Labrador – Island Transmission Link

Marine Habitats in the Strait of Belle Isle: Interpretation of 2007 Geophysical (Sonar) Survey Information *Supplementary Report*

Summary of the 2007 Marine Habitat Survey, With a Focus on the 2011 Forteau Point to Shoal Cove Cable Corridor Option

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1.0 INTRODUCTION

Nalcor Energy is proposing to develop the *Labrador – Island Transmission Link* (the Project), a High Voltage Direct Current (HVdc) transmission system extending from Central Labrador to the Island of Newfoundland's Avalon Peninsula. The proposed Project includes the installation and operation of marine cables across the Strait of Belle Isle (SOBI).

The environmental assessment (EA) process for the Project was initiated in January 2009 and is in progress. An Environmental Impact Statement (EIS) is being prepared by Nalcor Energy, which will eventually be submitted for review by government departments, Aboriginal and stakeholder groups and the public.

The Project concept for the proposed SOBI marine cables, as described in the 2009 EA Registration submitted to initiate the EA process, saw the preliminary identification of potential cable landing sites at Forteau Point, Labrador and Mistaken Cove, Newfoundland (with alternatives at L'Anse Amour and Yankee Point in Labrador and on the Island, respectively). From there, multiple cables would be placed in two identified marine corridors across the Strait (Figure 1.1).

Figure 1.1: Possible Marine Cable Landing Sites and Corridors Identified in the EA Registration

Since that time, Nalcor Energy has continued with its Project planning and engineering work, and in doing so, has proceeded to evaluate other possible design options and alternatives. This is common with any major development project, and is in keeping with the role and principle of EA as a planning tool, and the requirement

to consider and assess alternative means of carrying out a project through the EA process. The 2009 EA Registration document itself also states that Project planning and engineering would continue to identify and evaluate other potential cable crossing approaches, including possible landing sites.

Nalcor Energy is continuing to focus on Forteau Point as the Labrador cable landing site. On the Newfoundland side, and in keeping with the above, the Proponent has also identified Shoal Cove as a possible landing site, which is located several kilometers northeast of Mistaken Cove (See Figure 1.2). If the Forteau Point and Shoal Cove cable landing site options were to be finalized, on-land horizontal directional drilling technology may be used to install the cables from these locations, out to and under the Strait for up to several kilometers. From there, the cables would be placed on the seabed and protected with rock berms.

With this option, the cables would be placed within one marine corridor (rather than two) across the Strait (Figure 1.2). This single corridor is essentially an amalgamation of the two marine corridors illustrated above (see Figure 1.1), utilizing portions of each, with the addition of a new short segment in to Shoal Cove.

Figure 1.2: Single Marine Corridor Option Identified by Nalcor Energy in 2011 (Forteau Point to Shoal Cove)

Nalcor Energy has collected information on the existing marine environment within and adjacent to the Project area, including bathymetry and substrate characteristics within the submarine cable crossing corridors through side-scan sonar, multi-beam and sub-bottom profile surveys in 2007. An interpretation and analysis of these geophysical survey data (sidescan sonar imagery) was completed to identify and classify the seafloor marine habitats (substrate types and water depths) and reported in FJGI (2010), for eventual use in the Project's EA and associated regulatory processes.

The purpose of the *Supplementary Report* is to "extract" and provide a summary overview of the information from the 2007 marine geophysical surveys and associated interpretation and analyses that falls within the marine corridor option from Forteau Point to Shoal Cove (Figure 1.2).

2.0 APPROACH AND METHODS

In the original study by Fugro (FJGI 2010), benthic habitat substrate classes were mapped along the original two 500 m wide marine cable corridors, based on sidescan sonar and seabed video data (AMEC 2010) collected in 2007 and 2008 respectively (Figures 2.1 and 2.2). The present exercise involved re-computing the distribution of substrate types within the marine corridor option identified in 2011 (Forteau Point to Shoal Cove), using the original substrate data where available. Areas within the new marine corridor option that were not surveyed in 2007, and for which substrate mapping is thus not available, can be seen as hatched polygons in Figure 2.1.

This report summarizes, in a series of tables, the distribution of surficial substrate classes along this new marine cable corridor option across the Strait of Belle Isle.

Figure 2.1: Strait of Belle Isle Marine Cable Corridors: Including Original (2007) Corridors and 2011 Corridor Option (Forteau Point to Shoal Cove)

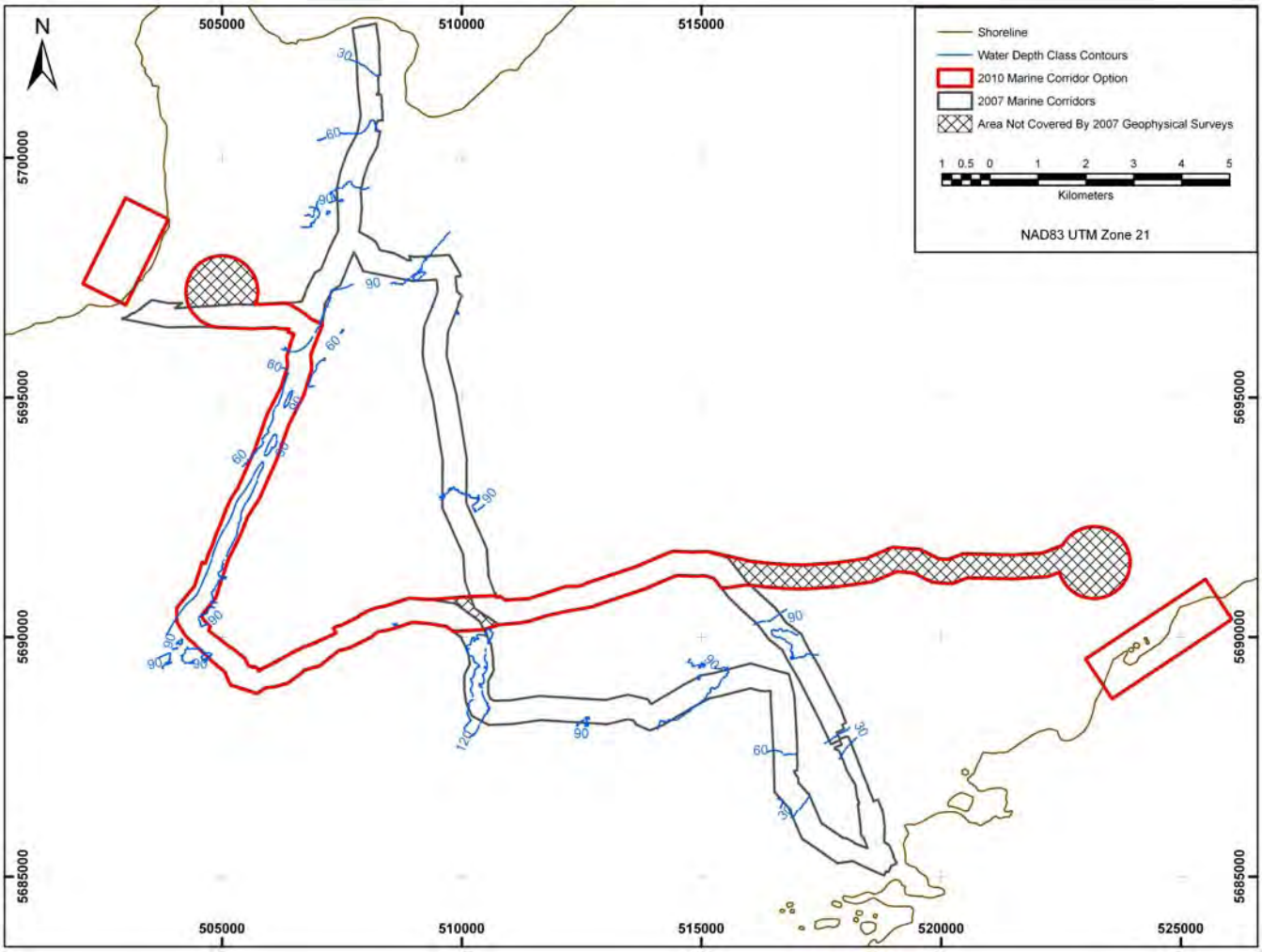
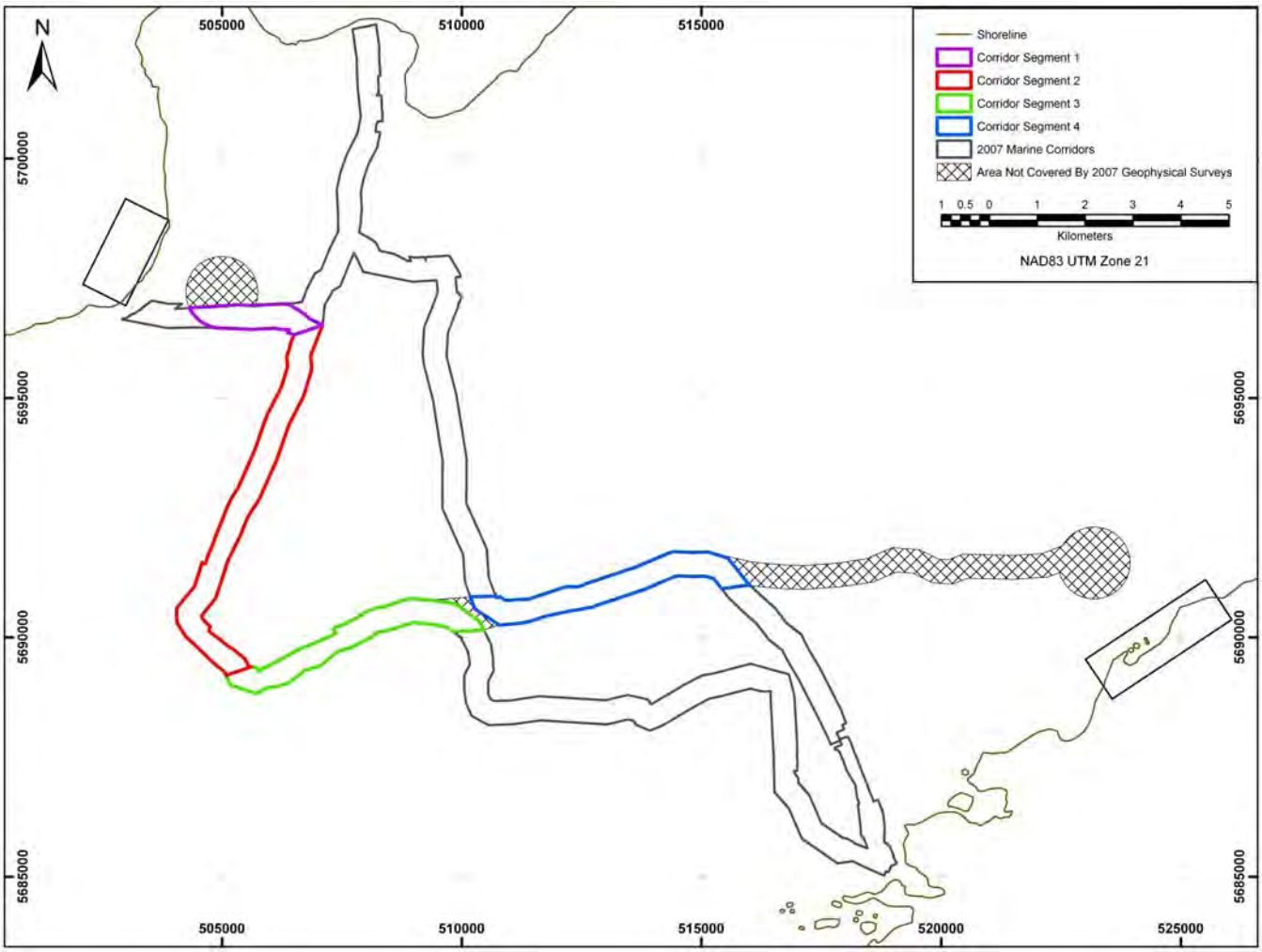


Figure 2.2: 2011 Marine Corridor Option (Forteau Point to Shoal Cove) By Segment



Nalcor Energy supplied the 2011 marine corridor information as ArcGIS shapefiles. The corridor was divided into four segments or polygons (coloured polygons in Figure 2.2). Three water depth classes (Deep Subtidal 1 to 3) occur within the corridor (Figure 2.1).

In the original study (FJGI 2010), sediments were classified into six substrate classes based on the grain-size of lithic fragments and shell content. These classes and the water depth classes are shown in Table 2.1.

The scope of work included the re-calculation of the area of each surficial sediment substrate class within the 2011 marine corridor option using the FJGI (2010) study results. The area (in km^2) and the percentage area of each substrate class are reported 1) by water depth class and 2) by marine corridor segment.

Table 2.1. Substrate Classes and Water Depth Classes

SUBSTRATE CLASS	DESCRIPTION
Bedrock	Continuous rock
Coarse-Large	Rubble and Boulder (140 to > 1000 mm)
Coarse-Small	Gravel and Cobble (2 – 140 mm)
Coarse-Small / Shells	Roughly equal proportions of: Gravel and Cobble (2 – 140 mm) and Calcareous remains of shells fish or invertebrates containing shells
Shells	Calcareous remains of shells fish or invertebrates containing shells
Fine	Detritus/silt/sand (>0.06 – 2 mm)
WATER DEPTH CLASS	**DESCRIPTION**
Intertidal Zone	Between high and low tide
Shallow Subtidal	0 – 30 m
Deep Subtidal 1	30 – 60 m
Deep Subtidal 2	60 – 90 m
Deep Subtidal 3	90 – 120 m
Deep Subtidal 4	120 – 150 m

ArcGIS software was used to manipulate the revised corridor data and to calculate the areas and percentages for the six substrate classes. In ArcGIS the following steps were performed:

1. From the original eastern and western corridors (reported in FJGI, 2010) substrate class polygons were clipped to the extents of the revised corridor;
2. The data were clipped to each of the five corridor segment polygons and to the water depth class polygons;
3. An area column and a percent area column were added to each of the newly created shape files and populated with the results from the ArcGIS field calculator; and
4. The ArcGIS tables were imported to Microsoft Excel for final tabulation of the calculated areas.

3.0 RESULTS AND SUMMARY

3.1 Substrate and Water Depth Classes for the 2011 Marine Corridor Option

Results of the substrate class analysis for water depth classes within the entire 2011 marine corridor option are presented in Tables 3.1 to 3.3, and the water depth class intervals are illustrated in Figure 2.1. The Tables present the substrate class distribution by area (km^2) and by percent of total area. Note that the Intertidal, Shallow Subtidal and Deep Subtidal 4 zones do not occur within the surveyed areas of the 2011 marine corridor option.

Table 3.1. Deep Subtidal 1 (30 – 60 m depth): Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.168	99.51
Coarse-Large	0.00	0.00
Coarse-Small	0.00	0.00
Coarse-Small/Shells	0.00	0.00
Shells	0.001	0.49
Fine	0.00	0.00
Total	**0.169**	**100**

Table 3.2. Deep Subtidal 2 (60 - 90 m depth): Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.531	25.51
Coarse-Large	0.117	5.64
Coarse-Small	0.970	46.61
Coarse-Small/Shells	0.100	4.79
Shells	0.363	17.45
Fine	0.00	0.00
Total	**2.081**	**100**

Table 3.3. Deep Subtidal 3 (90 - 120 m depth): Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.171	2.06
Coarse-Large	1.527	18.44
Coarse-Small	5.399	65.18
Coarse-Small/Shells	0.652	7.87
Shells	0.534	6.45
Fine	0.00	0.00
Total	**8.283**	**100**

3.2 Substrate Classes by Marine Corridor Segment

Results of the substrate class analysis for the corridor segments are presented in Tables 3.4 to 3.7, and the segmented corridor is illustrated in Figure 2.2. The Tables show the area (km^2) and percentage area within each segment, and Table 3.8 shows the results for substrate classes in the entire marine corridor.

Table 3.4. Corridor Segment 1: Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.024	2.10
Coarse-Large	0.170	14.82
Coarse-Small	0.145	12.64
Coarse-Small/Shells	0.752	65.56
Shells	0.056	4.88
Fine	0.00	0.00
Total	**1.147**	**100**

Table 3.5. Corridor Segment 2: Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.772	19.58
Coarse-Large	0.223	5.66
Coarse-Small	2.121	53.79
Coarse-Small/Shells	0.00	0.00
Shells	0.827	20.97
Fine	0.00	0.00
Total	**3.943**	**100**

Table 3.6. Corridor Segment 3: Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.037	1.42
Coarse-Large	0.373	14.36
Coarse-Small	2.187	84.22
Coarse-Small/Shells	0.00	0.00
Shells	0.00	0.00
Fine	0.00	0.00
Total	**2.597**	**100**

Table 3.7. Corridor Segment 4: Substrate Class Distribution from Sidescan

Substrate Class	Area (km^2)	Area (%)
Bedrock	0.037	1.31
Coarse-Large	0.878	30.84
Coarse-Small	1.916	67.32
Coarse-Small/Shells	0.00	0.00
Shells	0.015	0.53
Fine	0.00	0.00
Total	**2.846**	**100**

Table 3.8. Substrate Class Distribution from Sidescan: Entire Marine Corridor

Substrate Class	Area (km^2)	Area (%)	No. of Polygons in each Substrate Class
Bedrock	0.870	8.26	155
Coarse-Large	1.644	15.61	378
Coarse-Small	6.369	60.47	26
Coarse-Small/Shells	0.752	7.14	2
Shells	0.898	8.53	109
Fine	0.00	0.00	0
Total	**10.533**	**100**	**670**

4.0 REFERENCES

Amec Earth and Environmental, 2010. Labrador – Island Transmission Link - Marine Flora, Fauna and Habitat Survey: Strait of Belle Isle Subsea Cable Crossing Corridors. Final Report Prepared for Nalcor Energy.

FJGI (Fugro Jacques Geosurveys, Inc.), 2010. Labrador – Island Transmission Link - Marine Habitats in the Strait of Belle Isle: Interpretation of 2007 Geophysical (Sonar) Survey Information for the Submarine Cable Crossing Corridors. January 2010. Prepared for Nalcor Energy. Contract #LC-EV-012.

Labrador – Island Transmission Link

Marine Flora, Fauna and Habitat Survey: Strait of Belle Isle Supplementary Report

Summary of the 2008-09 Marine Survey Results, With a Focus on the Forteau Point to Shoal Cove Cable Corridor Option

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1.0 INTRODUCTION

Nalcor Energy is proposing to develop the *Labrador – Island Transmission Link* (the Project), a High Voltage Direct Current (HVdc) transmission system extending from Central Labrador to the Island of Newfoundland's Avalon Peninsula. The proposed Project includes the installation and operation of marine cables across the Strait of Belle Isle.

The environmental assessment (EA) process for the Project was initiated in January 2009 and is in progress. An Environmental Impact Statement (EIS) is being prepared by Nalcor Energy, which will eventually be submitted for review by government departments, Aboriginal and stakeholder groups and the public.

The Project concept for the proposed Strait of Belle Isle (SOBI) marine cables, as described in the January 2009 EA Registration submitted to initiate the EA process, saw the preliminary identification of potential cable landing sites at Forteau Point, Labrador and Mistaken Cove, Newfoundland (with alternatives at L'Anse Amour and Yankee Point in Labrador and on the Island, respectively). From there, multiple cables would be placed in two identified marine corridors across the Strait (Figure 1.1).

Since that time, Nalcor Energy has continued with its Project planning and engineering work, and in doing so, has proceeded to evaluate other possible design options and alternatives. This is common with any major development project, and is in keeping with the role and principle of EA as a planning tool and the requirement to consider and assess alternative means of carrying out a project through the EA process. The 2009 EA Registration document itself also states that Project planning and engineering would continue to identify and evaluate other potential cable crossing approaches, including possible landing sites.

Nalcor Energy is continuing to focus on Forteau Point as the Labrador cable landing site. On the Newfoundland side, and in keeping with the above, the Proponent has also identified Shoal Cove as a possible landing site, which is located several kilometres northeast of Mistaken Cove (see Figure 1.2).

If the Forteau Point and Shoal Cove cable landing site options were to be finalized, on-land horizontal directional drilling technology may be used to install the cables from these locations, out to and under the Strait for up to several kilometres. From there, the cables would be placed on the seabed and protected with rock berms.

With this option, the cables would be placed within one marine corridor (rather than two) across the Strait (Figure 1.2). This single corridor is essentially an amalgamation of the two marine corridors included in the 2009 EA Registration (see Figure 1.1), utilizing portions of each, with the addition of a new short segment in to Shoal Cove.

In 2008 and 2009, Nalcor Energy completed extensive *Marine Flora, Fauna and Habitat Surveys* within the two originally identified marine cable corridors across the SOBI (AMEC 2010), for eventual use in the Project's EA and associated regulatory processes.

The purpose of the Supplementary Report is to "extract" and provide a summary overview of the information from the 2008-09 marine surveys that falls within the marine corridor option from Forteau Point to Shoal Cove (Figure 1.2).

Figure 1.1

Possible SOBI Cable Landing Sites and Corridors Identified in the EA Registration (January 2009)

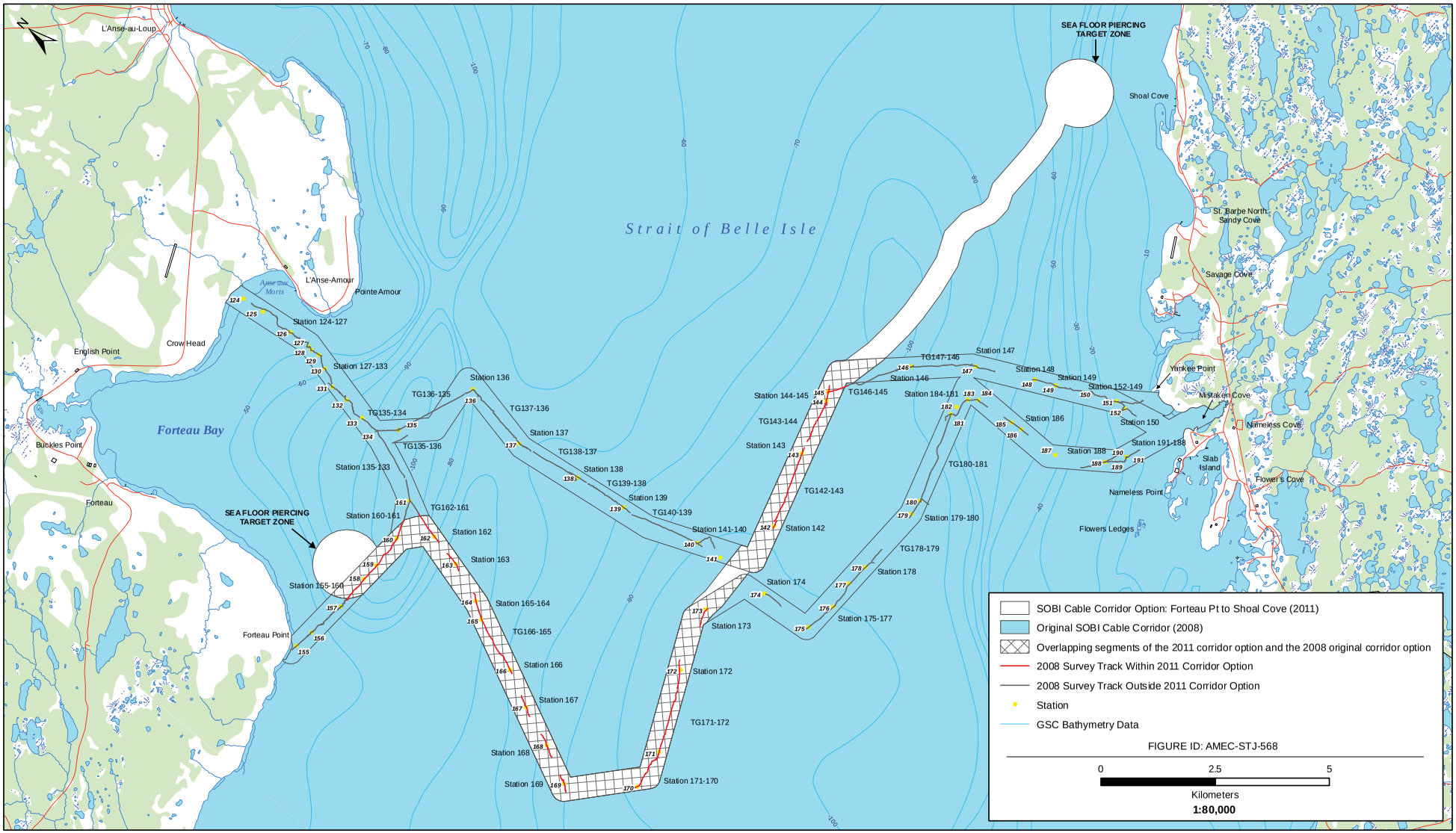

Figure 1.2

**2008 Survey Tracks within the SOBI Cable Corridor Option:
Forteau Point to Shoal Cove (2011)**

2.0 APPROACH AND METHODS

The following section outlines the methods used in the marine field program conducted in October 2008 in the SOBI and associated data analysis, as well as the 2011 summary that is the subject of this report.

2.1 2008-2009 Marine Survey

The marine survey field program was designed to gather environmental baseline information on marine fauna, flora, and associated depth and substrate distributions along the two submarine cable corridors and four potential shoreline cable landing points originally identified for the project.

The 2008 field program consisted of drop video marine survey transects of representative areas selected based on depth and substrate identified from a 2007 geophysical (sonar) survey (FJGI 2010). See "Chapter 2: Approach and Methods" in AMEC (2010) for full details of the 2008 marine survey. A subsequent dive survey in 2009 focused on the nearshore area near Mistaken Cove. As this 2009 survey did not include any of the 2011 corridor option, it is not discussed further in this report.

2.1.1 **Video Analysis**

Drop videos of transects were viewed and analysed for data relating to substrate, macrofloral, and macrofaunal distributions, similar to standard DFO (Fisheries and Oceans Canada) characterization (Table 2.1). The data was then compiled into a GIS database. Each video transect was further broken down into reaches based on the substrate composition.

All reaches that were partially or totally within the Forteau Point to Shoal Cove corridor option (Figure 1.2) were included in the analysis for the current study report. Macrofaunal and macrofloral distributions were identified to the lowest possible taxonomic level and analysed for both percent occurrence (presence/absence) and abundance. Percent occurrence is defined as the percent total length of all the reaches where the taxon was present. This strictly indicates whether a species was present or absent within a specific reach and does not account for abundance or density.

Table 2.1: Broad and Detailed Substrate Categories

Broad Substrate Categories	Detailed Substrate Categories	Definition
Bedrock	Bedrock	Continuous solid bedrock
Coarse-large	Small and Large Boulder	Rocks greater than 250 mm
	Rubble	Rocks ranging from 130 mm-250 mm
Coarse-small	Cobble	Rocks ranging from 30 mm-130 mm
	Gravel	Granule size or coarser; 2 mm-30 mm
Fine	Sand	Fine deposits ranging from 0.06 mm-2 mm
	Mud	Material encompassing both silt and clay < 0.06 mm
	Organic/Detritus	A soft material; 85% or more organic materials
Shell	Shell	Calcareous remains of shellfish or other invertebrates containing shells

The abundance of each taxon within each reach was ranked which provided an indication of how frequently the species occurred within each reach (although unquantifiable in some instances). The four abundance categories utilized are outlined below:

- **Abundant (A):** Numerous (not quantifiable) observations made throughout the entire reach.
- **Common (C):** Numerous (not quantifiable) observations made intermittently along the reach.
- **Occasional (O):** Quantifiable observations made intermittently along the reach.
- **Uncommon (U):** Quantifiable observations made infrequently along the reach.

2.2 2011 Data Analysis

Transects and their corresponding reaches from the 2008 marine survey that were within the marine corridor option from Forteau Point to Shoal Cove (Table 2.2) were analyzed and summarized to provide specific baseline information for the 2011 corridor option. Transects that crossed outside the 2011 corridor area (four out of 21) were subdivided into reaches and specific reaches within the marine corridor were included in the analysis. A small proportion of the reaches that were included in the study extended outside the corridor and accounted for approximately 2% of the entire area.

“Station” transects were pre-selected stations for the 2008 marine survey. Additional transects carried out between the stations were referred to as “track gaps” (TG). For example TG142-143 is a video survey of the remaining area between stations 142 and 143.

Table 2.2: Summary of 2008 Survey Tracts within the Forteau Point to Shoal Cove Corridor Option (2011)

Transect Name	Reaches[1]	Direction	Total Distance (m)
Station 142	1-4	East	208.2
Station 143	1-2	East	242.8
Station 144-145	1-4	East	455.3
Station 155-159[2]	6-14	East	1750.3
Station 160-161[2]	1-3	East	593.7
Station 162	1-4	West	397.4
Station 163	1-6	West	467.2
Station 165-164	1-7	West	865.4
Station 166	1-5	East	539.9
Station 167	1-3	West	515.0
Station 168	1-6	West	585.5
Station 169	1-5	East	441.2
Station 171-170	1-6	West	1071.9
Station 172	1-4	West	649.6
Station 173	1-4	West	449.6
TG142-143	1-15	East	1543.3
TG143-144	1-9	East	954.6
TG146-145[2]	7-8	West	497.8
TG162-161[2]	1	West	410.7
TG166-165	1-4	West	624.6
TG171-172	1-8	East	1531.3
Total	**-**	**-**	**14795.3**

[1]See Appendix C of AMEC (2010) for details on individual reaches.

[2]Indicates the four transects that crossed outside the 2011 corridor area.

3.0 RESULTS AND SUMMARY

3.1 Substrate distribution

All 2008 survey reaches that were within the 2011 corridor option were at depths in excess of 60 m. Most of the survey reaches (72%) were in the 90-130 m depth class, with the remaining reaches (28%) in the 60-89 m depth class.

Substrate distributions within the marine corridor predominantly fell within the broad substrate categories of Coarse-Small and Coarse-Large which respectively constituted 46.7% and 27.9% (74.6% total) of the marine survey area (Table 3.1, Figure 3.1). These substrate types were dominant in areas with depths in excess of 90 m. Shell dominant substrate was found predominantly in the western region of the Strait at depths exceeding 60 m and covered 25.2% of the 2011 corridor (Figure 3.2). Bedrock was rarely encountered and covered 0.2% of the corridor. Bedrock was usually encountered in relation to the edge zone of a trench (although not exclusively so).

Table 3.1: Dominant Substrate Summary: 2008 Survey Tracks within the Forteau Point to Shoal Cove Corridor Option (2011)

Broad Substrate Category	Detailed Substrate Categories	Number of Reaches with Substrate Dominant	Total Distance with Substrate Present (m)	Coverage (%)
Coarse-Large	Rubble, small boulder, and large boulder	42	4,127.6	27.9
Coarse-Small	Gravel and cobble	40	6,913.4	46.7
Shell	Calcareous remains	28	3,727.8	25.2
Bedrock	Continuous rock	1	26.5	0.2
Total	**-**	**111**	**14,795.3**	**100.0**

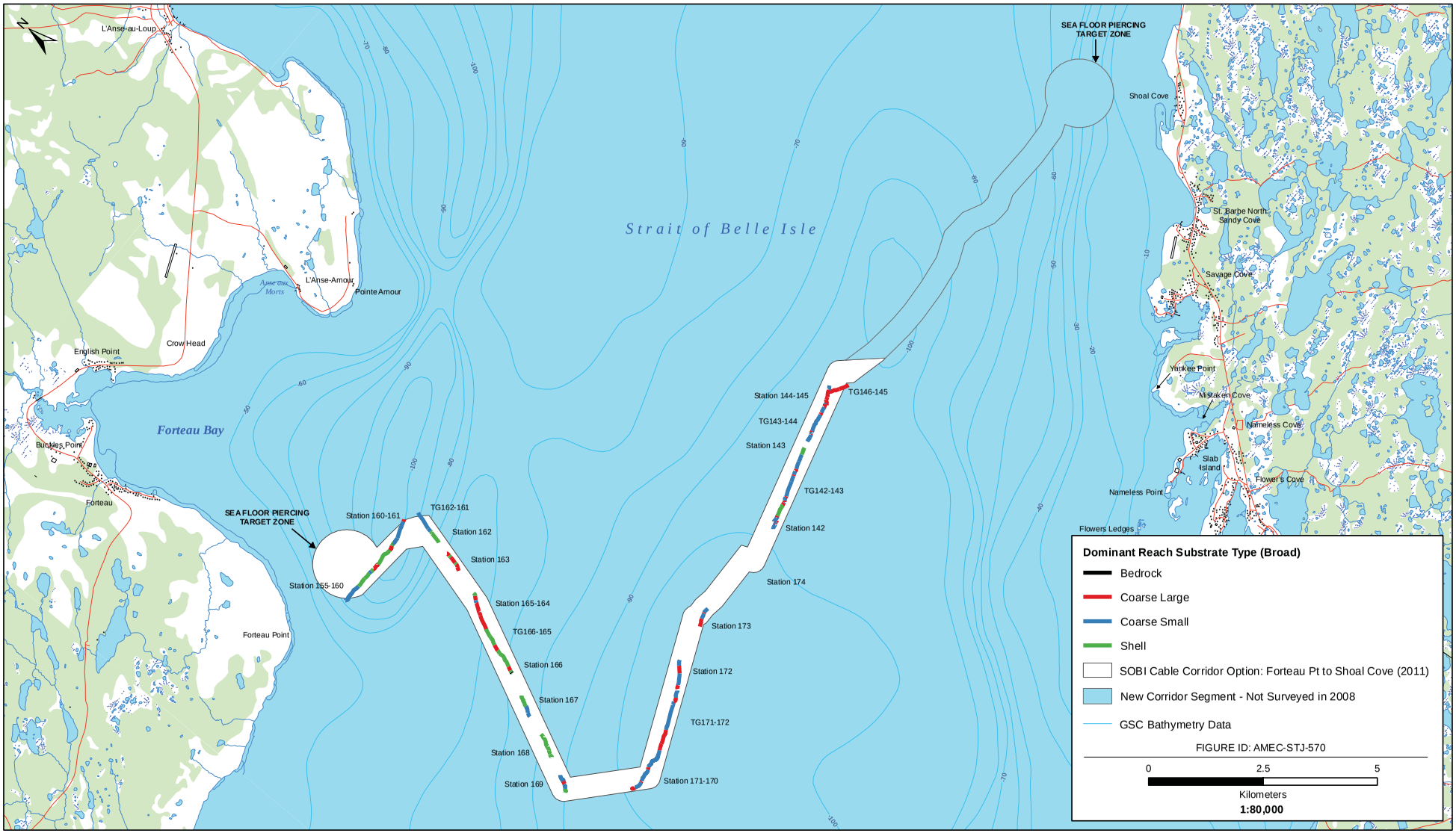

Figure 3.1

Strait of Belle Isle – Dominant Broad Substrate by Reach
Forteau Point to Shoal Cove Corridor Option (2011)

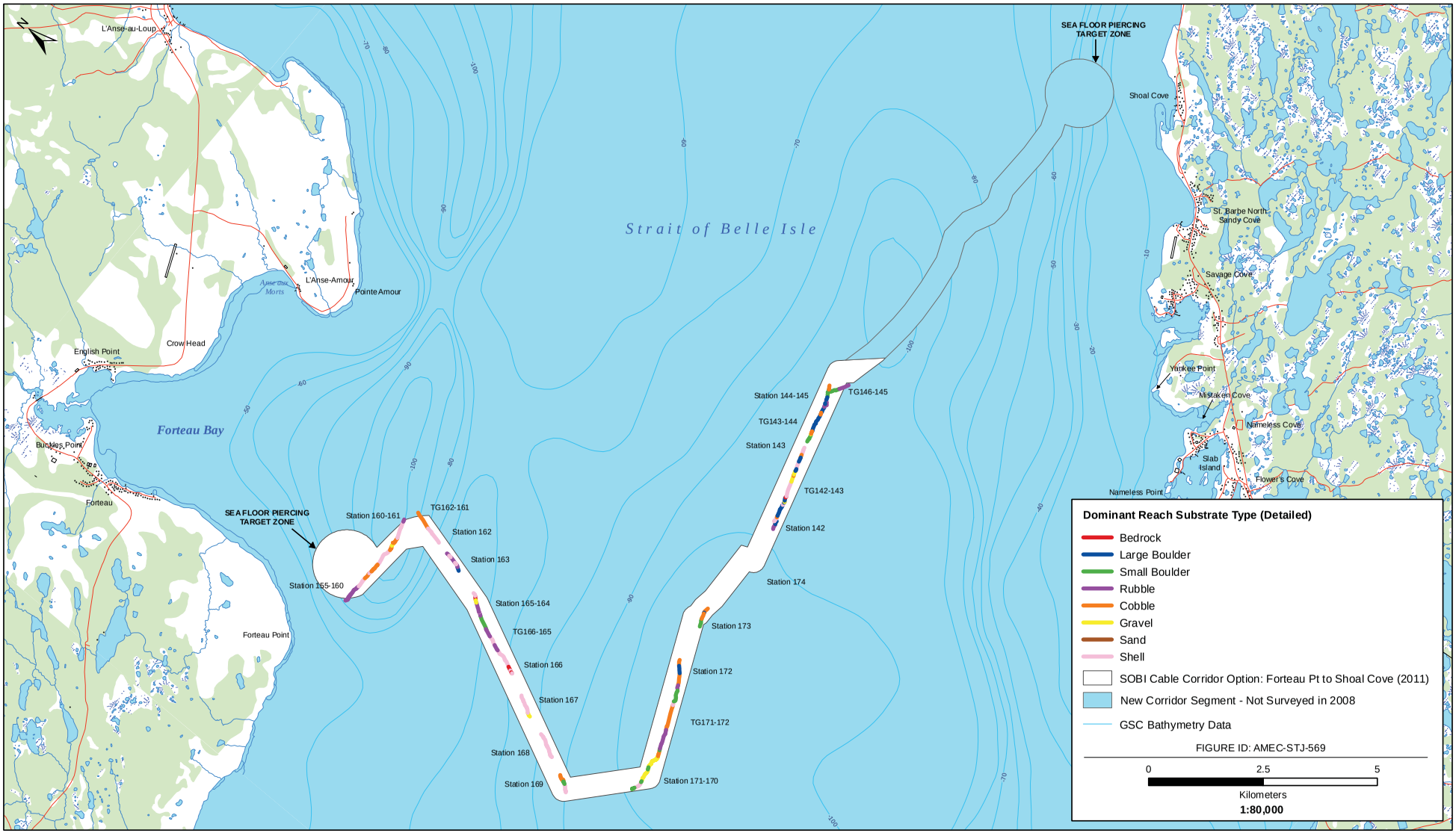

Figure 3.2

Strait of Belle Isle – Dominant Detailed Substrate by Reach
Forteau Point to Shoal Cove Corridor Option (2011)

3.2 Macrofauna

A total of 26 macrofaunal taxa were identified within the 2011 submarine corridor option from the 2008 marine survey data. Taxa are listed below in order of their percent occurrence (Table 3.2). Percent occurrence is defined as the total length of all the reaches (ie. an area with the same substrate composition) where the taxon was present.

The most widely distributed macrofauna taxa with occurrences of 75-100% of the reaches surveyed included pale urchin (*Strongylocentrotus pallidus*), hydroid (various species), starfish (*Crossaster* sp.), starfish (*Asterias* sp.), sea anemone (non-*Metridium* species), toad crab (*Hyas* sp.), and soft coral (*Gersemia* sp.).

Moderately distributed macrofauna taxa with occurrences ranging from 50-74% included stalked sea squirt (*Boltenia* sp.), bryozoan (various species), deep sea scallop (*Placopecten magellanicus*), barnacle (*Balanus* sp.), and sponge (Porifera).

Macrofauna species with occurrences ranging from 25-49% included basket star (*Gorgonocephalus* sp.), Icelandic scallop (*Chlamys islandica*), brittle star (Ophiuroidea), starfish (*Solaster* sp.), and sea squirt (Ascidiacea).

Macrofauna species with relatively low occurrences ranging from 5-24% included snow crab (*Chionoecetes opilio*), sea cucumber (*Cucumaria frondosa*), and alligatorfish (*Aspidophoroides monopterygius*).

Macrofauna taxa that were rarely encountered with distributions < 5% within the marine survey area included sculpin (*Myoxocephalus* sp.), sand dollar (*Echinarachnius parma*), Atlantic cod (*Gadus morhua*), a cushion star (*Asterina* sp.), an unidentified fish, and a gastropod. Most of these taxa with distributions < 5% occurred in only one or two reaches in the uncommon abundance category.

Table 3.2: Macrofaunal Taxa Observed in 2008 Survey Tracks within the Forteau Point to Shoal Cove Corridor Option (2011)

Rank*	Percent Occurrence	Common Name	Taxon	Category
1	90.9	Pale urchin	*Strongylocentrotus pallidus*	Echinoderm
2	89.7	Hydroid	-	Cnidarian
3	84.6	Starfish	*Crossaster* sp.	Echinoderm
4	82.4	Starfish	*Asterias* sp.	Echinoderm
5	79.1	Sea anemone	-	Cnidarian
6	78.3	Toad crab	*Hyas* sp.	Crab
7	75.6	Soft coral	*Gersemia* sp.	Colonial
8	71.7	Stalked sea squirt	*Boltenia* sp.	Tunicate
9	67.9	Bryozoan	-	Colonial
10	62.9	Deep sea scallop	*Placopecten magellanicus*	Shellfish
11	57.5	Barnacle	*Balanus* sp.	Mollusc
12	54.2	Sponge	Porifera	Colonial
13	41.6	Basket star	*Gorgonocephalus* sp.	Echinoderm
14	40.7	Icelandic scallop	*Chlamys islandica*	Shellfish
15	32.5	Brittle star	Ophiuroidea	Echinoderm
16	28.8	Starfish	*Solaster* sp.	Echinoderm
17	27.7	Sea squirt	Ascidiacea	Tunicate
18	19.7	Snow crab	*Chionoecetes opilio*	Crab
19	19.1	Sea cucumber	*Cucumaria frondosa*	Echinoderm
20	13.5	Alligatorfish	*Aspidophoroides monopterygius*	Fish
21	4.7	Sculpin	*Myoxocephalus* sp.	Fish
22	3.7	Sand dollar	*Echinarachnius parma*	Echinoderm
23	2.1	Atlantic cod	*Gadus morhua*	Fish
24	1.8	Cushion Star	*Asterina* sp.	Echinoderm
25	1.3	Unidentified Fish	-	Fish
26	0.4	Gastropod	-	Mollusc

*Rank is based on descending percent occurrence, the percentage of the total transect length of all the reaches where the taxon was present

3.2.1 Distribution on Substrate

Marine taxa were mainly distributed on Coarse-Small and Coarse-Large substrate with percent occurrences of up to 44.8% and 28.3% respectively (Figure 3.3). Species with the highest distribution (42.9-44.8%) on Coarse-Small substrate include hydroids, pale urchins (*S. pallidus*) starfish (*Crossaster* sp.), and sea anemone. Among the species with higher percent occurrence (25.9-28.3%) on Coarse-Large substrate were hydroids, stalked sea squirt (*Boltenia* sp.) and bryozoa.

Shell substrate had the third highest distribution of species with percent occurrences of up to 22.4%. Among the species with higher percent occurrence (20.1-22.4%) on Shell substrate were starfish (*Asterias* sp.), pale urchins (*S. pallidus*), and toad crabs (*Hyas* sp.).

Lowest distributions were observed on Bedrock with maximum occurrences of 0.2%. It was the lowest occurrence for all species found on Bedrock substrate.

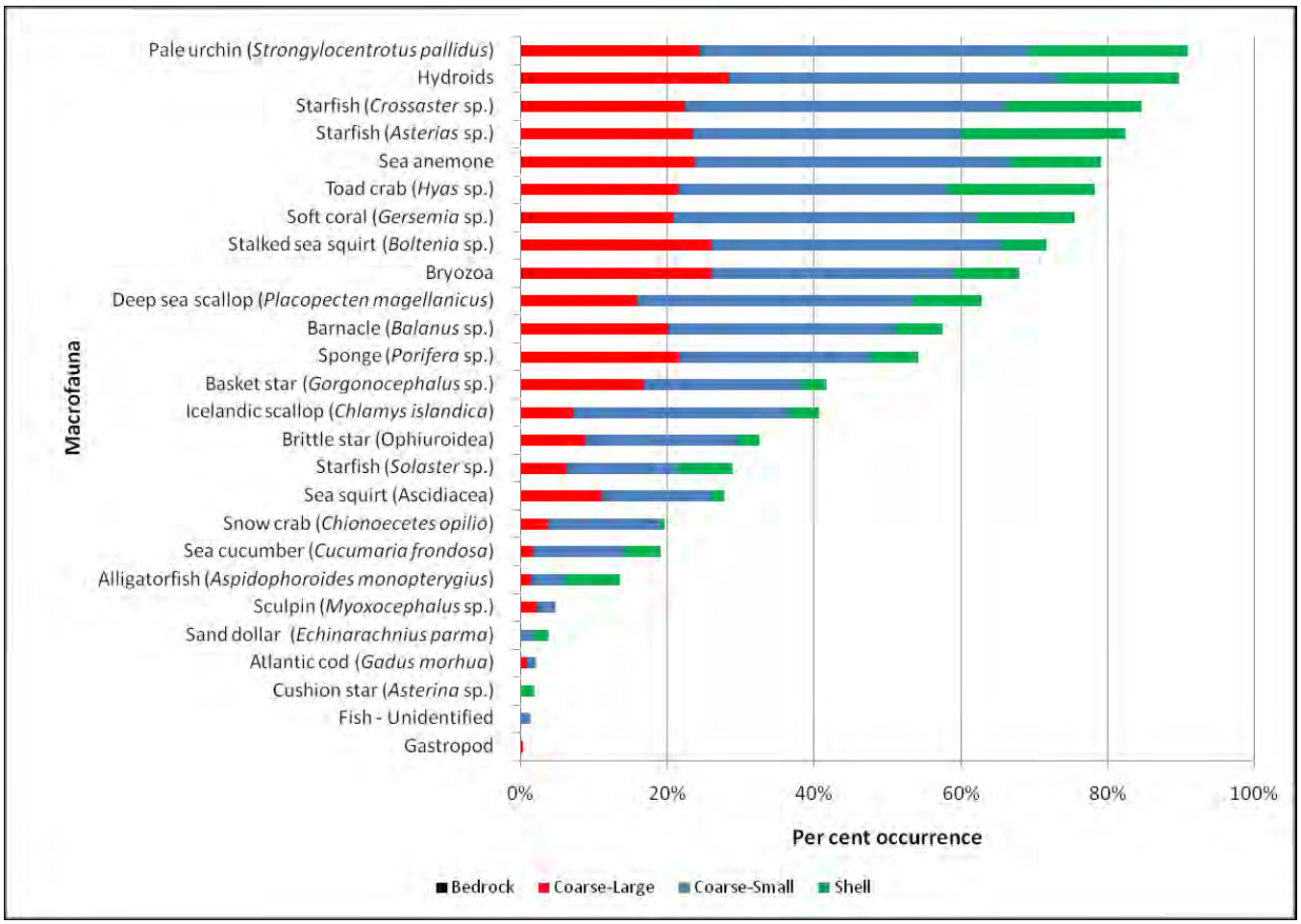

Figure 3.3: Summary of Distribution of all Macrofauna by Substrate Type within the Forteau Point to Shoal Cove Corridor Option (2011)

3.2.2 Depth Distribution

The majority of species observed in the 2008 survey occurred in the 90-130 m depth class (Figure 3.4). The species with the highest occurrences at this depth (64.9-72.4%) included hydroids, pale urchins (*S. pallidus*), and starfish (*Crossaster* sp.). Alligatorfish (*A. monopterygius*) and cushion stars (*Asterina* sp.) were mainly observed at the 60-89 m depth class with occurrences of 7.4% and 1.8%, respectively (however, occurrences of cushion stars were based on observations in a single transect).

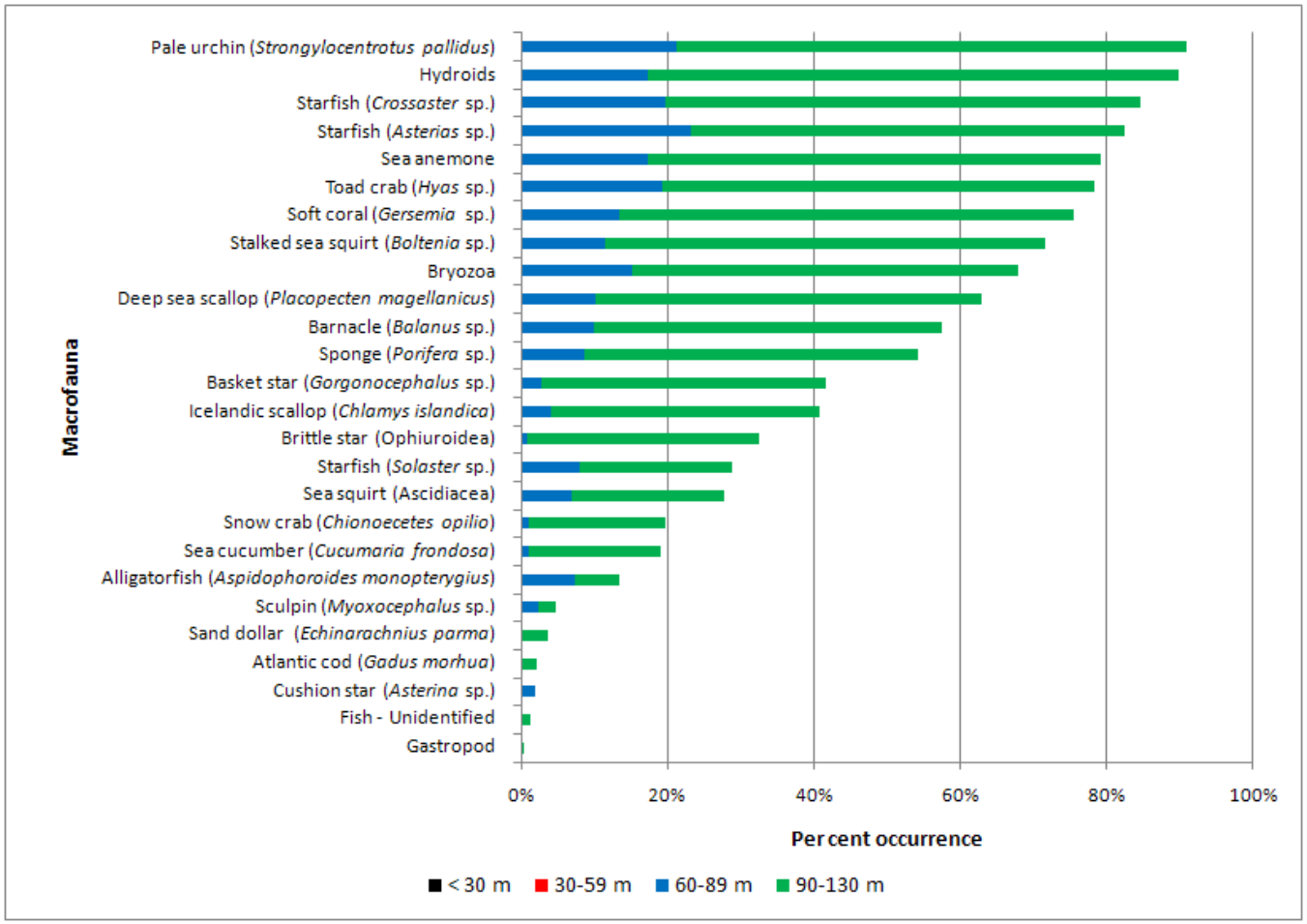

Figure 3.4: Summary of Depth Distribution of all Macrofauna within the Forteau Point to Shoal Cove Corridor Option (2011)

3.2.3 Species at Risk

All macrofaunal species observed during the 2008 survey were cross-checked with the Species at Risk Public Registry (Government of Canada 2011) and the provincial registry (Government of Newfoundland and Labrador 2010). The Atlantic cod population as a whole is listed under Schedule 3 of the Species at Risk Act (SARA) as a species of Special Concern. The area of the 2008 marine survey is adjacent to both the Newfoundland and Labrador population and the Laurentian North population of Atlantic cod. The Newfoundland and Labrador population and the Laurentian north population have a COSEWIC (Committee on the Status of Endangered

Wildlife in Canada) designation of Endangered. Atlantic cod is the only listed species observed during the 2008 study.

3.3 Macroflora

Coralline algae (various species) and crustose algae (*Lithothamnium* sp.) were found within the marine survey area, and are listed below in order of their percent occurrence (Table 3.3).

Table 3.3: Macrofloral Taxa Observed in 2008 Survey Tracks within the Forteau Point to Shoal Cove Corridor Option (2011)

Rank*	Percent Occurrence	Common Name	Taxon	Macrofloral Type
1	17.4	Coralline Algae	Various species	Red algae
2	5.6	Crustose Algae	*Lithothamnium* sp.	Red algae

*Rank is based on descending percent occurrence, the percentage of the total transect length of all the reaches where the taxon was present

3.3.1 **Distribution on Substrate**

Coralline algae occurred in 17.4% of the survey area (Figure 3.5) and was mainly distributed in areas of Coarse-Small and Coarse-Large substrate. It also occurred in areas of Shell substrate. Crustose algae occurred in 5.6% of the survey area (Figure 3.6) and occurred mainly in areas of Coarse-Large substrate. It was also found less often on Coarse-Small substrate.

3.3.2 **Depth Distribution**

Coralline algae was present only at depths between 90-130 m. Crustose algae was found mainly at depths between 60-89 m (4.8%), with some occurrences at 90-130 m (0.8%).

3.3.3 **Species at Risk**

All macrofloral species observed during the 2008 survey were cross-checked with the Species at Risk Public Registry (Government of Canada, 2011) and the provincial registry (Government of Newfoundland and Labrador 2010). No macrofloral species of special conservation status were encountered during the 2008 survey.

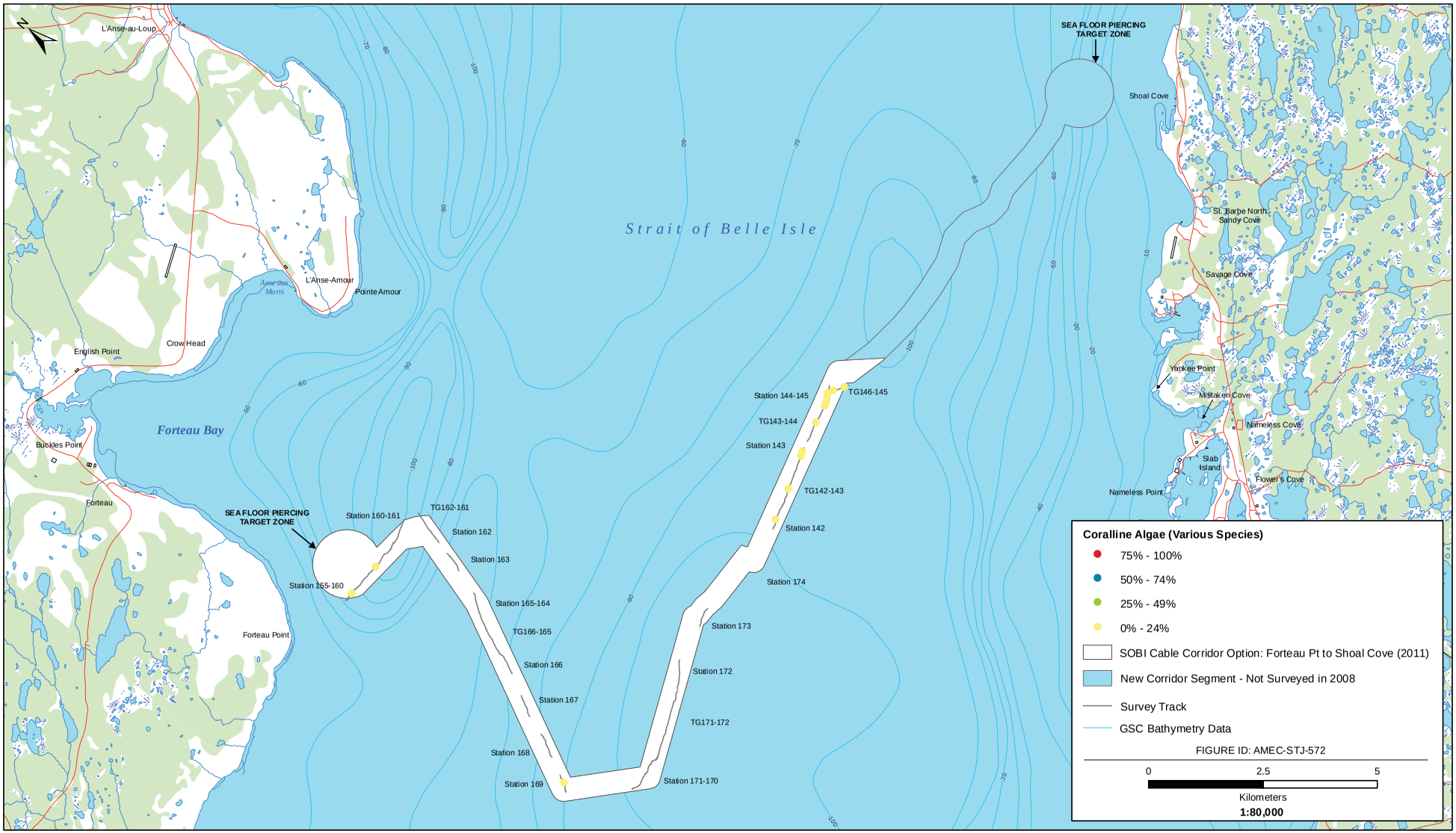

Figure 3.5

Coralline Algae (Various Species) - 2008 Survey
Forteau Point to Shoal Cove Corridor Option (2011)

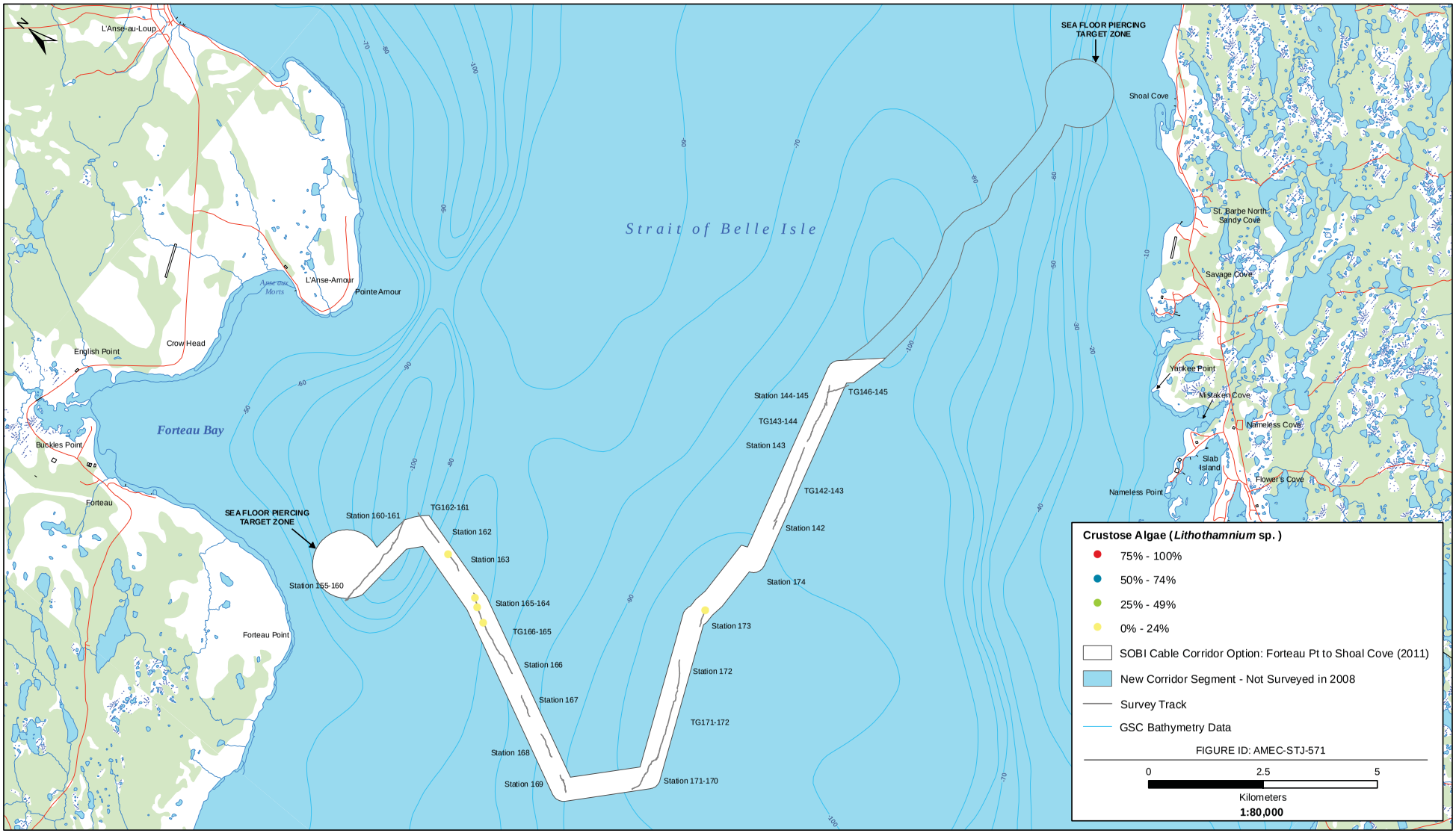

Figure 3.6

Crustose Algae (*Lithothamnium* sp.) - 2008 Survey
Forteau Point to Shoal Cove Corridor Option (2011)

4.0 REFERENCES

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