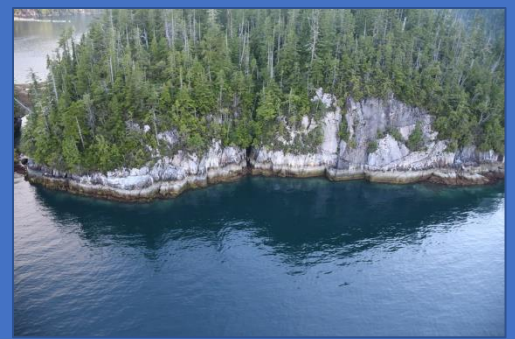
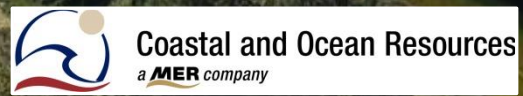


**ShoreZone Summary Report
Barkley Sound Survey Area
March 2023**



Prepared for:
Departement of Fisheries
and Oceans



On the cover:

Nahmint Bay

Port Alberni

Vernon Bay

ShoreZone Habitat Mapping Summary Report

Barkley Sound Survey Area



Walsh Island, Broken Group

Prepared for:
Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, BC, Canada

Prepared by:
SeaChange Marine Conservation Society
& Coastal and Ocean Resources
Brentwood Bay, BC
www.seachangesociety.com

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Ocean Resources, Brentwood Bay, BC. 65p.

Barkley Sound Survey Area Summary

559 km of shoreline mapped

3,451 shoreline units created

Average unit length is **162 m**

38% of the intertidal is classified as **Rock and Sediment-dominated** and **30%** is classed as **Rock**

69% of the shoreline has a high Oil Residence Index value (residence of months to years)

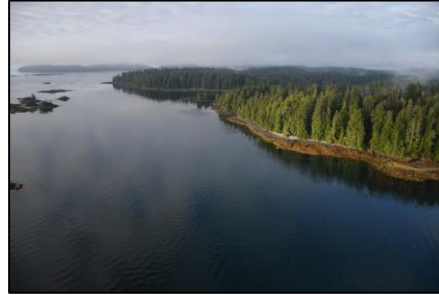
5% of the shoreline has a **Shoreline Modification** of some type

9 biobands were classified in the **intertidal** with **Green Algae** being the most common (**89 %** of units).

Rockweed was the second most common (**82%** of units)

6 biobands were classified in the **supratidal** with **Black Lichen** (**85%** of units) being the most common

8 biobands were classified in the **subtidal** with **Brown Bladed Algae** being the most common (**31%** of units)



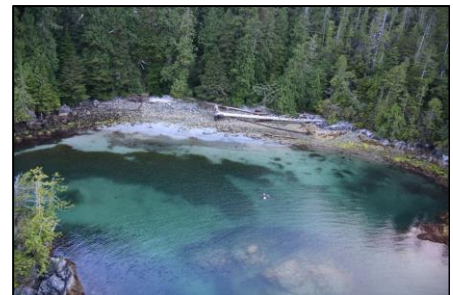
Chalk Island, Broken Group



Port Alberni



Macktush Creek



Vernon Bay

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ShoreZone is an imaging and habitat classification system for the coastal nearshore margin including the shallow subtidal, intertidal shoreline and supratidal fringe. One objective of ShoreZone is to produce a georeferenced, searchable inventory of the physical and biological attributes of coastal habitats. ShoreZone imagery and habitat mapping attributes can provide a useful baseline from which to study change over time, while the attributes mapped (such as shoreline sediments, predicted oil residence and biotic communities) provide an important resource for scientists, managers and responders. The ShoreZone mapping system provides a decision support tool with many potential uses including community planning, facilities citing, conservation planning, research and fisheries management, emergency planning and response, search and rescue, education and habitat modeling.

The ShoreZone system was developed in the 1980s and 1990s to map coastal habitats in British Columbia and Washington State (Howes 2001; Berry *et al.* 2004). In 2001 ShoreZone was implemented in Alaska, beginning with Cook Inlet, Outer Kenai, Katmai, and portions of the Kodiak Archipelago (Harper and Morris 2004). ShoreZone has since expanded to a spatially continuous database of over 123,500 km of coastal Alaska, British Columbia, Nova Scotia, Washington State and Oregon (see Figure 1 not including Nova Scotia). Figure 2 shows the extent of the shoreline mapped around Barkley Sound and is the section of shoreline covered by this summary report.

The ShoreZone imaging surveys conducted around the Barkley Sound in August 2022 acquired aerial video and digital still images of the coast during minus tides (zero-meter tide levels and lower). The imagery and associated audio commentary were used to map the physical and biological attributes of the shoreline. The entire shoreline was mapped according the most recent ShoreZone coastal habitat mapping protocol (Cook *et al.* 2017). The purpose of this report is to provide a summary of the physical (Section 2) and biological (Section 3) data imaged and classified in the Barkley Sound survey area. Please see the Acknowledgments section included in this report for the imaging and mapping funding partners in British Columbia.

The length of shoreline mapped is **559 kilometers in 3,451 along-shore segments** (units), averaging 162 m in length. The digital shoreline used for the ShoreZone habitat mapping was the CHS_Highwaterline_BCalbers.shp.

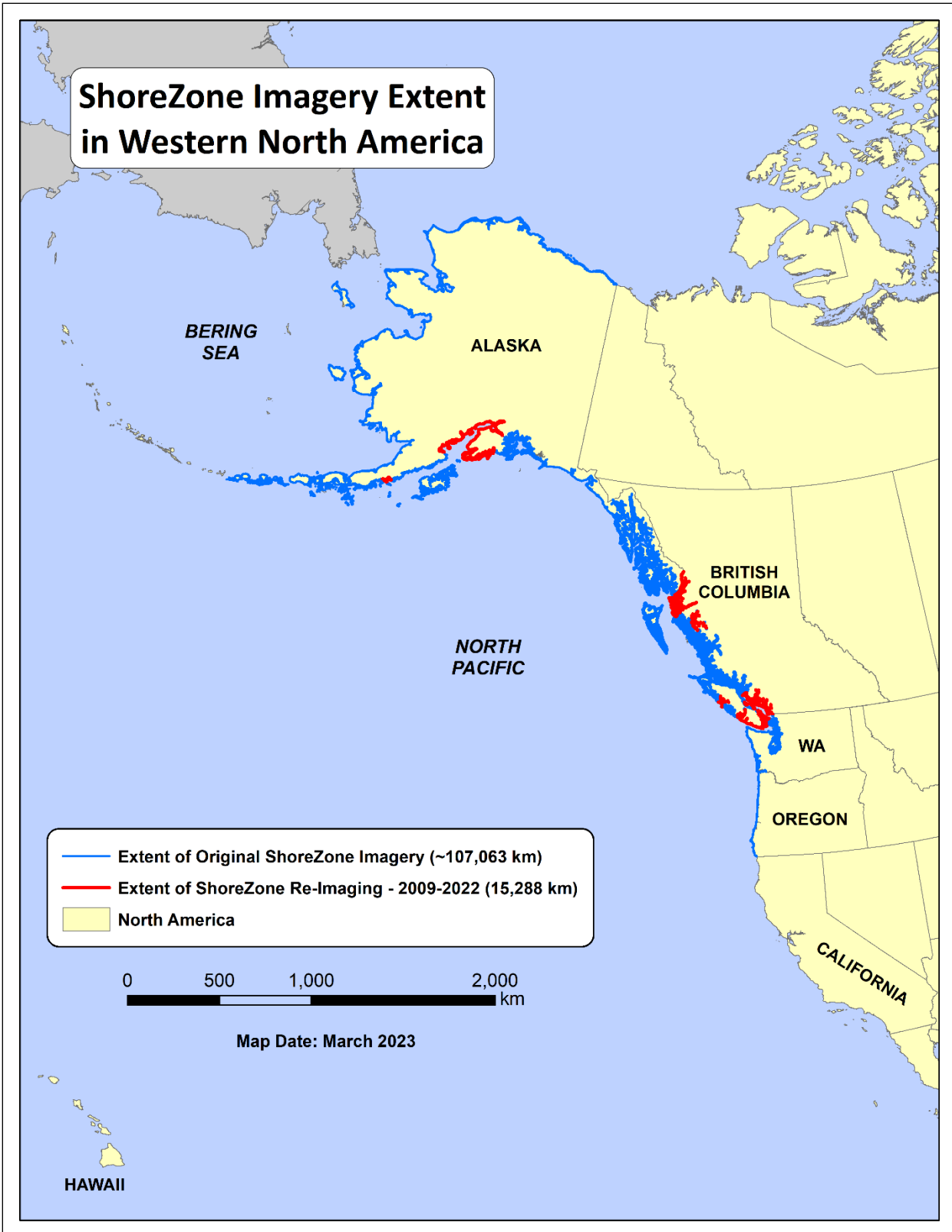


Figure 1. Extent of ShoreZone imagery in Alaska, British Columbia, Washington State and Oregon as of March 2023.

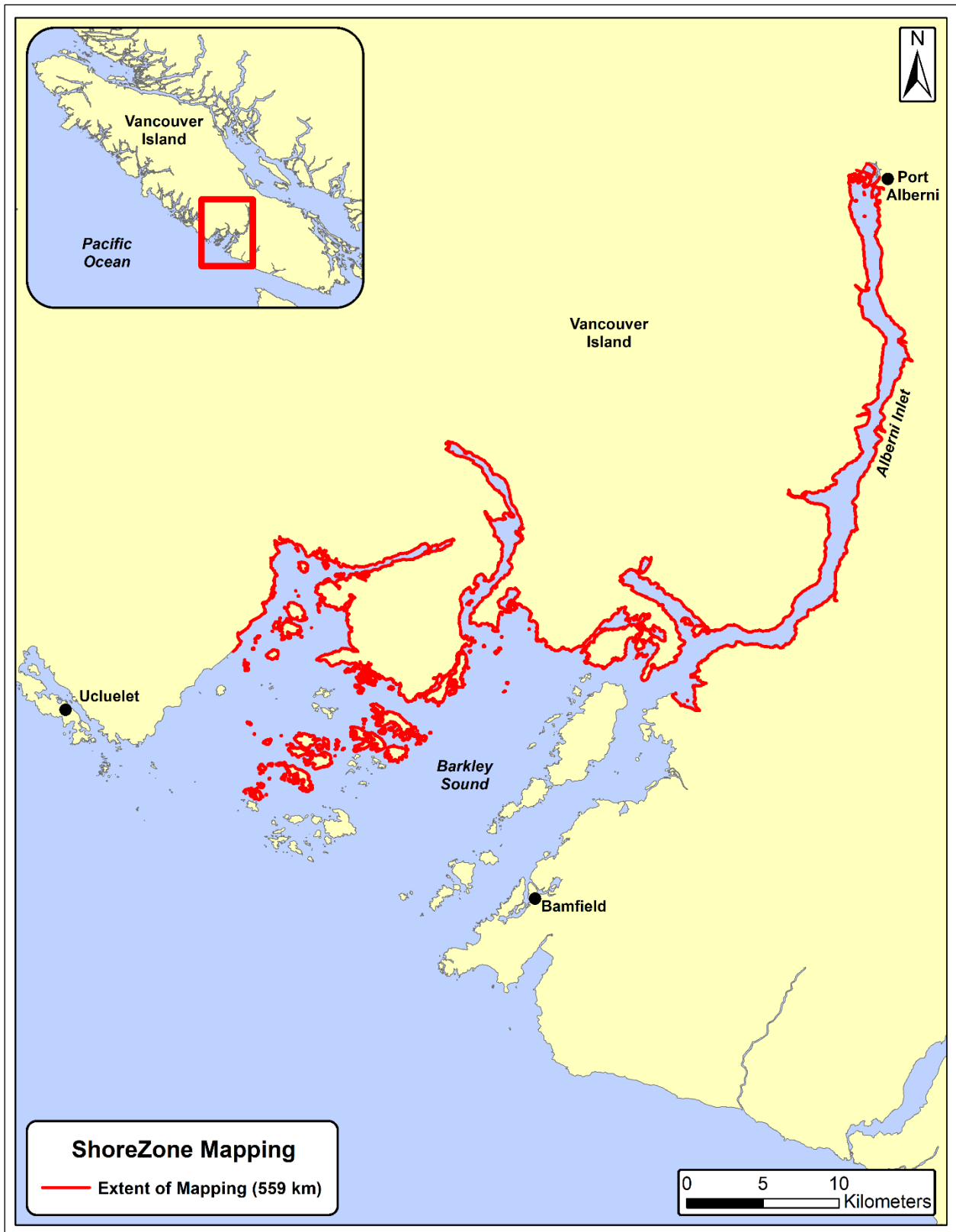


Figure 2. Extent of ShoreZone mapping for Barley Sound covered in this report.

2 PHYSICAL ATTRIBUTE DATA SUMMARY

2.1 Coastal Class

The Coastal Class is used to define along-shore coastal units based on the dominant process, geomorphic features and other attributes such as substrate size, across-shore width, and slope (Cook *et al.*, 2017 after Howes *et al.*, 1994). The principal characteristics of each along-shore unit are used to assign one of 39 overall unit classifications. Rock and sediment shorelines (37.6%) were prominent along with Rock shorelines (29.9%) and Sediment shorelines (26.5%) in the Barkley Sound survey area. Riparian, and Anthropogenic shorelines comprised the rest of the coast (see Figures 3 and 4 for distribution and summary statistics). The description for each Coastal Class category in the survey area is given in Table 1. Photographic examples of the major Coastal Classes mapped in the Barkley Sound survey area are found in Appendix A, Table A-1.

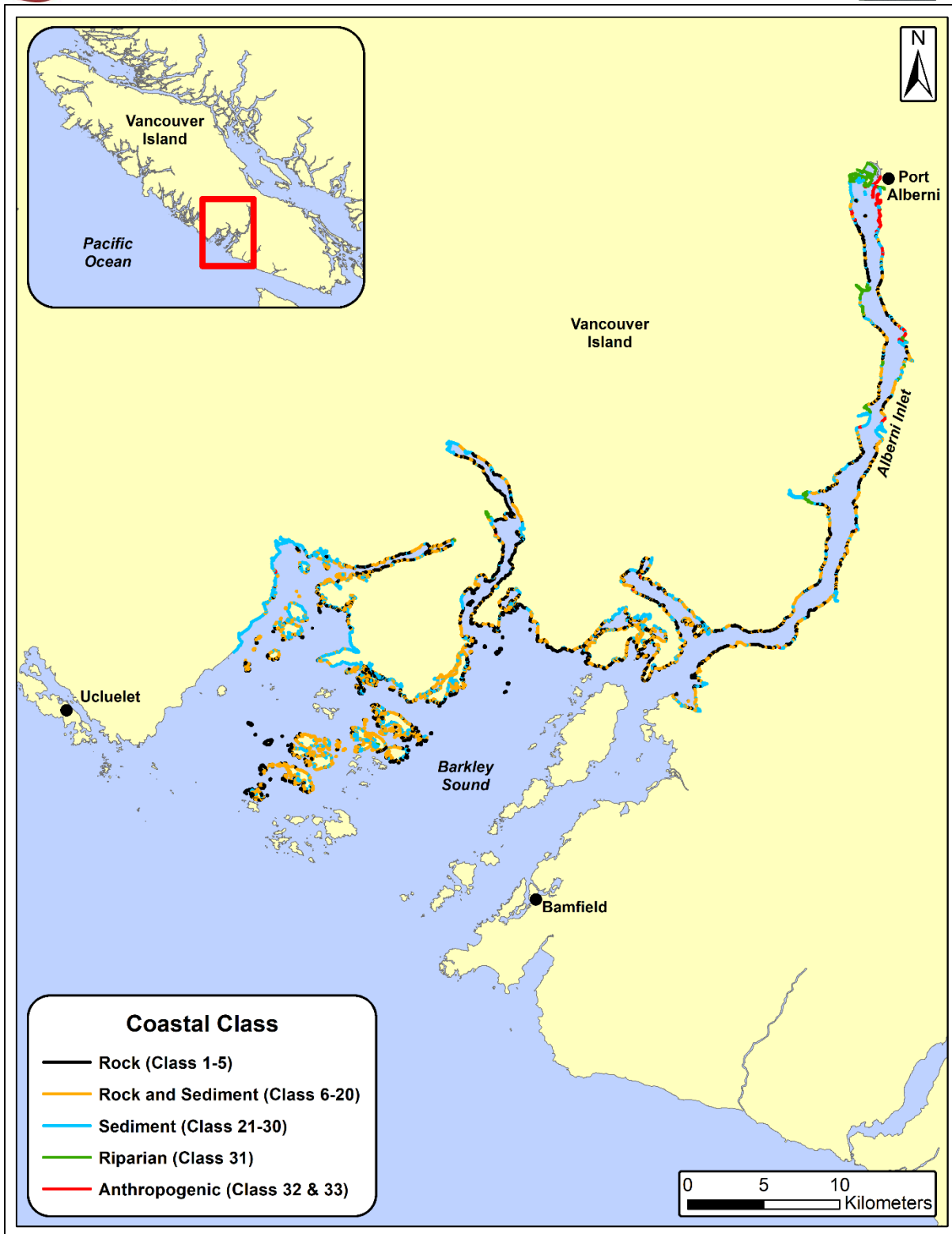


Figure 3. Map of the Coastal Class categories grouped by type (also known as Shore Type).

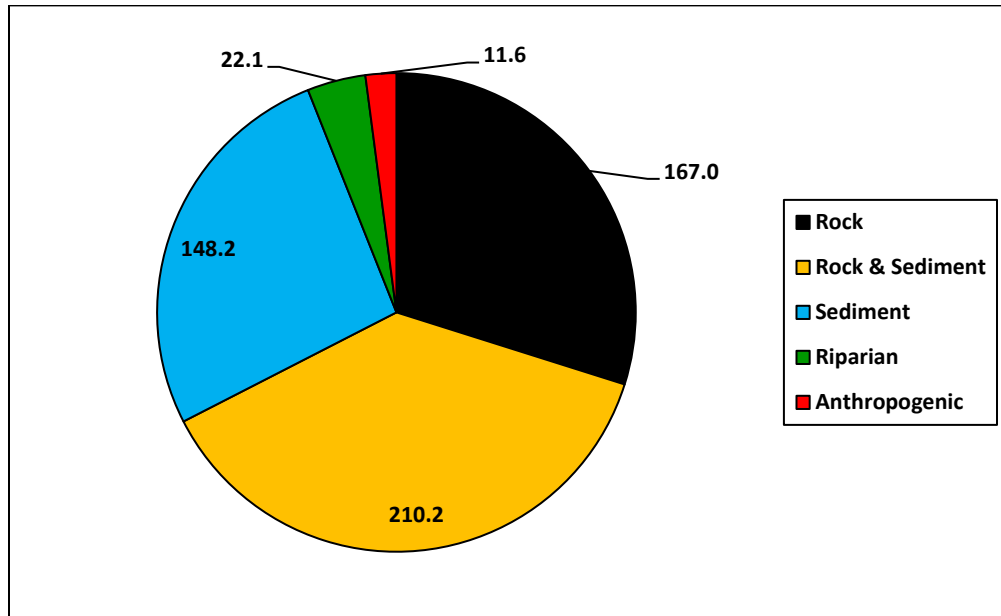


Figure 4. Grouped Coastal Class categories by shoreline length (km).

Table 1. Summary of Coastal Classes for the Barkley Sound survey area.

Substrate Type	Shore Type		Sum of Unit Length (km)	# of Units	% Occurrence (by length)	Cumulative Occurrence (% , km)
	No.	Description				
Rock	1	Rock Ramp, wide	1	6	<1	30% 167 km
	2	Rock Platform, wide	<1	3	<1	
	3	Rock Cliff	151	812	27	
	4	Rock Ramp, narrow	15	134	3	
Rock & Sediment	6	Ramp w gravel beach, narrow	2	10	<1	38% 210 km
	7	Platform w gravel beach, wide	<1	1	<1	
	8	Cliff with gravel beach	100	654	18	
	9	Ramp with gravel beach	30	265	5	
	10	Platform with gravel beach	<1	2	<1	
	11	Ramp w gravel & sand beach, wide	17	116	3	
	12	Platform with G&S beach, wide	4	23	1	
	13	Cliff with gravel/sand beach	14	112	3	
	14	Ramp with gravel/sand beach	42	356	8	
	15	Platform with gravel/sand beach	<1	3	<1	
	16	Ramp w sand beach, wide	1	4	<1	
	17	Platform w sand beach, wide	<1	1	<1	
	18	Cliff with sand beach	<1	4	<1	
	19	Ramp with sand beach, narrow	<1	2	<1	
Sediment	21	Gravel flat, wide	1	4	<1	27% 148 km
	22	Gravel beach, narrow	15	112	3	
	24	Sand & gravel flat or fan	66	222	12	
	25	Sand & gravel beach, narrow	62	492	11	
	26	Sand & gravel flat or fan	<1	1	<1	
	27	Sand beach	<1	1	<1	
	28	Sand flat	2	9	<1	
	29	Mudflat	2	4	<1	
	30	Sand beach	<1	2	<1	
	Organics	31	Organics/Estuarine	22	43	
Man-made	32	Man-made, permeable	9	42	2	2% 11 km
	33	Man-made, impermeable	3	11	1	
Totals:			559	3,451	100	100%

Note: This table only includes Coastal Classes observed in the survey area.

2.2 Environmental Sensitivity Index (ESI)

The NOAA Environmental Sensitivity Index (ESI) is a shoreline classification system developed to characterize coastal regions based on sensitivity to potential oil spills (Petersen *et al.*, 2002). The ESI system uses wave exposure and principal substrate type to assign a rank of 1 to 10 (with 10 being the most sensitive to oil) to alongshore units. Up to three ESI numbers can be assigned to each ShoreZone unit (high, mid and low intertidal) if applicable. The highest ESI number for each unit, which is the most sensitive, is used in this analysis.

The majority of the Barkley Sound coastline is represented by the grouped High and Very High categories (72.6% of shoreline length). These sections of the shoreline have a potentially high sensitivity to oil. At the other end of the spectrum, only 20.5% of the shoreline was mapped with a potentially low sensitivity to oil (Figures 5 and 6). The summary of Coastal Class by ESI class can be seen in Table 2.

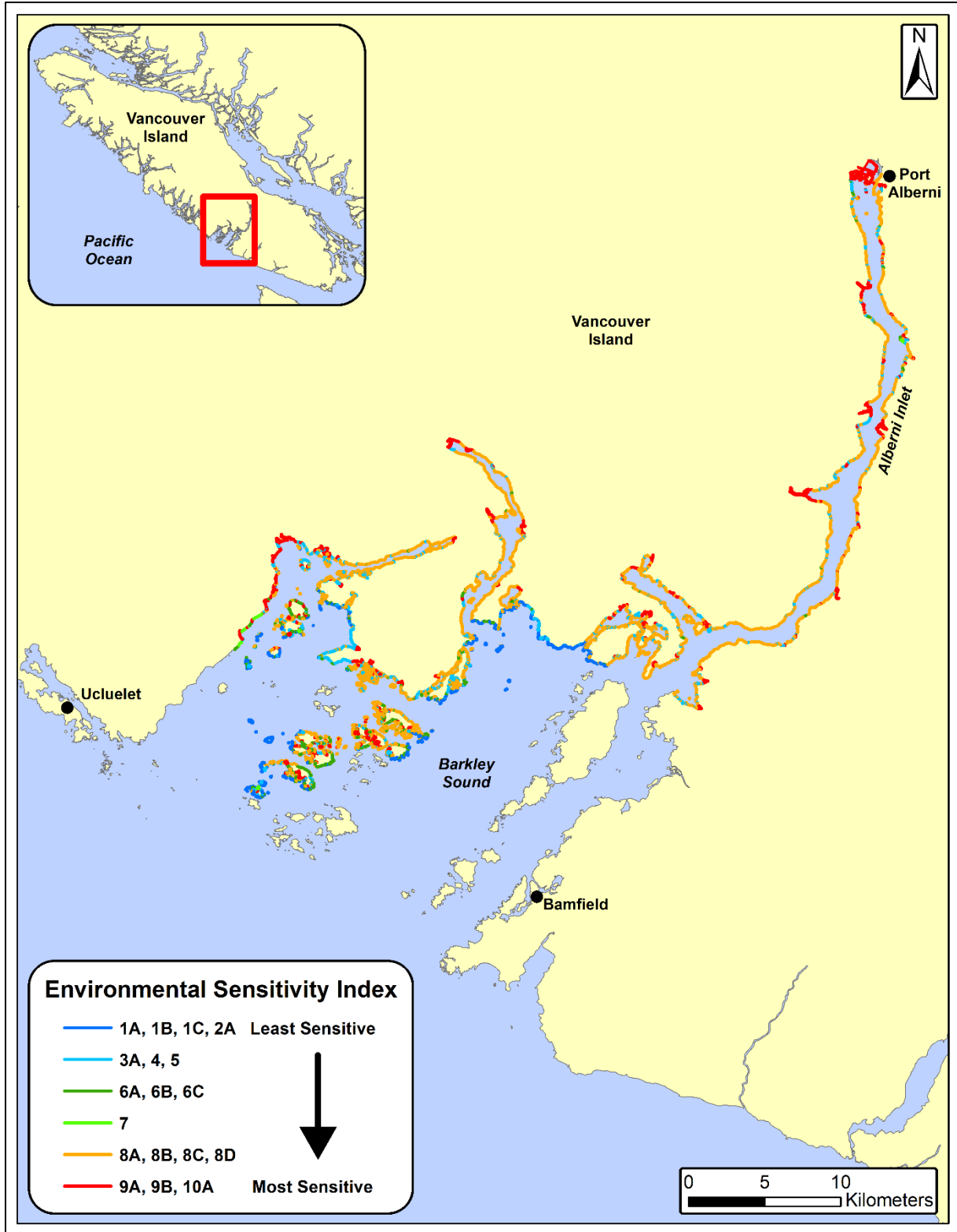


Figure 5. Distribution of the grouped ESI categories from least to most sensitive to oiling.

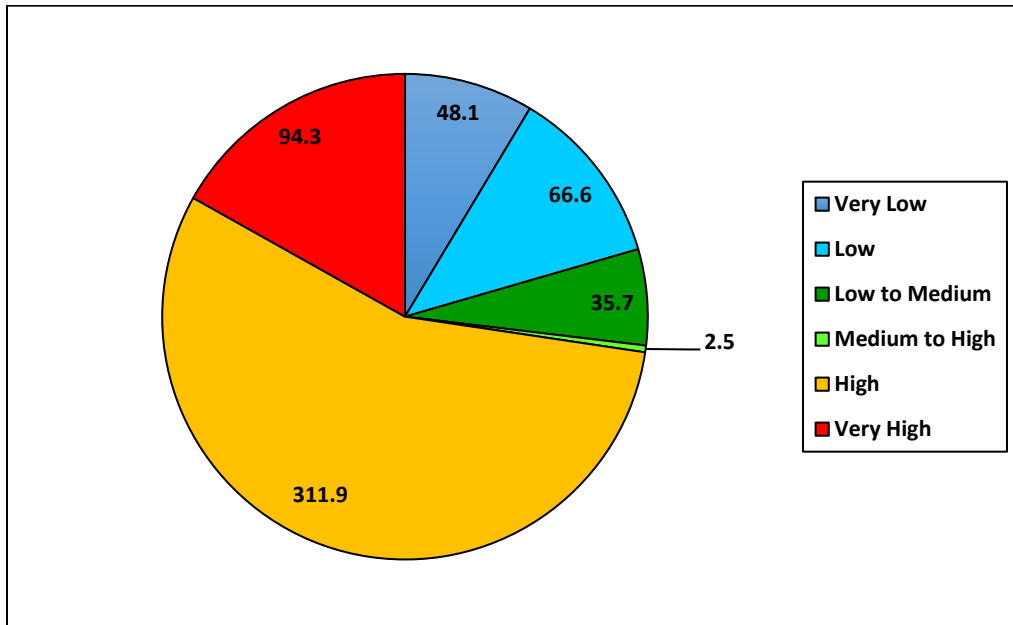


Figure 6. Grouped most sensitive ESI categories by shoreline length (km).

Table 2. Summary of Coastal Classes by ESI Class for the Barkley Sound survey area.

Environmental Sensitivity Index (ESI)		Sum of Unit Length (km)	# of Units	% of Total Shoreline Length
No.	Description			
1A	Exposed rocky shores; Exposed rocky banks	34	165	6
1B	Exposed, solid man-made structures	<1	1	<1
1C	Exposed rocky cliffs with boulder talus base	4	30	1
2A	Exposed wave-cut platforms in bedrock, mud, or clay	10	71	2
3A	Fine- to medium-grained sand beaches	1	7	<1
4	Coarse-grained sand beaches	1	4	<1
5	Mixed sand and gravel beaches	65	504	12
6A	Gravel beaches (granules and pebbles)	2	13	<1
6B	Gravel beaches (cobbles and boulders)	34	259	6
6C	Rip rap	<1	2	<1
7	Exposed tidal flats	3	9	<1
8A	Sheltered scarps in bedrock, mud, or clay; sheltered rocky shores (impermeable)	162	1,071	29
8B	Sheltered, solid, man-made structures; sheltered rocky shores (permeable)	32	277	6
8C	Sheltered Rip Rap	6	26	1
8D	Sheltered rocky rubble shores	112	722	20
9A	Sheltered tidal flats	30	146	5
9B	Vegetated low banks	1	1	<1
10A	Salt- and brackish-water marshes	64	143	11
Totals:		559	3,451	100

Note: ESI Classes not observed in this survey area were not included in the table.

2.3 Oil Residence Index (ORI)

The Oil Residence Index (ORI) is a rating between 1 and 5 with a value of 1 indicating a relatively short oil residence (days to weeks) while a value of 5 reflects potentially very long oil residence times (years). An ORI value is applied to each alongshore unit and to each across-shore component based on sediment texture and wave exposure (Cook *et al.*, 2017). The ShoreZone ORI was developed by Dr. John Harper based on his many years of experience with cleaning up oiled shorelines, starting with the Exxon Valdez spill in Prince William Sound in Alaska. Lower wave exposures and mobile sediments lead to higher ORI values for 68.6% of the shore segments in the Barkley Sound survey area, indicating oil residence times are on the order of months to years (see Figures 7 and 8 for distribution and summary statistics).

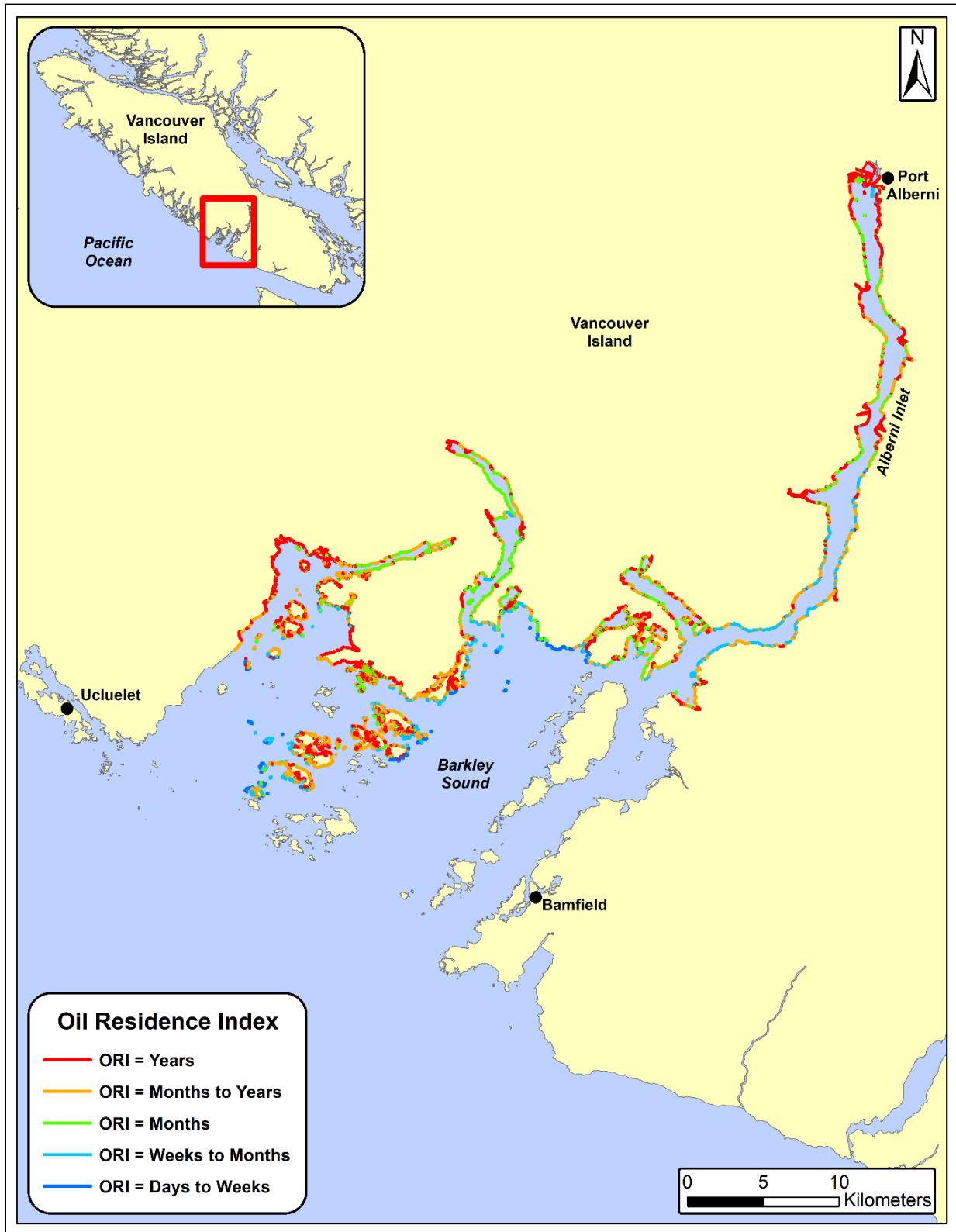


Figure 7. Distribution of the Oil Residence Index (ORI) categories.

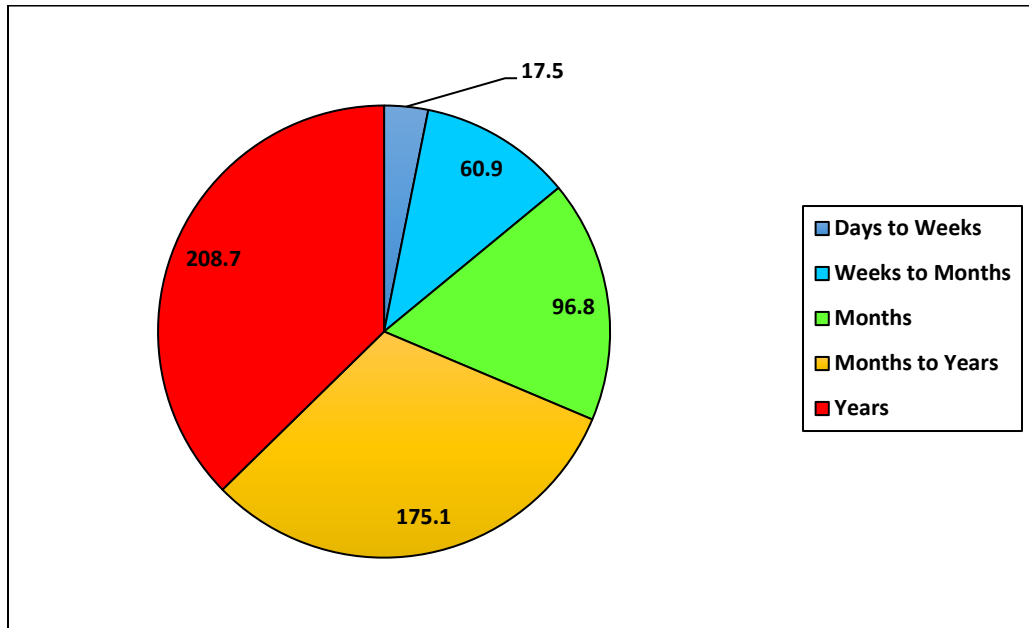


Figure 8. Oil Residence Index (ORI) categories by shoreline length (km).

2.4 ShoreZone Coastal Vulnerability

2.4.1 Flood Zone Width

The Coastal Vulnerability Module (CVM) includes a classification of flooding sensitivity based on the across shore profile and photographic evidence of historical flooding such as an unambiguous marine debris line. The Flooding Class is an estimate of vulnerability to inundation of the terrestrial area beyond the supratidal. The distance to the debris line is measured and used to classify the flooding potential. Flat shorelines with very low gradients that show evidence of historical flooding have a higher risk of being inundated by storm surges. Potential for damage due to flooding is generally low in the Barkley Sound study area, with 86.9% of the shoreline at a low risk of flooding <5m from the Mean High Waterline (MHW) (see Figures 9 and 10 for distribution and summary statistics). The flooding class is a parameter of the Coastal Vulnerability Index (see Page 21).

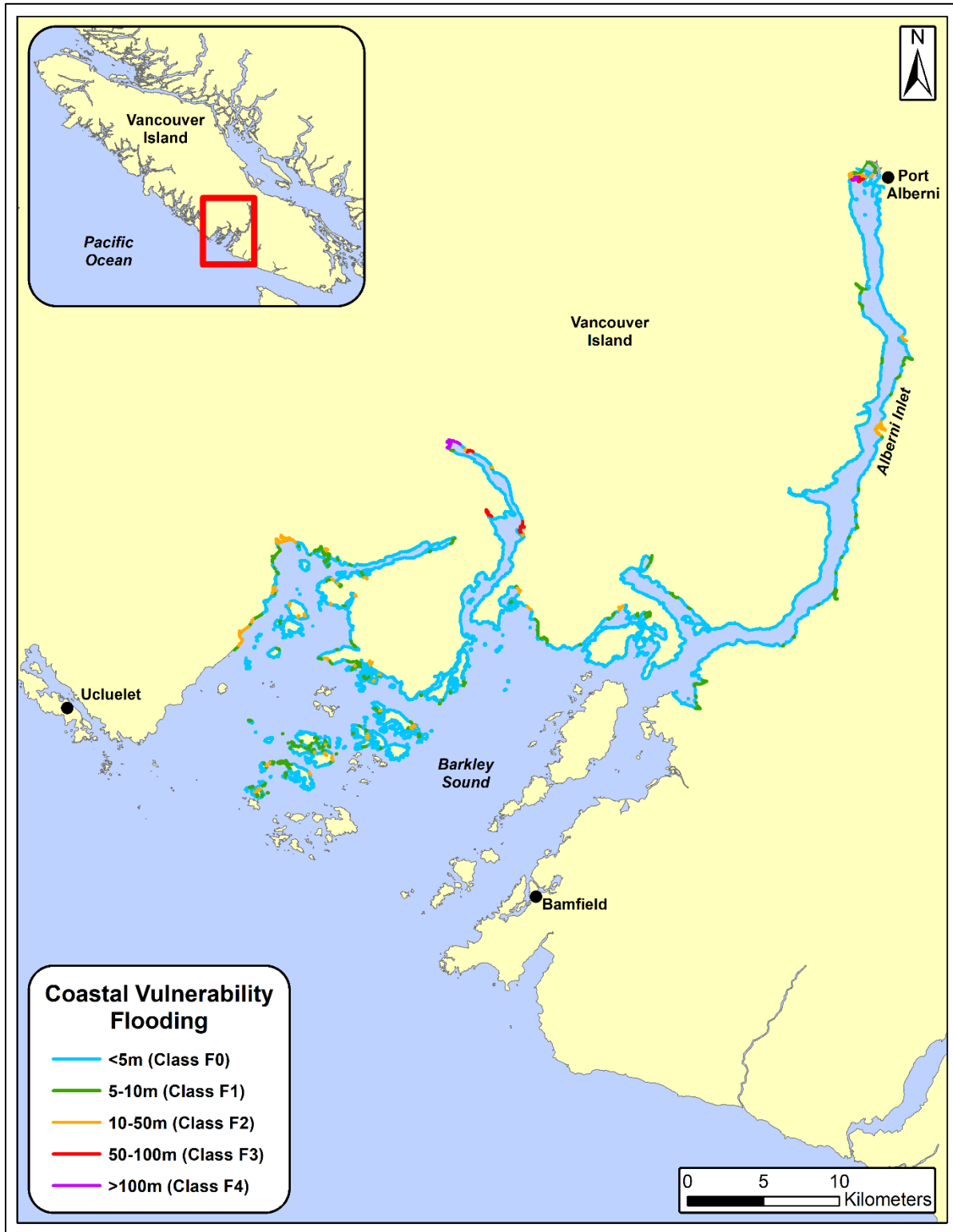


Figure 9. Distribution of the Coastal Vulnerability Flooding Class.

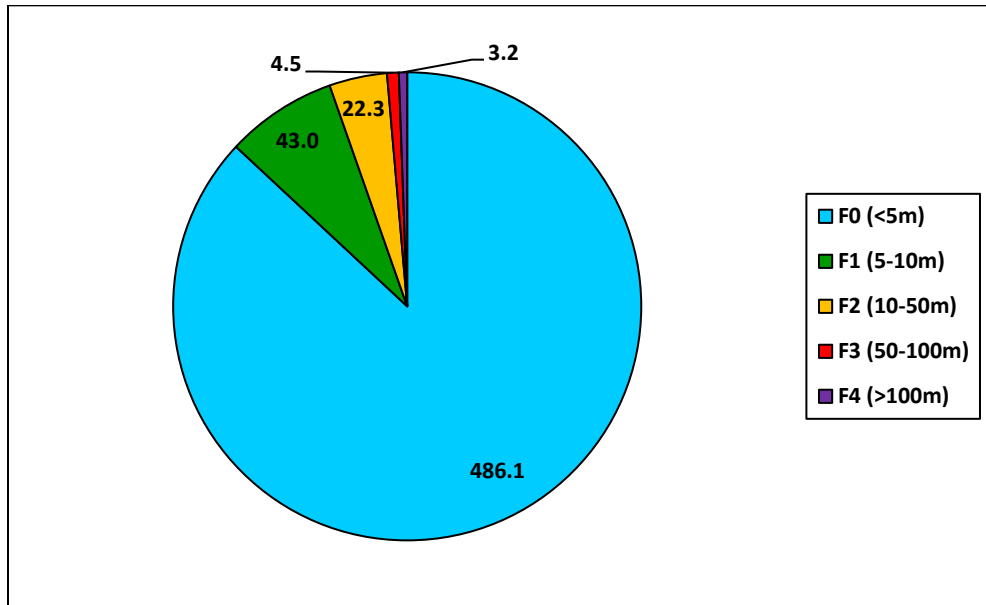


Figure 10. Flooding Class categories by shoreline length (km).

2.4.2 Coastal Vulnerability Observations

The Coastal Vulnerability Observations are features important for estimating the frequency and extent of coastal inundation. In the Barkley Sound survey area, apart from the 'None' category, the majority of observations were from the Anthropogenic category with 30.1 km. The subsequent category was the Wetland Deltaic complex category with 16.9 km (see Figures 11 and 12 for distribution and summary statistics). With regards to the Anthropogenic category, it is important to point out that these areas are not necessarily areas of vulnerability, but areas potentially impacted.

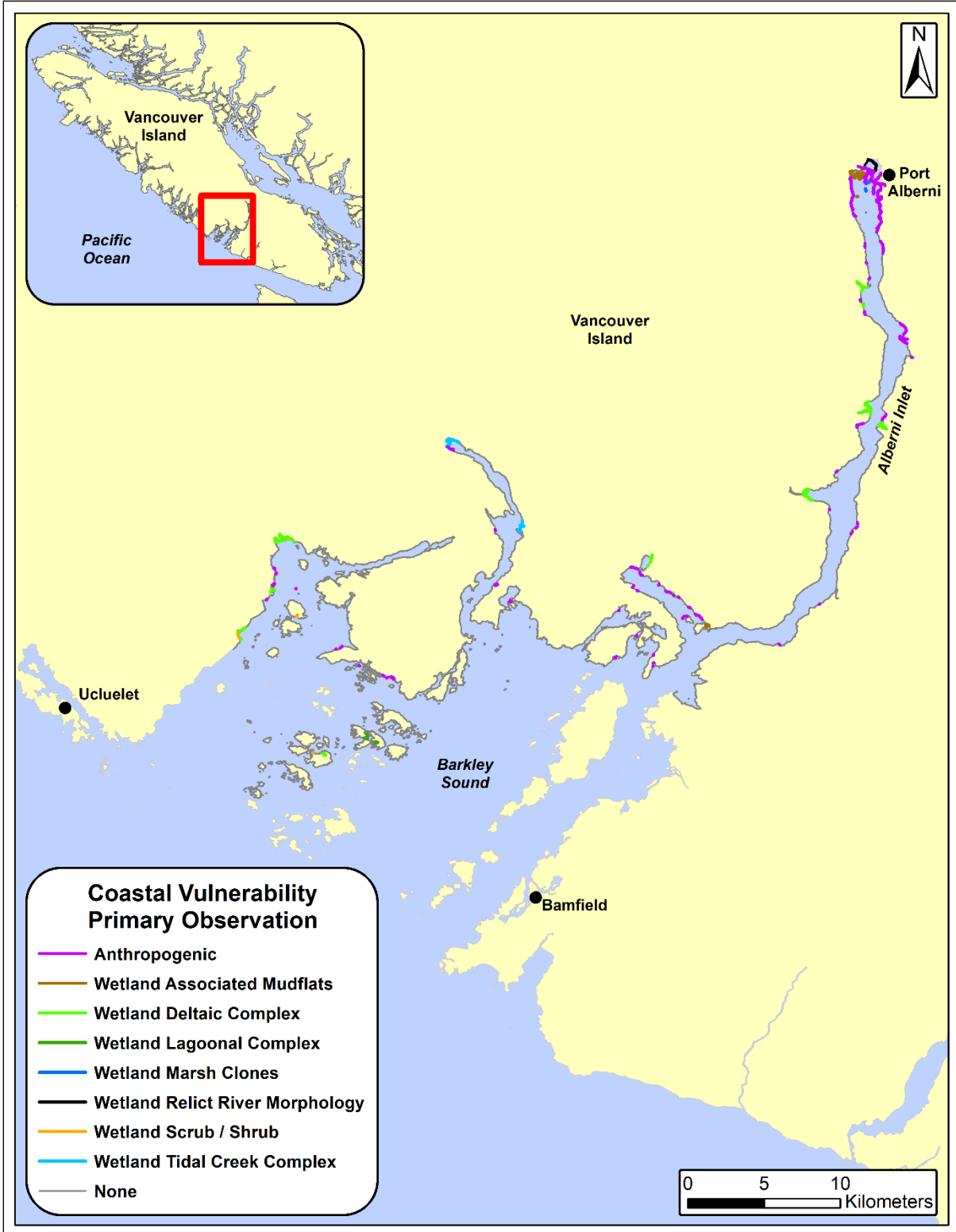


Figure 11. Distribution of the Coastal Vulnerability Observations categories.

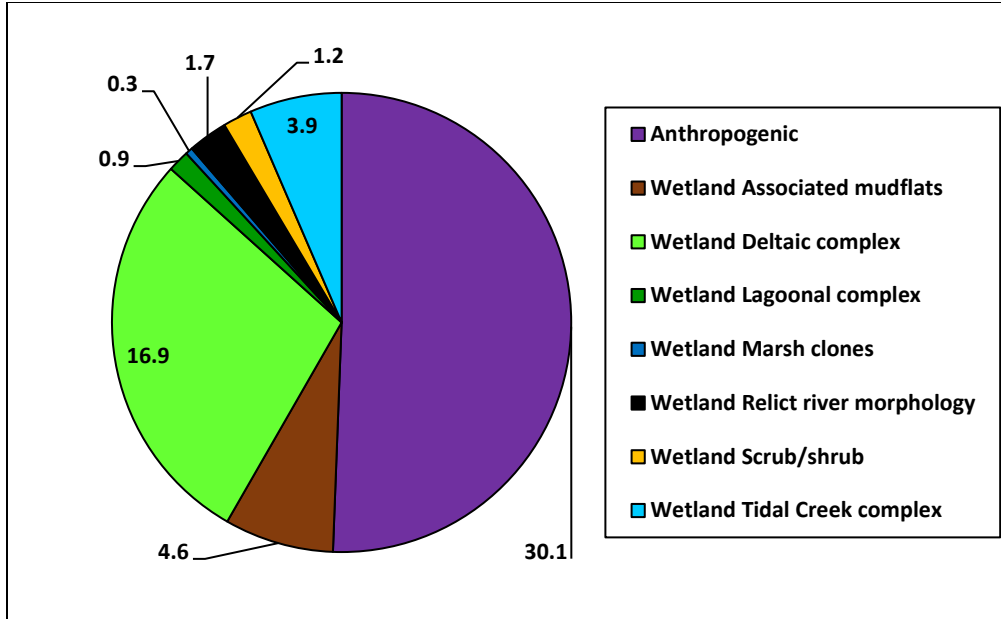


Figure 12. Coastal Vulnerability Observations categories by shoreline length (km). Category 'None' not shown.

2.4.3 Coastal Vulnerability Index

In the 2017 ShoreZone protocol (Cook *et al.*, 2017), the methods of Thieler and Hammer-Klose (2000) (<http://woodshole.er.usgs.gov/project-pages/cvi/>) were adapted to calculate a Coastal Vulnerability Index (CVI) using five ShoreZone attributes: Coastal Class, Max Tide Range, Shoreline Erosion index, Flood Zone Width, and Significant Wave Height. When we first attempted to calculate the CVI for the portion of the shoreline funded in the Eastern Aleutians by the Oil Spill Response Institute, it did not match the observations of the mappers as it appeared to rank too much of the rocky, steep shoreline as High or Very High in terms of vulnerability to sea level rise. After analysis of the data, we determined this was due to the use of a relative ranking system where the values from the study area were only compared to each other to determine the CVI rank. To resolve this issue, we calculated an absolute value for each CVI rank which is described in the latest version of the protocol (Cook *et al.*, 2017). The distribution of ranks in the Barkley Sound survey area is shown in Figure 13. Due to the protected nature of the coastline, few units in the survey area were ranked Moderate in terms of vulnerability to sea level rise, while the rest were ranked as Low. The Coastal Class and Wave Exposure were likely the driving factors behind the rankings in this survey area.

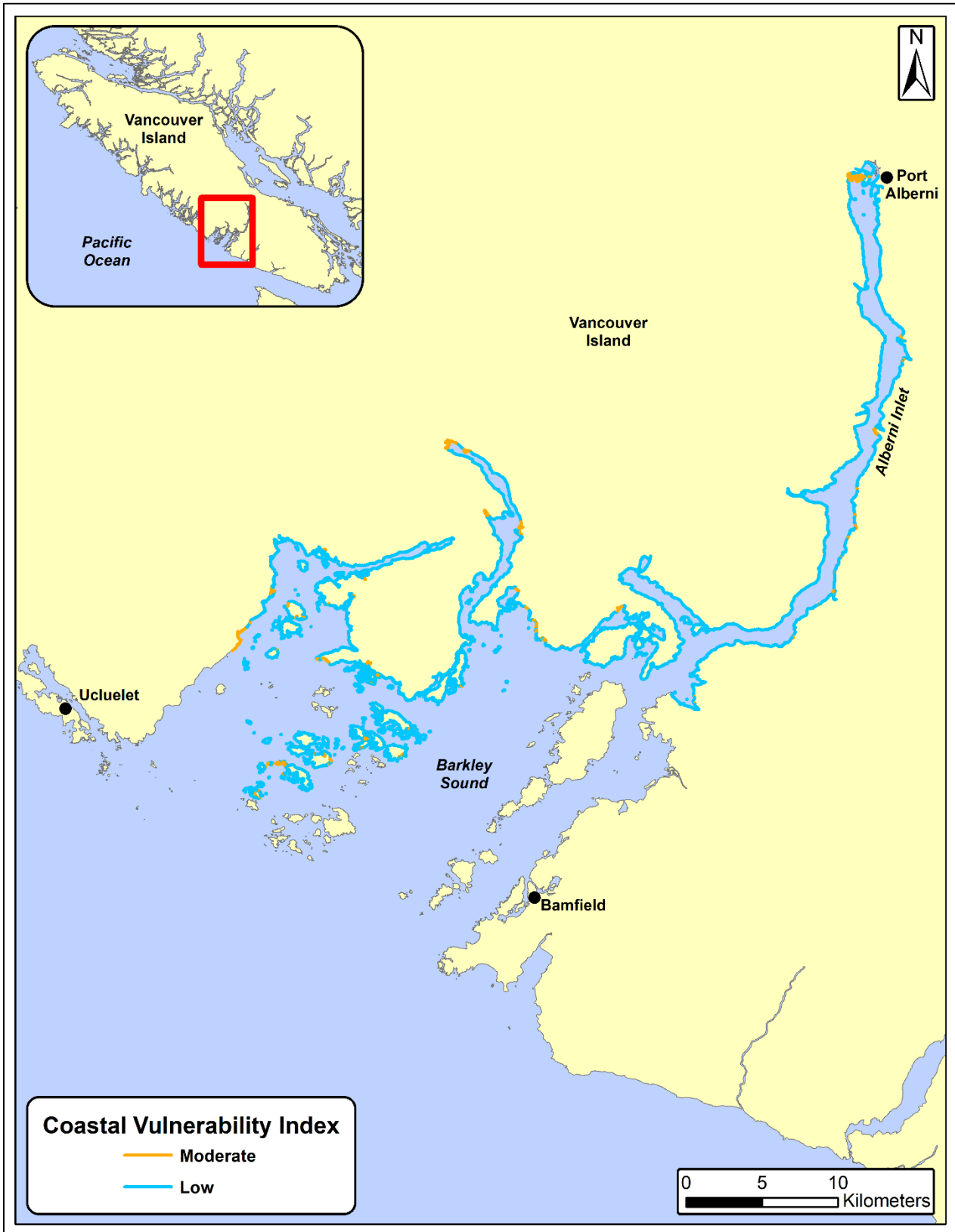


Figure 13. Distribution of Coastal Vulnerability index ranks in the Barkley Sound survey area.

2.5 Anthropogenic Shore Modifications

The Shoreline Modification attribute provides a thorough catalogue of the specific types of anthropogenic modification in each unit (Cook *et al.*, 2017). This includes many modifications within a given unit. For example, if both riprap and a pile-supported wharf occur, both are catalogued in the appropriate zone of that unit with an estimate of the alongshore length of the unit that modification covers. A total of 5% of the shoreline (taking the estimated length of that modification within the unit into account) exhibits shore modifications in the Barkley Sound study area (Figure 15). Landfill was the most commonly recorded observation (42.5%) with Rip Rap (27.4%) and Concrete Bulkhead (9.9%) rounding out the top three shoreline modifications along the coast. The associated map (Figure 14) shows the distribution of primary shore modifications, though it should be noted that any given modification is possible along the entire length of the indicated shore unit. The Geodatabase delivered with this report displays each shore modification with a specific length category (meters) along the shoreline pertaining to each unit as well as the specific zone (supratidal or intertidal) the modification occurs in.

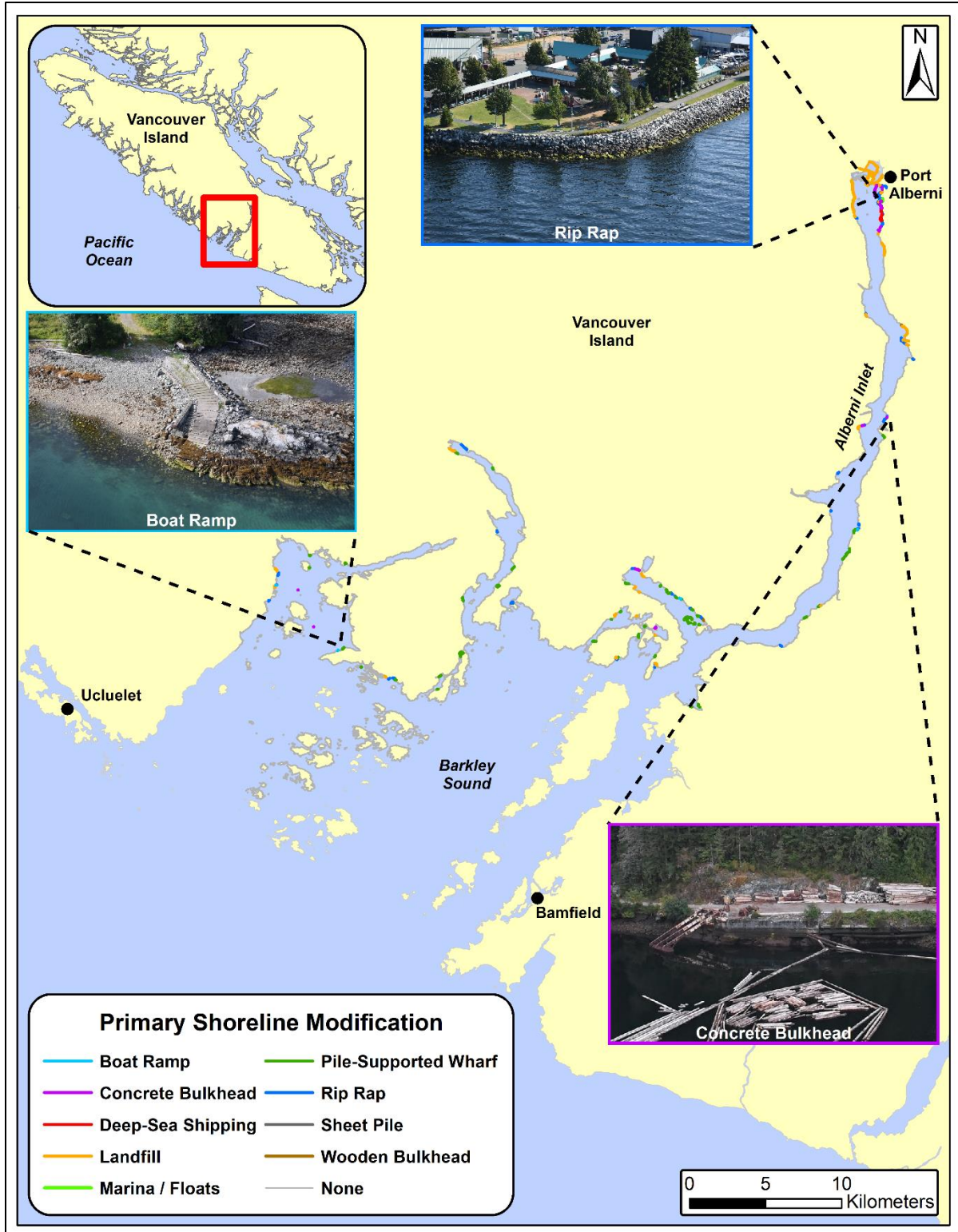


Figure 14. Distribution of types of the primary Shore Modifications. There may be other shore modifications in any given unit. That data would be found in the Shore Modifications table in the geodatabase.

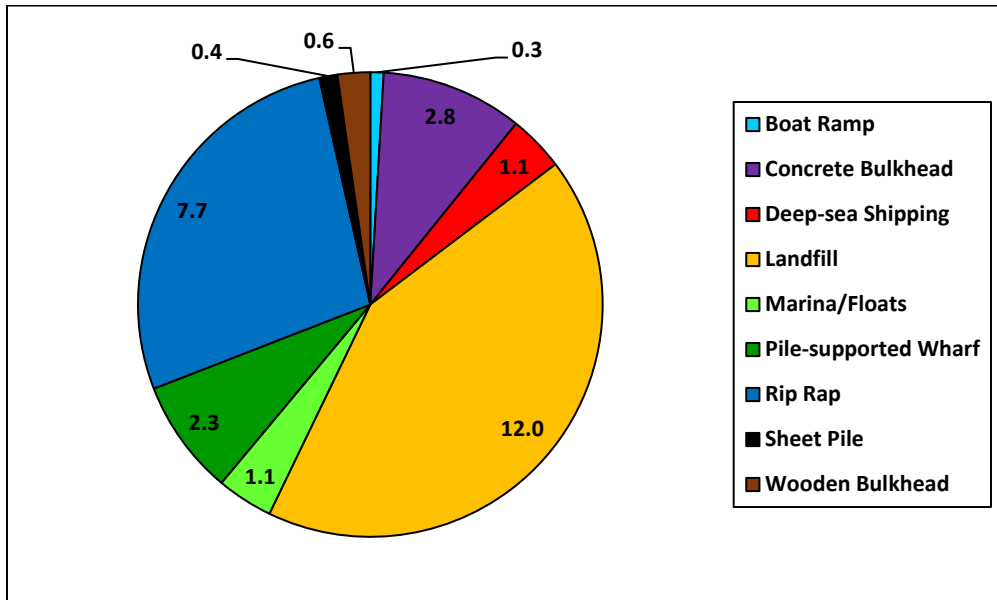


Figure 15. Shore Modifications by estimated shoreline length (km) of each modification type.

3 BIOLOGICAL ATTRIBUTE DATA SUMMARY

3.1 Biobands

Biobands represent assemblages of coastal biota found on the shoreline at characteristic wave exposures, substrate conditions and typical across-shore elevations. Biobands are spatially distinct, with alongshore and across-shore patterns of color and texture that are visible in aerial imagery (see Appendix A, Table A-2 for photographic examples of the common biobands from the Nootka Sound survey area). Full descriptions of all biobands, including indicator and associated species, can be found in the ShoreZone protocol (Cook *et al.*, 2017).

There are several metrics used for the biobands within each unit. All biobands are classified as Patchy (in <50% of the length of the unit) or Continuous (in >50% of the length of the unit). The zone in which a bioband was observed determines how the bioband is further described. For example, biobands found in the supratidal (A Zone) and subtidal (C Zone) are described by percent of alongshore length of unit and a width category. The intertidal (B zone) biobands are described by percent of alongshore length of the unit and percent cover of the zone. All metrics are described in the 2017 ShoreZone protocol (Cook *et al.* 2017). The data presented in this report uses Patchy and Continuous as metrics as that is consistent across all biobands.

Biobands mapped in the Barkley Sound survey area are summarized in Tables 3 and 4. The most commonly occurring intertidal bioband in the survey area was Green Algae in 89% of units. Rockweed and Barnacle were also common and were found in 82% and 77% of units, respectively. The most common supratidal bioband was Black Lichen, occurring in 85% of the units, while the supratidal/high intertidal Salt Marsh bioband was found in 32% of units. The most common low intertidal/subtidal biobands were Brown Bladed Kelps (31%), Eelgrass (22%) and Sargassum (18%), although it should be noted that some of the Brown Bladed Kelps may include Sargassum if the Sargassum was not distinguishable from the other kelps. Distribution maps, statistics and observations about some specific biobands are found in the following pages.

Table 3. Bioband abundances for non-splash zone biobands mapped in the Barkley Sound survey area.

Bioband		Patchy		Continuous		Total (km)	% of Total Mapped
Name	Code	(km)	%	(km)	%		
Dune Grass	DUGR	51	9	11	2	62	11
Salt Marsh	SAMB	104	19	76	14	180	32
Barnacle	BARN	75	13	353	63	428	77
Rockweed	ROCK	165	30	294	53	459	82
Green Algae	GRAL	225	40	275	49	500	89
Oysters	OYST	79	14	42	7	121	22
Blue Mussel	BLMU	47	8	39	7	86	15
Echinoderms	ECHI	97	17	0	0	97	17
Bleached Red Algae	BRAL	13	2	3	1	16	3
Filamentous and Foliose Red Algae	FFRA	111	20	162	29	272	49
Coralline Red Algae	CORA	4	1	1	0	5	1
Anemones	ANEM	2	0	0	0	2	0
Brown Bladed Kelps	BRBA	66	12	108	19	173	13
Sargassum	SARG	41	7	62	11	102	18
Eelgrass	EELG	82	15	40	7	122	22
Surfgrass	SURF	23	4	4	1	27	5
Urchin Barrens	URBA	4	1	7	1	11	2
Bull Kelp	BUKE	9	2	9	2	19	3
Giant Kelp	GIKE	20	3	21	4	41	7

Table 4. Bioband abundances for splash zone biobands mapped in the Barkley Sound survey area.

Bioband		Narrow (<1m)		Medium (1-5m)		Wide (>5m)		Total (km)	% of Total Mapped
Name	Code	(km)	%	(km)	%	(km)	%		
Black Lichen	BLLI	225	46	214	38	5	1	474	85
Splash Zone	SPZO	18	3	2	0	0	0	20	4
White Lichen	WHLI	98	17	2	0	51	9	151	27
Yellow Lichen	YELI	7	1	0	0	0	0	7	1

The Oyster bioband tends to be more common on the South Coast than other parts of BC and is generally only seen where concentrations of the introduced Pacific Oyster (*Magallana gigas*) are high enough to be visible from the aerial imagery. This was generally noted to occur in areas where there is or has been oyster aquaculture, which is the case throughout the Barkley Sound survey area. The Blue Mussel bioband was more common in the survey area in the Semi-Protected, rocky portions of the coast. Figures 16 and 17 show graphs of the proportion of the shoreline with the Oyster and Blue Mussel biobands, respectively. A map of the distribution of the Oyster and Blue Mussel bioband is in Figure 18.

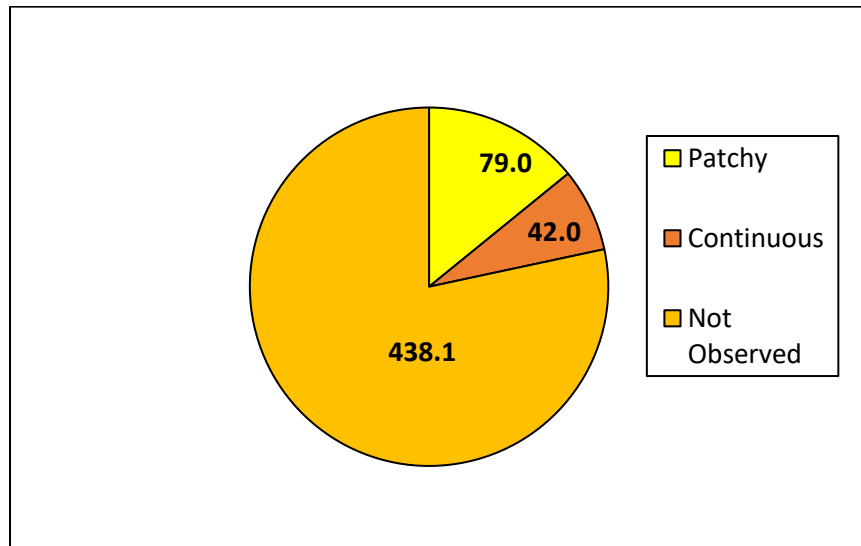


Figure 16. Proportion of shoreline length (km) of the intertidal Oyster (OYST) bioband by category.

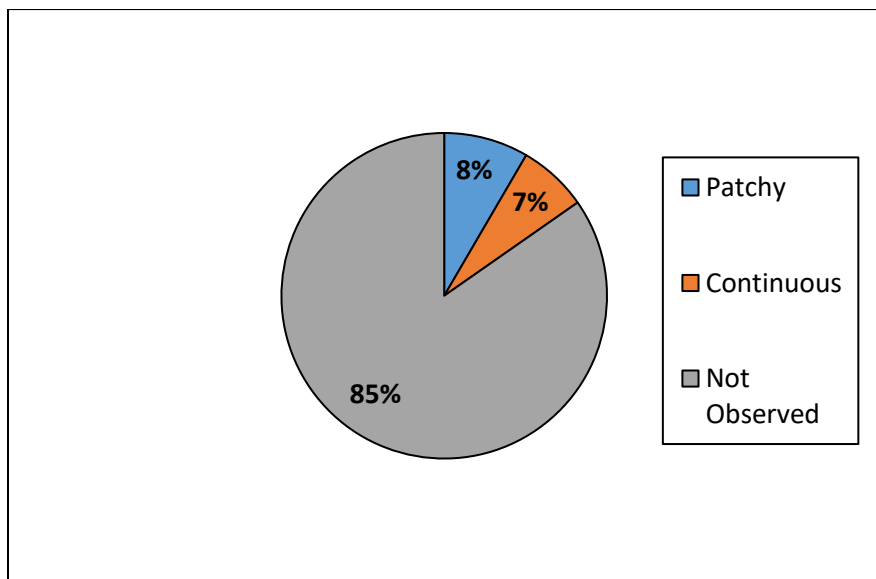


Figure 17. Proportion of shoreline length (km) of the intertidal Blue Mussel (BLMU) bioband by category.

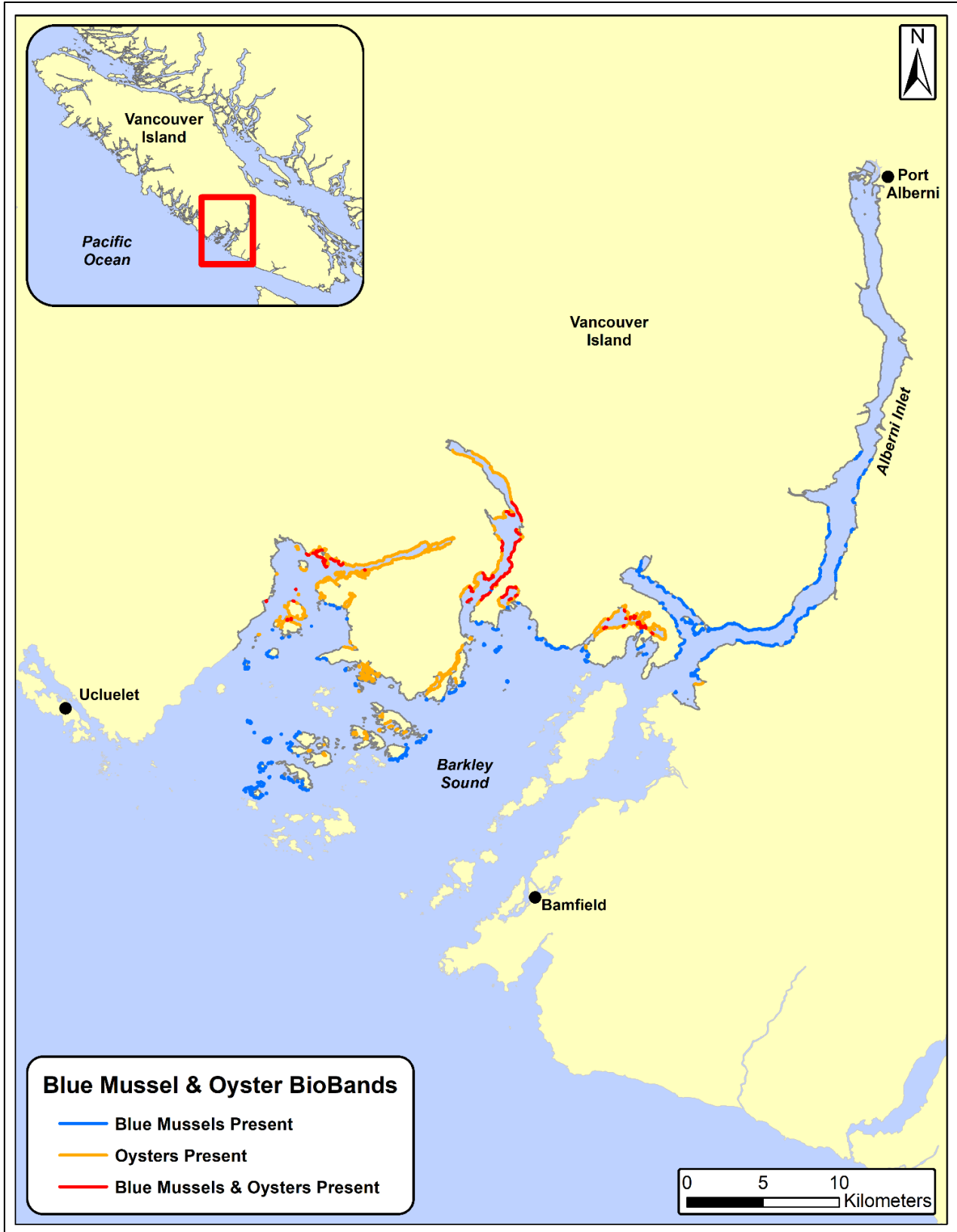


Figure 18. Distribution of the Oyster (OYST) and Blue Mussel (BLMU) biobands in the Barkley Sound survey area.

Seagrasses are an important component of coastal ecosystems with Eelgrass beds forming in sandy substrate at Semi-Protected and lower exposures while Surfgrass generally attaches to hard substrate on Semi-Protected or Semi-Exposed beaches. In the Barkley Sound survey area, both Eelgrass and Surfgrass were observed. Eelgrass beds are nursery habitats for juvenile fish and also sequester and store atmospheric carbon (called 'Blue Carbon') in addition to other valuable ecosystem services.

See Figures 19 and 20 for a graph showing the proportion of the shoreline with the Eelgrass and Surfgrass biobands, respectively, and a distribution map for both in Figure 21.

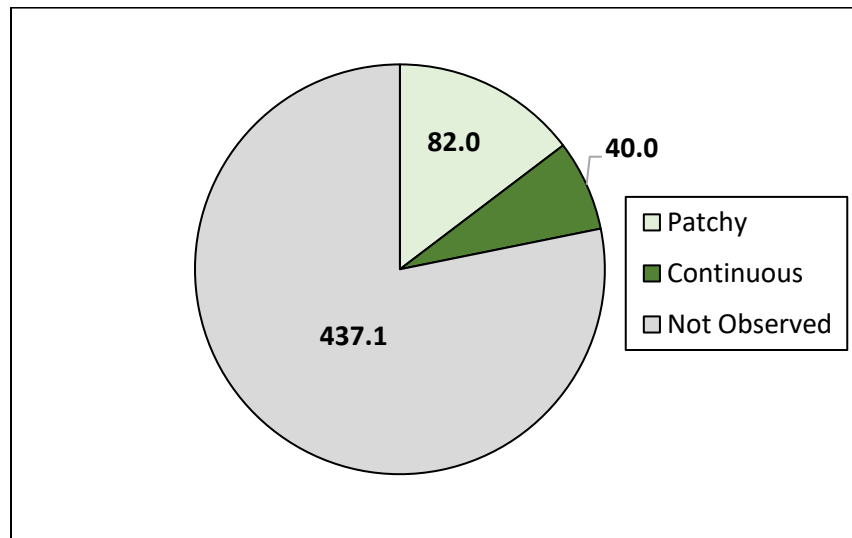


Figure 19. Distribution of the intertidal/subtidal Eelgrass bioband by shoreline length (km).

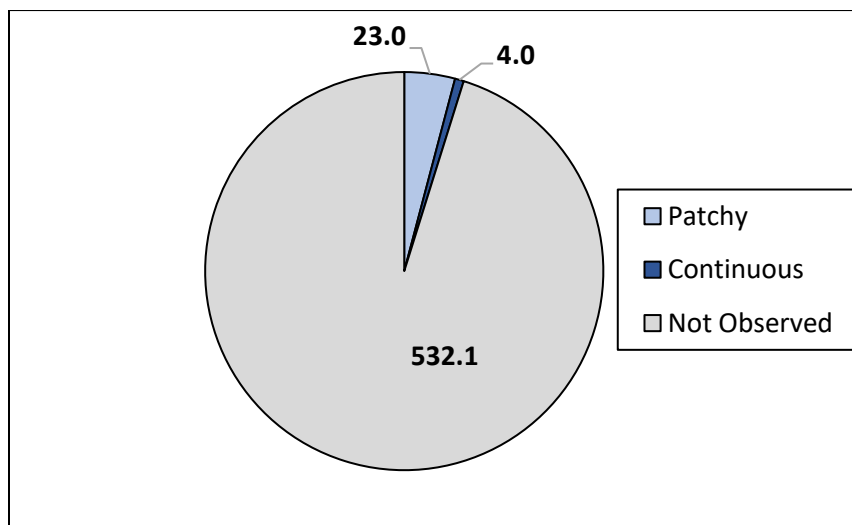


Figure 20. Distribution of the intertidal/subtidal Surfgrass bioband by shoreline length (km).

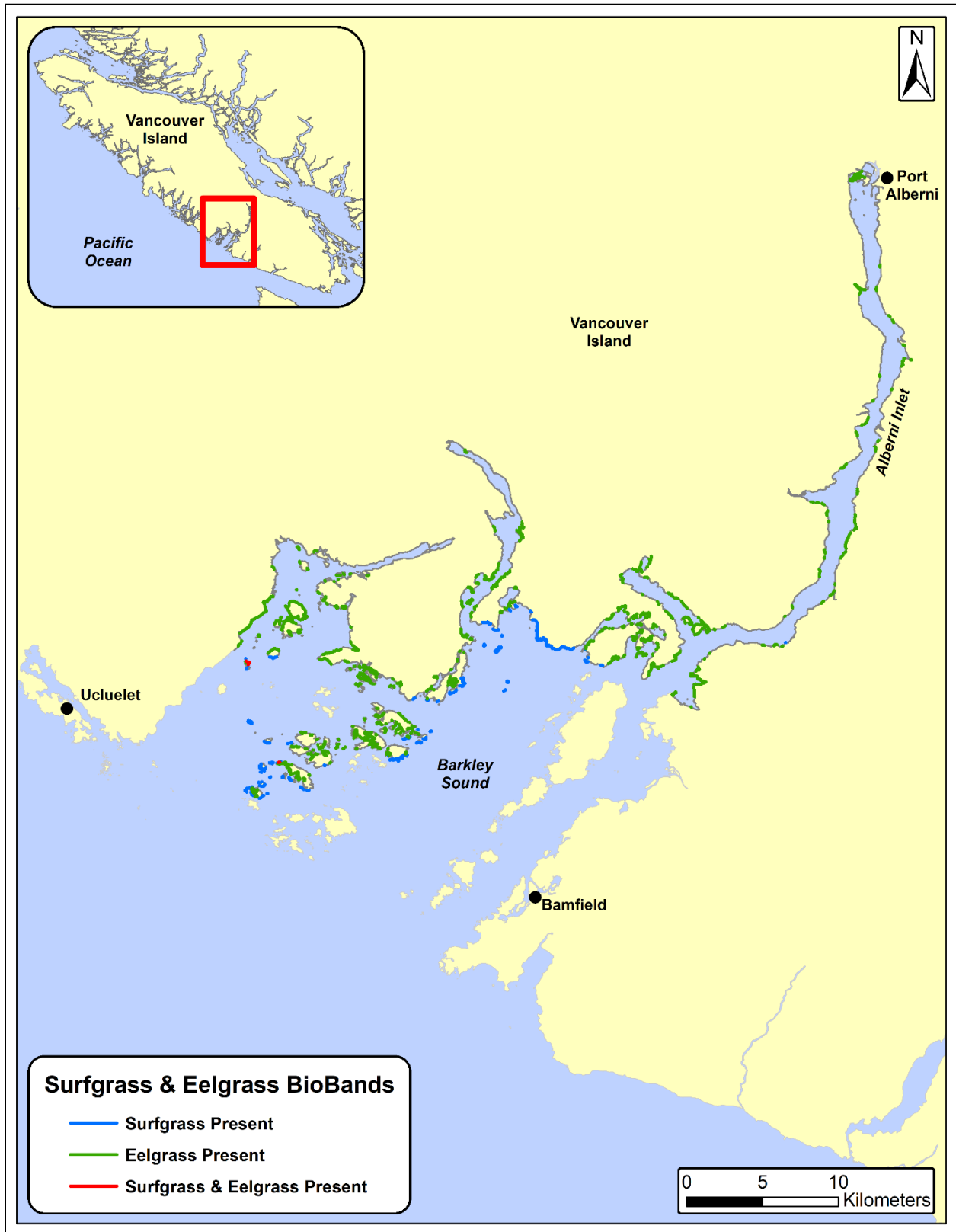


Figure 21. Distribution of the Eelgrass (EELG) and Surfgrass (SURF) biobands in the Barkley Sound survey area.

Echinoderms, most specifically sea stars, were observed in 17% of the units in the Barkley Sound survey area. *Pisaster ochraceus* was the most common sea star observed in the imagery. Mass mortality of at least 20 species of sea stars has occurred since a large-scale outbreak of sea star wasting disease occurred in the summer of 2013. *Pisaster ochraceus* was common along the West coast of North America prior to that event but is now uncommon or absent (Kohl et al., 2016). The die-off of sea stars has longer-term ecological consequences that can include elimination of low zone species and a change in zonation patterns of intertidal communities (Menge et al., 2016).

See Figure 22 for a graph showing the proportion of the shoreline with the Echinoderm bioband and a distribution map in Figure 23.

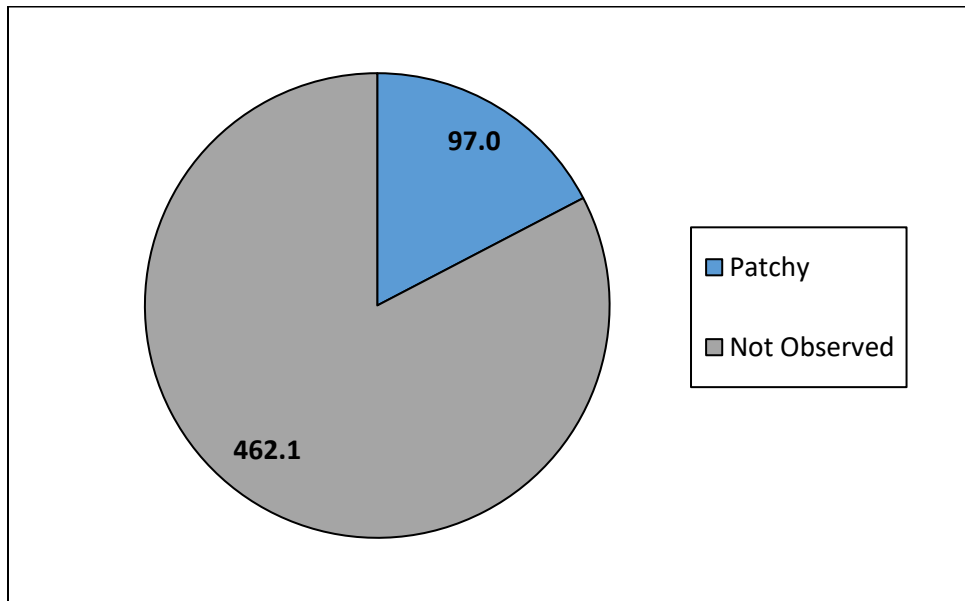


Figure 22. Distribution of the intertidal/subtidal Echinoderm bioband by shoreline length (km).

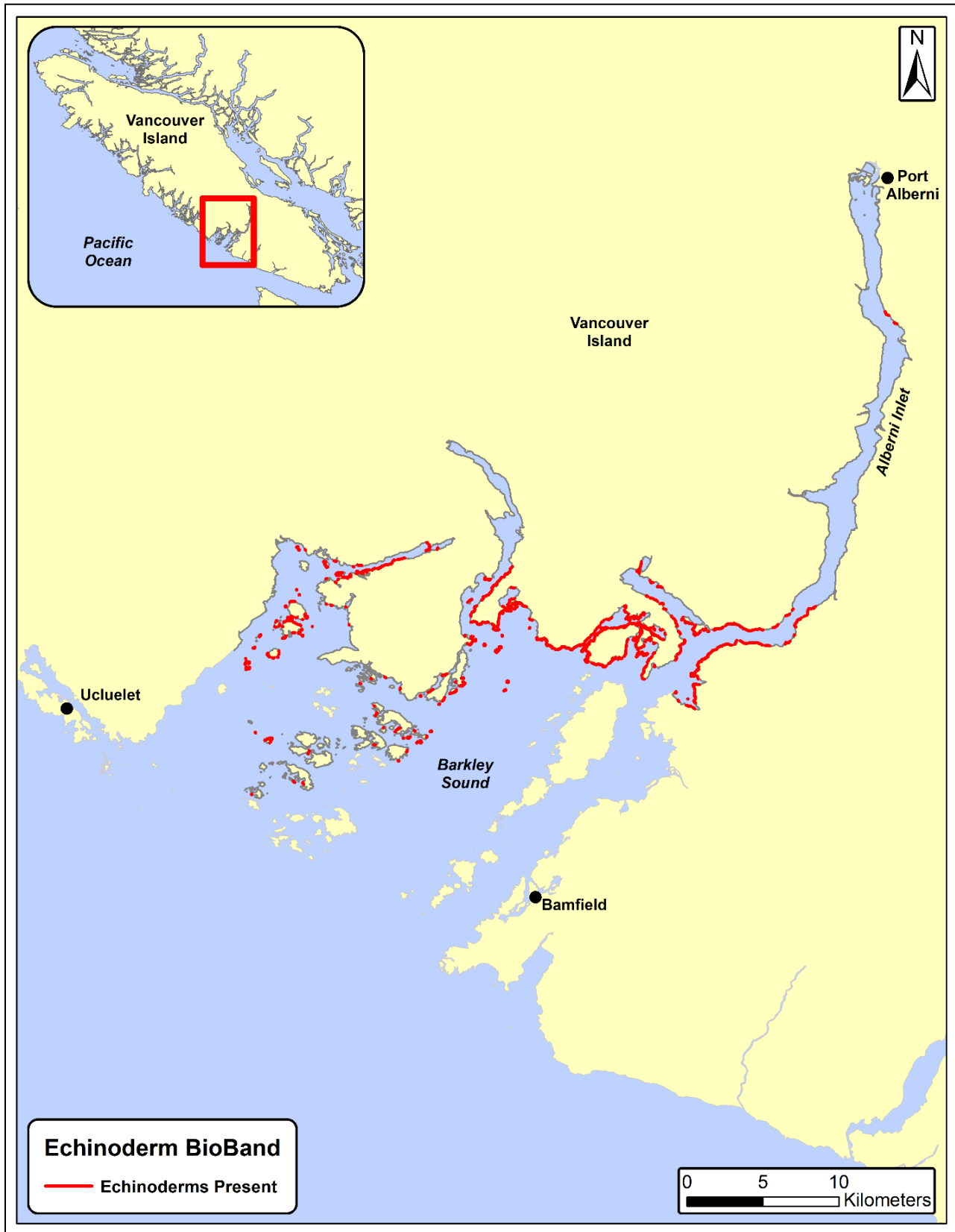


Figure 23. Distribution of the Echinoderm bioband in the Barkley Sound survey area.

The Sargassum bioband was observed in the Barkley Sound survey area. The Sargassum bioband is defined by the presence of Japanese Wireweed (*Sargassum muticum*), which is an introduced species. The Sargassum band was observed in 18% of units although it is possible much of the Brown Bladed Kelp that was recorded was actually a mix of kelps with Sargassum as there were areas where browns could be observed in the subtidal but not enough detail could be seen to determine if Sargassum was present. It can therefore be assumed it was more widely distributed than indicated by the ShoreZone mapping. There is significant literature available on the impacts of introduced Japanese Wireweed with somewhat conflicting conclusions, as some studies find negative impacts on native species (DeWreede and Vandermeulen, 1988; Britton-Simmons, 2004) and some find little to no impacts (Sanchez and Fernandez, 2005; Olabarria *et al.*, 2009). White (2003) studied the effects of *S. muticum* on macroalgal communities and grazing invertebrates in BC and found that the effects of introduction were both density and time dependent and were mediated through competition for light and also that the effects went in both positive and negative directions depending on the species being studied.

As noted previously, some of the Brown Bladed Kelps may include Sargassum if the Sargassum was not distinguishable from the other kelps and it is likely that Sargassum has been underestimated in the results.

See Figures 24 and 25 for a graph showing the proportion of the shoreline with the Sargassum and Brown Bladed Algae, respectively, Figure 26 for an image where it is hard to discern if it is a Brown Bladed Algae or Sargassum bioband, and a distribution map for both in Figure 27.

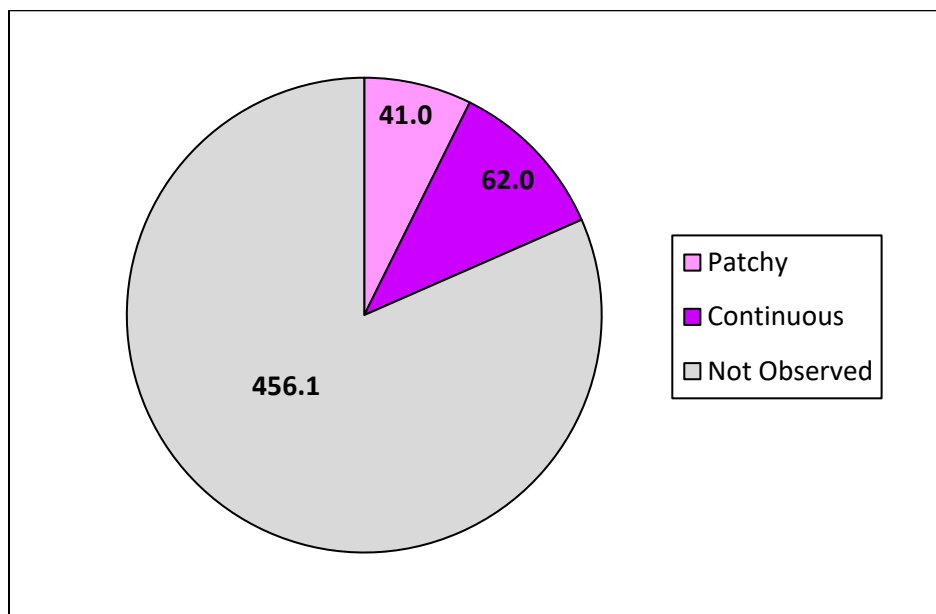


Figure 24. Distribution of the intertidal/subtidal Sargassum bioband by shoreline length (km).

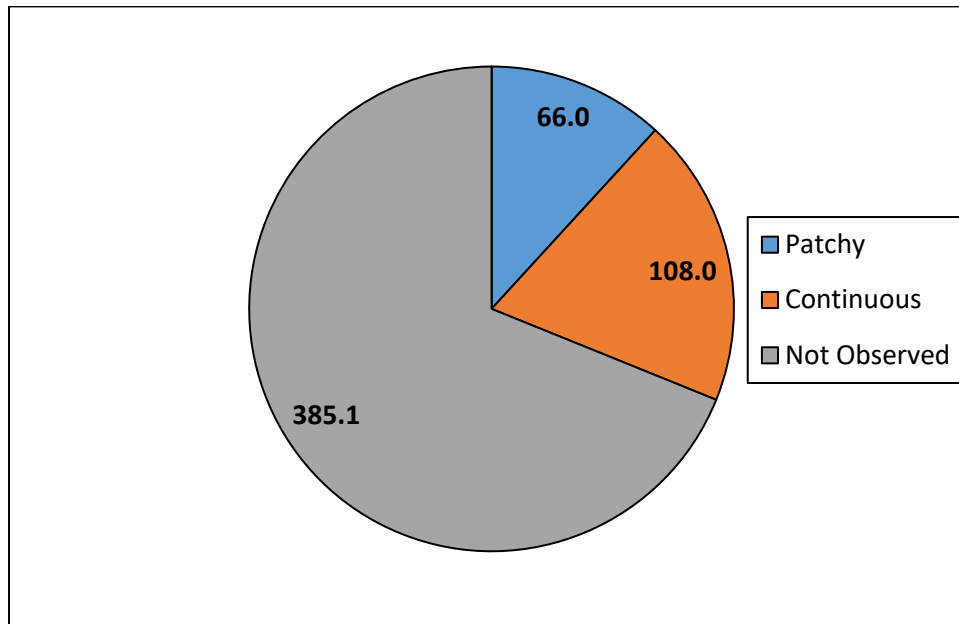


Figure 25. Distribution of the intertidal/subtidal Brown Bladed Algae bioband by shoreline length (km).



Figure 26. Image of Brown Bladed Algae band in the subtidal that could potentially be Sargassum or a mixed kelp/Sargassum bioband.

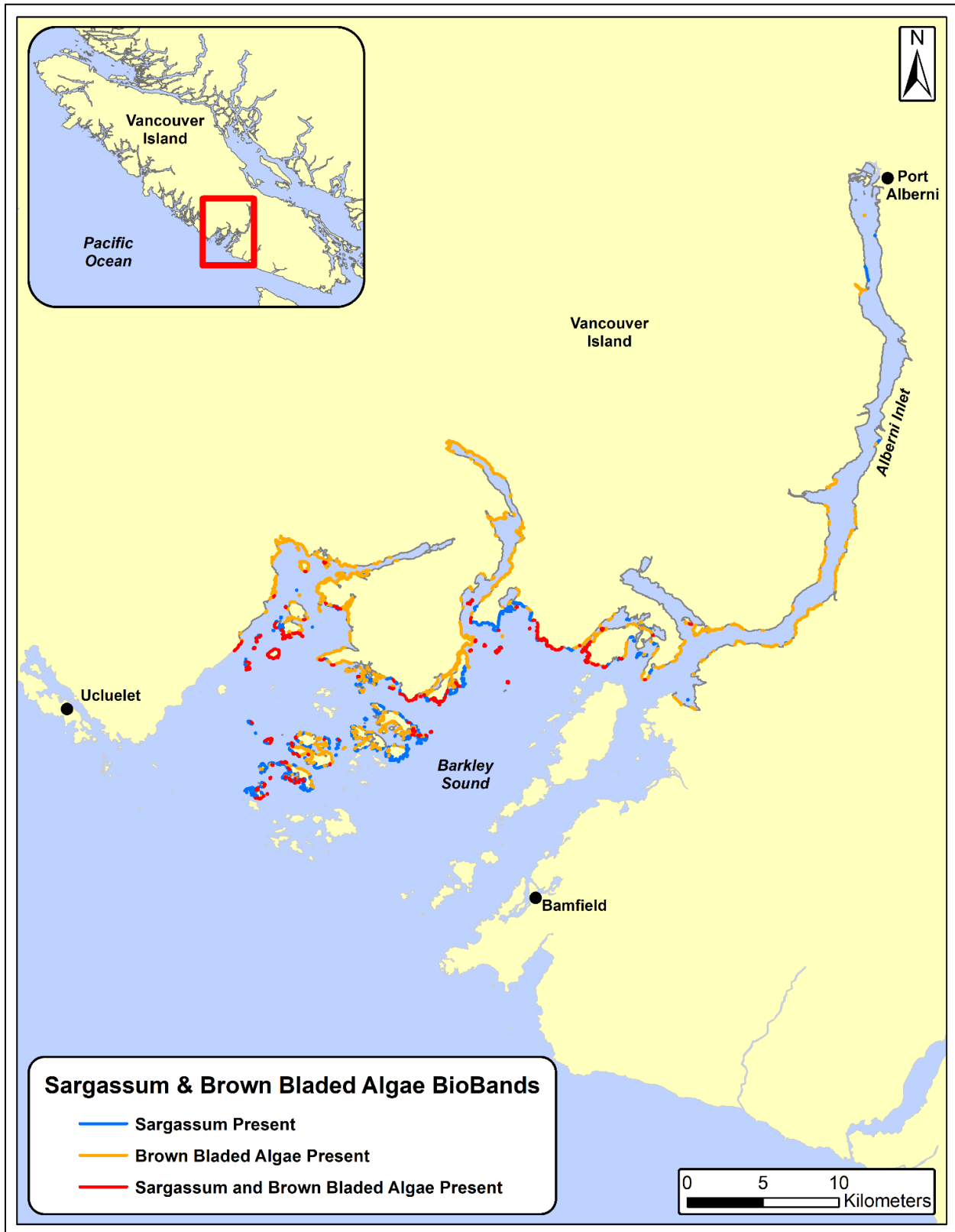


Figure 27. Distribution of the Sargassum and Brown Bladed Algae biobands in the Barkley Sound survey area.

Salt Marsh was the most commonly occurring supratidal, non-splash zone bioband and was found in 32% of units (see Figure 28 for a graph of proportion of the shoreline with the Salt Marsh and Figure 29 for a distribution map). Salt Marsh can occur either in the lower supratidal or upper intertidal. This is an important habitat for many shoreline species and can provide important ecological services, such as filtering land-based nutrients which can help maintain the balance of other habitats such as eelgrass meadows (Valiela *et al.*, 2000).

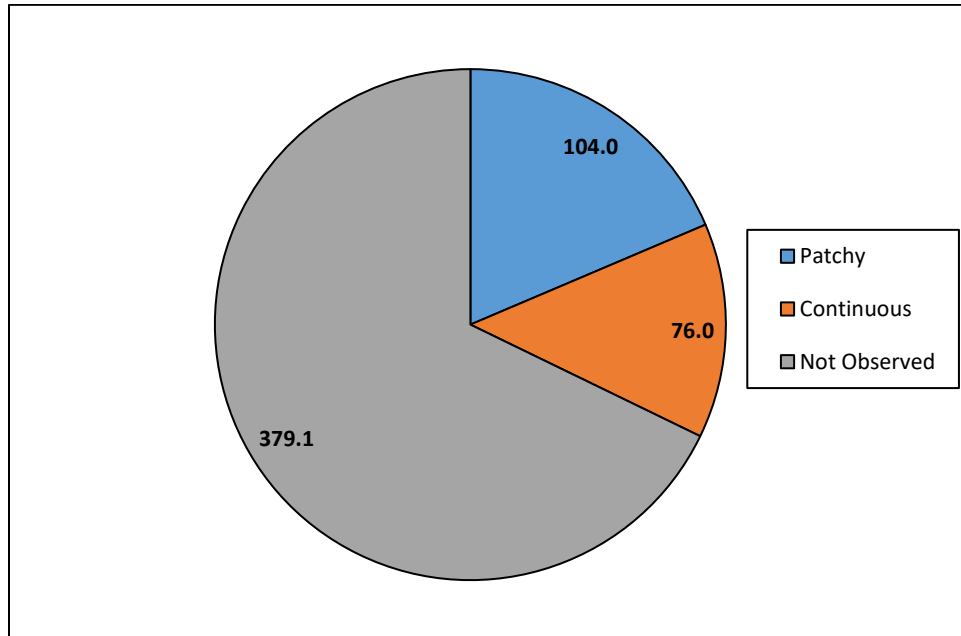


Figure 28. Distribution of the Salt Marsh (SAMB) bioband by shoreline length (km).

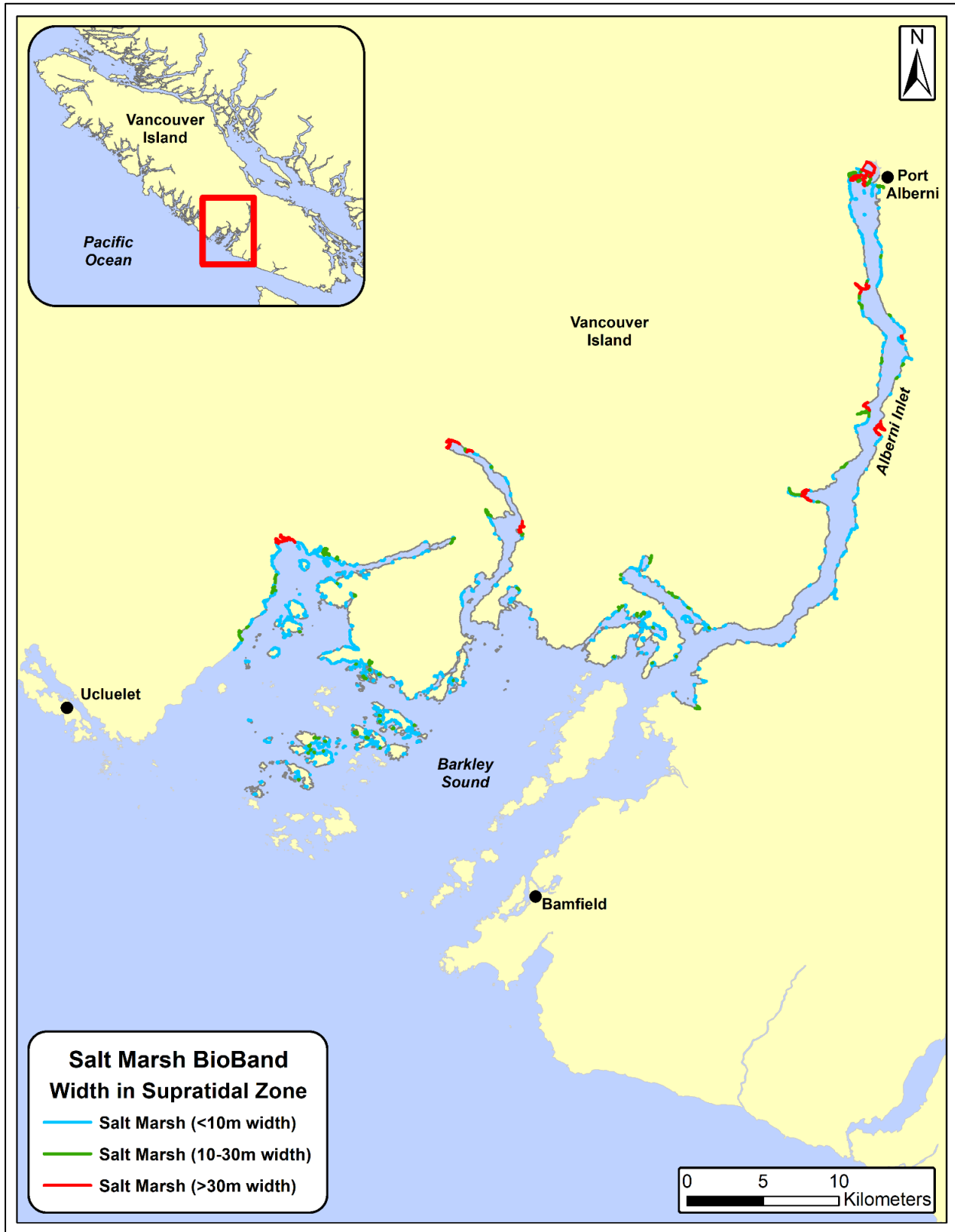


Figure 29. Distribution of the Salt Marsh (SAMB) bioband in the Barkley Sound Survey area.

3.2 Biological Wave Exposure

Biological wave exposure categories range from Very Protected (VP) to Very Exposed (VE) and are usually defined in ShoreZone on the basis of a typical set of biobands. When present, the relative abundance of biota in each alongshore unit is used as a proxy to determine the wave exposure at that site. For definitions of the Biological Wave Exposures and the exposure ranges of the biobands see the most recent ShoreZone protocol (Cook *et al.*, 2017).

The distribution of the wave exposure categories mapped in the Barkley Sound survey are summarized in Figure 30 and a distribution map of the categories is shown in Figure 31. Almost the entire coastline (99.5%) was in the lower to moderate wave exposures (Very Protected to Semi-Protected), with most of that Protected (69.7%). None of the coastline of the Barkley Sound survey area fell into the Very Exposed categories while only 0.5% were Exposed.

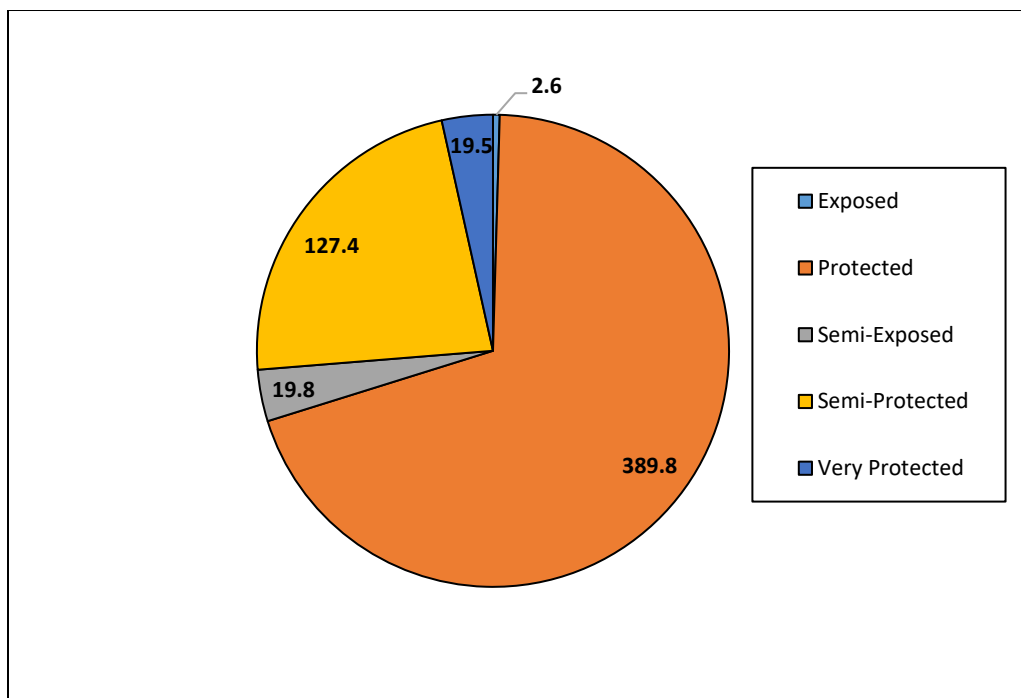


Figure 30. Distribution of Biological Wave Exposures mapped in the Barkley Sound survey area by shoreline length (km).

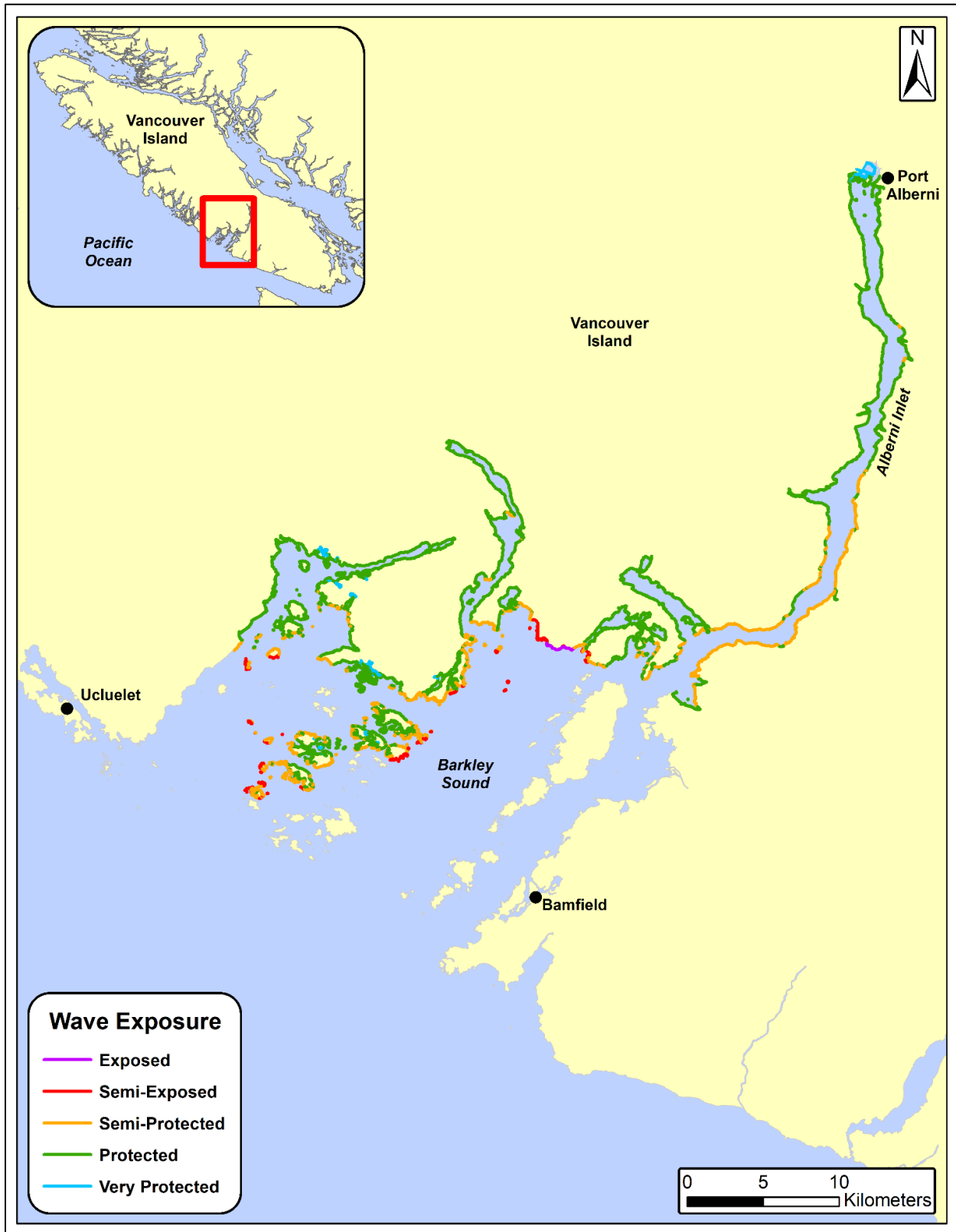


Figure 31. Distribution of the Biological Wave Exposure in the Barkley Sound survey area.

3.3 Habitat Class

Habitat Class is a classification based on wave exposure and geomorphic characteristics observed in an alongshore unit. The habitat class is intended to provide a single attribute to characterize the biophysical features of each unit. The habitat class is assigned by the biological mapper and weighted according to the dominant structuring process. Wave action is the most common structuring process with less commonly observed habitats being those structured by current, estuarine/fluvial processes, and anthropogenic structures. For habitat classes structured by wave action substrate mobility determines the presence of epibenthic biota. Where the substrate is highly mobile, biota is sparse or absent, and where the substrate is stable, biota can be abundant. For further definitions and explanations of Habitat Class codes please see the most recent ShoreZone protocol (Cook *et al.*, 2017).

The distribution of the Habitat Class categories mapped in the Barkley Sound survey area are summarized in Figure 32 and a distribution map of the categories is shown in Figure 33. Partially mobile substrate is the dominant shoreline type (59.6%), with Immobile accounting for the bulk of the rest (27.2%).

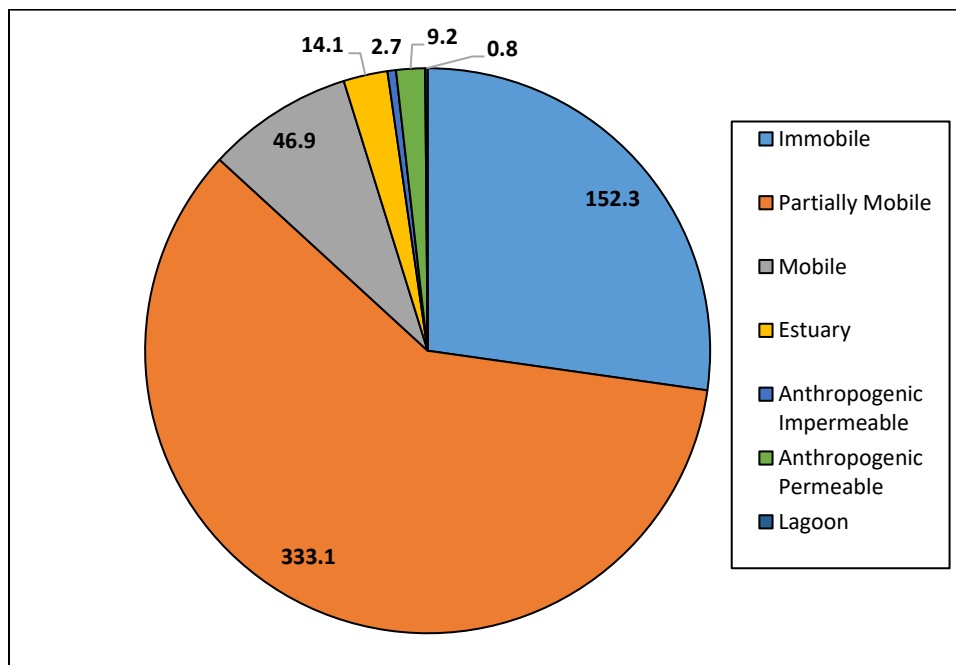


Figure 32. Distribution of Habitat Class categories in the Barkley Sound survey area by shoreline length (km).

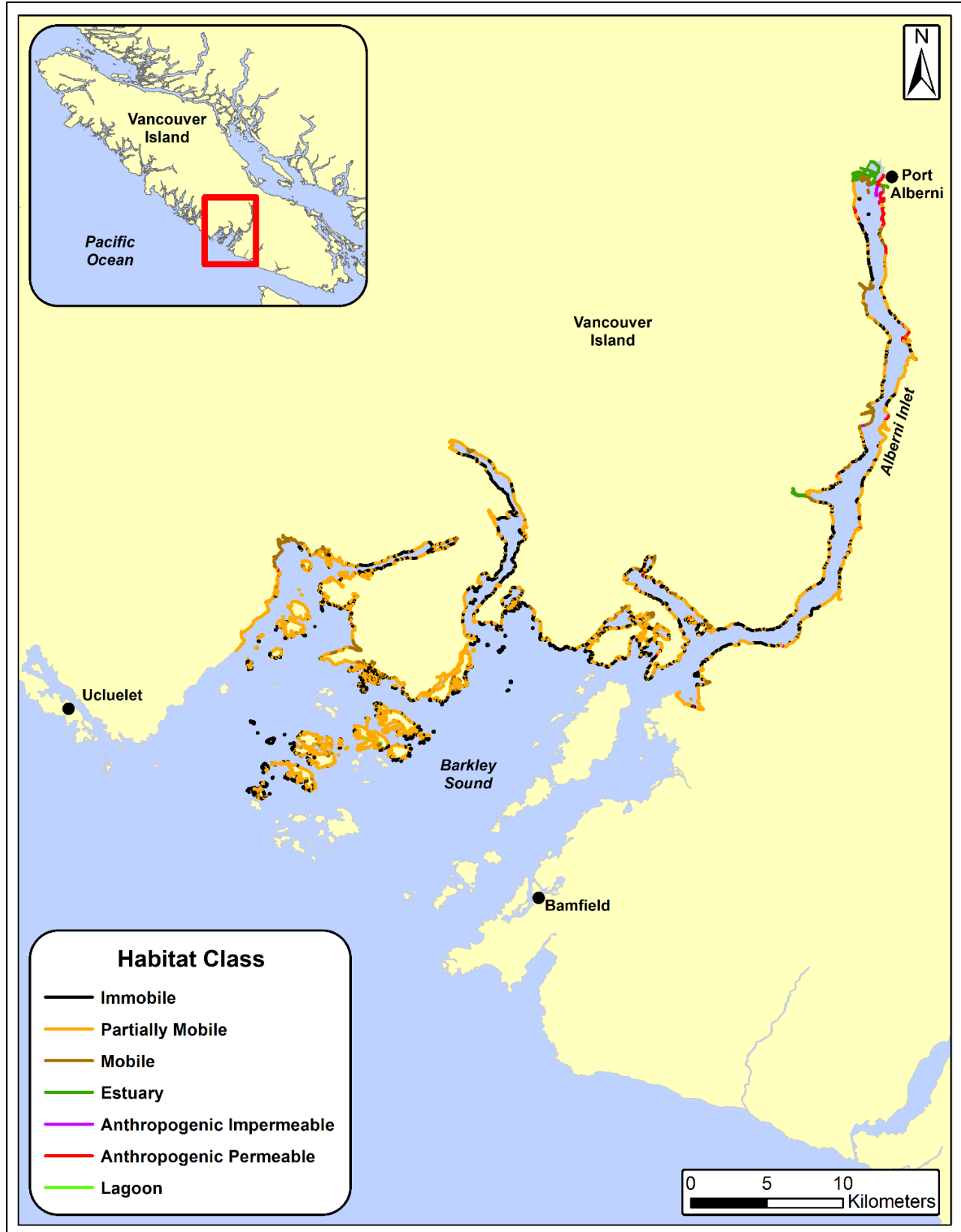


Figure 33. Distribution of Habitat Class categories in the Barkley Sound survey area.

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5 ACKNOWLEDGMENTS

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Protocols for data access and distribution are established by the program partner agencies. Please see www.ShoreZone.org for a list of partner agencies and related web sites. Imagery, reports, geodatabases and shapefiles for the ShoreZone dataset can be downloaded online at www.ShoreZone.org or through the links on that site.

Any hardcopies or published data sets utilizing ShoreZone products should clearly indicate their source. For questions regarding the protocols or information in this report, please contact Sarah Cook, Executive Director of Sea Change Marine Conservation Society, at SarahCook@seachangesociety.com (250-652-1662). For data requests or analytical support contact Kalen Morrow at Kalen@seachangesociety.com.

APPENDIX A

Photographic Examples of Coastal Classes and Biobands

Table A-1. Examples of the Coastal Classes in the Barkley Sound survey area (Page 41).

Table A-2. Examples of the Biobands in the Barkley Sound survey area (Page 48).

Table A-1. Examples of the Coastal Classes in the Barkley Sound survey area.



Photo bc22_bk_02342: Example of Coastal Class 3; Rock Cliff.
Alberni Inlet.

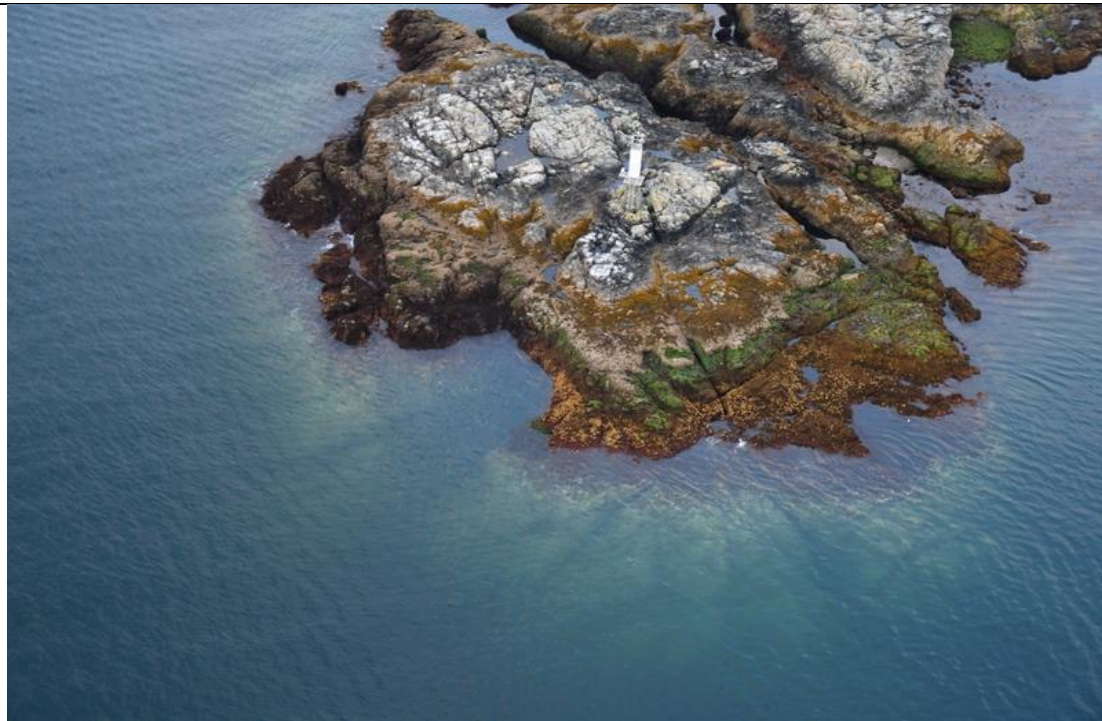


Photo bc22_bk_00587: Example of Coastal Class 4; Rock Ramp.
Reeks Island, Broken Group.



Photo bc22_bk_02240: Example of Coastal Class 8; Cliff gravel beach.
Alberni Inlet.



Photo bc22_bk_00535: Example of Coastal Class 9; Ramp with gravel beach.
San Mateo Bay.



Photo bc22_bk_00558: Example of Coastal Class 12; Platform with gravel & sand beach, wide. San Mateo Bay.



Photo bc22_bk_07456: Example of Coastal Class 13; Cliff with gravel & sand beach. Alberni Inlet.



Photo bc22_bk_00105: Example of Coastal Class 14; Ramp with gravel & sand beach.
Underwood Cove.



Photo bc22_bk_01832: Example of Coastal Class 19; Ramp with sand beach, narrow.
Trickett Island, Broken Group.



Photo bc22_bk_00592: Example of Coastal Class 22; Gravel beach, narrow.
Reeks Island, Broken Group.



Photo bc22_bk_00079: Example of Coastal Class 24; Sand & gravel flat or fan.
China Creek.



Photo bc22_bk_02312: Example of Coastal Class 25; Sand & gravel beach, narrow.
Alberni Inlet.



Photo bc22_bk_05141: Example of Coastal Class 28; Sand flat.
Macoah Passage.



Photo bc22_bk_02537: Example of Coastal Class 31; Organics/Fines.
Port Alberni.



Photo bc22_bk_002482: Example of Coastal Class 32; Permeable man-made structures.
Port Alberni.

Table A-2. Examples of the Biobands in the Barkley Sound survey area.



Photo bc22_bk_02725: Good example of the Splash Zone (SPZO) bioband which is an erosional or active A Zone without attached vegetation. Alma Russell Islands.

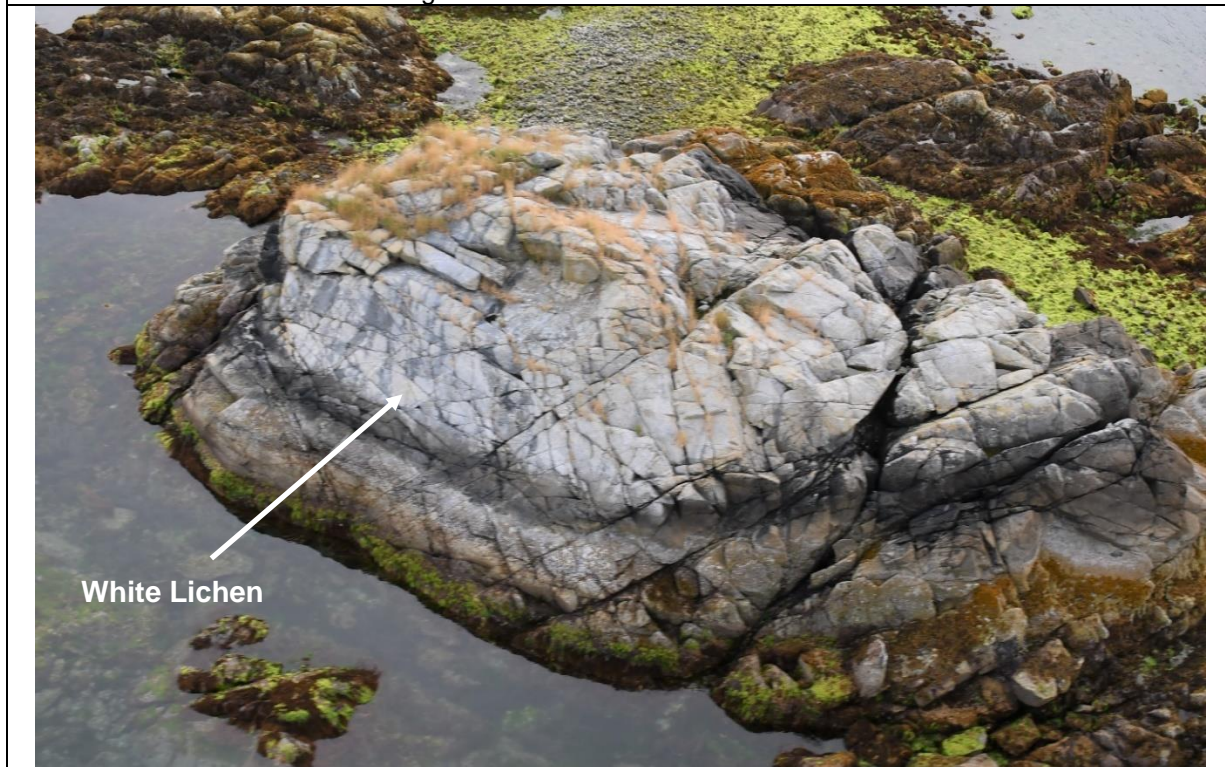


Photo bc23_bk_05003: Good example of White Lichen (WHLI) bioband in the supratidal zone, above the Black Lichen band. David Island.



Photo bc22_bk_01738: Good example of the Yellow Lichen (YELI) bioband which is a yellow-orange band in the supratidal zone. Hankin Island.



Photo bc22_bk_04687: Good example of the Black Lichen (BLLI) bioband which is a black band in the supratidal zone, usually caused by the lichen *Verrucaria* sp. Seddall Island.



Photo bc22_bk_02328: Good example of blue-green Dune Grass (DUGR) bioband in the supratidal zone. Macktush Bay.



Photo bc22_bk_02543: Good example of Salt Marsh (SAMB) bioband in the supratidal/intertidal zone. Johnstone Island.



Photo bc22_bk_04773: Good example of the Barnacle (BARN) bioband in the intertidal zone. Stopper Islands.

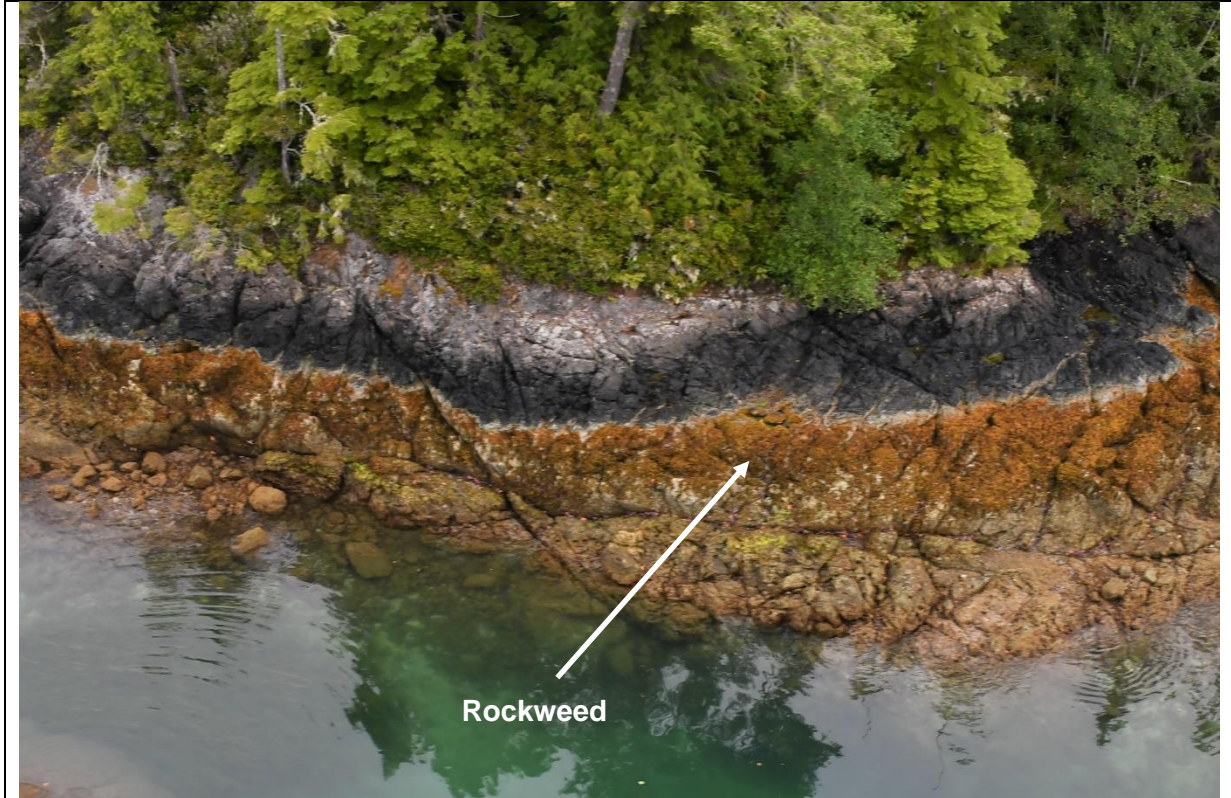


Photo bc22_bk_04690: Good example of the golden-brown Rockweed (ROCK) bioband. Rainy Bay.

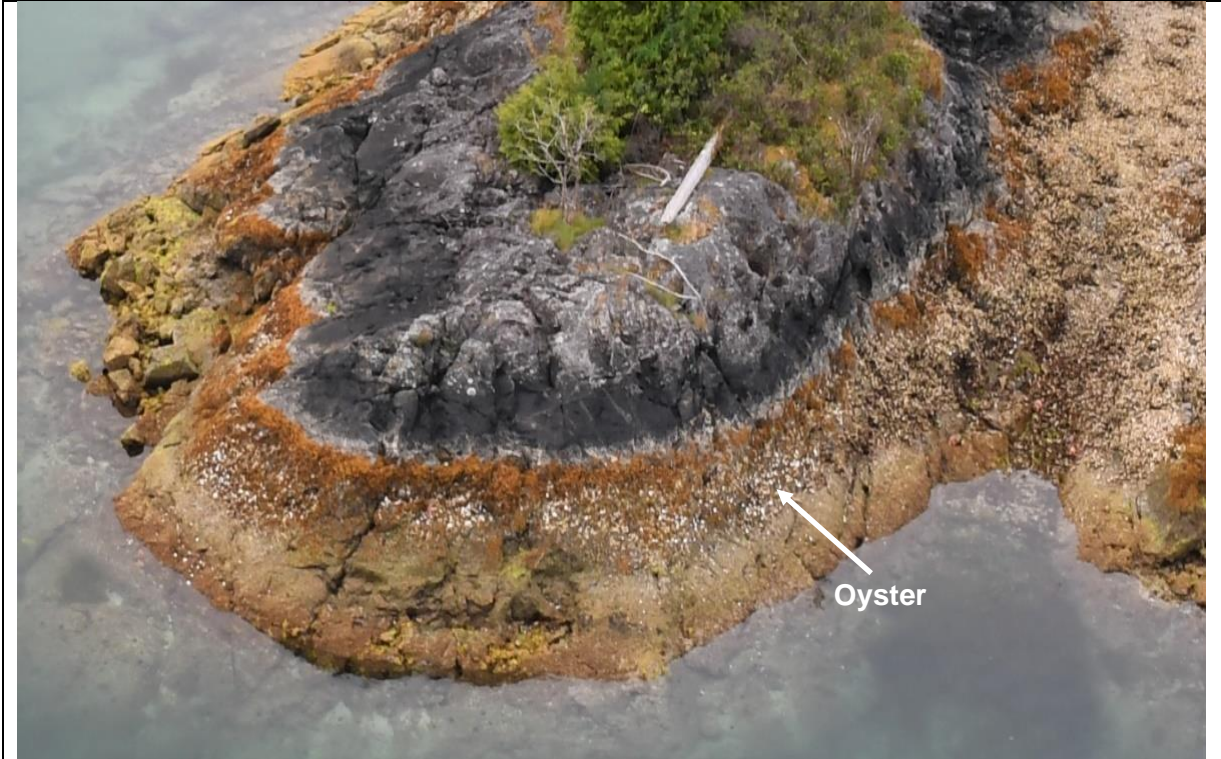


Photo bc22_bk_04870: Good example of the white spots of the Oyster (OYST) bioband. Stopper Islands.



Photo bc22_bk_03687: Good example of the black Blue Mussel (BLMU) bioband in the mid-intertidal. Rutley Islands.



Photo bc22_bk_05237: Good example of the Green Algae (GRAL) bioband in the lower intertidal. Stopper Islands.

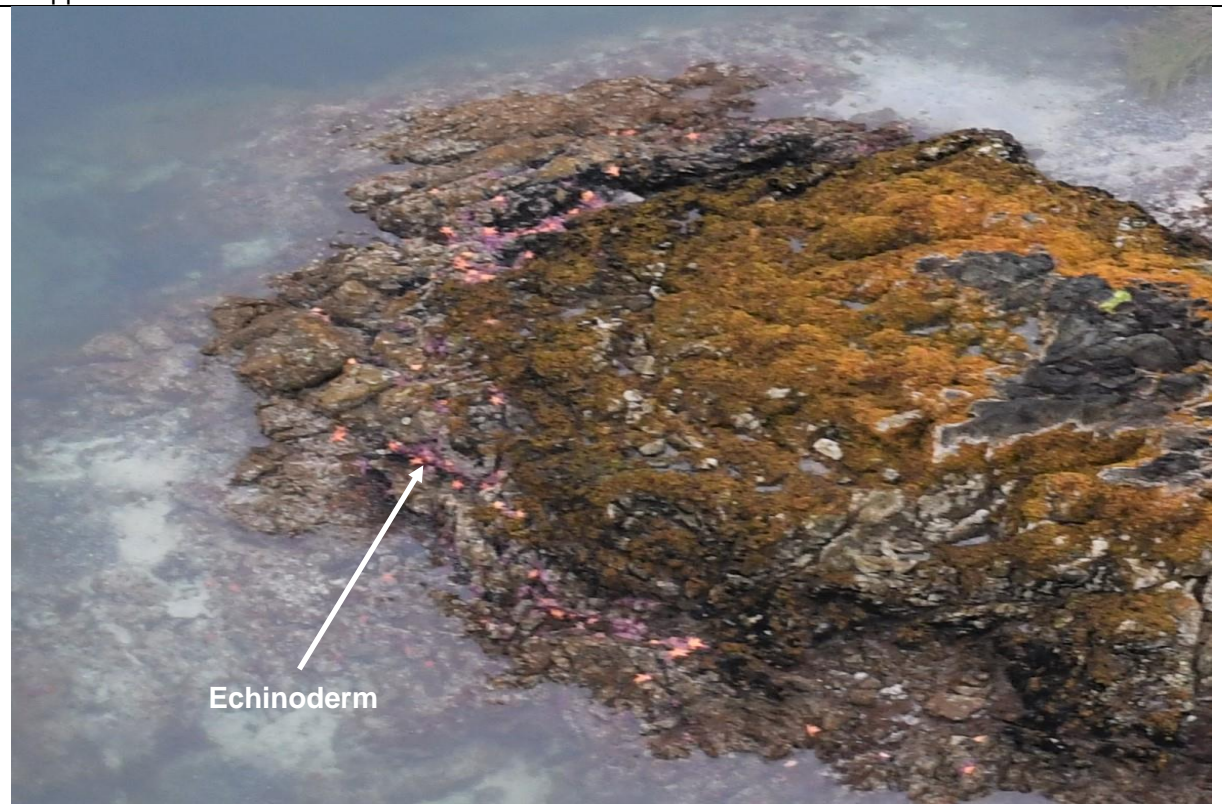


Photo bc22_bk_07411: Good example of the Echinoderm (ECHI) bioband. Brooksby Point.

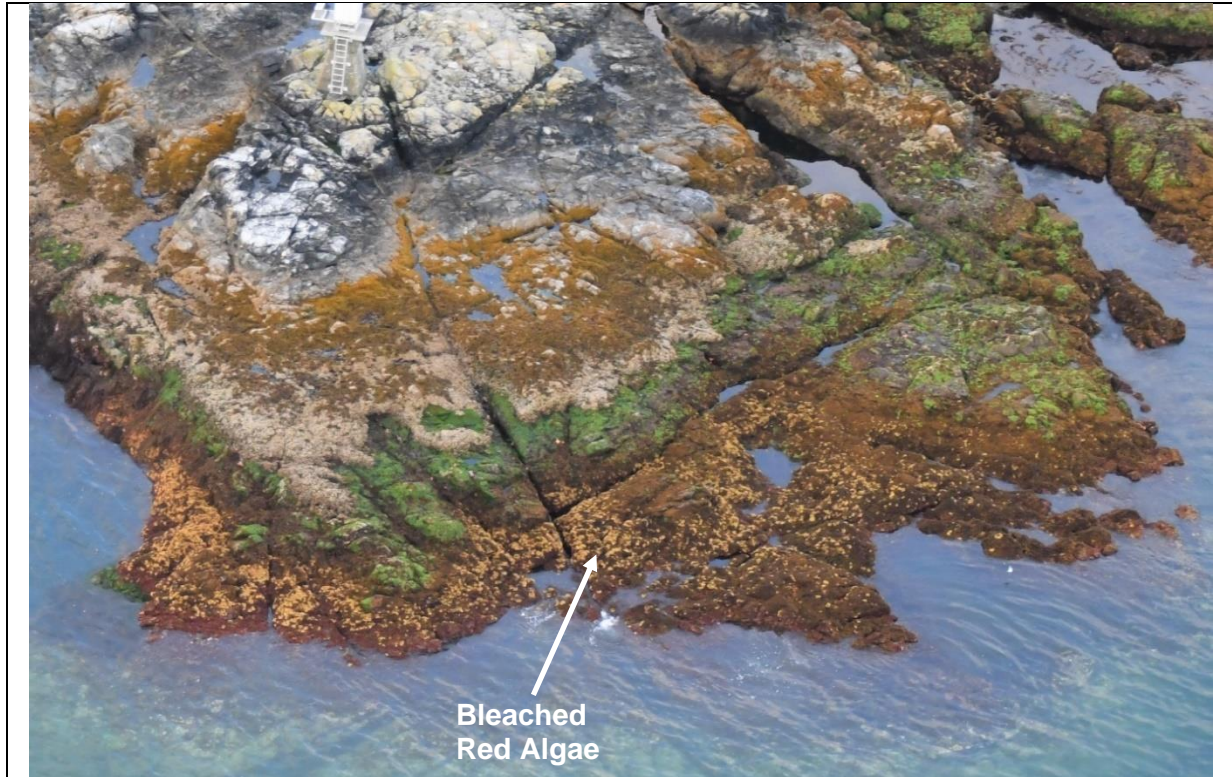


Photo bc22_bk_00587: Good example of the golden Bleached Red Algae (BRAL) bioband in the lower intertidal. Swale Rock.



Photo bc22_bk_01704: Good example of the Filamentous and Foliose Red Algae (FFRA) bioband in the lower intertidal. Page Island.

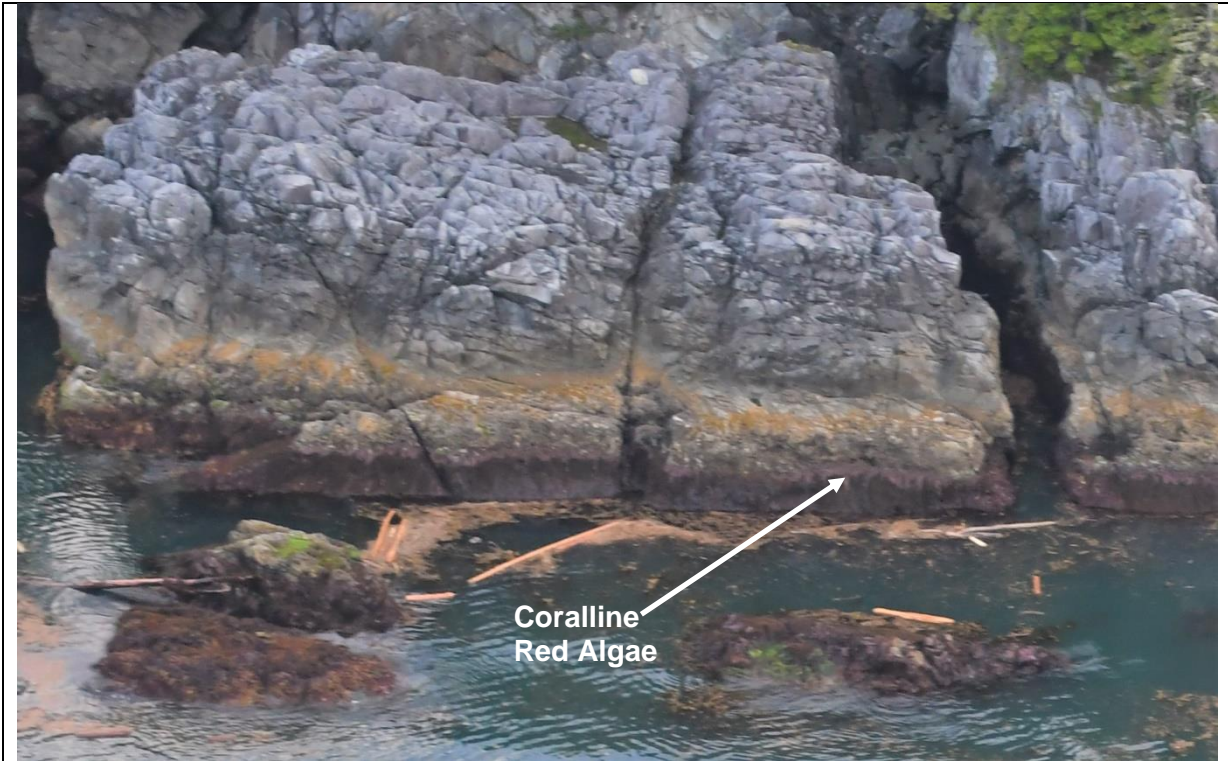


Photo bc22_bk_00587: Good example of the Coralline Red Algae (CORA) in the lower intertidal. Reeks Island.



Photo bc22_bk_01570: Good example of the Brown Bladed Algae (BRBA) in the subtidal. Walsh Island.



Photo bc22_bk_03765: Good example of the Anemone (ANEM) bioband in the subtidal. Vernon Bay.



Photo bc22_bk_03765: Good example of the fluffy, floating Sargassum (SARG) bioband in both the lower intertidal and the subtidal. Seddall Island.

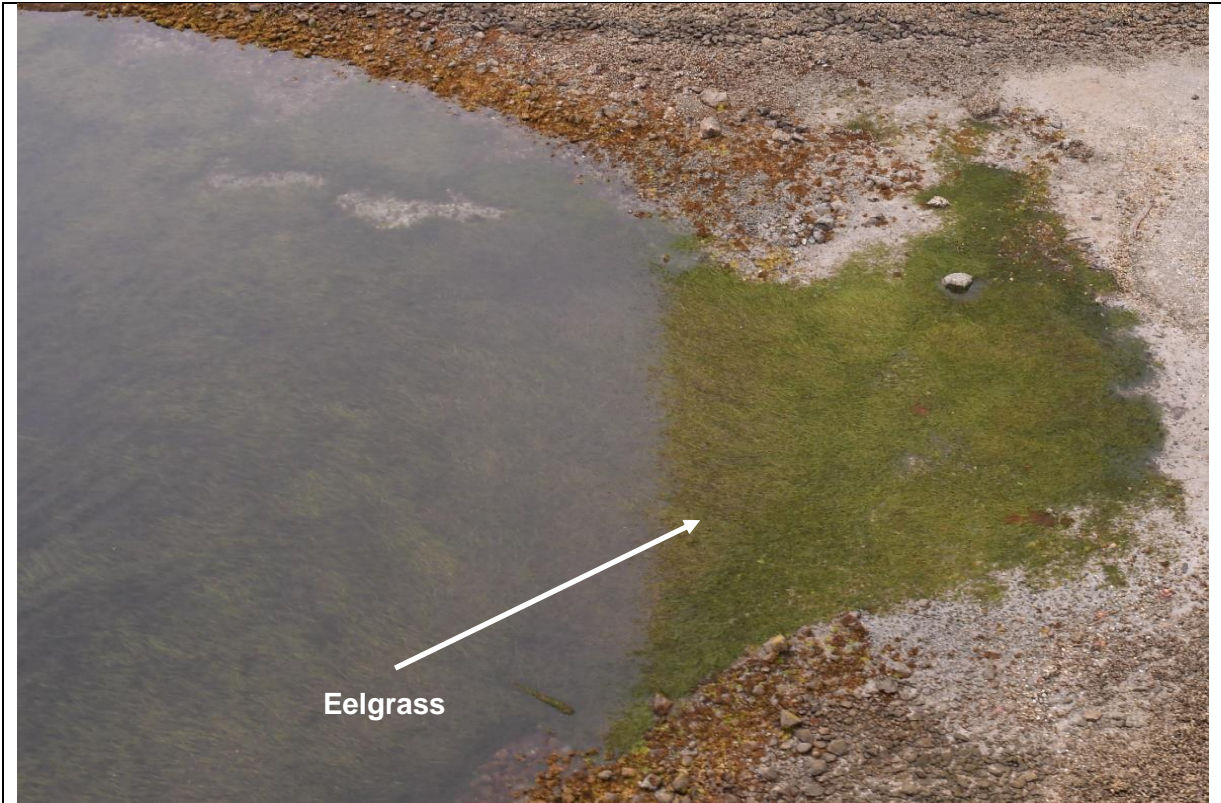


Photo bc22_bk_04830: Good example of the Eelgrass (EELG) bioband in both the lower intertidal and the subtidal. Stopper Islands.

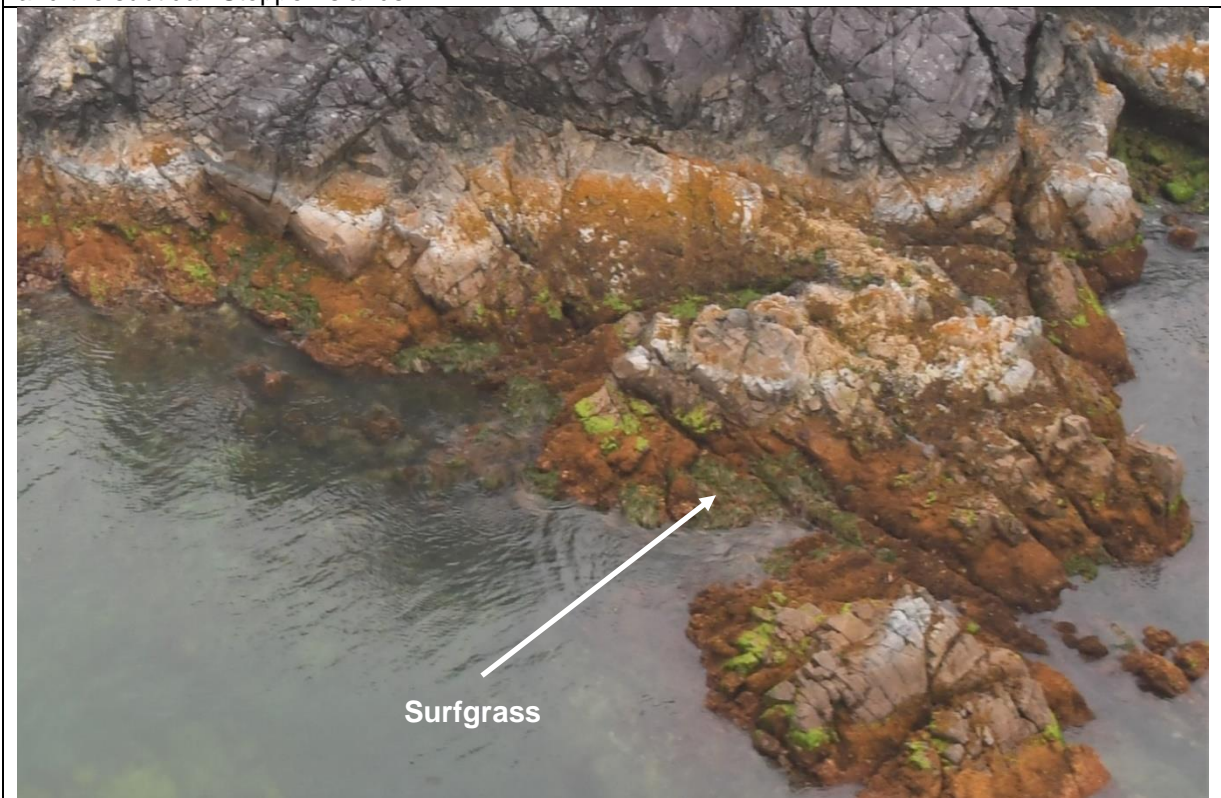


Photo bc22_bk_07748: Good example of the Surfgrass (SURF) bioband in the lower intertidal. Alma Russell Islands.

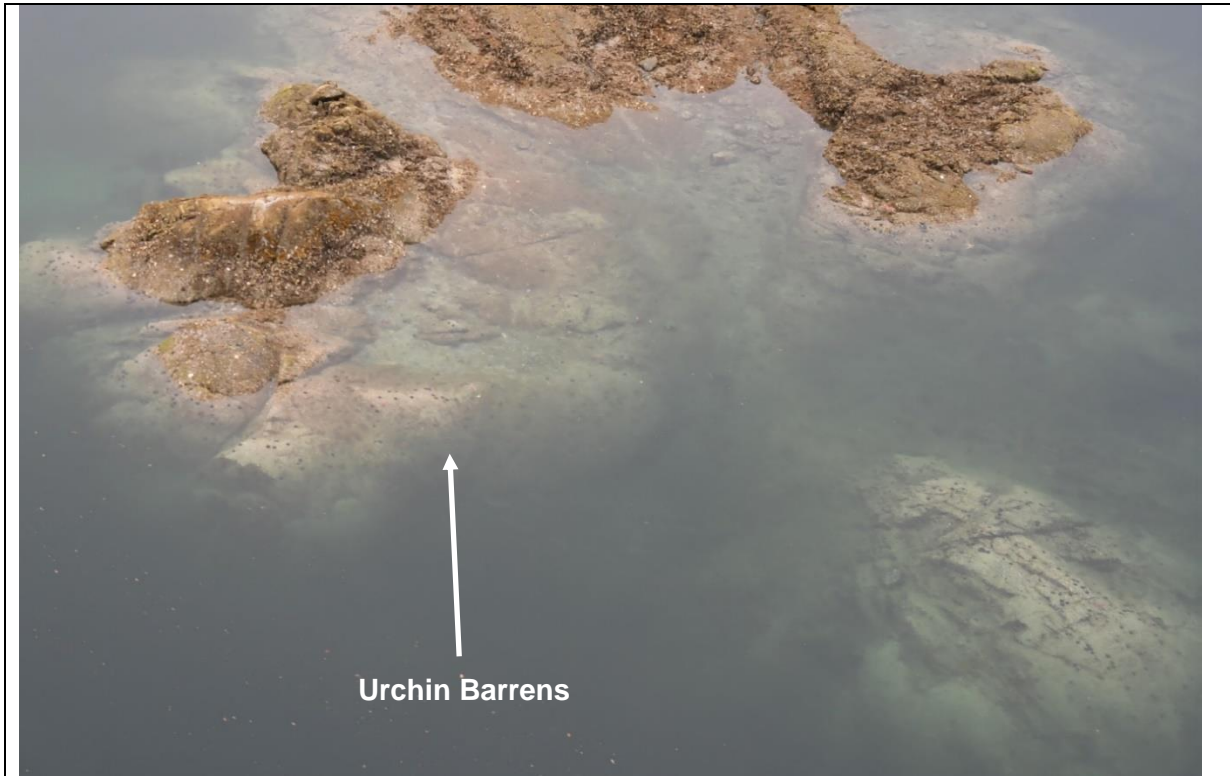


Photo bc22_bk_04410: Good example of the Urchin Barrens (URBA) bioband in the nearshore. Fatty Basin.



Photo bc22_bk_02111: Good example of the Bull Kelp (BUKE) bioband in the nearshore. Owens Island.

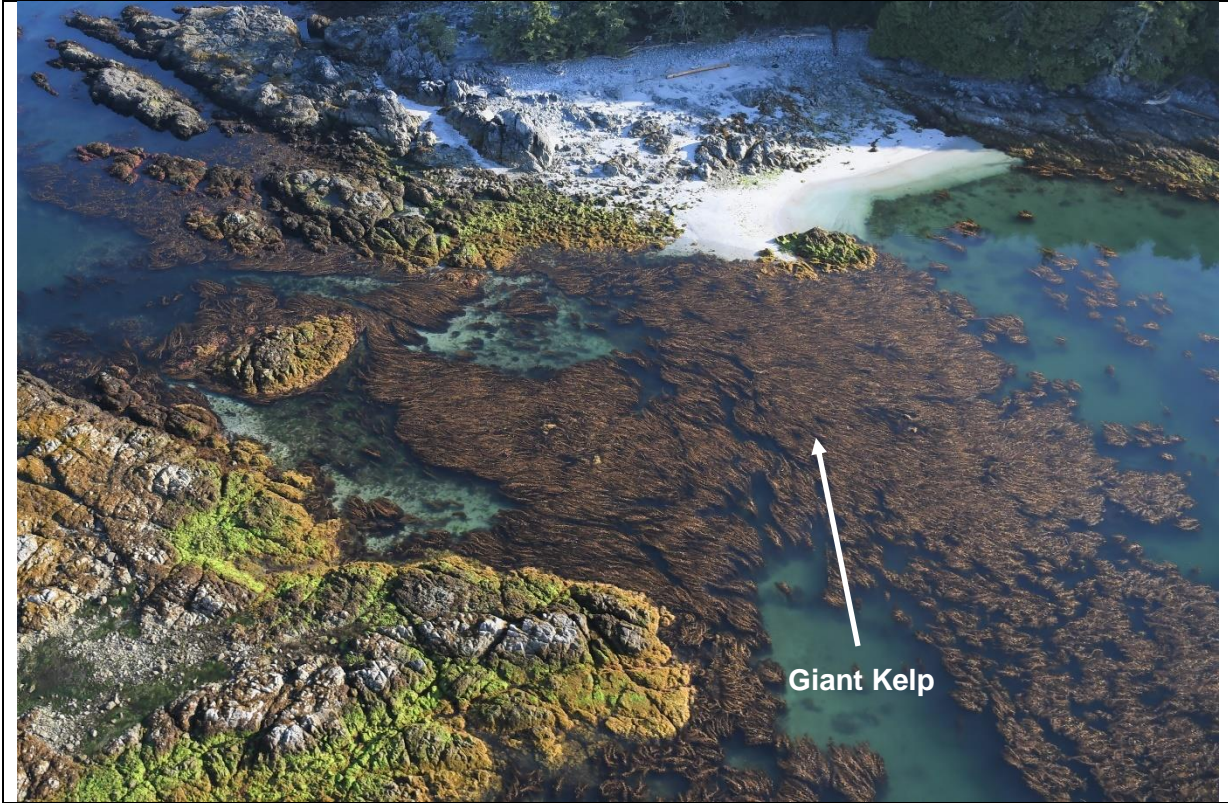


Photo bc22_bk_02100: Good example of the Giant Kelp (GIKE) bioband in the nearshore. Owens Island.