Characterisation of the sublittoral habitats of the Brier Island/Digby Neck Ecologically and Biologically Significant Area, Nova Scotia, Canada

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by

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ABSTRACT

Cooper, J.A., Goodwin, C., Lawton, P., Brydges, T., Hiltz, C., Armsworthy, S., and McCurdy, Q. 2019. Characterisation of the sublittoral habitats of the Brier Island/Digby Neck Ecologically and Biologically Significant Area, Nova Scotia, Canada. Can. Tech. Rep. Fish. Aquat. Sci. 3327: xv + 163 p.

The Brier Island/Digby Neck area has been identified as an Ecologically and Biologically Significant Area (EBSA) by Fisheries and Oceans Canada and is one of four marine areas within the Bay of Fundy recognised by Parks Canada as of national significance for marine conservation planning. The area is representative of important outer Bay of Fundy features with significant marine mammal, bird, and benthic diversity including potentially important aggregations of sensitive benthic species such as horse mussel and sponge. Much of the information used for this recognition is now over 40 years old and should be re-validated using standardised georeferenced survey methods. As a first phase, a diver-based survey of the sublittoral habitats and associated species was conducted in August and September of 2017 for the Brier Island area. This report summarises the major sublittoral habitat types, species assemblages, and oceanographic conditions observed at 20 locations including Northwest and Southwest Ledges, Gull Rock, Peter's Island, and Grand Passage. A total of 962 records were made of 178 taxa, consisting of 43 algae and 135 animals. Comparison with historical records largely confirmed the continued presence of unique habitats and species assemblages for which this area was initially recognised as an EBSA. Differences in species richness observed for cryptic and less known taxonomic groups such as sponges and bryozoans were attributable to changes in survey methods and knowledge. Based on

these findings, additional surveys of inshore and offshore Brier Island using more quantitative methods developed for other Bay of Fundy EBSAs would further support regional MPA network planning and provide relative scales of species diversity and habitat coverage for this area.

RÉSUMÉ

Cooper, J.A., Goodwin, C., Lawton, P., Brydges, T., Hiltz, C., Armsworthy, S., and McCurdy, Q. 2019. Characterisation of the sublittoral habitats of the Brier Island/Digby Neck Ecologically and Biologically Significant Area, Nova Scotia, Canada. Can. Tech. Rep. Fish. Aquat. Sci. 3327: xv + 163 p.

La région de l'île Brier et de la péninsule Digby a été désignée zone d'importance écologique et biologique (ZIEB) par Pêches et Océans Canada et est l'une des quatre zones marines de la baie de Fundy reconnues d'importance nationale par Parcs Canada pour la planification de la conservation marine. Elle est représentative des caractéristiques importantes de l'extérieur de la baie de Fundy, avec une grande diversité de mammifères marins, d'oiseaux et d'espèces benthiques, y compris des regroupements parfois importants d'espèces benthiques sensibles comme les modioles et les éponges. Une grande partie de l'information utilisée pour cette reconnaissance date maintenant de plus de 40 ans et il conviendrait de la valider à nouveau à l'aide de méthodes de relevés géoréférencés normalisés. Dans un premier temps, un relevé des habitats sublittoraux et des espèces associées a été effectué par des plongeurs en août et septembre 2017 dans la région de l'île Brier. Le présent rapport résume les principaux types d'habitats sublittoraux, les communautés d'espèces et les conditions océanographiques observés à 20 endroits, notamment Northwest Ledge et Southwest Ledge, Gull Rock, l'île Peters et Grand Passage. Au total, 962 enregistrements ont été effectués sur 178 taxons, dont 43 algues et 135 animaux. La comparaison avec les données historiques a largement confirmé la présence continue des habitats et communautés d'espèces uniques pour lesquels cette zone a

d’abord été reconnue comme une ZIEB. Les différences dans la richesse en espèces observée pour des groupes taxonomiques cryptiques et moins connus comme les éponges et les bryozoaires étaient attribuables à des changements dans les méthodes de relevés et les connaissances. Grâce à ces résultats, des relevés supplémentaires des zones côtières et extracôtières de l’île Brier, menés à l’aide de méthodes plus quantitatives élaborées pour d’autres ZIEB de la baie de Fundy, seraient utiles pour la planification du réseau régional d’AMP et fourniraient des échelles relatives de la diversité des espèces et de la couverture des habitats pour ce secteur.

PREFACE

This report updates some of the historical information for Brier Island that was collected over 40 years ago. Although much of this information was well documented, the extended time period between surveys and lack of first-hand local knowledge challenged the current investigators to develop a methodology that could be feasibly implemented in a remote and somewhat difficult location for diving-based investigations. Despite these complications, we considered this initial survey a success and gained an appreciation for the efforts required to collect the historical information. The revised information within this report can be used to support marine conservation planning within the Bay of Fundy and the methods used could be further developed to support baseline assessments for coastal zone management of sensitive benthic areas, sensitive species, and aquatic invasive species.

INTRODUCTION

Brier Island and Digby Neck has been recognised as an Ecologically and Biologically Significant Area (EBSA) by Fisheries and Oceans Canada (Buzeta 2014). It was also one of four marine areas within the Bay of Fundy recognised by Parks Canada as of national significance for marine conservation planning (PC/TNB 1985). The area was recommended by academics as a potential Marine Protected Area (MPA) because it is representative of important outer Bay of Fundy features, has significant marine mammal and bird diversity and is considered to have relatively high benthic diversity (Buzeta 2014). However, most of what is documented on the benthic marine life in this area is limited to one survey conducted over four decades ago (MacKay 1977).

Fisheries and Oceans Canada (DFO), Maritimes Region, is leading the development of a MPA network plan for the Scotian Shelf Bioregion, which roughly corresponds to the DFO Maritimes Region boundary (DFO 2018). For the coastal component of the bioregion, MPA network Conservation Priorities have been identified using both “coarse-filter” features (based on two regional physical environment-driven coastal classification systems), and “fine-filter” features based on biological or ecological features described for previously identified coastal EBSAs. Brier Island and Digby Neck is located at the transition zone between two of nine coastal eco-units and, in terms of fine-filter features, it could contribute to mutiple Conservation Priorities, including: highly natural ecosystems, areas of high productivity, areas of high biodiversity, complex or unique geomorphology, and persistent unique or rare oceanographic characteristics (DFO 2018).

The area offshore of Brier Island has recently been identified (from historical surveys and current species distribution modelling) as having one of the most significant concentrations

of sponges in the Maritimes Region (Kenchington et al. 2016) and due to the tidal and topographic conditions the sponges inshore are also likely to be rich. However, this modelling effort has not been validated by recent empirical observation. Many of the sponges records from the trawl surveys used for the predicted density analyses are not identified to species level and only four species are reported from the inshore baseline transect survey (MacKay 1977). As very little is known about sponges of the Bay of Fundy, species cannot currently be reliably identified visually; therefore much of the biodiversity information about this important functional group is lost. The efficacy of these models in near-shore and tidal environments should be validated through direct observation and careful species identification.

LOCATION

Brier Island is situated at the south-west tip of Nova Scotia (Figure 1). It is the outermost of two islands (Long Island being the other) at the end of the Digby Neck peninsula. The island is around 7.1 km long and 2.7 km wide. Sublittoral ledges extend directly from the island out to the south-west, terminating in Gull Rock. To the north-west is another series of sublittoral ledges, separated from the island by a slightly deeper channel area. The northern sides of these ledges drop precipitously to the base of the Grand Manan Channel. The peninsula and islands are a marine extension of a north mountain basalt range bounding Annapolis Valley. Brier Island has steep basalt cliffs, around 30 m in height on its south shore.

HISTORICAL OCEANOGRAPHIC AND CLIMATIC CONDITIONS

The coastal physiography around the island results in waters being swept up over the shoals to the north and south and through Grand Passage (MacKay 1977). Currents around Brier Island are strong and reach speeds of 5 to 6 knots in Grand Passage. Highly saline

marine water flows into the Bay of Fundy along the Nova Scotian shore carrying abundant zooplankton (Mills and Laviolette 2011). Tidal mixing and strong currents results in adjacent water masses being virtually isothermal from top to bottom (Gran and Braarud 1935, Hachey and Bailey 1952, Greenberg 1984, Brown and Gaskin 1986). Sea temperatures near Brier Island vary little annually and often did not exceed 7°C (Bailey 1954, Petrie et al. 1996). As reported in MacKay (1977), over 40 years agos the area had the highest mean air temperature in January (about -2°C) anywhere in the Maritime Provinces, the smallest mean annual temperature range (about 16°C), smallest mean daily temperature range (≤ 8°C) except for parts of Prince Edward Island, the mildest extreme low temperature (about -14°C), and the longest frost-free period (more than 160 days). Recent climate data, over the last 30 years, indicates Brier Island still has the highest local mean temperature in January (1°C), a mean annual temperature range of 23°C, a mean daily temperature range (< 8°C) and remains one of the most moderate climates in this region, compared to Grand Manan, Saint John, Digby, and Yarmouth (Govt of Canada online data resource http://climate.weather.gc.ca/historical_data/search_historic_data_e.html). The moderate climate and large (5 to 6 m) tidal range results in organisms only found subtidally in other areas of the Bay of Fundy being found intertidally (Mills and Laviolette 2011). The area was also noted for very clear water conditions with underwater visibility regularly exceeding 10 m (MacKay 1977). Consequently algae were abundant down to 20 m or more.

SUBLITTORAL HABITATS

MacKay (1977) recorded the following main sublittoral habitat areas:

1) Northwest ledge. Extensive ledge system lying to the north of Brier Island, much of which has a depth of < 3m below chart datum (BCD). Dominated by kelp, other algae and

associated invertebrate species.

2) Northern entrance to Grand Passage. Bedrock and boulder with some scoured sand and cobble patches on the sea bed. Dominated by kelps and other algae.

3) Westport Shore. Gently sloping mixed substrate shore. Some areas of eelgrass.

4) The Southeast coast. Steep bedrock with abundant large kelp and diverse invertebrate communities on holdfasts.

5) Southwest ledge. Previously not surveyed due to weather conditions but expected to be similar to Northwest ledge.

PRIOR KNOWLEDGE OF BENTHIC SPECIES OCCURRENCE

Limited benthic survey work has been carried out in the area. A baseline SCUBA survey was conducted by MacKay (1977). As the methodology employed by MacKay (1977) recorded only conspicuous species encountered during underwater transects, with no sample collection to later confirm identifications, the number of species is likely to have been significantly under-recorded. The biodiversity of groups that are hard to identify *in situ,* such as Bryozoa (no named species listed) and Porifera (only four named species recorded), is likely to have been particularly under-estimated.

Some prior algal survey work has been conducted in the area: Edelstein et al. (1970) recorded 187 species from the adjacent Digby Neck Peninsula, although only a single trip was made to Brier Island. A summary was also provided in Wilson et al. (1979). Research on the algae of Brier Island has recently been carried out by Professor David Garbary (St Francis Xavier University) who catalogued intertidal and subtidal species and collected algal samples (Garbary et al. 2018).

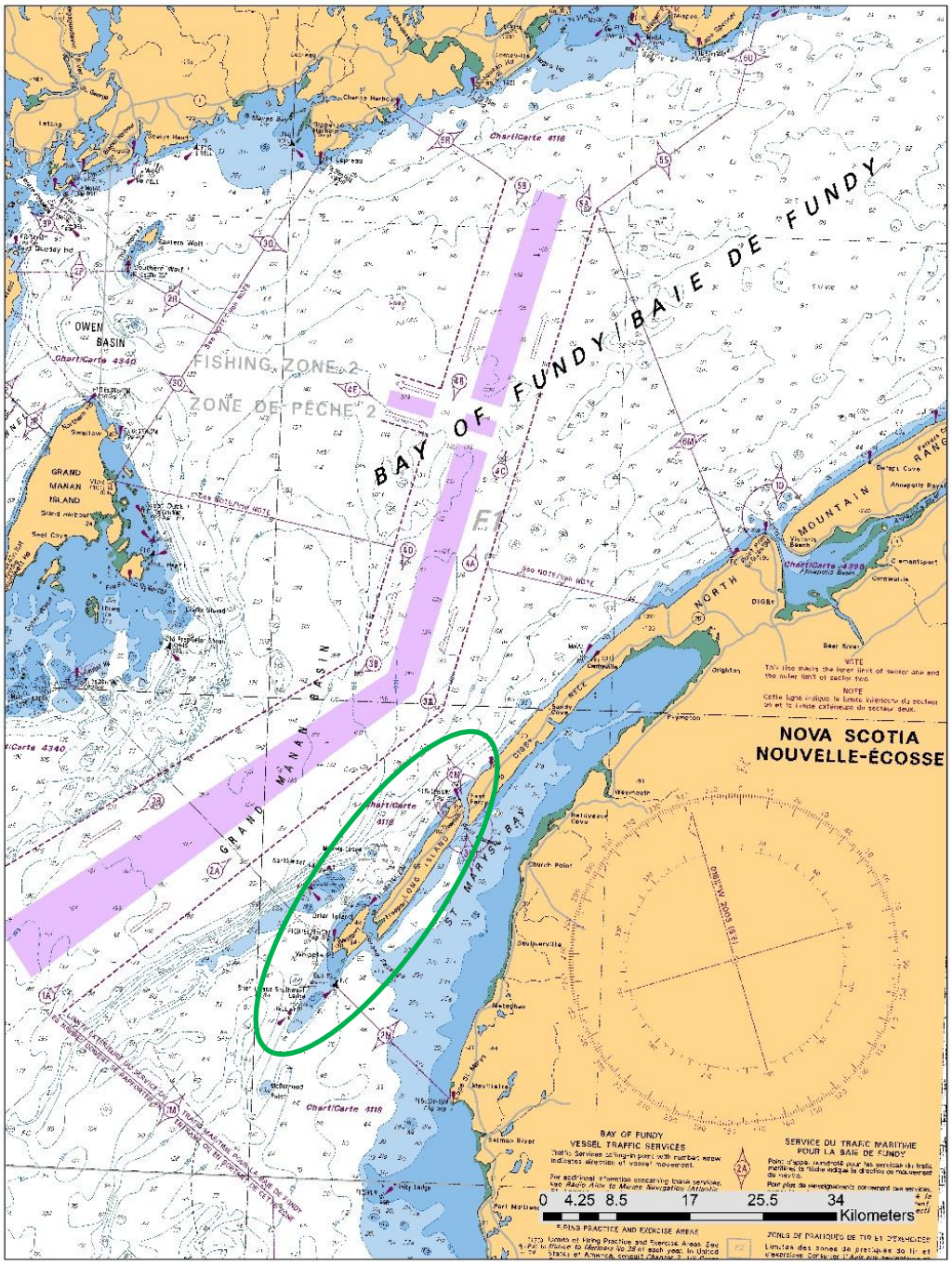

Figure 1 - Brier Island is located within the Bay of Fundy at the southwest end of Digby Neck, Nova Scotia. The area indicated within the green oval approximates the Brier Island/Digby Neck EBSA as circumscribed in Buzeta (2014). This present study focused on a portion of the EBSA surrounding Brier Island as well as both Southwest and Northwest ledges. Map reproduced with permission from the Canadian Hydrographic Service.

PROJECT OBJECTIVES

Three primary research objectives were developed with DFO Maritimes Oceans and Coastal Management Division on information that would be needed to facilitate consideration of conservation management options for this EBSA, and an assessment of currently available scientific knowledge on the benthic marine life.

1) Provide initial qualitative information on inshore habitats and species of Brier Island to validate available historical information and prior conclusions used for identifying this location as an EBSA. This would include presence of marine algal species with unique distribution within the Bay of Fundy as well as the various subtidal species found within intertidal habitats due to special environmental conditions.

2) Perform more detailed quantitative biodiversity surveys of inshore and offshore Brier Island using methodologies developed for other Bay of Fundy EBSA to support regional MPA network planning using comparative measures of species diversity and habitat coverage.

3) Report on sponge biodiversity of Brier Island and immediate offshore area as these were identified as potentially important aggregations of sensitive benthic species within the Scotian Shelf bioregion.

Initially proposed as a three year project, one year of funding under the Marine Conservation Target (MCT) program was used to conduct the 2017 diving survey, which fulfilled objective one and partially covered objective three. Completion of objectives two and three are discussed within next steps.

SURVEY METHODOLOGY

A SCUBA diver-based survey of sublittoral habitat and species occurrence was conducted in summer 2017 to validate and revise historical information on invertebrate and macroalgal species assemblages (Edelstein et al. 1970, MacKay 1977). Historical sampling sites were reviewed to develop a list of five priority areas to resurvey (Figure 2), based on featured species and habitats identified within the literature and through personal communication with current researchers familiar with this area. Within these areas we employed a baseline 'roving-diver technique' adapted from NOAA's Coral Reef Informaiton System (https://www.coris.noaa.gov/glossary) where divers are instructed to swim freely around the site to search and record every species they observe. This was conducted at 20 sites surrounding Brier Island and its nearby ledges. This survey collected semi-quantitative information on habitat and species presence (Appendix 1) at tide corrected depth (meters below chart depth = m BCD) using the Superabundant-Abundant-Common-Frequent-Occassional-Rare (SACFOR) abundance scale (Appendix 2). This scale and some of the substrate terminology adopted for the 2017 diving survey are based on the UK Marine Nature Conservation Review recording scheme (see http://jncc.defra.gov.uk/page-2683 and http://jncc.defra.gov.uk/pdf/mncrform.pdf). Substrate categories and algal cover definitions were also merged, where feasible, with habitat and species inventory protocols employed by DFO Aquatic Resources Research and Assessment Division in British Columbia (methods obtained from Domique Bureau, Pacific Biological Station, pers. comm.). Wide angle photography was used to document benthic habitat features at survey sites and macro photography was undertaken to document specific benthic species characteristics. Specimens of invertebrates and algae were collected on some dives, and preserved for

subsequent taxonomic verification. Water temperature (°C), salinity (PSU = practical salinity units), turbidity (NTU = nephelometric turbidity units), chlorophyll (RFU = relative fluorescence units), and sensor depth (m BSL = meters below sea level) were recorded at two minute intervals using a YSI 6920v2 multi-parameter water quality sonde attached to a diver. This sensor measured environmental conditions throughout each dive.

In addition to the dive profiles, surface to bottom vertical profiles of salinity, temperature, and depth were also recorded using a Sontek Castaway® CTD during the August and September sampling periods at 10 additional oceanographic stations (Figure 3) as per MacKay (1977).

DATA MANAGEMENT

Data and information generated through this project were managed under the data management policies for the Department of Fisheries and Oceans in a manner consistent with Treasury Board Secretariat Directive on Open Government (October 9th, 2014). This included metadata, archive of data and reports to support public discovery and accessibility, and the recognition of researchers and institutions involved.

Information recorded on site record forms (Appendix 1) was collated into a relational database of location, species, habitat characteristics, water parameters (temperature, salinity, turbidity, chlorophyll, depth) recorded at two minutes intervals, and record of photographic images. Photographs were catalogued using Adobe Lightroom. Algal samples were identified by David Garbary (Professor at St. Francis Xavier University) and invertebrates by staff from the Atlantic Reference Centre (Claire Goodwin, Rebecca Milne, and Crystal Hiltz). Voucher invertebrate specimens were placed in the Atlantic Reference Centre museum. Seaweed specimens were preserved, together with the collections from

Garbary et al. (2018), in herbaria at the E.C. Smith Herbarium (Acadia University), and St Francis Xavier University. The baseline information collected during this initial reassessment can be used to customise a quantitative survey method for the Brier Island area.

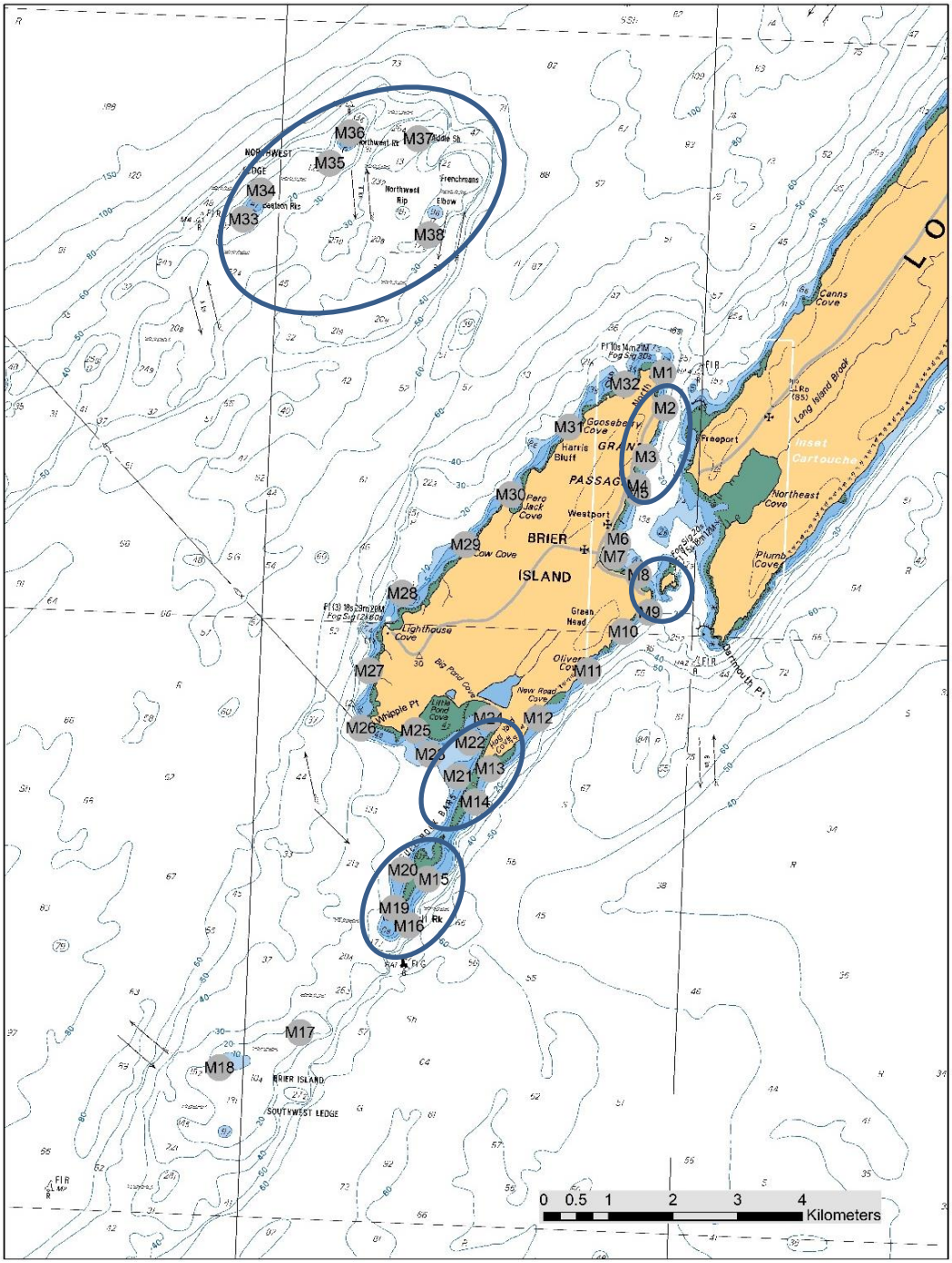

Figure 2 - Approximated locations in MacKay (1977) indicated as M# based on description and interpolation of published maps. Five areas circled were identified as priority locations for the current survey. Map reproduced with permission from the Canadian Hydrographic Service.

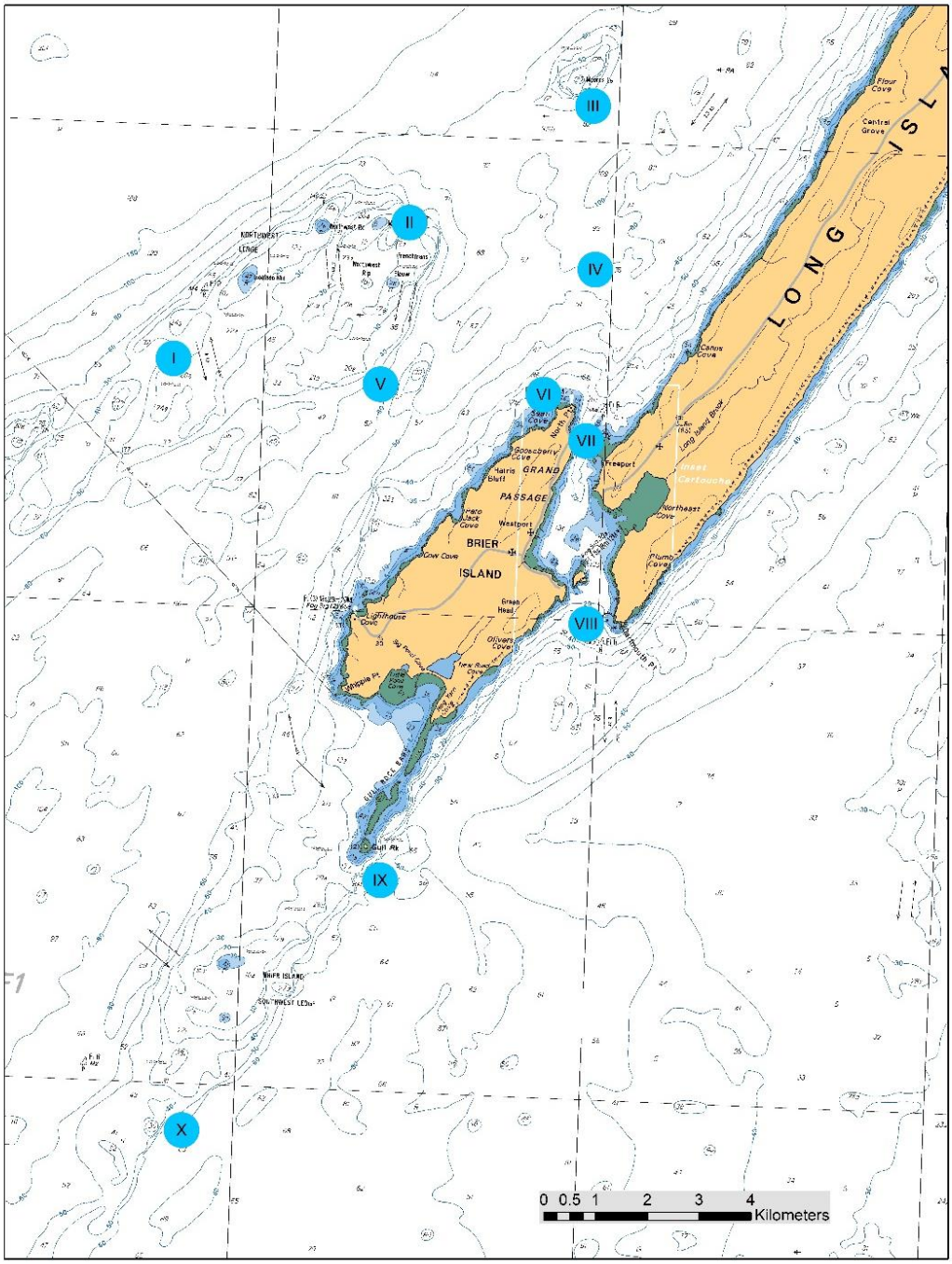

Figure 3 - Approximated oceanographic CTD stations interpolated from map and CTD depth profile in MacKay (1977). These locations were re-sampled during ebb and flood tidal periods for August and September 2017. Station coordinates and summary data are listed in Appendix 3. Map reproduced with permission from the Canadian Hydrographic Service.

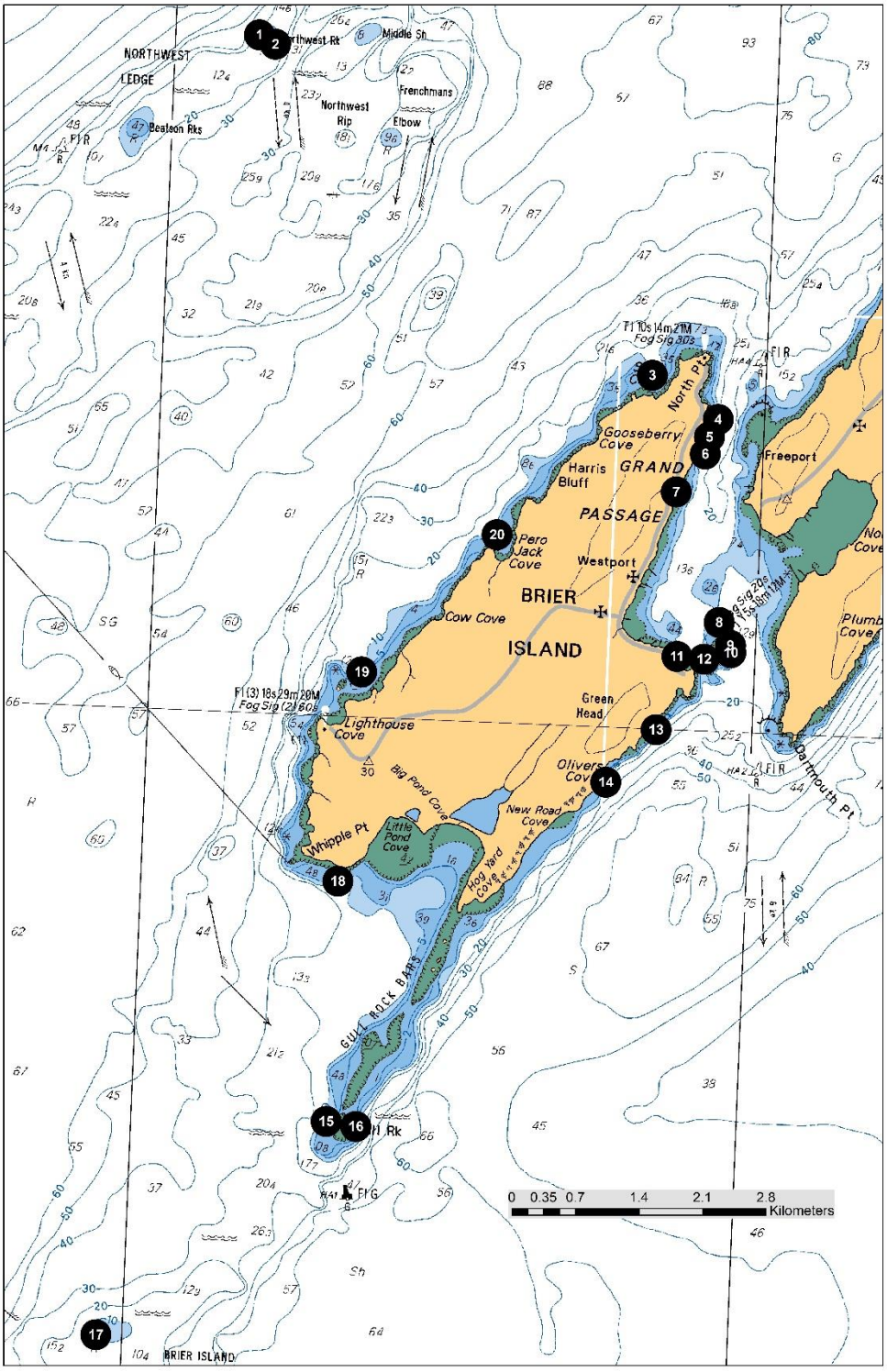

Figure 4 - Dive sites for 2017. Site coordinates are listed in Table 1. Map reproduced with permission from the Canadian Hydrographic Service.

RESULTS AND DISCUSSION

SAMPLING LOCATIONS

A total of 22 dives were conducted over two sampling periods from August 27-30 and September 26-28, 2017 (Table 1). Maximum diver depths ranged from 4 to 20 m BSL (0.8 to 18.9 m BCD) with an average bottom time of 35 minutes per dive. For safety reasons maximum planned dive depth was restricted to 20 m BSL. These dives surveyed 20 different sites surrounding Brier Island, including priority locations within Grand Passage, Pete's Island, Gull Rock, and both the Northwest and Southwest ledges (Figure 4).

OCEANOGRAPHIC OBSERVATIONS

Mean temperatures at dive sites ranged from 11.58 ^{o}C (n=20, sd=0.03) to 12.64 ^{o}C (n= 16, sd=0.06) in August and slightly higher 11.53 ^{o}C (n=21, sd 0.10) to 13.21 ^{o}C (n=18, sd=0.01) in September (Table 2). Overall temperature had greater spatial variability (site-to-site) compared to variability within a site at different depths. Shallower protected locations closest to Brier Island were warmer when compared to areas of high current or exposure such as the southwest and northwest ledges. There was very little temperature stratification at these sites. Only the calmest days measured slightly warmer water at the surface with little change below the surface to the maximum dive depths. There was 1.04 ^{o}C increase in mean water temperature between sampling August (Tavg=11.85 ^{o}C, n=229, sd=0.495) and September (Tavg=12.89 ^{o}C, n=120, sd=0.190). Although this was a significant temperature increase ($t_{\text{pooled variance}}$=22.146, df=347,$Prob_{.05}$=0.00), there were more sites sampled on slightly cooler offshore ledges in August which would explain much of this difference. Mean salinity over the entire sampling period ranged from 32.18 PSU (n=20, sd=.06) to 32.76 PSU (n=9, sd=.00) (Table 2). Salinity was much less variable than temperature with only small

differences among sites and sampling period and little to no change over depth within a site. Mean turbidity ranged from 0.70 to 4.29 NTU (Table 2). Most sites recorded low turbidity and divers reported good visibility during all sampling periods. One site (20) was significantly more turbid owing to close proximity to shore and exposure to ocean swell. Mean chlorophylll ranged from 0.28 to 0.73 RFU and showed very little variability among sites or sampling depth (Table 2). Chlorophyll measurements were not standardised against a known chlorophyll sample and only used to assess relative changes (RFU) at sites and depths and not as ug/L of chlorophyll.

Vertical profiles of temperature (^{o}C), salinity (PSU), and depth (m BSL) were conducted at 10 fixed oceanographic stations (Figure 3). All stations recorded an increase in temperature and small increase in salinity from late August to late September (Appendix 3). Profiles of temperature and salinity (Appendix 4) varied by location, month, and tidal cycle more than the dive locations owing to greater exposure and depth of sampling. Stations VIII, IX and X recorded a warmer surface layer evident when sampling during calm weather in August versus the same stations taken during a heavy swell in September. The sampling protocol allowed for the instrument to acclimate at 1 m below the surface prior to each cast to minimise the effects of air temperature and instrument lag on the first measurements. In August a distinct temperature and salinity stratification at CTD depths ranging from 25-65 m was recorded during ebb tide at stations II to V. Tidal cycle appeared to influence stratification at the southern entrance to Grand Passage (VIII) and stations II to V. By late September temperature and salinity stratification was not observed with nearly constant temperature and salinity extending from 5 meters to the maximum recorded depth of 90 m (Appendix 4). In order to better record the effects of tide, weather, and seasonality CTD

casts should be conducted more frequently during both ebb and flood cycles at each station. Oceanographic observations agree with those reported previously in which light and water clarity at Brier Island was highly regarded by divers as “the clearest water of any site visited in the Bay of Fundy” with visibilities estimated between 10 and 15 meters and only a slight reduction in visibility after a storm (MacKay 1977). Offshore CTD profiles in July and August of 1977 that indicated a high degree of vertical mixing with little to no stratification were confirmed in the 2017 measurement. This was largely due to continued strong currents over changing depths. Water temperatures measured in August 2017 were warmer by more than 2 ^{o}C compared to temperature reported in the same area 40 years prior (MacKay 1977) and warmer than the 7 ^{o}C historically indicated (MacKay 1977).

MAJOR SUBLITTORAL HABITAT TYPES

At each of the 20 dive sites, sublittoral habitats were classified into six types based on the dominant animal and algal communities present. Divers often recorded more than one habitat type during a dive as they moved through a site to record changing substrate features and depth contours.

Eelgrass bed

Eelgrass bed was observed at one site, an embayment west of Peters Island (Figure 5; Site 11). Situated within a protected cove with low current and low exposure to ocean swell and storm surge, substrate consisted almost entirely of fine sand. This habitat was surveyed over two dives with maximum diver depths ranging 1.3 to 7.4 m BCD, although the purpose of the second dive was to collect algal specimens for identification and no recording form was completed. A total of 24 species were recorded within this habitat type (Table 3). The dominant species was eelgrass (*Zostera marina),* which was dense over much of the site

(Figure 6). Towards the edge of the bed where the eelgrass was sparser (Figure 7) other algae such as witch's hair (*Desmarestia aculeata)* and sea lettuce (*Ulva lactuca)* were observed. Growing on the eelgrass were a number of algal species including *Planosiphon zosterifolius*, *Ectocarpus siliculosus*, and *Ceramium virgatum*. On the seabed beneath the eelgrass were mobile species such as the winter flounder (*Pseudopleuronectes americanus*), American lobster (*Homarus americanus*) (Figure 8), and rock crab (*Cancer irroratus*). This site corresponds to site M8 (Figure 2). MacKay (1977) reported lush eelgrass at this site and a dense bed still appears to be present. Garbary et al. (2018) noted that the unique algal assemblage associated with the eelgrass bed may be limited by eutrophication from nearby salmon cages, resulting in extensive growth of epiphytic chain-forming diatoms.

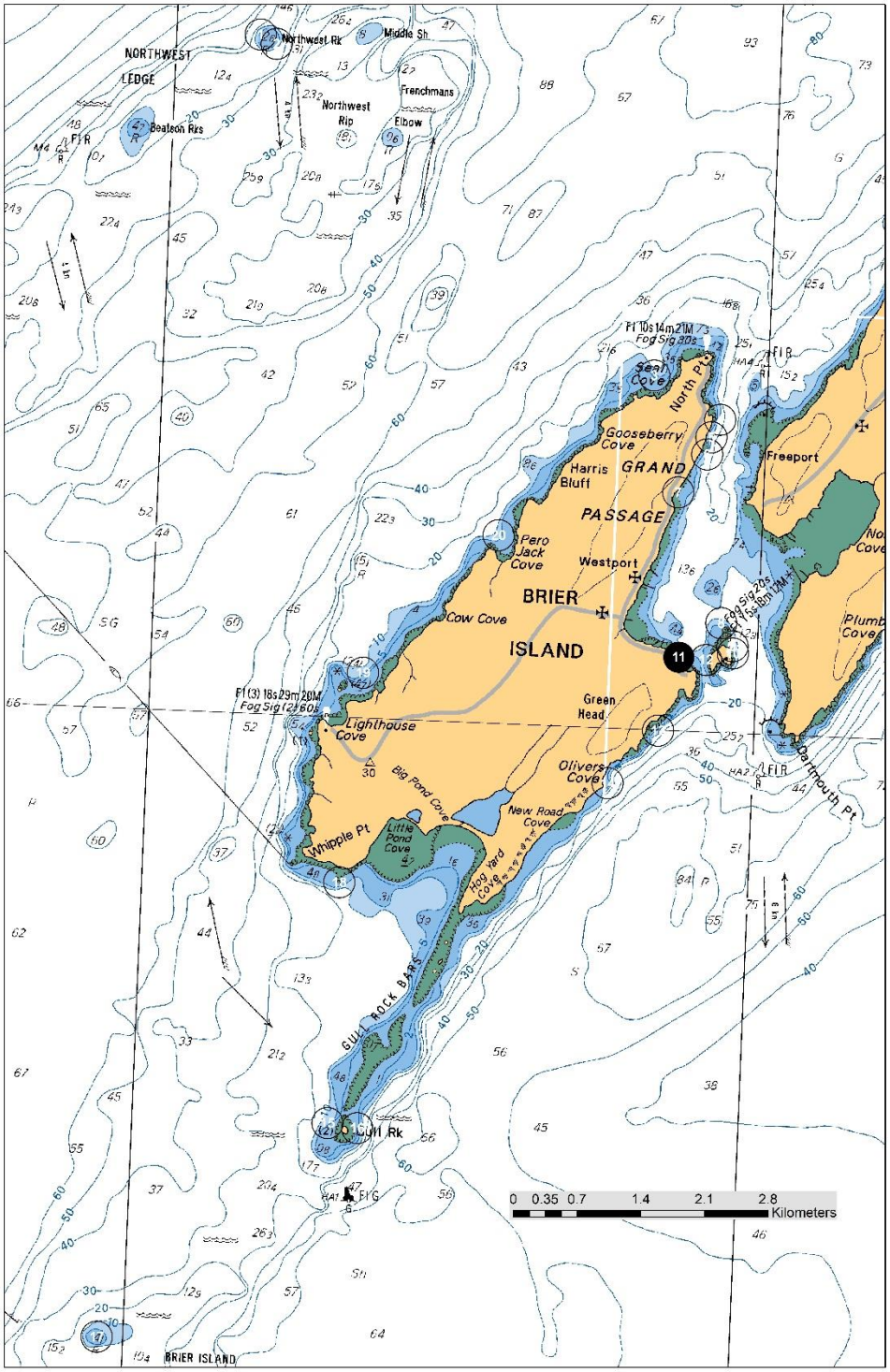

Figure 5 - Eelgrass bed habitat was observed at Site 11 (closed circle), a protected embayment west of Peter's Island. Open circles represent sites where this habitat type was not observed. Map reproduced with permission from the Canadian Hydrographic Service.

Figure 6 – DFO Science diver (S. Armsworthy) surveying a dense eelgrass bed at Site 11 'Bay West of Peter's Island'. Leaves were noted to extend beyond 2 m in length and were host to a number of epiphytic species.

Figure 7 - At the edge of the eelgrass bed where the eelgrass was sparser, a mixed algal turf was established with witch's hair (*Desmarestia aculeata), centre top and bottom with fine feathery red blades* and sea lettuce (*Ulva lactuca), centre left and right with short ruffled green blades*.

Figure 8 - Mobile species such as American lobster (*Homarus americanus)* centre left, were present beneath the eelgrass canopy.

Kelp bed

Kelp bed was observed at ten sites (14 habitat records) (Figure 9) within Grand Passage, the southern reefs and both northwestern and southwestern ledges. Substrates were bedrock and boulders with a small amount of shell gravel settled between larger rocks. This habitat was observed at depths ranging from 0.3 to 17.8 m BCD. A total of 104 species were recorded within this habitat type (Table 3). Dominated by a kelp canopy (usually *Laminaria digitata* Figure 10*,* but on some sites *Saccharina latissima* or *Alaria esculenta* were the dominant species Figure 11). Other algae such as the sea colander (*Agarum clathratum),* witch's hair (*Desmarestia aculeata*), sea oak (*Phycodrys rubens*)*,* dulse (*Palmaria palmata*)*,* Irish moss (*Chondrus crispus*) were also recorded*.* The lacy crust bryozoan (*Membranipora membranacea)* was often found on the kelp fronds (Figure 12) and sponge (*Isodictya deichmannae)* was recorded on bedrock beneath them. Mobile species such as American lobster (*Homarus americanus*), hermit crab (Paguridae), Johan crab (*Cancer borealis)*, starfish (*Henricia sanguinolenta)*, and pollock (*Pollachius viriens)* were frequently associated with this habitat.

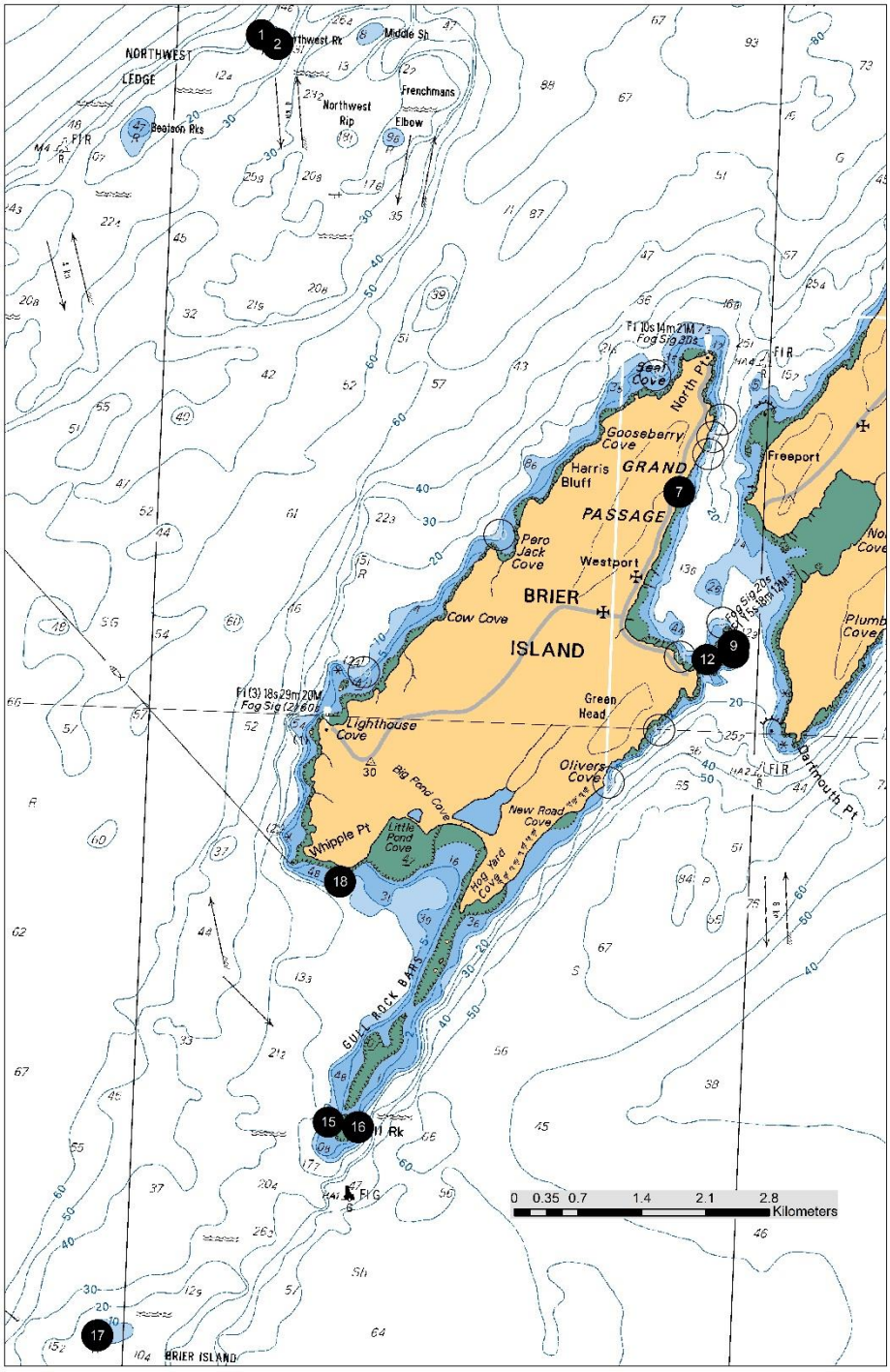

Figure 9 - Kelp bed habitat was observed at ten sites (closed circles) throughout Brier Island where a combination of hard substrate, clear water, and currents provide suitable conditions for growth. Open circles represent sites where this habitat type was not observed. Chart reproduced with permission from the Canadian Hydrographic Service.

Figure 10 - *Laminaria digitata (*large green blades on thick stipe, centre*)* was a dominant species kelp bed habitat on Site 17 'Southwest ledges'. Typically an area exposed to high current and large ocean swell this photo was taken during a short period slack tide under calm seas.

Figure 11 - Kelp bed habitat consisting of mainly *Alaria esculenta* (ruffled green blades with central stipe, centre) mixed with *Fucus* spp. (short thick olive green blades with gas bladder, centre right) observed at Site 7 'East of Westport cliffs'.

Figure 12 – DFO Science diver (J.A. Cooper) surveyed kelp bed habitat dominated by *Laminaria digitata (large green fronds with thick stipe)* at Site 15 ‘Gull Rock’. Epiphytic growth of the bryozoan *Membranipora membranacea* (white patch on kelp frond centre left of diver) was commonly observed in these habitats. The presence of large rocks and crevaces offers additional protected habitat for a high diversity of algal turf and animal species within an area that is typically exposed to high currents and large ocean swells.

Foliose algae

Foliose algae habitat was observed at ten sites (17 habitat records) (Figure 13) at depths of 0.3 to 17 m BCD. The maximum planned survey depth was 20 m and it is likely foliose algae habitat continues beyond this range. Substrate consisted of bedrock, boulders and cobble in locations that are exposed to ocean swell and coastal storm surge. These habitats were represented by a variety of algal turf species that replaced the dominant canopy of kelp as light is attenuated with depth or decreased water clarity in less exposed locations. In total, 121 taxa were recorded from this habitat (Table 3). While kelp (*Laminaria digitata* and *Saccharina latissima*) was present in this habitat, it was with lower abundances than found in the kelp bed habitat. Other algal species such as Irish moss (*Chondrus crispus)* (Figure 14), sea colander (*Agarum clathratum),* witch's hair (*Desmarestia aculeata),* sea lettuce (*Ulva* sp.), dulse (*Palmaria palmate),* lacy red weed (*Euthora cristata), sea oak (Phycodrys rubens)* (Figure 15) and corraline algae including *Corallina officinalis* and encrusting corallines were frequent. The lacy crust bryozoan (*Membranipora membranacea)* and the hydroid (*Obelia geniculate)* were common on kelp fronds. Mobile species such as American lobster (*Homarus americanus)*, Jonah crab (*Cancer borealis)*, and pollock (*Pollachius viriens)* were common.

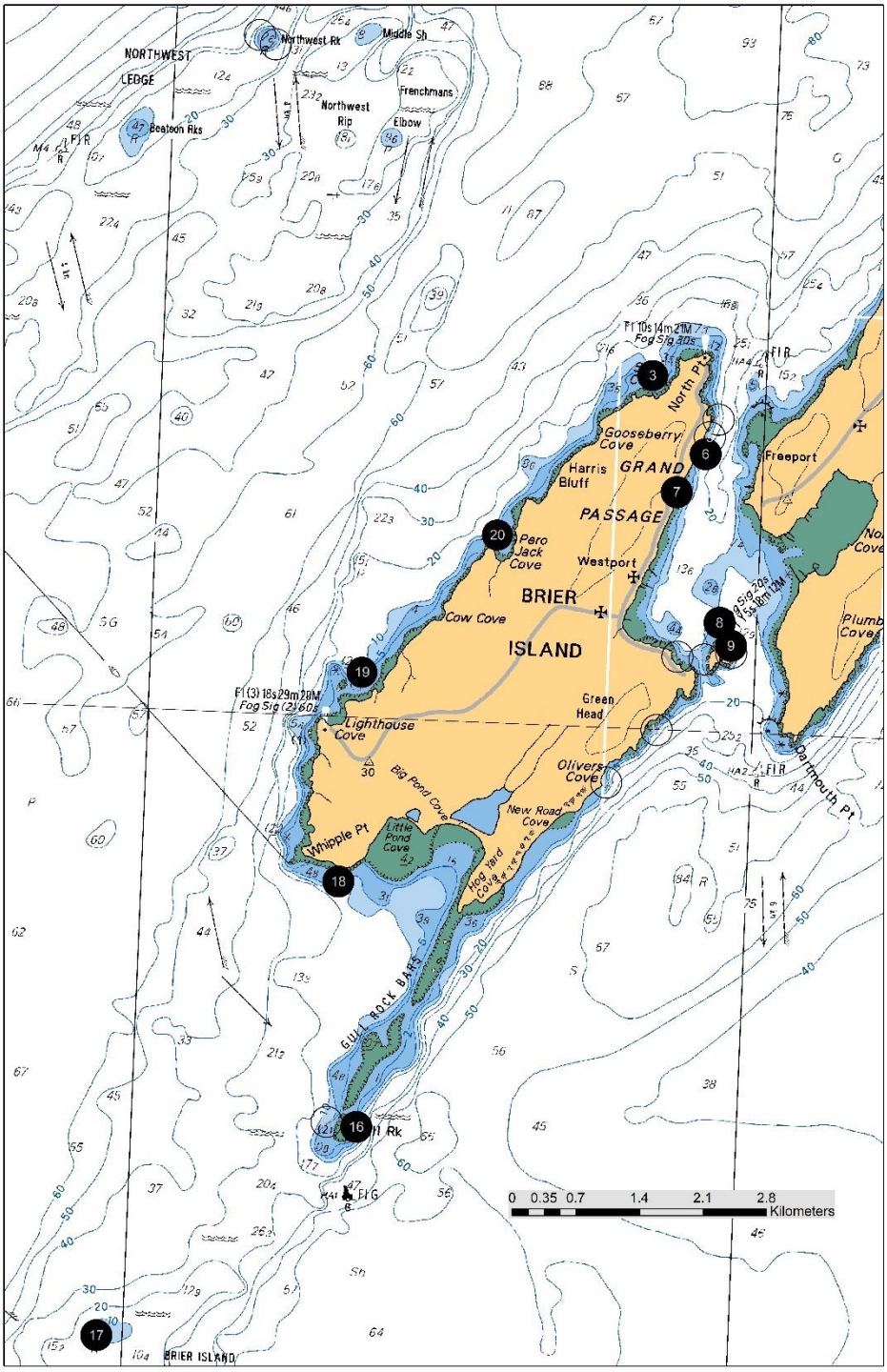

Figure 13 - Foliose algae habitat was observed at ten sites (closed circles) where hard a combination of mixed substrate and clear water at depth offered suitable habitat. Open circles represent sites where this habitat type was not observed. Map reproduced with permission from the Canadian Hydrographic Service.

Figure 14 - Foliose algae habitat at Site 9 ‘Peter's Island’. Many species of red algae were observed, including Irish moss (*Chondrus crispus),* red flat branched blades with white epiphytic growth, centre.

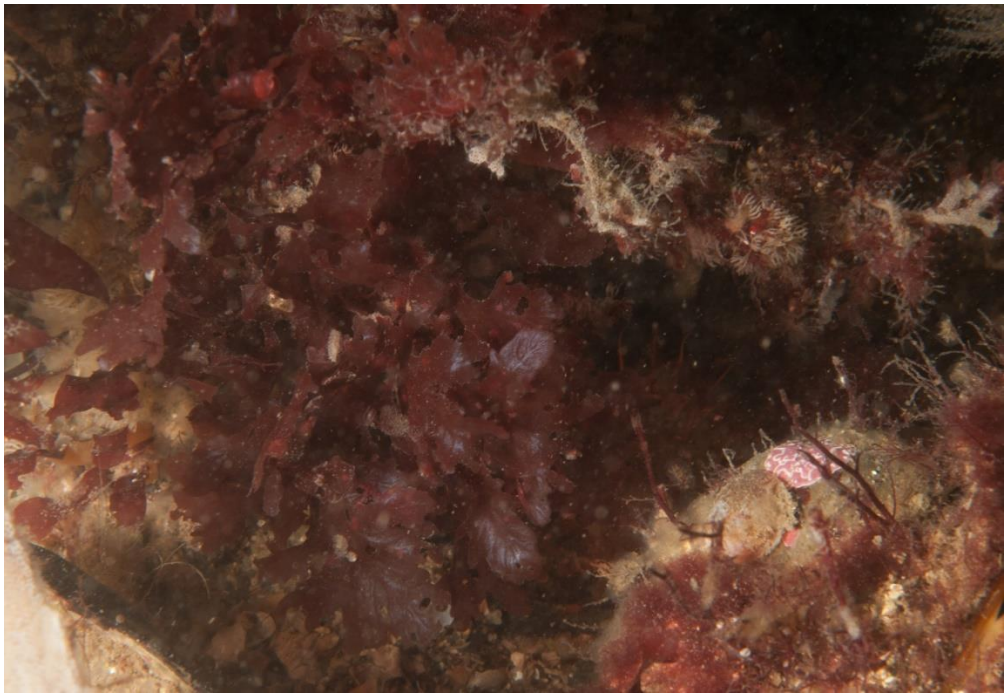

Figure 15 - Foliose algae habitat at Site 8 ‘Peter's Island’. Red algae present included the Sea oak (*Phycodrys rubens),* flat red blades shaped like an oak leaf, centre.

Foliose algae and animal turf

Foliose algae and animal turf habitat was recorded at four sites (six habitat records) (Figure 16). It was recorded at depths of 9.1 to 18.2 m BCD. The distinction between this habitat versus kelp forest and foliose algae was somewhat subjective. The differences were mostly due to depth zonation. These locations were deeper than the foliose algae habitat, representing the gradual trend towards animal dominated habitats in deeper water as light levels lessen. Because the survey depth was limited to 20m and due to the high water clarity at Brier, we surveyed very few animal dominated habitats. A total of 71 taxa were recorded from this habitat (Table 3). While sparse kelp (*Laminaria digitata* and *Saccharina latissima*) was present together with the same suite of algae as present in the Foliose algae habitat (*Chondrus crispus, Agarum clathratum, Corallina officinalis,* etc.), the algal abundance was much lower with substrate dominated by animals. These included the bryozoans (*Dendrobeania murrayana, Flustra foliacea* and *Caberea ellisii),* colonial ascidians such as *Didemnum albidum* and *Diplosoma listerianum,* and sponges such as *Crellomima* sp. (Figures 17, 18, 19).

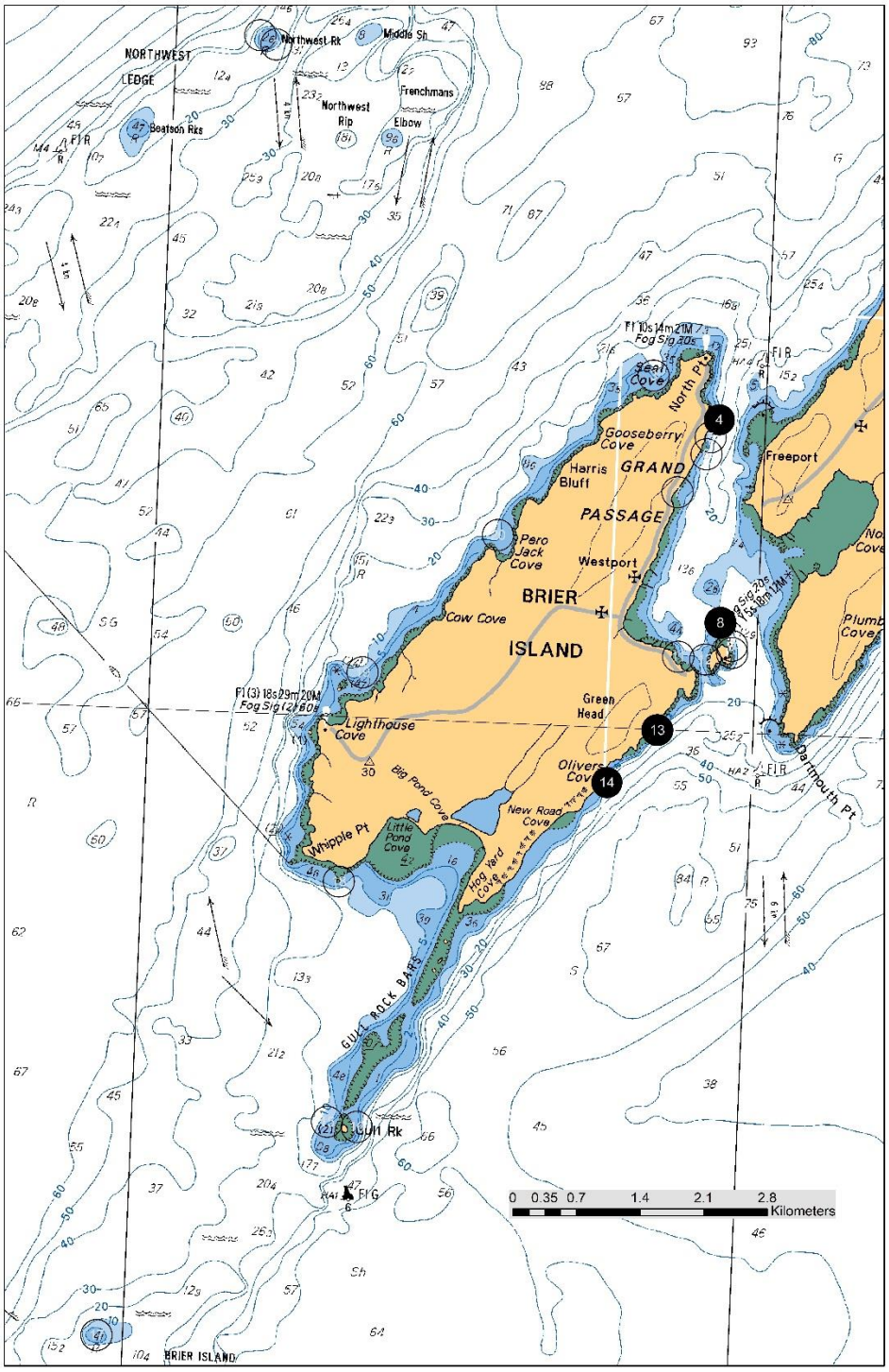

Figure 16 - Foliose algae and animal turf was observed at four sites (closed circles). Open circles represent sites where this habitat type was not observed. Map reproduced with permission from the Canadian Hydrographic Service.

Figure 17 - Foliose algae and animal turf habitat at Site 4 ‘Brier Island Grand Passage’. Bryozoans such as *Flustra foliacea* (centre) occurred with a variety of foliose algae.

Figure 18 - Foliose algae and animal turf habitat at Site 13 ‘Brier Island southeastern shore’. Sponges such as *Isodictya deichmannae* (centre) were often present, together with ascidians - including an invasive colonial ascidian (*Diplosoma listeranium)* which is seen encrusting much of the substrate here.

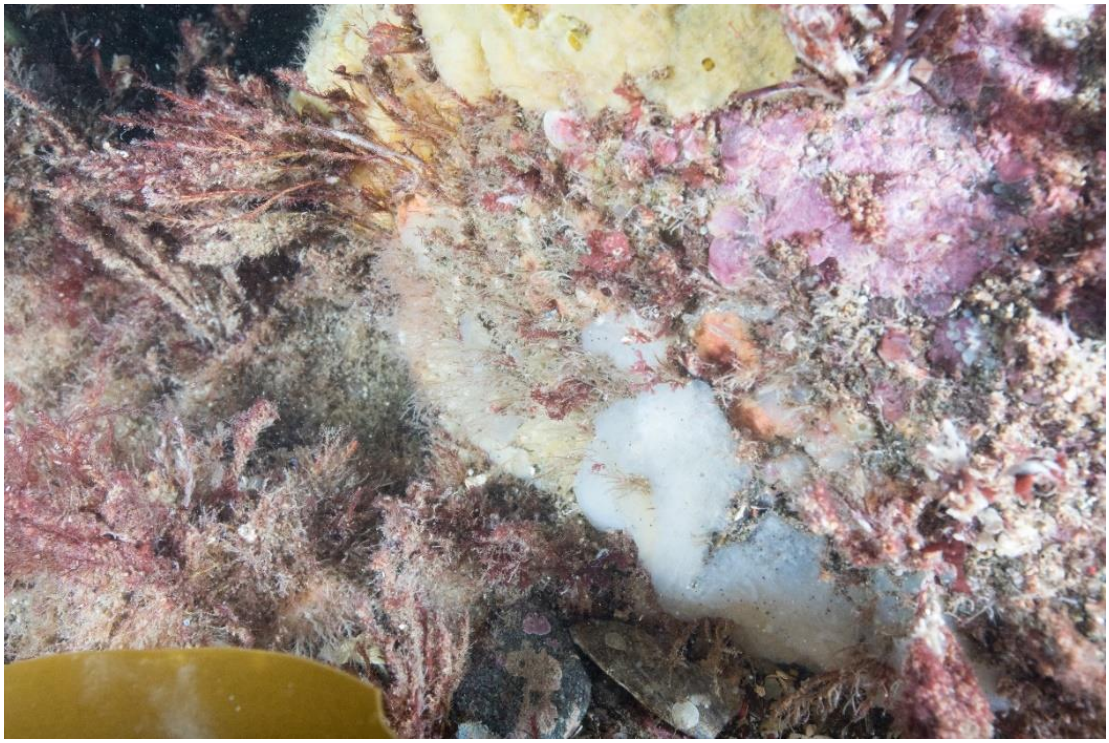

Figure 19 - Foliose algae and animal turf habitat at Site 4 ‘Brier Island Grand Passage’. Sponges and ascidians such as *Aplidium glabrum* (bottom right) occurred with a variety of red foliose algae.

Horse Mussel Reef

Horse mussel reef was observed within Grand Passage at two sites (three habitat records) (Figure 20) along the northwest side at depths ranging from 12 to 17 m BCD. This habitat likely extended along the passage for several hundred meters and beyond the maximum survey depth. A high current location, substrate consisted of a mixture of cobble, pebble and sand stabilised by the dominant species horse mussel (*Modiolus modiolus)* and empty shells (Figure 21). In total 80 taxa were recorded in this habitat (Table 3). Mobile species such as American lobster (*Homarus americanus)*, Jonah crab (*Cancer borealis),* starfish (*Asterias rubens)* and the rock gunnel (*Pholis gunnelis)* were frequent (Figure 22). The animal turf on the mussels and surrounding substrate was dominated by bryozoans (*Dendrobeania murrayana*, *Eucratea loricata*) and hydroids (*Ectopleura larynx* and *Coryne*

eximia). Jingle shells (*Anomia simplex)* and the branching sponges (*Isodictya palmata* and *I. deichmannae)* were also commonly found growing on the mussel shells (Figure 23). The lacy red seaweed (*Euthora cristata)* was also common and forest kelp (*Laminaria digitate)* was present in small amounts. Although MacKay (1977) notes that horse mussel (*Modiolus modiolus)* was one of the dominant species present at Brier Island and abundant at some sites, he does not note the presence of horse mussel reefs where the accumulation of living horse mussels and shell form the biogenic habitat. Horse mussels were noted as an Ecologically Significant Species that should be highlighted in MPA planning due to their ecological importance (Buzeta 2014). The stabilising effect they have on habitat and the hard substrate their shells provide results in high biodiversity (OSPAR 2009) but due to their long life, slow recovery from disturbance are recognised as vulnerable marine ecosystem (FAO 2009).

Within the context of MPA network planning in the Scotian Shelf bioregion (DFO 2018) biogenic habitats, including horse mussel reefs, are considered conservation priorities. Targets have been set for each conservation priority in the bioregions (DFO 2018). For offshore biogenic habitats (modelled by Beazley et al. 2017) a minimum target of 30% of known areas has been proposed. However, horse mussel reefs have been allocated a higher target level of 80 to 100% based on rarity and vulnerability (DFO 2018). MPA network planning was separated into coastal and offshore domains. Coastal MPA network planning was considered separately due to differences in data availability and a conservation planning approach that emphasized accumulated knowledge on a regional set of coastal EBSAs. Because of their vulnerability, the target for some invertebrate biogenic habitats in the coastal area (e.g., horse mussel reefs, stalked tunicates, and habitat-forming sponges)

was to protect all known significant concentrations, with significant areas identified and described through science advice (DFO 2018).

The spatial domain for the species distribution modelling work of Beazley et al. (2017) encompassed the entire DFO Maritimes Region, for which a suite of 66 environmenal variables were compiled and used within random forest modelling methods to generate probability of occurrence and biomass models for *Modiolus*, and four other taxonomic groups of interest. *Modiolus* records from DFO multispecies trawl survey were found to be relatively sparse, even where horse mussels are known to occur, and so data was also used from DFO scallop dredge surveys. Both of these surveys, and the consequent predictive spatial modelling do not encompass seabed habitats close to the coast, and particularly within the 20 m BCD depth contour of the 2017 dive surveys on Brier Island. Coastal scallop dredge surveys conducted in 1997 and 2007 provide the most extensive spatial coverage in the vicinity of Brier Island and the Digby Neck peninsula. As used by Beazley et al. (2017), there were a total of 74 presences and 181 absences of horse mussel catches across the two DFO scallop dredge surveys.

Horse mussel are known to occur elsewhere in the Bay of Fundy (Buzeta 2004, Wildish et al. 1998, Wildish et al. 2009). Their extent in the upper middle portion of Bay of Fundy has been inferred by multibeam bathymetry and interpretation of acoustic backscatter intensity (Kostylev et al. 2009, Todd et al. 2014 , DFO 2015). As with the trawl and scallop dredge surveys analysed by Beazley et al. (2017), these prior studies are all primarily focussed on deeper-water coastal habitats. The only other spatially explicit research to identify and map potential nearshore reef areas in Bay of Fundy similar to Brier Island is a project currently underway by DFO in association with the Canadian Healthy Oceans Network (CHONe; a

national collaborative academic-government research program). In 2016 and 2017 a surface deployed seabed video system was used to document seabed habitat characteristics across depth ranges from 10 to 80 m BCD within the Fundy Isles region of the Bay of Fundy. Among the species targeted for specific attention were the horse mussel and sea potato, (*Boltenia ovifera)*, both of which are considered biogenic habitat-forming species. Significant concentrations of both species were documented from the imagery data. Species distribution modelling in the CHONe project was conducted using environmental variables from high-resolution coastal bathymetry and oceanographic model data to develop spatial representations of suitable habitat.

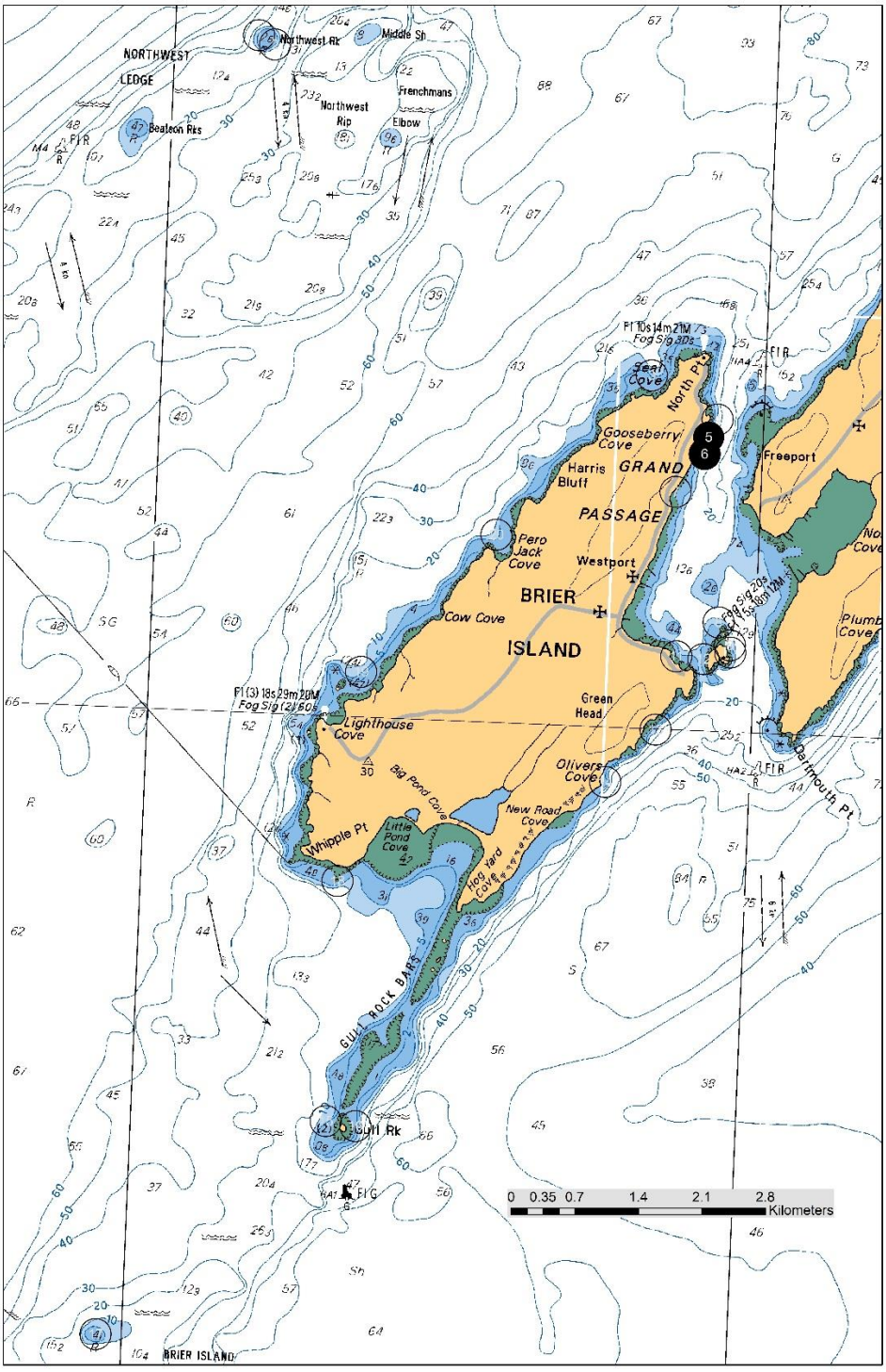

Figure 20 - Horse mussel reef was observed along the northwestern portion of Grand Passage (closed circles) an area with high tidal currents. Open circles represent sites where this habitat type was not observed. Map reproduced with permission from the Canadian Hydrographic Service.

Figure 21 - Horse mussel reef at Site 5 ‘Grand Passage, northeast of Bald Rock’. The high tidal current in this area limited the diver survey to brief windows of slack tide.

Figure 22 - Horse mussel reef at Site 5 ‘Grand Passage, northeast of Bald Rock’. American lobster were frequent.

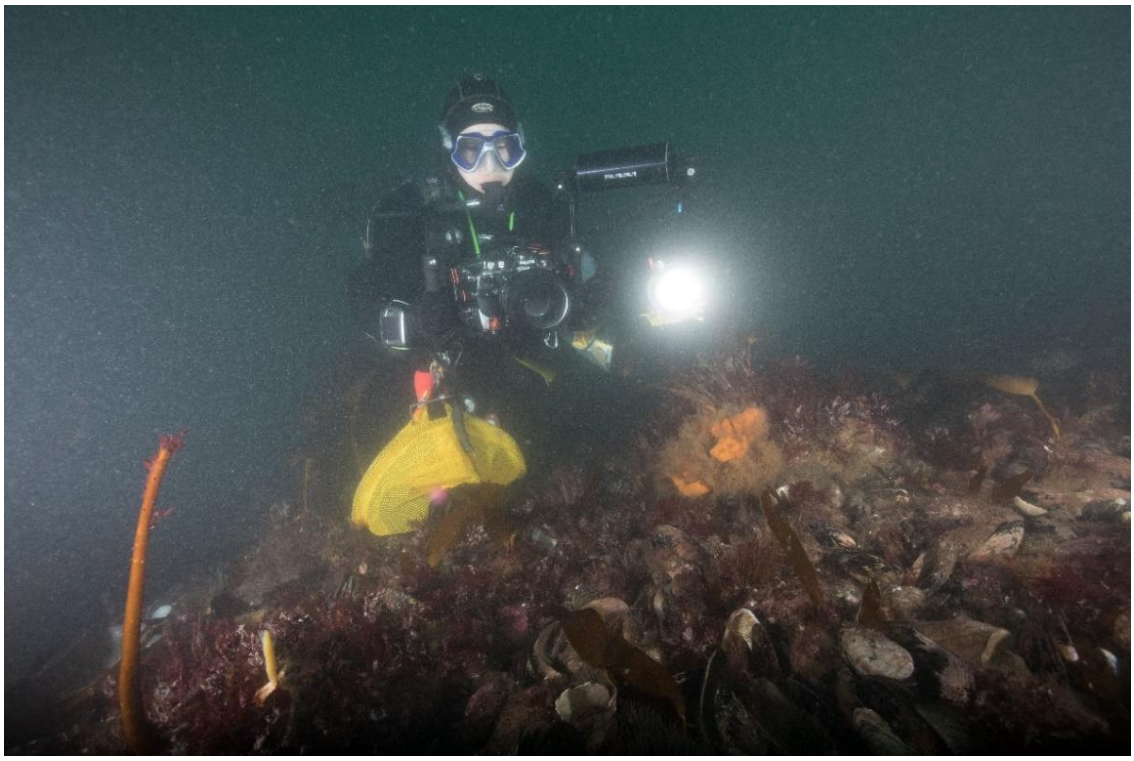

Figure 23 – HMSC Science diver (C. Goodwin) surveying Horse mussel reef at Site 5 ‘Grand Passage, northeast of Bald Rock’. The sponge (*Isodictya deichmannae),* illuminated below diver’s light was frequent.

Mixed sediment with sparse life

Mixed sediment with sparse life habitat was found at three locations (three habitat records) (Figure 24). This habitat was associated with high current areas and mobile sediment with sparse sedentary life such as *Ulva* sp., Corallinales, horse mussel (*Modiolus modiolus)* and Irish moss (*Chondrus crispus)*. Due to the open nature of this habitat, mobile species such as comb jelly (*Pleurobrachia pileus)* were more easily observed by the divers and recorded as abundant while pollock *(Pollachius virens),* herring *(Clupea harengus), lobster (Homarus americanus),* rock crab *(Cancer irroratus),* and cod *(Gadus morhua)* were either common or frequently observed.

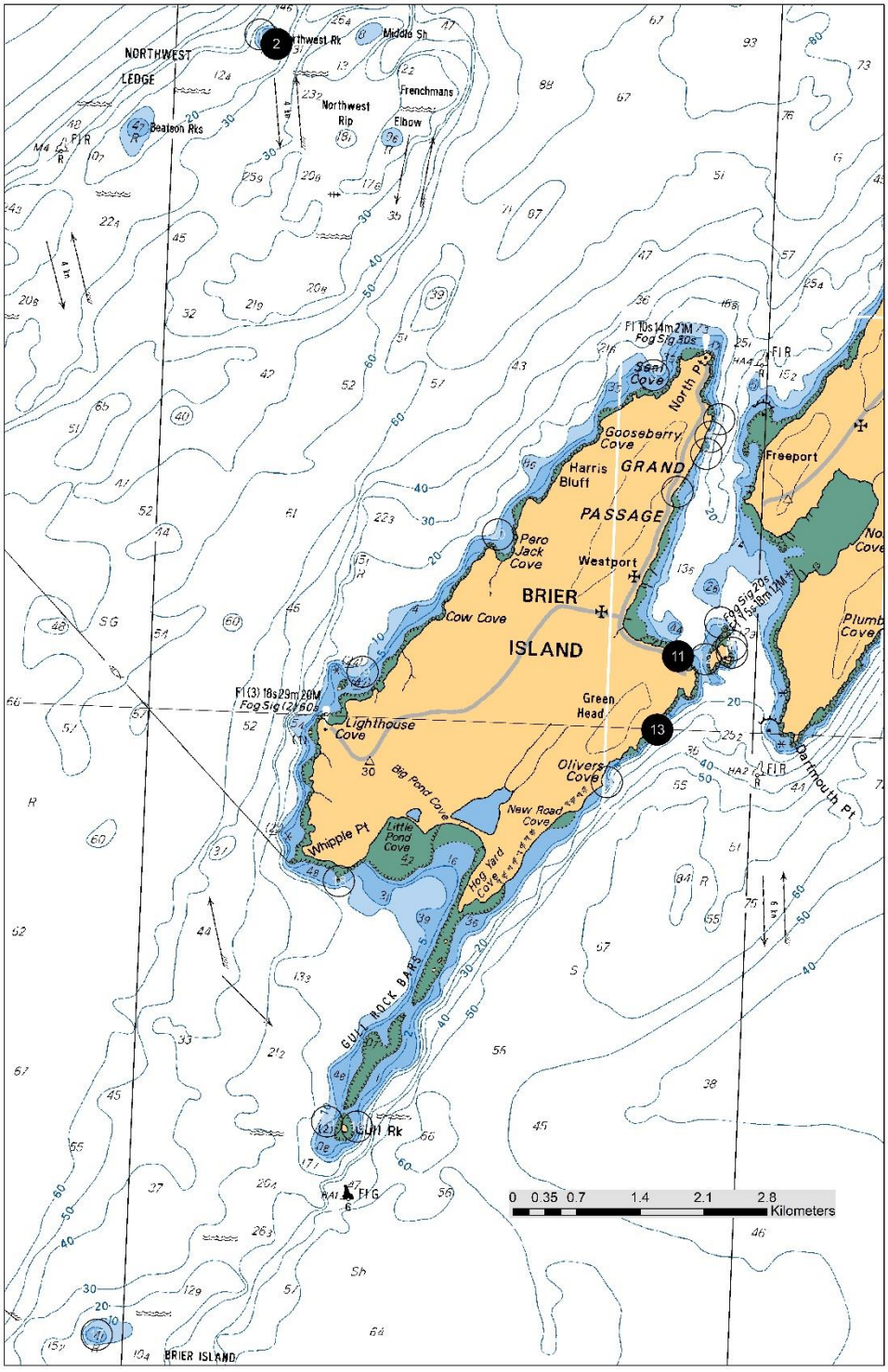

Figure 24 - Mixed sediment with sparse life was observed at three sites (closed circles) along the fringe transition areas of other habitats. Open circles represent sites where this habitat type was not observed. Map reproduced with permission from the Canadian Hydrographic Service.

SPECIES OCCURRENCE

In total 962 records were made of 178 taxa, consisting of 43 algae (Plantae and Chromista) and 135 animals (Tables 3 and 4). The number of taxa recorded ranged from 1 to 35 taxa for individual habitat types per site (Table 4). Accumulated species richness within each of the major sublittoral habitat types ranged from 21 species in the mixed sediment sparse life areas to 121 species for foliose algae habitats (Figure 25).

Sampling effort was not standardised by habitat type. Factors such as habitat complexity and the number of dive sites for a particular habitat can bias the number of species observed. For example, eelgrass bed was only surveyed at one site (Figure 5). The dense coverage of *Zostera marina* (Figure 6) would have limited visual detection (Vercaemer *et al* 2018) and may have contributed to divers recording the relatively low number of species when directly compared to other habitats (Figure 25). The roaming diver survey was a practical method for an initial survey of habitat type and species in this area. However, a comparative survey for different coastal habitats would require standardised methods that account for observation effort and habitat complexity.

Eighty-two specimens of algae were collected for subsequent identification, and 206 invertebrate specimens. These specimens were placed together in a single collection bag during each dive, in these locations where multiple habitat types were encountered it was not possible to note which habitat these specimens came from. Consequently, records from these specimens are recorded separately (Table 4).

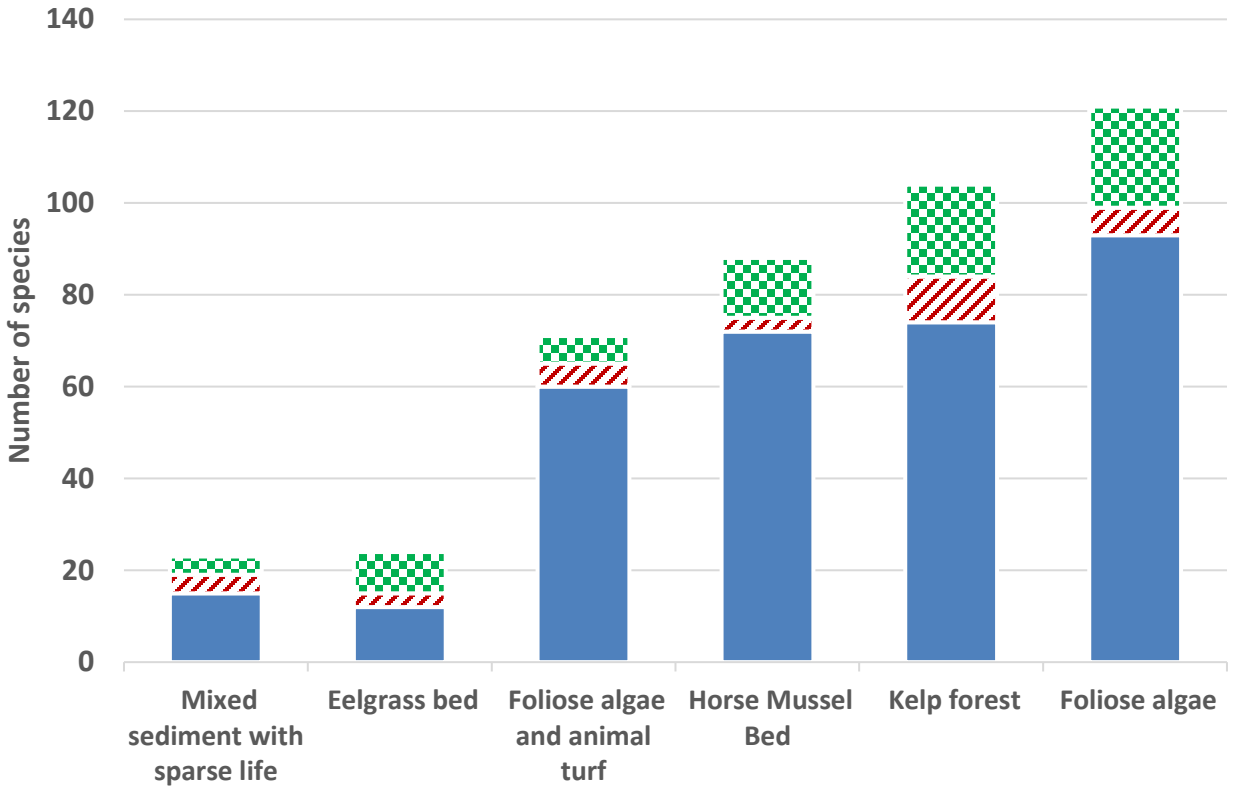

Figure 25 - Species richness by main habitat type broken down by Kingdom; Animalia (blue solid), Chromista (red diagonal bars), Plantae (green squares). Note that sampling effort was not the same for all habitats.

Sponge biodiversity

In total 19 sponge taxa were recorded (Table 3,4) – a significant increase from the four species recorded by MacKay (1977), *Hachondria panicea*, *Haliclona oculata*, *Isodictya deichmannae,* and *Sycon* sp. Many of the additional species have been reported from other areas in the Bay of Fundy (Goodwin 2016) but were not previously known from Brier Island and represent new records from this area. *Hymedesmia (Hymedesmia) canadensis* was previously described in Letite Passage, southeastern Bay of Fundy (Ginn et al. 1998) and until recently was known only from the type locality (Goodwin 2016). At Brier Island, it was

recorded from three habitats, foliose algae, foliose algae and animal turf, and kelp bed (Table 3). *Crellomima* sp. is a possible species new to science which is currently being investigated having been initially recorded in the Passamaquoddy region. It was recorded from seven habitats (Table 3). A *Hymedesmia (Hymedesmia)* species new to science was also recorded at the north end of Peter's Island, site 8 and the Southeast shore, site 13 (Table 4C). Two specimens of this were collected for further study and description. It would be desirable to obtain specimens from additional sites before formally describing this species. This species is currently only known from Brier Island.

These new findings on sponge distribution, including possible new species, and new location records for a known species, *Hymedesmia (Hymedesmia) canadensis,* thought to have restricted spatial distribution have potential implication in the designation of coastal conservation locations. We also suspect a number of additional species might be recorded at slightly greater depths. Sponges tend to be most abundant in the lower circalittoral animal dominated habitats that were characterised as 'Foliose algae and animal turf'. Because the water clarity at Brier Island is so high, the algal dominated upper circalittoral zone persists to over 20 m BCD. On this survey sampling by SCUBA was limited to 20 m BCD so it was not possible to sample deeper areas in which sponges were anticipated to be more abundant. On future surveys it would be desirable to sample in the 20-30 m BCD range using SCUBA and at greater depths using remote methods such as seabed camera surveys . Although more difficult to identify to species level, a camera-based survey would be effective in covering a larger area at these depths. This expanded view of distribution could be important to optimize MPA Network design principles of replication and representation.

COMPARISON BETWEEN MACKAY (1977) AND THIS SURVEY (2017)

Algae and Plants

In total 72 seaweed/eelgrass taxa were recorded by MacKay and this survey (Table 5). Seventeen species were recorded by both, 26 by this study only and 29 by MacKay only. It is not possible to make a meaningful comparison of the taxa because of methodological differences between the two surveys. MacKay surveyed many intertidal sites which have a high seaweed diversity. We collected seaweed samples from some, but not all, survey sites which were identified by David Garbary. Many algae require samples to be examined to confirm identification and doing this for every site was beyond the remit of this study and would have duplicated a parallel algal survey being conducted by David Garbary. For a full algal species list and discussion of the flora of Brier Island please see Garbary et al. (2018). Kelps *(Laminaria digitata, Saccharina latissima,* and *Alaria esculenta)* were recorded as abundant by both surveys. Because of the clarity of the water, dense *Laminaria digitata* is present down to depths of over 20m. It should be noted that *Saccharina longicruris* recorded by MacKay is now recognised as a synonym of *Saccharina latissima* (McDevit and Saunders 2010). Mathieson and Dawes (2017) state that simple bladed kelps that lack ducts in their stipe are *S. latissima*.

The eelgrass bed noted by MacKay (1977) as present at site number M8 (Figure 2), on the Westport shore, was re-surveyed and found to be in a good condition with a dense bed of eelgrass still present in this area (Figure 5). However, Garbary et al. (2018) noted that the unique algal assemblage associated with the eelgrass bed may be limited by eutrophication from nearby salmon cages, resulting in extensive growth of epiphytic chain-forming diatoms.

Animal taxa

In total 167 animal taxa were recorded by this study and MacKay (1977) (Table 6). Twenty-four of these taxa were recorded in both surveys, 111 in this study only and 32 in MacKay (1977) only. The differences between the taxa recorded can be mostly ascribed to methodological differences between the two surveys. The aim of MacKay (1997) was to record large, conspicuous, species *in situ*. As well as *in situ* recording of conspicuous species we also collected specimens, which resulted in records of 75 small (cryptic) taxa which would probably not have been possible to identify *in situ.* This study noted nine fish species. MacKay (1977) did not record fish but recognised that eight of these species had been recorded from the area, as documented by other sources. We recorded to a higher taxonomic resolution in some groups: notably bryozoans, ascidians, hydroids, and sponges. MacKay (1977) noted that bryozoan species were abundant, but did not record specific species. We recorded five bryozoan species which were recognisable *in situ* plus many other species from samples. MacKay (1977) noted that ascidian species, apart from low numbers of *Boltenia ovifera,* were absent and attributed this to low plankton levels. We recorded four species, three were recognisable *in situ* to us but are fairly inconspicuous and could have easily been missed*.* One of these, *Diplosma listerianum,* is an invasive species introduced after 1977 – see below for discussion. MacKay (1977) only noted four species of sponge whereas we incredibly recorded 19. However, several of the species identified in our survey require actual specimen collection to confirm identification and so could not have been noted by the methods employed by MacKay (1977).

Of the 32 animal taxa that were recorded by MacKay (1977) but not in this survey; seven are small species and likely to have been missed; 11 were only recorded at a small number

of sites or in specific habitats and might require more sampling effort to record again. Three of these species reside mainly in the intertidal, unlike MacKay (1977) we did not sample intertidal areas. For a further eight the difference is due to the taxonomic resolution at which taxa were recorded (e.g. whereas MacKay records *Lacuna* sp. we recorded *Lacuna vincta*).

Echinoderms

The group for which there does seem to have been a noticeable decline is Echinoderms. MacKay (1977) recorded three species which we did not note as being present: the sea cucumbers (*Cucumaria frondosa* and *Psolus fabricii)*, and the green sea urchin (*Strongylocentrotus droebachiensis)*. MacKay (1977) noted that *Psolus fabricii* was only observed along the south-east coast but not present elsewhere. We did not conduct extensive dive surveys in this region so it is possible that it is still present at sites we did not survey. MacKay noted that *Cucumaria frondosa* was only present at 5 sites, also in small numbers. We did resurvey near several of the sites where *C. frondosa* were previously reported but did not record any; however, as numbers were low it would require further sampling effort to determine whether they are really now absent. MacKay (1977) noted that *Strongylocentrotus droebachiensis* was common throughout the survey area, present at 21 sites. We did not record a single specimen of this species. This is a large, conspicuous, species and unlikely to have been missed by our SCUBA surveys and conclude that there may have been a decline for this this species in the area. The absence of urchins in our survey was consistent with low abundances observed in the local dive fishery in recent years (pers. communication with Carmen Burnie, Joel Doucette). Outbreaks of paramoebiasis, caused by the marine amoeba *Paramoeba invadens,* are known to result in

mass mortalities of green sea urchins in Nova Scotia (Jones and Scheibling 1985, Scheibling and Hennigar 1997) with near complete mortalities having been recorded over 130km of Nova Scotia coastline in one event (Scheibling and Hennigar 1997). This may have also occurred in the Brier Island area.

INVASIVE SPECIES

Diplosoma listerianum (colonial ascidian)

This ascidian is non-native to north-east North America. It forms extensive encrusting sheets and competes against other native tunicates, invertebrates, and algal species for substrate and nutrients. It was first recorded in North America in the Isles of Shoals in Maine in 1993 (Dijkstra et al. 2007), spreading to the Îles de la Madeleine, Quebec, in 2008 (see Ma et al. (2018) for complete history. It was first recorded in Nova Scotia near Lunenburg in 2012, but has not been reported since 2013, suggesting the introduction had failed (Sephton et al. 2017). Presence of *D. listerianum* was confirmed at four sites on Brier Island (Ma et al. 2018). It was rare at Peter's Island (site 9), frequent at Whipple Point (site 18) and the southeast side of Gull Rock (site 16), and common at the site on the South side (site 14) of Brier Island (Table 4). Photographic records (no specimen) were made from an additional 5 sites (1, 3, 13, 15, 19, Table 4). The presence of eggs, ovaries, and brooded larvae in some of the samples from Brier Island indicates that the population is able to reach sexual maturity and is perhaps self-sustaining.

Figure 26 - The colonial invasive ascidian *Diplosoma listerianum* was common at some sites. This specimen was from Site 3 ‘Seal Cove’.

Carcinus maenas (European green crab).

Although the distribution of the European green crab is expanding in Atlantic Canada there does not seem to have been any change at Brier Island. It is an aggressive shoreline species that feeds on a variety of molluscs, worms, and small crustaceans with potential to affect a number of fisheries, habitats, and biodiversity. The species was first reported from Canada in 1951 in Passamaquoddy Bay, southwestern New Brunswick, and by 1953 was recorded in Nova Scotia (Klassen and Locke 2007). MacKay observed it as present at site M8 (Figure 2) whereas we observed this species at sites 7 and 11 (Figure 4, Table 4A). It should be noted that we did not survey intertidal sites where European green crab are likely to be more abundant so additional survey of intertidal areas would be needed to confirm this.

Bonnemaisonia hamifera (Bonnemaison's hook weed)

This species is a native of Japan. It was first recorded at Woods Hole, MA in 1927 and is thought to have arrived either from Japan or via Europe. It grows on rock and other hard substrates and competes with other sessile organisms for the same. We recorded *Bonnemaisonia hamifera* at eight habitats around Peter's Island, the North-west ledges, Seal Cove (where it was abundant) in both habitats surveyed, NE of Bald Rock, and Gull Rock (Table 4). Identification was confirmed from specimens from all of these sites by David Garbary. Garbary et al. (2018) note that this species was abundant in both the subtidal and the shore all around Brier Island, in both tetrasporophytic and gametophytic phases. It was not previously recorded by MacKay (1977), or in the algal surveys of Edelestein et al. (1970) or Wilson et al. (1979). It has been widely recorded in Eastern Canada and may range from common to rare at sites where it is present (Mathieson & Dawes 2017).

RECOMMENDATIONS FOR FUTURE MONITORING AND ASSESSMENT

Future investigation around Brier Island should target additional inshore sites and offshore areas with an aim to develop more standardised coastal survey protocols based on the species lists developed by this survey and application of transects or quadrates for a per area assessment. A current SPERA project led by Peter Lawton and Andrew Cooper is incorporating both diver and drop camera transects to yield quantitative data on coatal species distribution in relatively shallow subtidal zones. Ideally future work would involve the ground-truth of sponge and other fauna occurrence in offshore areas indicated as significant for sponges by Kenchington et al. (2016). Analysis and reporting on sampling of Brier Island habitats should include comparisons with other Bay of Fundy EBSA, and addition of Brier

Island EBSA photo- and video-media to DFO image databases and libraries. Methods to qualitatively compare against historical information should be developed as part of this analysis and reporting plan.

Based on observations from the 2017 dive survey activity, next steps for the Brier Island survey should be:

- Conduct a drop camera survey at Brier Island to assess habitat at depths beyond 20m to assess perceived data gaps. With currently available regional camera systems these surveys could be conducted to 80 m, and with anticipated acquisition of new cable deployment systems in 2019 these coastal drop camera surveys could expand coverage to a maximum depth of 200 m, giving access to locations farther offshore, and overlapping with DFO ecosystem trawl and scallop dredge survey coverage that report sponge catch.
- Within the above objective specifically aquire new spatially referenced remote camera survey coverage between 20 to 30 m. This would be used in targeting deeper SCUBA dive locations to collect and confirm species identifications, particularly of sponges.
- Repeat CTD vertical profile sampling at oceanographic stations I-X with increased sampling over flood and ebb tides to describe role of tide in mixing water column in this area. Understanding timing and locations of vertical mixing areas for coastal Brier and its ledges would support distribution models of sensitive benthic organisms and aid emergency response planning for pollution events. Conduct extended oceanographic sampling (temperature, salinity, turbidity, chlorophyll) at all dive and camera locations to aid fine-scale distributional model comparisons.

- Develop and implement a standardised protocol for coastal habitat mapping and data sharing using species list and habitat classifications that were developed in this report.
- Develop framework to compare Brier Island subtidal habitat, flora, and fauna with historical observations and other Bay of Fundy EBSA.

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IDENTIFICATION RESOURCES

In comparing the last major sublittoral survey of Brier Island (MacKay 1977) with the 2017 survey we noted some differences in the perception of species richness, and also identified some trends in species presence over time. These are sensitive to both the survey methodology used (including limitations on ability to collect specimens for subsequent taxonomic identification) and taxonomic resolution achievable. In order to advance research and monitoring for coastal habitats, consistent approaches to habitat characterisation and species identification are essential to record changes in species distribution over time. Some of the literature sources that were used for identification of species in this study are listed below. As is typical of habitat biodiversity investigations, multiple taxonomic resources are used to build a comprehensive understanding of species richness within a specific region. To facilitate future investigations, we advocate the development of area-specific species checklists, a standardised habitat survey methodology, and the use of authoritative taxonomic identification based on *in situ* images and comparison with reference materials. As *in situ* appearance like substrate attachments, shape, and colour was not known for many species, we photographed specimens from difficult groups (including Bryozoans, Ascidians and Porifera) and collected samples for laboratory examination. Based on confirmed species identified from the samples, these newly-aquired reference photographs will enable more species to be identified *in situ* on future surveys of the area.

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Table 1 - Details of sites surveyed during the 2017 Brier Island Survey. Site positions as in Figure 4. Estimates for exposure and maximum tidal stream were assigned by the survey team based on chart and on-site observations.

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
1	170829_02	Northwest ledges	29/08/17	44.31714	-66.40504	9.5	Bedrock gully dominated by *Laminaria digitata*. Some areas of foliose algae.	Kelp bed.	Exposed	3-6k
2	170829_01	Northwest ledges	29/08/17	44.31627	-66.40279	11	Crevice 1-3m wide with walls 2-3m in height. Walls steeply sloping with some vertical faces. Kelp bed on upper parts of walls, foliose algae on lower. Shell gravel and cobbles on base of crevasse.	Kelp bed, Mixed sediment with sparse life.	Exposed	3-6k
3	170829_03	Seal Cove	29/08/17	44.28503	-66.34894	6.4	Basalt columns in fairly high stacks (3-4m in height). Many small walls. Sand in between columns. Dense cover of foliose red algae and sparse *Laminaria digitata*. Heavily silted.	Foliose algae.	Exposed	1-3k
4	170927_02	Brier Island Grand Passage	27/09/17	44.28093	-66.33964	16.6	Moderately sloping bottom consisting primarily of cobble with dispersed boulders (50cm-1m in	Foliose algae and animal turf.	Very Sheltered	>6k

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
							diameter). Boulders with turf of bryozoans, sponges and red algae. In cobble field there were numerous approx 1lb lobster and Jonah crab. Flatfish, gunnels and sea raven.			
5	170927_01	Brier Island Grand Passage northeast of Bald Rock	27/09/17	44.27916	-66.34076	14.9	Sloping *Modiolus modiolus* reef. Very dense accumulation of dead shells and consequently hard to estimate number of live individuals - around 10-20%. Occasional small boulders.	Horse mussel bed.	Very Sheltered	>6k
6	170926_01	Brier Island Grand Passage	26/09/17	44.27746	-66.34124	17.2	Horse mussel reef on sand and gravel substrate with cobbles and boulders. Covered with sparse kelp and moderately dense foliose algae.	Horse mussel bed, Foliose algae.	Very Sheltered	>6k
7	170827-04	East of Westport cliffs, Petite Passage	27/08/17	44.27359	-66.34501	0.8	Sloping, algae dominated, bedrock and boulders.	Kelp bed, Foliose algae.	Very Sheltered	>6k

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
8	170927_03	North end of Peter's Island	27/09/17	44.26084	-66.33835	11.5	Moderately sloping cobbles leading onto flat cobble plateau. Moderate to light coverage of kelp and turf algae species. Sandy gravel with *Modiolus modiolus* between cobbles.	Foliose algae, Foliose algae and animal turf.	Very Sheltered	3-6k
9	170827_01	Peter's Island	27/08/17	44.25860	-66.33667	9.1	Slope of boulders, cobbles and bedrock with some sand. Fairly dense kelp bed.	Kelp bed, Foliose algae.	Very Sheltered	3-6k
10	170827_02	Peter's Island	27/08/17	44.25789	-66.33660	8.3	Broad leaf kelp bed over boulders forming dense mats 1-2m thick.	Kelp bed.	Very Sheltered	3-6k
11	170827_03 170829_04	Bay west of Peter's Island	27/08/17 29/08/17	44.25731	-66.34399	7.4	*Zostera marina* eelgrass bed on soft sand. Very abundant, long, growth of *Zostera marina*. Lots of animal life at the base of the bed. Habitat form not completed on second dive as primarily for seaweed sample collection.	Eelgrass Bed, Mixed Sediment with sparse Life.	Very Sheltered	<1k
12	170928_02	West of Peter's Island	28/09/17	44.25715	-66.34025	4.9	Sloping seabed in passage between Brier Island and Peter's Island. Shallow area with fast	Kelp bed.	Very Sheltered	3-6k

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
							current. Seabed dominated by *Laminaria digitata.*			
13	170928_03	Brier Island southeast shore	28/09/17	44.24997	-66.34645	17.8	Steep stepped slope with vertical bedrock walls 2-5m high. Bedrock covered in algal turf, a few kelp holdfasts visible. Numerous crevices with lobster and crab. Several different sponges, both encrusting and branching.	Foliose algae and animal turf. Mixed sediment with sparse life.	Exposed	3-6k
14	170928_01	Southeast shore Brier Island	28/09/17	44.24457	-66.35309	18.9	Bedrock and boulder wall with moderate slope, ending on a deeper sandy plateau. Very rugged with fissures and crevices. Moderate amount of kelp and turf algae. Exposed to SW swell.	Foliose algae and animal turf.	Exposed	3-6k
15	170830_02	Gull rock west side	30/08/17	44.20986	-66.38966	9.1	Bedrock kelp covered ledge, gently sloping towards shore. Very uneven with many fissures, crevices and holes. Densely covered with foliose algae turf.	Kelp bed.	Exposed	1-3k

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
16	170830_01	Southeast side Gull rock	30/08/17	44.20948	-66.38554	8.6	Steep slope of boulders with bedrock wall at top. Slope east facing, on side of Gull Rock. Abundant foliose red algae and kelp bed on upper part of slope. Whole area heavily silted.	Kelp bed, Foliose algae.	Exposed	3-6k
17	170828-01 170828-02	Southwest ledges Brier Island	28/08/17	44.18781	-66.42013	13.2	Rocky reef with *Laminaria digitata* kelp bed and foliose red algae. Nearshore pinnacle. Bedrock mixed with cobbles on flat areas. Dense cover of kelp, red macroalgae, sponges, bryozoans and other invertebrates. Schooling pollack, sea raven and winter flounder.	Kelp bed, Foliose algae	Exposed	>6k
18	170828-03	East side of Whipple Point	28/08/17	44.23369	-66.38941	10.5	Bedrock in large steps leading onto sand with cobbles. Kelp bed in shallower areas then in deeper abundant coralline algae and foliose reds.	Kelp bed, foliose algae	Exposed	1-3k

Site	Dive No	Location	Date dd/mm/yy	Latitude Decimal Degrees	Longitude Decimal Degrees	Max Depth BCD (m)	Description	Main habitat present	Exposure	Max Tidal stream
19	170926_03	Brier Island northwest shore near south lighthouse	26/09/17	44.25449	-66.38734	4.8	Cove on northwest side of Brier Island with large shoal near mouth of the cove. Shallowly sloping bedrock covered in kelp.	Foliose algae.	Exposed	3-6k
20	170926_02	Brier Island northwest shore	26/09/17	44.26863	-66.36946	4.9	Cove on northwest side of Brier Island. Very surge swept. Substrate primarily small boulders <1m in diameter with open patches of shell hash and sand in between. Dominant cover kelp with patches of foliose algae.	Foliose algae.	Exposed	1-3k

Table 2 - Summary of water quality measured by month and dive number. Temperature, salinity, turbidity and chlorophyll are reported as average over the entire dive profile with sample standard deviation in brackets.

Dive	Site	Maximum sensor depth (m)	Samples (n)	Temperature (°C)	Salinity (PSU)	Turbidity (NTU)	Chlorophyll (RFU)
August							
170827.1	9	9.9	20	11.58(.03)	32.41(.01)	0.83(.14)	0.34(.07)
170827.2	10	6.9	17	11.96(.11)	32.38(.03)	1.15(.06)	0.38(.08)
170827.3	11	8.4	20	11.93(.03)	32.45(.01)	1.11(.16)	0.31(.10)
170827.4	7	3.3	16	12.64(.06)	32.31(.01)	1.05(.10)	0.32(.08)
170828.1	17	14.1	21	11.35(.01)	32.54(.01)	1.24(.57)	0.37(.07)
170828.2	17	13.5	14	11.36(.00)	32.55(.00)	1.09(.14)	0.35(.07)
170828.3	18	12.6	21	11.92(.05)	32.41(.01)	1.12(.37)	0.41(.11)
170829.1	2	11.3	23	11.24(.07)	32.65(.01)	0.95(.08)	0.45(.08)
170829.2	1	nd	nd	nd	nd	nd	nd
170829.3	3	8.1	17	11.64(.10)	32.56(.01)	1.08(.39)	0.32(.08)
170829.4	11	3.7	19	12.60(.09)	32.41(.03)	0.97(.05)	0.30(.08)
September							
170830.1	16	17.2	20	12.62(.18)	32.18(.06)	0.70(.06)	0.73(.18)
170830.2	15	10.2	21	11.53(.10)	32.53(.04)	0.85(.12)	0.35(.11)
170926.1	6	16	19	12.64(.02)	32.75(.02)	1.18(.13)	0.28(.06)
170926.2	20	6.7	9	12.91(.08)	32.76(.00)	4.29(.59)	0.40(.09)
170926.3	19	7.1	14	12.90(.02)	32.72(.01)	1.90(.18)	0.28(.07)
170927.1	5	15.4	15	12.76(.01)	32.68(.01)	1.40(.12)	0.30(.07)
170927.2	4	17.4	14	12.76(.01)	32.66(.00)	1.32(.11)	0.32(.08)
170927.3	8	12.7	19	12.87(.05)	32.68(.01)	1.33(.13)	0.34(.08)
170928.1	14	19.6	18	13.21(.01)	32.59(.01)	1.77(.35)	0.36(.06)
170928.2	12	6	12	13.11(.08)	32.59(.01)	1.44(.10)	0.32(.06)
170928.3	13	nd	nd	nd	nd	nd	nd

Table 3 - Species recorded by main habitat type as total number of records and records by habitat type (n = habitats observed).

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Kingdom Plantae – Phylum Chlorophyta									
Derbesia marina	(Lyngbye) Solier, 1846	Derbesiaceae	1						1
Chaetomorpha melagonium	(F.Weber & Mohr) Kützing, 1845	Cladophoraceae	2	1			1		
Gayralia oxysperma	(Kützing) K.L.Vinogradova ex Scagel et al., 1989	Gayraliaceae	1						1
Ulva lactuca	Linnaeus, 1753	Ulvaceae	2	1					1
Ulva	Linnaeus, 1753	Ulvaceae	12	7	2		2	1	
Kingdom Plantae – Phylum Rhodophyta									
Acrochaetium secundatum	(Lyngbye) Nägeli, 1858	Acrochaetiaceae	1				1		
Rhodochorton purpureum	(Lightfoot) Rosenvinge, 1900	Acrochaetiaceae	1	1					
Bonnemaisonia hamifera	Hariot, 1891	Bonnemaisoniaceae	7	4		1	2		1
Ptilota serrata	Kützing, 1847	Callithamniaceae	3	1			2		
Antithamnionella floccosa	(O.F.Müller) Whittick, 1980	Ceramiaceae	5	1		1	2		1
Ceramium virgatum	Roth, 1797	Ceramiaceae	1						1
Scagelia pylaisaei	(Montagne) M.J.Wynne, 1985	Ceramiaceae	4	2		1	1		
Phycodrys rubens	(Linnaeus) Batters, 1902	Delesseriaceae	13	4	1	1	6		
Membranoptera fabriciana	(Lyngbye) M.J.Wynne & G.W.Saunders, 2012	Delesseriaceae	2	1		1	1		
Polysiphonia flexicaulis	(Harvey) F.S.Collins, 1911	Rhodomelaceae	1						1

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Polysiphonia stricta	(Mertens ex Dillwyn) Greville, 1824	Rhodomelaceae	5	2		1	2		
Colaconema bonnemaisoniae	Batters, 1896	Colaconemataceae	1						1
Colaconema endophyticum	(Batters) J.T.Harper & G.W.Saunders, 2002	Colaconemataceae	2	1			1		
Colaconema daviesii	(Dillwyn) Stegenga, 1985	Colaconemataceae	2			1	1		
Corallina officinalis	Linnaeus, 1758	Corallinaceae	15	7	4	1	3		
Titanoderma pustulatum	(J.V.Lamouroux) Nägeli, 1858	Lithophyllaceae	3	1		1	1		
Corallinales	P.C. Silva & H.W. Johansen, 1986		20	8	4	2	5	1	
Fimbrifolium dichotomum	(Lepechin) G.I.Hansen, 1980	Cystocloniaceae	2	1			1		
Chondrus crispus	Stackhouse, 1797	Gigartinaceae	29	14	6	1	6	1	
Euthora cristata	(C.Agardh) J.Agardh, 1847	Kallymeniaceae	12	6	1	3	1		
Phyllophora pseudoceranoïdes	(S.G.Gmelin) Newroth & A.R.A.Taylor ex P.S.Dixon & L.M.Irvine, 1977	Phyllophoraceae	3	1		1	1		
Coccotylus truncatus	(Pallas) M.J.Wynne & J.N.Heine, 1992	Phyllophoraceae	2	2					
Coccotylus hartzii	(Rosenvinge) L.Le Gall & G.W.Saunders, 2010	Phyllophoraceae	1	1					
Hildenbrandia rubra	(Sommerfelt) Meneghini, 1841	Hildenbrandiaceae	1				1		
Rubrointrusa membranacea	(Magnus) S.L.Clayden & G.W.Saunders, 2010	Meiodiscaceae	2	1			1		
Palmaria palmata	(Linnaeus) Weber & Mohr, 1805	Palmariaceae	17	6	2	1	7		
Rhodophysema georgei	Batters, 1900	Rhodophysemataceae	1						1

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Kingdom Plantae – Phylum Tracheophyta									
Zostera (Zostera) marina	Linnaeus, 1753	Zosteraceae	3					1	1
Kingdom Chromista – Phylum Ochrophyta									
Desmarestia aculeata	(Linnaeus) J.V.Lamouroux, 1813	Desmarestiaceae	19	7	2		7	2	1
Dictyosiphon foeniculaceus	(Hudson) Greville, 1830	Chordariaceae	3	2			1		
Ectocarpus siliculosus	(Dillwyn) Lyngbye, 1819	Ectocarpaceae	3	1			1		1
Planosiphon zosterifolius	(Reinke) McDevit & G.W.Saunders, 2017	Scytosiphonaceae	1						1
Fucus vesiculosus	Linnaeus, 1753	Fucaceae	3	2			1		
Agarum clathratum	Dumortier, 1822	Agaraceae	26	12	3		10	1	
Alaria esculenta	(Linnaeus) Greville, 1830	Alariaceae	2				2		
Laminaria digitata	(Hudson) J.V.Lamouroux, 1813	Laminariaceae	30	12	4	2	11	1	
Saccharina latissima	(Linnaeus) C.E.Lane, C.Mayes, Druehl & G.W.Saunders, 2006	Laminariaceae	19	8	4	1	5	1	
Kingdom Animalia – Phylum Annelida									
Euphrosine borealis	Örstedt, 1843	Euphrosinidae	1		1				
Phyllodocidae	Örsted, 1843	Phyllodocidae	1						1
Harmothoe imbricata	(Linnaeus, 1767)	Polynoidae	2	1					1
Lepidonotus squamatus	(Linnaeus, 1758)	Polynoidae	3	1		1	1		
Gattyana cirrhosa	(Pallas, 1766)	Polynoidae	1	1					

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Proceraea prismatica	(O.F. Müller, 1776)	Syllidae	1			1			
Myxicola infundibulum	(Montagu, 1808)	Sabellidae	7	6	1				
Nicolea zostericola	Örsted, 1844	Terebellidae	1				1		
Kingdom Animalia – Phylum Arthropoda									
Ampithoe	Leach, 1814	Ampithoidae	1	1					
Caprellidae	Leach, 1814	Caprellidae	2	1					1
Caprella septentrionalis	Krøyer, 1838	Caprellidae	7	4		2	1		
Aeginina longicornis	(Krøyer, 1843)	Caprellidae	1				1		
Caprella linearis	(Linnaeus, 1767)	Caprellidae	5	2	1	2			
Monocorophium acherusicum	(Costa, 1853)	Corophiidae	5	4		1			
Dexamine thea	Boeck, 1861	Dexaminidae	1				1		
Gammarellus angulosus	(Rathke, 1843)	Gammarellidae	1	1					
Ischyrocerus	Krøyer, 1838	Ischyroceridae	3	1			1		1
Jassa marmorata	Holmes, 1905	Ischyroceridae	8	5		2	1		
Ericthonius rubricornis	(Stimpson, 1853)	Ischyroceridae	2			1	1		
Ischyrocerus anguipes	Krøyer, 1838	Ischyroceridae	2			1	1		
Ischyrocerus	Krøyer, 1838	Ischyroceridae	2	1		1			
Cancer irroratus	Say, 1817	Cancridae	14	5	1	1	5	1	1
Cancer borealis	Stimpson, 1859	Cancridae	27	11	6	3	7		
Carcinus maenas	(Linnaeus, 1758)	Carcinidae	2				1	1	
Crangon septemspinosa	Say, 1818	Crangonidae	1					1	

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Homarus americanus	H. Milne Edwards, 1837	Nephropidae	30	11	4	3	10	1	1
Paguridae	Latreille, 1802	Paguridae	16	5	2	1	8		
Pagurus acadianus	Benedict, 1901	Paguridae	4		2	2			
Lebbeus groenlandicus	(Fabricius, 1775)	Thoridae	1				1		
Idotea phosphorea	Harger, 1873 in Verrill, Smith & Harger, 1873	Idoteidae	5	2		2	1		
Achelia spinosa	(Stimpson, 1853)	Ammotheidae	4	2		1	1		
Nymphon grossipes	(Fabricius, 1780)	Nymphonidae	2	1		1			
Phoxichilidium femoratum	(Rathke, 1799)	Phoxichilidiidae	1			1			
Semibalanus balanoides	(Linnaeus, 1767)	Archaeobalanidae	2		1	1			
Kingdom Animalia – Phylum Brachiopoda									
Terebratulina septentrionalis	(Couthouy, 1838)	Cancellothyrididae	2		2				
Kingdom Animalia – Phylum Bryozoa									
Porella acutirostris	Smitt, 1868	Bryocryptellidae	1			1			
Dendrobeania murrayana	(Bean in Johnston, 1847)	Bugulidae	18	6	4	3	4		
Bugulina fulva	(Ryland, 1960)	Bugulidae	1	1					
Callopora thaxterae	Winston & Hayward, 2012	Calloporidae	2			1	1		
Tegella unicornis	(Fleming, 1828)	Calloporidae	3	1	1	1			
Amphiblestrum flemingii	(Busk, 1854)	Calloporidae	1			1			
Tricellaria ternata	(Ellis & Solander, 1786)	Candidae	6	2		2	2		
Caberea ellisii	(Fleming, 1814)	Candidae	6	1	3		2		

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Electra pilosa	(Linnaeus, 1767)	Electridae	9	4		2	3		
Eucratea loricata	(Linnaeus, 1758)	Eucrateidae	9	3	1	3	1		
Fenestrulina delicia	Winston, Hayward & Craig, 2000	Fenestrulinidae	1			1			
Flustra foliacea	(Linnaeus, 1758)	Flustridae	6	2	1		3		
Celleporella hyalina	(Linnaeus, 1767)	Hippothoidae	8	3	1	2	2		
Haplota clavata	(Hincks, 1857)	Hippothoidae	4	1	1	2			
Cylindroporella tubulosa	(Norman, 1868)	Lacernidae	1			1			
Membranipora membranacea	(Linnaeus, 1767)	Membraniporidae	23	9	5	2	7		
Microporella rogickae	Winston, Hayward & Craig, 2000	Microporellidae	2	1		1			
Entalophoroecia harmeri	(Osburn, 1933)	Annectocymidae	3	2	1				
Crisia eburnea	(Linnaeus, 1758)	Crisiidae	10	2	2	1	5		
Patinella verrucaria	(Linnaeus, 1758)	Lichenoporidae	4	1	1	2			
Tubulipora confracta	Winston & Hayward, 2012	Tubuliporidae	2	1		1			
Kingdom Animalia – Chordata - Tunicata									
Didemnum albidum	(Verrill, 1871)	Didemnidae	13	5	3	1	4		
Diplosoma listerianum	(Milne Edwards, 1841)	Didemnidae	10	3	3		4		
Aplidium glabrum	(Verrill, 1871)	Polyclinidae	6	2	2		2		
Boltenia echinata	(Linnaeus, 1767)	Pyuridae	3		2		1		
Kingdom Animalia – Chordata - Fish									
Clupea harengus	Linnaeus, 1758	Clupeidae	4		1		1	2	
Pollachius virens	(Linnaeus, 1758)	Gadidae	21	8	3	1	8	1	

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Gadus morhua	Linnaeus, 1758	Gadidae	2	1				1	
Tautogolabrus adspersus	(Walbaum, 1792)	Labridae	6	1	3		1	1	
Pholis gunnellus	(Linnaeus, 1758)	Pholidae	12	5	1	3	3		
Pseudopleuronectes americanus	(Walbaum, 1792)	Pleuronectidae	13	4	2	2	2	2	1
Triglops murrayi	Günther, 1888	Cottidae	2	1				1	
Myoxocephalus scorpius	(Linnaeus, 1758)	Cottidae	3	1			2		
Hemitripterus americanus	(Gmelin, 1789)	Hemitripteridae	4	1	2	1			
Kingdom Animalia – Cnidaria - Anemones									
Urticina felina	(Linnaeus, 1761)	Actiniidae	1		1				
Diadumene leucolena	(Verrill, 1866)	Diadumenidae	1				1		
Kingdom Animalia – Cnidaria - Hydroids									
Garveia cerulea	(Clarke, 1882)	Bougainvilliidae	2	1		1			
Garveia brevis	(Fraser, 1918)	Bougainvilliidae	1			1			
Coryne eximia	Allman, 1859	Corynidae	6	1	1	3	1		
Ectopleura larynx	(Ellis & Solander, 1786)	Tubulariidae	4			2	2		
Hybocodon prolifer	Agassiz, 1860	Tubulariidae	1	1					
Obelia geniculata	(Linnaeus, 1758)	Campanulariidae	17	10	1	2	4		
Orthopyxis integra	(MacGillivray, 1842)	Campanulariidae	8	3	1	2	2		
Rhizocaulus verticillatus	(Linnaeus, 1758)	Campanulariidae	4	1	1	1	1		
Obelia longissima	(Pallas, 1766)	Campanulariidae	3	1	1	1			
Obelia dichotoma	(Linnaeus, 1758)	Campanulariidae	1			1			

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Clytia hemisphaerica	(Linnaeus, 1767)	Campanulariidae	3	2	1				
Calycella syringa	(Linnaeus, 1767)	Campanulinidae	10	5	2	2	1		
Halecium articulosum	Clark, 1875	Haleciidae	5	2	2		1		
Halecium beanii	(Johnston, 1838)	Haleciidae	3	2			1		
Sertularella polyzonias	(Linnaeus, 1758)	Sertularellidae	3				3		
Diphasia rosacea	(Linnaeus, 1758)	Sertulariidae	4	2		1	1		
Hydrallmania falcata	(Linnaeus, 1758)	Sertulariidae	2	1			1		
Sertularia latiuscula	Stimpson, 1854	Sertulariidae	1				1		
Sertularia argentea	Linnaeus, 1758	Sertulariidae	3		1	2			
Symplectoscyphus tricuspidatus	(Alder, 1856)	Symplectoscyphidae	1			1			
Kingdom Animalia – Ctenophora									
Pleurobrachia pileus	(O. F. Müller, 1776)	Pleurobrachiidae	2					1	1
Kingdom Animalia – Echinodermata									
Amphipholis squamata	(Delle Chiaje, 1828)	Amphiuridae	1			1			
Ophiopholis aculeata	(Linnaeus, 1767)	Ophiopholidae	3	1			1	1	
Asterias rubens	Linnaeus, 1758	Asteriidae	12	4	3	2	3		
Asterias forbesi	(Desor, 1848)	Asteriidae	3		2	1			
Henricia sanguinolenta	(O.F. Müller, 1776)	Echinasteridae	15	3	5		7		
Kingdom Animalia – Mollusca									
Hiatella arctica	(Linnaeus, 1767)	Hiatellidae	8	4		2	2		

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Parvicardium pinnulatum	(Conrad, 1831)	Cardiidae	1			1			
Boreochiton ruber	(Linnaeus, 1767)	Tonicellidae	1				1		
Tonicella marmorea	(O. Fabricius, 1780)	Tonicellidae	1	1					
Lacuna vincta	(Montagu, 1803)	Littorinidae	13	7	1	2	2		1
Littorina saxatilis	(Olivi, 1792)	Littorinidae	1						1
Littorina littorea	(Linnaeus, 1758)	Littorinidae	4	2			2		
Alvania pseudoareolata	Warén, 1974	Rissoidae	5	2	1	1	1		
Skeneopsis planorbis	(O. Fabricius, 1780)	Skeneopsidae	2	1			1		
Modiolus modiolus	(Linnaeus, 1758)	Mytilidae	23	7	4	3	8	1	
Mytilus edulis	Linnaeus, 1758	Mytilidae	5	2		2	1		
Buccinum undatum	Linnaeus, 1758	Buccinidae	5	2	1		2		
Tritia trivittata	(Say, 1822)	Nassariidae	1						1
Cadlina laevis	(Linnaeus, 1767)	Cadlinidae	1	1					
Doto formosa	A. E. Verrill, 1875	Dotidae	1					1	
Doto	Oken, 1815	Dotidae	3	1		1	1		
Anomia simplex	d'Orbigny, 1853	Anomiidae	11	3	1	3	3		
Heteranomia squamula	(Linnaeus, 1758)	Anomiidae	3	2		1			
Placopecten magellanicus	(Gmelin, 1791)	Pectinidae	4	2		1		1	
Margarites helicinus	(Phipps, 1774)	Margaritidae	1			1			
Kingdom Animalia – Porifera									
Haliclona	Grant, 1841	Chalinidae	3	2		1			

Species	Authority	Family	Total no. records (44)	Foliose algae (17)	Foliose algae and animal turf (6)	Horse Mussel Bed (3)	Kelp bed (14)	Mixed sediment with sparse life (3)	Eelgrass bed (1)
Haliclona (Haliclona) oculata	(Linnaeus, 1759)	Chalinidae	1		1				
Leucosolenia	Bowerbank, 1864	Leucosoleniidae	1	1					
Sycon	Risso, 1827	Sycettidae	5	2	2		1		
Crellomima	Rezvoi, 1925	Crellidae	7	2	4		1		
Plocamionida ambigua	(Bowerbank, 1866)	Hymedesmiidae	3		2		1		
Hymedesmia (Hymedesmia) canadensis	Ginn, Logan, Thomas & van Soest, 1998	Hymedesmiidae	3	1	1		1		
Hymedesmia (Hymedesmia)	Bowerbank, 1864	Hymedesmiidae	3		3				
Isodictya deichmannae	(de Laubenfels, 1949)	Isodictyidae	12	3	2	1	6		
Isodictya palmata	(Ellis & Solander, 1786)	Isodictyidae	4	3		1			
Myxilla (Myxilla) fimbriata	(Bowerbank, 1866)	Myxillidae	3	1	1		1		
Tedania (Tedania) suctoria	Schmidt, 1870	Tedaniidae	2		1		1		
Polymastia boletiformis	(Lamarck, 1815)	Polymastiidae	1	1					
Halichondria (Eumastia) sitiens	(Schmidt, 1870)	Halichondriidae	5	2			3		
Halichondria (Halichondria) panicea	(Pallas, 1766)	Halichondriidae	15	6	5	2	2		
Halichondria (Halichondria)	Fleming, 1828	Halichondriidae	1				1		
Hymeniacidon	Bowerbank, 1858	Halichondriidae	5	2	3				
Halichondria (Halichondria) bowerbanki	Burton, 1930	Halichondriidae	1	1					
Protosuberites	Swartschewsky, 1905	Suberitidae	1	1					

Table 4 - Species recorded by location, dive number, main habitat type (EB = eelgrass bed; FA = foliose algae; FAA = foliose algae and animal turf; HM = horse mussel reef; KB = kelp bed; MS = mixed sediment with sparse life) or aggregated as collected for seaweed sampled or animals. Species abundances are reported using the semi-quantitative SACFOR scale (see Appendix 2).. Data arranged as three tables 4A, 4B, 4C in the order that dives were conducted.

Table 4A		**Peter's Island Sites 9 and 10**						**Bay west of Peter's Island Site 11**			**East of Westport cliffs, Petite Passage Site 7**			**Southwest ledges Site 17**						**East side of Whipple Point Site 18**			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Kingdom Plantae – Phylum Chlorophyta																							
Derbesia marina	1									P													
Chaetomorpha melagonium	2				P																		
Gayralia oxysperma	1									P													
Ulva	12																						
Ulva lactuca	2									P													
Kingdom Plantae – Phylum Rhodophyta																							
Acrochaetium secundatum	1																						
Rhodochorton purpureum	1																						

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Bonnemaisonia hamifera	8									P													
Ptilota serrata	3																						
Antithamnionella floccosa	5									P													
Ceramium virgatum	1									P													
Scagelia pylaisaei	4																						
Membranoptera fabriciana	3																						
Phycodrys rubens	13																						
Polysiphonia flexicaulis	1									P													
Polysiphonia stricta	5																						
Colaconema bonnemaisoniae	1									P													
Colaconema daviesii	2																						
Colaconema endophyticum	2																						
Corallina officinalis	15															P					S		
Titanoderma pustulatum	3																						
Corallinales	20																			O	C	C	

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Fimbrifolium dichotomum	2																						
Chondrus crispus	29	C		C										F		P				F	F	F	
Euthora cristata	12															P					F		
Coccotylus hartzii	1																						
Coccotylus truncatus	2																						
Phyllophora pseudoceranoïdes	3							P															
Hildenbrandia rubra	1																						
Rubrointrusa membranacea	2																						
Palmaria palmata	17	O		O										F						C	F		
Rhodophysema georgei	1									P													
Kingdom Plantae – Phylum Tracheophyta																							
Zostera (Zostera) marina	3							S	O	P													
Kingdom Chromista – Phylum Ochrophyta																							
Desmarestia aculeata	19		O						O	P					F	P							

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Dictyosiphon foeniculaceus	3																						
Ectocarpus siliculosus	3									P													
Planosiphon zosterifolius	1			R																			
Fucus vesiculosus	3										S	R	R										
Agarum clathratum	26	P					P		O		R	F	R	O		P					C		
Alaria esculenta	2											A											
Laminaria digitata	30	A		A										C	O	P		S	S	A			
Saccharina latissima	19	F		F			S		O		O	S	O							R			
Kingdom Animalia – Phylum Annelida																							
Euphrosine borealis	1																						
Phyllodocidae	1													F						C	C		
Gattyana cirrhosa	1																P						
Harmothoe imbricata	2							P									P						
Lepidonotus squamatus	3	P				P																	
Proceraea prismatica	1																						
Myxicola infundibulum	7																						
Nicolea zostericola	1																						

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Kingdom Animalia – Phylum Arthropoda																							
Semibalanus balanoides	2																						
Ampithoe	1					P																	
Aeginina longicornis	1																						
Caprella linearis	5																P						
Caprella septentrionalis	7					P																	P
Caprellidae	2							P									P						
Monocorophium acherusicum	5																P						P
Dexamine thea	1																						
Gammarellus angulosus	1																P						
Ericthonius rubricornis	2																						
Ischyrocerus	5							P									P						P
Ischyrocerus anguipes	2																						
Jassa marmorata	8					P											P						P
Cancer borealis	27	O	O	O										C	C					C	C		
Cancer irroratus	14						F	F	F											F			
Carcinus maenas	2								O			P											

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Crangon septemspinosa	1								R														
Homarus americanus	30	C	C				F	F	F					F	C			F	F	F	C	A	
Paguridae	16	C	C	C			O					P											
Pagurus acadianus	4																						
Lebbeus groenlandicus	1		R																				
Idotea phosphorea	5																						P
Achelia spinosa	4																						
Nymphon grossipes	2																						
Phoxichilidium femoratum	1											P		R	R								
Kingdom Animalia – Phylum Brachiopoda																							
Terebratulina septentrionalis	2																						
Kingdom Animalia – Phylum Bryozoa																							
Porella acutirostris	1																						
Bugulina fulva	1																						

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Dendrobeania murrayana	18	P		P										O							O		
Amphiblestrum flemingii	1																						
Callopora thaxterae	2																						
Tegella unicornis	3																						
Caberea ellisii	6																						
Tricellaria ternata	6																P						
Electra pilosa	9					P											P						P
Eucratea loricata	9	F		F																			
Fenestrulina delicia	1																						
Flustra foliacea	6													C									
Celleporella hyalina	8					P											P						
Haplota clavata	4																						P
Cylindroporella tubulosa	1																						
Membranipora membranacea	23	A		A										F	F								
Microporella rogickae	2																						
Entalophoroecia harmeri	3					P																	
Crisia eburnea	10	F		F										C									

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Patinella verrucaria	4																						
Tubulipora confracta	2																						
Kingdom Animalia – Chordata - Tunicata																							
Didemnum albidum	13	O												F							F		
Diplosoma listerianum	10	R																			F		
Aplidium glabrum	6	O																			P		P
Boltenia echinata	3																						
Kingdom Animalia – Chordata - Fish																							
Clupea harengus	4																						
Gadus morhua	2														R								
Pollachius virens	21	C					F					C	C	C	C			C	C		C	C	
Tautogolabrus adspersus	6																						
Pholis gunnellus	12									P													
Pseudopleuronectes americanus	13							R	R						R			A	A				
Myoxocephalus scorpius	3																						

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Triglops murrayi	2								R														
Hemitripterus americanus	4														R								
Kingdom Animalia – Cnidaria - Anemones																							
Urticina felina	1																						
Diadumene leucolena	1																						
Kingdom Animalia – Cnidaria - Hydroids																							
Garveia brevis	1																						
Garveia cerulea	2																						
Coryne eximia	6																						
Ectopleura larynx	4																						
Hybocodon prolifer	1																P						
Clytia hemisphaerica	3					P																	
Obelia dichotoma	1																						
Obelia geniculata	17	C		C										F	F					C	C		
Obelia longissima	3																				P		
Orthopyxis integra	8					P																	

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Rhizocaulus verticillatus	4																				P		
Calycella syringa	10					P											P						P
Halecium articulosum	5																P						
Halecium beanii	3																						
Sertularella polyzonias	3	P																					
Diphasia rosacea	4													F			P						
Hydrallmania falcata	2																						
Sertularia argentea	3																						
Sertularia latiuscula	1																						
Symplectoscyphus tricuspidatus	1																						
Kingdom Animalia – Ctenophora																							
Pleurobrachia pileus	2							A	A														
Kingdom Animalia – Echinodermata																							
Asterias forbesi	3																						
Asterias rubens	12													O	O								
Henricia sanguinolenta	15	R												O	O								

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Amphipholis squamata	1																						
Ophiopholis aculeata	3								P								P						
Kingdom Animalia – Mollusca																							
Hiatella arctica	8																P						P
Parvicardium pinnulatum	1																						
Modiolus modiolus	23			F			O						P					C	C	C			
Mytilus edulis	5																P						
Anomia simplex	11	C										P											
Heteranomia squamula	3					P																	
Placopecten magellanicus	4																						
Lacuna vincta	13					P		C									P						
Littorina littorea	4										C												
Littorina saxatilis	1							O															
Alvania pseudoareolata	5					P																	
Skeneopsis planorbis	2																P						
Buccinum undatum	5																						
Tritia trivittata	1							P															

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Cadlina laevis	1																				O		
Doto	3																P			R			
Doto formosa	1								R														
Margarites helicinus	1																						
Boreochiton ruber	1																						
Tonicella marmorea	1																				P		
Kingdom Animalia – Porifera																							
Leucosolenia	1																						P
Sycon	5																						
Haliclona	3																						
Haliclona (Haliclona) oculata	1																						
Crellomima	7	P																			R		
Hymedesmia (Hymedesmia)	3																						
Hymedesmia (Hymedesmia) canadensis	3													R									

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Plocamionida ambigua	3																						
Isodictya deichmannae	12	F		O																			P
Isodictya palmata	4													C									
Myxilla (Myxilla) fimbriata	3													P									
Tedania (Tedania) suctoria	2	P																					
Polymastia boletiformis	1																						P
Halichondria (Eumastia) sitiens	5	O												P									
Halichondria (Halichondria)	1																	C					
Halichondria (Halichondria) bowerbanki	1																						
Halichondria (Halichondria) panicea	15													O					C				
Hymeniacidon	5																						P
Protosuberites	1													P									

Table 4A		Peter's Island Sites 9 and 10						Bay west of Peter's Island Site 11			East of Westport cliffs, Petite Passage Site 7			Southwest ledges Site 17						East side of Whipple Point Site 18			
Species	**Total no. records**	170827_01_Hab1 KB	170827_01_Hab2 KB	170827_01_Hab3 FA	170827_01_seaweed	170827_01_Specimens	170827_02_Hab1 KB	170827_03_Hab1 EB	170827_03_Hab2 MS	170827_03_seaweed	170827_04_Hab1 FA	170827_04_Hab2 KB	170827_04_Hab3 FA	170828_01_Hab1 FA	170828_01_Hab2 FA	170828_01_seaweed	170828_01_Specimens	170828_02_Hab1 KB	170828_02_Hab2 FA	170828_03_Hab1 KB	170828_03_Hab2 FA	170828_03_Hab3 FA	170828_03_Specimens
Total no. species		**25**	**5**	**14**	**1**	**13**	**7**	**12**	**13**	**13**	**4**	**9**	**5**	**24**	**13**	**6**	**21**	**6**	**6**	**12**	**20**	**4**	**14**

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Kingdom Plantae – Phylum Chlorophyta																						
Derbesia marina	1																					
Chaetomorpha melagonium	2										P											
Gayralia oxysperma	1																					
Ulva	12		F						F	F							R					
Ulva lactuca	2										P											
Kingdom Plantae – Phylum Rhodophyta																						
Acrochaetium secundatum	1																	P				
Rhodochorton purpureum	1														P							
Bonnemaisonia hamifera	8	F							C	C	P				P			P				
Ptilota serrata	3			P											P			P				
Antithamnionella floccosa	5			P											P			P				
Ceramium virgatum	1																					
Scagelia pylaisaei	4			P							P				P							
Membranoptera fabriciana	3			P											P							
Phycodrys rubens	13																					P
Polysiphonia flexicaulis	1																					
Polysiphonia stricta	5			P							P				P			P				

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Colaconema bonnemaisoniae	1																					
Colaconema daviesii	2																	P				
Colaconema endophyticum	2			P							P											
Corallina officinalis	15			P					O		P							P				
Titanoderma pustulatum	3										P							P				
Corallinales	20	C	C														O	P			C	
Fimbrifolium dichotomum	2			P							P											
Chondrus crispus	29								C		P			F	P		F	P			R	
Euthora cristata	12			P					O		P				P					F	F	
Coccotylus hartzii	1														P							
Coccotylus truncatus	2										P				P							
Phyllophora pseudoceranoïdes	3																					
Hildenbrandia rubra	1			P																		
Rubrointrusa membranacea	2			P											P							
Palmaria palmata	17	C					C		F					F	P		O					
Rhodophysema georgei	1																					
Kingdom Plantae – Phylum Tracheophyta																						
Zostera (Zostera) marina	3																					

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Kingdom Chromista – Phylum Ochrophyta																						
Desmarestia aculeata	19		O	P		F	O		F	C	P			F			F	P			O	
Dictyosiphon foeniculaceus	3			P							P				P							
Ectocarpus siliculosus	3														P			P				
Planosiphon zosterifolius	1		P																	R	R	
Fucus vesiculosus	3																					
Agarum clathratum	26	F		P		C	F		C					F			F				R	
Alaria esculenta	2	F																				
Laminaria digitata	30	A	O	P		S	A		A	F				F			A	P		O	F	
Saccharina latissima	19								F								F				O	
Kingdom Animalia – Phylum Annelida																						
Euphrosine borealis	1																					
Phyllodocidae	1	C		P									C	C	P		A	P		O		
Gattyana cirrhosa	1																					
Harmothoe imbricata	2																					
Lepidonotus squamatus	3																					
Proceraea prismatica	1																					P
Myxicola infundibulum	7								C	O			O									

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Nicolea zostericola	1				P																	
Kingdom Animalia – Phylum Arthropoda																						
Semibalanus balanoides	2																					P
Ampithoe	1																					
Aeginina longicornis	1				P																	
Caprella linearis	5															P						P
Caprella septentrionalis	7				P							P				P						P
Caprellidae	2																					
Monocorophium acherusicum	5												P			P						P
Dexamine thea	1				P																	
Gammarellus angulosus	1																					
Ericthonius rubricornis	2				P																	P
Ischyrocerus	5				P																	
Ischyrocerus anguipes	2																		P			
Jassa marmorata	8				P							P				P						P
Cancer borealis	27	F							F	F			A	O			C			O	F	
Cancer irroratus	14					O	O						C	F						O	O	
Carcinus maenas	2																					
Crangon septemspinosa	1																					

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Homarus americanus	30					C	C		F	F			S	C			C			O	O	
Paguridae	16					O	O										O			F	F	
Pagurus acadianus	4																					
Lebbeus groenlandicus	1																					
Idotea phosphorea	5				P							P										P
Achelia spinosa	4				P											P						P
Nymphon grossipes	2															P						P
Phoxichilidium femoratum	1					R							O	O						R	O	
Kingdom Animalia – Phylum Brachiopoda																						
Terebratulina septentrionalis	2																					
Kingdom Animalia – Phylum Bryozoa																						
Porella acutirostris	1																					P
Bugulina fulva	1															P						
Dendrobeania murrayana	18	F											C	F						C	C	P
Amphiblestrum flemingii	1																					P
Callopora thaxterae	2				P																	P
Tegella unicornis	3															P						P
Caberea ellisii	6				P									O								

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Tricellaria ternata	6	P			P																	P
Electra pilosa	9	O			P											P			P			P
Eucratea loricata	9																			F	F	P
Fenestrulina delicia	1																					P
Flustra foliacea	6	F												O			O					
Celleporella hyalina	8				P											P			P			P
Haplota clavata	4																					P
Cylindroporella tubulosa	1																					P
Membranipora membranacea	23	C				C	R							C			F			C	C	
Microporella rogickae	2															P						P
Entalophoroecia harmeri	3															P						
Crisia eburnea	10	C			P									P								P
Patinella verrucaria	4															P						P
Tubulipora confracta	2															P						P
Kingdom Animalia – Chordata - Tunicata																						
Didemnum albidum	13	C							F				F	C			O			P		
Diplosoma listerianum	10	O							O					F			O					
Aplidium glabrum	6	O																				
Boltenia echinata	3													R								

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Kingdom Animalia – Chordata - Fish																						
Clupea harengus	4	A	A																			
Gadus morhua	2		F																			
Pollachius virens	21	C	C			C	C		O				C				F					
Tautogolabrus adspersus	6												F	R								
Pholis gunnellus	12																					
Pseudopleuronectes americanus	13		R										O	O						F	F	
Myoxocephalus scorpius	3					R	O						P									
Triglops murrayi	2																				R	
Hemitripterus americanus	4																					
Kingdom Animalia – Cnidaria - Anemones																						
Urticina felina	1																					
Diadumene leucolena	1	F																				
Kingdom Animalia – Cnidaria - Hydroids																						
Garveia brevis	1																					P
Garveia cerulea	2															P						P
Coryne eximia	6																			P		P

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Ectopleura larynx	4	O																				
Hybocodon prolifer	1																					
Clytia hemisphaerica	3															P						
Obelia dichotoma	1																					P
Obelia geniculata	17	C							C	O				F						F	F	
Obelia longissima	3																					P
Orthopyxis integra	8	P			P											P						P
Rhizocaulus verticillatus	4													P								
Calycella syringa	10				P											P						P
Halecium articulosum	5				P																	
Halecium beanii	3												C	C		P						
Sertularella polyzonias	3	O			P																	
Diphasia rosacea	4				P																	
Hydrallmania falcata	2												C	C								
Sertularia argentea	3																					
Sertularia latiuscula	1	F																				
Symplectoscyphus tricuspidatus	1																					P
Kingdom Animalia – Ctenophora																						

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Pleurobrachia pileus	2																					
Kingdom Animalia – Echinodermata																						
Asterias forbesi	3																					
Asterias rubens	12	O				R	R		O											R	R	
Henricia sanguinolenta	15	F				O	O						C	F			O					
Amphipholis squamata	1																					P
Ophiopholis aculeata	3																		P			
Kingdom Animalia – Mollusca																						
Hiatella arctica	8				P											P			P			P
Parvicardium pinnulatum	1																					P
Modiolus modiolus	23	F	F			C	C						F				O			A	A	
Mytilus edulis	5				P											P						P
Anomia simplex	11															P			P	F		P
Heteranomia squamula	3															P						P
Placopecten magellanicus	4			P											P							
Lacuna vincta	13				P				C	C		P				P			P			P
Littorina littorea	4					C	C															
Littorina saxatilis	1																					

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Alvania pseudoareolata	5				P																	P
Skeneopsis planorbis	2				P																	
Buccinum undatum	5	R											O				R					
Tritia trivittata	1																					
Cadlina laevis	1																					
Doto	3																					
Doto formosa	1																					
Margarites helicinus	1																					P
Boreochiton ruber	1																		P			
Tonicella marmorea	1																					
Kingdom Animalia – Porifera																						
Leucosolenia	1																					
Sycon	5								F					R								
Haliclona	3												R							P		
Haliclona (Haliclona) oculata	1																					
Crellomima	7																					
Hymedesmia (Hymedesmia)	3																					
Hymedesmia (Hymedesmia) canadensis	3	R																				
Plocamionida ambigua	3	P																				

Table 4B		Northwest ledges Sites 1 and 2							Seal Cove Site 3				Southeast side Gull rock Site 16				Gull rock west side Site 15			Grand Passage Site 6		
Species	**Total no. records**	170829_01_Hab1 KB	170829_01_Hab2 MS	170829_01_seaweed	170829_01_Specimens	170829_02_Hab1 KB	170829_02_Hab2 KB	170829_02_Specimens	170829_03_Hab1 FA	170829_03_Hab2 FA	170829_03_seaweed	170829_03_Specimens	170830_01_Hab1 FA	170830_01_Hab2 KB	170830_01_seaweed	170830_01_Specimens	170830_02_Hab1 KB	170830_02_seaweed	170830_02_Specimens	170926_01_Hab1 HM	170926_01_Hab2 FA	170926_01_Specimens
Isodictya deichmannae	12	F						P						O			O					
Isodictya palmata	4								O											C	C	
Myxilla (Myxilla) fimbriata	3	F																				
Tedania (Tedania) suctoria	2																					
Polymastia boletiformis	1																					
Halichondria (Eumastia) sitiens	5	P															R					
Halichondria (Halichondria)	1																					
Halichondria (Halichondria) bowerbanki	1																					
Halichondria (Halichondria) panicea	15	P																		R	R	
Hymeniacidon	5																					
Protosuberites	1																					
Total no. species		**35**	**10**	**17**	**25**	**14**	**14**	**1**	**22**	**9**	**14**	**4**	**19**	**27**	**17**	**24**	**22**	**14**	**8**	**22**	**23**	**44**

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Kingdom Plantae – Phylum Chlorophyta																					
Derbesia marina	1																				
Chaetomorpha melagonium	2																				
Gayralia oxysperma	1																				
Ulva	12	R	R	O	O						R	R	R					R			
Ulva lactuca	2																				
Kingdom Plantae – Phylum Rhodophyta																					
Acrochaetium secundatum	1																				
Rhodochorton purpureum	1																				
Bonnemaisonia hamifera	8							P													
Ptilota serrata	3																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Antithamnionella floccosa	5							P													
Ceramium virgatum	1																				
Scagelia pylaisaei	4							P													
Membranoptera fabriciana	3							P													
Phycodrys rubens	13							P													
Polysiphonia flexicaulis	1																				
Polysiphonia stricta	5							P													
Colaconema bonnemaisoniae	1																				
Colaconema daviesii	2							P													
Colaconema endophyticum	2																				
Corallina officinalis	15	O	O	F			O			F					F	O		O		O	
Titanoderma pustulatum	3							P													
Corallinales	20	F	F	C	C	O	O			F	F	O	O					A		C	

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Fimbrifolium dichotomum	2																				
Chondrus crispus	29	A	A	F	F		O	P	P	F	F	R	R		F	R		O	C	C	
Euthora cristata	12					F	F	P							F						
Coccotylus hartzii	1																				
Coccotylus truncatus	2																				
Phyllophora pseudoceranoïdes	3							P													
Hildenbrandia rubra	1																				
Rubrointrusa membranacea	2																				
Palmaria palmata	17						O	P		O		F	O					F			
Rhodophysema georgei	1																				
Kingdom Plantae – Phylum Tracheophyta																					
Zostera (Zostera) marina	3																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Kingdom Chromista – Phylum Ochrophyta																					
Desmarestia aculeata	19											O	O		O						
Dictyosiphon foeniculaceus	3																				
Ectocarpus siliculosus	3																				
Planosiphon zosterifolius	1																				
Fucus vesiculosus	3																				
Agarum clathratum	26	O	O	O	O							F			F	R		C		O	
Alaria esculenta	2																				
Laminaria digitata	30	A	A	F	F		C			F	F				O			A		O	
Saccharina latissima	19			O	F		O			O	F	C	C							O	
Kingdom Animalia – Phylum Annelida																					

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Euphrosine borealis	1																			O	
Phyllodocidae	1																			P	
Gattyana cirrhosa	1																				
Harmothoe imbricata	2																				
Lepidonotus squamatus	3								P												
Proceraea prismatica	1																				
Myxicola infundibulum	7	R			R															R	
Nicolea zostericola	1																				
Kingdom Animalia – Phylum Arthropoda																					
Semibalanus balanoides	2																P				
Ampithoe	1																				
Aeginina longicornis	1																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Caprella linearis	5								P												P
Caprella septentrionalis	7								P												
Caprellidae	2																				
Monocorophium acherusicum	5																				
Dexamine thea	1																				
Gammarellus angulosus	1																				
Ericthonius rubricornis	2																				
Ischyrocerus	5								P												
Ischyrocerus anguipes	2								P												
Jassa marmorata	8								P												
Cancer borealis	27			O	F	C	C			C	C	C	O		O	O		O		F	
Cancer irroratus	14	O	O									O	O								
Carcinus maenas	2																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
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Crangon septemspinosa	1																				
Homarus americanus	30				O	O	F			A	A	O	O					O		F	
Paguridae	16	O	O	O						O	O							O			
Pagurus acadianus	4					O	O			F	F										
Lebbeus groenlandicus	1																				
Idotea phosphorea	5								P												
Achelia spinosa	4													P							
Nymphon grossipes	2																				
Phoxichilidium femoratum	1					O	O				O	R									
Kingdom Animalia – Phylum Brachiopoda																					
Terebratulina septentrionalis	2														F					F	

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Kingdom Animalia – Phylum Bryozoa																					
Porella acutirostris	1																				
Bugulina fulva	1																				
Dendrobeania murrayana	18					O	O					F	F		F		P	P		O	
Amphiblestrum flemingii	1																				
Callopora thaxterae	2																				
Tegella unicornis	3																P				
Caberea ellisii	6													P	C	C				C	
Tricellaria ternata	6								P					P							
Electra pilosa	9								P												
Eucratea loricata	9					F	F					O	O								
Fenestrulina delicia	1																				

Table 4C		**NW shore Site 20**		**NW shore near south light-house Site 19**		**Grand Passage NE of Bald Rock Site 5**				**Grand Pass. Site 4**		**North end of Peter's Island Site 8**			**SE shore Site 14**			**West of Peter's Island,**	**SE shore Site 13**		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Flustra foliacea	6									C				P							
Celleporella hyalina	8								P								P				
Haplota clavata	4								P								P				
Cylindroporella tubulosa	1																				
Membranipora membranacea	23	O	O	F	F		C			C	C	C	C		C			C		C	
Microporella rogickae	2																				
Entalophoroecia harmeri	3																P				
Crisia eburnea	10														P	P		F			
Patinella verrucaria	4								P								P				
Tubulipora confracta	2																				
Kingdom Animalia – Chordata - Tunicata																					
Didemnum albidum	13									R		R			F	O					

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Diplosoma listerianum	10				P										C	C				F	
Aplidium glabrum	6														R					O	
Boltenia echinata	3														F					O	
Kingdom Animalia – Chordata - Fish																					
Clupea harengus	4																		F	F	
Gadus morhua	2																				
Pollachius virens	21					C				O					O	O					
Tautogolabrus adspersus	6														C	C			F	F	
Pholis gunnellus	12																				
Pseudopleuronectes americanus	13						O			O	O										
Myoxocephalus scorpius	3																				
Triglops murrayi	2																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Hemitripterus americanus	4						R				R				R						
Kingdom Animalia – Cnidaria - Anemones																					
Urticina felina	1															R					
Diadumene leucolena	1																				
Kingdom Animalia – Cnidaria - Hydroids																					
Garveia brevis	1																				
Garveia cerulea	2																				
Coryne eximia	6					P				F				P				C			
Ectopleura larynx	4					F	F											P			
Hybocodon prolifer	1																				
Clytia hemisphaerica	3																P				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Obelia dichotoma	1																				
Obelia geniculata	17						F					8	C	P							
Obelia longissima	3																				P
Orthopyxis integra	8								P					P			P				
Rhizocaulus verticillatus	4						R						O								
Calycella syringa	10								P					P			P				P
Halecium articulosum	5													P	F	F					
Halecium beanii	3																				
Sertularella polyzonias	3																				
Diphasia rosacea	4						P														
Hydrallmania falcata	2																				
Sertularia argentea	3					F	F			P											
Sertularia latiuscula	1																				

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Symplectoscyphus tricuspidatus	1																				
Kingdom Animalia – Ctenophora																					
Pleurobrachia pileus	2																				
Kingdom Animalia – Echinodermata																					
Asterias forbesi	3					O				R	R										
Asterias rubens	12					F				R	R									R	
Henricia sanguinolenta	15									O	O				R	R		R		O	
Amphipholis squamata	1																				
Ophiopholis aculeata	3																				
Kingdom Animalia – Mollusca																					
Hiatella arctica	8								P					P							

Table 4C		NW shore Site 20		NW shore near south light-house Site 19		Grand Passage NE of Bald Rock Site 5				Grand Pass. Site 4		North end of Peter's Island Site 8			SE shore Site 14			West of Peter's Island,	SE shore Site 13		
Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Parvicardium pinnulatum	1																				
Modiolus modiolus	23				R	A	A			C	C	F	F					O		O	
Mytilus edulis	5								P												
Anomia simplex	11					O	O					C	C	P							
Heteranomia squamula	3																				
Placopecten magellanicus	4																				
Lacuna vincta	13								P					P			P				
Littorina littorea	4		R																		
Littorina saxatilis	1																				
Alvania pseudoareolata	5													P			P				
Skeneopsis planorbis	2																				
Buccinum undatum	5									P		R									
Tritia trivittata	1																				

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Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Cadlina laevis	1																				
Doto	3								P												
Doto formosa	1																				
Margarites helicinus	1																				
Boreochiton ruber	1																				
Tonicella marmorea	1																				
Kingdom Animalia – Porifera																					
Leucosolenia	1																				
Sycon	5													P	P	P					
Haliclona	3													P							
Haliclona (Haliclona) oculata	1												R								
Crellomima	7											F	F		P	P				F	
Hymedesmia (Hymedesmia)	3														P	P				P	

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Hymedesmia (Hymedesmia) canadensis	3																			P	
Plocamionida ambigua	3														P	P					
Isodictya deichmannae	12					O						F	F					F		O	
Isodictya palmata	4																				
Myxilla (Myxilla) fimbriata	3																			P	
Tedania (Tedania) suctoria	2																			O	
Polymastia boletiformis	1																				
Halichondria (Eumastia) sitiens	5													P							
Halichondria (Halichondria)	1																				
Halichondria (Halichondria) bowerbanki	1													P							

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Species	**Total no. records**	170926_02_Hab1 FA	170926_02_Hab2 FA	170926_03_Hab1 FA	170926_03_Hab2 FA	170927_01_Hab1 HM	170927_01_Hab2 HM	170927_01_Seaweed	170927_01_Specimens	170927_02_Hab1 FAA	170927_02_Hab2 FAA	170927_03_Hab1 FA	170927_03_Hab2 FAA	170927_03_Specimens	170928_01_Hab1 FAA	170928_01_Hab2 FAA	170928_01_Specimens	170928_02_Hab1 KB	170928_03_Hab1 MS	170928_03_Hab2 FAA	170928_03_Specimens
Halichondria (Halichondria) panicea	15	P			R	O				O	O	O	O		O	O		F			
Hymeniacidon	5													P	P	P	P				
Protosuberites	1																				
Total no. species		**11**	**10**	**10**	**13**	**18**	**23**	**12**	**18**	**23**	**18**	**23**	**20**	**18**	**27**	**19**	**13**	**19**	**3**	**29**	**3**

Table 5 - Comparison of algal species recorded by this survey and MacKay (1977). Whether a species was recorded in the current study, MacKay or both is given in the records column. Hypothesised reasons for differences between surveys are given in the 'Reason for difference' column. Reason codes: Cryptic - a small/inconspicuous/hard to identify species which could have been missed; Resolution - recorded at a different level of taxonomic resolution e.g. one survey recorded at species level wheras the other recorded to genus level only; Invasive – known invasive species which are likely to have become established since MacKay's survey; Intertidal – a species which mainly occurs in the intertidal (not surveyed in this study); and Taxonomy – taxonomic knowledge.

Species	Authority	Species name in MacKay	Records	Reason for difference
Kingdom Plantae - Phylum Chlorophyta				
Derbesia marina	(Lyngbye) Solier, 1846		Current	Cryptic
Chaetomorpha melagonium	(F.Weber & Mohr) Kützing, 1845	*Chaetomorpha melagonium*	Both	
Cladophora rupestris	(Linnaeus) Kützing, 1843	*Cladophora rupestris*	MacKay	Cryptic
Monostroma	Thuret, 1854	*Monostroma*	MacKay	Cryptic
Acrosiphonia sonderi	(Kützing) Kornmann, 1962	*Spongomorpha sonderi*	MacKay	Cryptic
Acrosiphonia spinescens	(Kützing) Kjellman, 1893	*Spongomorpha spinescens*	MacKay	Cryptic
Gayralia oxysperma	(Kützing) K.L.Vinogradova ex Scagel et al., 1989		Current	Cryptic
Ulva lactuca	Linnaeus, 1753	*Ulva lactuca*	Both	
Ulva	Linnaeus, 1753		Current	Resolution
Ulva intestinalis	Linnaeus, 1753	*Enteromorpha intestinalis*	MacKay	Resolution
Ulva linza	Linnaeus, 1753	*Enteromorpha linza*	MacKay	Resolution
Ulva rigida	C.Agardh, 1823	*Ulva rigida*	MacKay	Resolution
Kingdom Plantae - Phylum Rhodophyta				
Pyropia leucosticta	(Thuret) Neefus & J.Brodie, 2011	*Porphyra leucosticta*	MacKay	Cryptic

Species	Authority	Species name in MacKay	Records	Reason for difference
Wildemania miniata	(C.Agardh) Foslie, 1891	*Porphyra miniata*	MacKay	Cryptic
Acrochaetium secundatum	(Lyngbye) Nägeli, 1858		Current	Cryptic
Rhodochorton purpureum	(Lightfoot) Rosenvinge, 1900		Current	Cryptic
Ahnfeltia plicata	(Hudson) E.M.Fries, 1836	*Ahnfeltia plicata*	MacKay	Cryptic
Bonnemaisonia hamifera	Hariot, 1891		Current	Invasive
Ptilota serrata	Kützing, 1847	*Ptilota serrata*	Both	
Plumaria plumosa	(Hudson) Kuntze, 1891	*Plumaria elegans*	MacKay	Cryptic
Plumaria plumosa	(Hudson) Kuntze, 1891	*Ptilota elegans*	MacKay	Cryptic
Antithamnionella floccosa	(O.F.Müller) Whittick, 1980		Current	Cryptic
Scagelia pylaisaei	(Montagne) M.J.Wynne, 1985		Current	Cryptic
Phycodrys rubens	(Linnaeus) Batters, 1902	*Phycodrys rubens*	Both	
Membranoptera fabriciana	(Lyngbye) M.J.Wynne & G.W.Saunders, 2012		Current	Cryptic
Polysiphonia stricta	(Mertens ex Dillwyn) Greville, 1824	*Polysiphonia urceolata*	Both	
Polysiphonia flexicaulis	(Harvey) F.S.Collins, 1911		Current	Cryptic
Rhodomela confervoides	(Hudson) P.C.Silva, 1952	*Rhodomela confervoides*	MacKay	Cryptic
Vertebrata lanosa	(Linnaeus) T.A.Christensen, 1967	*Polysiphonia lanosa*	MacKay	Cryptic
Colaconema bonnemaisoniae	Batters, 1896		Current	Cryptic
Colaconema daviesii	(Dillwyn) Stegenga, 1985		Current	Cryptic
Colaconema endophyticum	(Batters) J.T.Harper & G.W.Saunders, 2002		Current	Cryptic

Species	Authority	Species name in MacKay	Records	Reason for difference
Corallina officinalis	Linnaeus, 1758	*Corallina officinalis*	Both	
Titanoderma pustulatum	(J.V.Lamouroux) Nägeli, 1858		Current	Cryptic
Lithothamnion	Heydrich, 1897	*Lithothamnion*	MacKay	Resolution
Corallinales	P.C. Silva & H.W. Johansen, 1986		Current	Resolution
Fimbrifolium dichotomum	(Lepechin) G.I.Hansen, 1980	*Rhodophyllis dichotoma*	Both	
Cystoclonium purpureum	(Hudson) Batters, 1902	*Cystoclonium purpureum*	MacKay	Cryptic
Chondrus crispus	Stackhouse, 1797	*Chondrus crispus*	Both	
Mastocarpus stellatus	(Stackhouse) Guiry, 1984	*Gigartina stellata*	MacKay	Cryptic
Euthora cristata	(C.Agardh) J.Agardh, 1847		Current	Cryptic
Coccotylus hartzii	(Rosenvinge) L.Le Gall & G.W.Saunders, 2010		Current	Cryptic
Coccotylus truncatus	(Pallas) M.J.Wynne & J.N.Heine, 1992		Current	Cryptic
Phyllophora pseudoceranoïdes	(S.G.Gmelin) Newroth & A.R.A.Taylor ex P.S.Dixon & L.M.Irvine, 1977		Current	Cryptic
Hildenbrandia rubra	(Sommerfelt) Meneghini, 1841		Current	Cryptic
Rubrointrusa membranacea	(Magnus) S.L.Clayden & G.W.Saunders, 2010		Current	Cryptic
Ceramium virgatum	Roth, 1797	*Ceramium rubrum*	Both	
Devaleraea ramentacea	(Linnaeus) Guiry, 1982	*Halosaccion ramentaceum*	MacKay	Cryptic
Rhodophysema georgei	Batters, 1900		Current	Cryptic

Species	Authority	Species name in MacKay	Records	Reason for difference
Palmaria palmata	(Linnaeus) Weber & Mohr, 1805	*Rhodymenia palmata*	Both	
Kingdom Plantae -Phylum Tracheophyta				
Zostera (Zostera) marina	Linnaeus, 1753	*Zostera marina*	Both	
Kingdom Chromista – Phylum Ochrophyta				
Desmarestia aculeata	(Linnaeus) J.V.Lamouroux, 1813	*Desmarestia aculeata*	Both	
Desmarestia viridis	(O.F.Müller) J.V.Lamouroux, 1813	*Desmarestia viridis*	MacKay	Cryptic
Dictyosiphon foeniculaceus	(Hudson) Greville, 1830		Current	Cryptic
Elachista fucicola	(Velley) Areschoug, 1842	*Elachista fucicola*	MacKay	Cryptic
Ectocarpus siliculosus	(Dillwyn) Lyngbye, 1819		Current	Cryptic
Ectocarpus confervoides	Harvey, 1855	*Ectocarpus confervoides*	MacKay	Cryptic
Pylaiella littoralis	(Linnaeus) Kjellman, 1872	*Pilayella littoralis*	MacKay	Cryptic
Planosiphon zosterifolius	(Reinke) McDevit & G.W.Saunders, 2017		Current	Cryptic
Scytosiphon dotyi	M.J.Wynne, 1969	*Scytosiphon dotyi*	MacKay	Cryptic
Fucus vesiculosus	Linnaeus, 1753	*Fucus vesiculosus*	Both	
Ascophyllum nodosum	(Linnaeus) Le Jolis, 1863	*Ascophyllum nodosum*	MacKay	Intertidal
Fucus distichus subsp. edentatus	(De La Pylaie) Powell, 1957	*Fucus edentatus*	MacKay	Intertidal
Fucus distichus subsp. evanescens	(C.Agardh) H.T.Powell, 1957	*Fucus evanescens*	MacKay	Intertidal
Agarum clathratum	Dumortier, 1822	*Agarum cribrosum*	Both	
Alaria esculenta	(Linnaeus) Greville, 1830	*Alaria esculenta*	Both	
Halosiphon tomentosus	(Lyngbye) Jaasund, 1957	*Chorda tormentosa*	MacKay	Cryptic?
Laminaria digitata	(Hudson) J.V.Lamouroux, 1813	*Laminaria digitata*	Both	

Species	Authority	Species name in MacKay	Records	Reason for difference
Saccharina latissima	(Linnaeus) C.E.Lane, C.Mayes, Druehl & G.W.Saunders, 2006		Current	Taxonomy
Saccharina longicruris	(Bachelot de la Pylaie) Kuntze, 1891	*Laminaria longicruris*	MacKay	Taxonomy
Saccorhiza dermatodea	(Bachelot de la Pylaie) J.Agardh, 1868	*Saccorhiza dermatodea*	MacKay	Intertidal

Table 6 - Comparison of animal species recorded by this survey and MacKay (1977). Whether a species was recorded in the current study, MacKay or both is given in the records column. Hypothesised reasons for differences between surveys are given in the 'Reason for difference' column. Reason codes: Cryptic - a small/inconspicuous/hard to identify species which could have been missed; Rare – recorded only rarely in either survey so could have easily been missed; Resolution - recorded at a different level of taxonomic resolution e.g. one survey recorded at species level wheras the other recorded to genus level only; Invasive – known invasive species which are likely to have become established since MacKay's survey; Intertidal – a species which mainly occurs in the intertidal (not surveyed in this study); Bryozoa - MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites'. However, does not identify to species; Fish - MacKay did not record fish on dive surveys. However, he does note several species was recorded around Brier by other sources; Hydroid - MacKay reported unidentified hydroids from five sites.

Species	**Authority**	**Species name in MacKay**	**Records**	**Abundance MacKay**	**Abundance Current (No. of habitats)**	**Reason for difference**	**Notes**
Kingdom Animalia – Phylum Annelida							
Euphrosine borealis	Örstedt, 1843		Current		1	Cryptic/Rare	
Glycera dibranchiata	Ehlers, 1868	*Glycera dibranchiata*	MacKay	One specimen from Pond Cove.	0	Cryptic/Rare	
Phyllodocidae	Örsted, 1843		Current		1	Cryptic/Rare	
Lepidonotus squamatus	(Linnaeus, 1758)	*Lepidonotus squamatus*	Both	Pond Cove.	3		
Gattyana cirrhosa	(Pallas, 1766)		Current		1	Cryptic/Rare	
Harmothoe imbricata	(Linnaeus, 1767)		Current		2	Cryptic/Rare	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Proceraea prismatica	(O.F. Müller, 1776)		Current		1	Cryptic/Rare	
Myxicola infundibulum	(Montagu, 1808)	*Myxicola infundibulum*	Both	Common on eastern coast.	7		
Potamilla neglecta	(Sars, 1851)	*Potamilla oculifera*	MacKay	4 sites. Associated with *Myxicola infundibulum*.	0	Cryptic/Rare	Tube worm associated with *Myxicola infundibulum*.
Spirorbis spirorbis	(Linnaeus, 1758)	*Spirorbis borealis*	MacKay	Abundant on kelp at 7 sites. Probably abundant through whole area.	0	Cryptic	MacKay recorded on kelp at 7 sites. Small species easily missed.
Amphitrite	P.T. Cleve ex O. Kunze, 1891	*Amphitrite*	MacKay	One site on SE coast.	0	Rare	Recorded by MacKay at one site only.
Nicolea zostericola	Örsted, 1844		Current		1	Cryptic/Rare	
Clymenella	Verrill, 1873	*Clymenella*	MacKay	Large numbers near LW in mud		Cryptic	Intertidal habitats were not surveyed in this study.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
				along Westport Shore.			
Kingdom Animalia – Phylum Arthropoda							
Semibalanus balanoides	(Linnaeus, 1767)	*Balanus balanoides*	Both	Common to abundant intertidally.	2		
Balanus balanus	(Linnaeus, 1758)	*Balanus balanus*	MacKay	Recorded at 3 sites.	0	Cryptic	MacKay recorded at three sites. We did not note but may well have been present.
Ampithoe	Leach, 1814		Current		1	Cryptic/Rare	
Caprella linearis	(Linnaeus, 1767)		Current		5	Cryptic	
Caprella septentrionalis	Krøyer, 1838		Current		7	Cryptic	
Caprellidae	Leach, 1814		Current		2	Cryptic	
Aeginina longicornis	(Krøyer, 1843)		Current		1	Cryptic/Rare	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Monocorophium acherusicum	(Costa, 1853)		Current		5	Cryptic	
Dexamine thea	Boeck, 1861		Current		1	Cryptic/Rare	
Gammarellus angulosus	(Rathke, 1843)		Current		1	Cryptic/Rare	
Gammarus oceanicus	Segerstråle, 1947	*Gammarus oceanicus*	MacKay	Intertial. Common along Westport Shore.	0	Intertidal	Intertidal habitats not surveyed in this study.
Jassa marmorata	Holmes, 1905		Current		8	Cryptic	
Ericthonius rubricornis	*(Stimpson, 1853)*		Current		2	Cryptic/Rare	
Ischyrocerus	Krøyer, 1838		Current		2	Cryptic/Rare	
Ischyrocerus anguipes	Krøyer, 1838		Current		2	Cryptic/Rare	
Cancer borealis	Stimpson, 1859	*Cancer sp.*	Both	Recorded at 5 sites but expected to be common throughout area (hidden in kelp).	27	Resolution	MacKay only assigns *C. borealis* and *C. irroratus* to *Cancer* sp. He notes their study

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							may have under-recorded.
Cancer irroratus	Say, 1817	*Cancer sp.*	Both		14	Resolution	MacKay only assigns *C. borealis* and *C. irroratus* to *Cancer* sp. He notes their study may have under-recorded.
Carcinus maenas	(Linnaeus, 1758)	*Carcinus maenas*	Both	Observed only at one site.	2		
Crangon septemspinosa	Say, 1818		Current		1	Cryptic/Rare	Might have been present in MacKay - they only assign to Shrimp.
Homarus americanus	H. Milne Edwards, 1837	*Homarus americanus*	Both	Recorded at two sites but known to be abundant in area.	30		

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Pagurus	Fabricius, 1775	*Pagurus*	MacKay	Common. Occurring at 18 sites.	0	Resolution	MacKay notes that hermit crabs were common but only assigns them to *Pagurus* sp.
Paguridae	Latreille, 1802		Current		16	Resolution	MacKay notes that hermit crabs were common but only assigns them to *Pagurus* sp.
Pagurus acadianus	Benedict, 1901		Current		4	Resolution	MacKay notes that hermit crabs were common but only assigns them to *Pagurus* sp.
Lebbeus groenlandicus	(Fabricius, 1775)		Current		1	Cryptic/Rare	Might have been present in MacKay - they only assign to Shrimp.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
		Shrimp	MacKay	Single specimen.	0	Resolution	Might have been present in MacKay - they only assign to Shrimp.
Idotea phosphorea	Harger, 1873 in Verrill, Smith & Harger, 1873		Current		5	Cryptic	
Isopoda	Latreille, 1817	*Isopoda*	MacKay	Abundant in intertidal stream.	0	Resolution	MacKay only assigns to Isopoda - we recorded several Isopod species.
Achelia spinosa	(Stimpson, 1853)		Current		4	Cryptic	
Nymphon grossipes	(Fabricius, 1780)		Current		2	Cryptic/Rare	
Phoxichilidium femoratum	(Rathke, 1799)		Current		1	Cryptic/Rare	
Kingdom Animalia – Phylum Brachiopoda							

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Terebratulina septentrionalis	(Couthouy, 1838)	*Terebratulina septentrionalis*	Both	Recorded at only one site (Hog Yard Cove).	2		
Kingdom Animalia – Phylum Bryozoa							
Porella acutirostris	Smitt, 1868		Current		1	Cryptic/Rare	
Dendrobeania murrayana	(Bean in Johnston, 1847)		Current		18	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites'. However, does not identify to species.
Bugulina fulva	(Ryland, 1960)		Current		1	Cryptic/Rare	
Amphiblestrum flemingii	(Busk, 1854)		Current		1	Cryptic/Rare	
Callopora thaxterae	Winston & Hayward, 2012		Current		2	Cryptic/Rare	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Tegella unicornis	(Fleming, 1828)		Current		3	Cryptic/Rare	
Caberea ellisii	(Fleming, 1814)		Current		6	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites'. However, does not identify to species.
Tricellaria ternata	(Ellis & Solander, 1786)		Current		6	Cryptic	
Electra pilosa	(Linnaeus, 1767)		Current		9	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites'. However,

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							does not identify to species.
Eucratea loricata	(Linnaeus, 1758)		Current		9	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites'. However, does not identify to species.
Fenestrulina delicia	Winston, Hayward & Craig, 2000		Current		1	Cryptic/Rare	
Flustra foliacea	(Linnaeus, 1758)		Current		6	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							sites'. However, does not identify to species.
Celleporella hyalina	(Linnaeus, 1767)		Current		8	Cryptic	
Haplota clavata	(Hincks, 1857)		Current		4	Cryptic	
Cylindroporella tubulosa	(Norman, 1868)		Current		1	Cryptic/Rare	
Membranipora membranacea	(Linnaeus, 1767)		Current		23	Bryozoa	MacKay notes 'a wide variety of Bryozoans recorded as common to abundant at 15 sites. However, does not identify to species.
Microporella rogickae	Winston, Hayward & Craig, 2000		Current		2	Cryptic/Rare	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Entalophoroecia harmeri	(Osburn, 1933)		Current		3	Cryptic	
Crisia eburnea	(Linnaeus, 1758)		Current		10	Cryptic	
Patinella verrucaria	(Linnaeus, 1758)		Current		4	Cryptic	
Tubulipora confracta	Winston & Hayward, 2012		Current		2	Cryptic/Rare	
		Kingdom Animalia – Chordata - Tunicata					
Didemnum albidum	(Verrill, 1871)		Current		13	Cryptic	
Diplosoma listerianum	(Milne Edwards, 1841)		Current		10	Invasive	Invasive ascidian is a recent coloniser (Ma et al. 2018).
Aplidium glabrum	(Verrill, 1871)		Current		6	Cryptic	
Boltenia ovifera	(Linnaeus, 1767)	*Boltenia ovifera*	MacKay	Small numbers at Gull Rock.	0	Rare	MacKay does not note where this species was recorded. It may be that we did not survey the area that it occurred in - this

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							species has quite specific habitat requirements.
Boltenia echinata	(Linnaeus, 1767)		Current		3	Cryptic	
			Kingdom Animalia – Chordata - Fish				
Clupea harengus	Linnaeus, 1758		Current		4	Fish	MacKay did not record fish on dive surveys. However, he does note this species was recorded around Brier by other sources.
Gadus morhua	Linnaeus, 1758		Current		2	Fish	MacKay did not record fish on dive surveys. However, he does note this species was recorded around

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							Brier by other sources.
Pollachius virens	(Linnaeus, 1758)		Current		21	Fish	MacKay did not recordfish on dive surveys. However, he does note this species was recorded around Brier by other sources.
Tautogolabrus adspersus	(Walbaum, 1792)		Current		6	Fish	MacKay did not recordfish on dive surveys. However, he does note this species was recorded around Brier by other sources.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Pholis gunnellus	(Linnaeus, 1758)		Current		12	Fish	MacKay did not recordfish on dive surveys. However, he does note this species was recorded around Brier by other sources.
Pseudopleuronectes americanus	(Walbaum, 1792)		Current		13	Fish	MacKay did not recordfish on dive surveys. However, he does note this species was recorded around Brier by other sources.
Myoxocephalus scorpius	(Linnaeus, 1758)		Current		3	Fish	MacKay did not recordfish on dive surveys. However,

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							he does note this species was recorded around Brier by other sources.
Triglops murrayi	Günther, 1888		Current		2	Fish	MacKay did not recordfish on dive surveys.
Hemitripterus americanus	(Gmelin, 1789)		Current		4	Fish	MacKay did not recordfish on dive surveys. However, he does note this species was recorded around Brier by other sources.
Kingdom Animalia – Cnidaria - Anemones							

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Urticina felina	(Linnaeus, 1761)	*Tealia felina*	Both	Recorded only at one site (Gull Rock).	1		MacKay recorded only at Gull Rock. We also recorded at only one site - Oliver's cove on the south side of Brier Island.
Diadumene leucolena	(Verrill, 1866)		Current		1	Rare	We only recorded from one site (NW ledges).
Metridium senile	(Linnaeus, 1761)	*Metridium senile*	MacKay	Recorded in small numbers at one site.	0	Rare	MacKay only recorded from one site.
Pachycerianthus borealis	(Verrill, 1873)	*Cerianthus borealis*	MacKay	One site in Grand Passage	0	Rare	MacKay only noted from one site (Grand Passage) we did resurvey this site but did not record.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Kingdom Animalia – Cnidaria - Hydroids							
Garveia brevis	(Fraser, 1918)		Current		1	Cryptic/Rare	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Garveia cerulea	(Clarke, 1882)		Current		2	Cryptic/Rare	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Coryne eximia	Allman, 1859		Current		6	Cryptic	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Tubularia	Linnaeus, 1758	*Tubularia*	MacKay	Recorded at 5 sites.	3	Resolution	This could be Ectopleura larynx -

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							which we did record.
Hybocodon prolifer	Agassiz, 1860		Current		1	Cryptic	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Ectopleura larynx	(Ellis & Solander, 1786)		Current		4	Resolution	MacKay's records of Tubularia sp. may well be this species.
Obelia	Péron & Lesueur, 1810	*Obelia*	MacKay	Recorded at 15 sites - abundant on kelp.		Resolution	We noted several species of Obelia. These records from MacKay might be *Obelia geniculata*.
Rhizocaulus verticillatus	(Linnaeus, 1758)		Current		4	Hydroid	MacKay reported unidentified hydroids from 5

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							sites but did not identify to species.
Orthopyxis integra	(MacGillivray, 1842)		Current		8	Cryptic	
Clytia hemisphaerica	(Linnaeus, 1767)		Current		3	Cryptic/Rare	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Obelia dichotoma	(Linnaeus, 1758)		Current		1	Resolution	MacKay only recorded *Obelia* to genus level.
Obelia geniculata	(Linnaeus, 1758)		Current		17	Resolution	MacKay only recorded *Obelia* to genus level.
Obelia longissima	(Pallas, 1766)		Current		3	Resolution	MacKay only recorded *Obelia* to genus level.
Calycella syringa	(Linnaeus, 1767)		Current		10	Cryptic	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Halecium articulosum	Clark, 1875		Current		5	Cryptic	
Halecium beanii	(Johnston, 1838)		Current		3	Cryptic	
Sertularella polyzonias	(Linnaeus, 1758)		Current		3	Cryptic	
Hydrallmania falcata	(Linnaeus, 1758)		Current		2	Hydroid	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Sertularia argentea	Linnaeus, 1758		Current		3	Hydroid	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
Diphasia rosacea	(Linnaeus, 1758)		Current		4	Cryptic	
Sertularia latiuscula	Stimpson, 1854		Current		1	Cryptic	MacKay reported unidentified hydroids from 5

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							sites but did not identify to species.
Symplectoscyphus tricuspidatus	(Alder, 1856)		Current		1	Cryptic	MacKay reported unidentified hydroids from 5 sites but did not identify to species.
			Kingdom Animalia – Ctenophora				
Pleurobrachia pileus	(O. F. Müller, 1776)	*Pleurobrachia pileus*	Both	Large numbers at 4 sites. Probably present throughout area.	2		
Kingdom Animalia – Echinodermata							
Asterias rubens	Linnaeus, 1758	*Asterias vulgaris*	Both	Scattered individuals recorded at 19 sites. Population levels low.	12		

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Asterias forbesi	(Desor, 1848)		Current		3	Rare/Taxonomy	Possibly identified as A. vulgaris by MacKay.
Henricia sanguinolenta	(O.F. Müller, 1776)	*Henricia sanguinolenta*	Both	Small numbers. Recorded at nine sites.	15		
Solaster endeca	(Linnaeus, 1771)	*Solaster endeca*	MacKay	One site near Pero Jack Cove.	0	Rare	
Strongylocentrotus droebachiensis	(O.F. Müller, 1776)	*Strongylocentrotus droebachiensis*	MacKay	Common throughout area. Recorded 21 sites.	0		MacKay notes as being common throughout the entire study area, occurring at 21 sites.
Cucumaria frondosa	(Gunnerus, 1767)	*Cucumaria frondosa*	MacKay	Small numbers at 5 sites.	0		MacKay notes as occurring at 5 sites.
Psolus fabricii	(Düben & Koren, 1846)	*Psolus fabricii*	MacKay	Common along south-east coast near Grand	0		MacKay notes as common along the south-east coast

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
				Passage. Not recorded elsewhere.			near Grand Passage but didn't record elsewhere.
Amphipholis squamata	*(Delle Chiaje, 1828)*		Current		1	Cryptic	
Ophiopholis aculeata	(Linnaeus, 1767)	*Ophiopholis aculeata*	Both	Abundance not recorded	3		
			Kingdom Animalia – Mollusca				
Hiatella arctica	(Linnaeus, 1767)	*Hiatella arctica*	Both	Recorded one site - Pond Cove.	8		
Parvicardium pinnulatum	(Conrad, 1831)		Current		1	Cryptic	
Mya arenaria	Linnaeus, 1758	*Mya arenaria*	MacKay	Common Westport Shore in suitable habitat.		Restricted distribution	Restricted in distribution by habitat availability.
Modiolus modiolus	(Linnaeus, 1758)	*Modiolus modiolus*	Both	One of dominant species at Brier Island - Common to	23		

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
				Abundant at 19 study sites.			
Mytilus edulis	Linnaeus, 1758	*Mytilus edulis*	Both	Scattered beds. Found at four study sites.	5		
Anomia simplex	d'Orbigny, 1853		Current		11	Cryptic	Can be inconspicuous and may have been missed by MacKay.
Heteranomia squamula	(Linnaeus, 1758)		Current		3	Cryptic	
Placopecten magellanicus	(Gmelin, 1791)	*Placopecten magellanisuc*	Both	Single empty shell recorded at South Point.	4		
Lacuna	W. Turton, 1827	*Lacuna*	MacKay	Very abundant on kelp near South Point.	0	Resolution	Recorded as *Lacuna vincta* in our survey.
Littorina littorea	(Linnaeus, 1758)	*Littorina littorea*	Both	Abundant intertidally.	4		

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Littorina saxatilis	(Olivi, 1792)	*Littorina saxatilis*	Both	Abundant intertidally.	1		
Littorina obtusata	(Linnaeus, 1758)	*Littorina obtusata*	MacKay	Abundant intertidally.		Intertidal	
Lacuna vincta	(Montagu, 1803)		Current		13	Resolution	
Euspira heros	(Say, 1822)	*Lunatia heros*	MacKay	One site on Westport Shore.	0	Rare	Lack of suitable habitat (sandy-mud) restricts distribution.
Alvania pseudoareolata	Warén, 1974		Current		5	Cryptic	
Skeneopsis planorbis	(O. Fabricius, 1780)		Current		2	Cryptic/Rare	
Buccinum undatum	Linnaeus, 1758	*Buccinum undatum*	Both	Abundant. Recorded at 17 sites.	5		
Neptunea decemcostata	(Say, 1826)	*Neptunea decemcostata*	MacKay	Recorded only at one site.	0	Rare	

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Nucella lapillus	(Linnaeus, 1758)	*Thais lapillus*	MacKay	Recorded at 4 sites.	0	Rare	
Tritia trivittata	(Say, 1822)		Current		1	Cryptic/Rare	
Cadlina laevis	(Linnaeus, 1767)		Current		1	Rare/Ephemeral	
Dendronotus frondosus	(Ascanius, 1774)	*Dendronotus frondatus*	MacKay	Nudibranchs recorded at seven sites.	0	Rare/Ephemeral	
Doto	Oken, 1815		Current		3	Rare/Ephemeral	
Doto formosa	A. E. Verrill, 1875		Current		1	Rare/Ephemeral	
Coryphella	J. E. Gray, 1850	*Coryphelia*	MacKay	Nudibranchs recorded at seven sites.	0	Rare/Ephemeral	
Onchidoris	Blainville, 1816	*Onchidoris*	MacKay	Nudibranchs recorded at seven sites.	0	Rare/Ephemeral	
Margarites helicinus	(Phipps, 1774)		Current		1	Cryptic/Rare	
Testudinalia testudinalis	(O. F. Müller, 1776)	*Acmaea testudinalis*	MacKay	Recorded at 13 study sites.		Intertidal	More common intertidally - intertidal not

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
							surveyed in this study. Small species and could have been under-recorded in this study.
Boreochiton ruber	(Linnaeus, 1767)	*Ischnochiton ruber*	Both	11 sites.	1		May have been under-recorded by our study (small inconspicuous species).
Stenosemus albus	(Linnaeus, 1767)	*Ischnochiton alba*	MacKay	1 site.	0	Cryptic/Rare	
Tonicella marmorea	(O. Fabricius, 1780)		Current		1	Rare	
Kingdom Animalia - Nemertea							
Lineus	Sowerby, 1806	*Lineus*	MacKay	Tiny species' recorded at two sites on Westport Shore.		Cryptic/rare	
Kingdom Animalia – Porifera							

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Leucosolenia	*Bowerbank, 1864*		Current		1	Cryptic	
Sycon ciliatum	(Fabricius, 1780)	*Scypha ciliata*	MacKay	Recorded at one site on south-east coast.		Resolution	We recorded as *Sycon* sp. due to taxonomy issues.
Sycon	Risso, 1827		Current		5	Taxonomy	MacKay recorded as *Sycon ciliatum*.
Haliclona (Haliclona) oculata	(Linnaeus, 1759)	*Haliclona oculata*	Both	Found at one site (Gull Rock).	1		
Haliclona	Grant, 1841		Current		3	Cryptic	
Crellomima	Rezvoi, 1925		Current		7	Cryptic	Only identifiable with aid of samples.
Hymedesmia (Hymedesmia)	Bowerbank, 1864		Current		3	Cryptic	Only identifiable with aid of samples.
Hymedesmia (Hymedesmia) canadensis	Ginn, Logan, Thomas & van Soest, 1998		Current		3	Cryptic	This species was described after MacKay's survey.
Plocamionida ambigua	(Bowerbank, 1866)		Current		3	Cryptic	Only identifiable with aid of samples.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Isodictya deichmannae	(de Laubenfels, 1949)	*Isodictya deichmannae*	Both	Common at five sites in Grand Passage on rock and horse mussel shells.	12		
Isodictya palmata	(Ellis & Solander, 1786)		Current		4	Cryptic	Hard to distinguish from *I. deichmannae* without samples.
Myxilla (Myxilla) fimbriata	(Bowerbank, 1866)		Current		3	Cryptic	Hard for non-specialists to identify in field.
Tedania (Tedania) suctoria	Schmidt, 1870		Current		2	Cryptic	Hard for non-specialists to identify in field.
Polymastia boletiformis	(Lamarck, 1815)		Current		1	Cryptic	Hard for non-specialists to identify in field.

Species	Authority	Species name in MacKay	Records	Abundance MacKay	Abundance Current (No. of habitats)	Reason for difference	Notes
Halichondria (Halichondria) panicea	(Pallas, 1766)	*Halichondria panicea*	Both	Common on rock and kelp holdfasts. Recorded at 14 sites.	15		
Halichondria (Eumastia) sitiens	(Schmidt, 1870)		Current		5	Cryptic	Hard for non-specialists to identify in field.
Halichondria (Halichondria)	Fleming, 1828		Current		1	Cryptic	Hard for non-specialists to identify in field.
Halichondria (Halichondria) bowerbanki	Burton, 1930		Current		1	Cryptic	Hard for non-specialists to identify in field.
Hymeniacidon	Bowerbank, 1858		Current		5	Cryptic	
Protosuberites	Swartschewsky, 1905		Current		1	Cryptic	

APPENDIX 1 - SURVEY FORM

Brier Island Dive Survey Form		Dive no:
Site Name:		
General Location:		
Position:	Derived from:	
Date of dive:		
Start time:	Duration:	Temp:
Exposure of site: extremely exposed; very exposed; exposed; mod exposed; sheltered; v sheltered; extremely sheltered		
Max tidal stream: >6k; 3-6k; 1-3k; <1k; negligible		
Max depth:	Min depth:	Correction to Chart Datum:
Diver names		
Camera 1 (type/photo nos)		
Camera 2 (type/photos nos)		
Specimens taken (type/numbers)		
Site Summary: main features (plant/animal cover types, substrate), unusual species/features/human activities/impacts		
Sketch of site - include seabed profile, sketch map of position, main habitats (link to 1,2,3 described below).		

Habitat description: Depth range, substrate, dominant species

Habitat 1:

Habitat 2:

Habitat 3:

	Habitat		
Depth (m)	1	2	3
Upper (SL)			
Lower (SL)			
Upper (CD)			
Lower (CD)			

	Habitat		
Substrate (%)	1	2	3
Bedrock			
Boulders - larger than basketball			
Cobbles - fist to basketball sized			
Pebbles - 1cm to fist sized			
Gravel - 2mm-1cm			
Sand <2mm			
Mud			
Shell gravel			
Shell whole or chunks			
Other (state)			

	Habitat		
	1	2	3
Algal Cover (%)			
Kelps			
Turf species (<30cm high)			

	Habitat		
Rock features (1-5)	1	2	3
Relief (even-rugged)			
Texture (smooth-pitted)			
Stability (stable-mobile)			
Scour (none-scoured)			
Silt (none-heavy)			
Fissure > 10mm (none-many)			
Crevice <10mm (none-many)			
(rounded to angular)			
Sediment features (1-5)			
Firmness (firm-soft)			
Stability (stable-mobile)			
Sorting (well-poor)			
Sediment features (tick)			
Mounds/casts			
Burrows/Holes			
Waves >10cm			
Ripples <10cm			

Species List. Abundance to be recorded using SACFOR scale (Super Abundant, Abundant, Common, Frequent, Occasional, Rare)

If subsequently identified from a photo or specimen record as Present.

	Habitat					Habitat			
	1	2	3			1	2	3	
Sponges					Echinoderms				
					Ascidians				
Cnidarians: hydroids/anemones/corals									
					Fishes				
Worms									
					Algae				
Crustaceans									
Molluscs									
					Other/continuations				
Bryozoans									

APPENDIX 2 – MNCR SACFOR SCALE

The UK Marine Nature Conservation Review semi-quantitative SACFOR scale was used to record species abundances. See http://jncc.defra.gov.uk/page-2684. *NB. Read notes below prior to use of scale.*

	Growth form		**Size of individuals/colonies**					
% cover	**Crust/ meadow**	**Massive/ Turf**	**<1cm**	**1-3 cm**	**3-15 cm**	**>15 cm**	**Density**	
>80%	S		S				>1/0.001 m^2 (1x1 cm)	>10,000 / m^2
40-79%	A	S	A	S			1-9/0.001 m^2	1000-9999 / m^2
20-39%	C	A	C	A	S		1-9 / 0.01 m^2 (10 x 10 cm)	100-999 / m^2
10-19%	F	C	F	C	A	S	1-9 / 0.1 m^2	10-99 / m^2
5-9%	O	F	O	F	C	A	1-9 / m^2	
1-5% or density	R	O	R	O	F	C	1-9 / 10m^2 (3.16 x 3.16 m)	
<1% or density		R		R	O	F	1-9 / 100 m^2 (10 x 10 m)	
					R	O	1-9 / 1000 m^2 (31.6 x 31.6 m)	
						R	<1/1000 m^2	

Use of the MNCR SACFOR abundance scales

The MNCR cover/density scales adopted from 1990 provide a unified system for recording the abundance of marine benthic flora and fauna in biological surveys. The following notes should be read before their use:

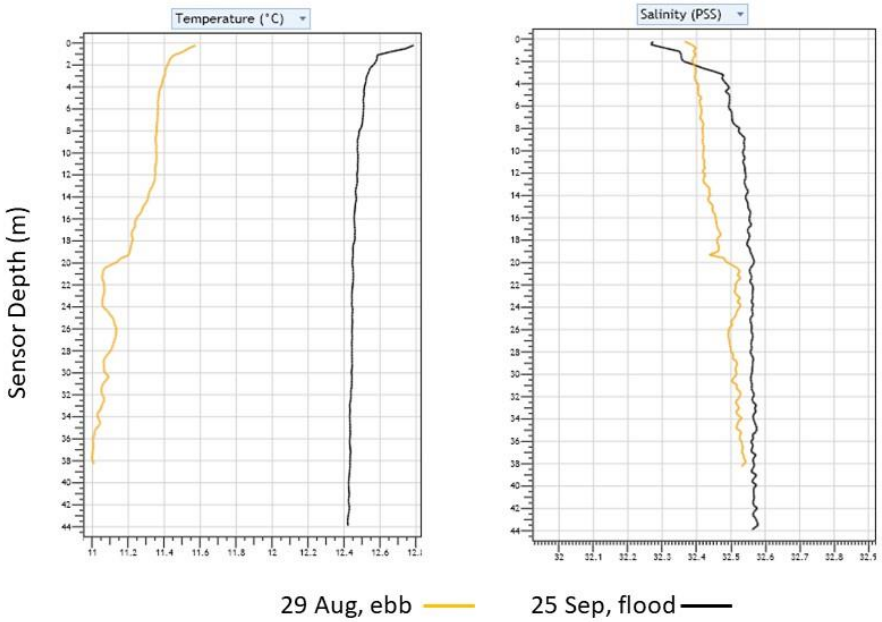
1. Whenever an attached species covers the substratum and percentage cover can be estimated, that scale should be used in preference to the density scale.
2. Use the massive/turf percentage cover scale for all species, excepting those given under crust/meadow.
3. Where two or more layers exist, for instance foliose algae overgrowing crustose algae, total percentage cover can be over 100% and abundance grade will reflect this.
4. Percentage cover of littoral species, particularly the fucoid algae, must be estimated when the tide is out.
5. Use quadrats as reference frames for counting, particularly when density is borderline between two of the scale.
6. Some extrapolation of the scales may be necessary to estimate abundance for restricted habitats such as rockpools.
7. The species (as listed above) take precedence over their actual size in deciding which scale to use.
8. When species (such as those associated with algae, hydroid and bryozoan turf or on rocks and shells) are incidentally collected (i.e. collected with other species that were superficially collected for identification) and no meaningful abundance can be assigned to them, they should be noted as present (P).

APPENDIX 3 - OCEANOGRAPHIC CTD STATION DATA SUMMARY.

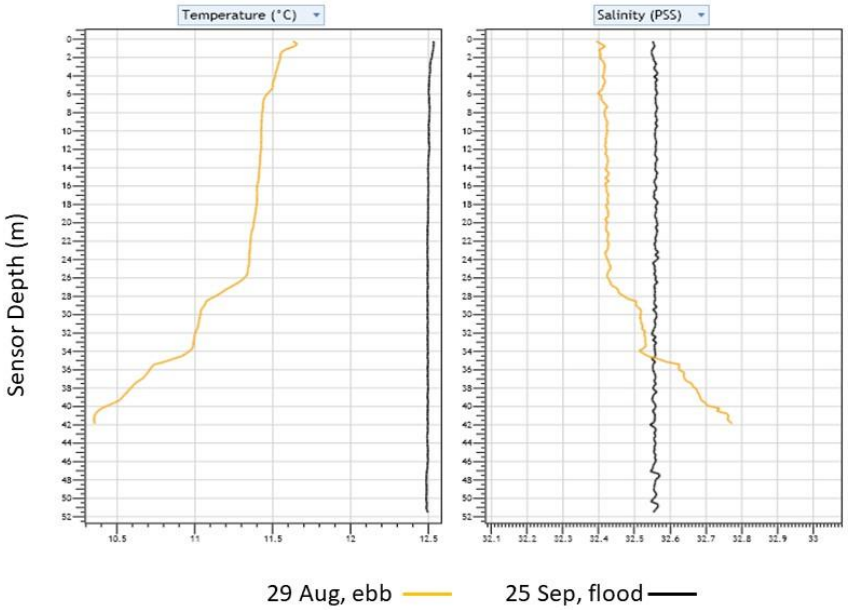
Station -date	Latitude (Decimal degrees)	Longitude (Decimal degrees)	Temperature (C) [min - max]	Salinity (PSU) [min - max]	Max Depth (mBSL)	Tide
I						
-29-Aug	44.29273	-66.43861	10.99 - 11.57	32.36 - 32.54	38.2	Ebb
-25-Sep	44.29279	-66.43864	12.42 - 12.79	32.27 - 32.58	43.9	Flood
II						
-29-Aug	44.31788	-66.38306	10.35 - 11.66	32.39 - 32.77	41.8	Ebb
-25-Sep	44.31820	-66.38250	12.48 - 12.53	32.54 - 32.57	51.5	Flood
III						
-29-Aug	44.33968	-66.33968	10.49 - 11.45	32.37 - 32.71	86.7	Ebb
-25-Sep	44.33964	-66.33954	12.20 - 12.64	32.58 - 32.74	90.4	Flood
IV						
-29-Aug	44.31120	-66.33746	9.83 - 11.50	32.35 - 32.94	77.4	Ebb
-25-Sep	44.31103	-66.33727	12.48 - 12.75	32.46 - 32.61	83.7	Flood
V						
-29-Aug	44.28995	-66.38795	10.39 - 11.62	32.37 - 32.77	61.9	Ebb
-25-Sep	44.28986	-66.38814	12.48 - 12.69	32.47 - 32.55	67.2	Flood
VI						
-29-Aug	44.28913	-66.34862	11.37 - 11.50	32.37 - 32.42	25.5	Ebb
-25-Sep	44.28913	-66.34883	12.67 - 12.75	32.51 - 32.53	27.3	Flood
VII						
-29-Aug	44.28149	-66.33826	11.38 - 11.56	32.36 - 32.41	34.2	Ebb
-25-Sep	44.28131	-66.33801	12.89 - 13.01	32.33 - 32.47	35.6	Flood
VIII						
-28-Aug	44.24949	-66.33598	11.73 - 12.77	31.79 - 32.11	30.5	Flood
-30-Aug	44.24925	-66.33628	11.80 - 11.94	32.18 - 32.27	28.8	Ebb
-29-Sep	44.24947	-66.33611	12.90 - 12.96	32.16 - 32.36	29.2	Ebb
IX						
-28-Aug	44.20342	-66.38349	11.35 - 13.33	31.80 - 32.24	58.8	Flood
-29-Sep	44.20341	-66.38315	12.95 - 13.03	32.10 - 32.29	57.0	Ebb
X						
-28-Aug	44.15868	-66.42888	10.83 - 12.26	32.07 - 32.53	68.3	Flood
-29-Sep	44.15845	-66.42871	12.65 - 12.93	32.31 - 32.47	68.1	Ebb

APPENDIX 4 – CTD PROFILES FOR OCEANOGRAPHIC STATIONS I TO X.

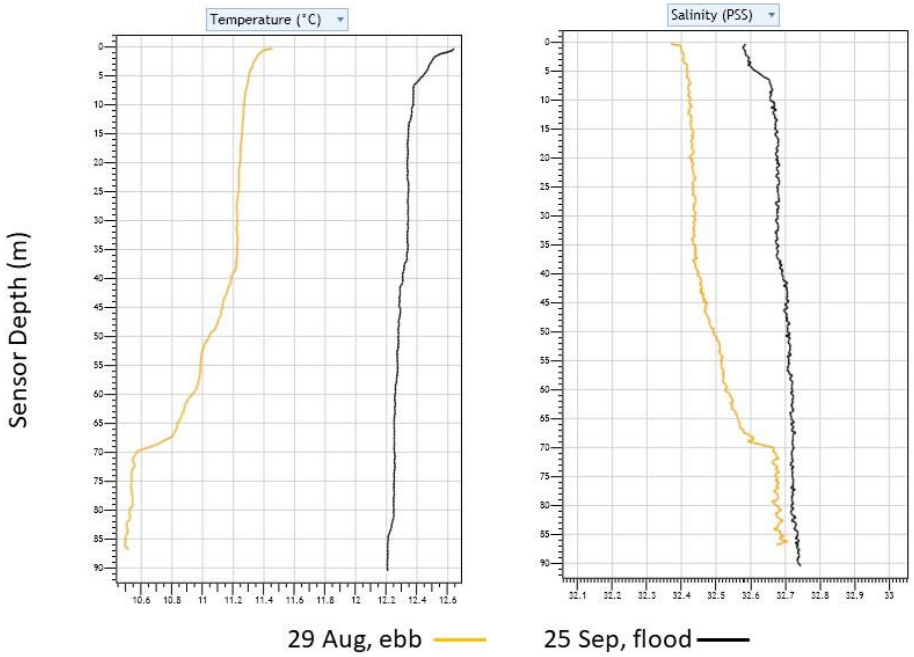
Station I



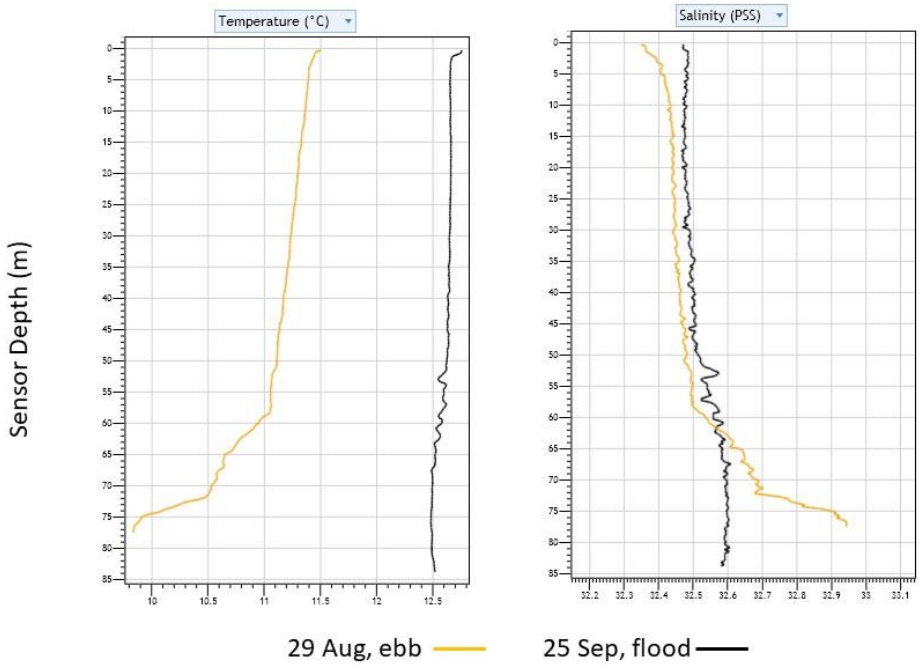
Station II



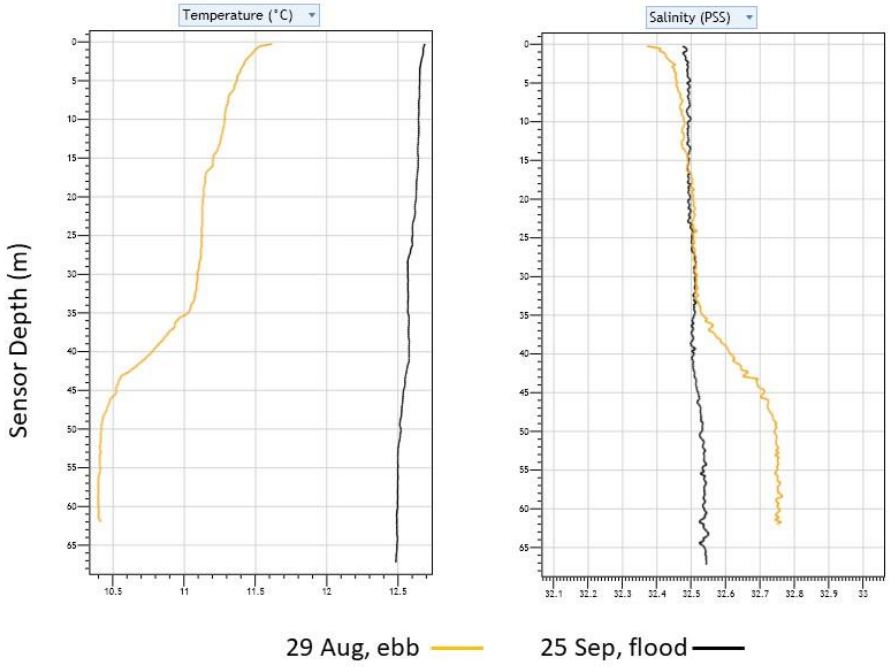
Station III



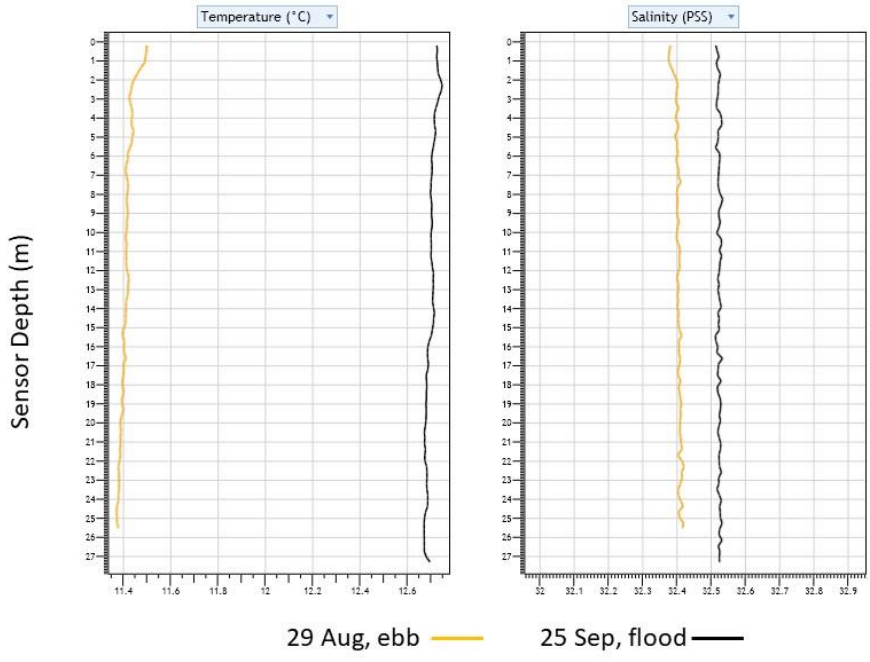
Station IV



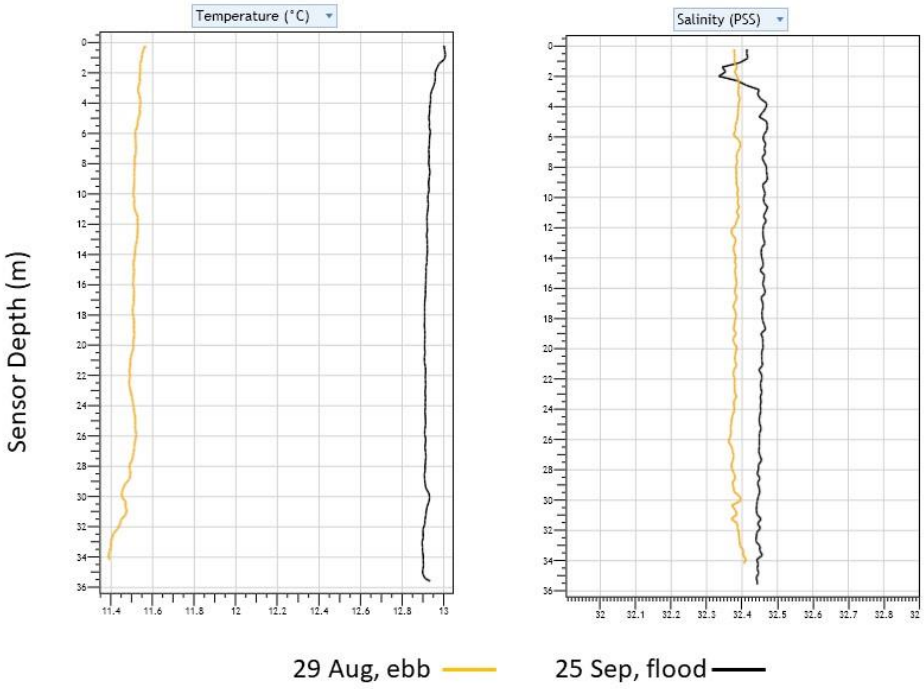
Station V



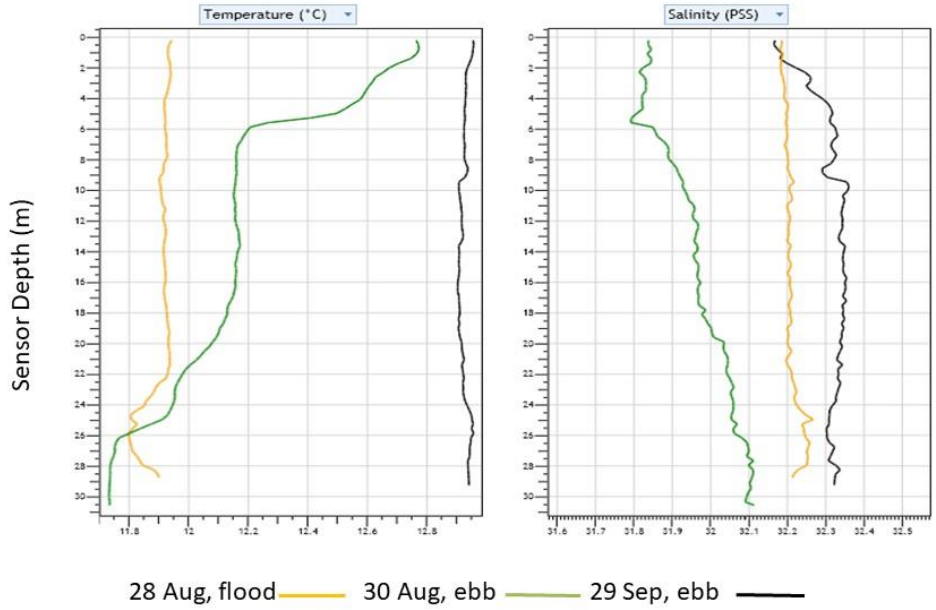
Station VI



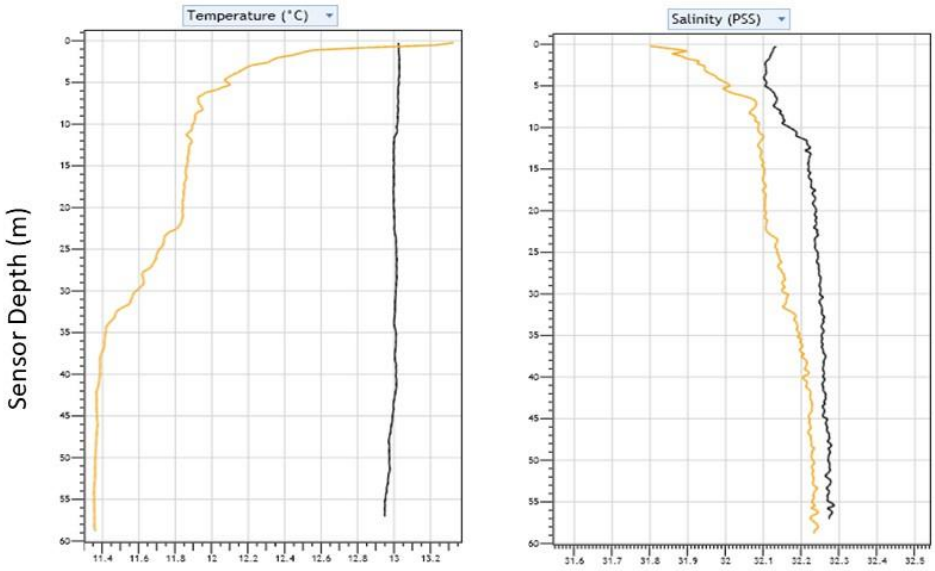
Station VII



Station VIII



Station IX



Station X