

Appendix X

Wetlands Environmental Monitoring Report

MONITORING OF PLANT COMMUNITIES IN MARSH AND ADJACENT WETLAND AREAS—MINAS PASSAGE TIDAL ENERGY DEMONSTRATION SITE

Report to;

Fundy Ocean Research Centre for Energy
Halifax, Nova Scotia

October 2019

EXECUTIVE SUMMARY

Fundy Ocean Research Centre for Energy (FORCE) operates an experimental test site for tidal turbines in the Minas Passage of the Bay of Fundy. FORCE installed electrical transmission cables for the site across a coastal salt/fresh marsh at the site in September 2014 and subsequently, impacts of the trenching on the vegetation and physical conditions in the wetlands have been monitored as required by the Wetland Alteration Approval for the project under the *Nova Scotia Environment Act*. The 5th and final year of monitoring (post-trenching) was conducted on August 20, 2019, documenting plant species composition and dominance at sites previously selected and surveyed (i.e. baseline, first year and second year post-trenching surveys, Envirosphere 2014, 2015 and 2016). No rare plants, or plants of conservation concern occur, as noted in earlier botanical surveys. Plant communities along the cable alignment are dominated by freshwater associated species, with the sedge *Carex paleacea*, cord grass *Sporobolus michauxianus* (formerly *Spartina pectinata*), grasses *Glyceria* spp., and alders *Alnus incana* making up nearly 100% cover, with occasional other species present. Overall, the cable alignment route is well vegetated. The cable corridor near the upland is dominated by *Alnus incana* (Speckled alder), *Glyceria striata* (Fowl manna grass), *Galium asprellum* (Rough bedstraw), *Calystegia sepium* (Bindweed), New York aster (*Symphyotrichum novi-belgii*), and *Onoclea sensibilis* (Sensitive fern), with minor amounts of other species occurring. Plant communities near the mouth of the stream entering the marsh consisted of dominant species, *Carex paleacea*, and occasional other species (i.e. *Iris versicolor*, etc). In mid-marsh, further along the corridor, two dominant species were *Sporobolus michauxianus* and *Carex paleacea*, with minor occurrences of other species. Plant communities in the marsh, closest to the beach berm consisted of only five species—*Sporobolus michauxianus*, *Carex paleacea*, *Agrostis stolonifera*, *Anthoxanthum nitens* (formerly *Hierochloe odorata*, sweet grass), and *Symphyotrichum novi-belgii*. The site has shown recovery to pre-construction conditions and no further monitoring is recommended.

INTRODUCTION

FORCE operates an experimental test site for tidal turbines in the Minas Passage of the Bay of Fundy. As part of the development, in October 2014, FORCE installed four, 14.3 cm diameter submarine cables from proposed turbine test locations offshore in the Minas Passage. In late September 2014, prior to installation of the offshore cables, underground cables were installed from shore connection vaults to an upland connection with the Nova Scotia power grid. The installation required trenching and burial of the cables in a coastal fresh marsh/saltmarsh complex and restoration of the marsh surface after project completion as a condition of the Wetland Alteration Approval for the project under the *Nova Scotia*

Environment Act. A monitoring program was developed which included baseline pre-trenching (August 2014) and post-construction vegetation and photographic sampling surveys for two years after installation of the cables (August 2015 and 2016), as well as one final survey after five years post-trenching (i.e. 2019).

Disturbance of two types was expected for the sites: 1) disturbance by trenching and replacement of substrate; and 2) disturbance from protective coverings of the marsh surface, including swamp mats and geotextile sheets, which were used for supporting trenching equipment and for temporary placement of soil during the trenching operations. The cable route had already been partially disturbed by a pass of an 8-ton excavator and three test pits dug in the marsh for trenching on August 8, 2012, discussed in an earlier botany survey report (dated September 28, 2012). The final monitoring survey, five years' post-trenching, was conducted in August 2019 and results of the survey are presented in this report.

METHODS

The survey team consisting of botanist Ruth Newell (M.Sc.) and environmental professional Heather Levy (B.Sc. (Hons.)); EnviroSphere Consultants Limited), visited the site on August 20, 2019. Plant communities were assessed using a 1 m² sampling quadrat at locations used in the earlier surveys, and which were initially selected to represent wetlands to be crossed by trenches for the cables, and adjacent reference areas not expected to be impacted (Figure 1).

Sites were chosen to include:

1. the alder swamp on the north edge of the wetland complex¹;
2. the fresh marsh and associated community on an outwash gravel deposit near the margin of the fresh marsh/salt marsh at the site; and,
3. an area in the marsh located mid-way between the upland and beach area;
4. the marsh area near the beach berm (Figure 1).

Plant communities located approximately 10 m east and west of the proposed cable alignment served as reference sites, which would not be disturbed directly by the cable laying activities. At each site, all species in the 1 m² sample area were identified, and the dominant species determined by estimating percent cover, which is a common measurement of dominance in plant communities. Percentage cover of exposed surface soil (not occupied by plants) was also documented where it occurred. Photographs were taken at each of the sites to document the communities and GPS coordinates were taken of each of the sites using a hand-held GPS (Garmin GPS Map, 78s). Plant communities over large areas were homogeneous as assessed by eye and the single quadrat sampled was judged to be both representative, and adequate to show the characteristics of plant communities in the vicinity, as well as providing sufficient information to meet regulatory requirements.

Sampling locations for the 2019 monitoring survey were the same as in previous surveys (2014 baseline, 2015 1st year and 2016 2nd year, post-trenching surveys). In total 12-survey plots were assessed including those in which sampling occurred on the mid-line of the cable trench, as well as those along the cable margins as noted (Figure 1).

¹ The overstorey of mature alders were removed from the cable corridor in 2014, and was expected to recover after site restoration. Alders continue to be present as intermediate shrubs but a canopy of tall, mature alders has not re-established in the five years since trenching.

RESULTS AND DISCUSSION

General Observations

Observations of plant communities and relative importance are presented in Table 1 and sites are shown in Photos 1-12. As noted in previous years (2014-2016), plant communities were homogeneous and extensive, and the choice of a relatively small number of sites and single quadrats (versus replicated quadrats) for the community assessment provided a fair representation of communities over a broader area. Wetland vegetation at the site is strongly influenced by freshwater inflows from a stream, which enters from a ravine situated to the northeast (Figure 1). The proximity of the upland slope to the ravine contributes to conditions at the base of the slope, which favours the occurrence of wetland vegetation. The wetland vegetation is also strongly influenced by groundwater. At the mouth of the stream an outwash delta has formed, which consists of coarser sediments than the adjoining marsh and swamp areas. The freshwater influence in the part of the marsh through which the cable was installed is marked by the co-dominance of sedge *Carex paleacea* and cord grass *Sporobolus michauxianus* (formerly named *Spartina pectinata*), which commonly occurs in the inner extent of salt marshes where there is freshwater influence. Cord grass species typically associated with salt marshes (e.g. *Spartina patens* and *Spartina alterniflora*) occur on the outer marsh to the west of the cable route.

No rare or endangered plant species were found, consistent with results of earlier botanical assessments and wetland evaluations for the project. Sweet Grass, *Anthoxanthum nitens* (formerly named *Hierochloa odorata*), a species with ceremonial importance for the Mi'kmaq, was present this year (e.g. Site W4-W, and along the edge of the marsh, close to the beach berm) in low abundance, <1% cover. The species has occurred in all other surveys at the FORCE site.

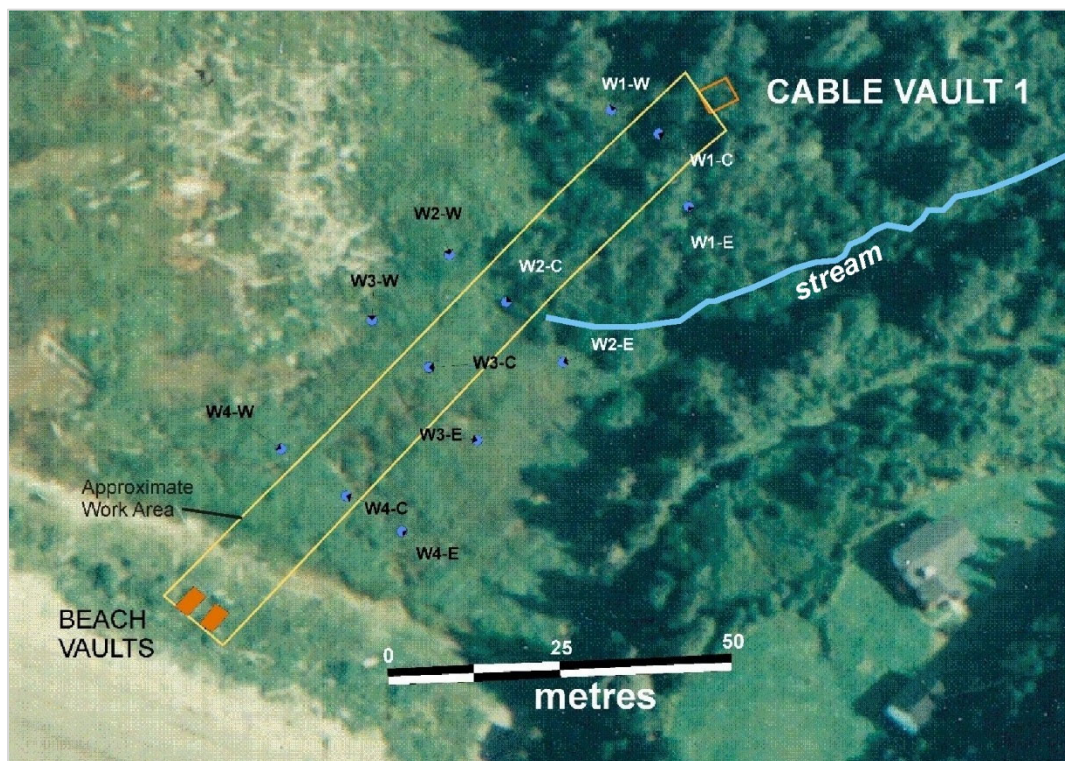


Figure 1. Sampling locations for long-term monitoring of plant communities at the FORCE Shore Facility, August 2019.

Community Descriptions

Overall, the cable alignment route is well vegetated and there are negligible un-vegetated areas. Plant communities along the cable alignment show a significant freshwater influence and are dominated by freshwater associated species with the sedge *Carex paleacea* and cord grass *Sporobolus michauxianus* together making up nearly 100% of the area, with occasional other species present. In particular, the alder swamp area near the upland, which was cut in preparation for cable installation, is dominated by *Alnus incana* (Speckled alder)², *Glyceria striata* (Fowl manna grass), *Galium asprellum* (Rough bedstraw), *Calystegia sepium* (Bindweed), *Symphyotrichum novi-belgii* (New York Aster), *Onoclea sensibilis* (Sensitive fern) with minor amounts of other species³. Plant communities near the mouth of the stream, which discharges into the marsh (W2—E, C and W), consisted of dominant species *Carex paleacea* and *Sporobolus michauxianus* with occasional other species present (i.e. *Galium* spp. (Bedstraw), *Glyceria* spp. (grasses), *Calamagrostis canadensis* (Bluejoint grass), *Agrostis* spp. (Bentgrass), *Iris versicolor* (Blue flag), *Carex lurida* (Sallow sedge), *Impatiens capensis* (Touch me not), *Persicaria sagittata* (Tear Thumb), *Symphyotrichum novi-belgii* (New York Aster), and *Calystegia sepium* (Bindweed)). Mid-marsh (W3—E, C and W), further towards the shore, two dominant species were *Sporobolus michauxianus* and *Carex paleacea*, with other species such as *Impatiens capensis* (Touch-me-not), *Agrostis* spp (Bentgrass), and *Symphyotrichum novi-belgii* (New York Aster) occurring. Plant communities in the marsh closest to the beach berm consisted of only five species—*Sporobolus michauxianus*, *Carex paleacea*, *Agrostis stolonifera*, *Anthoxanthum nitens*, and *Symphyotrichum novi-belgii*.

Comparison Between Sites

Similarity in 2019

In the similarity groupings in Figure 2, the centre sites (i.e. the most disturbed) showed relatively close similarity to reference sites (i.e. east and west) at the locations, suggesting that there has been recovery from trenching activity⁴. For example, groups 2 and 3 (G2 and G3, Figure 2), which include centre 'C' sites as well as east and west sites ('E' and 'W') and have a similarity of >40%. The least similar group of a 'C' site was in Group 1 (G1) at Site W1C, which was nearest to the upland.

Similarity in 2012, 2014, 2015, 2016 & 2019

The cluster analysis showed that the communities, overall, were similar over survey years and that they were similar before and after trenching (i.e. they had recovered) (Figure 3). Mid-marsh sites differed slightly from those clustered in other groups, as these middle marsh sites were affected by the outflow of the stream, whereas the areas closer to the upland area and further out in the marsh were not.

In particular, reference sites in mid-marsh and near the beach berm, were most similar in terms of percent cover and species composition (i.e. W2W (2012, 2014-2016 and 2019), W4W (2012), W3W (2019) and W4E (2012, 2014-2016 and 2019). Plants at these sites, located along western edge of the corridor (all years, in 2012 and this year, respectively) and along the eastern edge of the corridor (W4E), were 'clustered' in Group 1 (G1) and had the greatest similarity (>50%) overall (Figures 2 and 3). The sites in this closely similar group were characterized by a freshwater marsh species community, which was

² The dominant overstorey of alder which was present pre-construction, has been slow to recover in the trenched areas although alder saplings are present and are likely to reestablish in the future.

³ The upland area was modified in the spring of 2014 as alders at the base of the upland on the northern edge of the marsh along the cable route were cut in preparation for trenching work.

⁴ A cluster analysis, based on Bray-Curtis similarity on percent cover was used to assess similarity. Percent cover was transformed prior to analysis to a numerical value, using Van de Maarl's cover scale (Jager and Looman 1995).

dominated by cord grass (*Sporobolus michauxianus*). Although other species were present, they occurred in minor amounts.

Two other main groups (G2 and G4), which represented reference and centre sites showed similarity of plant communities (45-50%). Group 2 (G2), contained sites W3E and W4C (years 2012, 2014-2016 and 2019), W3C and W3W (years 2012 and 2014-2016), and W4W (2014-2016 and 2019), all of which are mainly located in the inner extent of the marsh along the cable route and along the eastern and western boundaries. Plant communities at these sites included *Carex paleacea*, *Sporobolus michauxianus*, and *Agrostis stolonifera*, as well as other occasional species. Group 4 (G4) contained Site W1C (years 2014-2016 and 2019), located along the cable route alignment, and an outlier site (W1W, 2012) along the western edge of the cable route, both near the upland. Species composition at these sites included a mix of *Glyceria* spp., *Ranunculus repens*, *Symphyotrichum novi-belgii* and *Onoclea sensibilis*, as well as minor numbers of other species such as *Polygonum sagittatum* and *Galium* spp.

The least similar groups overall, in terms of plant species composition, were Groups 3 and 5 (G3 and G5, with a similarity of 30-40%) (Figure 3). Group 3, includes a reference site located in the middle of the marsh to the east of the stream outflow (W2E—2014-2016 and 2019) and a centre site near the stream outflow (W2C—2012, 2014-2016 and 2019), as well as another centre site; Site W3C—2019, which is an outlier (Figure 3). Dominant species to the east consisted of *Carex paleacea*, *Galium palustre*, and *Glyceria* spp. At sites near the stream outflow, *Carex paleacea*, *Glyceria grandis*, and *Galium paulstre* occurred. Group 5 includes sites at the base of the upland in years 2014-2016 and 2019, to the east and west of the cable route (reference sites W1E and W1W). The dominant species *Alnus incana* occurred at these sites, as well as a mix of other species including *Calystegia sepium*, *Chelone glabra*, *Doellingeria umbellatus*, *Gallium* spp., *Glyceria* spp., *Juncus effusus*, *Polygonum sagittatum*, *Solidago rugosa*, and *Symphyotrichum novi-belgii* (Figure 3).

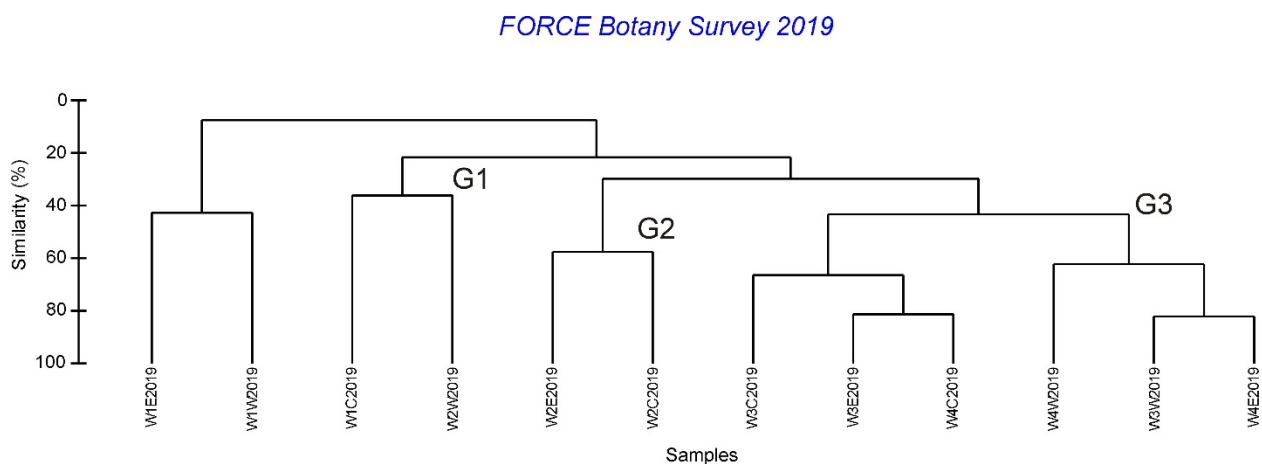


Figure 2. Clustering of plant species locations observed during the 2019 botany survey, FORCE Visitor Centre, Black Rock, NS. Percent cover was measured between sites using Bray-Curtis Similarity index and based on van der Maarel's scale (Jager and Looman, 1995).

FORCE Botany Surveys 2012, 2014-2016, 2019

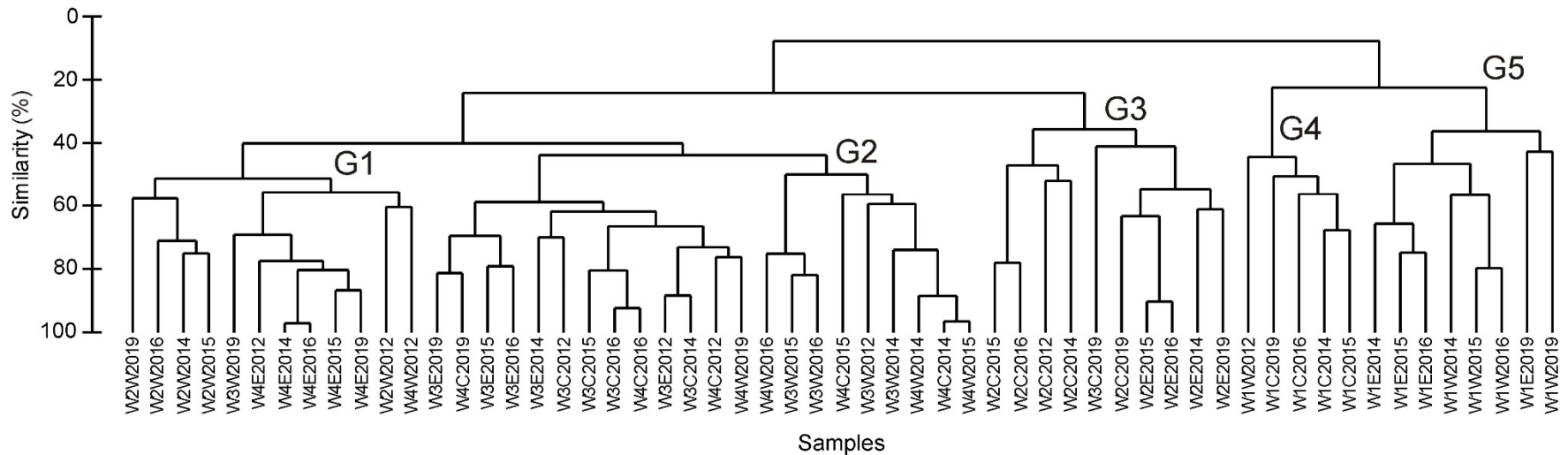


Figure 3. Clustering of plant species locations observed during 2012, 2014-2016 and 2019 botany surveys, FORCE Visitor Centre, Black Rock, NS, based on similarity using Bray-Curtis Similarity index and percent cover measured on van der Maarel's scale (Jager and Looman, 1995).

CONCLUSIONS

The survey determined dominant species, reinforced the importance of freshwater influence on plant communities in the vicinity of the cable alignment, and showed that the wetland, post-trenching, is well vegetated and has recovered from trenching operations. The final year (post-trenching) sampling of plant communities as part of the environmental monitoring program for cable installation at the FORCE Minas Passage site has provided a profile of plant communities at the site, which is a reasonable basis for assessing extent of impact and recovery from disturbance caused by project activities.

REFERENCES

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TABLES

Table 1. Plant observations and percent (%) cover across the wetland (marsh and shrub swamp), along the cable route, FORCE Shore Facility, August 20, 2019.

Site Location	Coordinates: UTM Zone 20, Easting, Northing	Description	Plant Community	Comments
W1E	390121, 5025110	Modified alder swamp between upland and marsh ¹ .	<u>Dominant Species:</u> <i>Alnus incana</i> (Speckled Alder) 95%. <u>Other Species:</u> <i>Glyceria striata</i> (Fowl Manna Grass) 15-20%; <i>Galium asprellum</i> (Rough Bedstraw) 15%, <i>Calystegia sepium</i> (Bindweed) 10%; <i>Chelone glabra</i> (White Turtlehead) 3%; <i>Rubus</i> sp (a blackberry) 3-4%; <i>Solidago rugosa</i> (Rough Goldenrod) 2%; <i>Doellingeria umbellatus</i> (Tall White Aster) 2%; and <i>Thalictrum pubescens</i> (Tall Meadow-rue) <1%. <u>Additional species occurring just outside of quadrat:</u> <i>Carex crinita</i> s.l. (Fringed Sedge); <i>Dryopteris intermedia</i> (Evergreen Wood Fern); <i>Glyceria canadensis</i> (Rattlesnake Manna Grass); <i>Glyceria melicaria</i> (Slender Manna Grass); and <i>Symphotrichum novi-belgii</i> (New York Aster). Photo 1.	Dominant species in 2016 included: <i>Glyceria canadensis</i> (present outside the quadrat this year) and <i>Polygonum sagittatum</i> .
W1C	390114, 5025117	Modified alder swamp between upland and marsh.	<u>Dominant Species:</u> <i>Symphotrichum novi-belgii</i> (New York Aster) 45%; <i>Glyceria striata</i> (Fowl Manna Grass) 30%; and <i>Onoclea sensibilis</i> (Sensitive Fern) 30%. <u>Other Species:</u> <i>Impatiens capensis</i> (Touch-me-not) 5%; <i>Equisetum arvense</i> (Field Horsetail) 2%; <i>Glyceria melicaria</i> (Slender Manna Grass) 1%; <i>Ranunculus repens</i> (Creeping Buttercup) 1%; <i>Carex lurida</i> (Sallow Sedge) <1%; <i>Galium</i> sp. (a bedstraw) <1%; <i>Myosotis</i> sp. (a forget-me-not) <1%; and <i>Persicaria sagittata</i> (Arrow-leaved Tearthumb) <1%. Photo 2.	Dominant species in 2016 included: <i>Glyceria melicaria</i> , which was in low abundance this year.
W1W ²	390110, 5025127	Modified alder swamp between upland and marsh.	<u>Dominant Species:</u> <i>Alnus incana</i> (Speckled Alder) 75%; and <i>Chelone glabra</i> (Turtlehead) 50%. <u>Other Species:</u> <i>Sparganium eurycarpum</i> (Great Bur-reed) 10%; <i>Juncus effusus</i> s.l. (Soft Rush) 5-10%; <i>Glyceria striata</i> (Fowl Manna Grass) 5%; <i>Impatiens capensis</i> (Spotted Touch-me-not) 5%; <i>Rosa virginiana</i> (Virginia Rose) 5%; <i>Typha latifolia</i> (Broad-leaved Cattail) 5%; <i>Doellingeria umbellata</i> (Tall White Aster) 2-3%; <i>Persicaria sagittata</i> (Arrow-leaved Tearthumb) <1%; and <i>Agrostis capillaris</i> (Colonial Bentgrass) <1%. Photo 3.	Dominant species in 2016 included: <i>Glyceria canadensis</i> and <i>Juncus effusus</i> , which were not present this year.
W2E	390099, 5025090	Marsh	<u>Dominant Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) 90%. <u>Other Species:</u> <i>Galium palustre</i> (Marsh Bedstraw) 5%; <i>Glyceria striata</i> (Fowl manna Grass) 5%; <i>Glyceria melicaria</i> (Slender Manna Grass) 2-3%; <i>Calamagrostis canadensis</i> (Bluejoint) 2%; <i>Agrostis capillaris</i> (Colonial Bentgrass) <1%; and <i>Glyceria canadensis</i> (Rattlesnake Manna Grass) <1%. Photo 4.	Dominant species in 2016 was the same as this year, <i>Carex paleacea</i> .
W2C ³	390095, 5025099	Marsh	<u>Dominant Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) 85%. <u>Other Species:</u> <i>Iris versicolor</i> (Blue Flag) 25%; <i>Calamagrostis canadensis</i> (Bluejoint) 5%; <i>Galium palustre</i> (Marsh Bedstraw) 3%; <i>Agrostis stolonifera</i> (Creeping Bentgrass) <1%; <i>Carex lurida</i> (Sallow Sedge) <1%; <i>Glyceria melicaria</i> (Slender Manna Grass) <1%; <i>Glyceria striata</i> (Fowl Manna Grass) <1%; <i>Impatiens capensis</i> (Touch-me-not) <1%; <i>Persicaria sagittata</i> (Tear Thumb) <1%; <i>Sporobolus michauxianus</i> (Cord Grass) <1%; and <i>Symphotrichum novi-belgii</i> (New York Aster) <1%. <u>Additional species occurring just outside of quadrat:</u> <i>Scirpus microcarpus</i> (Barber-pole Bulrush). Photo 5.	In 2016, substrate material deposited from a stream was observed at the site. This year, no substrate material was observed and the dominant plant species differed.

FINAL YEAR OF ENVIRONMENTAL MONITORING OF PLANT COMMUNITIES—SHORE FACILITIES
FUNDY TIDAL ENERGY DEMONSTRATION SITE, OCTOBER 2019

Site Location	Coordinates: UTM Zone 20, Easting, Northing	Description	Plant Community	Comments
W2W ⁴	390088, 5025106	Marsh	<u>Dominant Species:</u> <i>Sporobolus michauxianus</i> (Cord Grass) 100%. <u>Other Species:</u> <i>Scirpus microcarpus</i> (Barber-pole Bulrush) 10%; <i>Calystegia sepium</i> (Bindweed) 5-10%; <i>Persicaria sagittata</i> (Arrow-leaved Tearthumb) <1%; <i>Impatiens capensis</i> (Touch-me-not) <1%; <i>Galium</i> sp. (a bedstraw) <1%; and <i>Symphotrichum novi-belgii</i> (New York Aster) <1%. <u>Additional species occurring just outside of quadrat:</u> <i>Poa palustris</i> (Fowl Blue Grass). Photo 6.	Dominant species in 2016 was the same as this year.
W3E ⁵	390090, 5025078	Marsh	<u>Dominant Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) 95%. <u>Other Species:</u> <i>Impatiens capensis</i> (Spotted Touch-me-not) <1% and <i>Sporobolus michauxianus</i> (Cord Grass) <1%. Photo 7.	Dominant species in 2016 was the same as this year.
W3C ⁶	390083, 5025085	Marsh	<u>Dominant Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) 100%. <u>Other Species:</u> <i>Impatiens capensis</i> (Spotted Touch-me-not) <1% and <i>Agrostis</i> spp. (bentgrasses) <1%. <u>Additional species occurring just outside of quadrat:</u> <i>Sporobolus michauxianus</i> (Cord Grass) and <i>Typha latifolia</i> (Broad-leaved Cattail). Photo 8.	Dominant species in 2016 included: <i>Agrostis</i> spp., which were present in low abundance this year.
W3W	390079, 5025094	Marsh	<u>Dominant Species:</u> <i>Sporobolus michauxianus</i> (Cord Grass) 60%. <u>Other Species:</u> <i>Symphotrichum novi-belgii</i> (New York Aster) 25%; <i>Carex paleacea</i> (Chaffy Sedge) <1%; and <i>Agrostis</i> sp. (a bentgrass) <1%. Photo 9.	Dominant species in 2016 was the same as this year.
W4E	390078, 5025065	Seaward part of marsh.	<u>Dominant Species:</u> <i>Sporobolus michauxianus</i> (Cord Grass) 90%. <u>Other Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) <1% and <i>Symphotrichum novi-belgii</i> (New York Aster) <1%. Photo 10.	Dominant species in 2016 was the same as this year.
W4C	390069, 5025072	Seaward part of marsh.	<u>Dominant Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) 80%. <u>Other Species:</u> <i>Sporobolus michauxianus</i> (Cord Grass) 20% Photo 11.	Dominant species in 2016 was <i>Agrostis</i> spp., which was not noted this year.
W4W	390060, 5025077	Seaward part of marsh.	<u>Dominant Species:</u> <i>Sporobolus michauxianus</i> (Cord Grass) 100% <u>Other Species:</u> <i>Carex paleacea</i> (Chaffy Sedge) <1%; <i>Anthoxanthum nitens</i> (Sweet Grass) <1%; and <i>Agrostis stolonifera</i> (Creeping Bentgrass) <1%. Photo 12.	Dominant species in 2016 was the same as this year.
1. Alder swamp between upland and marsh. Mature alders were cut in the spring of 2014, opening up the understorey which has become dominated by other species. Alders continue to be present as intermediate shrubs. 2. Similar area as 2012 sampling location W1. 3. Similar area as 2012 sampling location W2-1. 4. Similar area as 2012 sampling location W2-2. 5. Similar area as 2012 sampling location W3-1. 6. Similar area as 2012 sampling location W3-3.				

PHOTOS



Photo 1. W1-E, alder swamp dominated by *Alnus incana* (Speckled Alder), August 20, 2019.



Photo 2. W1-C, middle of cable alignment. Dominated by *Symphyotrichum novi-belgii* (New York Aster), *Glyceria striata* (Fowl Manna Grass), and *Onoclea sensibilis* (Sensitive Fern), August 20, 2019.



Photo 3. W1-W, west of cable alignment. Dominated by *Alnus incana* (Speckled Alder) and *Chelone glabra* (Turtlehead), August 20, 2019.



Photo 4. W2-E. Dominated by *Carex paleacea* (Chaffy Sedge), August 20, 2019.



Photo 5. W2-C. Dominated by *Carex paleacea* (Chaffy Sedge), August 20, 2019.



Photo 6. W2-W. Dominated by *Sporobolus michauxianus* (Cord Grass), August 20, 2019.



Photo 7. W3-E. Dominated by *Carex paleacea* (Chaffy Sedge), August 20, 2019.



Photo 8. W3-C. Dominated by *Carex paleacea* (Chaffy Sedge), August 20, 2019.



Photo 9. W3-W. Dominated by *Sporobolus michauxianus* (Cord Grass), August 20, 2019.



Photo 10. W4-E. Dominated by *Sporobolus michauxianus* (Cord Grass), August 20, 2019.



Photo 11. W4-C. Dominated by *Carex paleacea* (Chaffy Sedge), August 20, 2019.



Photo 12. W4-W. Dominated by *Sporobolus michauxianus* (Cord Grass), August 20, 2019.