Northeast Avalon ACAP's Wetland Survey Project
Final Report for 2012-2013

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With Insight From:
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Executive Summary

In 2011- 2012 the Northeast Avalon ACAP (NAACAP) began wetland surveys throughout the Northeast Avalon Peninsula of Newfoundland and Labrador. During the 2012-2013 project year, NAACAP visited an additional 14 wetlands and 12 barachois ponds as part of its Wetlands Survey Project. This report gives details on the 14 wetlands; the information from the barachois ponds is given in a separate report titled *An Examination of the Barachois Pond Ecosystems on the Northeast Avalon Peninsula of Newfoundland and Labrador*.

This project obtained baseline data from the visited wetlands including information pertaining to: flora located in each, including the presence of non- native species; benthic macroinvertebrate types found in each and their classification as water quality indicators, and various water quality readings. With the use of the *Stress Evaluation Rubric*, developed in 2011-2012, each wetland was assigned a number based on surrounding developments and the potential for stress to the wetland from them.

Overall, the wetlands visited contained a variety of flora and invertebrates. For the most part, water quality parameter levels were within guidelines suggested for the protection of aquatic life. The wetlands also illustrated varying potential stress from surroundings.

Acknowledgments

Principle funding for this project came from Environment Canada's Atlantic Ecosystem Initiative program. NAACAP board members provided advice and provided assistance to staff through all aspects of this project. A Conservation Corps Newfoundland and Labrador Green Team collected field data from the wetland sites. Credit is given to Green Team 2012 members Julia Collins, Aaron Wiseman and Catherine Hooper for their hard work. Bob Helleur at of the Department of Chemistry at Memorial University helped with disposal of waste generated from the Hach Stream Survey kits. Suggestions for wetland sites to visit were supplied by the Town of Portugal Cove St. Philip's, the Town of Flatrock, and the Town of Wabana, all of whom had staff members who met with the Green Team to discuss wetlands within municipal boundaries and provided assistance with finding the sites. The Topsail Beach wetland site was recommended by a resident of the area that was concerned that the wetland would be lost to development pressures. Aare Voitk and Claudia Hanel kindly provided botanist expertise with the identification of plants collected and dried during the plant surveys.

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1.0 Introduction

In 2011, the Northeast Avalon ACAP (NAACAP) started to collect baseline data from the wetlands on the Northeast Avalon Peninsula. This project was initiated because of the pressure that rapid increase in development in the region is having on wetlands; in terms of numbers and quality. This project was continued in 2012, as the amount of wetlands in the region was too extensive for one year.

1.1 What is a Wetland?

Wetlands, as defined by Environment Canada (2012), are:

> "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 favours the dominance of either hydrophytic or water-tolerant plants. The five major types of wetlands are: marshes, swamps, bogs, fens, and shallow open waters"

Each of the five types of wetlands given in the above definition can also be further classified, but will not be mentioned here.

1.2 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. This filter ability becomes increasingly important as deforestation and the presence of 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.

Wetlands can also be viewed as sponges, retaining water during wet periods and releasing it during dry periods (Environment Canada, 2012). 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.

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.

1.3 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.

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).

2.0 Methods

2.1 Plant Sampling

Plant inventory data were collected using a belt transect survey method. The length of each transect varied depending on the size and accessibility of the wetland, with a goal of a 50m transect; if this was not possible, the transect length 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), but generally each surveyed wetland had two plant transects.

Plants found within each quadrat were counted and percent cover estimated. Plants were identified to species name where possible. In most cases, grasses, sedges, rushes and ferns were not identified to species level 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; *Trees and Shrubs Newfoundland and Labrador* by Tod Boland; *A Travellers' Guide to Wild Flowers of Newfoundland Canada* by Bill and June Titford; 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 a sample taken and dried in a plant press so that they could be 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 under estimates of the true richness, as some 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 during the 2011 – 2012 Wetland Survey Project (J. Maunder, personal communication, August 15, 2011) and lists of non- native plant species developed by the Memorial University of Newfoundland Botanical Gardens and the Newfoundland and Labrador Invasive Species Council.

2.2 Benthic Macroinvertebrate Sampling

Sampling for benthic macroinvertebrates was performed at two sites for each wetland site surveyed; these two sites corresponded with the inflow and outflow of the wetland where possible. Depending on substrate type at each sample location, one of two methods was used for benthic macroinvertebrate sampling. A kick net was used at locations of sandy or fine sediment substrates, and a serber sampler methodology, involving turning over rocks and scrubbing them to obtain invertebrates, was used to investigate invertebrates in areas with a rocky substrate.

When a kick net was used, sample effort was kept consistent through the use of a timed sample collection. Substrate was disturbed for thirty seconds and collected in the net by moving the net in a zig-zag motion through the disturbed material. The collected material was then transferred to a white dish pan where macroinvertebrates were identified and returned to the environment. In areas with rocky substrates a dish pan was partially filled with water from the sample location. An area of approximately 30 square centimetres was selected and rocks within that space were removed from their location and scrubbed into the dish pan to loosen macroinvertebrates for identification.

Invertebrates were identified in the field where possible; specimens that could not be identified in the field were kept in ethanol and later observed with a microscope to aid in identification. Resources used for identification included Charlotte E. Holmes' guidebook *Common Insects of Oxen Pond Botanic Park* and *Insects- Their Natural History and Diversity: With a Photographic Guide to Insects of North America* by Stephen A. Marshall. While identifying to species was not possible, all organisms were identified to order. Invertebrate richness was calculated for each invertebrate sample location as an indication of the number of different macroinvertebrate types found there.

Macroinvertebrates can be utilized to determine water quality, as some types are more sensitive to pollutants than others. For this study, identified macroinvertebrates were assigned a

value of 1, 2 or 3, based on their tolerance to pollution. The assigning of these values was based on the Biotic Index for Water Quality taken from the teacher's resource *Finding the Balance: For Earth's Sake* by Dennis Minty, Heather Griffin and Dan Murphy. This Index assigned a value of 1 to invertebrates with a high tolerance of pollution, a value of 2 to those invertebrates that had a moderate tolerance of pollution, and a value of 3 to those invertebrates that have a low tolerance of pollution. Another reference was used to assign values based on pollution tolerance if an organism was not found in this index. This was taken from the guidebook *Volunteer Water Quality Monitoring Part of the Missouri Stream Team Program*, which is a partnership between the Missouri Department of Natural Resources, the Missouri Department of Conservation, and the Conservation Federation of Missouri. The invertebrate scoring was found in *Chapter 4, Biological Monitoring* and is available online at http://www.dnr.mo.gov/env/wpp/vmqmp/vwqm-intro04.pdf. The scoring located there was opposite to that used in index found in *Finding the Balance: For Earth's Sake*, so it was altered so that scores were assigned the same as the index, a value of 1 to invertebrates with a high tolerance of pollution, a value of 2 to those invertebrates that had a moderate tolerance of pollution, and a value of 3 to those invertebrates that have a low tolerance of pollution. This assigning of scores was slightly challenging, as the above mentioned two references used common names, which can sometimes vary amongst people and geographic area.

2.3 Water Quality

Water quality parameters were measured for each wetland site using Hach Stream Survey kits. Temperature and pH were recorded in the field. The other parameters tested using the Hach kits were more difficult to perform in the field due to safety reasons, mainly the hazardous nature of some of the reagents used and because of the need to boil the sample for the phosphate test. It was thought that safety could be maintained indoors rather than outdoors. A water sample collected for the dissolved oxygen test had to be tested in the field because of the unstable nature of dissolved oxygen. However, testing for total phosphates, nitrates, ammonia and ammonium ion was performed after returning from the field with a chilled water sample.

2.4 Determination of Wetland Boundaries

The wetland boundaries were identified using Google Earth satellite imagery. Many wetland boundaries were distinct and evident from visual inspection while other wetland areas were 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 2012 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.

During NAACAP's 2011- 2012 Wetlands Survey project, a *Stress Evaluation Rubric* was designed to assign a number based on potential stressors located near the wetland boundary. This same rubric was used for this project (Appendix B). 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. Pasture lands and farm fields fall under the agriculture category. Areas of continuous asphalt, concrete, roofs, or other similar impermeable surfaces, were considered an impervious surface feature. Sparsely developed areas, those with no more than one building lot within 100 meters of roadway, were given a lower value than those building lots more densely developed (more than one building lot within 100 meters of roadway). Larger roadways had a higher stress value. If the stressors were 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.

Features identified as stressors were quantified where necessary using ArcGIS. The features were located on the Bing Map basemap available from Esri and traced to give a polygon whose approximate area could be calculated. A 15m, 30m, and 50m buffer was drawn around the wetland boundary to determine what range the feature was located within. The slope between the wetland and the feature was estimated using 1m contour interval data where available, or the elevation profile tool in Google Maps where the contour data was not available.

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

3.0 Results

There were a total of 14 wetland sites surveyed during the 2012-2013 Wetlands Survey project. Their distribution across the Northeast Avalon Peninsula is illustrated in Figure 1. Individual wetland delineations are found in Appendix A.

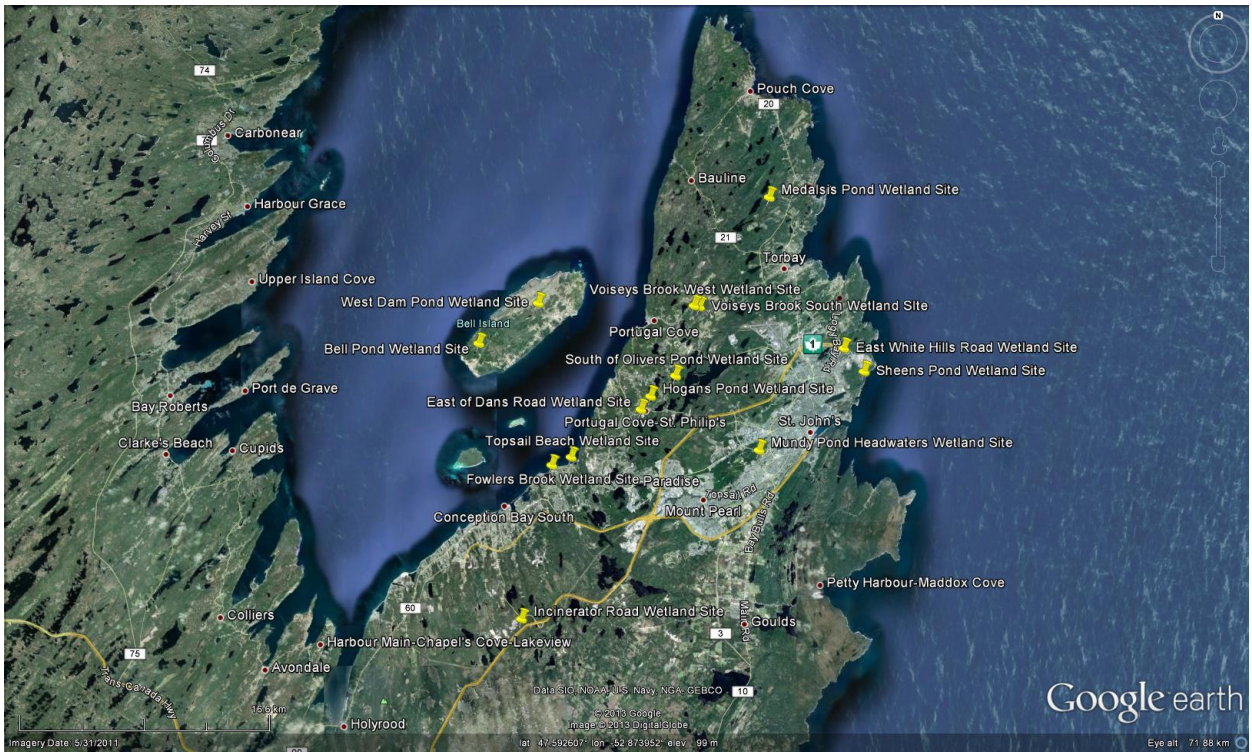

Figure 1. : The locations of the 14 wetlands surveyed during the 2012- 2013 project year throughout the Northeast Avalon Peninsula of Newfoundland and Labrador represented by yellow markers. (Google Earth Image. [Accessed 18 March 2013]. Available from: http://www.google.com/earth/index.html

3.1 Plant Sampling

Table 1 details the richness information obtained from each sample transect within each surveyed wetland.

Table 1. Richness data obtained for each plant transect within the surveyed wetlands

Sample Site Location	Transect Length	GPS Location of Transect Start	Plant Richness	Number of Non-native Species
Bell Pond Transect 1	50m	47.60806°N, 3.0073°W	27	0
Bell Pond Transect 2	50m	47.6077 °N, 53.008 °W	17	0
East of Dans Road Transect 1	50m	47.56816 °N, 52.8643 °W	24	0
East of Dans Road Transect 2	50m	47.56853 °N, 52.8649 °W	22	0
Fowlers Brook Transect 1	50m	47.53602 °N, 52.9444 °W	21	2
Fowlers Brook Transect 2	25m	47.53549 °N, 52.9442 °W	19	1
Hogans Pond Transect 1	50m	47.57629 °N, 52.8567 °W	18	0
Hogans Pond Transect 2	50m	47.5762 °N, 52.856 °W	22	0
Incinerator Road Transect 1	50m	47.44529 °N, 52.9694 °W	24	0
Incinerator Road Transect 2	50m	47.44537 °N, 52.9698 °W	28	0
Medalsis Pond Transect 1	50m	47.69515 °N, 52.7513 °W	30	0
Medalsis Pond Transect 2	50m	47.69471 °N, 52.7514 °W	27	0
Mundy Pond Headwaters Transect 1	50m	47.5442 °N, 52.7598 °W	11	1
Sheens Pond Transect 1	50m	47.59258 °N, 52.6671 °W	11	1
Sheens Pond Transect 2	25m	47.59258 °N, 52.6671 °W	11	1
South of Olivers Pond Transect 1	50m	47.58977 °N, 52.8351 °W	12	0
South of Olivers Pond Transect 2	50m	47.58876 °N, 52.8339 °W	18	0
Topsail Beach Transect 1	50m	47.5409°N, 52.9265 °W	11	1
Topsail Beach Transect 2	50m	47.54082 °N, 52.9269 °W	20	2
Voiseys Brook South Transect 1	50m	47.62823 °N, 52.8152 °W	25	0
Voiseys Brook West Transect 1	50m	47.62985°N, 52.8176 °W	22	0
Voiseys Brook West Transect 2	50m	47.63029 °N, 52.8184 °W	21	0
West Dam Pond Transect 1	50m	47.63158 °N, 52.9572 °W	17	0
West Dam Pond Transect 2	50m	47.63213 °N, 52.9554 °W	15	0
East White Hills Road Transect 1	50m	47.60385 °N, 52.6878 °W	15	0
East White Hills Road Transect 2	50m	47.60388 °N, 52.6865 °W	20	1
East White Hills Road Transect 3	50m	47.60514 °N, 52.6819 °W	20	1

The plant richness for the identified plant species for each transect varied from 11 (Mundy Pond Headwaters Transect 1, Sheens Pond Transect 1 and 2, and Topsail Beach Transect 2) to 30 (Medalsis Pond Transect 1) different species identified. Fowlers Brook wetland was found to contain two non-native species, common reed (*Phragmites australis*) and common St. John's wort (*Hypericum perforatum*). Mundy Pond Headwaters wetland and Sheen's Pond wetland had one non-native plant species, cattail (*Typha latifolia*). There were two non-native species identified in the Topsail Beach wetland site, common reed (*Phragmites australis*) and rough mannagrass (*Glyceria maxima*). Rough mannagrass (*Glyceria maxima*) was also found in the East White Hills Road wetland site. Further details on plant species/ type found and abundance in sample areas can be found in Appendix C.

3.2 Macroinvertebrate Sampling

Table 2 shows the richness of macroinvertebrates, based on the number of different taxonomic orders that were found at each sample site within the surveyed wetlands. Complete invertebrate sample data can be found in Appendix C.

Table 2. Macroinvertebrate richness values, representing the number of different orders identified, at each location where invertebrate sampling occurred during the summer of 2012

Sample Site Location	GPS Location of Sample Site	Invertebrate Richness
Bell Pond Outflow	47.60835°N, 53.00711° W	5
Bell Pond Inflow	47.608°N, 53.00771°W	5
East of Dans Road Inflow	47.56931°N, 52.86449°W	2
East of Dans Road Outflow	47.56947°N, 52.86653°W	1
Fowlers Brook Inflow	47.53608°N, 52.94442°W	4
Fowlers Brook Outflow	47.53537°N, 52.94234°W	4
Hogans Pond*	47.57642°N, 52.85601°W and 47.57642°N, 52.85589°W	1
Incinerator Road Inflow	47.44559°N, 52.96883°W	5
Incinerator Road Outflow	47.4455°N, 52.96891°W	5
Medalsis Pond Sample 1	47.69506°N, 52.75127°W	0
Medalsis Pond Sample 2	47.69521°N, 52.75142°W	0
Mundy Pond Headwaters Inflow	47.54508°N, 52.7615°W	6
Mundy Pond Headwaters Outflow	47.54433°N, 52.75898°W	6
Sheens Pond Sample 1	47.59258°N, 52.66709°W	2
South of Olivers Pond Inflow	47.58977°N, 52.83506°W	3
South of Olivers Pond Outflow	47.58942°N, 52.83461°W	2
Topsail Beach Sample 1	47.54103°N, 52.92672°W	7
Topsail Beach Sample 2	47.54076°N, 52.9276°W	4
Voiseys Brook South Sample 2	47.6542°N, 52.9211°W	6
Voiseys Brook South Sample 1	47.62899°N, 52.81451°W	6
Voiseys Brook West Sample 2	47.63108°N, 52.8183°W	5
Voiseys Brook West Sample 1	47.63031°N, 52.81842°W	4
West Dam Pond Inflow	47.63062°N, 52.95847°W	0
West Dam Pond Outflow	47.63922°N, 52.94221°W	2
East White Hills Road Inflow	47.60353°N, 52.68769°W	5

*The two invertebrate samples collected for this site were combined due to the lack of water in the wetland to sample from, resulting in a low number or lack of invertebrates found

The macroinvertebrate richness ranged from zero at the West Dam Pond Inflow and the Medalsis Pond Sample 1 and 2 sites to 7 at the Topsail Beach Sample 1 site.

The macroinvertebrates found at each wetland site classified based on their pollution tolerance are given in Table 3

Table 3. The macroinvertebrates identified at each surveyed wetland site, classified based on their pollution tolerance. Those organisms that did not clearly fit into one of the classifications were placed under the category Other.

Wetland Site Name	High Tolerance of Pollution (1 point)	Moderate Tolerance of Pollution (2 points)	Low Tolerance of Pollution (3 points)	Other
Bell Pond	Midge larvae	Amphipod (scud) Predaceous Diving Beetle Dragonfly nymph		Giant Water Bug (Order Hemiptera)
East of Dans Road	Midge larvae	Dragonfly nymph		Water boatmen (Family Corixidae)
Fowlers Brook	Leech Water Worm	Damselfly nymph Crane Fly larvae	Crawling Water Beetle Stonefly nymph	
Hogans Pond		Dragonfly nymph		
Incinerator Road	Midge larvae	Dragonfly nymph Predaceous Diving Beetle Beetle larvae	Caddis Fly larvae	Unknown (Order Plecoptera) Weevil Adult Mosquito Water Mite
Medalsis Pond (No macroinvertebrates found)				
Mundy Pond Headwaters	Leech Midge larvae	Dragonfly nymph Amphipod (scud)	Caddis Fly larvae Stonefly nymph	Marsh Beetle
Sheens Pond		Water Beetle		Mosquito larvae
South of Olivers Pond		Predaceous Diving Beetle Beetle larvae (type unknown) Dragonfly Nymph		Pill Clam Whirligig Beetle Water boatmen
Topsail Beach	Midge larvae Leech Aquatic Earthworm	Amphipod (scud)	Mayfly adult	Seed Shrimp Flatworm Water boatmen Water Strider
Voiseys Brook South	Midge larvae Leech	Amphipod (scud) Aquatic sowbug	Caddis fly larvae	Northern Caddisfly (Family Limnephilidae) Order Diptera, Family Psychodidae Larvae Aquatic Mite Flatworm Order Coleoptera, Family Polycenropidae (life stage not given)
Voiseys Brook West	Midge Larvae	Predacious Diving Beetle Marsh Beetle Larvae Dragonfly nymph		Common Pillbug (Order Isopoda, Family Armadelididae) Blade Fly (Order Diptera, Family Simuliidae) Water boatmen
West Dam Pond		Pill/ Fingernail Clam		Water boatmen
East White Hills Road	Leech	Dragonfly nymph Damselfly nymph Amphipod (Scud)		Diving Beetle (family Noteridae)

Organisms with a low tolerance of pollution were identified in the Fowlers Brook, Incinerator Road, Mundy Pond Headwaters, Topsail Beach and Voiseys Brook South wetland sites. All of the wetland sites had organisms that were classified as having a high or a low tolerance to pollution.

3.3 Water Quality

The results of water quality testing of samples collected from the surveyed wetlands are given in Table 4.

Table 4. Water quality parameters, temperature, pH, dissolved oxygen (DO), nitrate, total phosphate, un-ionized ammonia, and ammonium ion obtained from each the wetland study sites. Values in red text exceed the Canadian Water Quality Guidelines for the Protection of Aquatic Life.

Wetland Site Name	GPS Location of Water Sample	Temp. (°C)	pH	Dissolved Oxygen (mg/L)	Nitrate (mg/L)	Total Phosphate (mg/L)	Ammonia (mg/L)	Ammonium Ion (mg/L)
Bell Pond	47.60800°N, 53.00771°W	22.2	7.2	6	0	0	0.001968	0.257868
East of Dans Road	47.56931°N, 52.86449° W	22	8.3	7	0	0.04	0.007012	0.12212
Mundy Pond Headwaters	47.54433°N, 52.75898°W	22	7.8	9	0	0	0.001686	6.31735
Fowlers Brook	47.53608°N, 52.94442°W	19.9	7.8	9	0	0	0.002928	0.126826
Hogans Pond	47.57642°N, 52.85601°W	25	7.2	**3**	0.44	0	**0.024192**	2.703792
Incinerator Road	47.44550°N, 52.96891°W	16.1	**5.7**	**4**	0	0	0	0
Medalsis Pond	47.69521°N, 52.75142°W	18.3	6.5	**5**	0	0.52	0	0
Sheens Pond	47.59258°N, 52.66709°W	20	**6.1**	**0.8**	0	0	0	0
South of Olivers Pond	47.58977°N, 52.83506°W	29	8.2	**5**	0	0.03	**0.035928**	0.260988
Topsail Beach	47.54103°N, 52.92672°W	20.1	7.4	9	0	0.04	0.001176	0.128726
Voiseys Brook South	NA	22	8.5	7	0	0.08	0.01849	0.10997
Voiseys Brook West	NA	23	7.6	7	0	0	0.017184	1.021384
West Dam Pond	47.63062°N, 52.95847°W	20	6.5	8	0	0.04	0	0
East White Hills Road	47.60353°N, 52.68769°W	17.7	6.8	**4**	0	0.12	0	0

The CCME Water Quality Guidelines for the Protection of Aquatic Life have recommendations for pH, dissolved oxygen, nitrate nitrogen, nitrate and unionized ammonia. There are no guidelines for ammonium ion, as the unionized form (NH_3) is believed to be the better indicator of ammonia toxicity (Environment Canada, 1999; Frias-Espericueta et al., 1999; EPA, 1998 as cited in CCME, 2010), or phosphate, as phosphorus is essential for life and the levels that cause problems can vary amongst different ecosystems (CCME, 2004). The CCME

Canadian Water Quality Guidelines for the Protection of Aquatic Life present a framework for phosphorus levels, where it is recommended that values not exceed "trigger ranges" or increase more than 50% over baseline values (CCME, 2004). The values of ammonium ion data collected here is valuable as baseline data to compare with any future readings, as it is a component of the nitrogen cycle and may be useful if looking at nitrogen supply.

The pH values recorded at the Incinerator Road and Sheens Pond sample sites were outside of the 6.5- 9 range suggested in the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2006). All of the other samples had values within the recommended range for pH. The dissolved oxygen values for the Hogans Pond (3 mg/L), Incinerator Road (4mg/L), Medalsis Pond (5mg/L), Sheens Pond (0.8mg/L), South of Olivers Pond (5mg/L), and East White Hills Road (4mg/L) wetland sites were below the lowest acceptable level in warm water of 6.0mg/L for early life stages and 5.5mg/L for other life stages suggested in the CCME Water Quality Guidelines for the Protection of Aquatic Life (CCME, 1999). The maximum recommended level of nitrates of 13mg/L (CCME, 2012) was not exceeded at any of the wetland sites. The Hogans Pond (0.024192 mg/L) and South of Olivers Pond (0.035928 mg/L) wetland sites had ammonia values that exceeded the 0.019mg/L recommended for ammonia (CCME, 2010).

The total phosphate values ranged recorded ranged from zero to 0.52 mg/L, while the ammonium ion values ranged from zero to 2.703792 mg/L.

3.4 Stress Evaluation Rubric Values

The *Stress Evaluation Rubrics* for each wetland site are available in Appendix C. Table 5 contains the final rubric score for each wetland site. 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.

Table 5. Stress Evaluation Rubric Scores for the Wetland Sites surveyed during 2012.

Wetland Site Name	**Total *Stress Evaluation Rubric Score***
Bell Pond	0
East of Dans Road	10
Mundy Pond Headwaters	42
Fowlers Brook	27
Hogans Pond	18
Incinerator Road	3
Medalsis Pond	3
Sheens Pond	6
South of Oliver's Pond	21
Topsail Beach	7
Voiseys Brook South	19
Voiseys Brook West	24
West Dam Pond	7
East White Hills Road	26

As shown in Table 5, the *Stress Evaluation Rubric* scores ranged from zero to 42. The Bell Pond wetland site received a score of zero, while the Mundy Pond Headwaters wetland site received a score of 42. The median value of all the scores was 14.

4.0 Discussion

The wetland sites visited during the 2012-2013 project year were found to contain varying flora and fauna. There were also variations in the amount of potential stress from surrounding anthropogenic pressures.

There appears to be a connection between the presence of non- native plants and higher scores in the *Stress Evaluation Rubric*. The Mundy Pond Headwaters, East White Hills Road and Fowlers Brook wetland sites all contained non-native plant species, and all scored within the top 5 values in the rubric. This supports the suggestion that anthropogenic influence allows the introduction of non-native species into an area. At the Topsail Beach and Mundy Pond Headwaters wetland sites, there were non- native plant species identified and these two sites both had plant richness values that were at the lowest end of the range of values for all the sites surveyed. This could be because the non-native species are outcompeting the native species, the ultimate result with time being a decreased biodiversity.

There are also some connections between water quality and invertebrate richness. The Sheens Pond wetland site had a low pH and low levels of dissolved oxygen. It also had a low recorded invertebrate richness, which could be related to the low dissolved oxygen levels, as inverts need oxygen to live. However, there were other wetland sites that had a lower invertebrate richness than the Sheens Pond site. The Medalsis Pond wetland site was found to contain no aquatic invertebrates, and had a pH that was lower than water quality guidelines. As the pH in Newfoundland waters is sometimes naturally low, it is not likely that pH was the cause of the lack of inverts. One of the samples from the West Dam Pond wetland site also was found to contain no aquatic invertebrates, but the other invert sample from that wetland did contain inverts. It was observed in field notes that there were a number of flying insects, frogs, fish, and what appeared to be rabbits present in the wetland. This suggests that that wetland does support a variety of faunal life forms, although one invertebrate sample yielded poor results.

The distribution of invertebrate types labelled as having a low tolerance of pollution was in most cases correlated with water quality values that met guidelines. This was true at the Fowlers Brook, Mundy Pond Headwaters, Topsail Beach, and Voiseys Brook South wetland sites. However, the Incinerator Road wetland site contained organisms with a low tolerance of pollution, but also had dissolved oxygen and pH values that were lower than recommended.

The weather during the summer of 2012 was very dry, and therefore water levels in the wetlands were naturally lower than they would be at times of greater precipitation levels. This lack of precipitation would surely place pressure on the wetland ecosystems, and could be responsible for lower plant richness, invert richness and water quality measurements that are outside of guidelines. A comparison to past data would be necessary to confirm this. The dead

grass found in some of the wetlands (Appendix C) is an indicator that the low precipitation caused stress to the plant communities in the wetlands.

Regardless of the lack of precipitation, all of the wetland sites were found to contain some water, or evidence of water being present in the near past. As such, they can be considered to serve some level of water retention function. The wetlands also serve as habitat, with sightings of frogs, birds, small mammals and flying insects within them.

5.0 Recommendations:

Continued monitoring of the wetland sites would be needed to determine if there are any negative changes to them with changes to the landscape and variations in any development located adjacent to the wetlands. These changes would take time, so it would be beneficial to perform future monitoring at five year intervals.

Increased awareness of wetland locations, functions and biodiversity is necessary to conserve remaining wetlands on the Northeast Avalon Peninsula. Wetland destruction and alteration is often done without the realization of the ecosystems and their natural functions as water retention reservoirs and habitat, services that are expensive to effectively create anthropogenically.

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CCME Canadian Council of Ministers of the Environment (2006). *Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table*. In: Canadian environmental quality guidelines, 1999. Winnipeg, MN: Canadian Council of Ministers of the Environment.

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Appendix A Wetland Delineations and Sample Site Locations

Bell Pond Wetland Site:

The Bell Pond wetland study site was located on Bell Island, at approximately the middle of the island. The wetland boundary was defined by forest borders. As Bell Pond itself was surrounded by wetland vegetation, the delineation included the open water portion of Bell Pond.

Figure 1. Bell Pond wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

East of Dan's Road Wetland Site:

The East of Dan's Road Wetland study site was located in Portugal Cove – St. Philip's. It was accessed via Rainbow Gully Road. The wetland boundary was defined by forest borders.

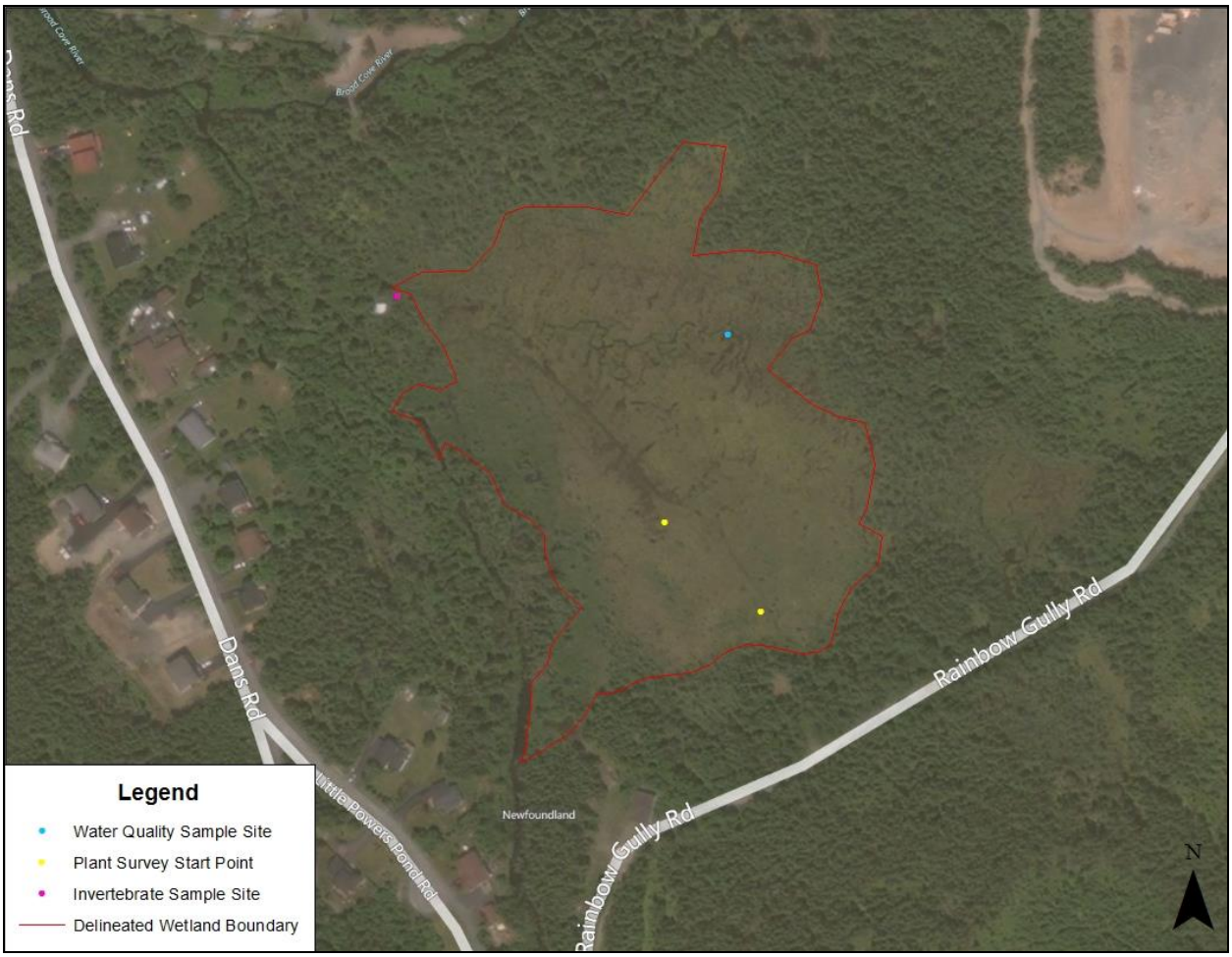

Figure 2. East of Dans Road wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Fowlers Brook Wetland Site:

The Fowlers Brook wetland study site was located at the mouth of Fowlers Brook, where it enters Chamberlains Pond, in Conception Bay South. The wetland boundary was defined by the developed areas on Lions Crescent and the Conception Bay Highway, the beach to the north, and the open water area of Chamberlains Pond.

Figure 3. Fowlers Brook wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The area is incorrectly identified on the underlying imagery as Chamberlains Beach Park, which is actually located further east along the shore of Conception Bay. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Hogans Pond Wetland Site:

The Hogans Pond wetland study site was located to the south of Hogans Pond in Portugal Cove - St. Philip's. The wetland boundary was defined by forest area except for a small section on the south west side that was defined by Hogans Pond Road extension.

Figure 4. Hogans Pond wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Incinerator Road Wetland Site:

The Incinerator Road wetland study site was located adjacent to Incinerator Road, within the St. John's municipal border. The wetland boundary was defined by forest border and by Incinerator Road to the east. While there was another wetland area on the other side of Incinerator Road from the delineated wetland, it was not included in the delineation because it was separated by Incinerator Road.

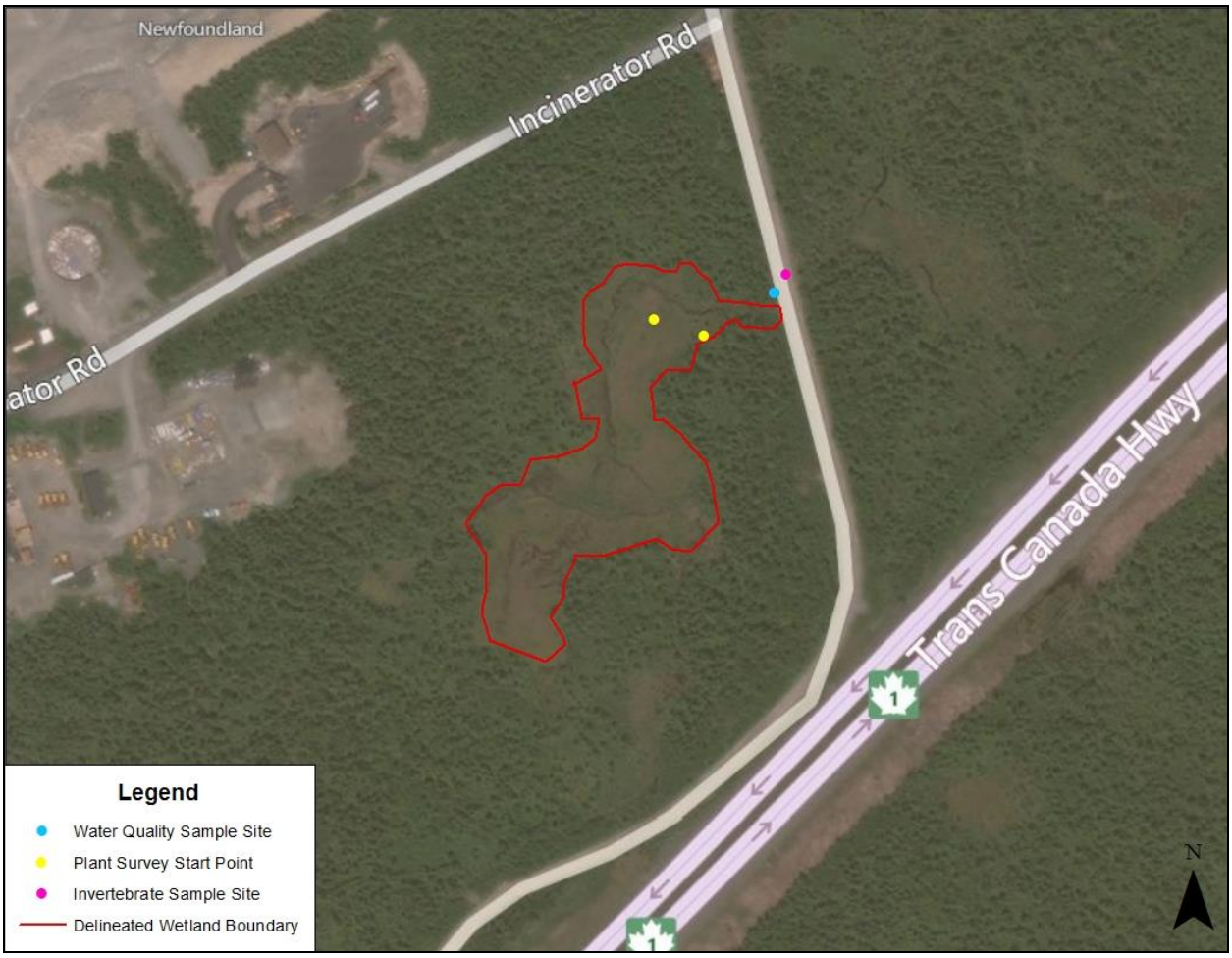

Figure 5. The Incinerator Road wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Medalsis Pond Wetland Site:

The Medalsis Pond wetland study site was located in the municipality of Flatrock. It was accessed via Medalsis Pond Road which led into Middle Pond. The wetland boundary was defined by forest border.

Figure 6. Medalsis Pond wetland study site with the boundary indicated in red. The location of start points for the two plant surveys are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Mundy Pond Headwaters Wetland Site:

The Mundy Pond Headwaters wetland study site was located to the north of Empire Avenue, in St. John's. The wetland boundary was defined by forest borders, development borders to the southwest, and Empire Avenue to the south.

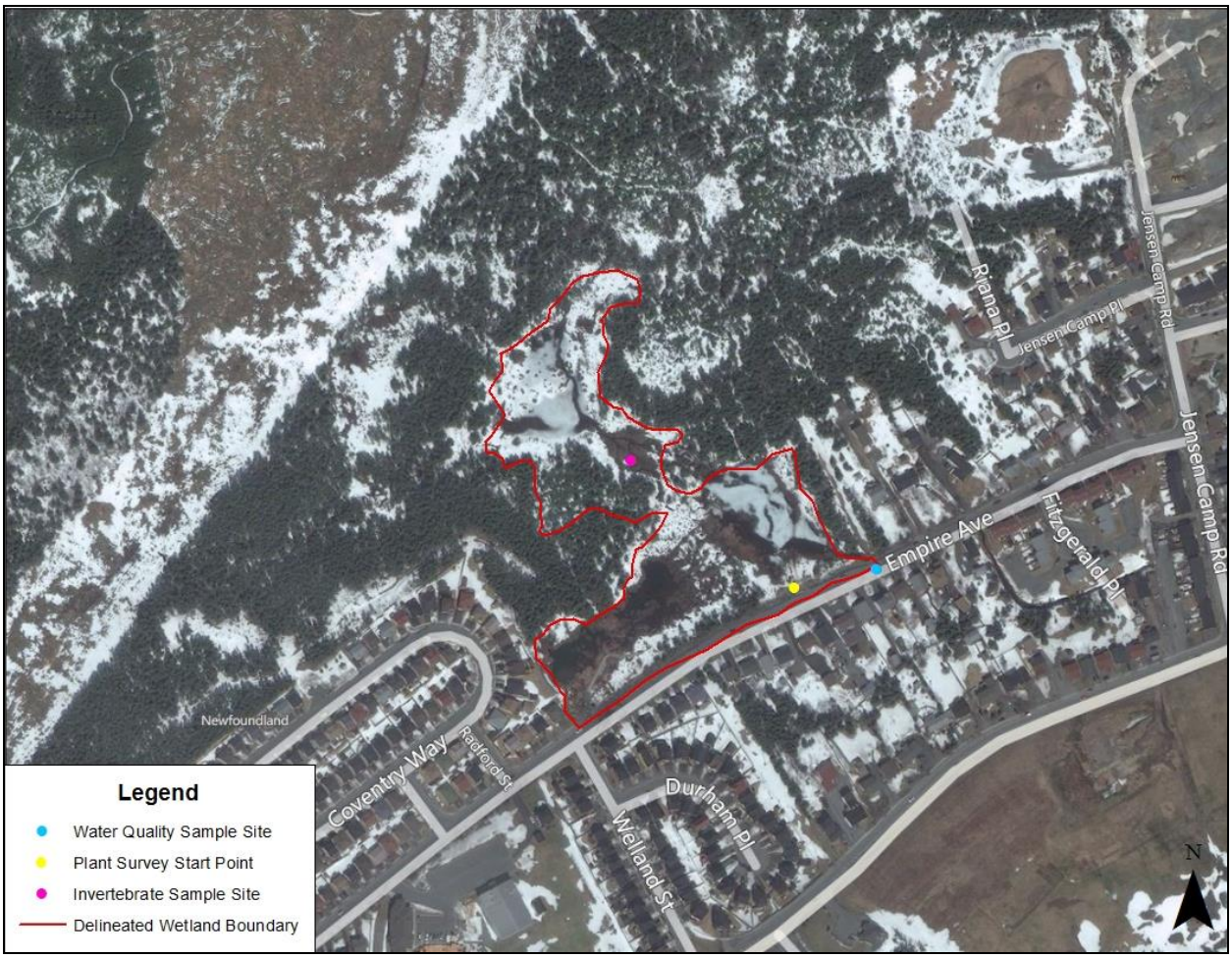

Figure 7. Mundy Pond Headwaters wetland study site with the boundary indicated in red. The location of start point for the plant survey is indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Sheens Pond Wetland Site:

The Sheens Pond wetland study site was located in St. John's. It was accessed via a small dirt road located behind the Northwest Atlantic Fisheries Centre building on East White Hills Road. The wetland boundary was determined mainly by forest borders and the dirt road for a short section to the northwest.

Figure 8. Sheens Pond wetland study site with the boundary indicated in red. The location of start points for the plant surveys are indicated by a yellow dot. The water quality sample site, the plant survey transect start point and the invertebrate sample were all located at the same place, but colors representing all of them could not be shown at the same time. There were actually two plant survey transects, but the start point was the same for each of them. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

South of Olivers Pond Wetland Site:

The South of Olivers Pond wetlands study site was located within Portugal Cove - St. Philip's. As the site name implies, it was located south of Olivers Pond, on the opposite side of Olivers Pond Road. The Wetland boundary was defined by forest borders, by developed borders on the western side consisting of a farm field and a residential lot and Olivers Pond Road at the northwestern extent.

Figure 9. South of Olivers Pond wetland study site with the boundary indicated in red. The location of start points for the plant survey are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling and the start point of a plant survey transect, but colors representing all of them could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Topsail Beach Wetland Site:

The Topsail Beach wetland study site was located in Conception Bay South. It was accessed by walking along the beach from Carters Lane. The wetland boundary was defined by the beach along the north side, and by developed borders, residential properties, along the other sides

Figure 10. Topsail Beach wetland study site with the boundary indicated in red. The location of start points for the plant survey are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Voiseys Brook South and Voiseys Brook West Wetland Sites:

The Voiseys Brook South and Voiseys Brook West wetland survey sites were located in Portugal Cove - St. Philip`s. The wetland boundaries were defined mainly by forest borders in the case of the Voiseys Brook West site, and forest borders and developed borders in the case of the Voiseys Brook South site.

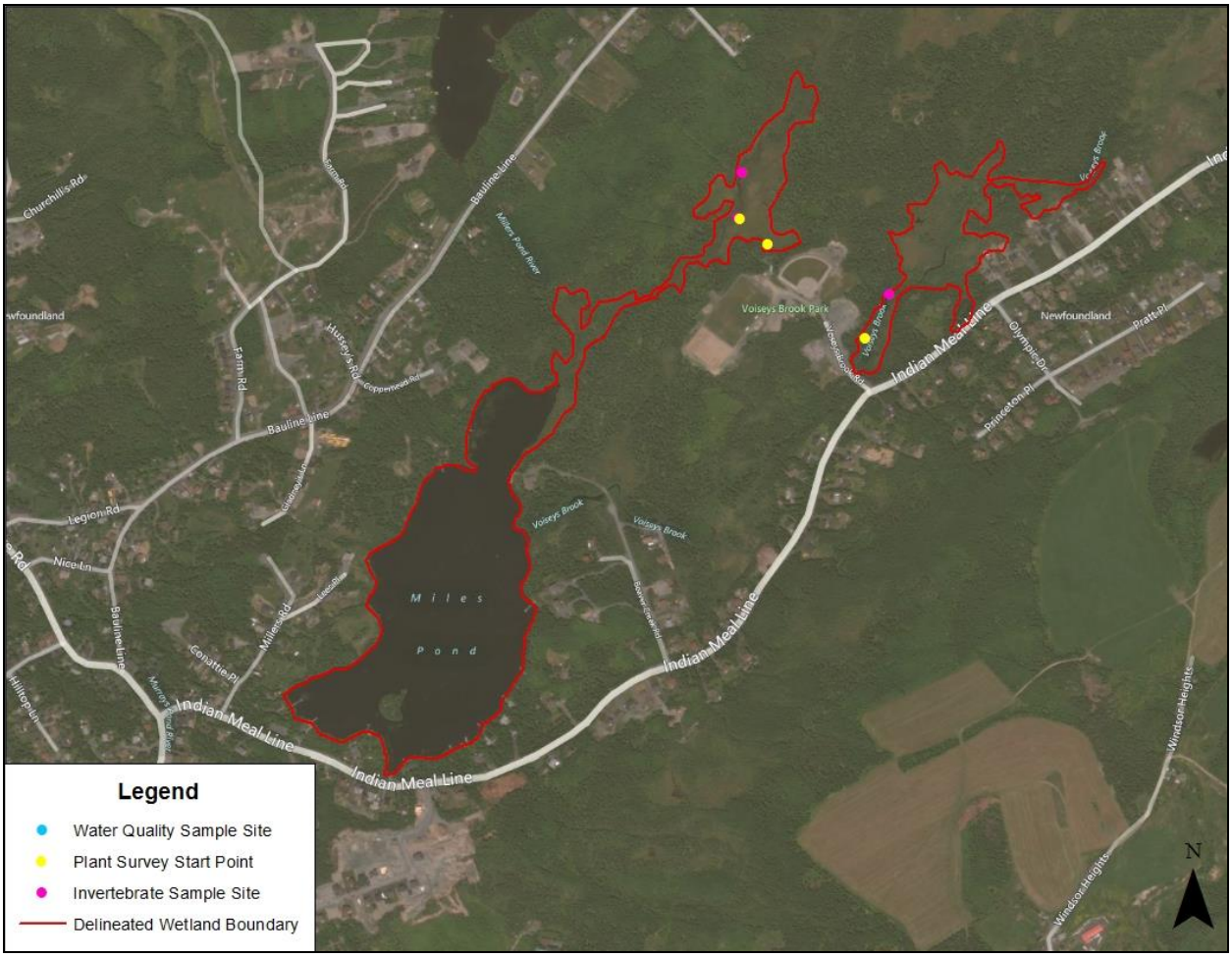

Figure 11. Voiseys Brook West (left) and Voiseys Brook South (right) wetland study sites with the boundary indicated in red. The location of start points for the plant survey are indicated by a yellow dot. The location of the invertebrate sample sites are indicated by a pink dot. The most northerly plant transect start point (yellow) is also the location of invertebrate sampling, but colors representing both could not be shown at the same time. There are no blue dots representing water sample locations, as the GPS coordinates for these locations were not recorded. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

West Dam Pond Wetland Site:

The West Dam Pond wetland study site was located on the western portion of Bell Island. The wetland boundary was defined by forest borders and developed borders, being the dirt roads. The wetland was split in half by West Track Road, but is treated as one continuous wetland for this study, as plant transects were sampled on both sides of the road.

Figure 12. West Dam Pond wetland study site with the boundary indicated in red. The location of start points for the plant survey are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

East White Hills Road Wetland Site:

The East White Hills Road wetland study site was located in St. John`s. It was the wetland known as Lundrigan's Marsh. The wetland boundaries were defined by developed borders, as the wetland is located in the middle of industrial commercial areas.

Figure 13. East White Hills Road wetland study site with the boundary indicated in red. The location of start points for the plant survey are indicated by a yellow dot. The location where the water sample was collected is indicated by a blue dot, and the location of the invertebrate sample site is indicated by a pink dot. The location of the water sample was also the location of invertebrate sampling, but colors representing both could not be shown at the same time. The underlying imagery is courtesy of Bing Maps (c) 2011 Microsoft Corporation and its data suppliers. [Accessed 18 March, 2013].

Appendix B- *Stress Evaluation Rubric Template*

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					

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
Table 1	
Table 2	
Table 3	
Score	

Appendix C- Wetland Site Data

Bell Pond Wetland Site – Plant Data

Site Name:	Bell Pond
GPS Coordinates of Start of Transect:	N 47.60806 W 053.00731 Ele: 75m
Date:	August 7th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Labrador Tea	*Rhododendron groenlandicum*	8					14		3	6	3
Leatherleaf	*Chamaedaphne calyculata*	20	20	20	40	65	66	40	29	22	15
Cinnamon fern	*Osmundastrum cinnamomeum*	5								5	
Bog Aster	*Oclemena nemoralis*	27	25	41	30					1	
Northeastern Rose	*Rosa natida*	3									
Bunchberry	*Cornus canadensis*	5									1
Purple Goldenrod	*Solidago spp.*	5									
White Spruce	*Picea glauca*	1									
Sweet Gale	*Myrica gale*	6	15	7	14	5	22	9	4	1	8
Colonial Bent/Rhode Island Bent	*Agostis capillaris*		6	7							
Canada Rush	*Juncus canadensis*		3								
Bog Buckbean	*Menyanthes trifoliata*			18	5	14	12				
Marsh Bedstraw	*Galium Palustre*			27							
Estuary Sedge	*Carex vacillans*			8				1			
Bog Laurel	*Kalmia Polifolia*					2	1		4		
Cloudberry	*Rubus chamaemorus*							5			
Sheep Laurel	*Kalmia Angustifolia*							45	20	26	
Tawny Cottongrass	*Eriophorum virginicum*				4	5					
Sweet gale	*Myrica gale*								1		

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Twinflower	*Linnaea borealis*	5%				<5%				<5%	<5%
Small Cranberry	*Vaccinium oxycoccus*	<5%	5%	<5%	5%	5%	5%	5%	5%	5%	5%
3 Leaved False Solomons Seal	*Smilacina trifolia*	<5%	25%			<5%		<5%	<5%	<5%	
Sweetflag	*Aconus americana*	10%	10%		5%		30%			<10%	
Normal Grass	*N/A*	60%	60%	70%	60%	50%		20%	20%	20%	35%
Peat Moss	*Sphagnum sp.*	10%	20%		10%	30%	50%	70%	50%	70%	40%
Viola sp.	*Viola spp.*		<5%								
White Beakrush	*Rhynchospora alba*				10%	<1%			<1%		
Black Crowberry	*Empetrum negrum*								<5%	<5%	
Dead Grass	*N/A*	10%		25%		10%	15%		15%		15%
Mud	*N/A*				10%						

Site Name:	Bell Pond
GPS Coordinates of Start of Transect:	N 47.60770 W 53.00799 Ele: 80m
Date:	August 7th, 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Leatherleaf	*Chamaedaphne calyculata*	12	20	16	15	4	15	41	15	32	21
Labrador Tea	*Rhododendron groenlandicum*	8	3	3	3				21		8
White Spruce	*Picea glauca*	1		1					1		
Sheep Laurel	*Kalmia angustifolia*	12	11		4		2	3	15	15	
lowbush blueberry	*Vaccinium angustifolium*	3									
Sweet Gale	*Myrica gale*		3	21	23	17	24	26	3		7
Bog Buckbean	*Menyanthes trifoliata*		18	6							
Bog Aster	*Oclemena nemoralis*			22	21	21		2		3	3
Northeastern Rose	*Rosa natida*			1							
Cloudberry	*Rubus chamaemorus*							6			

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Normal Grass	*N/A*	20%		15%	25%	40%	40%	30%	20%	10%	25%
Peat Moss	*Sphagnum spp.*	60%	70%	50%	40%		30%	50%	70%	70%	
Small Cranberry	*Vaccinium oxycoccus*	<5%	5%	<5%	<5%			5%	<5%	<5%	<5%
Thee Leaves Solomons Seal	*Smilacina trifolia*		<5%	<5%	<5%			<5%	<5%		
White Beakrush	*Rhyncospora alba*			5%	10%	10%	10%				10%
Sweetflag	*Aconus americana*						10%		10%	10%	
Twinflower	*Linnaea borealis*									5%	
Dead Grass	*N/A*	10%						10%			
Mud	*N/A*			20%	20%	50%	10%				60%

Bell Pond Wetland Site- Invertebrate Data

Site:	Bell Pond
GPS Coordinates (Sample #1)	**N 47.60835 W 053.00711**
GPS Coordinates (Sample #2)	**N 47.60800 W 053.00771**

INFLOW

Order	Family	Common Name	Count
Amphipoda		Scud	23
Odonata	Anispotera	Dragonfly Nymph	3
Hemiptera	Belostomatidae	Giant Water Bug	1
Coleoptera	Dytiscidae	Predacious Diving Bettle	1
Diptera	Chironimidae	Midge Larvae	8

OUTFLOW

Order	Family	Common Name	Count
Odonata	Anisoptera	Dragonfly Nymph	7
Amphipoda		Scud	22
Diptera	Chironimidae	Midge Larvae	1
Unknown	Unknown	Small Pebble With tail/grooves	2
Hemiptera	Belostomatidae	Possible Giant Water Beetle Larvae	1

Bell Pond Wetland 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		2					
4 Lane Road		3					
							0

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	0
Table 2	0
Table 3	0
Score	0

The wetland delineation found in Appendix A (Figure 1) was used for the analysis of potential stressors in the stress evaluation rubric. The Bell Pond wetland study site received a score of zero in the rubric because there was no development present within the specified distances used. The nearest development was houses on Middleton Avenue.

East of Dans Road Wetland Site- Plant Data

Site Name:	East of Dan's Road
GPS Coordinates of Start of Transect:	N 47.56816 W 052.86429
Date:	23-Jul-12
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Tall cottongrass	*Eriophorum angustifolium*	1									
Common Juniper	*Juniperus communis*	1	3	1					3		
White Spruce	*Picea glauca*	5	1				1				
North-eastern Rose	*Rosa nitida*	5		3	2	2	5	3			1
Bog Aster	*Oclemena nemoralis*	8		3	11	4		3	15	26	36
Club Spur Orchid	*Platanthera clavellata*		6	2	10	3	4	2	10	2	8
Sedge spp.	*Carex spp.*					15	19	12	13	9	10
Sundew	*Drosera spp.*	10				10		10		15	14
Sheep Laurel	*Kalmia angustifolia*	25	4	7	8	4	10	7		10	5
Bog Laurel	*Kalmia polifolia*	2		2	1			1			
Labrador Tea	*Rhododendron groenlandicum*	7	39	12	1	3	16	12	13	11	
Sweet Gale	*Myrica gale*		19	7	3	6		4	13		8
Tamarack	*Larix laricinia*		1	2			4				
Bog Goldenrod	*Solidago uliginosa*		4		1	2	2	3	4		
Thee Leaved False Solomons Seal	*Smilacina trifolia*				1		8			8	12
Canada Rush	*Juncus canadensis*						10	20			
Twinflower	*Linnaea borealis*						12				
Violet Species	*Viola spp.*						23				
Purple Pitcher Plant	*Sarracenia Purpurea*							3			
Purple Chokeberry	*Aronia X punifolia*										2

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Sedge spp.	*Carex spp.*	10%									
Peat Moss	*Sphagnum spp.*	30%	25%	40%	70%	40%	40%	30%	30%	40%	40%
Grass	*N/A*	40%	30%	10%	15%	40%	40%	40%	30%	30%	15%
Twinflower	*Linnaea borealis*	5%		2%	2%	3%	3%		2%	1%	
Small Cranberry/Marshberry	*Vaccinium oxycoccus*	10%	5%	5%	5%	5%	5%	5%	5%	5%	4%

Site Name:	East of Dan's Road
GPS Coordinates of Start of Transect:	N 47.56853 W 052.86488
Date:	July 23rd, 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Common Juniper	*Junipus communis*		1								
White Spruce	*Picea glauca*	3									
North-Eastern Rose	*Rosa nitida*		4	3							
Bog Aster	*Oclemena nemoralis*		11	30			30		32	20	28
Club Spur Orchid	*Platanthera clavellata*	9		2				2			
Sheep Laurel	*Kalmia angustifolia*			4					16		6
Bog Laurel	*Kalmia polifolia*	2									
Labrador Tea	*Rhododendron groenlandicum*	17						5			
Sweetgale	*Myrica gale*	5		19	17				11		8
Tamarack	*Larix laricinia*	1	2								
Bog Goldenrod	*Solidago uliginosa*	2	3		2				2	6	
Three Leaved Flase Solomons Seal	*Smilacina trifolia*		3		5	1		3			3
Canada Rush	*Juncus canadensis*			20							
Violet Species	*Viola spp.*		6								
Purple Pitcher Plant	*Sarracenia purpurea*			8	2	1					1
Tall Meadow-rue	*Thalictrum pubescens*						3		1	1	1
Goldenrod	*Goldenrod spp.*						1				

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bog Aster	*Oclemena nemoralis*				10%			20%			
Three Leaved False Solomons Seal	*Smilacina trifolia*						10%				
White beakrush	*Rhynchospora alba*					30%					
Peat Moss	*Sphagnum spp.*	40%	75%	60%	70%	10%	70%	60%	70%	80%	60%
Grass	*N/A*	20%	5%	15%	15%	40%	10%	20%	<5%	5%	15%
Small Cranberry/Marshberry	*Vaccinium oxycoccus*	5%	5%			10%					

East of Dans Road Wetland Site- Invertebrate Data

Site:	East of Dan's Road
GPS Coordinates (Possible Inflow)	**N 47.56931 W 052.86449**
GPS Coordinates (Possible Outflow)	**N 47.56947 W 052.86653**

INFLOW (Site #1)

Order	Family	Common Name	Count
Odonata	Anisoptera	Dragonfly Nymph	5
Coleoptera	Corixidae	Water Boatmen	1

OUTFLOW (Site #2)

Order	Family	Common Name	Count
Diptera	Chironimidae	Midge Larvae	1

East of Dans Road- *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	Residences on Little Powers Pond Road	2	Dense	6				9
	Building at end of Rainbow Gully Road	1	Sparse	3				
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	Rainbow Gully Road	1			1		1
2 Lane Road		2					
4 Lane Road		3					
							1

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	9
Table 2	1
Table 3	0
Score	10

The wetland delineation found in Appendix A (Figure 2) was used for the analysis of potential stressors in the stress evaluation rubric. Rainbow Gully Road, a building on Rainbow Gully Road, and residences on Little Powers Pond Road were determined to be within 50m of the wetland boundary. None of these features were considered to be at an elevation significantly higher than the wetland. While not mentioned within the rubric, it was observed in field notes that there were a number of ATV tracks throughout the wetland. There is potential for wetland damage from ATV use.

Fowlers Brook Wetland Site- Plant Data

Site Name:	Fowler's Brook
GPS Coordinates of Start of Transect:	N 47.536023 W 052.94439 Ele: 8m
Date:	August 9th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10	
Blue Flag Iris	*Iris versicolor*	3							1			
Sweet Gale	*Myrica gale*	12						12				
New York/Bog Aster	*Oclamena spp.*	44	42	14	6	8	5		9	5	4	
"6 Whorled Tall Oval" - Unidentified	*N/A*	6							2			
Berry Bedstraw	*Galium spp.*	12	13						8		5	
Estuary Sedge	*Carex vacillans*	2	10									
Common Reed	*Phragmites australis*	1	2				4	5				*NL Invasive Species
Wild Mint	*Mentha arvenis*		31	18	12	32	1	2	7	6	25	
Cow Vetch	*Vicia cracca*		2	8		1			3	3	2	
Common St. Johns Wort	*Hypericum perforatum*			12								*NL Invasive Species
Grass #1- Unidentified	*N/A*			7		10						
Canadian Burnet	*Sanguisorba canadensis*				31		4	3	26	34	29	
Northeastern Rose	*Rosa natida*				16	10	2		2			
Meadow Sweet	*Filipendula Ulmaria*					5	23	7	9			
Tall Meadow-rue	*Thalictrum pubescens*					2						
Goldenrod	*Solidago sp.*						3					
Arrow-leaved Tearthumb	*Polygonum sagittatum*						2					
Marsh Bedstraw	*Gallium palustre*										4	

% Cover

Undergrowth	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Sweet Flag	*Acorus calamus*	10%	20%	20%	5%			5%	5%	5%	
Normal Grass	N/A	70%	40%	50%	25%	50%	50%	30%	45%	50%	60%
Viola sp.	*Viola spp.*		5%						<5%		5%
Dead Grass	N/A	20%	35	30%	70%	50%	50%	65%	45%	45%	35%

Site Name:	Fowler's Brook
GPS Coordinates of Start of Transect:	N 47.53549 W 052.94415 Ele: 1m
Date:	August 9th, 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	
Berry Bedstraw	*Galium spp.*	18	7				
Marsh Bedstraw	*Galium palustre*	24	4		7		
Sedge #3 - Unidentified	*NA*	4					
"6 Whorled Tall Oval"- Unidentified	*NA*	1	6			21	
Arrow-leaved Tearthumb	*Polygonum sagittatum*		8				
Blue Flag Iris	*Iris versicolor*		4				
Common Reed	*Phragmitis australis*		2	3	4	4	*NL Invasive Species
Wild Mint	*Mentha arvenis*		2	15	2		
Meadowsweet	*Filipendula ulmaria*			14	15		
Sweet gale	*Myrica gale*			15			
Cow Vetch	*Vicia cracca*			2			
Canadian Burnet	*Sanguisorba canadensis*				5		
New York Aster	*Symphyotrichum novi-belgii*				9		
Common St. Johns Wort	*Hypericum perforatum*				5		*NL Invasive Species
Bog Rush	*Juncus effusus*					1	
Jointed Bog Rush	*Juncus militaris*					22	

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5
Normal Grass	*N/A*	80%	40%	30%	70%	70%
Sweet Flag	*Acorus calamus*		50%			5%
Viola sp.	*Viola spp.*		5%			
Dead Grass	*N/A*	20%	10%	70%	30%	25%

Fowlers Brook Wetland Site- Invertebrate Data

Site:	Fowlers Brook
GPS Coordinates (Inflow)	N 47.53608 W 052.94442
GPS Coordinates (Outflow)	N 47.53537 W 052.94234

INFLOW

Order	Family	Common Name	Count
Hirudinae		Leech	2
Annelida		Waterworm	1
Coleoptera	Halipidae	Crawling Water Beetle	1
Odonata	Zygoptera	Damselfly Nymph	1

OUTFLOW

Order	Family	Common Name	Count
Plecoptera	Leuctridae	Stonefly Larvae	1
Diptera	Tipulidae	Cranefly Larvae	4
Hirudinae		Leech	1
Annelida		Waterworm	1

Fowlers Brook Wetland 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	Condos on Lions Crescent	1	< 1000 m2	6				9
	Automotive repair shop	2 3	1000 - 10,000 m2 > 10,000 m2	3				
Residential	Residences on Lions Crescent	2	Dense	6				12
	Residences on Route 60	1	Sparse	6				
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								21

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	Lions Crescent	2			2		6
	Route 60				2	x2	
4 Lane Road		3					
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	21
Table 2	6
Table 3	0
Score	27

The wetland delineation found in Appendix A(Figure 3) was used for the analysis of potential stressors in the stress evaluation rubric. Features determined to be within 50m of the wetland boundary included Route 60 (Conception Bay Highway) and the residences located along it, Lions Crescent and its residences, the

condos on Lions Crescent, the paved parking area for the soccer field, and the garage at the corner of Lions Crescent and Route 60. Of these, only Route 60 was determined to be at an elevation such that there was potential for a greater impact of runoff from it. Although not a component of the rubric, as Fowlers Brook runs through the wetland, there is also potential for upstream runoff containing contaminants to be carried to the wetland, and ultimately into Chamberlains Pond.

Hogans Pond Wetland Site- Plant Data

Site Name:	Hogan's Pond
GPS Coordinates of Start of Transect:	N 47.57629 W 052.85666 Ele: 141m
Date:	July 24th 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Sundew	*Drosera spp.*			11							
Leatherleaf	*Chamaedaphne calyculata*	38	23	21	19	4	7	7	23	15	41
Sweet Gale	*Myrica gale*	12	2	13	16						
Bog Aster	*Oclemena nemoralis*	7	27	9	22	6		1			
Sheep Laurel	*Kalmia angustifolia*	7	7	4				15		5	6
Bog Laurel	*Kalmia polifolia*	1	3	11	6	6	7	22	12	12	38
Labrador Tea	*Rhododendron groenlandicum*		11		10		1	2		7	37
Canada Rush	*Juncus canadensis*		5					2			
Balsam Fir	*Abies balsamea*			1		1		3	1		
Northeastern Rose	*Rosa nitida*			1	4	1					
Tamarack	*Larix laricinia*				1	1		2	3	1	1
White Spruce	*Picea glauca*				2			2		3	
Two eyed Berry/ partridge berry	*Mitchella repens*							3			3
Goldenrod	*Solidago spp.*									1	

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Sundew	*Drosera spp.*	<5%				<5%	<5%	<5%	<5%	<5%	<5%
Small Cranberry	*Vaccinium oxycoccus*	10%	<5%	5%	5%	<5%	<5%	<5%	5%	5%	5%
Peat Moss	*Sphagnum spp.*	35%	25%	35%	30%	20%	30%	30%	40%	15%	20%
Grass (White Flower)	*N/A*	35%	10%	15%	20%	20%	15%	40%	25%	15%	10%
Sweet Gale	*Myrica gale*		30%			5%					
3 Leaved False Solomons Seal	*Smilacinia trifolia*			<5%		45%	50%	<5%		<5%	
Mud	*N/A*							<5%			

Site Name:	Hogan's Pond
GPS Coordinates of Start of Transect:	N 47.57620 W 052.85600 Ele: 140m
Date:	July 24th 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Sheep Laurel	*Kalmia angustifolia*	18	17					7	4		18
Bog Laurel	*Kalmia polifolia*	26	10	16	5	7		12	2		3
Leatherleaf	*Chamaedaphne calyculata*	28	25	7	19	8	5	12		4	6
White Spruce	*Picea glauca*	10	8	3				8	5		3
Northeastern Rose	*Rosa nitida*	2									1
Labrador Tea	*Rhododendron groenlandicum*		4	4	1			11			10
Sweet Gale	*Myrica gale*		1								
Meadow Sweet	*Filipendula ulmaria*		1								
Tamarack	*Larix laricinia*			7					2		
Bog Aster	*Oclemena nemoralis*			5	5	9	10		6	4	
Horned Bladderwort	*Utricularia cornuta*					4				6	
Purple Chokeberry	*Aronia X prunifolia*						2	8	6		
Goldthread	*Coptis trifolia*							32			
Violet spp.	*Viola spp.*							6	1		
Goldenrod	*Solidago spp.*								2		1
Common Juniper	*Juniperus communis*										6

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Black Crowberry	*Empetrum nigrum*	<5%			<5%			<5%			
Small Cranberry/Marshberry	*Vaccinium oxycoccus*	5%	5%	5%	<5%	<5%		<5%			<5%
Peat Moss	*Sphagnum spp.*	40%	30%	40%	20%	40%		20%	50%	5%	20%
Grass	*N/A*	20%	15%	30%	20%	20%	10%	10%	20%	30%	50%
Sundew	*Drosera spp.*	<5%	<5%	<5%	<5%	<5%			<5%	<5%	<1%
3 Leaved False Solomons Seal	*Smilacinia trifolia*			<5%					<5%		
Mud	*N/A*				35%	15%	80%			40%	

Hogans Pond Wetland Site- Invertebrate Data

Site:	Hogan's Pond
GPS Coordinates (Dried up Pond)	**N 47.57642 W 052.85589**
GPS Coordinates (Water filled pool)	**N 47.57642 W 052.85601**

Order	Family	Common Name	Count
Odonata	Anisoptera	Dragonfly Nymph	2

Hogans Pond Wetland 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	Houses on Hogans Pond Road Extension	2	Dense		2			4
	Houses on Hogans Pond Road	1	Sparse		2			
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								4

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road	Parrott Place	1			1		1
2 Lane Road	Hogans Pond Road	2	6				12
	Hogans Pond Road Extension		6				
4 Lane Road		3					
							13

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	1	Under Hogans Pond Road Extension	1
Dam			
			1

	TOTALS
Table 1	4
Table 2	13
Table 3	1
Score	18

The wetland delineation found in Appendix A (Figure 4) was used for the analysis of potential stressors in the stress evaluation rubric. Features determined to be within 50 m of the wetland boundary included Hogans Pond Road and residences on it, Hogans Pond Road Extension and houses on it, and Parrot Place. None of these features were thought to be located at an elevation that was significantly greater than that of the wetland.

Incinerator Road Wetland Site – Plant Data

Site Name:	Incinerator Road
GPS Coordinates of Start of Transect:	N 47.44529 W 052.96942
Date:	July 30th 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Bog Laurel	*Kalmia Polifolia*	44	34	15	23	20	34	25	25	25	15
Bog Rosemary	*Andromeda Polifolia*	8	6		1				5	40	24
Labrador Tea	*Rhododendron Groenlandicum*	11	19	13	4	22	17		15	20	
Purple Chokeberry	*Aronia X prunifolia*	19	16	8	6	7	10	7	4	4	5
Leatherleaf	*Chamaedaphne sp.*	27	33	25	15	31	41	33	35	32	35
Northern Wild Raisin	*Viburnum nudum*	12			2						
Sweet Gale	*Myrica Gale*	10		3		7		10		7	10
Sheep Laurel	*Kalmia Angustifolia*	8	51	44	65	32	12	26	32	3	
Tamarack	*Larix laricina*		4	4	1			2		2	
Sweet Gale	*Myrica gale*			1				2		3	4
Common Juniper	*Juniperus Communis*			5				1	9		
Wild Sasparilla	*Aralia nudicaulis*			5							4
Purple Pitcher Plant	*Sarracenia purpurea*					1	2	7	7	5	
Mountain Holly	*Ilex mucronata*						6				7
New York Aster	*Symphyotrichum novi-belgii*										3
Northeastern Rose	*Rosa natida*				1						

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Bunchberry	*Cornus canadensis*	5%	<5%	<5%	<5%	<5%	<5%	<5%		<5%	
Peat Moss	*Sphagnum spp.*	40%	30%	55%	30%	30%	55%	40%	30%	35%	50%
Grass	*N/A*	20%	30%	15%	20%	10%	15%	30%	20%	20%	15%
Twinflower	*Linnaea borealis*	<5%									
Violet sp.	*Viola spp.*	<5%	<5%	<5%	<5%	<1%	<5%	<5%		<5%	
Goldthread	*Coptis trifolia*	<5%	10%	<5%	<5%	<5%	<5%	<5%			
Small Cranberry	*Vaccinium oxycoccos*		<5%	5%	10%	<5%	5%	<5%	<5%	10%	5%
Moss #2	*N/A*			15%	30%	15%					
White Moss	*N/A*			5%		20%	10%				

Site Name:	Incinerator Road
GPS Coordinates of Start of Transect:	N 47.44537 W 052.96978
Date:	July 30th 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Labrador Tea	*Rhododendron groenlandicum*	13	5	20	3	14	11	13	5	14	9
Sheep Laurel	*Kalmia angustifolia*	36	16	14	20	4	22	3		2	22
Bog Laurel	*Kalmia polifolia*	30	24	18	7	14	20	43	17	36	12
Sweet Gale	*Myrica gale*					4			3		4
Leatherleaf	*Chamaedaphne calyculata*	31	108	43	62	48	37	11	12	27	33
Bog Rosemary	*Andromeda polifolia*		9	7	4	2	13	10	8	2	2
Purple Pitcher Plant	*Sarracenia purpurea*	1			1		1				
Purple Chokeberry	*Aronia X prunifolia*	6	8	32	16	28	15	7	4	14	5
Tamarack	*Larix laricina*	1	1	2	1		2	1	4	2	3
White Spruce	*Picea Glauca*	1			1					1	
Rhodora	*Rhododendron canadense*			7							2
Bog Aster	*Oclemena nemoralis*				8				4		
Wild Sasparilla	*Aralia nudicaulis*						1	6		4	
Northern Wild Raisin	*Viburnum nudum*							1			
Common Juniper	*Juniperus communis*								5		
Sundew	*Drosera sp.*								3		
New York Aster	*Symphyotrichum novi-belgii*										2
Twinflower	*Linnaea borealis*										15
Mountain Holly	*Ilex mucronata*										1

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Peat Moss	*Sphagnum spp.*	40%	30%	20%	40%	25%	20%	70%	50%	40%	30%
Grass	*N/A*	15%	20%	10%	20%	15%	10%	15%	30%	20%	10%
"Moss #2"	*N/A*			10%		5%	40%				
Goldthread	*Coptis trifolia*	<5%	5%	<5%	<5%		<5%	<5%	<5%	<5%	
Violet sp.	*Viola spp.*	<5%	<5%	5%	<5%	<5%	<5%	<5%	<5%		
Bunchberry	*Cornus canadensis*	5%	<5%	5%	<5%						<5%
Small Cranberry	*Vaccinium oxyoccos*	5%	<5%	5%	5%	5%	5%	5%	5%	5%	5%
White Moss	*N/A*		20%	30%		25%	20%				
Black Crowberry	*Empetrum nigrum*				<5%					5%	

Incinerator Road Wetland Site – Invertebrate Data

Site:	Incinerator Road
GPS Coordinates (Inflow, culvert)	N47.44559 W 052.96883
GPS Coordinates (Outflow, culvert)	N 47.44550 W 052.96891

INFLOW (Into culvert)

Order	Family	Common Name	Count
Odonata	*Anisoptera*	Dragonfly Nymph	3
Trichoptera	*Chironimidae*	Midge Larvae	9
Plecoptera	*Leuctridae*	Unknown	4
Coeloptera	*Curculionidae*	Weevil	1
Trichoptera	*Polycentropidae*	Caddisfly Larvae-No case	3
Diptera	*Culicidae*	Mosquito Adult	1

OUTFLOW (Out of culvert)

Order	Family	Common Name	Count
Trichoptera	*Chironimidae*	Midge Larvae	12
Odonata	*Anisoptera*	Dragonfly Nymph	1
Plecoptera	*Leuctridae*	Unknown	38
Coleoptera	*Dytiscidae*	Predacious Diving Beetle	2
Trichoptera	*Polycentropidae*	Caddislfy Larvae	5
Arachnida	*Hydracaraina*	Water Mite	4
Coleoptera	*Dytiscidae*	Beetle Larvae	3

Incinerator Road Wetland 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	Incinerator Road	1	3				3
2 Lane Road		2					
4 Lane Road		3					
							3

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	0
Table 2	3
Table 3	0
Score	3

The wetland delineation found in Appendix A (Figure 5) was used for the analysis of potential stressors in the stress evaluation rubric. The only feature found to be located within 50m of the wetland boundary was Incinerator Road. However, some of the industries on the paved portion of Incinerator Road and the Trans Canada Highway are adjacent to the wetland, but outside of the 50m used in this study.

Medalsis Pond Wetland Site- Plant Data

Site Name:	Medalsis Pond
GPS Coordinates of Start of Transect:	N 047.69515 W 052.75125 Ele: 112m
Date:	August 15th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Sweet Gale	*Myrica Gale*	9	8		13	8	9	6	10	3	6
Michaux's Sedge	*Carex michauxiana*	11	15			8					
Bog Aster	*Oclemena nemoralis*	18	8	24	20	9	11	6	19	28	14
Leatherleaf	*Chamaedaphne calyculata*	2	2	18	16	5	21	2		3	4
Bog Laurel	*Kalmia polifolia*	1		1			1	6	3	4	
Jointed Bog Rush	*Juncus militaris*	1	21		4		13				
Onescale Spike Rush	*Eleocharis uniglumis*	13									
Bog Rush	*Juncus effusus*		1								
Tamarack	*Larix laricina*		1		3	1				1	
Northeastern Rose	*Rosa nitida*		1		1						4
Labrador Tea	*Rhododendron groenlandicum*		3								
Wild Sarsaparilla	*Aralia nudicaulis*			5			2			2	5
Goldenrod sp.	*Solidago spp.*		1								
Club Spur Orchid	*Platanthera clavellata*				1				1	1	
Water Sedge	*Carex aquatilis*	1	1		1	5					
Viola sp.	*Viola spp.*				20		2				
Sheep Laurel	*Kalmia angustifolia*							12		2	1
Fewseed Sedge	*Carex oligosperma*					5		17	1	13	3
Estuary Sedge	*Carex vacillans*									1	
Purple Chokeberry	*Aronia Prunifolia*									2	
Round leaved sundew	*Drosera rotundifolia*									4	
Spiky Moss	*Unknown*									2	
Bog Rosemary	*Andromeda Polifolia*										1
Northern burreed	*Sparganium hyperboreum*						1				

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
3 Leaved False Solomon's Seal	*Smilacina trifolia*	10%	10%	10%	10%	5%	5%	5%			
Small Cranberry	*Vaccinium oxyoccos*	<5%	<1%	5%	5%	5%	10%	5%	5%	5%	5%
White Beak Rush	*Rhyncospora alba*	5%	5%	15%	15%	10%			5%		
Grass	*N/A*	25%	20%	20%	40%	15%	30%	50%	30%	65%	50%
Round leaved sundew	*Drosera rotundifolia*	5%	<1%	<5%	<1%	<1%				<1%	<5%
Peat Moss	*Sphagnum spp.*	10%	10%	30%	15%	30%	50%	20%	40%	10%	30%
Black Crowberry	*Empetrum nigrum*		<1%								
Mud	*N/A*	40%	60%	25%	15%	30%	5%	20%	20%	20%	10%

Site Name:	Medalsis Pond
GPS Coordinates of Start of Transect:	N 47.69471 W 052.75138 Ele: 111m
Date:	August 15th, 2012
Transect 2 of 2	

Total # Standing Counts

Overgrowth Species	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Fewseed Sedge	*Carex oligosperma*	28	53	35	44	15	21				
Estuary Sedge	*Carex vacillans*	5	2								
Leatherleaf	*Chamaedaphne calyculata*	1				15	6	2	4	3	10
Bog Laurel	*Kalmia polifolia*	1				1	2	4	4	4	
Sweet Gale	*Myrica gale*		2		4		10	16	10	6	6
Jointed Bog Rush	*Juncus militaris*				7						
Bog Aster	*Oclemena nemoralis*				11		1	12			
Sheep Laurel	*Kalmia angustifolia*				11	22	3	17	10	66	9
Dog's Tail	*Drosera spp.*				4						
Labrador Tea	*Rhododendron groenlandicum*					7		7	14	12	10
White Beak Rush	*Rynhcospora alba*					4					
White Spruce	*Picea glauca*						1	1			
Purple Chokeberry	*Aronia X prunifolia*							6	2	2	
Northern Wild Raisin	*Vibirnum nudum*							12		3	4
Goldthread	*Coptis trifolia*							24		20	22
"Confused Oval Hairy'- Unidentified	*N/A*							15			
Balsam Fir	*Abies balsamea*							1	1	3	3
Wild Sarsaparilla	*Aralia nudicaulis*							4			
Bunchberry	*Cornus canadensis*								7	16	21
Twinflower	*Linnaea borealis*								5		14
Tamarack	*Larix laricina*									1	1
Mountain Holly	*Ilex mucronata*									1	6

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Grass	N/A	70%	65%	80%	55%	10%	35%	35%	10%	20%	10%
3 Leaved False Solomon's Seal	*Smilacina trifolia*		5%	<1%	10%	5%		5%	5%	5%	5%
Small Cranberry	*Vaccinium oxyoccos*				<5%	5%	5%	5%	5%	5%	5%
Peat Moss	*Sphagnum spp.*				10%	70%	60%	50%	70%	60%	50%
Black Crowberry	*Empetrum nigrum*					10%		5%		10%	
Mud	N/A	30%	30%	20%	20%				10%		30%

Medalsis Pond Wetland Site- Invertebrate Data

Site:	Medalsis Pond
GPS Coordinates (Sample 1)	**N 47.69506 W 052.75127**
GPS Coordinates (Sample #2)	N 47.69521 W 052.75142

Order	Family	Common Name	Count

No Inverts Found
2 Small Arachnids Found on net however, small size - around a couple of millimetres.

Medalsis Pond Wetland 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	Medalsis Pond Road	1	3				3
2 Lane Road		2					
4 Lane Road		3					
							3

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	0
Table 2	3
Table 3	0
Score	3

The wetland delineation found in Appendix A (Figure 6) was used for the analysis of potential stressors in the stress evaluation rubric. The only feature located within 50m of the wetland boundary was Medalsis Pond Road, which was a small dirt road. There was agricultural area located to the south of the wetland, but they were outside the 50m used in this study.

Mundy Pond Headwaters Wetland Site – Plant Data

Site Name:	**Mundy Pond Headwaters (Off Empire Avenue)**
GPS Coordinates of Start of Transect:	**N 47.5442 W 052.75983**
Transect 1 of 1	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Meadowsweet	*Spiraea latifolia*	22									2
Sweet Gale	*Myrica Gale*	8	6	29							20
Northeastern Rose	*Rosa nitida*	2		1							
Tall Meadow-rue	*Thalictrum polygamum*		17				21				
Marsh Bedstraw	*Galium palustre*			10							
Canadian Goldenrod	*Solidago canadensis*			5							
Cattail	*Typha latifolia*				9	8	11	3	9	7	9
Leatherleaf	*Chamaedaphne calyculata*						2				

* Considered non- native by John Maunder

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Tall Meadow-rue	*Thalictrum pubescens*	5%									
Moss		5%		90%							
Grass	N/A		10%	5%	40%	80%	80%	70%	85%	70%	60%
Water	N/A				40%	10%	5%	10%	5%		
Dead Debris	N/A	30%	80%					5%	10%	15%	15%

Mundy Pond Headwaters Wetland Site – Invertebrate Data

Site:	Mundy Pond Headwaters (Off Empire Avenue)
GPS Coordinates (Inflow)	N 47.54508 W 052.76150
GPS Coordinates (Outflow)	N 47.54433 W 052.75898

INFLOW

Order	**Family**	**Common Name**	**Count**
Tricoptera		Caddisfly Larvae	1
Odonata	Libellulidae	Dragonfly Nymphs	3
Hirudinae		Leech	2
Diptera	Chyronimidae	Midge Larvae	13
Coeleoptera	Scirtidae	Marsh Beetle	1
Hemiptera		Nymph	1

OUTFLOW

Order	**Family**	**Common Name**	**Count**
Trichoptera		Caddisfly Larvae	2
Amphipoda		Scud	3
Odonata	Libellulidae	Dragonfly Nymph	3
Coeleoptera	Scirtidae	Marsh Beetle	1
Plecoptera		Stoneflies	1
Diptera	Drosophilidae	Fruitfly	1
Diptera	Chyronimidae	Midge Larvae	1

Mundy Pond Headwaters Wetland 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	Houses on corner of Coventry Way, Radford Street and Empire Avenue	2	Dense	6			x2	12
	Houses on South Side of Empire Av				4		x2	8
	Houses on West side of Welland Street	1	Sparse		4			4
	Houses on North Side of Empire Avenue					2	x2	4
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								28

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	Empire Avenue	2	6				6
	Welland Street			4			4
	Coventry Way				2	x2	4
4 Lane Road		3					
							14

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	28
Table 2	14
Table 3	0
Score	42

The wetland delineation found in Appendix A (Figure 7) was used for the analysis of potential stressors in the stress evaluation rubric. Within 50m of the wetland boundary there were houses and the roads that they are located on. The houses on the corner of Coventry Way, Radford Street and Empire Avenue and those on the north and south side of Empire Avenue were determined to be at an elevation such that there was potential for a greater impact of runoff from them. Although not a part of the rubric, there was garbage present in the wetland.

Sheens Pond Wetland Site- Plant Data

Site Name:	**Sheen's Pond**
GPS Coordinates of Start of Transect:	**N 47.59258 W 052.66709**
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
White Spruce	*Picea glauca*									1	2
Sweet Gale	*Myrica gale*	10	13	10	30	18	16	17	8	7	4
Sheep Laurel	*Kalmia angustifolia*			12		3	20	23	33	40	47
Common Labrador Tea	*Rhododendron groenlandicum*									4	4
Pale Bog Laurel	*Kalmia polyfolia*						1	1	9	1	1
Sweet gale	*Myrica gale*	3	4			3	5	6	3	9	
Catttail	*Typha latifolia*					5		6	7	5	
Balsam Fir	*Abies balosamia*						2				
Leatherleaf	*Chamaedaphne calyculata*	3	4	4	3		7				

* Considered non- native by John Maunder

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Peat Moss	*Sphagnum spp.*		70%	<5%	<5%	50%	65%	<5%	50%	60%	75%
Grass	N/A	60%	5%	<5%	<5%	10%	15%	20%	<5%	<5%	
Open Water	N/A	<5%	<5%	80%	80%	15%	15%	15%	10%		

Site Name:	**Sheen's Pond**
GPS Coordinates of Start of Transect:	**N 47.59258 W 052.66709**
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5
White Spruce	*Picea glauca*				1	1
Sweet Gale	*Myrica gale*	19	12	10	3	
Sheep Laurel	*Kalmia angustifolia*	31	25	21	17	3
Common Labrador Tea	*Rhododendron groenlandicum*			2		2
Pale Bog Laurel	*Kalmia polyfolia*					3
Cattail	*Typha latifolia*	3				
Mountain Fly Honeysuckle	*Lonicera villosa*				2	
Leatherleaf	*Chamaedaphne calyculata*		3			10
Dead Tree	*NA*				1	

* Considered non- native by John Maunder

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5
Peat Moss	Sphagnum spp.	<5%	30%	20	30	30%
Grass	N/A	10%	50%	40%		<5%
Open Water	N/A	20%	<5%			

Sheens Pond Wetland Site- Invertebrate Data

Site:	Sheens Pond (No defined inflow or outflow)
GPS Coordinates (Sample 1)	**N 47.59258 W 052.66709**
GPS Coordinates (Sample 2)	**N 47.59258 W 052.66709** (no organsims recorded for this location)

Both samples

Order	Family	Common Name	Count
Coleoptera	Helodidae	Water Beetle	2
Diptera	Culicidae	Mosquito Larvae	1
Diptera		Adult	1

Sheens Pond Wetland 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	Gravel Access Road	1	3			x2	6
2 Lane Road		2					
4 Lane Road		3					
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	0
Table 2	6
Table 3	0
Score	6

The wetland delineation found in Appendix A (Figure 8) was used for the analysis of potential stressors in the stress evaluation rubric. The only feature found to be located within 50m of the wetland boundary was the dirt road that ran alongside of it, which was determined to be at an elevation such that there was potential for a greater impact of runoff from it.

South of Olivers Pond Wetland Site – Plant Data

Site Name:	**South of Oliver's Pond**
GPS Coordinates of Start of Transect:	**N 47.58977 W 052.83506**
Date:	July 12th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Sweetgale	*Myrica gale*	24	4	2		10	3	8	3	20	
BlueFlag Iris	*Iris versicolor*	6				3	1				3
Marsh Bedstraw	*Galium palustre*	11	8	44	29	7					
Northern willowherb	*Epilobium ciliatum*	6	1								
Leatherleaf	*Chamaedaphne calyculata*	4	11	3		4					
Small White Violet	*Viola macloskeyi*										
Three Leaved Solomons Seal	*Smilacina trifolia*						15				
Bog Aster	*Oclemena nemoralis*							2			
Sheep Laurel	*Kalmia angustifolia*										20

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Grass	*N/A*	5.00%	15.00%	30.00%	10.00%	7.00%			10.00%	<5%	
Sweet gale	*Myrica gale*		20.00%							40.00%	
Leatherleaf	*Chamaedaphne calyculata*				60.00%		15.00%	30.00%		20.00%	
Peat Moss	*Sphagnum spp.*				10.00%		5.00%	20.00%		30.00%	
Small White Violet	*Viola macloskeyi*				5.00%	3.00%					
Northern Bedstraw	*Galium boreale*						5.00%				
Three Leaved False Solomons Seal	*Smilacina trifolia*							<5%		10.00%	
Dead Debris	*N/A*	10.00%		20.00%	10.00%					10.00%	
Mud	*N/A*			30.00%		80.00%	50.00%		80.00%		

Site Name:	**South of Olivers Pond**
GPS Coordinates of Start of Transect:	**N 47.58876 W 052.83394**
Date	July 13th, 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Iris	*Iris sp.*					9		3		5	2
Leathleaf	*Chamaedaphne calyculata*	19	14	17	18	23		17	21		5
Bog Aster	*Oclemena nemoralis*							5	15	30	2
Bog Laurel	*Kalmia polifolia*										1
Tamarack	*Larix laricina*								2		
Northeastern Rose	*Rosa nitida*					6		6			
Sweet gale	*Myrica gale*					9		3			
Goldthread	*Coptis gorenlandica*							6			
Yellow Pond Lily	*Nuphar lutea*						2				
Sundew	*Drosera sp.*				5						
Black Crowberry	*Empetrum nigrum*		35	12	23						
Labrador Tea	*Rhododendron groenlandicum*		12	1							
Purple Pitcher Plant	*Sarracenia purpurea*		1								
White Spruce	*Picea glauca*		5		1						
Mushrooms	*Unknown*	2									

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Moss	*Sphagnum spp.*	70%	60%	60%	85	70%		80%	80%	80%	90%
Grass	*N/A*	10%	10%	20%	5%	10%		8%	10%	10	5
Three Leaved False Solomons Seal	*Smilacina trifolia*	10%	20%	10%	5%	5%			5%	5	3
Yellow Pond Lily	*Nuphar lutea*						10%				
Dead Foliage	*N/A*									2%	
Open Water	*N/A*						90%				

South of Olivers Pond Wetland Site – Invertebrate Data

Site:	South of Oliver's Pond
GPS Coordinates (Inflow)	N 47.58977 W 052.83506
GPS Coordinates (Downstream)	N 47.58942 W 052.83461

INFLOW

Order	Family	Common Name	Count
Coleoptera	Dytiscidae	Predacious Diving Beetle	12
Coleoptera	Dytiscidae	Larvae	1
Coleoptera		Whirlygig	1
Coleoptera		Unknown #1	1
Coleoptera		Unknown#2	1
Odonata	Ashnidae		1
Odonata	Anisoptera	Dragonfly Nymph	1
Hemiptera	Pleidae		1
Hemiptera	Corixidae	Water Boatmen	8

DOWNSTREAM

Order	Family	Common Name	Count
Mollusca		Pill Clam	1
Odonata	Anisoptera	Dragonfly Nymph	1

South of Olivers Pond Wetland Site – *Stress Evaluation Rubric*

Part 1: Area Features

	Feature	Value	Area	<15m (3)	15 m - 30 m (2)	30 m - 50 m (1)	Elevation of Concern X 2	TOTALS
Agriculture	Property facing Olivers Pond Place	1 2 3	< 1000 m2 1000 - 10,000 > 10,000 m2	9				9
Impervious Surfaces		1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2					
Residential	Residence on Olivers Pond Road (to the east of wetland)	2	Dense		2			5
	Residence on Olivers Pond Road (to the west of wetland)	1	Sparse	3				
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								14

Part 2: Roadways

	Feature	Value	<15m (3)	15 m - 30 m (2)	30 m - 50 m (1)	Elevation of Concern	TOTALS
Dirt Road		1					
2 Lane Road	Oliver's Pond Road	2	6				6
4 Lane Road		3					
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	1	Crosses under Oliver's Pond Road	1
Dam			
			1

	TOTALS
Table 1	14
Table 2	6
Table 3	1
Score	21

The wetland delineation found in Appendix A (Figure 9) was used for the analysis of potential stressors in the stress evaluation rubric. There was an agricultural area located to the west of the wetland boundary, and some residences that appeared to be within 50m of the wetland boundary. Olivers Pond Road was also one of the features included in the rubric.

Topsail Beach Wetland Site- Plant Data

Site Name:	Topsail Beach
GPS Coordinates of Start of Transect:	N 47.54090 W 052.92653 Ele: 3m
Date:	August 6th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10	
Blue Flag Irises	*Iris versicolor*	2	2									
Large Forget-Me-Not	*Myosotis scorpioides*	9	4		9	10	10			2	1	
Common Reed	*Phragmites australis*		20			11	45					*NL Invasive Species
Bog buckbean	*Menyanthes trifoliata*			2	41	23	1					
Woolgrass	*Scirpus cypernius*								3		6	
Yellow Loosestrife/Swamp Candles	*Lysmachia terrestris*									1		
Spurred Gentain	*Halenia deflexa*									1		
Rattlesnake Mannagrass	*Glyceria canadensis*									1		

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10	
Sweetflag	*Aconus americanus*	40%	15%			30%						
Normal grass	*N/A*	30%			40%	30%	30%		20%	70%	40%	
Common Reed	*Phragmites australis*		30%	<5%								*NL Invasive Species
Bog buckbean	*Menyanthes trifoliata*			90%			30%	60%	40%			
Long thin grass	*N/A*								10%		15%	
Dead grass	*N/A*	30%	40%		30%	20%						
Open water	*N/A*		15%	5%	30%	20%	40%	40%	30%	30%	35%	

Site Name:	Topsail Beach
GPS Coordinates of Start of Transect:	N 47.54082 W 052.92688 Ele: 1m
Date:	August 6th, 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10	
Large Forget-Me-Not	*Myosotis scorpioides*	3	4	5	12	2		2				
Blue Flag Iris	*Iris versicolor*		1		4		4	4			5	
Common Reed	*Phragmites australis*		2									* NL Invasive Species
Unidentified	*N/A*		2									
Bogbean/Buckbean	*Menyanthes trifoliata*		2									
Rough Mannagrass	*Glyceria maxima*				14							* Considered non- native by John Maunder
White Beak Rush	*Rhynchospora alba*				1	1						
Yellow Loosestrife/Swamp Candles	*Lysimachia terrestris*				3	7						
Spurred Gentain	*Halenia deflexa*				1							
Tall Meadow Rue	*Thalictrum pubescens*					6	2					
Arrowleaf Tearthumb	*Persicaria sagittata*					2	10	9		12		
New York Aster	*Symphyotrichum novi-belgii*						1	2	30	23	24	
Marsh Willowherb	*Epilobium palustre*						2	1				
Field Horsetail	*Equisetum arvense*							2	3	6	14	
Marsh Bedstraw	*Galium palustre*							12	21	15	9	
Meadowsweet	*Spiraea latifolia*								2	1		

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10	
Bog Buckbean	*Menyanthes trifoliata*	70%	70%	60%								
Normal Grass	*N/A*	10%	10%	20%	60%	80%	50%	10%	30%	30%	25%	
Common Reed	*Phragmites australis*		5%									* NL Invasive Species
Sweetflag	*Acornus americanus*						10%	30%			10%	
Viola spp.	*Viola spp.*							5%	5%	5%	5%	
Peat Moss	*Sphagnum sp.*							10%	30%	40%	50%	
Dead Grass	*N/A*								15%			
Open Water	*N/A*	20%	15%		40%	20%	40%	45%	20%		10%	

Topsail Beach Wetland Site- Invertebrate Data

Site:	Topsail Beach
GPS Coordinates (Sample #1)	**N 47.54103 W 052.92672**
GPS Coordinates (Sample #2)	**N 47.54076 W 052.92760**

Sample #1

Order	Family	Common Name	Count
Diptera	Chironimidae	Midge Larvae	7
Ephemeroptera	Potamonthidae	Mayfly Adults	60
Hirudinae		Leech	23
Hemiptera	Corixidae	Water Boatmen	8
Platyhelminthes		Flatworm	5
Oligochaeta		Aquatic earthworm	1
Ostracod		Seed Shrimp	1

Sample #2

Order	Family	Common Name	Count
Hirudinae		Leech	3
Hemiptera	Corixidae	Water Boatmen	5
Amphipoda		Scud	1
Hempitera	Gerridae	Water Strider	1

Topsail Beach Wetland 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	Residential Properties on Route 60	2 1	Dense Sparse	3				3
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								3

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	Route 60	2			2	x2	4
4 Lane Road		3					
							4

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	3
Table 2	4
Table 3	0
Score	7

The wetland delineation found in Appendix A (Figure 10) was used for the analysis of potential stressors in the stress evaluation rubric. The residential properties on Route 60 and Route 60 (Conception Bay Highway) were the only two features determined to be within 50m of the wetland boundary. Only Route 60 was determined to be at an elevation such that there was potential for a greater impact of runoff from it.

Voiseys Brook South Wetland Site- Plant Data

Site Name:	Voisey's Brook South
GPS Coordinates of Start of Tran	N 47.62823 W 052.81515 Ele: 138m
Date:	July 25th 2012
Transect 1 of 1	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Mountain Holly	*Ilex mucronata*	6	1	5		9					
Sheep Laurel	*Kalmia angustifolia*	18	9								
Labrador Tea	*Rhododendron groenlandicum*	27	38	22			2		1		
Cottontail Sedge	*Eriophorum spp.*	1									
Bog Laurel	*Kalmia polifolia*	8	26	6	16	2		5		1	10
Bunchberry	*Cornus canadensis*	5	59	34							
Sweet gale	*Myrica gale*	16	6	22	31	15	29	21	14	6	19
Leatherleaf	*Chamaedaphne calyculata*	7	35	23	39			8		3	15
3 Leaved False Solomons Seal	*Smilacinia trifolia*	5				3	7	4			20
White Spruce	*Picea glauca*		10								
Tamarack	*Larix laricinia*			2							
Goldenrod	*Solidago spp.*				2						
Northeastern Rose	*Rosa nitida*				1	1	7	1	10	3	
Tall Meadow-rue	*Thalictrum pubescens*					1					
Bog Aster	*Oclemena nemoralis*					43	12	1	88	20	53
Rough Leaved Aster	*Eurybia radula*					3					
Northern Wild Raisin	*Viburnum nudum*						3				
Canada Rush	*Juncus candensis*									33	4

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Peat Moss	*Sohagnum spp.*	40%	20%	15%	60%	20%	40%	30%	40%	60%	50%
Grass	*N/A*	20%	10%	5%	10%	5%	5%	10%	10%	20%	30%
Black Crowberry	*Empetrum nigrum*	15%			<5%		<5%				
Sundew	*Drosera spp.*	<5%	<1%								
Small Cranberry	*Vaccinium oxycoccus*	<10%	<5%	<10%	5%	5%	<5%			<10%	5%
Leatherleaf	*Chamaedaphne calyculata*					30%	10%				
Mountain Fly Honeysuckle	*Lonicera villosa*						20%	10%	10%		

Voiseys Brook South Wetland Site- Invertebrate Data

Site:	Voisey's Brook South
GPS Coordinates (Inflow)	N 47.6542 W052.92110 Elevation: 125 m
GPS Coordinates (Outflow)	N 47.62899 W 052.81451 Elevation: 131 m

INFLOW (site #2)

Order	**Family**	**Common Name**	**Count**
Diptera	Chironimidae	Midge larvae	25
Amphipoda		Scuds	39
Coleoptera	Dytiscidae		12
Trichoptera	Limnephilidae	Northern Caddisfly	5
Trichoptera	Polycentropidae	Caddisfly larvae	2
Diptera	Psychodidae	Larvae	1
Hydracarina		Aquatic Mite	1
Annelida	Hirudinae	Leech	1

OUTFLOW (site #1)

Order	**Family**	**Common Name**	**Count**
Amphipoda		Scud	27
Diptera	Chironimidae	Midge Larvae	27
Coleoptera	Dytiscidae		2
Trichoptera	Polycentropidae		3
Isopoda		Aquatic Sowbug	2
Unknown		Flatworm	1

Voiseys Brook South Wetland 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	Housing on the North side of Indian Meal Line	2	Dense	6				6
	Housing on the South side of Indian Meal Line	1	Sparse		2		x2	4
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								10

Part 2: Roadways

	Feature	Value	<15m	15 m - 30 m	30 m - 50 m	Elevation of Concern	TOTALS
			3	2	1		
Dirt Road	Voiseys Brook Road	1	3				3
2 Lane Road	Indian Meal Line	2	6				6
4 Lane Road		3					
							9

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	10
Table 2	9
Table 3	0
Score	19

The wetland delineation found in Appendix A (Figure 11) was used for the analysis of potential stressors in the stress evaluation rubric. Features determined to be within 50m of the wetland boundary were Voiseys Brook Road, Indian Meal Line, and residences on Indian Meal Line. Only the residences on the south side of Indian Meal Line were determined to be at an elevation such that there was potential for a greater impact of runoff from them. The gravel parking area at Voiseys Brook park was also within 50m of the wetland boundary, but was not included in the rubric because it did not fit the categories.

Voiseys Brook West Wetland- Plant Data

Site Name:	Voisey's Brook (West)
GPS Coordinates of Start of Transect:	**N 47.62985 W 052.81763 Ele: 135m**
Date:	July 19th, 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Tawny Cottongrass	*Eriophorum virginicum*	7					5		8		3
Sheep Laurel	*Kalmia angustifolia*	15	4	14		20	5		3	9	4
Tamarack	*Larix laricinia*	3				1		2	2	1	2
Bog Aster	*Oclemena nemoralis*	1						21	8		
Bog Goldenrod	*Solidago uliginosa*	1									3
Bog Laurel	*Kalmia polifolia*	8	13	18		3	4	3	5	4	9
Leather Leaf	*Chamaedaphne calyculata*	22						12	19		3
Sweet gale	*Myrica gale*	9	15		10		5	1	2	11	11
Chesnut Sedge	*Carex castanea*						6				
Labrador Tea	*Rhododendron groenlandicum*	1	4	5		1			2	3	13
Dwarf Huckleberry /Bog Huckleberry	*Gaylussacia bigeloviana*		1								
Balsam Fir	*Abies balsamea*		1				2	1	2	1	
White Spruce	*Picea glauca*			18		5	7				4
Creeping Snowberry	*Gaultheria hispidula*					45					
Purple Chokeberry	*Aronia X prunifolia*									4	7
Bunchberry	*Cornus canadensis*									1	

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Peat Moss	Sphagnum spp.	60%	50%	60%	80%	30%	60%	30%	50%	60%	60%
Black Crowberry	*Empetrum nigrum*	5%	5%	10%	<1%					10%	5%
3 Leaved Falso Solomons Seal	*Smilacina trifolia*	10%		<5%	5%	5%	10%	10%	5%	<5%	10%
Sundew	*Drosera spp.*	<5%	5%		<5%	<5%		10%	5%		<5%
Sweet gale	*Myrica Gale*		10%	10%	5%		10%				
Grass	N/A		15%	5%	10%	20%		15%		15%	10%
Mud	N/A							10%	25%		

Site Name:	Voisey's Brook West
GPS Coordinates of Start of Transect:	N 47.63029 W 052.81836 Ele: 136m
Date:	July 19th 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Labrador Tea	*Rhododendron groenlandicum*	6	21	18	3	16	6	3	2	4	7
Bog Laurel	*Kalmia polifolia*	7	8	6	2	5	3	4	4	3	
Leatherleaf	*Chamaedaphne calyculata*	26	5		12						
Tawny Cottongrass	*Eriophorum virginicum*	30									
Bog Goldenrod	*Solidago uliginosa*										1
Sheep Laurel	*Kalmia angustifolia*	6	10	36	45	12	3	7	32	27	62
Bog Aster	*Oclemena nemoralis*	4									
Sweet Gale	*Myrica gale*		3		2	4					
Tamarack	*Larix laricinia*		1	1	3				2	2	
Purple Chokeberry	*Aronia X prunifolia*		4	6			12		9		
White Spruce	*Picea glauca*					1					
Goldthread	*Coptis trifolia*							22	11		
Twinflower	*Linna borealis*			3							

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Peat Moss	*Sphagnum spp.*	50%	60%	40%	70%	30%	40%	10%	50%	40%	30%
Grass	*N/A*	10%	10%		5%	20%	10%	15%	15%	15%	20%
Sweet Gale	*Myrica Gale*	15%		20%			10%				
Black Crowberry	*Empetrum nigrum*	5%	10%	10%	15%	20%	10%	10%	10%	10%	5%
3 Leaved False Solomons Seal	*Smilacina trifolia*	5%	5%		<5%	5%	5%	5%	5%	5%	<5%
Creeping Snowberry	*Gaultheria hispidula*	5%		<5%	<5%			5%			
Sundew	*Drosera spp.*	1%	1%		1%						
White Spruce	*Picea glauca*							50%			
Moss	*N/A*							5%	<5%	<5%	5%

Voiseys Brook West Wetland- Invertebrate Data

Site:	Voisey's Brook West
GPS Coordinates (Sample #2)	N 47.63108 W 052.81830 Ele: 129m
GPS Coordinates (Sample #1)	N 47.63031 W 052.81842 Ele: 134m

Upstream (Sample #2)

Order	Family	Common Name	Count
Odonata	Anisoptera	Dragonfly Nymph	3
Isopoda	Armadellididae	Common Pillbug	1
Hemipteran	Corixidae	Water Boatmen	1
Coleoptera	Dytiscidae	Predacious Diving Beetle	1
Coleoptera	Scirtidae	Marsh Beetle Larvae	2
Diptera	Simuliidae	Blade Fly	1

Downstream (Sample #1)

Order	Family	Common Name	Count
Amphipoda		Scud	6
Diptera	Chironomidae	Midge Larvae	1
Arachnida		Spider	1
Odonata	Anisoptera	Dragonfly Nymph	1

Voiseys Brook West Wetland- *Stress Evaluation Rubric*

Part 1: Area Features

	Feature	Value	Area	<15m (3)	15 m - 30 m (2)	30 m - 50 m (1)	Elevation of Concern (X 2)	TOTALS
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	Residences on Indian Meal Line	2	Dense		2		x2	4
	Residences on Lees Place			3			x2	6
	Residence on Bauline Line Extension	1	Sparse	3			x2	6
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								16

Part 2: Roadways

	Feature	Value	<15m (3)	15 m - 30 m (2)	30 m - 50 m (1)	Elevation of Concern	TOTALS
Dirt Road		1					
2 Lane Road	Indian Meal Line	2		4		x2	8
4 Lane Road		3					
							8

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	16
Table 2	8
Table 3	0
Score	24

The wetland delineation found in Appendix A (Figure 11) was used for the analysis of potential stressors in the stress evaluation rubric. Indian Meal Line and residences on Indian Meal Line, Lees Place and Bauline Line Extension were determined to be within 50m of the delineated wetland boundary. All of these features were determined to be at an elevation such that there was potential for a greater impact of runoff from them.

West Dam Pond Wetland Site- Plant Data

Site Name:	West Dam Pond
GPS Coordinates of Start of Transect	N 47.63158 W 052.95720 Ele:100m
Date:	August 1st 2012
Transect 1 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Sweet Gale	*Myrica gale*	13	13	8	16	11	8		5	2	8
Goldenrod	*Solidago sp.*	5			1	3					1
Leatherleaf	*Chamaedaphne calyculata*	13	7	8	16		40	50	28	50	29
Bog Aster	*Oclemena nemoralis*	3	28	6	10	12	1	5	3	1	6
Sheep Laurel	*Kalmia angustifolia*	7	1				4		1		
Labrador Tea	*Rhododendron groenlandicum*	2					17			25	
Rhodora	*Rhododendron canadense*	5	5								
Purple Chokeberry	*Aronia prunifolia*	2									
Cinnamon Fern	*Osmundastrum cinnamomeum*		14				4				
Bog Rush/Soft Rush	*Juncus effusus*		3	6		20	14	12	14	10	14
Marsh Bedstraw	*Galium palustrae*			6		14					
Bog Laurel	*Kalmia polifolia*						12	9		2	
Mountain Holly	*Ilex mucronata*								4		

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Grass	N/A	90%	15%	60%	60%	60%	30%	60%	70%	40%	90%
3 Leaved False Solomons Seal	*Smilacinia trifolia*	<5%			5%	10%	10%		<5%	<5%	<5%
Peat Moss	*Sphagnum sp.*		15%			10%	40%	10%	5%	40%	
Small Cranberry	*Vaccinium oxyoccos*					<5%	5%	5%	<1%	10%	<5%
Dead Grass	N/A	5%		30%	20%	10%		20%	10%	5%	<5%
Mud	*N/A*		60%		10%						

Site Name:	West Dam Pond
GPS Coordinates of Start of Transect:	N 47.63213 W 052.95539 Ele: 100m
Date:	August 1st 2012
Transect 2 of 2	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Goldenrod	*Solidago spp.*	6	14		4		1	6	10	4	
Sweet Gale	*Myrica gale*	1	3	8	3	1	5	4	3	5	13
Cut Leaved Water Horehound	*Lycopus americanus*	14	46	32	45	31	17	7	24	25	20
Spotted Touch Me Not/Jewelweed	*Impatiens capensis*	7									
Marsh Bedstraw	*Galium palustre*	6			6	17	16	9	4	9	
Rattlesnake Mannagrass	*Glyceria canadensis*	3				2	5		13	3	
Arrowleaf Tearthumb/ Arrow-leaved smartweed	*Persicaria sagittata*			67	2	7	1				
Bog Aster	*Oclemena nemoralis*			4	26	29	7	6	11	32	6
Devils beggarticks	*Bidens frondosa*					1			2		
Meadowsweet	*Spirea latifolia*							36	18		
Aster sp.	*Symphyotrichum spp.*							7			

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Grass	N/A	80%	90%	60%	70%	80%	60%	80%	60%	50%	40%
Violet sp.	*Violet spp.*					<5%	<5%				
3 Leaved False Solomons Seal	*Smilacina trifolia*							<5%	<5%		<5%
Willowherb sp.	*Epilobium spp.*					<1%				<1%	
Mud	N/A	10%	5%			15%	20%		30%	40%	50%
Dead Grass	N/A			30%	20%		10%	10%			

West Dam Pond Wetland Site- Invertebrate Data

Site:	West Dam Pond
GPS Coordinates (Sample #1, upstream)	**N 47.63062 W 052.95847**
GPS Coordinates (Sample #2, downstream)	**N 47.63922 W 052.94221**

Sample #1 (Nothing Found)

Sample #2 (Downstream)

Order	Family	Common Name	Count
Hemiptera	Corixidae	Water Boatman	33
Veneroida	Sphaeriidae	Pill/Fingernail Clam	1

West Dam Pond Wetland 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	West Track Road	1	3				6
	Scotia Road		3				
2 Lane Road		2					
4 Lane Road		3					
							6

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert	1	Under West Track Road	1
Dam			
			1

	TOTALS
Table 1	0
Table 2	6
Table 3	1
Score	7

The wetland delineation found in Appendix A (Figure 12) was used for the analysis of potential stressors in the stress evaluation rubric. West Track Road and Scotia Road were the only features determined to be within 50m of the delineated wetland boundary.

East White Hills Road Wetland Site- Plant Data

Site Name:	West of East White Hills Road
GPS Coordinates of Start of Transect:	N 47.60385 W 052.68784 Ele: 75m
Date:	August 14th, 2012
Transect 1 of 3	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Horsetail	*Equisetum sp.*	132	156	142	128	160	<200	<200	100	136	<200
Blue Flag Iris	*Iris versicolor*	2								1	
Marsh Bedstraw	*Galium palustre*	13	12	3	32	16	25	26	35	51	
Arrowleaf Tearthumb	*Polygonum sagittatum*	4	37	6	4	19	15	11	12	5	
Leatherleaf	*Chamaedaphne calyculata*	6	6		5	2					
Cut-leaved Water Horehound/ cutleaf bugleweed	*Lycopus americanus*	10	35	14	22	11	14	17	14	15	
Purple-Stemmed Aster	*Symphyotrichum puniceum*	15	10	3	4	6	4	5	4	12	
Sweetflag	*Acorus Calamus*		25	27	33	14		4	17	15	2
White Beak Rush	*Rhynchospora alba*		4	1	3			5			
Bog Rush	*Juncus effusus*			1							
Sweet Gale	*Myrica gale*				1	3					
Berry Bedstraw	*Galium spp.*				1			6		4	
Rattlesnake Mannagrass	*Glyceria canadensis*							3			8

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
3 Leave False Solomon's Seal	*Smilacina trifolia*	15%	10%	15%	5%	15%	10%		10%	10%	
Watercress	*Nasturtium officinale*	10%	5%	5%	10%	5%	10%	10%	10%	10%	15%
Dead Debris	*N/A*	75%	85%	80%	85%	80%	80%	90%	80%	80%	85%

Site Name:	West of East White Hills Road
GPS Coordinates of Start of Transect:	N 47.60388 W 052.68648 Ele: 71m
Date:	August 14th, 2012
Transect 2 of 3	

Total # Standing Counts

Common Name	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad10
Common Reed	*Phragmites australis*	21	6				5		7	16	
Horsetail	*Equisitum spp.*	80	100	150	84	90	160	148	139	122	140
Sweet Gale	*Myrica gale*	2			10	15	7	3	2	3	
Purple-stemmed Aster	*Symphyotrichum puniceum*	6	10	2	2			2			
Arrowleaf Tearthumb	*Polygonum sagittatum*	33									
White Beak Rush	*Rhynchospora alba*	4	5	2		5		2			
Cut-Leaved Water Horegound/ Cutleaf bugleweed	*Lycopus americanus*	16	46						5		
Marsh Bedstraw	*Galium palustre*	40	6	13	12		3				
Sweet Flag	*Acorus calamus*		4					6	10		5
Woolgrass	*Scirpus cypernius*				1	3					
Bebbs Willow	*Salix bebbiana*				15	4	9	2			
Bog Rush	*Juncus effusus*					3					
Berry Bedstraw	*Galium spp.*					5		10	12	22	6
Water Sedge	*Carex aquatalis*						2				
Stipitate Sedge	*Carex stipata*						2				
Blue Flag Iris	*Iris versicolor*										1
Pussy Willow	*Salix discolor*			4	2		3	1			4

*NL Invasive Species

% Cover

Undergrowth (% Cover)	*Species Name*	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9	Quad 10
Watercress	*Nasturtium officinale*	10%	5%	5%	10%	5%	5%	5%	10%	10%	10%
3 Leaved False Solomon's Seal	*Smilacina trifolia*			5%							
Peat Moss	*Sphagnum sp.*		30%	50%							
Dead Debris	*N/A*	90%			70%	95%	95%	65%	80%	80%	90%
Mud	*N/A*		65%	40%	20%			30%		10%	

Site Name:	West of East White Hills Road
GPS Coordinates of Start of Transect:	N 47.60514 W 052.68193 Ele: 77m
Date:	August 16th, 2012
Transect 3 of 3	

Total # Standing Counts

Common Name	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad10**
Common Reed	*Phragmites australis*	8	5	9		7					
Goldenrod	*Solidago sp.*	4	8	4							
Water Sedge	*Carex aquatalis*	1			3						
Sweet Flag	*Acorus calamus*	5				4			8		6
Cow Vetch	*Vicia cracca*	1									
Woolgrass	*Scirpus cyperinus*		5					3		5	
Goldenrod #2	*Solidago spp.*		2								
Fireweed	*Epilobium angustifolium*		2								
Sweet Gale	*Myrica gale*			10	3		1	4		3	
Puple-stemmed Aster	*Symphyotrichum puniceum*			2		2					
Bog Rush	*Juncus effusus*				21						
Rattlesnake Mannagrass	*Glyceria Canadensis*				1						
White Beak rush	*Rhynchospora alba*				1						
Nodding Sedge	*Carex gynandra*					18	14	23	20	38	
Berry Bedstraw	*Galium spp.*							4			
Blue Flag Iris	*Iris versicolor*										2

*NL Invasive Species

% Cover

Undergrowth (% Cover)	***Species Name***	**Quad 1**	**Quad 2**	**Quad 3**	**Quad 4**	**Quad 5**	**Quad 6**	**Quad 7**	**Quad 8**	**Quad 9**	**Quad 10**
Beachgrass (leaves)	*Ammophila briviligulata*	70%	60%	50%	50%	50%	40%	60%	80%	60%	
Marsh Bedstraw	*Galium palustre*		10%	5%	10%	10%		10%		10%	
Watercress	*Nasturtium officinale*			10%	10%	10%				5%	
Bog Buckbean	*Menyanthes trifoliata*										60%
Dead Debris	*N/A*	30%	30%	35%	30%	30%	40%	20%	10%	15%	
Water	*N/A*						20%	10%	10%	10%	40%

East White Hills Road Wetland Site- Invertebrate Data

Site:	West of East White Hills Road
GPS Coordinates (Inflow)	N 47.60353 W052.68769

Order	**Family**	**Common Name**	**Count**
Odonata	Anisoptera	Dragonfly Nymph	43
Hirudinae		Leech	1
Coleoptera	Noteridae	Diving Beetles	7
Odonata	Zygoptera	Damselfly Nymph	2
Odonata	Lestidae	Damselfly Nymph	1
Amphipoda		Scud	18

East White Hills Road Wetland 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	Industries on East White Hills Rd	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2			3	6	6
	Industries on Harding Rd	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2			3		3
	Industries on Logy Bay Road	1 2 3	< 1000 m2 1000 - 10,000 m2 > 10,000 m2			2 3		5
Residential		2 1	Dense Sparse					
Commercial / Institutional		2 1	Dense Sparse					
Industrial		2 1	Dense Sparse					
								14

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	East White Hills Road	2	6			12	12
4 Lane Road		3					
							12

Part 3: Culverts and Dams

	# Present	Comment	TOTALS
Culvert			
Dam			
			0

	TOTALS
Table 1	14
Table 2	12
Table 3	0
Score	26

The wetland delineation found in Appendix A (Figure 12) was used for the analysis of potential stressors in the stress evaluation rubric. The delineated wetland boundary was surrounded by industrial areas. Of the features determined to be within 50m of the delineated wetland boundary, East White Hills Road and the industries on it were determined to be at an elevation such that there was potential for a greater impact of runoff from them.