 3	0
Score	0

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure19) was used for the analysis of potential stressors in the stress evaluation rubric. This site did not have any of the developmental features used in the stress evaluation rubric within a 50 meter distance of the wetland boundary, and therefore received a value of zero in the stress evaluation rubric.

This site does have human influence in the form of hiking trails and there are power lines that intercept the area. There is therefore potential for stress to the wetland ecosystem that did not fit in the stress evaluation rubric.

Nut Brook Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Nut Brook	Date/Time: Aug. 16th, 2011
Monitored By: JP + RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Incinerator Road, across from old landfill

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Balsam Fir										
Bittercress*										
Bog Laurel										
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear										
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry										
Creeping Buttercup*	3									
Ferns										
Fraser's Marsh SJW										
Goldenrod	49	1	82							
Labrador Tea										
Lady's smock*										
Larch										
Larger Blueflags										
Leatherleaf										
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster										
Purple Pitcher Plant										
Sheep Laurel										
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew										
Sweet Gale	14			3						
White Bog Orchid										
Pink pepper^		3	4							
Spiney fat G^			10							

*Non-native plant

^This plant was not properly identified, it is considered a separate plant type

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry										
Grasses										
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses										
Rushes										
Sedges										
Small Cranberry										
Typha										
Three Leaved False SS										

Inverts

Organism	Total Count
Mosquito larvae	11
Water mite	3

Nut Brook Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Lot at Western End of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9			 X2	18
	Second Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9			 X2	18
	Third Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9			 X2	18
	Fourth Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 	 6		 X2	12
	Fifth Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 6 				6
	Sixth Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9				9
	Seventh Lot, traveling west from end of Incinerator Road	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	 9			 X2	18
								99

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
2 Lane Road	Incinerator Road	2	6				6
							6

	TOTALS
Part 1	99
Part 2	6
Part 3	0
Score	105

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 20) was used for the analysis of potential stressors in the stress evaluation rubric. Seven developments were identified along Incinerator Road that fit the criteria used in the stress evaluation rubric. Five of these lots were at an elevation higher than the wetland study site and may have had increased potential impact of run-off from these areas into the wetland site. The Nut Brook site received a total score of 105 in the stress evaluation rubric.

Incinerator Road is home to a variety of industries, all of which present different potential stress to the wetland ecosystem. Those industries that did not fit into the stress evaluation rubric may still cause stress. Nut Brook flows through many of these industries and could potentially transport contaminants from them into the wetland.

Powers Pond Wetland Study Site - Plant and Invertebrate Data

Plants

Site Name: Powers Pond	Date/Time: Aug. 16th, 2011
Monitored By: NC, JP, RS	General Site Area/Nearest Road:
Transect Number: 1 of 1	Power's Pond walking trail

Total Standing Counts

Overgrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
A-leaved Tearthumb*										
Bakeapple						4		6	13	10
Balsam Fir										
Bittercress*										
Bog Laurel		16				3		11		4
Bog Rosemary										
Bog Violet										
Buck Bean										
Canadian Burnet										
Cedar										
Chuckley Pear								13		2
Club Spur Orchid										
Common Speedwell*										
Cotton Grass										
Cracker Berry								14	7	
Creeping Buttercup*									7	
Ferns										
Fraser's Marsh SJW										
Goldenrod										
Labrador Tea	1	18	50			9		19	34	43
Lady's smock*										
Larch			1				2	5		2
Larger Blueflags										
Leatherleaf		2	76	6		65	31	24		
Lousewort										
Meadow Rue										
Meadowsweet										
Nothern Bugleweed										
Northeastern rose										
Pink Bog Orchid										
Purple Bog Aster	20								6	
Purple Pitcher Plant			4				1	2		5
Sheep Laurel									19	18
Shrubby Cinquefoil										
Small Cranberry										
Spotted Joe-Pye										
Sundew			50			15				
Sweet Gale	21	26		17		16	15	10	14	
White Bog Orchid										

*Non-native plant

% Percent Coverage

Undergrowth species	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bindweed										
Black Crowberry								5		5
Grasses	15	5	<1	<1			<1			
High Bush Blueberry										
Low Sweet Blueberry										
Marsh Bedstraw										
Peat Mosses	15	85	65	10		80	75		30	40
Rushes						5	10	85	<1	5
Sedges		<1	<1	5	15	<1				
Small Cranberry			<1				<1		<1	<1
Large Cranberry		<1					<1		<1	
Typha										
Three Leaved False SS			<1	<1			<1			
Lichen								5	50	25

Inverts

Organism	Total Count
Back swimmers	5
Dragonfly larvae	20
Water boatmen	8
Mosquito larvae	6

Powers Pond Wetland Study Site - Stress Evaluation Rubric

Part 1: Area Features

	Feature		Area	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value		3	2	1	X 2	
Impervious Surfaces	Donovan's Industrial Park	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 9				9
	Sagona Avenue Residential Neighbourhood	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	 	 6			6
	Residential Neighbourhood to the South	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2	 9				9
								24

Part 2: Roadways

	Feature		<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
		Value	3	2	1		
Dirt Road		1					
2 Lane Road		2					
4 Lane Road		3					
							0

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Part 1	24
Part 2	0
Part 3	0
Score	24

Description of the stress evaluation rubric:

The wetland delineation found in Appendix B (Figure 21) was used for the analysis of potential stressors in the stress evaluation rubric. Three features were within 50 meters of this wetland site: Donovan's Industrial Park; the residential neighbourhood of Sagona Avenue; and the residential neighbourhood of Michener Avenue. The Powers Pond Wetland study site received a value of 24 in the stress evaluation rubric.