

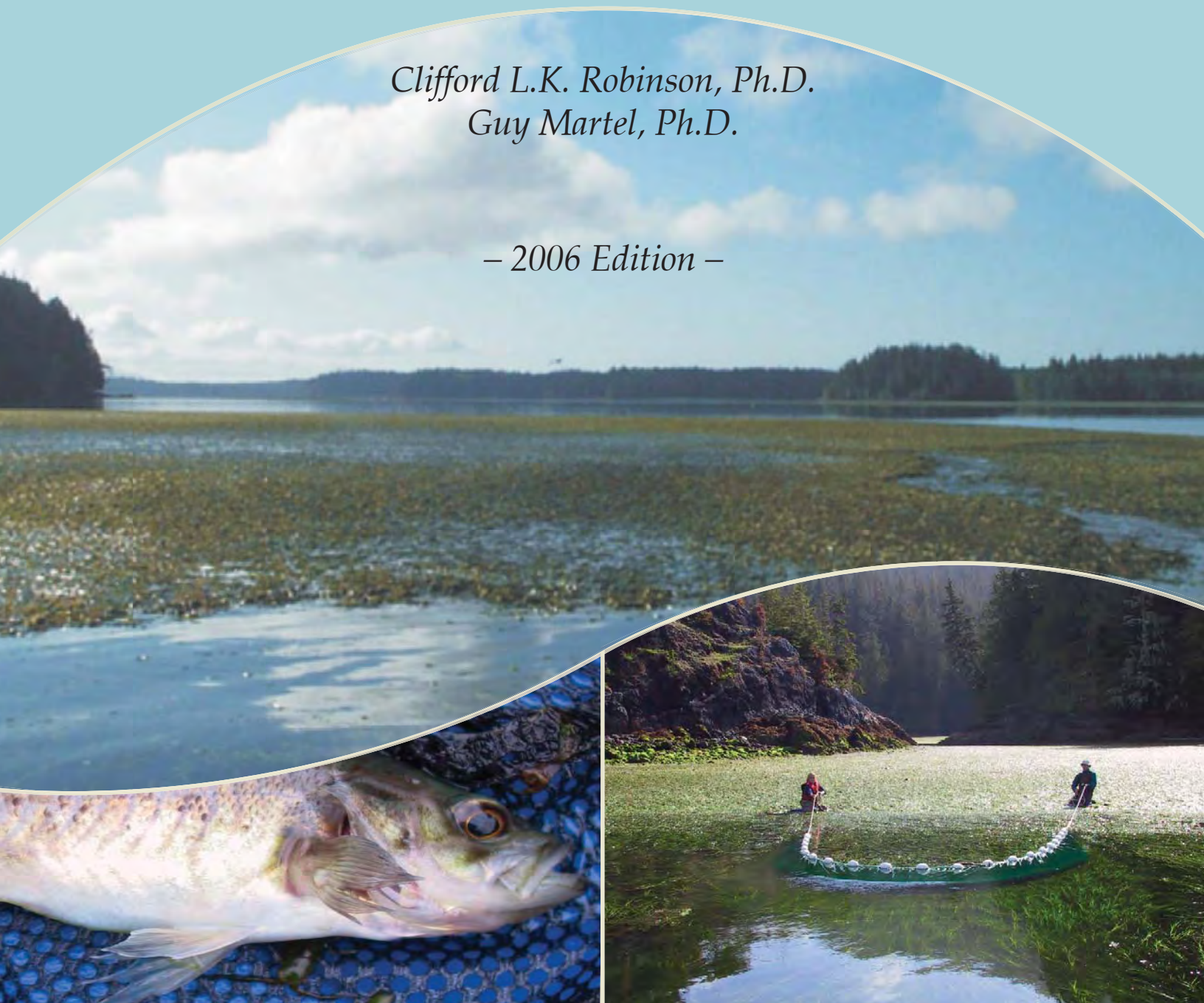


# WESTERN AND NORTHERN SERVICE CENTRE

## MONITORING FOR THE ECOLOGICAL INTEGRITY OF EELGRASS BEDS (*Zostera marina*) IN CANADA'S COASTAL NATIONAL PARKS OF BRITISH COLUMBIA

*Clifford L.K. Robinson, Ph.D.  
Guy Martel, Ph.D.*

*– 2006 Edition –*



Parks  
Canada

Parcs  
Canada

Canada

*Monitoring for the ecological integrity of eelgrass beds  
(Zostera marina) in coastal National Parks of British Columbia*

*2006 edition*

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**31 March 2007**

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**FORMATTING AND COVER:** Alice Gavin, Parks Canada, Western and Northern Service Centre

**WNSC  
RESOURCE CONSERVATION  
TECHNICAL REPORT**

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EELGRASS BEDS (*Zostera marina*) IN COASTAL  
NATIONAL PARKS OF BRITISH COLUMBIA**

**2006 edition**

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**EXECUTIVE SUMMARY**

The Canada National Parks Act Sec 8(2) states that “Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks.” Ecological Integrity (EI) means, with respect to a park, “a condition characteristic of its natural region and likely to persist, including abiotic components and the structure/function of biological communities”. An objective science-based monitoring program will be required to assess and monitor for changes in EI in Canada’s National Parks.

Two National Park Reserves of Canada (NPRC) have marine components in the Pacific Bioregion (Pacific Rim NPRC and the Southern Gulf Islands NPRC). In addition, there is a proposed National Marine Conservation Area surrounding the third terrestrial park in coastal British Columbia (Gwaii Haanas NPRC – Haida Heritage Site). Because of the similar nature of the coastal near shore ecosystems among these three regions, Parks Canada should develop and apply a common coast wide monitoring approach. The overarching monitoring objectives for maintaining EI of near shore marine ecosystems in the Pacific Bioregion are:

1. Characterize the present (future) state of ecosystems, focusing on environmental and biological diversity.
2. Establish empirical limits of ecosystem component variation (in space and time).
3. Provide early diagnosis of “abnormal” ecosystem structure and function.

In this report, we discuss results from the third year of a program intended to monitor for the ecological integrity of a highly productive and highly sensitive near shore ecosystem, namely eelgrass (*Zostera marina*). Because of where they grow, eelgrass beds are potentially subjected to impacts from a wide variety of land-use and marine-use activities. For example, boating activities can directly, physically impact eelgrass, and activities such as logging or construction can quickly impact eelgrass bed structure and function through changes in water quality.

During the summer of 2006, 47 eelgrass beds were sampled for environmental properties, eelgrass bed properties, and fish community properties. This report provides a summary of information collected for each eelgrass bed sampled in four regions of interest to Parks Canada: beds in the proposed Gwaii Haanas National Marine Conservation Area surrounding Gwaii Haanas National Park – Haida Heritage Site, beds

in Grice Bay, Pacific Rim National Park Reserve and southern Clayoquot Sound, beds in the Broken Group Island unit of Pacific Rim National Park Reserve and Barkley Sound, and beds within and outside the Gulf Islands National Park Reserve.

The following information is compiled for each eelgrass bed:

1) information on bed location, 2) environmental properties, 3) eelgrass properties such as biomass and epiphyte load, and 4) fish communities.

#### ACKNOWLEDGEMENTS

Jennifer Yakimishyn, Clint Johnson and Scott Giroux have been instrumental in keeping the sampling programs operational in Pacific Rim, Gwaii Haanas and the Gulf Islands, respectively. Alice Gavin developed the report format.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	i
ACKNOWLEDGEMENTS .....	ii
TABLE OF CONTENTS.....	iii
<b>1.0 BACKGROUND</b>	
1.1 Eelgrass inventory.....	2
<b>2.0 SITE DESCRIPTIONS</b>	
2.1 Explanation of Graphs, Tables and Abbreviations.....	3
2.2. Gwaii Haanas Site Descriptions.....	5
Section Cove .....	6
Huxley .....	8
Rose Inlet.....	10
Head of Looscoone Inlet.....	12
Looscoone .....	14
Balcom Inlet.....	16
Heater Harbour.....	18
Swan Bay.....	20
Bag Harbour .....	22
Sedgwick.....	24
Murchison.....	26
2.3. Clayoquot Sound Site Descriptions.....	29
Beck .....	30
Felice.....	32
Roberts Point.....	34
Elbow Bank .....	36
Arakun.....	38
Sharp .....	40
Mud Bay .....	42
Calmus.....	44
Ducking.....	46
Indian.....	48
Auseth.....	50
Kootowis.....	52

## TABLE OF CONTENTS (cont.)

### 2.0 SITE DESCRIPTIONS (cont.)

2.4 Barkley Sound Site Descriptions.....	55
Pinkerton .....	56
Hand Island.....	58
Nettle .....	60
Jacques-Jarvis Lagoon.....	62
Joe's Bay .....	64
Clarke .....	66
Turret .....	68
Wouwer.....	70
Effingham .....	72
Robbers Passage.....	74
Roquefeuil.....	76
Mayne Bay .....	78
2.5 Gulf Islands Site Descriptions.....	81
Lyll Harbour .....	82
Irish Bay .....	84
Beaumont.....	86
Narvaez .....	88
Cabbage.....	90
Tumbo Island.....	92
James Bay .....	94
Selby Cove .....	96
James Island.....	98
Sidney Spit.....	100
Reynard Point.....	102
Moresby East .....	104

### 3.0 DESCRIPTION OF SAMPLING METHODS

3.1 Environmental Properties - Field Sampling.....	107
3.2 Environmental Properties - Laboratory Sampling .....	107
3.3 Eelgrass Properties - Field Methods.....	109
3.4 Eelgrass Properties - Lab Analysis.....	111
3.5 Sediment Properties - Lab Analysis.....	112
3.6 Fish Sampling .....	113
3.7 Additional References of Interest.....	115



## 1.0 BACKGROUND

The *Canada National Parks Act* Sec 8(2) states that “Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks.” Ecological Integrity (EI) means, with respect to a park, “a condition characteristic of its natural region and likely to persist, including abiotic components and the structure/function of biological communities”. An objective science-based monitoring program will be required to assess and monitor for changes in EI in Canada’s National Parks.

Two National Park Reserves of Canada (NPRC) have marine components in the Pacific Bioregion (Pacific Rim NPRC and the Southern Gulf Islands NPRC). In addition, there is a proposed National Marine Conservation Area surrounding the third terrestrial park in coastal British Columbia (Gwaii Haanas NPRC – Haida Heritage Site). Because of the similar nature of the coastal nearshore ecosystems among these three regions, Parks Canada should develop and apply a common coast-wide monitoring approach. The overarching monitoring objectives for maintaining EI of nearshore marine ecosystems in the Pacific Bioregion are:

- 1.Characterize the status and trends of ecosystems, focusing on environmental and biological diversity;
- 2.Establish empirical limits of ecosystem component variations (in space and time); and,
- 3.Provide early diagnosis of “abnormal” ecosystem structure and function.

There are many coastal ecosystems in Pacific NPRs that will require monitoring to ensure conservation of nearshore ecological integrity. In this report, we discuss the rationale for establishing a monitoring program for what is arguably the most productive and sensitive (to human impacts) nearshore ecosystem, eelgrass (*Zostera marina*). In addition, previous research conducted in other

temperate areas has shown that eelgrass is a useful and meaningful indicator of greater ecosystem health.

Eelgrass prefers clear, oligotrophic and oxygenated waters of the shallow subtidal and intertidal (+2 m to –5 m relative to Chart Datum). Eelgrass beds are an important coastal ecosystem for several reasons. First, they directly support food chains through the secondary production of invertebrates associated with epiphytes (animals or algae growing on eelgrass blades). Second, eelgrass meadows indirectly support food chains through supplies of plant material to detrital pathways and adjacent ecosystems (e.g., mudflats). Third, eelgrass provides rearing and foraging habitat for invertebrates (e.g., Dungeness crabs), fishes and birds such as the Great Blue herons. Finally, eelgrass beds reduce impacts of shoreline erosion by waves and currents, help stabilize sediments, and act as an integral component of the shallow water nutrient recycling process.

Because of where they grow, eelgrass beds are potentially subjected to impacts from a wide variety of land and marine use activities. For example, boating activities may directly impact eelgrass through shading or churning of substrate by anchors or propellers. In addition, certain activities can quickly impact eelgrass meadow structure and function through changes in water quality. Perusal of the primary scientific literature indicates that a deterioration of water quality leads mainly to a reduction of light available for eelgrass. Increased nutrient levels in the water column may result in major blooms of phytoplankton, epiphytic algae, and increased macro algal populations. This in turn reduces light levels, preventing eelgrass seeds from germinating and causing old eelgrass blades to die because of lack of light. Similarly, an increase in water column turbidity from increased sediment load (from coastal river run-off or nearshore construction, etc) reduces light available to eelgrass. Ultimately, the major

consequence of decreased light availability is a decline in eelgrass density and biomass and a subsequent reduction in the size and function of eelgrass beds.

Eelgrass beds (EGBs) meet the majority of selection criteria developed for selecting indicator taxa for assessing ecosystem health (Hilty and Merenlender 2000). Their taxonomic status is clear, and there is one dominant species of eelgrass in nearshore coastal British Columbia (*Zostera marina*). There is a large and growing literature on the biology and life history of eelgrass, and tolerance limits to environmental conditions (e.g., temperature, salinity, light levels, etc) are well known. Eelgrass has a cosmopolitan distribution and has limited mobility (rhizomes can potentially spread 1-3 meters per year). There is plenty of evidence to indicate that eelgrass offers an early warning system in response to stress. For example, recent observations in the San Juan Islands (Wyllie-Echeverria et al. 2003) indicate that intertidal portions of many meadows were completely lost within two years. Eelgrass is easy to find because it is visible at low tide, and it occurs along 10-25% of the British Columbia coastline. Parks Canada is presently investigating relationships between changes in eelgrass

and other ecosystem components (e.g., fish assemblages) and documenting the variability in population parameters. Overall, eelgrass is one of the few marine species that offers such a complete attribute package for acting as an indicator of coastal ecosystem health.

### 1.1. Eelgrass Inventory

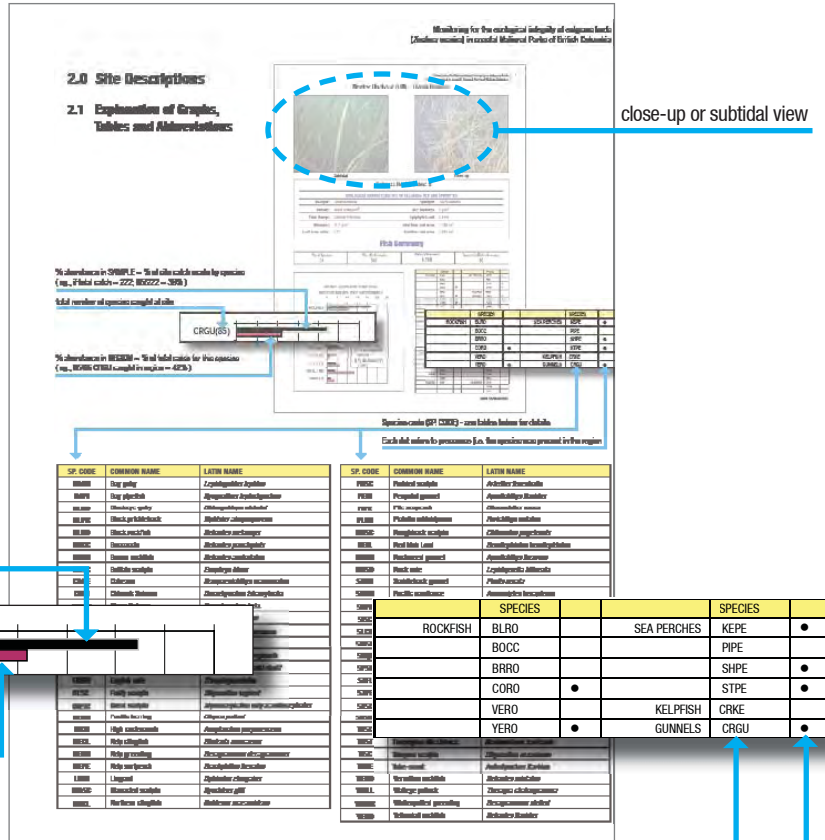
Inventories of eelgrass meadows are required before detailed monitoring programs can be established. Parks Canada began the eelgrass meadow inventory program in 2004 in each of the four study regions. Because the 4 regions of interest are spread along the BC coast, the surveys were restricted to sampling eelgrass meadows within a temporal index period (see table below). The major criteria for selecting an eelgrass meadow was that it could be safely accessed on a lower low water tide during the index period. The maximum number of meadows that can be sampled within a region during a low tide window is 12. The Table below summarizes the number of meadows sampled during the index period for each region. Some 47 eelgrass meadows were sampled in 2006, and 38 were re-sampled from 2005.

Region	Sampling Period	Year	Total Meadows Sampled	Meadows Re-sampled	New Meadows
<b>GWAI HAANAS</b>	Mid July	2004	12	0	12
		2005	12	10	2
		2006	11	10	1
<b>CLAYOQUOT SOUND</b>	Mid June	2004	10	0	10
		2005	12	9	3
		2006	12	7	3
<b>BARKLEY SOUND</b>	July	2004	8	0	8
		2005	8	7	1
		2006	12	11	1
<b>SOUTHERN GULF ISLANDS</b>	Early August	2004	8	0	8
		2005	12	6	6
		2006	12	10	2



## 2.0 Site Descriptions

### 2.1 Explanation of Graphs, Tables and Abbreviations



SP. CODE	COMMON NAME	LATIN NAME
BAGO	Bay goby	<i>Lepidogobius lepidus</i>
BAPI	Bay pipefish	<i>Syngnathus leptorhynchus</i>
BLGO	Blackeye goby	<i>Rhinogobiops nicholsi</i>
BLPR	Black prickleback	<i>Xiphister atropurpureus</i>
BLRO	Black rockfish	<i>Sebastes melanops</i>
BOCC	Boccaccio	<i>Sebastes paucispinis</i>
BRRO	Brown rockfish	<i>Sebastes auriculatus</i>
BUSC	Buffalo sculpin	<i>Enophrys bison</i>
CABE	Cabezon	<i>Scorpaenichthys marmoratus</i>
CHIN	Chinook Salmon	<i>Oncorhynchus tshawytscha</i>
CHUM	Chum Salmon	<i>Oncorhynchus keta</i>
CORO	Copper rockfish	<i>Sebastes caurinus</i>
COSO	C-O sole	<i>Pleuronichthys coenosus</i>
CRGU	Crescent gunnel	<i>Pholis laeta</i>
CRKE	Crevice kelpfish	<i>Gibbonsia montereyensis</i>
CUTT	Cutthroat trout	<i>Oncorhynchus clarki clarki</i>
ENSO	English sole	<i>Parophrys vetulus</i>
FLSC	Fluffy sculpin	<i>Oligocottus snyderi</i>
GRSC	Great sculpin	<i>Myoxocephalus polyacanthocephalus</i>
HERR	Pacific herring	<i>Clupea pallasii</i>
HICO	High cockscomb	<i>Anoplarchus purpurascens</i>
KECL	Kelp clingfish	<i>Rimicola muscarum</i>
KEGR	Kelp greenling	<i>Hexagrammos decagrammus</i>
KEPE	Kelp surfperch	<i>Brachyistius frenatus</i>
LING	Lingcod	<i>Ophiodon elongatus</i>
MASC	Manacled sculpin	<i>Synchirus gilli</i>
NOCL	Northern clingfish	<i>Goblesox maeandricus</i>

SP. CODE	COMMON NAME	LATIN NAME
PASC	Padded sculpin	<i>Artedius fenestralis</i>
PEGI	Penpoint gunnel	<i>Apodichthys flavidus</i>
PIPE	Pile seaperch	<i>Rhacochilus vacca</i>
PLMI	Plainfin midshipman	<i>Porichthys notatus</i>
RBSC	Roughback sculpin	<i>Chitonotus pugetensis</i>
REIL	Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>
ROGU	Rockweed gunnel	<i>Apodichthys fuorum</i>
ROSO	Rock sole	<i>Lepidopsetta bilineata</i>
SAGU	Saddleback gunnel	<i>Pholis ornata</i>
SAND	Pacific sandlance	<i>Ammodytes hexapterus</i>
SHPE	Shiner surfperch	<i>Cymatogaster aggregata</i>
SISC	Siverspotted sculpin	<i>Blepsias cirrhosus</i>
SLCO	Slender cockscomb	<i>Anoplarchus insignis</i>
SMSC	Smootherhead sculpin	<i>Artedius lateralis</i>
SM[R	Pacific snake prickleback	<i>Lumpenus sagitta</i>
SPSA	Speckled sanddab	<i>Citharichthys stigmaeus</i>
STFL	Starry flounder	<i>Platichthys stellatus</i>
STPE	Striped seaperch	<i>Embiotoca lateralis</i>
STSC	Staghorn sculpin	<i>Leptocottus armatus</i>
SUSM	Surf smelt	<i>Hypomesus pretiosus</i>
TASC	Tadpole sculpin	<i>Psychrolutes paradoxus</i>
THST	Threespine stickleback	<i>Gasterosteus aculeatus</i>
TISC	Tidepool sculpin	<i>Oligocottus maculosus</i>
TUBE	Tube-snout	<i>Autorhynchus flavidus</i>
VERO	Vermilion rockfish	<i>Sebastes miniatus</i>
WALL	Walleye pollock	<i>Theragra chalcogramma</i>
WHGR	Whitespotted greenling	<i>Hexagrammos stelleri</i>
YERO	Yellowtail rockfish	<i>Sebastes flavidus</i>

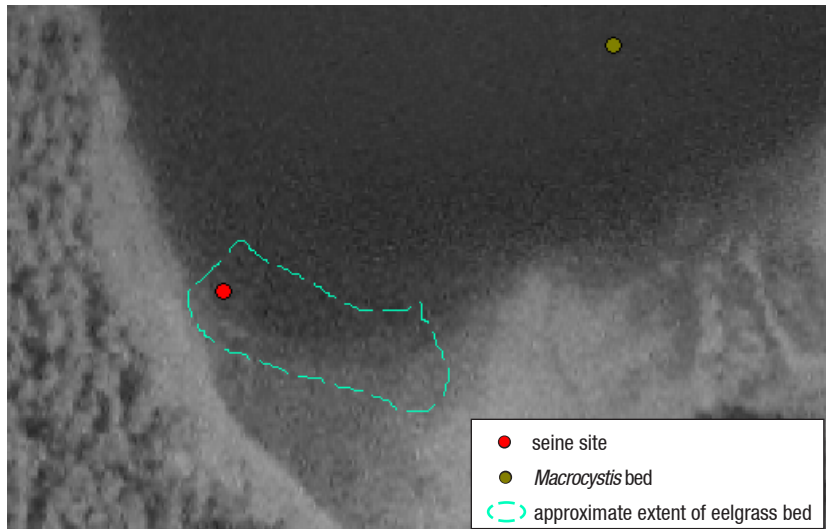
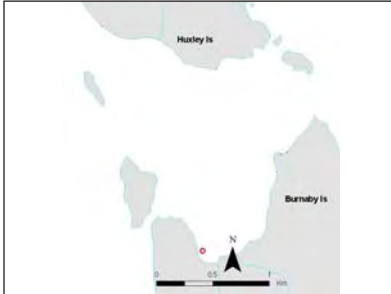


## 2.2 Gwaii Haanas Site Descriptions



## Section Cove

UTM Coordinates : 339254 E  
 : 5810121 N  
 Date Sampled: July 10, 2006 @ 6:50  
 Years Sampled: 2004, 2005, 2006  
 Weather: overcast, light rain, sea with ripples



Large and thick intertidal bed on a shallow sloped gravel and sand beach surrounded by large cobbles and bedrock. This was the only Gwaii Haanas eelgrass bed sampled whose intertidal portion was larger than the subtidal one. Eelgrass mixed with sea hair reached unusually high in the intertidal zone. The epiphyte load was higher than in the previous year (11% vs. 5%; diatoms in both cases) and appeared heavy on the video. The subtidal bed was patchy, with alternating thin and thick patches; its lower subtidal limit was along mud/gravel and laminariales. As in last year, there was evidence of dessication damage on many leaves. Kelp and helmet crabs were common among eelgrass and there were few grazers (eelgrass limpets primarily); geoducks and gaper clams were seen within the bed, along with the mottled sea stars and *Orthasterias*.

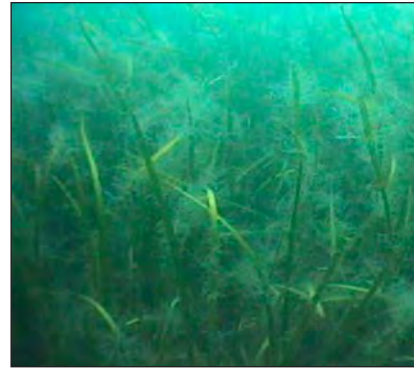
The catches ranked second in Gwaii Haanas and were dominated by bay pipefish as in 2005 (the highest pipefish and crescent gunnels catches of any site in 2006). It also ranked fourth overall for species richness. The site had the second highest juvenile rockfish abundance for the region, although well below last year's catches (193). It had the highest number of juvenile copper rockfish of any site in 2006. Last year sandlance schools were seen above the eelgrass but not sampled; this year the site had the only sandlance school in the region (one single individual was also caught in the nearest site, Huxley). As last year, black rockfish were filmed above the eelgrass and possibly a copper rockfish. Salmonids have previously been filmed in this bed. This was one of only two Gwaii Haanas sites with cabezon and was tied for highest number of smoothhead sculpins. Black tailed deer have often been observed to forage on this bed at low tide and roe-on-kelp frames were lying on the beach.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.8	<b>SEDIMENT COMPOSITION:</b> mud
<b>SALINITY (ppt):</b> 30.4	<b>SILT-CLAY FRACTION:</b> 4.1%
<b>CHLOROPHYLL a (ug/L):</b> 0.80	<b>SLOPE:</b> < 10°
<b>NITRATES (um):</b> 0.56	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 0.564	<b>TURBIDITY:</b> 0.066 NTU

## Section Cove (SC) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

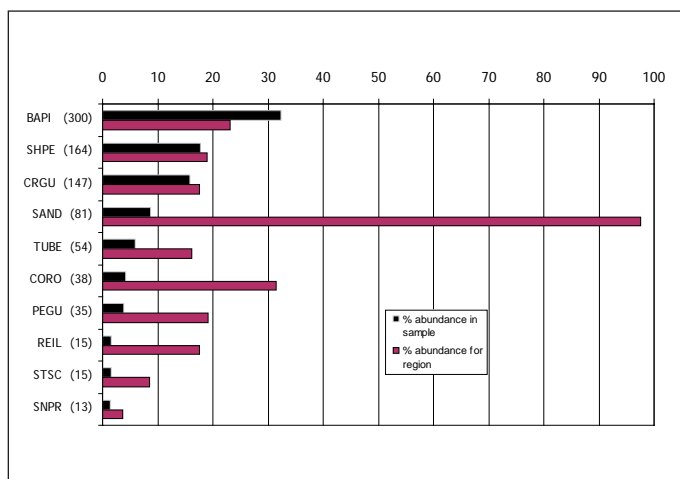
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 23
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 800	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 11
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 177	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 3,200
<b>LEAF AREA INDEX:</b> 2.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,200

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 25	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 926
<b>PIELOU'S EVENNESS:</b> 0.664	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE
	BRRO			SHPE ●
	CORO ●			STPE ●
	UNRO		GUNNELS	CRGU ●
	YERO ●			PEGU ●
SCULPINS	BUSC ●			ROGU
	CABE ●			SAGU
	REIL ●		PRICKLEBACKS	SNPR ●
	GRSC ●			BLPR
	MASC ●			HICO
	PASC ●			SLCO
	RBSC		FLATFISHES	COSO
	FLSC			ENSO
	SISC ●			ROSO
	SMSC ●			SPSA
	STSC ●			STFL
	UNSC ●		GREENLINGS	WHGR ●
	TISC ●			KEGR ●
PLATED FISHES	THST			PAGR
	TUBE ●			ROGR
	BAPI ●			LING
CLINGFISHES	KECL ●		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND ●
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)

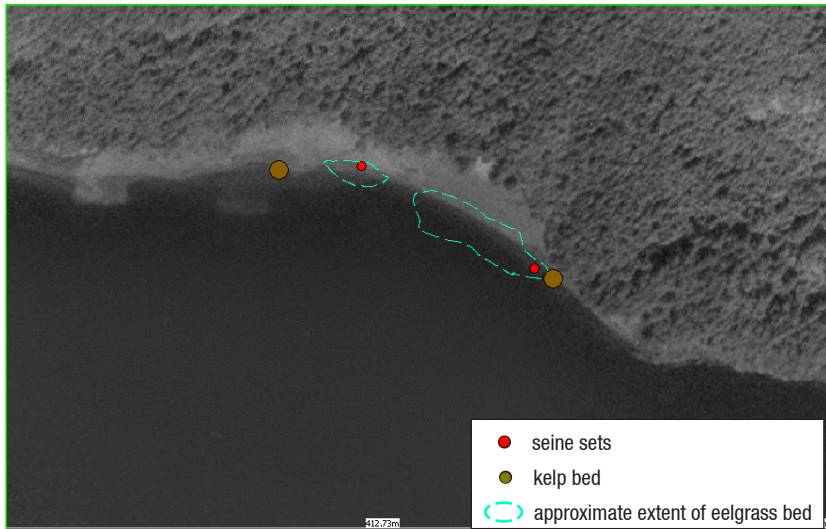




## Huxley

UTM Coordinates : 338685 E  
 : 5811943 N  
 Date Sampled: July 10, 2006 @ 9:00  
 Years Sampled: 2006  
 Weather: Cloudy; calm sea

NOT AVAILABLE



Two patchy, thin, mostly subtidal beds close to the warden station and abutted at either end by giant kelp (*Macrocystis*) beds. There were many red rock crabs present, many of them in amplexus at the time of sampling. Kelp and helmet crabs were also common. Both eelgrass biomass and epiphyte load were average for the region in 2006.

The site's fish catches were the lowest for the region, and were dominated by bay pipefish and crescent gunnels. This was one of two Gwaii Haanas sites with cabezon. There were only two shiner perch.

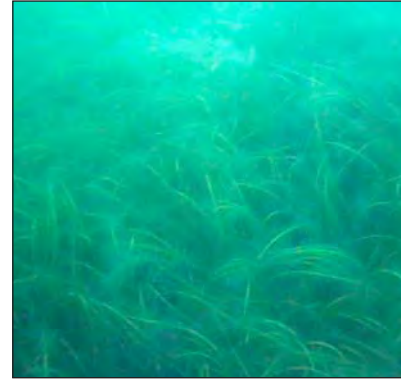


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.5	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 31	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 0.85	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.73	<b>ESTIMATED EXPOSURE:</b> Semi-exposed
<b>FLUORESCENCE (FU):</b> 0.72	<b>TURBIDITY:</b> 0.003 NTU



## Huxley (H) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

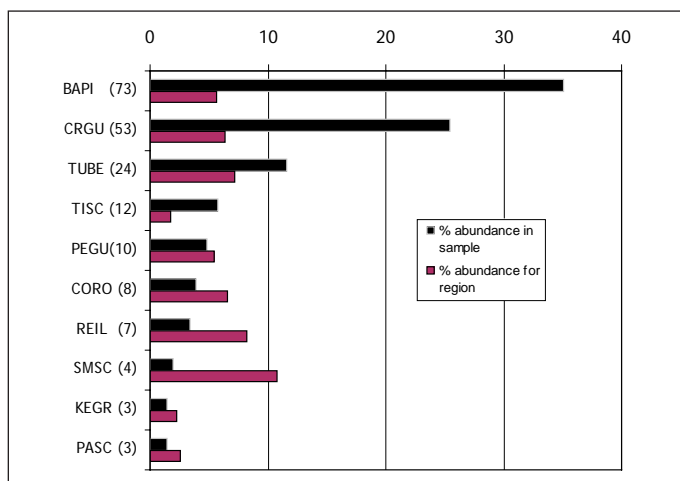
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Mostly subtidal; some intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 183
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 12
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 183	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> 2.3	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 5,330

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 208
<b>PIELOU'S EVENNESS:</b> 0.664	<b>TAXONOMIC DISTINCTIVENESS:</b> 95

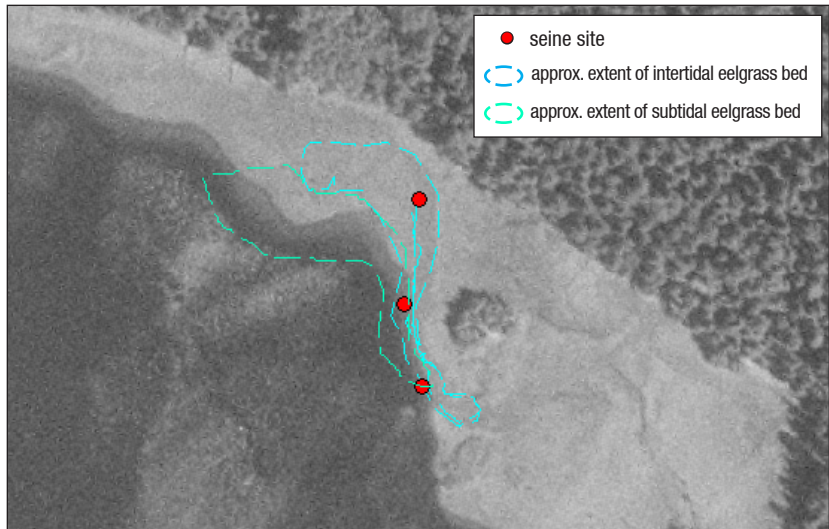
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE
	BRRO			SHPE ●
	CORO	●		STPE
	TIRO		GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU
	CABE	●		SAGU
	REIL	●	PRICKLEBACKS	SNPR
	GRSC	●		BLPR
	MASC			HICO
	PASC	●		SLCO
	RBSC		FLATFISHES	COSO
	UNSC	●		ENSO
	SISC			ROSO
	SMSC	●		SPSA
	STSC	●		STFL
	SHSC		GREENLINGS	WHGR ●
	TISC	●		KEGR ●
PLATED FISHES	THST			PAGR
	TUBE	●		ROGR
	BAPI	●		LING
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND ●
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

#### PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



## Rose Inlet

UTM Coordinates : 353774 E  
 : 5785957 N  
 Date Sampled: July 11, 2006 @ 6:50  
 Years Sampled: 2004, 2005, 2006  
 Weather: overcast, light rain, calm sea



Thick intertidal bed on a cobble/gravel beach at the end of a large bay at the southern end of Gwaii Haanas. *Zostera marina var. typica* was present in the mid intertidal zone (*Z. marina var. phillipsi* was however more common). The intertidal epiphyte load, negligible in 2005 (0% DW) was one of the lowest for the 2006 sites (6%) although it appeared heavy on the video. The subtidal portion of the bed was thick and surrounded by cobbles/mud and some extent of diatom-covered mudflats. The subtidal epiphyte load varied from medium to heavy (hydroids and diatoms). There was no evidence of wasting disease but bruises were noted on several leaves. The eelgrass bed was close to low laminariales, colander and giant kelp stipes. Large plumose anemones (*Metridium*), slender crabs and several sea stars (sunflower, ochre, spiny pink and mottled) were present. Limpets and other small gastropods (possibly *Lirularia*) were abundant on some blades.

The site had the third highest fish abundance in the region (it ranked second in 2005), but was not dominated by shiner perch as in the previous year. It boasted the second highest species richness of all 2006 sites and the highest catch of sticklebacks of any site (mostly juveniles). It also had the highest great sculpin and chum salmon catches of any site, but had only two rockfish (one copper and one black/yellowtail), which is similar to the previous year. It was also the only Gwaii Haanas site with English soles.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.5	<b>SEDIMENT COMPOSITION:</b> gravel, soft mud
<b>SALINITY (ppt):</b> 30	<b>SILT-CLAY FRACTION:</b> 3.9%
<b>CHLOROPHYLL a (ug/L):</b> 5.68	<b>SLOPE:</b> <10°
<b>NITRATES (um):</b> 0.64	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 2.518	<b>TURBIDITY:</b> 0.112 NTU

## Rose Inlet (RI) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

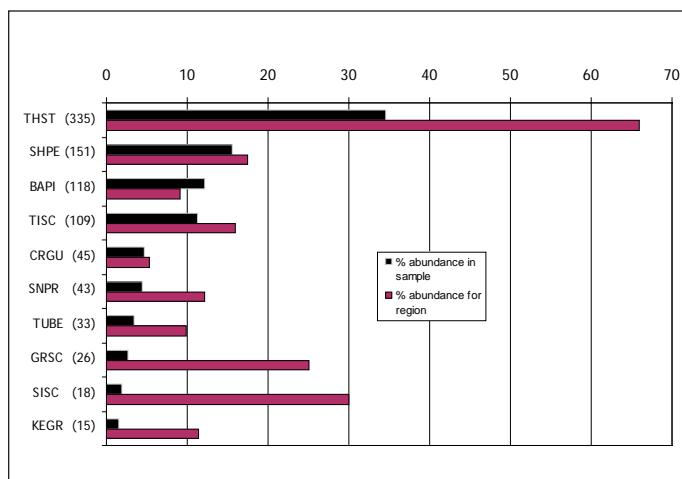
<b>ECOTYPE:</b> <i>Zostera marina</i> var. <i>phillipsi</i> & <i>typica</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 6
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 600	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 6
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 116	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 6,400
<b>LEAF AREA INDEX:</b> 1.9	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 7,800

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 26	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 968
<b>PIELOU'S EVENNESS:</b> 0.667	<b>TAXONOMIC DISTINCTIVENESS:</b> 95

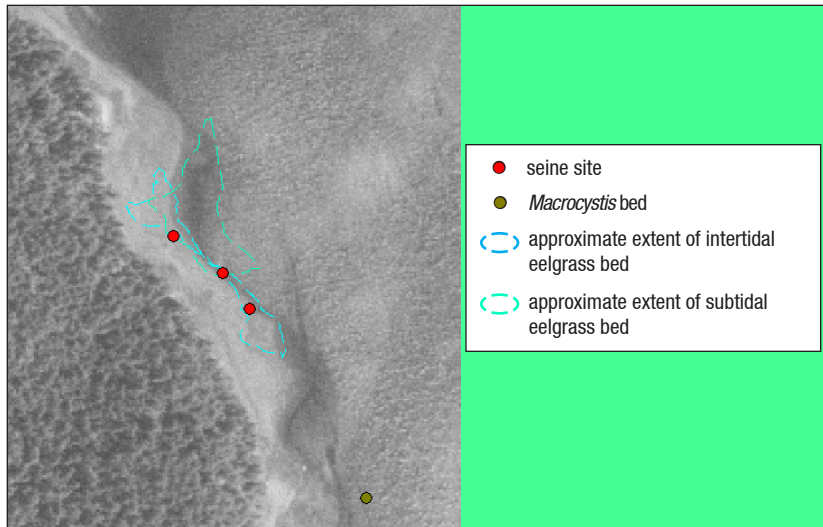
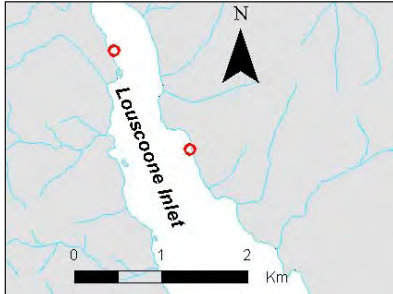
	SPECIES		SPECIES		
ROCKFISH	BLRO		SEA PERCHES	KEPE ●	
	BOCC	●		PIPE	
	BRRO			SHPE	●
	CORO	●		STPE	●
	UNRO		GUNNELS	CRGU ●	
	YERO	●		PEGU	●
SCULPINS	BUSC	●		ROGU	
	CABE			SAGU	
	REIL		PRICKLEBACKS	SNPR ●	
	GRSC	●		BLPR	
	MASC	●		HICO	
	PASC	●		SLCO	●
	RBSC		FLATFISHES	COSO	
	FLSC	●		ENSO	●
	SISC	●		ROSO	
	SMSC	●		SPSA	
	STSC	●		STFL	
	SHSC		GREENLINGS	WHGR ●	
	TISC	●		KEGR ●	
PLATED FISHES	THST	●		PAGR	
	TUBE	●		ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL	●	PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM ●	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



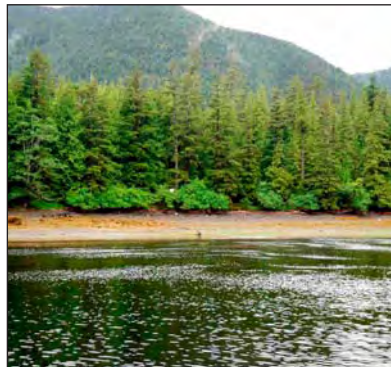
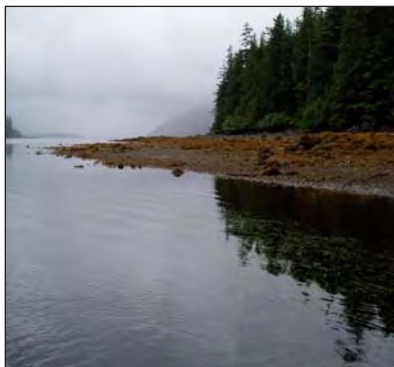
## Head of Louscoone Inlet

UTM Coordinates: 344113 E  
 : 5789092 N  
 Date Sampled: July 12, 2006 @ 7:40  
 Years Sampled: 2004, 2005, 2006  
 Weather: Cloudy, rain & mist; sea calm



Thick and relatively undisturbed intertidal bed on the west side of Louscoone inlet, approximately 2 km from Louscoone, on a cobble/loose gravel substrate with some mud patches. *Z. marina var. phillipsi* was dominant (95% of eelgrass) with *Z. marina var. typica* (5%) higher in the intertidal. The epiphyte load was much higher than in 2005 (13% vs 5% DW) again mostly diatoms. As in 2005, there were many limpets (*Lottia parallela*) and small gastropods (chink shells) on eelgrass blades, and juveniles, young-of-the-year Dungeness crabs were common. No incidence of wasting disease. The subtidal bed was abutted to mud/debris on its deeper end. It was thin on the outside edges and its epiphyte load was medium to heavy along the edges and low in the middle. There were many moon jellies (*Aurelia*) in the water column at the time of sampling.

The site had the same species richness as the other Louscoone Inlet site but more individuals and a lower species evenness, the latter partly explained by the dominance of tidepool sculpins in the catches (highest in the region, second highest overall). It also harboured fewer rockfish (16 in total, two species) than the other Louscoone site and many fewer than last year. The influence of freshwater may explain the relatively high catches of sticklebacks (one of only 3 such sites in the region). The site also had large catches of juvenile greenlings (kelp and whitespotted). The two inlet sites had the only blakeye gobies of the region. Pile perch were seen on the video but not recorded in catches.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 11.5	<b>SEDIMENT COMPOSITION:</b> mud & gravel
<b>SALINITY (ppt):</b> 29	<b>SILT-CLAY FRACTION:</b> 7.0%
<b>CHLOROPHYLL a (ug/L):</b> 0.29	<b>SLOPE:</b> < 10°
<b>NITRATES (um):</b> 0.68	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 0.93	<b>TURBIDITY:</b> 0.023 NTU



## Head of Louscoone Inlet (HL) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

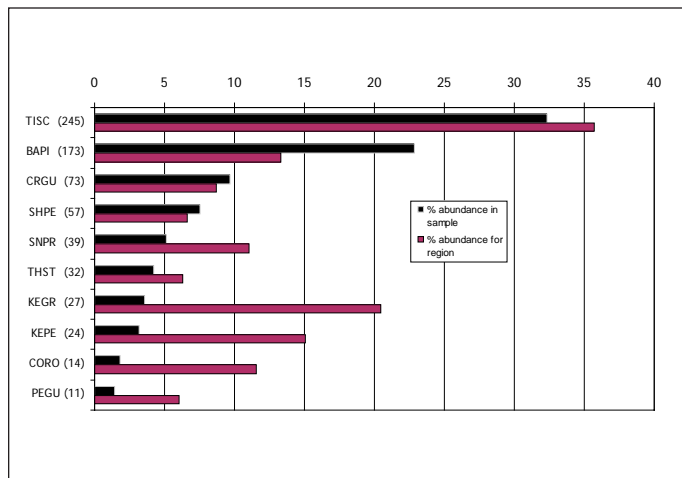
<b>ECOTYPE:</b> 95% <i>Zostera marina</i> var. <i>phillipsi</i> & <i>typica</i> 5% <i>Z. marina</i> var. <i>typica</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 30
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 13
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 207	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 3,800
<b>LEAF AREA INDEX:</b> 2.2	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 6,400

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 24	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 757
<b>PIELOU'S EVENNESS:</b> 0.683	<b>TAXONOMIC DISTINCTIVENESS:</b> 95

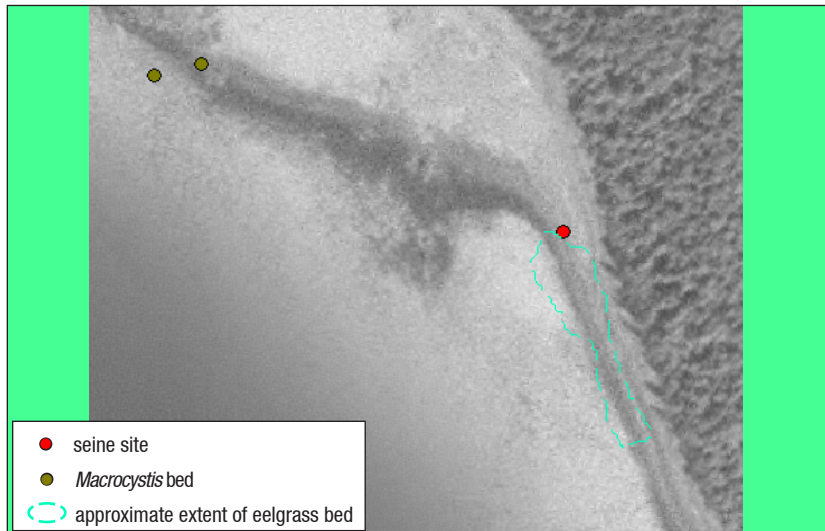
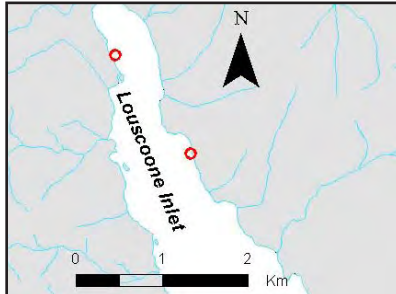
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE
	BRRO			SHPE ●
	CORO	●		STPE
	UNRO		GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU
	CABE			SAGU
	REIL	●	PRICKLEBACKS	SNPR ●
	GRSC	●		BLPR
	MASC			HICO
	PASC			SLCO ●
	RBSC		FLATFISHES	COSO
	UNSC	●		ENSO
	SISC	●		ROSO
	SMSC	●		SPSA
	STSC	●		STFL
	SHSC		GREENLINGS	WHGR ●
	TISC	●		KEGR ●
PLATED FISHES	THST	●		PAGR
	TUBE	●		ROGR
	BAPI	●		LING
CLINGFISHES	KECL	●	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO	●	GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Louscoone

UTM Coordinates : 345084 E  
 : 5788026 N  
 Date Sampled: July 12, 2006 @ 9:40  
 Years Sampled: 2004, 2005, 2006  
 Weather: Cloudy,rain and mist; sea with ripples



Thick and undisturbed intertidal bed on the east side of the inlet. *Z. marina var. phillipsi* was dominant, with patches of *Z. marina var. typica* in the mid intertidal zone. The south end of the beach dropped steeply and harboured a giant kelp bed. A thick *Fucus* band covered boulders in the intertidal. Many bivalves and gastropods occupied the area: cockles, gaper clams, butter clams, moonsnails, red turban. Many small hydrozoans (*Polyorchis* sp) were in the water column at the time of sampling. Coonstripe shrimp were common. The subtidal portion of the bed was thin on the edges and thicker in the middle. The epiphyte load was third highest for the region, double that of the previous year for the site (14 vs 7%). No incidence of wasting disease visible on video. The bed was surrounded by mud and laminariales (*Agarum* sp); giant kelp stipes also grew near the bed. Many small hydrozoans (*Polyorchis* sp) were visible in the water column and there were many eelgrass limpets (*Lottia parallela*) on the blades.

The site harboured the highest fish diversity (Simpson's index) and the second highest species evenness of all sites sampled in 2006. The diversity and abundance of rockfish were the highest for the region : aside from the most yellowtail/black rockfish and second most copper rockfish in the region, the site also yielded 2 bocaccios and 2 black rockfish. As in 2005, kelp clingfish were unusually abundant for the region. It was one of two Gwaii Haanas sites with blackeye gobies, along with the other Louscoone Inlet site.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.4	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 25.7	<b>SILT-CLAY FRACTION:</b> 1.0%
<b>CHLOROPHYLL a (ug/L):</b> 21.34	<b>SLOPE:</b> <10°
<b>NITRATES (um):</b> 0.13	<b>ESTIMATED EXPOSURE:</b> Semi-protected
<b>FLUORESCENCE (FU):</b> 8.57	<b>TURBIDITY:</b> 0.174 NTU



## Louscoone (L) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

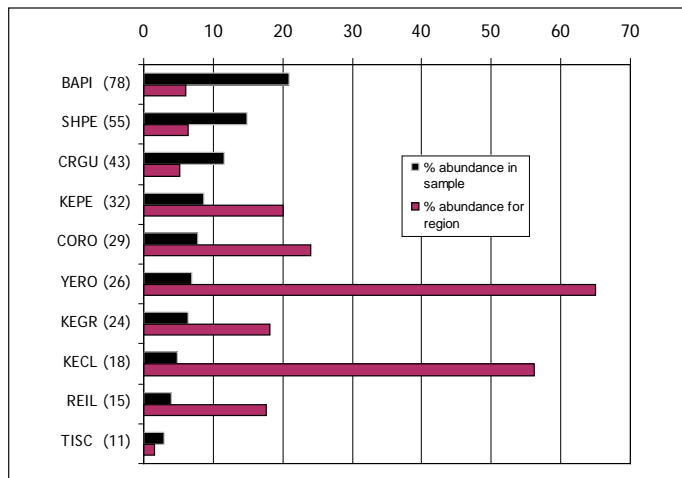
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 27
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 14
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 194	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 3,500
<b>LEAF AREA INDEX:</b> 2.7	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,200

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 24	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 372
<b>PIELOU'S EVENNESS:</b> 0.792	<b>TAXONOMIC DISTINCTIVENESS:</b> 93

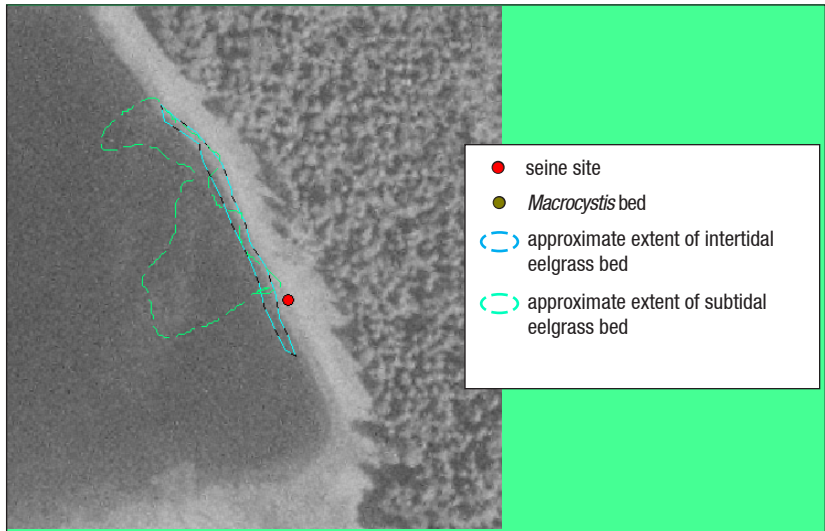
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC	●		PIPE
	BRRO	●		SHPE ●
	CORO	●		STPE ●
	UNRO	●	GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU
	CABE			SAGU
	REIL	●	PRICKLEBACKS	SNPR ●
	GRSC			BLPR
	MASC			HICO
	PASC			SLCO
	RBSC		FLATFISHES	COSO ●
	UNSC			ENSO
	SISC	●		ROSO
	SMSC	●		SPSA
	STSC	●		STFL
	SHSC		GREENLINGS	WHGR
	TISC	●		KEGR ●
PLATED FISHES	THST			PAGR
	TUBE	●		ROGR
	BAPI	●		LING
CLINGFISHES	KECL	●	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO	●	GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM ●
KELPFISH	CRKE			CUTT

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



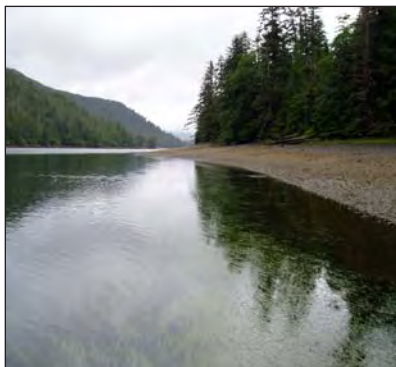
## Balcom Inlet

UTM Coordinates: 363023 E  
 : 5773275 N  
 Date Sampled: July 13, 2006 @ 8:30  
 Years Sampled: 2004, 2005, 2006  
 Weather: Cloudy, mist and light rain; sea with ripples



Southernmost site sampled in Gwaii Haanas, at the end of a small inlet. Thick and narrow bed (3-4 m wide) on soft substrate - gravel/sand/shells. The epiphyte load, which was heaviest among Gwaii Haanas sites in 2005 (15% DW) was lower in 2006 (10%); although in the top five sites in terms of eelgrass biomass, the site had one of the lowest epiphyte loads. The subtidal portion of the bed was also narrow, due to a steep drop; it started thin at its deepest limit where the substrate was mostly marl (shell, sand) with a diatom mat. It then became thick in the shallow subtidal zone. There were many prawn (*Pandalus* sp), isopods (*Idotea ressecata*), and rock crabs. There was some dessication damage and this is one of two sites sampled in Gwaii Haanas where wasting disease might be present.

As in 2005, there were few shiner perch caught (only 2; 13 in 2005). There fewer juvenile rockfish sampled than in 2005 (7 vs 39), but the site had the highest tidepool sculpins catches of the region, second highest of all beds in 2006. Few fishes were seen in the video (the majority of which being kelp perch) even though the eelgrass bed was immediately adjacent to a giant kelp bed.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 11.8	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 31.1	<b>SILT-CLAY FRACTION:</b> 6.70%
<b>CHLOROPHYLL a (ug/L):</b> 2.23	<b>SLOPE:</b> 6 - 8° in intertidal, steep (> 20°) subtidally
<b>NITRATES (um):</b> 2.59	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.2	<b>TURBIDITY:</b> 0.118 NTU

## Balcom Inlet (BI) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

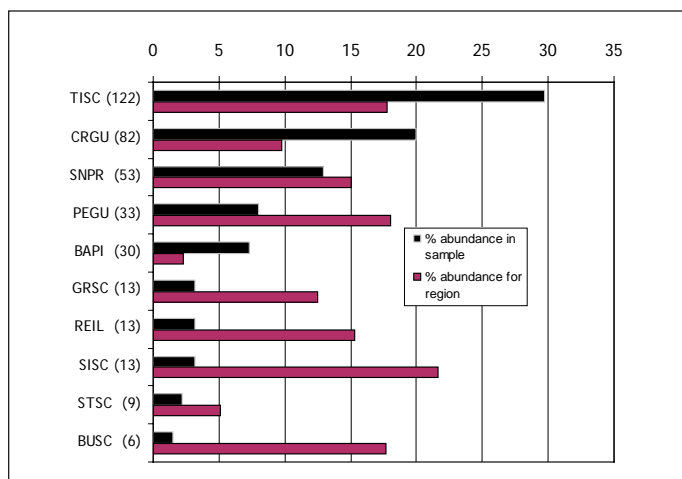
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 21
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 10
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 247	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 1,550
<b>LEAF AREA INDEX:</b> 4.2	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 8,330

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 21	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 411
<b>PIELOU'S EVENNESS:</b> 0.734	<b>TAXONOMIC DISTINCTIVENESS:</b> 88

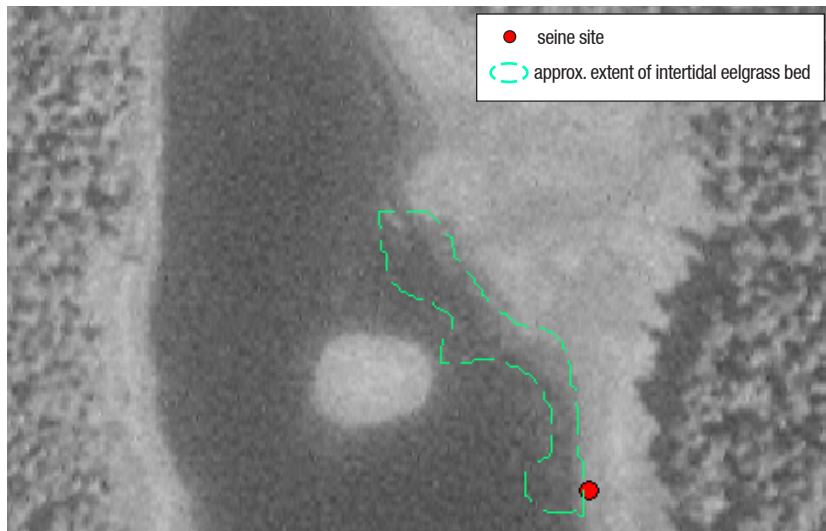
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE
	BRRO			SHPE ●
	CORO	●		STPE
	TIRO		GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU
	CABE			SAGU
	REIL	●	PRICKLEBACKS	SNPR ●
	GRSC	●		BLPR
	MASC			HICO
	PASC	●		SLCO ●
	RBSC		FLATFISHES	COSO
	UNSC	●		ENSO
	SISC	●		ROSO
	SMSC			SPSA
	STSC	●		STFL
	SHSC		GREENLINGS	WHGR ●
	TISC	●		KEGR ●
PLATED FISHES	THST			PAGR
	TUBE	●		ROGR
	BAPI	●		LING ●
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



## Heater Harbour

UTM Coordinates : 359837 E  
 : 5777274 N  
 Date Sampled: July 13, 2006 @ 10:30  
 Years Sampled: 2004, 2005, 2006  
 Weather: Cloudy, mist and light rain; calm sea



Thick intertidal bed on a flat gravel/cobble beach mid-way along a small bay. The intertidal epiphyte load was the highest for the region (16% DW), mostly diatoms. Giant kelp patches (*Macrocystis*) were adjacent to the south of the bed. The subtidal portion of the bed was also thick, and adjacent to a mudflat/diatom mat in deeper water. Some grazers were noted on the blades— mainly chink shells and limpets. The site, along with its neighbouring site Balcom Inlet, may show the first incidence of wasting disease so far in Gwaii Haanas. This should be ascertained. Some areas of the bed had some sunburns. There were many fewer pandalid shrimp observed than in 2005. Some ghost shrimp (*Upogebia*) molts were observed in the bed.

Only three shiner perch were caught, which is consistent with the previous year's catches (2 in 2005). The number of rockfish caught (14) was also consistent with 2005 (18 then). However the kelp perch catches were the highest for the region and the tubesnout catches were the most of any site in 2006. Crescent gunnels abundant in 2005, were less frequent this year and sticklebacks, one of the two most common species in 2005, were absent in 2006.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.4	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 28.2	<b>SILT-CLAY FRACTION:</b> 8.40%
<b>CHLOROPHYLL a (ug/L):</b> 3.53	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.34	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.74	<b>TURBIDITY:</b> 0.091 NTU



## Heater Harbour (HH) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

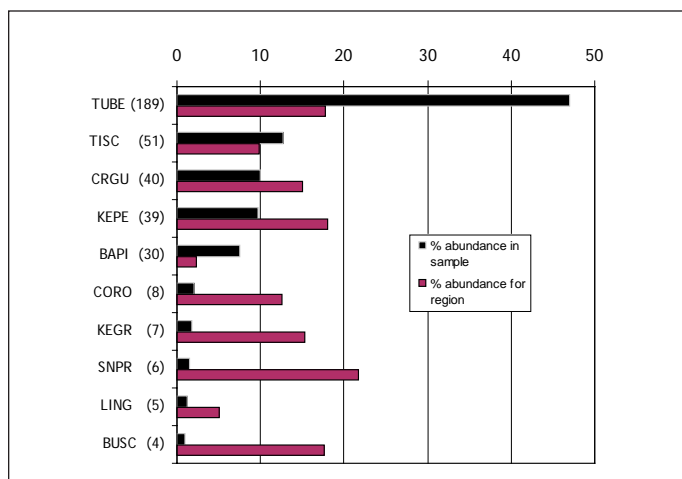
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 15
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 16
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 82	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 1,200
<b>LEAF AREA INDEX:</b> 1.3	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 2,780

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS:</b>
21	402
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.614	96

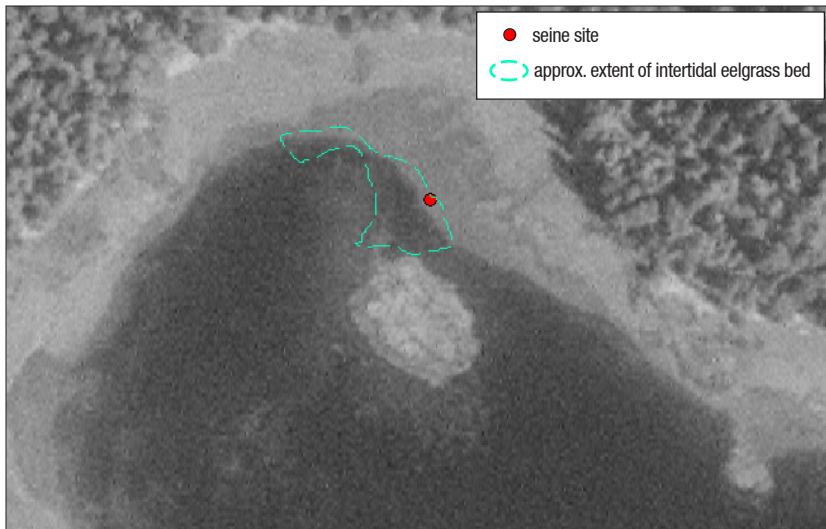
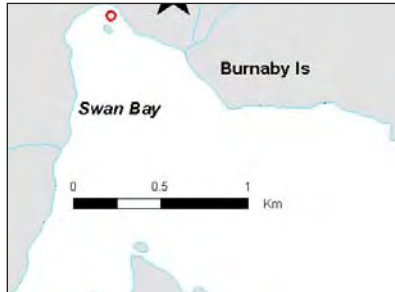
	SPECIES			SPECIES	
ROCKFISH	BLRO	•	SEA PERCHES	KEPE	•
	BOCC			PIPE	
	BRRO	•		SHPE	•
	CORO	•		STPE	
	TIRO		GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC	•		ROGU	
	CABE			SAGU	
	REIL		PRICKLEBACKS	SNPR	•
	GRSC	•		BLPR	
	MASC	•		HICO	
	PASC	•		SLCO	
	RBSC		FLATFISHES	COSO	
	UNSC			ENSO	
	SISC	•		ROSO	
	SMSC	•		SPSA	
	STSC	•		STFL	
	SHSC		GREENLINGS	WHGR	
	TISC	•		KEGR	•
PLATED FISHES	THST			PAGR	
	TUBE	•		ROGR	
	BAPI	•		LING	•
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO		GADIDS	SAND	
	BAGO			TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Swan Bay

UTM Coordinates : 343023 E  
 : 5802415 N  
 Date Sampled: July 14, 2006 @ 9:15  
 Years Sampled: 2004, 2005, 2006  
 Weather: overcast, light rain, calm



Dense, relatively undisturbed bed on a weak sloped gravel beach bisected by a small creek (0.5 m wide) seeping into the eelgrass bed. Some sea hair patches intertidally. The substrate was primarily soft mud and gravel, with woody debris at the water's edge. The epiphyte load was average for the region. Mud shrimp burrows were near the creek's mouth. Isopods, pandalid shrimp and helmet crabs were common in the catch as were small hydrozoan medusae (*Polyorchis*) in the water column. The subtidal portion of the bed was patchy with sea lettuce growing along its edges, surrounded by sand and gravel. Eelgrass grew thick in the middle of some patches, some blades with dessication damage. Limpets (*Lottia parallela*) were abundant on some blades. Many clam siphons in the shallow portion, *Pisaster* and *Pycnopodia* common.

The site ranked among the three highest catches in Gwaii Haanas (as was the case in 2005), and was once again dominated by shiner perch (the only site of the region to be dominated by this species). It ranked fifth overall in 2006 in terms of diversity (Simpson's index). Also as in 2005, it had the highest numbers of silver spotted sculpins for the region but few juvenile rockfish (3). It had the highest catches of manacled sculpins of any site and boasted many species of sculpins - highest catches of any sites for Red Irish Lords, padded and staghorn sculpins, and high catches of great sculpins. Black bears have been observed foraging on the shore of this bed.

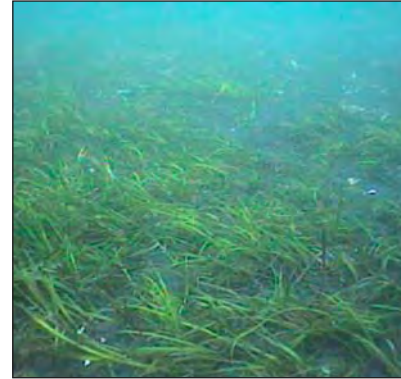


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.1	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 30.8	<b>SILT-CLAY FRACTION:</b> 22.7%
<b>CHLOROPHYLL a (ug/L):</b> 2.83	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.69	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 2.734	<b>TURBIDITY:</b> 0.215 NTU



## Swan Bay (SW) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

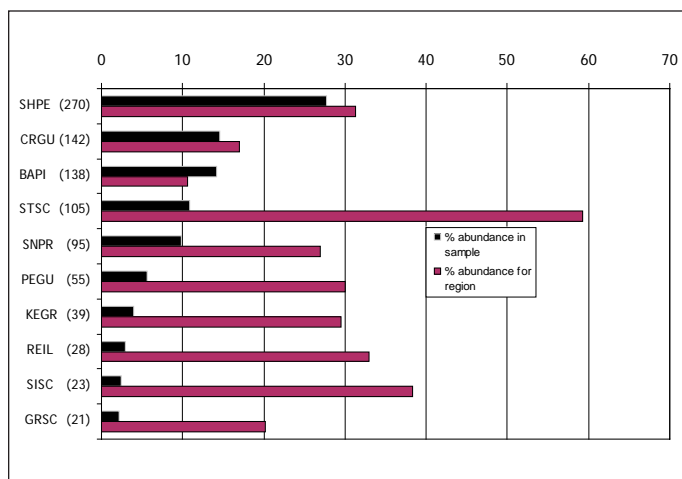
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 16
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 12
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 127	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 650
<b>LEAF AREA INDEX:</b> 1.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 2,570

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 21	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 972
<b>PIELOU'S EVENNESS:</b> 0.733	<b>TAXONOMIC DISTINCTIVENESS:</b> 92

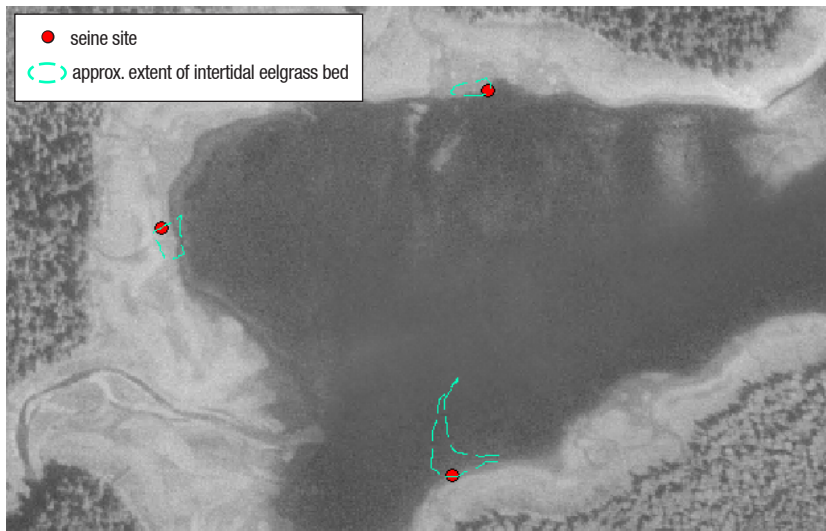
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE ●
	CORO ●			STPE ●
	UNRO		GUNNELS	CRGU ●
	YERO ●			PEGU ●
SCULPINS	BUSC ●			ROGU
	CABE			SAGU
	REIL ●		PRICKLEBACKS	SNPR ●
	GRSC ●			BLPR
	MASC ●			HICO
	PASC ●			SLCO
	RBSC		FLATFISHES	COSO
	FLSC			ENSO
	SISC ●			ROSO
	SMSC ●			SPSA
	STSC ●			STFL
	UNSC ●		GREENLINGS	WHGR ●
	TISC ●			KEGR ●
PLATED FISHES	THST			PAGR
	TUBE ●			ROGR
	BAPI ●			LING
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Bag Harbour

UTM Coordinates: 338820 E  
: 5802426 N  
Date Sampled: July 14, 2006 @ 12:00  
Years Sampled: 2004, 2005, 2006  
Weather: Cloudy, mist & light rain; calm



Long narrow bed along the shores of an enclosed bay. Three different sides of the bay were sampled. The epiphyte load, high for the region in 2005 (14% DW) was the second lowest of all sites in 2006 (1.2%; diatoms). The subtidal bed was patchy but thick, with diatom mat-covered mudflat filling between the patches subtidally. Most of the shallow subtidal substrate was gravel & mud, shells. No incidence of wasting disease. Dungeness crab, aggregations of bat stars, mottled sea stars, pink stars, moonsnail and nudibranch egg masses, and juvenile Dungeness crabs were common along some subtidal edges, and plumose anemones and spiny pink stars were seen on the mud subtidally. Some desiccation visible on some blades.

The site presented the fourth highest species evenness of all sites sampled in 2006. As in 2005, sticklebacks were the most common fish caught and English soles (the latter catches accounting for 90% of the individuals caught in the region, vs. 85% in 2005) were also relatively abundant. The site also boasted the highest catches of snake pricklebacks for the region (second most overall), and most slender cockcombs and padded sculpins overall. There was only one rockfish caught in 2005 and none in 2006 (this was the only eelgrass bed sampled in the region without rockfish). Also of note were high catches of great sculpins.



Site 1



Site 3

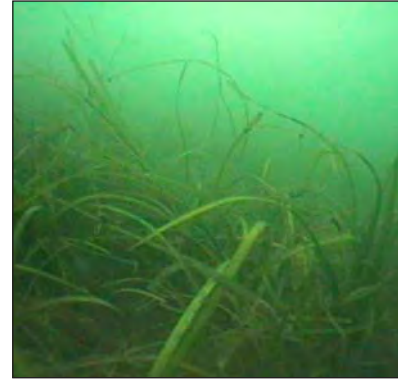
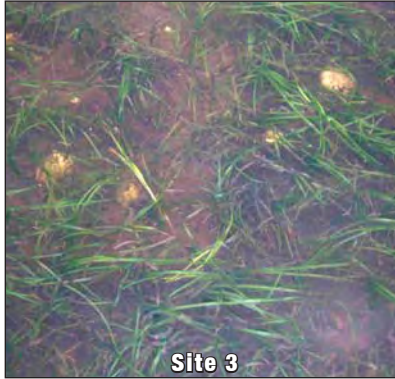


Site 1

## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.9	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 30.6	<b>SILT-CLAY FRACTION:</b> 7.70%
<b>CHLOROPHYLL a (ug/L):</b> 1.27	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.55	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 1.2	<b>TURBIDITY:</b> 0.039 NTU

## Bag Harbour (BH) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

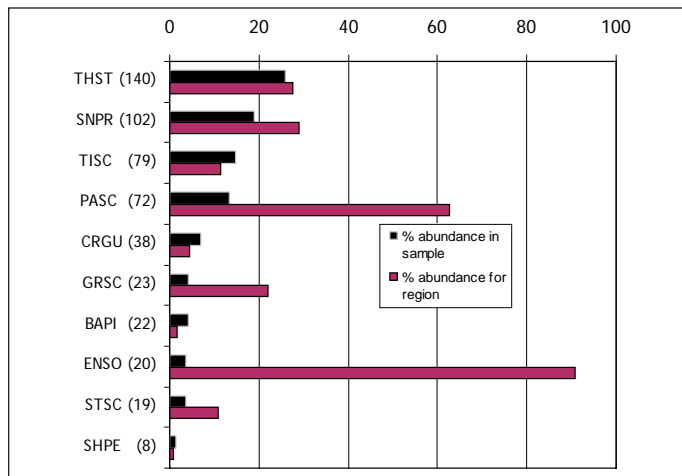
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 1
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 600	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 1.2
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 84	<b>EELGRASS BED TOTAL AREA (m<sup>2</sup>):</b> 2,900
<b>LEAF AREA INDEX:</b> 1.6	

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 17	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 538
<b>PIELOU'S EVENNESS:</b> 0.748	<b>TAXONOMIC DISTINCTIVENESS:</b> 93

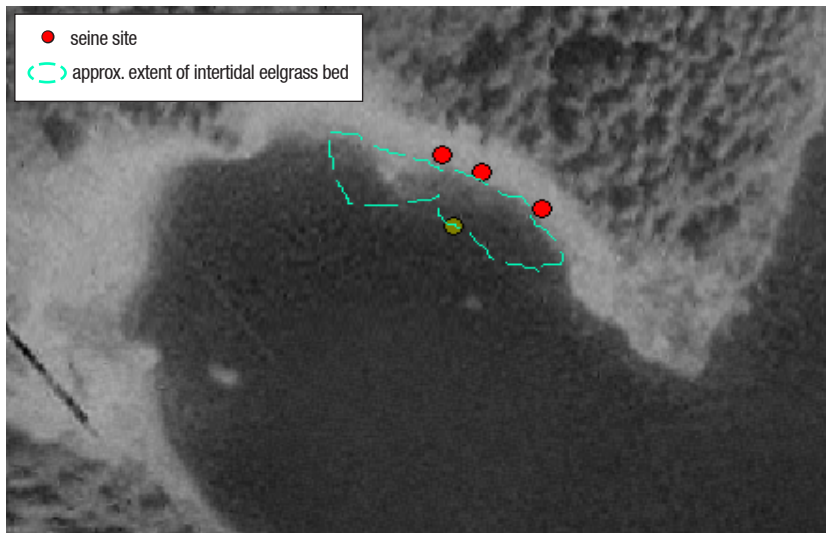
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE •
	CORO			STPE
	TIRO		GUNNELS	CRGU •
	YERO			PEGU •
SCULPINS	BUSC	•		ROGU
	CABE			SAGU
	REIL		PRICKLEBACKS	SNPR •
	GRSC	•		BLPR
	MASC			HICO
	PASC	•		SLCO •
	RBSC		FLATFISHES	COSO
	SFSC			ENSO •
	SISC			ROSO
	SMSC			SPSA
	STSC	•		STFL
	SHSC		GREENLINGS	WHGR •
	TISC	•		KEGR
PLATED FISHES	THST	•		PAGR
	TUBE	•		ROGR
	BAPI	•		LING •
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND •
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



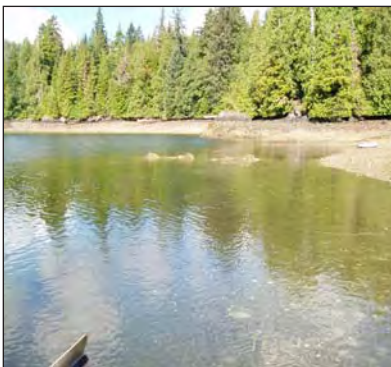
## Sedgwick

UTM Coordinates : 323596 E  
 : 5834462 N  
 Date Sampled: July 15, 2006 @ 10:00  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and calm



Narrow, constrained intertidal bed over cobbles and soft mud. The vast majority of the bed was subtidal. There was a thick sea lettuce band in the mid intertidal zone. The epiphyte load was high for the region (14% DW; diatoms). Seagrass nudibranchs (*Phyllaplysia*), juvenile sea stars *Pycnopodia*, and pandalid shrimp were common. Many native little neck and horse clams were present. The subtidal bed was dense and surrounded by giant kelp and colander kelp along its deeper edges. Many small jellyfish in the water column. The subtidal epiphyte load ranged from medium to heavy (filamentous diatoms). As last year, there was possible evidence of dessication towards the shallow subtidal edge.

As in 2005, the catch was dominated by bay pipefish (second highest total for 2006), and also as in 2005 kelp perch were disproportionately abundant. There were relatively few juvenile rockfish caught for the region, but the site had the highest juvenile lingcod catches of any site in 2006. The only painted greenling caught in an eelgrass bed in 2006 was caught at this site (one was also seen on the video). Many fishes (kelp and shiner perch, copper rockfish, etc.) were seen on the video.

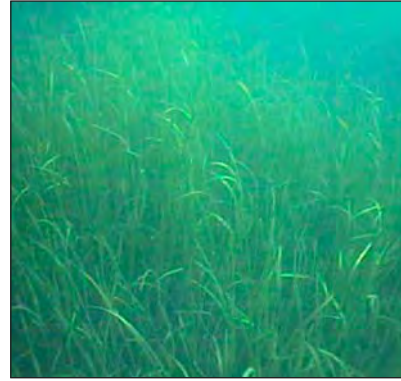


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.7	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 30.9	<b>SILT-CLAY FRACTION:</b> 4.1%
<b>CHLOROPHYLL a (ug/L):</b> 2.18	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.88	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 0.664	<b>TURBIDITY:</b> 0.052 NTU



## Sedgwick (SE) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

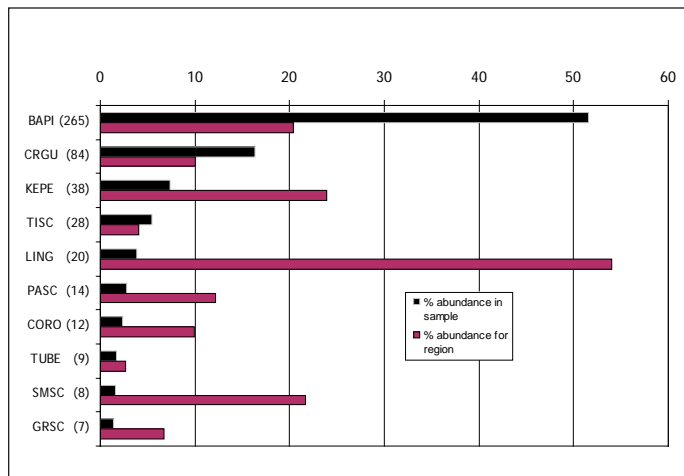
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 28
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 600	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 15
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 178	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 90
<b>LEAF AREA INDEX:</b> 4.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 2,100

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 514
<b>PIELOU'S EVENNESS:</b> 0.592	<b>TAXONOMIC DISTINCTIVENESS:</b> 97

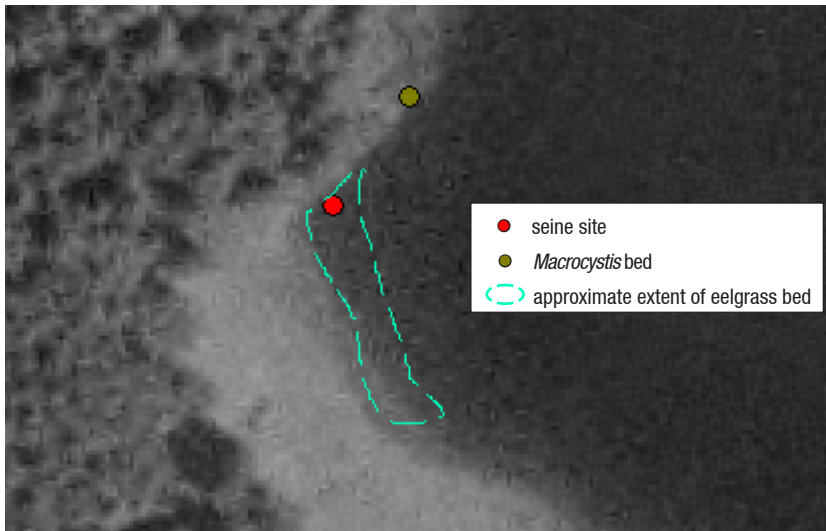
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE
	BRRO			SHPE ●
	CORO	●		STPE ●
	UNRO	●	GUNNELS	CRGU ●
	YERO			PEGU
SCULPINS	BUSC	●		ROGU
	CABE			SAGU
	REIL	●	PRICKLEBACKS	SNPR ●
	GRSC	●		BLPR
	MASC			HICO
	PASC	●		SLCO
	RBSC		FLATFISHES	COSO
	FLSC			ENSO
	SISC			ROSO
	SMSC	●		SPSA
	STSC	●		STFL
	UNSC		GREENLINGS	WHGR ●
	TISC	●		KEGR
PLATED FISHES	THST	●		PAGR ●
	TUBE	●		ROGR
	BAPI	●		LING ●
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)

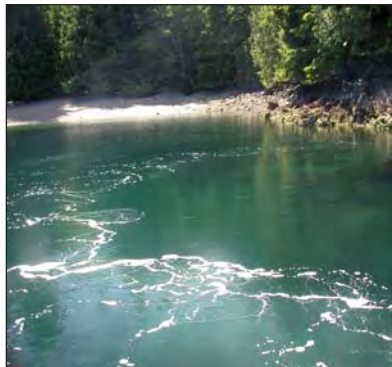
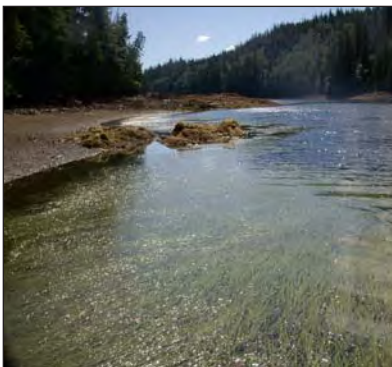


## Murchison

UTM Coordinates : 332556 E  
 : 5829857 N  
 Date Sampled: July 15, 2006 @ 11:40  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny, calm



Narrow, relatively undisturbed (EDI 8) intertidal bed at the edge of a large, gently sloping gravel beach. Sea hair was abundant on the bedrock at the north end of the beach. There were filamentous diatoms in much of the intertidal zone. Both intertidal and subtidal epiphyte loads were low (8% DW; diatoms). Geoducks were present intertidally. The subtidal bed was thick, surrounded by marl deeper and adjacent to a dense bed of colander kelp and laminariales close to the shallow subtidal edge, which itself merged into muddy substrate and woody debris. No incidence of wasting disease. Kelp crabs and chink shell were seen on eelgrass blades. The site had the highest abundance and diversity of juvenile rockfish of any of the 2005 sites: 386 fish among five species, most of which copper. One juvenile bocaccio and seven brown rockfish were also caught.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.3	<b>SEDIMENT COMPOSITION:</b> gravel
<b>SALINITY (ppt):</b> 31.1	<b>SILT-CLAY FRACTION:</b> 2.8%
<b>CHLOROPHYLL a (ug/L):</b> 1.50	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 8.84	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.915	<b>TURBIDITY:</b> 0.011 NTU



## Murchison (MU) - Gwaii Haanas



### Biological Characteristics of Eelgrass Bed And Epiphytes

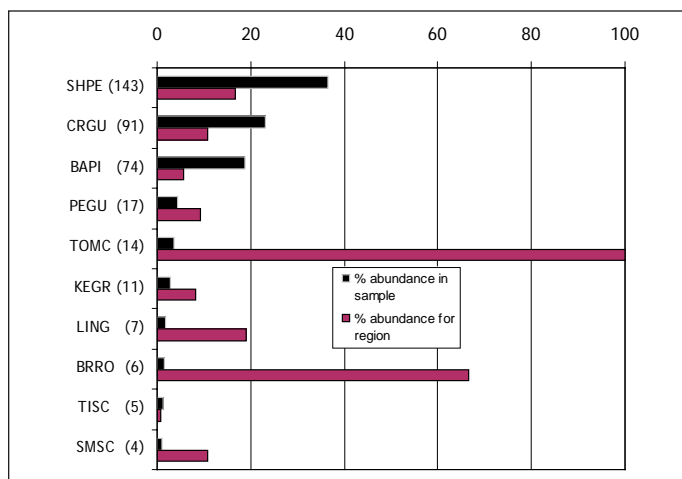
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Almost 100% diatoms; some <i>Ulva</i> sp.
<b>TIDAL RANGE:</b> Intertidal and subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 12
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 7
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 150	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 700
<b>LEAF AREA INDEX:</b> 3.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 75

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 22	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 392
<b>PIELOU'S EVENNESS:</b> 0.611	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO	•		SHPE
	CORO	•		STPE
	UNRO	•	GUNNELS	CRGU
	YERO	•		PEGU
SCULPINS	BUSC			ROGU
	CABE			SAGU
	REIL	•	PRICKLEBACKS	SNPR
	GRSC	•		BLPR
	MASC	•		HICO
	PASC	•		SLCO
	RBSC		FLATFISHES	COSO
	UNSC	•		ENSO
	SISC	•		ROSO
	SMSC	•		SPSA
	STSC	•		STFL
	SHSC		GREENLINGS	WHGR
	TISC	•		KEGR
PLATED FISHES	THST	•		PAGR
	TUBE	•		ROGR
	BAPI	•		LING
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

### PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



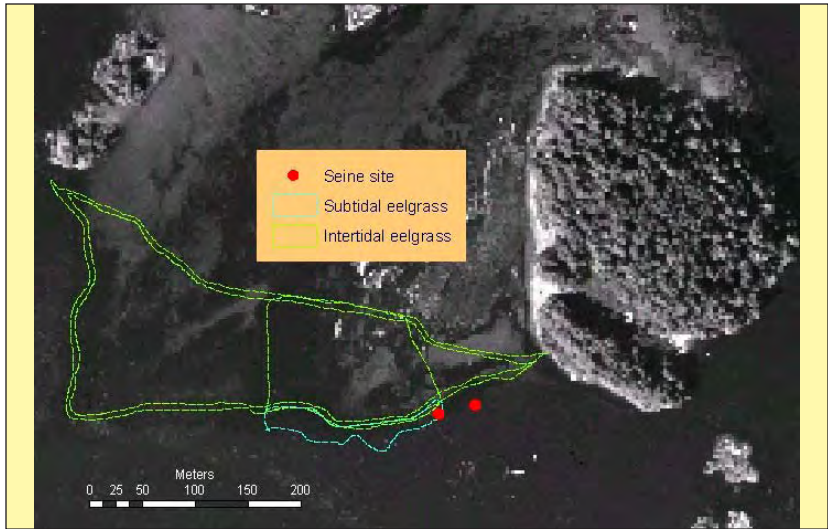


## 2.3 Clayoquot Sound Site Descriptions



**Beck**

UTM coordinates : 288372 E  
 : 5449310 N  
 Date Sampled: June 25, 2006 @ 6:00  
 Years Sampled: 2004, 2004, 2006  
 Weather: sunny and warm



Somewhat disturbed bed, close to Tofino and in a high boat traffic area. Patchy and sandy intertidal bed continuing in the subtidal area. Many polychaetes tubes or phoronids and butter clams shells subtidally. The epiphyte load was similar to that of the previous year (16 vs. 17% DW).

As in 2005, the site catch was dominated by shiner perch. It had the second yellowtail/black rockfish catches and the second highest species richness in the region.

NOT AVAILABLE

NOT AVAILABLE

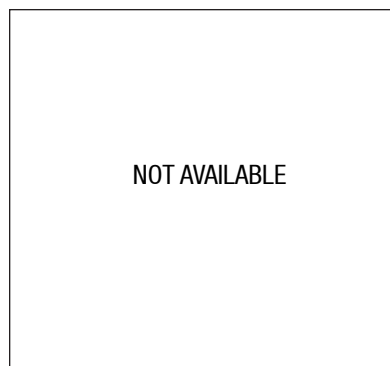
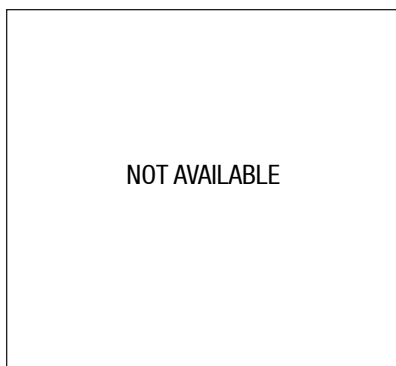
NOT AVAILABLE

**Physical Characteristics**

<b>TEMPERATURE ( °C):</b> 13.8	<b>SEDIMENT COMPOSITION:</b> sand
<b>SALINITY (ppt):</b> 27.9	<b>SILT-CLAY FRACTION:</b> 1.30%
<b>CHLOROPHYLL a (ug/L):</b> 4.76	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 1.65	<b>ESTIMATED EXPOSURE:</b> semi-protected
<b>FLUORESCENCE (FU):</b> 2.26	<b>TURBIDITY:</b> 0.027 NTU



## Beck (B) - Clayoquot Sound



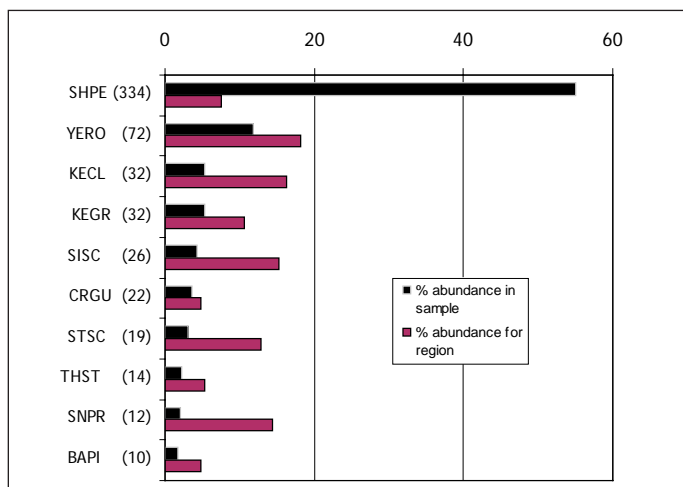
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Diatoms, <i>Kommannia</i> , <i>Ulva</i> & <i>Smithora</i>
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 36
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 16
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 163	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2645
<b>LEAF AREA INDEX:</b> 2.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 3,118

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 23	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 607
<b>PIELOU'S EVENNESS:</b> 0.568	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO	●		STPE ●
UNRO			GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU ●
	CABE	●		SAGU ●
FLSC			PRICKLEBACKS	SNPR ●
	GRSC			BLPR ●
MASC				HICO ●
PASC				SLCO ●
RBSC			FLATFISHES	COSO ●
REIL				ENSO ●
SISC	●			ROSO ●
SMSC	●			SPSA ●
STSC	●			STFL ●
SHSC			GREENLINGS	WHGR ●
TISC				KEGR ●
PLATED FISHES	THST	●		PAGR ●
	TUBE	●		ROGR ●
	BAPI	●		LING ●
CLINGFISHES	KECL	●	PREY FISHES	HERR ●
	NOCL			SUSM ●
GOBIES	ARGO			SAND ●
	BAGO		GADIDS	TOMC ●
TOADFISH	PLMI		SALMONIDS	CHIN ●
POACHER	TUPO			CHUM ●
KELPFISH	CRKE			CUTT ●

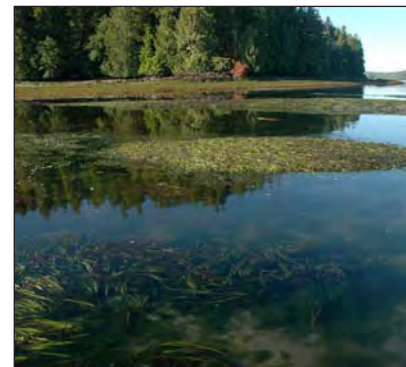
## Felice

UTM coordinates : 287070 E  
 : 5449044 N  
 Date Sampled: June 25, 2006 @ 7:45  
 Years Sampled: 2004, 2004, 2006  
 Weather: sunny and warm



Thick bed near Tofino in well travelled area, with medium disturbance. The subtidal portion of the bed was thick and surrounded by sandy patches with many butter clam shells. The epiphyte load was similar to that of the previous year (15% vs. 11% DW).

As in 2005, the site had a low abundance of fishes (the second lowest) for the region, but it ranked highest for species evenness among all sites sampled in 2006, and fourth for species diversity. but the only two buffalo sculpins and half of the cabezons caught in Clayoquot Sound (3) were caught there. Of note in the fish catches were 3 Pacific herring and 3 chum salmon.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.8	<b>SEDIMENT COMPOSITION:</b> sand
<b>SALINITY (ppt):</b> 27.9	<b>SILT-CLAY FRACTION:</b> 1.30%
<b>CHLOROPHYLL a (ug/L):</b> 6.04	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.97	<b>ESTIMATED EXPOSURE:</b> semi-protected
<b>FLUORESCENCE (FU):</b> 3.73	<b>TURBIDITY:</b> 0.102 NTU

## Felice (F) - Clayoquot Sound



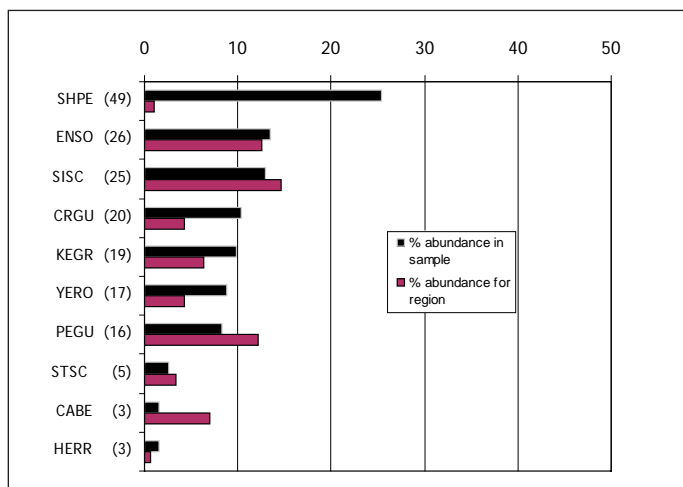
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina phillipsi, some typica</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 18
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 15
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 115	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 3,102,000
<b>LEAF AREA INDEX:</b> 1	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 13,000

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 16	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 193
<b>PIELOU'S EVENNESS:</b> 0.804	<b>TAXONOMIC DISTINCTIVENESS:</b> 95

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO			STPE
TIRO		GUNNELS	CRGU	•
	YERO	•	PEGU	•
SCULPINS	BUSC	•	ROGU	
	CABE	•	SAGU	
FLSC		PRICKLEBACKS	SNPR	
	GRSC		BLPR	
MASC		HICO		
PASC	•	SLCO		
RBSC		FLATFISHES	COSO	
REIL	•		ENSO	•
SISC	•		ROSO	
SMSC	•		SPSA	•
STSC	•		STFL	
SHSC		GREENLINGS	WHGR	
TISC			KEGR	•
PLATED FISHES	THST		PAGR	
	TUBE	•	ROGR	
BAPI		LING		
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

## Roberts Point

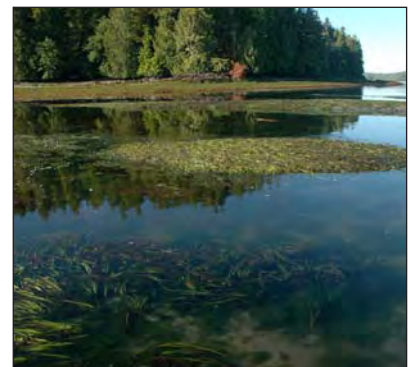
UTM coordinates : 288407 E  
 : 5456870 N  
 Date Sampled: June 26, 2006 @ 6:45  
 Years Sampled: 2006  
 Weather: sunny and warm

NOT AVAILABLE

NOT AVAILABLE

Shallow bed. The epiphyte load of the site was among the 10 highest for 2006 sites although the eelgrass biomass was among the lowest.

The site boasted the highest species richness in Clayoquot Sound (fourth overall) and ranked third overall in terms of Taxonomic Distinctness, indicating that there were many unrelated species and perhaps high habitat diversity. It was dominated by Pacific herring (the only site in the region where a school of these fish was sampled in 2006). It also had the only sandlance, blackeye goby and rosytip sculpins caught in the region, and the second most kelp greenlings of any site in 2006. The yellowtail/black rockfish catches were the highest for the region and second highest overall. Lingcod catches were also the highest for the region.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.3	<b>SEDIMENT COMPOSITION:</b> sand and mud
<b>SALINITY (ppt):</b> 28.2	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 4.20	<b>SLOPE:</b> < 10°
<b>NITRATES (um):</b> 0.74	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.94	<b>TURBIDITY:</b> 0.027 NTU



## Roberts Point (RP) - Clayoquot Sound



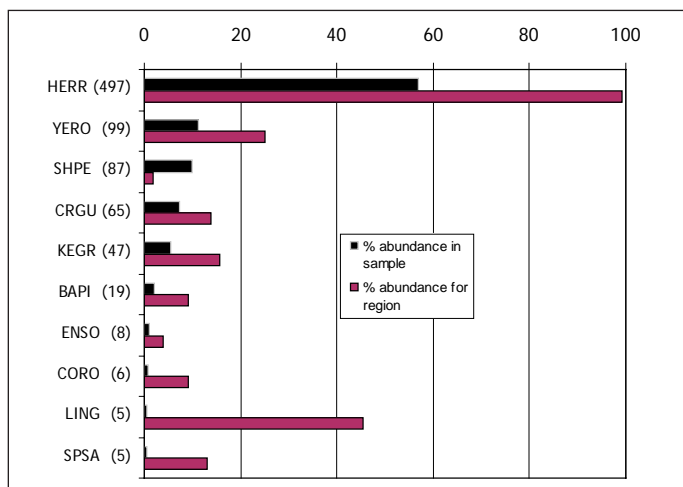
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> mostly diatoms & <i>Kommannia</i> , some <i>Ulva</i> sp
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 29
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 43
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 74	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> 0.9	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 25	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 875
<b>PIELOU'S EVENNESS:</b> 0.500	<b>TAXONOMIC DISTINCTIVENESS:</b> 99

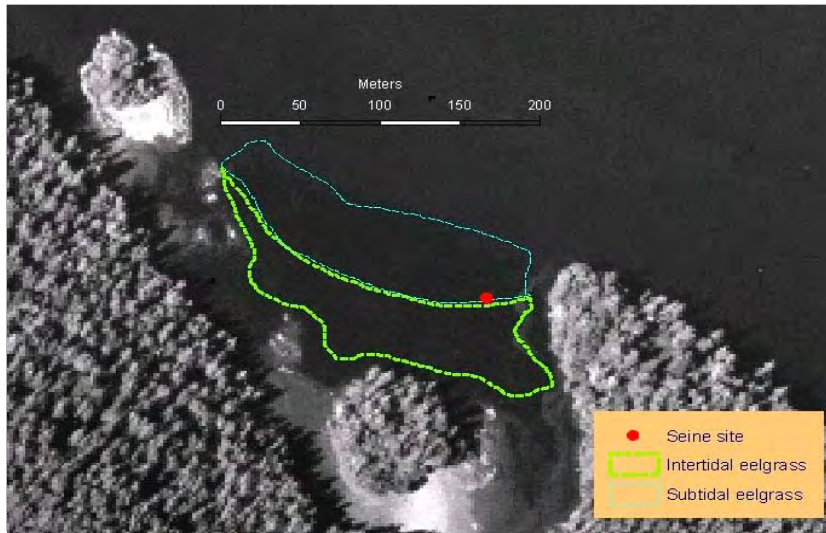
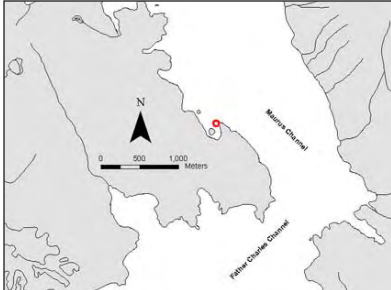
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO	•		STPE
TIRO			GUNNELS	CRGU
	YERO	•		PEGU
	SCULPINS	BUSC	•	
CABE		•		SAGU
ROSC		•	PRICKLEBACKS	SNPR
GRSC				BLPR
MASC			HICO	
PASC	•		SLCO	
RBSC		FLATFISHES	COSO	
REIL			ENSO	
SISC			ROSO	
SMSC	•		SPSA	
STSC	•		STFL	
SHSC		GREENLINGS	WHGR	
TISC			KEGR	
PLATED FISHES	THST		PAGR	
	TUBE	•	ROGR	
	BAPI	•	LING	
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO	•	GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

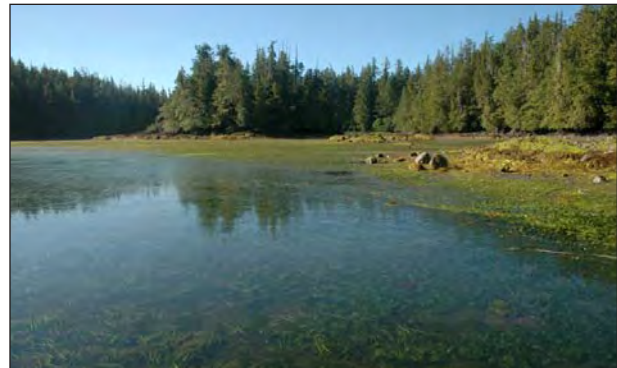
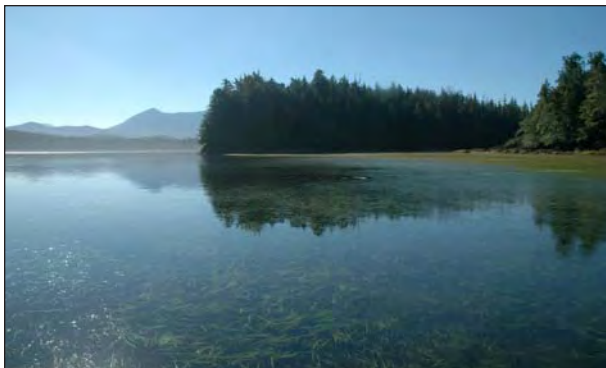
## Elbow Bank

UTM Coordinates : 285626 E  
 : 5453293 N  
 Date Sampled: June 26, 2006 @ 8:40  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and warm



Large, thick intertidal bed situated in a narrow bend subjected to a high incidence of boat traffic. The subtidal portion of the bed was also thick but narrow on a steep slope. The mid-channel substrate was predominantly gravel and shells. The epiphyte load was low, similar to that of the previous year. Several sea pen and red rock crabs inhabited the area.

The site boasted the second highest species richness in the region. As in 2005, Elbow Bank had proportionally few shiner perch as compared to other sites. It also harboured the most crescent gunnels and the second highest number of penpoint gunnels caught in Clayoquot Sound. It tied for first for the number of copper rockfish and cabezons in the region. Bald eagles were seen foraging on the intertidal bed.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.2	<b>SEDIMENT COMPOSITION:</b> Fine mud
<b>SALINITY (ppt):</b> 29.1	<b>SILT-CLAY FRACTION:</b> 3.30%
<b>CHLOROPHYLL a (ug/L):</b> 3.83	<b>SLOPE:</b> Flat in intertidal, steep > 10° subtidally
<b>NITRATES (um):</b> 0.26	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 3.33	<b>TURBIDITY:</b> 0.044 NTU

## Elbow Bank (EB) - Clayoquot Sound



### Biological Characteristics of Eelgrass Bed And Epiphytes

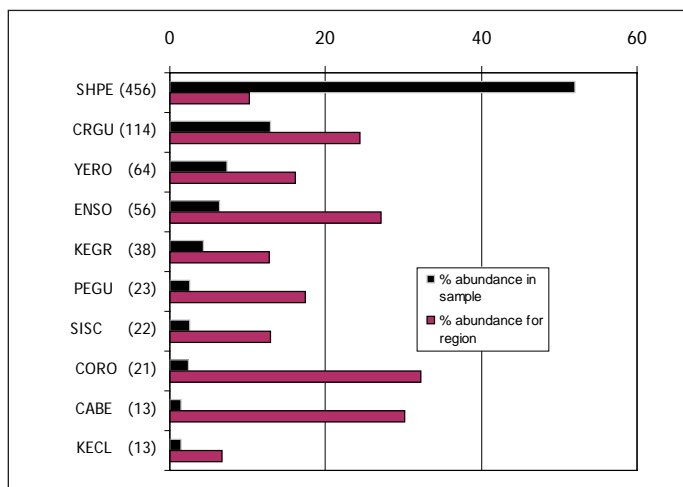
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 11
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 700	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 9
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 119	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 22,375
<b>LEAF AREA INDEX:</b> 1.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,385

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 23	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 877
<b>PIELOU'S EVENNESS:</b> 0.585	<b>TAXONOMIC DISTINCTIVENESS:</b> 93

	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC	•		PIPE	
	BRRO			SHPE	•
	CORO	•		STPE	
TIRO	•	GUNNELS	CRGU	•	
	YERO	•	PEGU	•	
	SCULPINS	BUSC	•	ROGU	
CABE		•	SAGU	•	
FLSC		PRICKLEBACKS	SNPR	•	
	GRSC	•	BLPR		
MASC		HICO			
PASC		SLCO			
RBSC		FLATFISHES	COSO		
REIL	•	ENSO	•		
SISC	•	ROSO			
SMSC	•	SPSA	•		
STSC	•	STFL			
SHSC		GREENLINGS	WHGR		
TISC		KEGR	•		
PLATED FISHES	THST		PAGR		
	TUBE	•	ROGR		
BAPI	•	LING	•		
CLINGFISHES	KECL	•	PREY FISHES	HERR	
	NOCL		SUSM		
GOBIES	ARGO		SAND		
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO		CHUM		
KELPFISH	CRKE		CUTT		

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Arakun

UTM coordinates : 289446 E

: 5450380 N

Date Sampled: June 27, 2006 @ 7:30

Years Sampled: 2004, 2005, 2006

Weather: sunny and warm



Small, patchy, isolated bed in a current-swept area (presence of sand ridges in the in the subtidal); *Z. marina var. typica* was present at higher elevations. The subtidal portion appeared thicker than last year and surrounded by sand and shell . The epiphyte load was among the lowest of the 2006 sites (3% DW) but appeared medium in the video (hydroids and *Smithora*). Incidence of wasting disease was low and there was also some dessication damage. The most common macrophytes were Turkish towel, sea lettuce and the *Gracilaria/Gracilariopsis* complex. Bat stars and leather stars were common in the intertidal while red rock and Dungeness crabs were common subtidally. Many moonsnail egg masses.

As in 2005, Arakun had one of the lowest fish abundance for the region and the second lowest of all 2006 eelgrass beds sampled. However, it also had the third highest species evenness and the second highest diversity (Simpson's index) overall. As in 2005, it had one of the highest number of saddleback gunnels in the region. The site had the second highest number of staghorn sculpins for the region, 4 out 5 shorthorn sculpins and the lowest number of shiner perch.

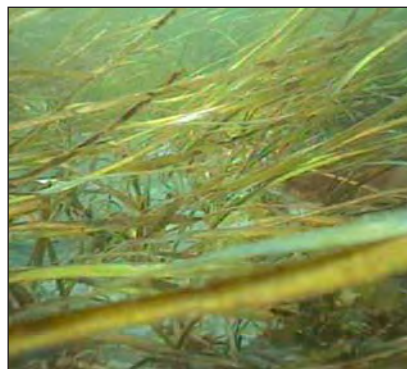


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.6	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 28.5	<b>SILT-CLAY FRACTION:</b> 2.50%
<b>CHLOROPHYLL a (ug/L):</b> 3.8	<b>SLOPE:</b> steep, > 20°
<b>NITRATES (um):</b> 0.15	<b>ESTIMATED EXPOSURE:</b> semi-protected
<b>FLUORESCENCE (FU):</b> 2.34	<b>TURBIDITY:</b> 0.14 NTU



## Arakun (A) - Clayoquot Sound



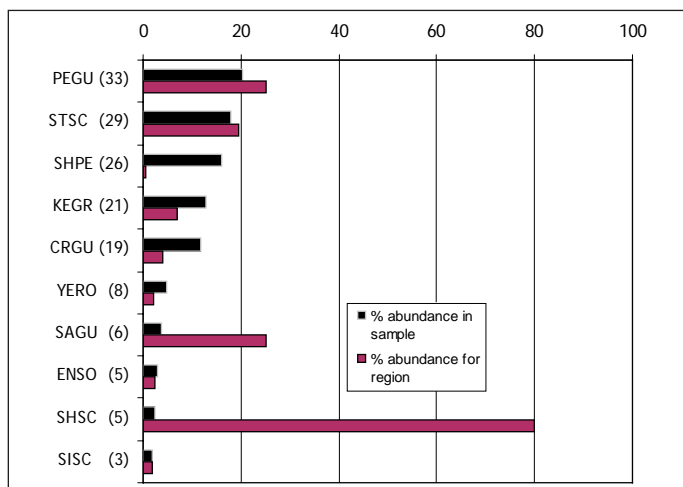
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some <i>Ulva</i> sp
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 2
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 3
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 64	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 6,486
<b>LEAF AREA INDEX:</b> 1.0	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 8,425

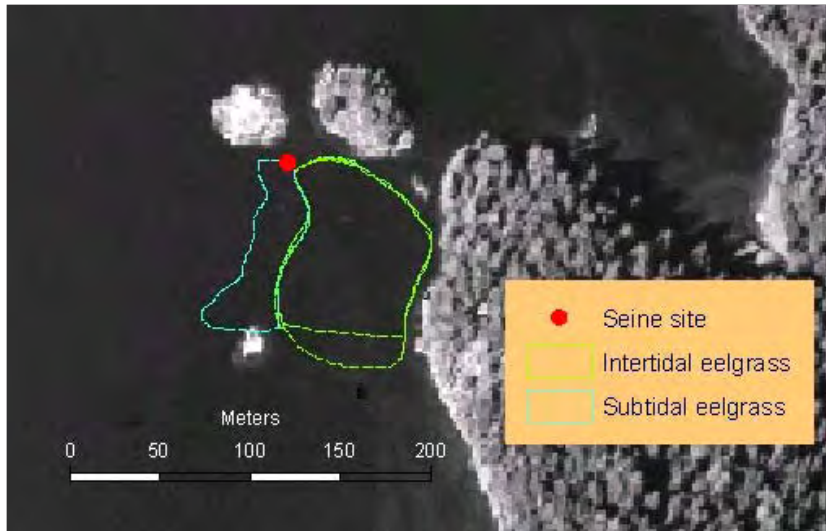
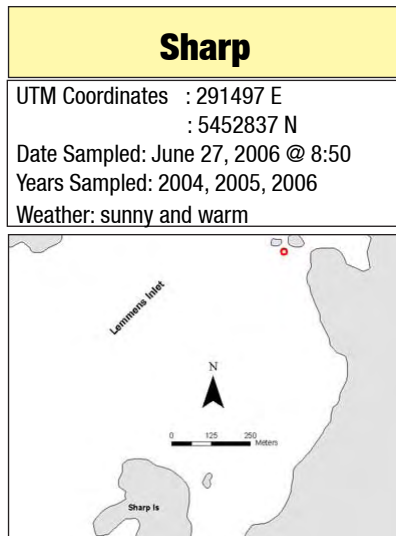
### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 17	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 163
<b>PIELOU'S EVENNESS:</b> 0.792	<b>TAXONOMIC DISTINCTIVENESS:</b> 90

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



	SPECIES		SPECIES		
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO			SHPE	•
	CORO			STPE	•
	VERO		GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC			ROGU	
	CABE	•		SAGU	•
	FLSC		PRICKLEBACKS	SNPR	
	GRSC	•		BLPR	
	MASC			HICO	
	PASC			SLCO	
	RBSC		FLATFISHES	COSO	
	REIL			ENSO	•
	SISC	•		ROSO	
	SMSC			SPSA	•
	STSC	•		STFL	
	SHSC	•	GREENLINGS	WHGR	
	TISC			KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
	BAPI	•		LING	•
CLINGFISHES	KECL	•	PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	



Thick bed on soft, muddy substrate. Relatively undisturbed site. The subtidal portion of the bed was thin and abutted to a large mudflat area in deeper water. The epiphyte load was almost double that of the previous year (23 vs. 12% DW). Sea whips were unusually abundant and sea pens were present in the deeper, muddy area. Their main predator, the striped nudibranch *Armina californica*, was also present. Large spiny pink stars, slender and Dungeness crabs were common.

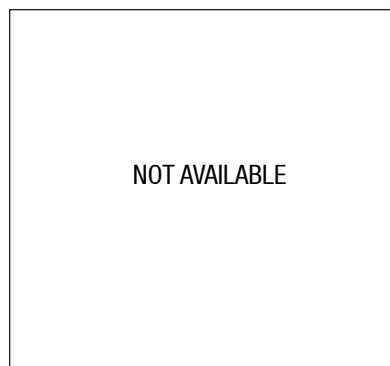
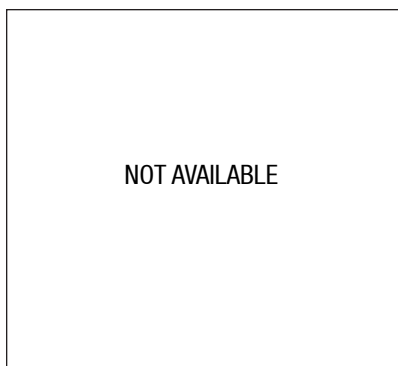
The site's catches were the highest for the region (24% of all fishes caught in Clayoquot Sound in 2006), third highest overall. The site was however dominated by shiner perch (the most for the region) which accounted for the low species evenness. One of two Clayoquot Sound sites with bay gobies (it had the highest catches for this species in 2005), and the highest catches of bay pipefish and plainfin midshipman for the region. Speckled sanddabs were less common than in 2005.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16.3	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 27.9	<b>SILT-CLAY FRACTION:</b> 13.40%
<b>CHLOROPHYLL a (ug/L):</b> 2.82	<b>SLOPE:</b> flat, < 10°
<b>NITRATES (um):</b> below detection	<b>ESTIMATED EXPOSURE:</b> very protected
<b>FLUORESCENCE (FU):</b> 2.12	<b>TURBIDITY:</b> 0.184 NTU

## Sharp (S) - Clayoquot Sound



### Biological Characteristics of Eelgrass Bed And Epiphytes

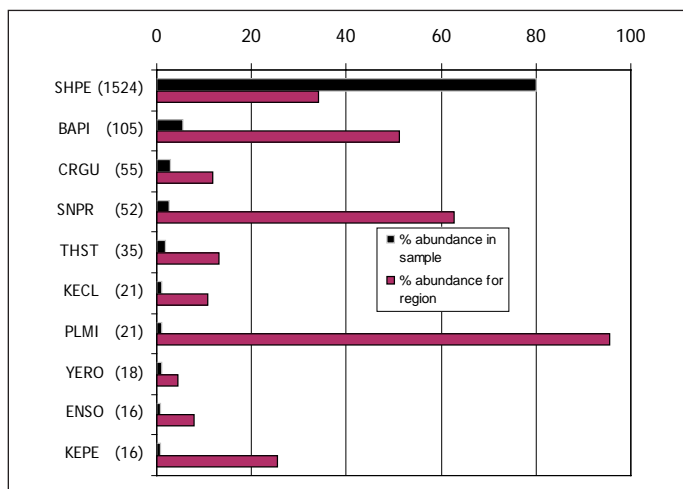
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some <i>Ulva</i> sp
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 42
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 24
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 143	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 22,375
<b>LEAF AREA INDEX:</b> 2.0	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,385

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 1,904
<b>PIELOU'S EVENNESS:</b> 0.319	<b>TAXONOMIC DISTINCTIVENESS:</b> 92

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO	●		STPE ●
TIRO			GUNNELS	CRGU ●
	YERO	●		PEGU ●
SCULPINS	BUSC	●		ROGU ●
	CABE	●		SAGU ●
ROSC			PRICKLEBACKS	SNPR ●
	GRSC			BLPR ●
MASC			HICO	
PASC			SLCO	
RBSC			FLATFISHES	COSO
SFSC	●			ENSO ●
SISC	●			ROSO ●
SMSC				SPSA ●
STSC	●			STFL ●
SHSC			GREENLINGS	WHGR
TISC				KEGR
PLATED FISHES	THST	●		PAGR
	TUBE			ROGR
BAPI	●		LING	
CLINGFISHES	KECL	●	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO	●	GADIDS	TOMC
TOADFISH	PLMI	●	SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



## Mud Bay

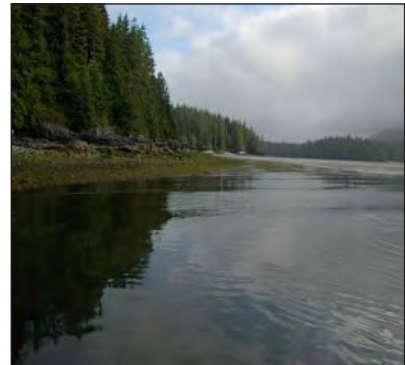
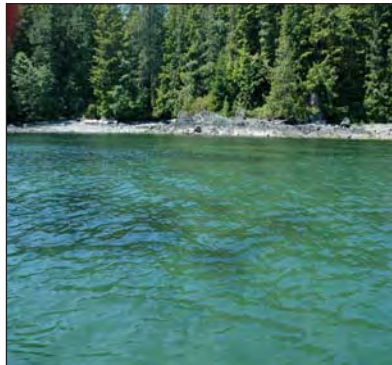
UTM coordinates : N/A  
 : N/A  
 Date Sampled: June 28, 2006 @ 8:45  
 Years Sampled: 2006  
 Weather: sunny & warm, calm, light swell

NOT AVAILABLE

NOT AVAILABLE

Extensive, mostly subtidal eelgrass bed. *Ulva* and *Sargassum* were common. Adjacent areas had rocky outcrops with kelp (*Desmarestia* and *Macrocystis*) and red algae (*Chondracanthus*, *Mazzaella*). The site was the site most subjected to marine influences (high salinity, low temperature) in the region. Although the eelgrass biomass was relatively high (6th highest in 2006), the epiphytic load was among the lowest (7th).

The site boasted high species evenness and diversity (5th and 3rd highest of all 2006 sites, respectively) and the second highest species richness in Clayoquot Sound. It also had the highest catches of kelp greenling, silverspotted sculpins, cabezons, and kelp clingfish of all eelgrass beds sampled in 2006.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 11.8	<b>SEDIMENT COMPOSITION:</b> sand
<b>SALINITY (ppt):</b> 30.7	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 5.59	<b>SLOPE:</b> flat, < 10°
<b>NITRATES (um):</b> 0.30	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 3.09	<b>TURBIDITY:</b> 0.003 NTU



## Mud Bay (MB) - Clayoquot Sound



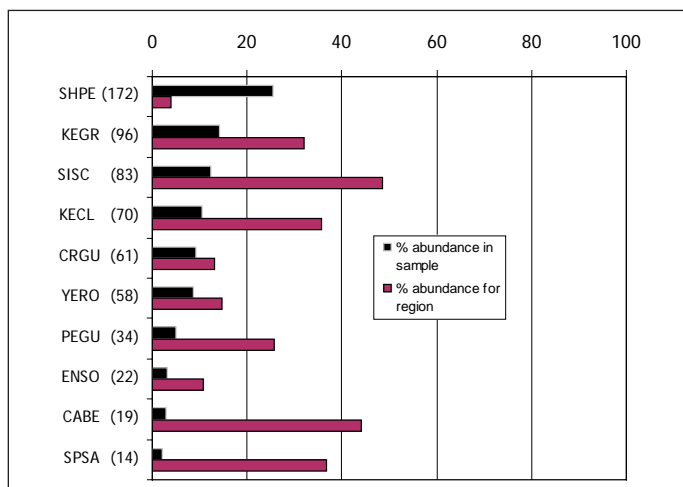
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly <i>Smithora</i> , some <i>Ulva</i> sp & diatoms
<b>TIDAL RANGE:</b> Mostly subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 26
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 10
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 223	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> 1.7	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 23	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 673
<b>PIELOU'S EVENNESS:</b> 0.738	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO	•		STPE
	TIRO		GUNNELS	CRGU
	YERO	•		PEGU
SCULPINS	BUSC	•		ROGU
	CABE	•		SAGU
	FLSC		PRICKLEBACKS	SNPR
	GRSC	•		BLPR
	MASC			HICO
	PASC	•		SLCO
	RBSC		FLATFISHES	COSO
	REIL	•		ENSO
	SISC	•		ROSO
	SMSC	•		SPSA
	STSC	•		STFL
	SHSC		GREENLINGS	WHGR
	TISC			KEGR
PLATED FISHES	THST	•		PAGR
	TUBE	•		ROGR
	BAPI	•		LING
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

## Calmus

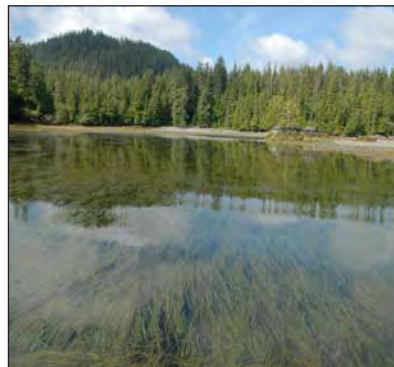
UTM Coordinates : 284398 E  
 : 5454963 N  
 Date Sampled: June 28, 2006 @ 9:50  
 Years Sampled: 2006  
 Weather: sunny and warm

NOT AVAILABLE



Large protected, narrow entrance bay with eelgrass throughout, one of the beds most subjected to marine influences among the beds sampled in the region. The bed was almost entirely subtidal but very shallow. The underwater video showed a mixed bed with hydroids, heavy epiphyte load although the dry epiphyte load was average for the region. Some dessication damage visible but no wasting disease.

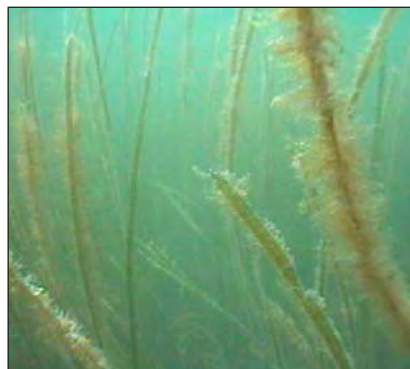
The site had the most smoothhead sculpins, the second highest catches of crescent gunnells, and tied for highest catches of copper rockfish in the region.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.5	<b>SEDIMENT COMPOSITION:</b> mud and sand
<b>SALINITY (ppt):</b> 28.8	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 10.51	<b>SLOPE:</b> flat, < 5°
<b>NITRATES (um):</b> 0.14	<b>ESTIMATED EXPOSURE:</b> N/A
<b>FLUORESCENCE (FU):</b> 4.76	<b>TURBIDITY:</b> 0.103 NTU

## Calmus (C) - Clayoquot Sound



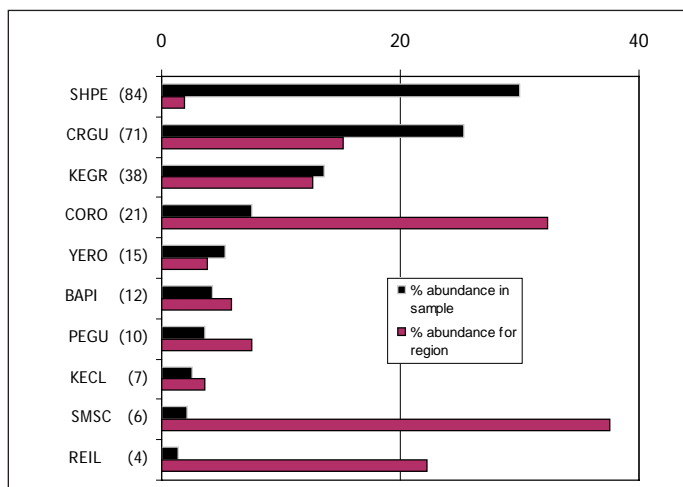
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms
<b>TIDAL RANGE:</b> mostly subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 26
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 20
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 100	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> 3.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 280
<b>PIELOU'S EVENNESS:</b> 0.685	<b>TAXONOMIC DISTINCTIVENESS:</b> 92

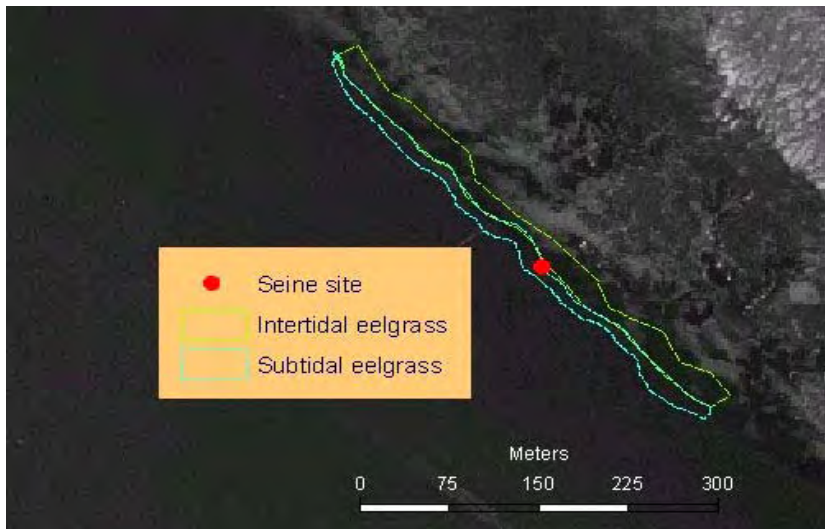
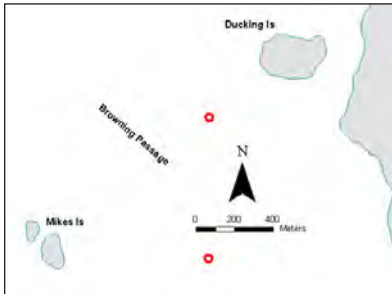
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO	•		STPE
VERO			GUNNELS	CRGU
	YERO	•		PEGU
SCULPINS	BUSC	•		ROGU
	CABE	•		SAGU
FLSC			PRICKLEBACKS	SNPR
	GRSC			BLPR
	MASC			HICO
	PASC			SLCO
RBSC			FLATFISHES	COSO
	REIL	•		ENSO
SISC				ROSO
	SMSC	•		SPSA
STSC				STFL
	SHSC		GREENLINGS	WHGR
TISC				KEGR
	THST			PAGR
PLATED FISHES	TUBE	•		ROGR
	BAPI	•		LING
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
	POACHER	TUPO		CHUM
KELPFISH	CRKE			CUTT

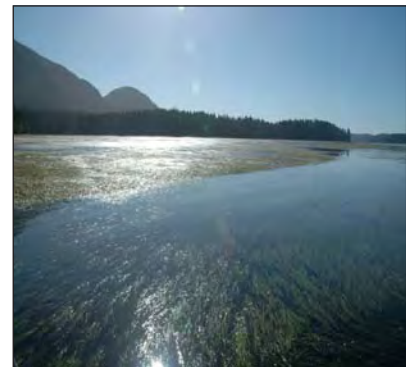
## Ducking

UTM Co-ordinates : 290918 E  
 : 5446967 N  
 Date Sampled: June 29, 2006 @ 8:20  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and warm



Relatively undisturbed, thick bed across the channel from Mikes Island. Turkish towels were abundant intertidally, with *Ulva* sp patches among the eelgrass. The epiphyte load was similar to that of the previous year (17 vs 20%). The subtidal portion of the bed was thick but patchy, and its surroundings were current-swept and sandy.

As was the case in 2005, shiner perch were unusually abundant in the samples, accounting for more than 80% of all fishes caught at this site. This partly explained the site's low species evenness and diversity (Simpson's), among the 10 lowest in 2006. There were three species of rockfish caught and the only black rockfish caught in the region was caught here. The site also had the highest abundance of saddleback gunnels for the region. Bald eagles are frequently observed foraging on this bed.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.2	<b>SEDIMENT COMPOSITION:</b> mud and sand
<b>SALINITY (ppt):</b> 27.1	<b>SILT-CLAY FRACTION:</b> 2.80%
<b>CHLOROPHYLL a (ug/L):</b> 1.99	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 1.04	<b>ESTIMATED EXPOSURE:</b> semi-protected
<b>FLUORESCENCE (FU):</b> 1.39	<b>TURBIDITY:</b> 0.185 NTU



## Ducking (D) - Clayoquot Sound



### Biological Characteristics of Eelgrass Bed And Epiphytes

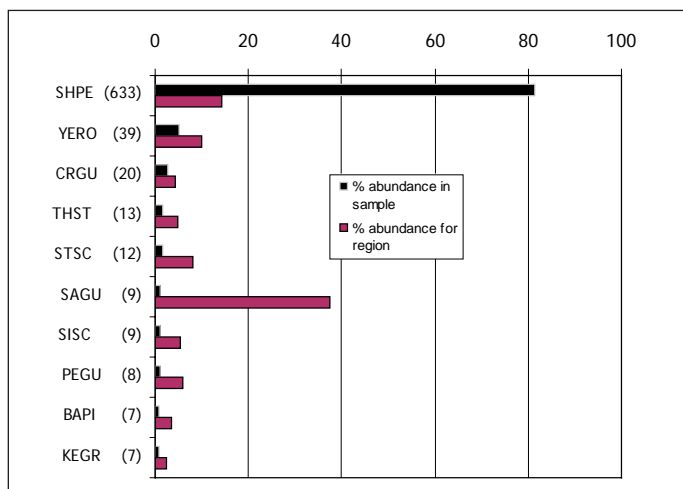
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 15
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 17
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 91	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 8,720
<b>LEAF AREA INDEX:</b> 0.9	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 5,460

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 19	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 777
<b>PIELOU'S EVENNESS:</b> 0.313	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

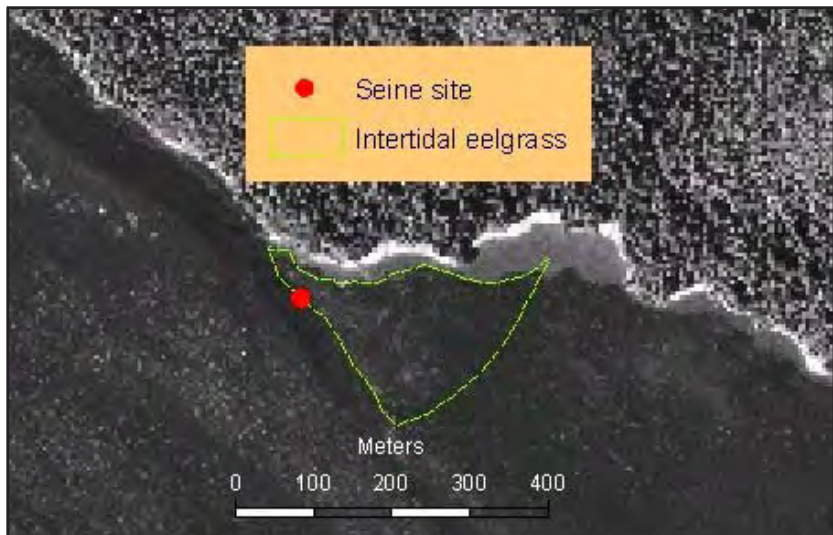
	SPECIES		SPECIES		
ROCKFISH	BLRO	•	SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO			SHPE	•
	CORO	•		STPE	•
VERO			GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC			ROGU	
	CABE			SAGU	•
	FLSC		PRICKLEBACKS	SNPR	•
GRSC				BLPR	
	MASC			HICO	
PASC				SLCO	
RBSC			FLATFISHES	COSO	
REIL				ENSO	•
SISC	•			ROSO	
SMSC				SPSA	•
STSC	•			STFL	•
SHSC	•		GREENLINGS	WHGR	
TISC				KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
	BAPI	•		LING	
CLINGFISHES	KECL	•	PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Indian

UTM Coordinates : 297404 E  
 : 5443714 N  
 Date Sampled: June 29, 2006 @ 10:20  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and warm



Relatively undisturbed, thick intertidal bed on soft mud, part of a larger one - the mapped area was approximately half of the whole bed. Heavy epiphyte load (fourth highest second highest for all sites sampled in 2006 - 59%, from second highest in 2005 - 60% DW), mostly diatoms. The underwater video showed the bed as thin, with a heavy *Smithora* epiphyte load. No incidence of wasting nor dessication but few blades were visible due to the high epiphyte cover.

As in 2005, the fish catch was dominated by shiner perch and sticklebacks. All perch species were caught, and this was one of three sites in the region with pile perch. It also had the highest kelp perch catch for the region, tied for highest catches of chum salmon in the region, and had the second highest number of kelp clingfish in any eelgrass bed sampled in 2006. This was the only site in Clayoquot Sound where no English soles were caught. Mink were seen foraging on the bed.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 23.8	<b>SILT-CLAY FRACTION:</b> 3.80%
<b>CHLOROPHYLL a (ug/L):</b> 1.99	<b>SLOPE:</b> steep, >10 - 20°
<b>NITRATES (um):</b> 0.24	<b>ESTIMATED EXPOSURE:</b> protected
<b>FLUORESCENCE (FU):</b> 1.16	<b>TURBIDITY:</b> 0.200 NTU

## Indian (I) - Clayoquot Sound



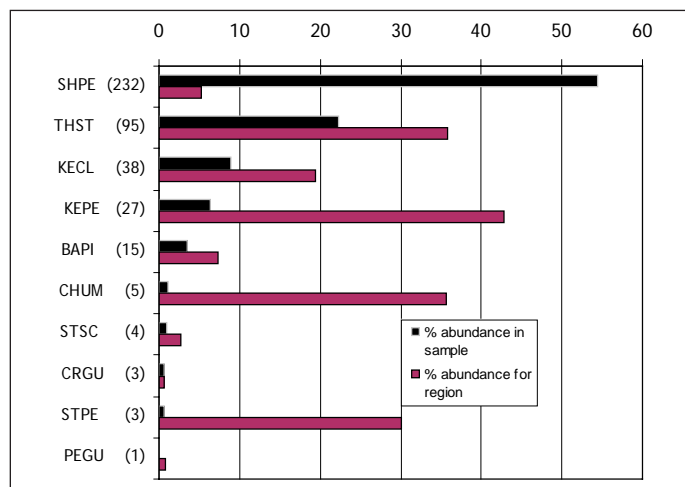
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms & filamentous red, some <i>Smithora</i>
<b>TIDAL RANGE:</b> intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 88
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 59
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 134	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 36, 550
<b>LEAF AREA INDEX:</b> 1.3	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

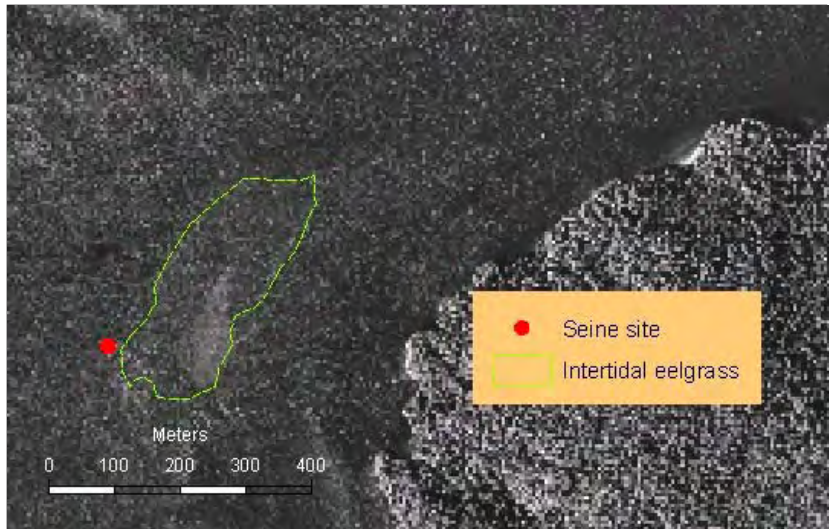
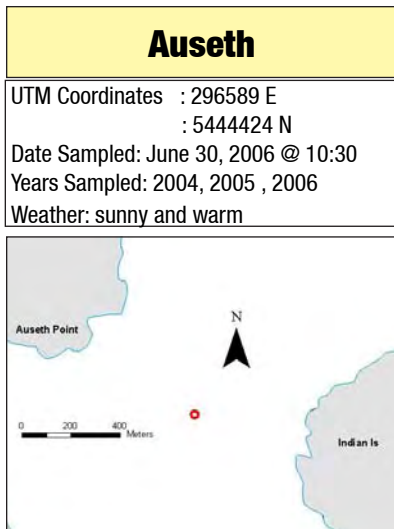
<b>NUMBER OF DIFFERENT SPECIES:</b> 13	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 426
<b>PIELOU'S EVENNESS:</b> 0.544	<b>TAXONOMIC DISTINCTIVENESS:</b> 90

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)



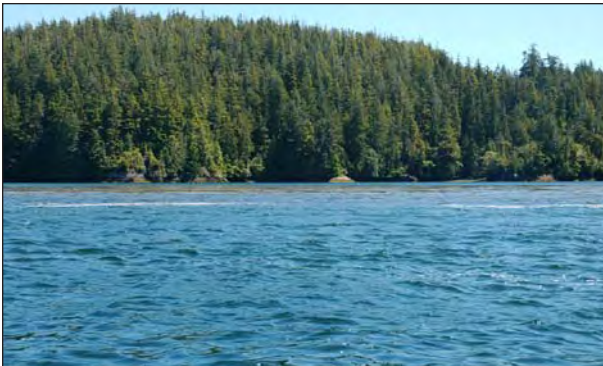
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
TIRO			GUNNELS	CRGU	●
	YERO	●		PEGU	●
SCULPINS	BUSC			ROGU	
	CABE			SAGU	
	FLSC		PRICKLEBACKS	SNPR	
GRSC				BLPR	
	MASC			HICO	
PASC				SLCO	
RBSC			FLATFISHES	COSO	
REIL				ENSO	
SISC				ROSO	
SMSC	●			SPSA	
STSC	●			STFL	
SHSC			GREENLINGS	WHGR	
TISC				KEGR	
PLATED FISHES	THST	●		PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL	●	PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	●
KELPFISH	CRKE			CUTT	





Relatively undisturbed, continuous bed lodged in mid-channel between Auseth Point and Indian Island in Grice Bay. The intertidal area was mostly soft substrate (sand and mud) with localized sea hair patches. As in 2005, the epiphyte load was heavy (78%, third heaviest, vs. 33% in 2005), although diatoms replaced *Smithora* in 2006. In contrast, the eelgrass biomass was the fourth lowest of 2006 sites. This may be due to the position of the site, which receives significant inputs of freshwater from Kennedy Lake and adjacent water bodies.

Shiner perch accounted for close to 70% of the total catch. As in 2005, the total fish catch at this site was one of the lowest among Clayoquot Sound sites. It was dominated by shiner perch (84% of the catch), had the lowest species richness (12 species) and the third lowest species diversity of all sites sampled in 2006. The site is generally environmentally stressed as it lies within the outflow of the Kennedy River.

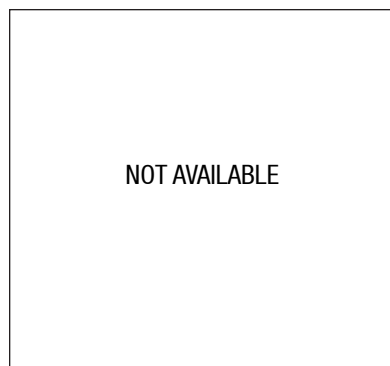
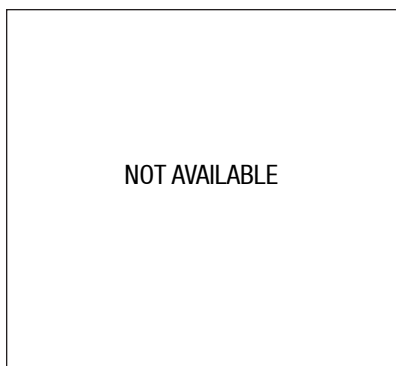


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 18.4	<b>SEDIMENT COMPOSITION:</b> mud and sand
<b>SALINITY (ppt):</b> 20.5	<b>SILT-CLAY FRACTION:</b> 3.90%
<b>CHLOROPHYLL a (ug/L):</b> 0.62	<b>SLOPE:</b> steep >20°
<b>NITRATES (um):</b> 0.12	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 0.856	<b>TURBIDITY:</b> 0.125 NTU



## Auseth (AU) - Clayoquot Sound



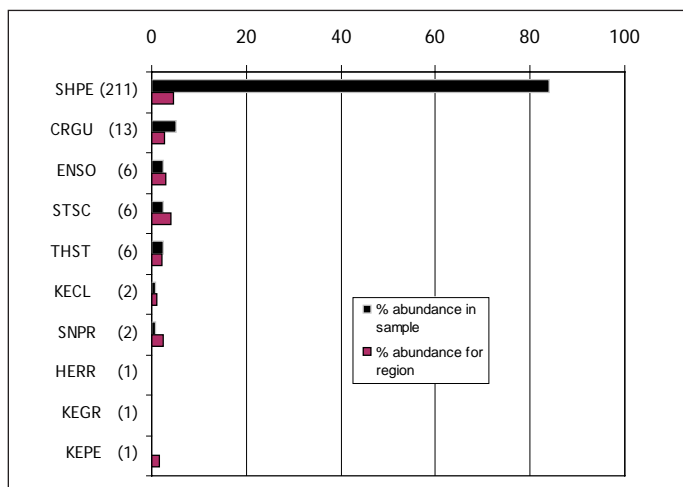
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i> mostly var. <i>latifolia</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> mostly intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 58
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 78
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 64	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 22,375
<b>LEAF AREA INDEX:</b> 1.1	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,385

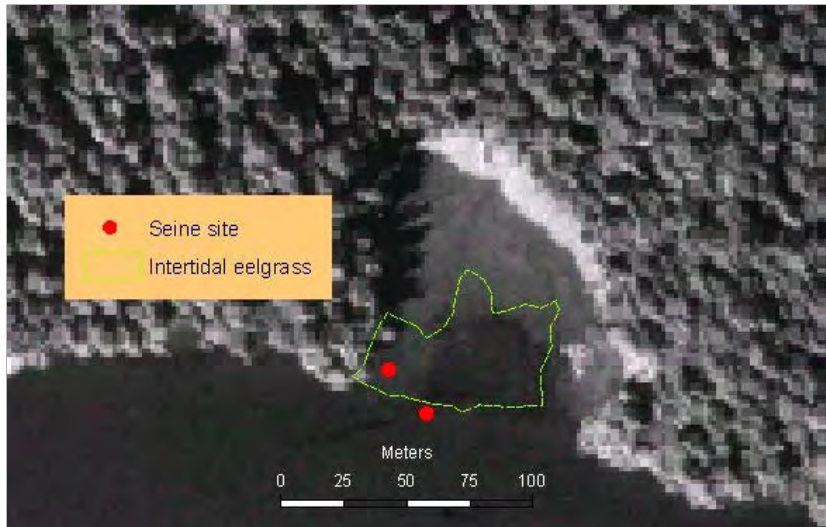
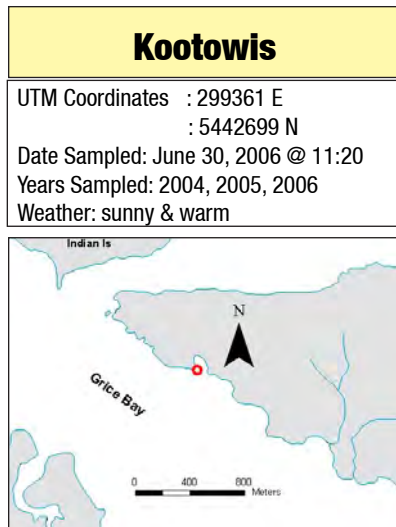
### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 12	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 251
<b>PIELOU'S EVENNESS:</b> 0.303	<b>TAXONOMIC DISTINCTIVENESS:</b> 91

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	•
	BOCC			PIPE	•
	BRRO			SHPE	•
	CORO			STPE	
VERO			GUNNELS	CRGU	•
	YERO	•		PEGU	
SCULPINS	BUSC			ROGU	
	CABE			SAGU	
	FLSC		PRICKLEBACKS	SNPR	•
	GRSC			BLPR	
	MASC			HICO	
	PASC			SLCO	
	RBSC		FLATFISHES	COSO	
	REIL			ENSO	•
	SISC			ROSO	
	SMSC			SPSA	
	STSC	•		STFL	
	SHSC		GREENLINGS	WHGR	
	TISC			KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
	BAPI			LING	
CLINGFISHES	KECL	•	PREY FISHES	HERR	•
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	



Relatively undisturbed, small indented bay in Grice Bay with a large, thick and continuous intertidal bed. The epiphyte load, third heaviest of all 2005 sites (54% DW) was lower this year (30% DW), mostly diatoms. The underwater video showed a high epiphyte load, mostly *Smithora*. No incidence of wasting disease nor of dessication.

The site had the second largest catch and second highest number of sticklebacks in the Clayoquot area. Shiner perch dominated and the staghorn sculpins catches were the highest for the region, but it was the only site in the region where no penpoint gunnels were caught. It was one of two Clayoquot Sound sites where bay gobies were present. This was also the only eelgrass bed in 2006 where cutthroat trouts were caught. Few plainfin midshipman were caught, which contrasts with 2005, when they were common at the site.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 17.6	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 23.2	<b>SILT-CLAY FRACTION:</b> 8.40%
<b>CHLOROPHYLL a (ug/L):</b> 0.70	<b>SLOPE:</b> flat < 10°
<b>NITRATES (um):</b> 0.07	<b>ESTIMATED EXPOSURE:</b> very protected
<b>FLUORESCENCE (FU):</b> 0.6	<b>TURBIDITY:</b> 0.149 NTU

## Kootowis (K) - Clayquot Sound



### Biological Characteristics of Eelgrass Bed And Epiphytes

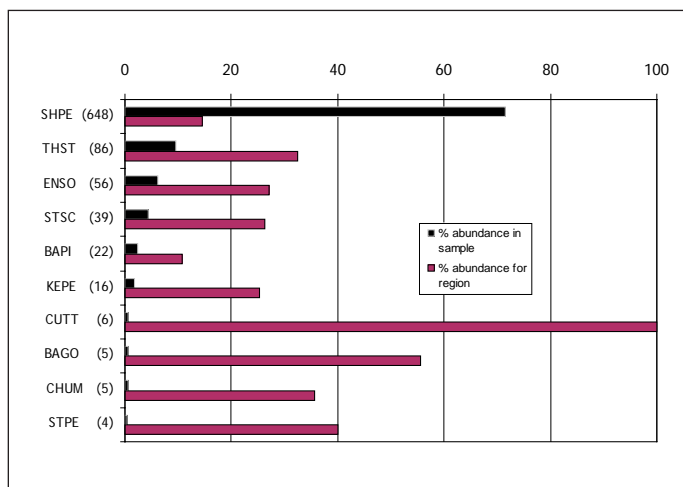
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms; some <i>Ulva sp.</i> , <i>Smithora</i>
<b>TIDAL RANGE:</b> mostly intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 24
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 100	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 31
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 116	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,608
<b>LEAF AREA INDEX:</b> 0.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 0

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 907
<b>PIELOU'S EVENNESS:</b> 0.393	<b>TAXONOMIC DISTINCTIVENESS:</b> 95

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE ●
	TIRO		GUNNELS	CRGU ●
	YERO ●		PEGU	
SCULPINS	BUSC			ROGU
	CABE			SAGU ●
	FLSC		PRICKLEBACKS	SNPR ●
	GRSC			BLPR
	MASC			HICO
	PASC ●		SLCO	
	RBSC		FLATFISHES	COSO
	REIL			ENSO ●
	SISC			ROSO
	SMSC ●			SPSA
	STSC ●			STFL ●
	SHSC		GREENLINGS	WHGR
	TISC			KEGR
PLATED FISHES	THST ●			PAGR
	TUBE			ROGR
	BAPI ●			LING
CLINGFISHES	KECL ●		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO ●		GADIDS	TOMC
TOADFISH	PLMI ●		SALMONIDS	CHIN
POACHER	TUPO			CHUM ●
KELPFISH	CRKE			CUTT ●

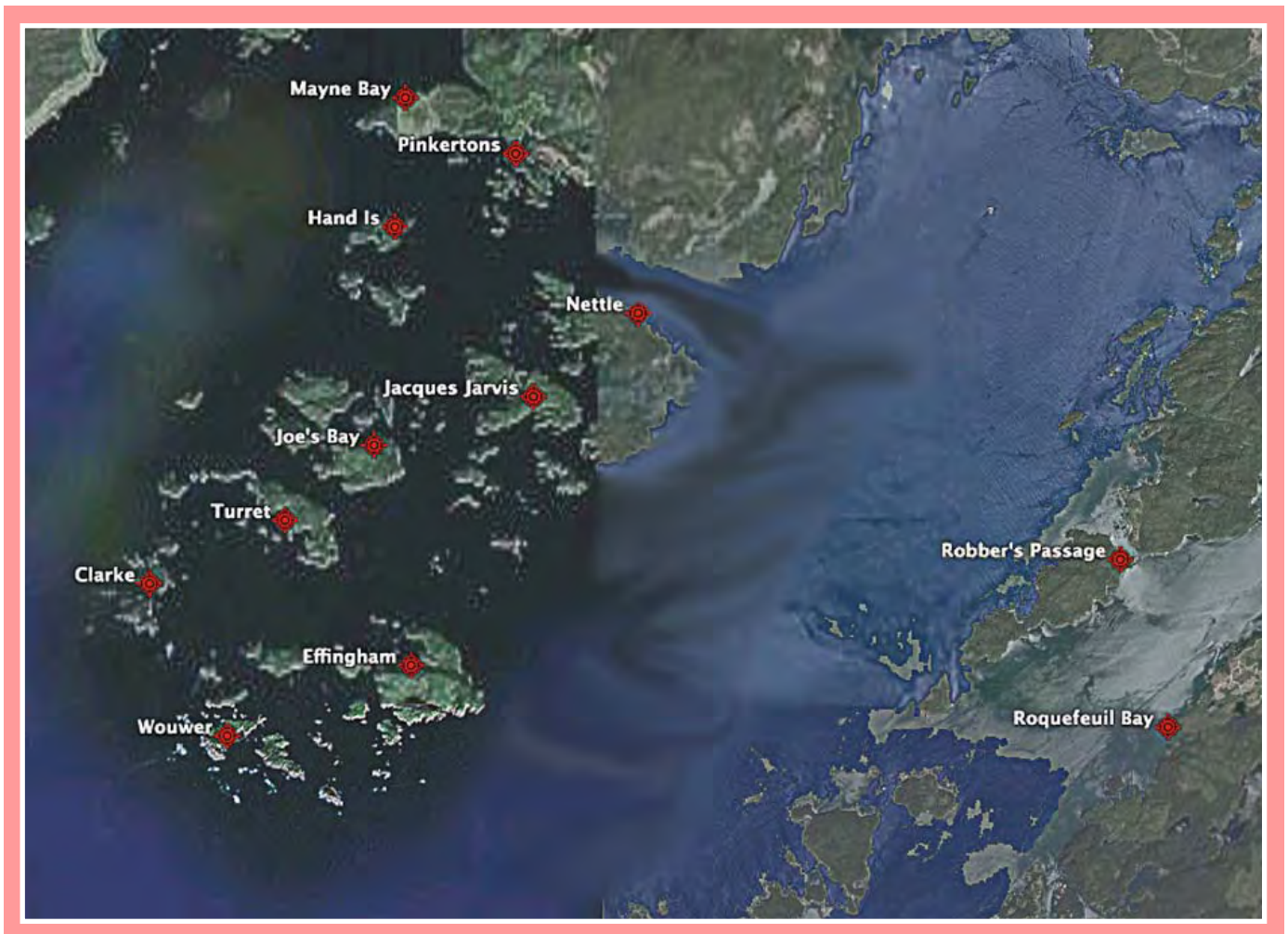
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)





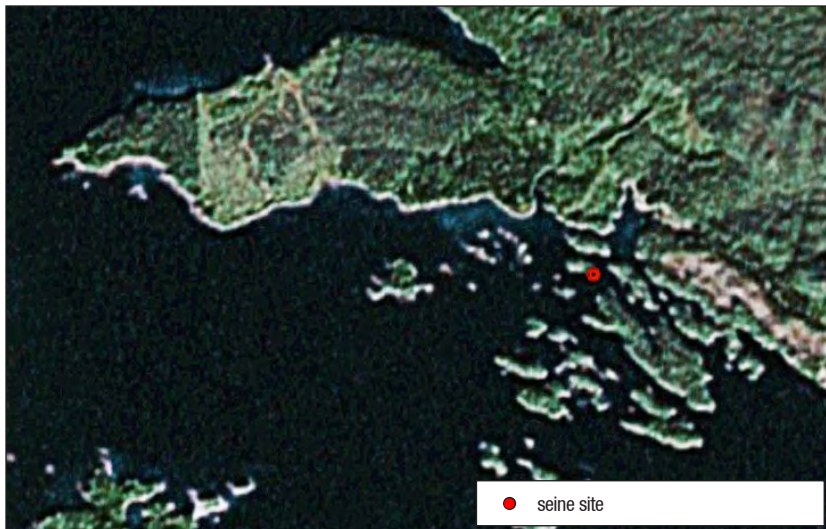


## 2.4 Barkley Sound Site Descriptions



## Pinkerton

UTM Coordinates : 333116 E  
 : 5425864 N  
 Date Sampled: July 23, 2006 @ 6:00  
 Years Sampled: 2005, 2006  
 Weather: sunny and hot



Very sheltered site. Dense intertidal bed abutted to a large subtidal bed. The epiphyte load was non existent (lowest for 2006 sites), in contrast with the previous year (18% DW). This site had the highest incidence of wasting disease in 2005, and it was still present. Changes in extent of the disease could however not be assessed. Sea hair clumps common within the intertidal portion of the bed. The subtidal portion of the bed was patchy, thin and surrounded by marl (gravel, shell, mud) on the deep side and abutted to a boulder slope on some inshore sides. Some sea lettuce clumps were scattered near the high subtidal edge. Cerianthids (burrowing anemones), bat stars were common; moonsnails, mottled stars, slender crabs, spiny pink stars were also seen. Kelp crabs (mostly females) were common in the catch.

Most fishes were caught entangled in *Ulva torta*, and the catch was dominated by sticklebacks (in similar numbers to the previous year) and the site boasted the second largest catch of this fish for any site in 2006. Its Taxonomic Distinctness ranked 4th overall, indicating a fairly specific fish assemblage and high diversity. The Red Irish Lords numbers caught were also the most in Barkley Sound, and the only surf smelts caught in the region or in any eelgrass beds in 2006 were caught here. It was also one of four eelgrass beds with a significant herring catch in 2006. A float house was recently built within one km of the site. Four boats were anchored nearby at the time of sampling.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 20.7	<b>SEDIMENT COMPOSITION:</b> soft mud
<b>SALINITY (ppt):</b> 27.3	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 1.03	<b>SLOPE:</b> fairly steep > 10°
<b>NITRATES (um):</b> 0.14	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 0.466	<b>TURBIDITY:</b> 0.044 NTU

## Pinkerton (P) - Barkley Sound



### Biological Characteristics of Eelgrass Bed

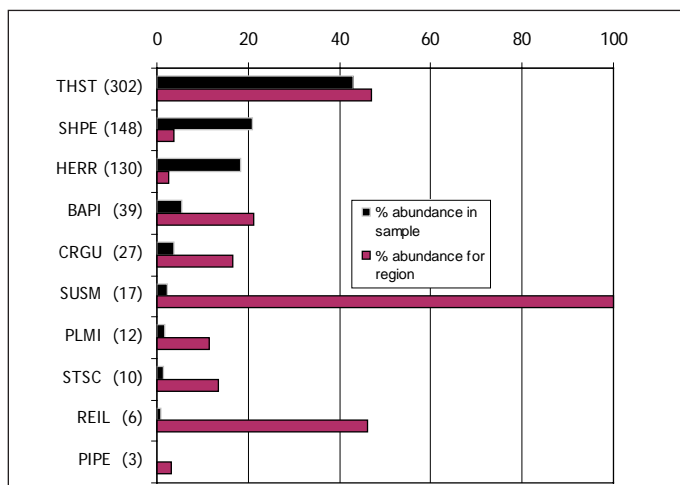
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> no epiphytes
<b>TIDAL RANGE:</b> Subtidal and intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 0
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 500	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 0
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 210	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 392
<b>LEAF AREA INDEX:</b> 2.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 4,642

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 17	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 704
<b>PIELOU'S EVENNESS:</b> 0.597	<b>TAXONOMIC DISTINCTIVENESS:</b> 98

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO			STPE
VERO			GUNNELS	CRGU
	YERO	•		PEGU
SCULPINS	BUSC			ROGU
	CABE			SAGU
	FLSC		PRICKLEBACKS	SNPR
	GRSC			BLPR
	MASC			HICO
	PASC	•		SLCO
	RBSC		FLATFISHES	COSO
	REIL	•		ENSO
	SISC			ROSO
	SMSC			SPSA
	STSC	•		STFL
	TASC		GREENLINGS	WHGR
	TISC			KEGR
PLATED FISHES	THST	•		PAGR
	TUBE			ROGR
	BAPI	•		LING
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO	•	GADIDS	TOMC
TOADFISH	PLMI	•	SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

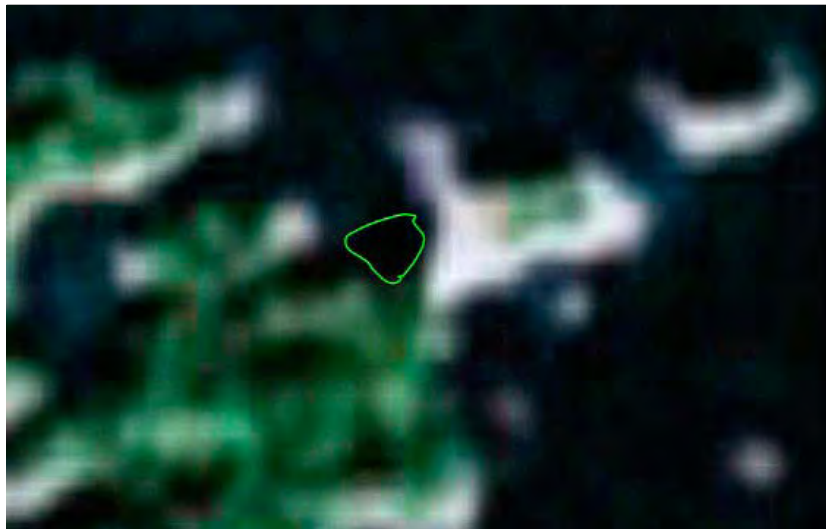
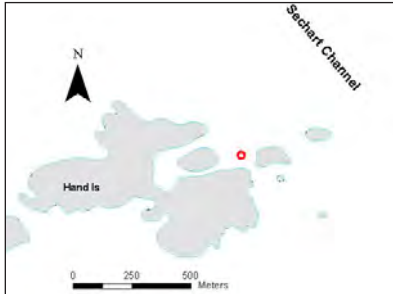
#### PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)





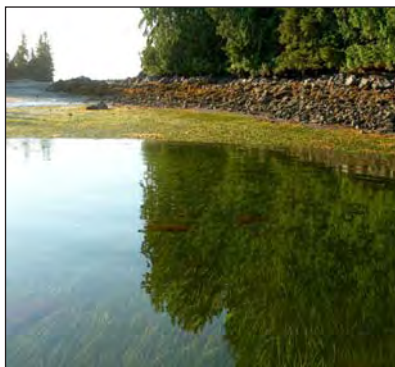
## Hand Island

UTM Coordinates : 330668 E  
 : 5424598 N  
 Date Sampled: July 23, 2006 @ 7:45  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny, calm and hot



Sheltered site, but open to Loudon Channel. Dense bed covering an extensive intertidal area, with a low to medium epiphyte load (11% DW, diatoms, almost identical to the previous year). The site lies close to a campsite, which may account for its disturbed state. Dessication damage was common and possibly wasting disease. *Ulva* sp. and the *Gracilaria-opsis* complex made up the understory close to shore. Moonsnails were abundant. Eelgrass pollen was floating on the surface at the time of sampling. Four boats passed by during sampling.

The total fish catches were much lower than in 2005, and shiner perch not as dominant. Species evenness was mid range for the region but Taxonomic Distinctness ranked 6th overall, indicating a fairly diverse fish assemblage (species not related to each other). The site had the highest plainfin midshipman catches of any site sampled in 2006, and 3 black/yellowtail rockfish juveniles. One third of rockweed gunnels caught in Barkley Sound eelgrass beds were caught at this site.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 20.1	<b>SEDIMENT COMPOSITION:</b> mud and sand
<b>SALINITY (ppt):</b> 28.5	<b>SILT-CLAY FRACTION:</b> 7.70%
<b>CHLOROPHYLL a (ug/L):</b> 3.99	<b>SLOPE:</b> <10°
<b>NITRATES (um):</b> 0.10	<b>ESTIMATED EXPOSURE:</b> protected
<b>FLUORESCENCE (FU):</b> 1.113	<b>TURBIDITY:</b> 0.031 NTU



## Hand Island (HI) - Barkley Sound



### Biological Characteristics of Eelgrass Bed and Epiphytes

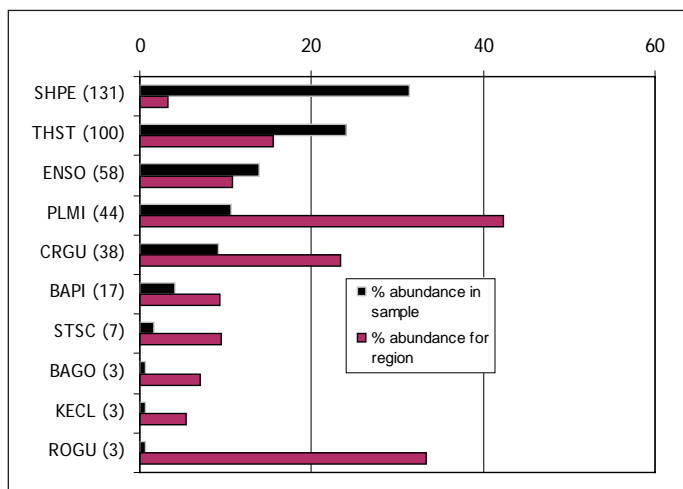
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Subtidal and intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 12
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 550	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 11
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 119.5	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,265
<b>LEAF AREA INDEX:</b> 1.8	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 3,750

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
18	417
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.661	98

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO			STPE
VERO			GUNNELS	CRGU
	YERO	•		PEGU
SCULPINS	BUSC			ROGU
	CABE			SAGU
	FLSC		PRICKLEBACKS	SNPR
	GRSC	•		BLPR
	MASC			HICO
	PASC	•		SLCO
	RBSC		FLATFISHES	COSO
	REIL	•		ENSO
	SISC			ROSO
	SMSC	•		SPSA
	STSC	•		STFL
	TASC		GREENLINGS	WHGR
	TISC	•		KEGR
PLATED FISHES	THST	•		PAGR
	TUBE			ROGR
	BAPI	•		LING
CLINGFISHES	KECL	•	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO	•	GADIDS	TOMC
TOADFISH	PLMI	•	SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Nettle

UTM Coordinates : 335382 E  
 : 5422727 N  
 Date Sampled: July 24, 2006 @ 7:00  
 Years Sampled: 2004, 2006  
 Weather: sunny and hot



Site open to the Sechart Channel. The eelgrass bed was patchy, with a low epiphyte load (based on visual observations; no samples were collected). *Melobesia* was a very common epiphyte on some blades. The water temperature was abnormally high at the time of the sampling. Dungeness and red rock crabs were present and decorator crabs were abundant.

This homogenous, loose gravel site is usually sampled for sandlances. These fish accounted for most of the site's catch (47%), which was the most of any site sampled in 2006 for this species. The Pacific sanddab catch was also the largest of any site. Kelp greenling catches were highest in Barkley Sound.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 20.8	<b>SEDIMENT COMPOSITION:</b> N/A
<b>SALINITY (ppt):</b> 26.1	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 2.90	<b>SLOPE:</b> 8 - 10 <sup>0</sup>
<b>NITRATES (um):</b> below detection	<b>ESTIMATED EXPOSURE:</b> semi-exposed
<b>FLUORESCENCE (FU):</b> 0.949	<b>TURBIDITY:</b> 0.025 NTU

## Nettle (N) - Barkley Sound



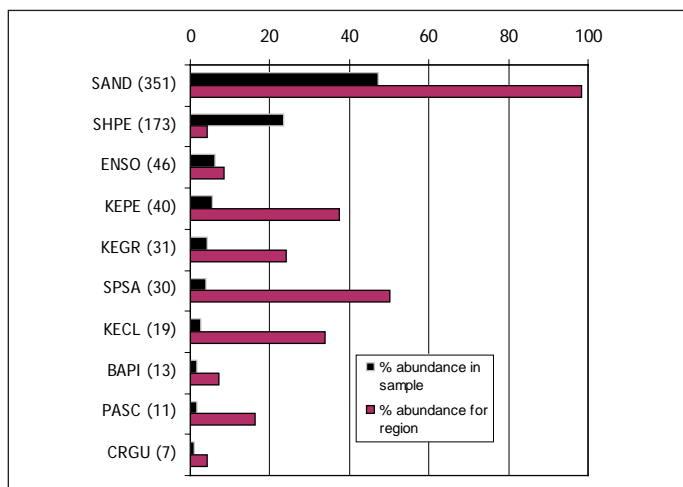
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> no eelgrass collected
<b>TIDAL RANGE:</b> Subtidal and intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> N/A
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> no eelgrass collected	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> N/A	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 18	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 741
<b>PIELOU'S EVENNESS:</b> 0.591	<b>TAXONOMIC DISTINCTIVENESS:</b> 90

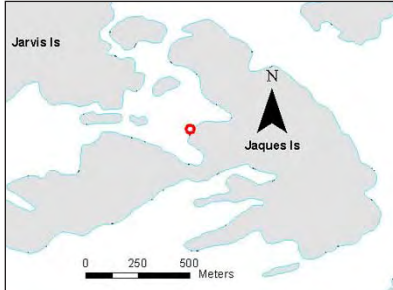
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	
VERO			GUNNELS	CRGU	●
	YERO			PEGU	
SCULPINS	BUSC	●		ROGU	
	CABE	●		SAGU	
FLSC			PRICKLEBACKS	SNPR	
	GRSC			BLPR	
MASC			HICO		
PASC	●		SLCO		
RBSC			FLATFISHES	COSO	●
REIL				ENSO	●
SISC				ROSO	
SMSC				SPSA	●
STSC	●			STFL	
TASC			GREENLINGS	WHGR	
TISC				KEGR	
PLATED FISHES	THST			PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL	●	PREY FISHES	HERR	●
	NOCL			SUSM	
GOBIES	ARGO			SAND	●
	BLGO	●	GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE	●		CUTT	

## Jaques-Jarvis Lagoon

UTM Coordinates : 333305 E  
 : 5421196 N  
 Date Sampled: JJuly 25, 2006 @ 6:45  
 Years Sampled: 2004, 2005, 2006  
 Weather: cloudy, calm



Small, thin, patchy and relatively undisturbed bed mostly subtidal, located in a sheltered area. The bed appeared stressed at the time of sampling. The very soft substrate made it hazardous to sample and only two sets were sampled, which partly explains the paucity of species (the site's species richness ranked 43rd out of 47 eelgrass beds sampled in 2006). The epiphyte load appeared medium based on visual observations.

Most of the catch was made up by shiner perch. Contrary to previous years there were few sticklebacks. The site boasted the second highest total of padded sculpins in Barkley Sound.

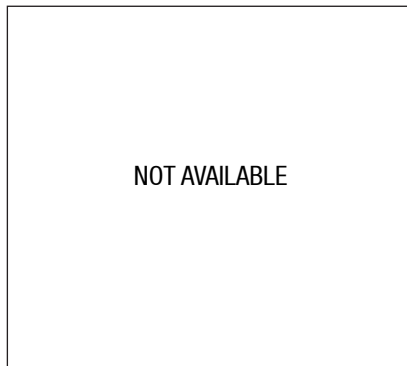


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 19.5	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 29	<b>SILT-CLAY FRACTION:</b> 18.60%
<b>CHLOROPHYLL a (ug/L):</b> 8.06	<b>SLOPE:</b> <10°
<b>NITRATES (um):</b> 0.15	<b>ESTIMATED EXPOSURE:</b> very protected
<b>FLUORESCENCE (FU):</b> 2.605	<b>TURBIDITY:</b> 0.064 NTU



## Jaques-Jarvis Lagoon (JJ) - Barkley Sound



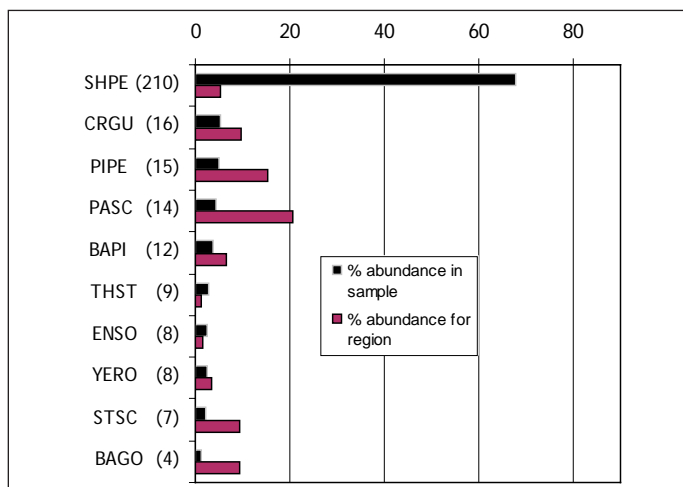
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> not collected in 2006
<b>TIDAL RANGE:</b> Subtidal and intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> N/A
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> not collected in 2006	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> not collected in 2006	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 13	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 309
<b>PIELOU'S EVENNESS:</b> 0.530	<b>TAXONOMIC DISTINCTIVENESS:</b> 90

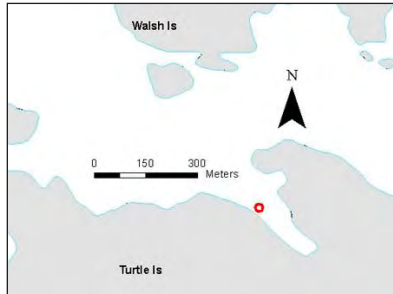
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE
	VERO		GUNNELS	CRGU ●
	YERO ●			PEGU
SCULPINS	BUSC			ROGU
	CABE			SAGU
	FLSC		PRICKLEBACKS	SNPR ●
	GRSC			BLPR
	MASC			HICO
	PASC ●			SLCO
	RBSC		FLATFISHES	COSO
	REIL			ENSO ●
	SISC			ROSO
	SMSC			SPSA
	STSC ●			STFL ●
	TASC		GREENLINGS	WHGR
	TISC			KEGR
PLATED FISHES	THST ●			PAGR
	TUBE			ROGR
	BAPI ●			LING
CLINGFISHES	KECL ●		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BAGO ●		GADIDS	TOMC
TOADFISH	PLMI		SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

## Joe's Bay

UTM Coordinates : 330119 E  
 : 5420364 N  
 Date Sampled: July 25, 2006 @ 9:30  
 Years Sampled: 2004, 2005, 2006  
 Weather: cloudy, foggy, slight mist, calm



Fairly undisturbed, thin bed in a small, shallow and narrow embayment on Turtle Island, mostly dewatered at low tide. Sailboats frequently anchor nearby. As in 2005, the water had a high humic acid content ('tea stained') at the time of collection. *Sargassum*, *Ulva torta*, *Cladophora* and *Ralfsia* were common in the intertidal. The clam *Saxidomus*, the sea stars *Dermasterias*, *Evasterias* and *Asterina* the snails *Tegula* and *Lithopoma*, and moon snails were all common. The epiphyte load (all diatoms) was more than double of that of last year (28% vs. 12%) but the eelgrass dry biomass per m<sup>2</sup> was the lowest of any site in 2006 (slightly more than half of that of the second lowest site, Roquefeuil Bay). The underwater portion of the bed was abutted to a large area of marl in deeper water and immediately adjacent to cobbles.

The site had one of the lowest species richness overall (42nd out of 47 sites) but its Taxonomic Distinctness ranked 5th overall (much higher than in 2005 - 79) indicating a fairly specific fish assemblage (species not much related to each other). As in 2005, shiner perch were the most abundant species, but there were many fewer padded sculpins. It had the third highest abundance of sticklebacks and the most starry flounders among Barkley Sound sites. Three black/yellowtail rockfish juveniles were caught.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 18	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 29.8	<b>SILT-CLAY FRACTION:</b> 4.8%
<b>CHLOROPHYLL a (ug/L):</b> 10.64	<b>SLOPE:</b> <5°
<b>NITRATES (um):</b> 0.10	<b>ESTIMATED EXPOSURE:</b> very protected
<b>FLUORESCENCE (FU):</b> 2.684	<b>TURBIDITY:</b> 0.042 NTU

## Joe's Bay (JB) - Barkley Sound



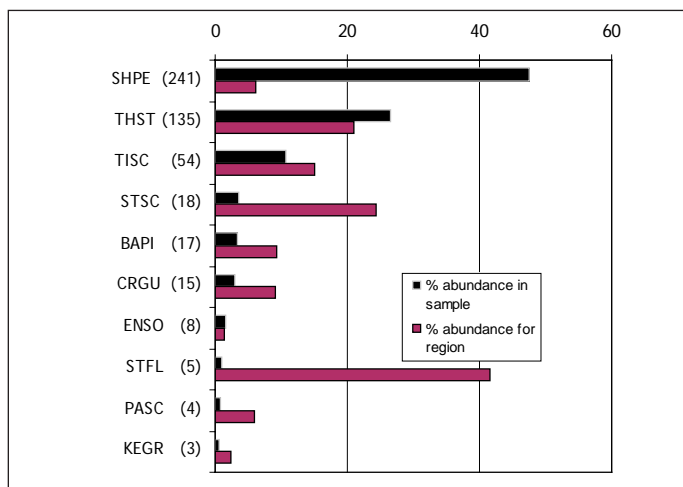
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Diatoms
<b>TIDAL RANGE:</b> Subtidal and intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 9
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 28
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 34	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,174
<b>LEAF AREA INDEX:</b> 0.66	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 14	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 508
<b>PIELOU'S EVENNESS:</b> 0.585	<b>TAXONOMIC DISTINCTIVENESS:</b> 98

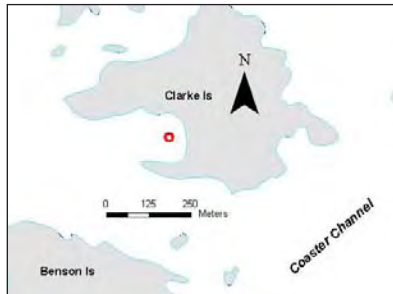
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO			SHPE	•
	CORO			STPE	
VERO			GUNNELS	CRGU	•
	YERO	•		PEGU	
SCULPINS	BUSC			ROGU	
	CABE	•		SAGU	
FLSC			PRICKLEBACKS	SNPR	
	GRSC			BLPR	
MASC			HICO		
PASC			SLCO		
RBSC			FLATFISHES	COSO	
REIL				ENSO	•
SISC			ROSO		
SMSC	•		SPSA		
STSC	•		STFL	•	
TASC			GREENLINGS	WHGR	
TISC	•			KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
BAPI	•		LING		
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO		GADIDS	TOMC	
TOADFISH	PLMI	•	SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	

## Clarke

UTM Coordinates : 325579 E  
 : 5417784 N  
 Date Sampled: JJuly 26, 2006 @ 7:00  
 Years Sampled: 2005, 2006  
 Weather: foggy and calm



● seine site  
 ○ approx. extent of intertidal eelgrass bed

Thin, patchy beds nestled among several different habitats, opening to Loudoun Channel. The epiphyte load was much higher than in 2005 (15% vs. 5% DW), diatoms in both cases. The subtidal bed consisted of small, thin patches surrounded by various habitats: *Phyllospadix* meadow, *Laminaria* sp., a giant kelp bed, sea staghorn alga (*Codium*), *Chondracanthus*, urchin barren, sand/cobble area with dense ulvoid cover and marl (sand/shells gravel). There were many invertebrates such as moon snails, bat stars, leather stars, spiny pink stars, red sea urchins, sea cucumbers (*Cucumaria*), and cerianthid anemones.

As in 2005, fish species richness was high (23 species, second only to Robbers Pass in the region) and catches were dominated by shiner perch. Also as in 2005, this site had unusually high numbers of crevice kelpfish, silver spotted sculpins, penpoint gunnels and striped seaperch for the region. Taxonomic Distinctness was however relatively low, indicating that the fish assemblage was composed of closely related species. The site had the highest catch of yellowtail/black rockfish of any eelgrass bed sampled in 2006, but only one copper rockfish. Overall this site and Roberts Point in Clayoquot Sound were tied for the highest rockfish catches of 2006. The only rock greenling caught in 2006 was at this site, and 7 out of 9 tubesnout were caught here.

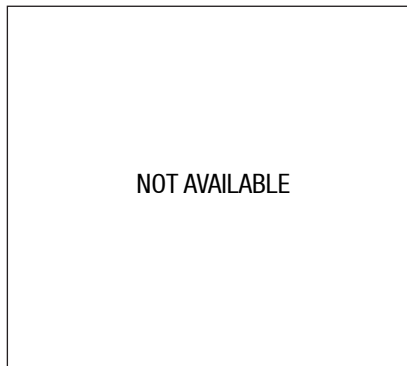


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.5	<b>SEDIMENT COMPOSITION:</b> N/A
<b>SALINITY (ppt):</b> 30.5	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 32.58	<b>SLOPE:</b> 10 - 15°
<b>NITRATES (um):</b> 0.28	<b>ESTIMATED EXPOSURE:</b> semi-exposed
<b>FLUORESCENCE (FU):</b> 8.8	<b>TURBIDITY:</b> 0.632 NTU



## Clarke (C) - Barkley Sound



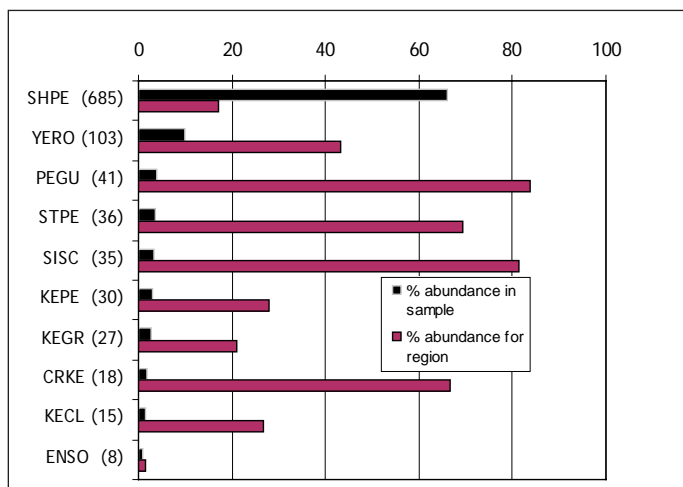
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some <i>Ulva</i> sp
<b>TIDAL RANGE:</b> mostly subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 40
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 600	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 15
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 218	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,099
<b>LEAF AREA INDEX:</b> 2.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> unknown

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 13	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 309
<b>PIELOU'S EVENNESS:</b> 0.530	<b>TAXONOMIC DISTINCTIVENESS:</b> 90

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	•
	BOCC			PIPE	•
	BRRO			SHPE	•
	CORO	•		STPE	•
VERO			GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC			ROGU	
	CABE	•		SAGU	•
FLSC			PRICKLEBACKS	SNPR	
	GRSC			BLPR	
MASC			HICO		
PASC	•		SLCO		
RBSC			FLATFISHES	COSO	
REIL	•			ENSO	•
SISC	•			ROSO	
SMSC				SPSA	
STSC				STFL	
TASC			GREENLINGS	WHGR	
TISC				KEGR	
PLATED FISHES	THST			PAGR	
	TUBE	•		ROGR	•
BAPI	•		LING		
CLINGFISHES	KECL	•	PREY FISHES	HERR	
	NOCL	•		SUSM	
GOBIES	BLGO			SAND	
BAGO			GADIDS	TOMC	
TOADFISH	PLMI	•	SALMONIDS	CHIN	
POACHER	TUPO	•		CHUM	
KELPFISH	CRKE	•		CUTT	

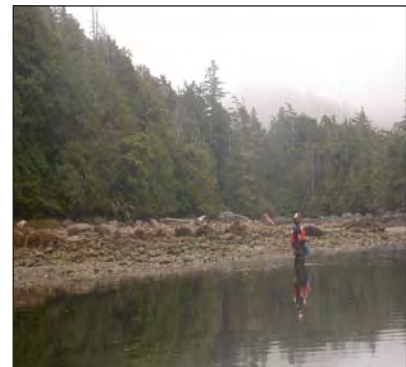
## Turret

UTM Coordinates : 328288 E  
 : 5418952 N  
 Date Sampled: July 26, 2006 @ 9:45  
 Years Sampled: 2004, 2005, 2006  
 Weather: foggy, calm



Relatively undisturbed, extensive and thick bed in a sheltered site. The intertidal epiphyte load was medium, slightly higher than the previous year (19% DW vs. 15% previously; diatoms). The underwater portion of the bed was also thick and dense and surrounded by muddy substrate (shells) and nearby laminariales. Leather, bat and spiny pink stars, Dungeness and kelp crabs were present.

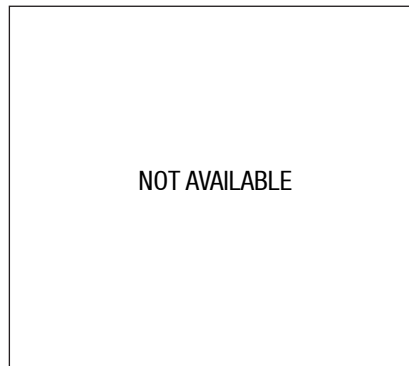
As in 2005, about one third of the yellowtail/black rockfish caught in Barkley Sound were caught here. There were many padded and smoothhead sculpins (the site tied for first among 2006 sites in the latter). Some people were seen harvesting in the intertidal and others exercising their pets.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.6	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 30.6	<b>SILT-CLAY FRACTION:</b> 5.30%
<b>CHLOROPHYLL a (ug/L):</b> 25.14	<b>SLOPE:</b> flat, <10°
<b>NITRATES (um):</b> 0.21	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 7.31	<b>TURBIDITY:</b> 0.607 NTU

### Turret (T) - Barkley Sound



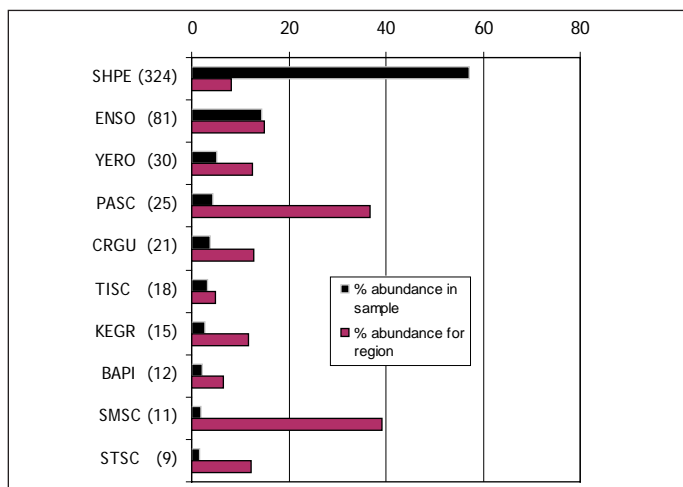
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 12
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 19
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 74	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,479
<b>LEAF AREA INDEX:</b> 1.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 6.987

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 21	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 566
<b>PIELOU'S EVENNESS:</b> 0.539	<b>TAXONOMIC DISTINCTIVENESS:</b> 97

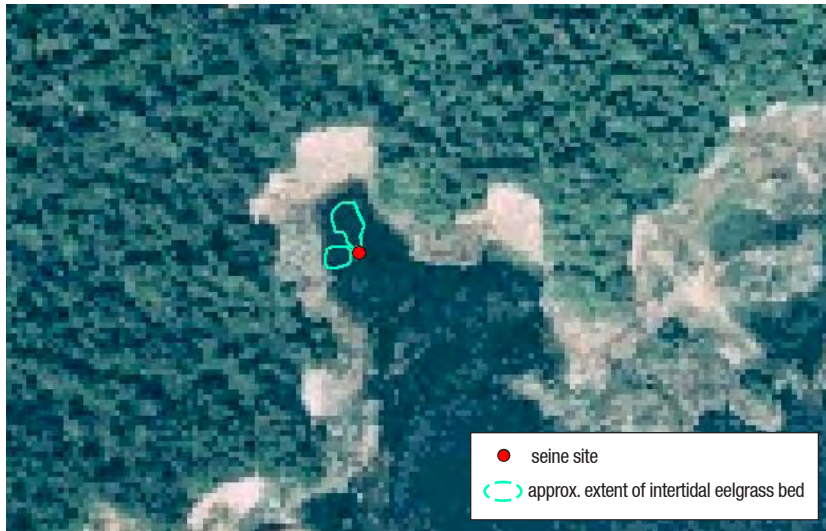
**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	•
	BOCC			PIPE	•
	BRRO			SHPE	•
	CORO			STPE	
VERO			GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC	•		ROGU	
	CABE	•		SAGU	•
FLSC			PRICKLEBACKS	SNPR	
	GRSC			BLPR	
	MASC			HICO	
	PASC	•		SLCO	
RBSC		FLATFISHES	COSO		
REIL			ENSO	•	
SISC			ROSO		
SMSC	•		SPSA	•	
STSC	•		STFL	•	
TASC			GREENLINGS	WHGR	
TISC	•			KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
	BAPI	•		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BAGO	•	GADIDS	TOMC	
TOADFISH	PLMI	•	SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	

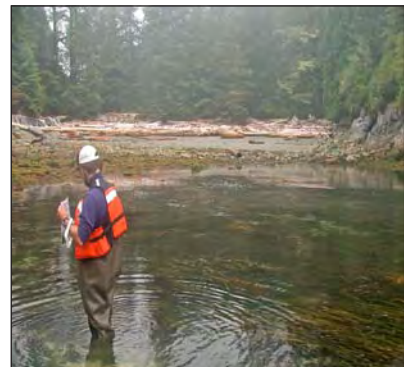
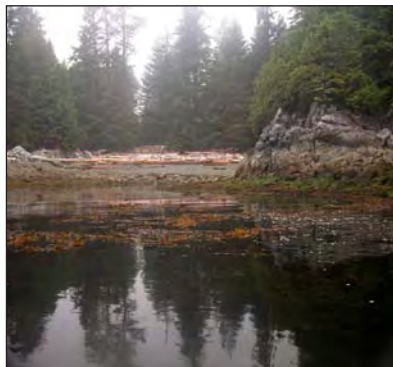
## Wouwer

UTM Coordinates : 327013 E  
 : 5414748 N  
 Date Sampled: July 27, 2006 @ 7:30  
 Years Sampled: 2006  
 Weather: foggy, misty, calm



Relatively sheltered eelgrass bed in a small bay behind a large reef but on the western edge of Barkley Sound and subjected to strong marine influences. Adjacent to a sandlance beach. *Phyllospadix*, *Macrocystis*, *Chondracanthus*, *Laminaria*, *Desmarestia*, *Costaria* and *Ulva* were common. Decorator crabs and sand shrimps (*Crangon*) were also common. The eelgrass dry biomass was relatively high (7th highest in 2006) but the epiphytic load was mid range.

The site boasted a fairly high species evenness (in top 3rd among all sites sampled in 2006), but the second lowest total of individuals caught in the region, after Mayne Bay. There were many rockfish, the most copper rockfish in Barkley Sound sites and the second most yellowtail/black, after Clarke. It was one of one of three sites where striped seaperch were caught in Barkley Sound, and 3 out of the 5 northern clingfish caught in all 2006 sites were caught there.

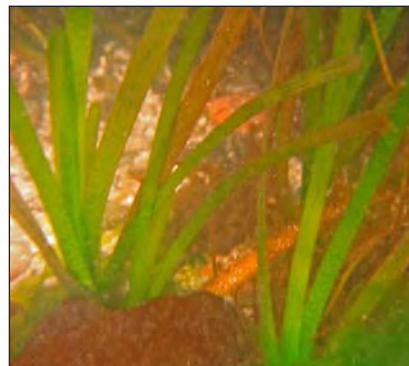


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 15.2	<b>SEDIMENT COMPOSITION:</b> sand
<b>SALINITY (ppt):</b> 31.2	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 5.80	<b>SLOPE:</b> 10 -15°
<b>NITRATES (um):</b> 1.40	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 1.41	<b>TURBIDITY:</b> 0.505 NTU



## Wouwer (W) - Barkley Sound



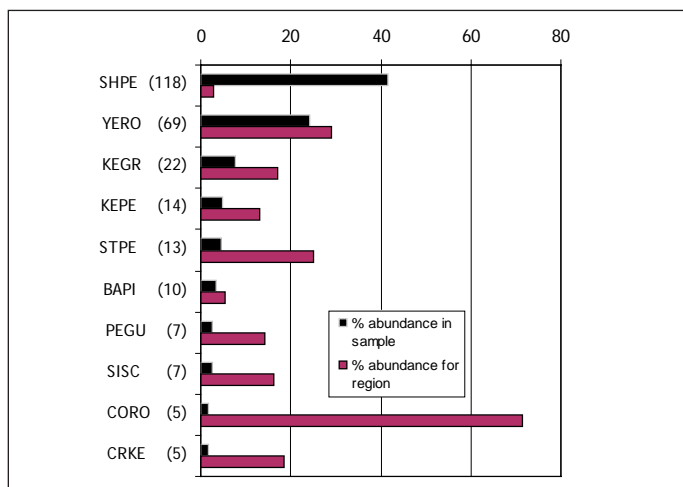
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly <i>Smithora naiadum</i> ; <i>Ulva</i> sp dominant on some blades
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 55
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 17
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 219	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 577
<b>LEAF AREA INDEX:</b> 1.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 17	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 284
<b>PIELOU'S EVENNESS:</b> 0.663	<b>TAXONOMIC DISTINCTIVENESS:</b> 91

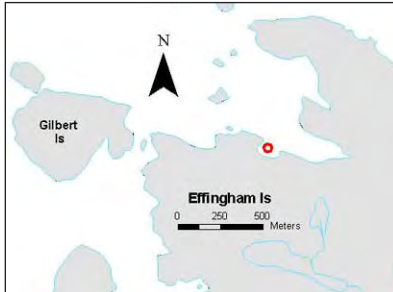
PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



SPECIES		SPECIES	
ROCKFISH	BLRO	SEA PERCHES	KEPE ●
	BOCC		PIPE ●
	BRRO		SHPE ●
	CORO ●		STPE ●
	VERO	GUNNELS	CRGU
	YERO ●		PEGU ●
SCULPINS	BUSC ●		ROGU ●
	CABE ●		SAGU
	FLSC	PRICKLEBACKS	SNPR
	GRSC		BLPR
	MASC		HICO
	PASC		SLCO
	RBSC	FLATFISHES	COSO
	REIL ●		ENSO
	SISC ●		ROSO
	SMSC		SPSA
	STSC		STFL
	TASC	GREENLINGS	WHGR
	TISC		KEGR ●
PLATED FISHES	THST		PAGR
	TUBE ●		ROGR
	BAPI ●		LING
CLINGFISHES	KECL	PREY FISHES	HERR
	NOCL ●		SUSM
GOBIES	ARGO		SAND
	BAGO	GADIDS	TOMC
TOADFISH	PLMI	SALMONIDS	CHIN
POACHER	TUPO		CHUM
KELPFISH	CRKE ●		CUTT

## Effingham

UTM Coordinates : 330695 E  
 : 5416033 N  
 Date Sampled: July 27, 2006 @ 11:00  
 Years Sampled: 2005, 2006  
 Weather: foggy and calm



Sheltered, small, thin and mostly intertidal bed, over a substrate of gravel, cobbles and mud. *Ulva torta* was common in the intertidal, as large woody debris. Sailboats frequently anchor nearby. The epiphyte load was much higher than the previous year (47% vs 19% DW) but again mostly diatoms.

As in 2005, the site ranked second in Barkley Sound in fish catches (7th overall). Catches were also dominated by shiner perch (the only perch species at this site), and this was mirrored by the low species evenness. The site ranked second overall in terms of Taxonomic Distinctness, indicating many unrelated species and perhaps high habitat variability. Tidepool sculpins were unusually common (the most of any site in 2006), as in 2005. Four of the five arrow gobies caught in all sites were caught at this site.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 15.1	<b>SEDIMENT COMPOSITION:</b> N/A
<b>SALINITY (ppt):</b> 30.7	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 30.59	<b>SLOPE:</b> flat, <5°
<b>NITRATES (um):</b> 0.08	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 9.51	<b>TURBIDITY:</b> 1.60 NTU

## Effingham (E) - Barkley Sound



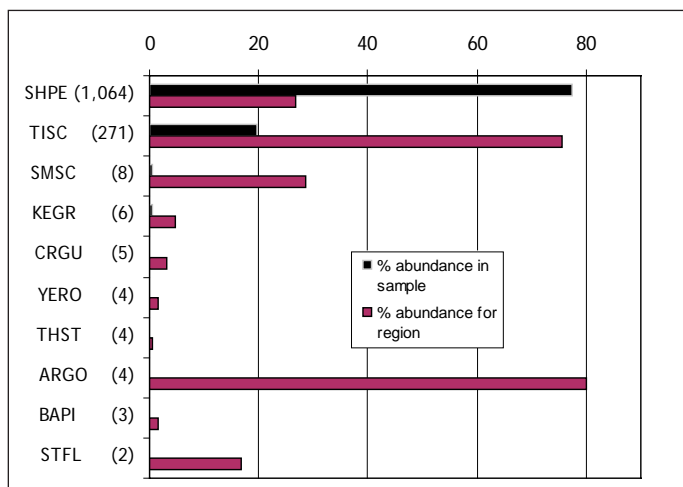
### Biological Characteristics of Eelgrass Bed and Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some filamentous red
<b>TIDAL RANGE:</b> Intertidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 42
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 700	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 47
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 83	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,258
<b>LEAF AREA INDEX:</b> 1.59	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 0

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 13	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 1,374
<b>PIELOU'S EVENNESS:</b> 0.266	<b>TAXONOMIC DISTINCTIVENESS:</b> 99

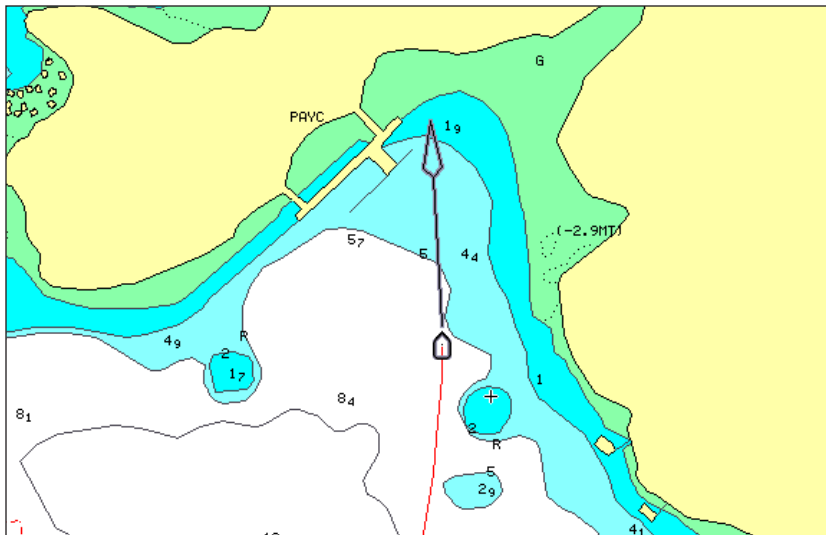
**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO			SHPE	•
	CORO			STPE	
VERO	VERO		GUNNELS	CRGU	•
	YERO	•		PEGU	
SCULPINS	BUSC			ROGU	•
	CABE			SAGU	
FLSC	FLSC		PRICKLEBACKS	SNPR	
	GRSC			BLPR	
MASC	MASC			HICO	
	PASC			SLCO	
RBSC	RBSC		FLATFISHES	COSO	
	REIL			ENSO	
SISC	SISC			ROSO	
	SMSC	•		SPSA	
STSC	STSC			STFL	•
	TASC		GREENLINGS	WHGR	
TISC	TISC	•		KEGR	•
PLATED FISHES	THST	•		PAGR	
	TUBE			ROGR	
BAPI	BAPI	•		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	•
	NOCL			SUSM	
GOBIES	ARGO	•		SAND	
	BAGO	•	GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
	POACHER	TUPO		CHUM	
KELPFISH	CRKE			CUTT	

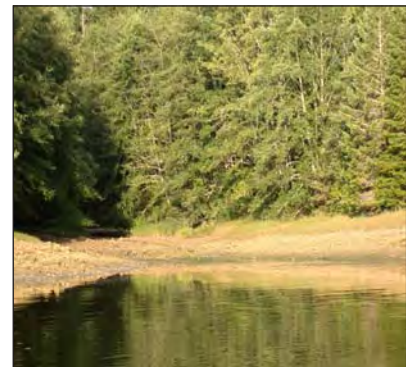
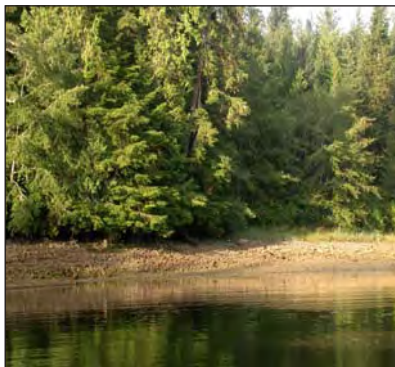
## Robbers Passage

UTM Coordinates : 344711 E  
 : 5417767 N  
 Date Sampled: July 28, 2006 @ 8:00  
 Years Sampled: 2004, 2006  
 Weather: 60% cloud cover, calm



Large bed in sheltered bay between two islands (subject to strong water circulation), adjacent to a small marina and a small creek. The epiphyte load as judged from visual observations was heavy. Woody debris were common. Dungeness and red rock crabs were common and graceful crabs were mostly soft shelled. There were many siphon shows. The site had a relatively high epiphyte load considering its eelgrass biomass.

The site had the highest species richness and the largest fish catch of any eelgrass bed sampled in 2006. Its Taxonomic Distinctness also ranked first overall, indicating a diverse fish assemblage (species not related to each other) and high diversity. It however also had the lowest species evenness of any site, due largely to the site being dominated by herring (by far the most herrings of any site in 2006). Without herring the site's catch would have ranked third highest in Barkley Sound. It also boasted the most English soles and Bay gobies of any site, and the most snake pricklebaks in Barkley Sound. The only chum salmon caught in Barkley Sound eelgrass beds was caught here, probably due to the proximity of a small stream. A school of Pacific mackerel patrolled the area, although none were caught in the seine.

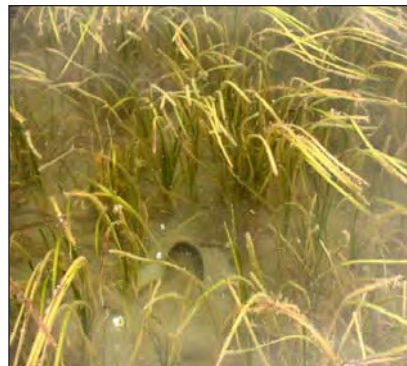
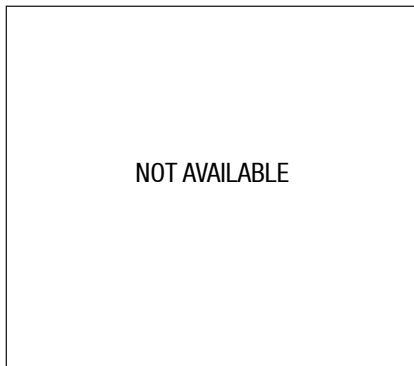


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16	<b>SEDIMENT COMPOSITION:</b> fine mud
<b>SALINITY (ppt):</b> 28.1	<b>SILT-CLAY FRACTION:</b> 5.50%
<b>CHLOROPHYLL a (ug/L):</b> 5.40	<b>SLOPE:</b> flat, <10°
<b>NITRATES (um):</b> 1.53	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 1.14	<b>TURBIDITY:</b> 0.082 NTU



## Robbers Passage (RP) - Barkley Sound



### Biological Characteristics of Eelgrass Bed and Epiphytes

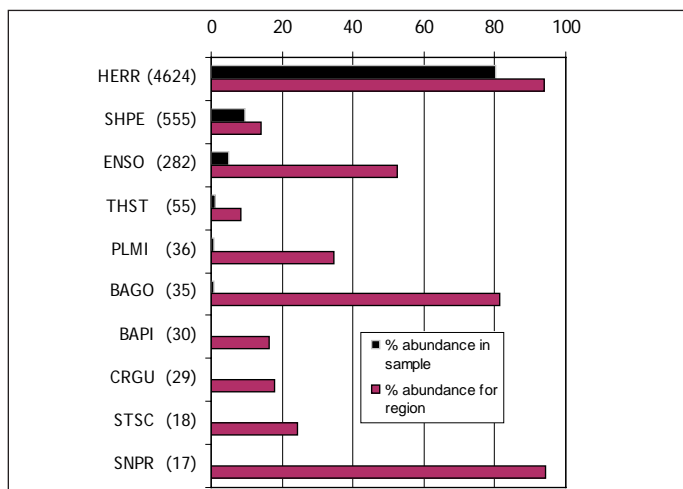
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 32
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 29
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 85	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,400
<b>LEAF AREA INDEX:</b> 0.8	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 3,700

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 27	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 5,774
<b>PIELOU'S EVENNESS:</b> 0.258	<b>TAXONOMIC DISTINCTIVENESS:</b> 100

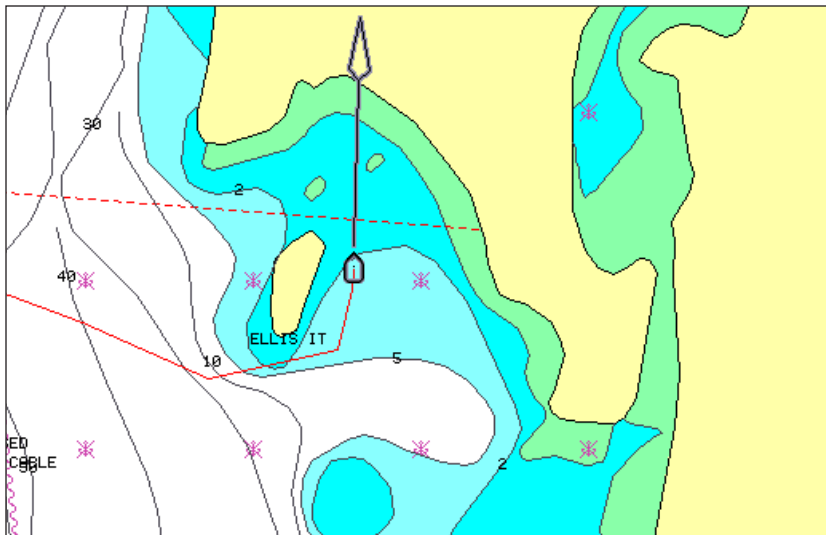
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO	●		STPE	●
VERO			GUNNELS	CRGU	●
	YERO	●		PEGU	●
SCULPINS	BUSC			ROGU	●
	CABE			SAGU	●
	FLSC		PRICKLEBACKS	SNPR	●
	GRSC	●		BLPR	●
MASC			HICO	●	
PASC	●		SLCO	●	
RBSC		FLATFISHES	COSO	●	
REIL			ENSO	●	
SISC			ROSO	●	
SMSC	●		SPSA	●	
STSC	●		STFL	●	
TASC		GREENLINGS	WHGR	●	
TISC	●		KEGR	●	
PLATED FISHES	THST	●	PAGR	●	
	TUBE		ROGR	●	
	BAPI	●	LING	●	
CLINGFISHES	KECL	●	PREY FISHES	HERR	●
	ARGO	●		SUSM	●
GOBIES	BAGO	●		SAND	●
	BLGO	●	GADIDS	TOMC	●
TOADFISH	PLMI	●	SALMONIDS	CHIN	●
POACHER	TUPO			CHUM	●
KELPFISH	CRKE			CUTT	●

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



## Roquefeuil Bay

UTM Coordinates : 345559 E  
 : 5414377 N  
 Date Sampled: July 28, 2006 @ 10:45  
 Years Sampled: 2004, 2006  
 Weather: 60% cloud cover, calm



Only site sampled SE of the Deer Group, and one of four sites with significant herring catches (3 of which were in the Barkley Sound area in 2006). The eelgrass bed was close to two *Macrocystis* beds. *Sargassum*, *Phyllospadix*, *Egregia* and *Chondracanthus* were also common nearby. The eelgrass dry biomass per m<sup>2</sup> was the second lowest among 2006 sites (Joe's Bay being the lowest).

The site's pile perch catches were the largest in Barkley Sound, second most in all eelgrass beds. All perch species were present, but very few sculpins. There were many deer tracks on the beach. Several SMURFs were anchored in the bay.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16	<b>SEDIMENT COMPOSITION:</b> gravel, sand
<b>SALINITY (ppt):</b> 28.5	<b>SILT-CLAY FRACTION:</b> 1.60%
<b>CHLOROPHYLL a (ug/L):</b> 5.91	<b>SLOPE:</b> flat, <10°
<b>NITRATES (um):</b> 1.43	<b>ESTIMATED EXPOSURE:</b> sheltered
<b>FLUORESCENCE (FU):</b> 3.15	<b>TURBIDITY:</b> 0.099 NTU

## Roquefeuil Bay (RB) - Barkley Sound

NOT AVAILABLE

NOT AVAILABLE

### Biological Characteristics of Eelgrass Bed and Epiphytes

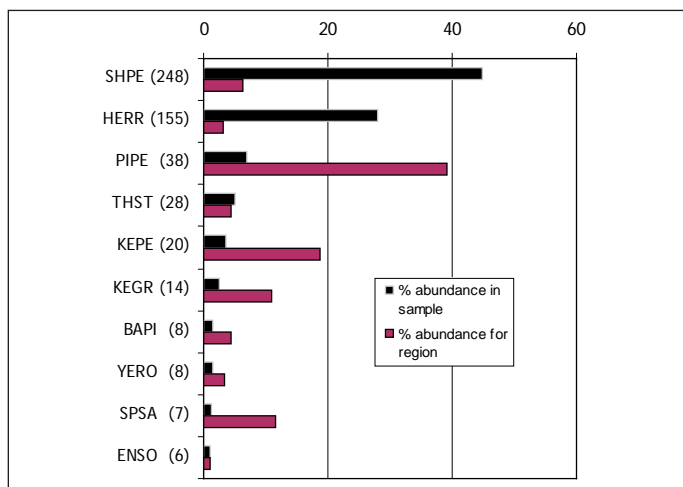
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms
<b>TIDAL RANGE:</b> Mostly subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 7
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 11
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 60	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> 0.7	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> N/A

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 19	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 552
<b>PIELOU'S EVENNESS:</b> 0.573	<b>TAXONOMIC DISTINCTIVENESS:</b> 92

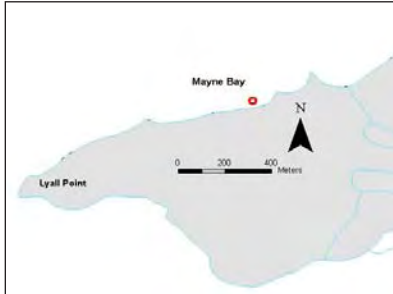
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
VERO			GUNNELS	CRGU	●
	YERO	●		PEGU	
SCULPINS	BUSC			ROGU	●
	CABE	●		SAGU	
	FLSC		PRICKLEBACKS	SNPR	
	GRSC			BLPR	
	MASC			HICO	
	PASC			SLCO	
	RBSC		FLATFISHES	COSO	●
	REIL			ENSO	●
	SISC			ROSO	
	SMSC			SPSA	●
	STSC	●		STFL	
	TASC		GREENLINGS	WHGR	
	TISC			KEGR	●
PLATED FISHES	THST	●		PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL	●	PREY FISHES	HERR	●
	NOCL			SUSM	
GOBIES	ARGO			SAND	●
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	TUPO			CHUM	
KELPFISH	CRKE			CUTT	

PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES  
(N in parentheses)



## Mayne Bay

UTM Coordinates : 330962 E  
 : 5425864 N  
 Date Sampled: July 29, 2006 @ 10:00  
 Years Sampled: 2005, 2006  
 Weather: calm, 60% overcast



Patchy intertidal bed over soft, muddy bottom and surrounded by other macrophytes such as *Sargassum* and *Desmarestia*. The epiphyte load was much lower than in 2005 ( 16% vs. 39% DW, mostly diatoms). The subtidal bed appeared thin and bordered by sand and boulders/cobbles/mud (low energy environment). Giant kelp & laminariales patches were recorded nearby. Many invertebrates were present such as slender crabs, sea cucumbers (*Parastichopus* & *Cucumaria*), anemones (*Tealia*, cerianthids), and bat stars. the snail *Lithopoma*, the sea stars *Dermasterias* and *Pisaster brevispinus* and the clam *Saxidomus* were also present in the low intertidal. One female green crab (*Carcinus maenas*) was caught in the seine net.

As in 2005, the catches were the lowest in Barkley Sound. They ranked third last for all sites in 2006. The ichthyofauna was however diverse, as expected from the presence of macrophytes nearby. There were proportionally high incidences of buffalo sculpins (highest for Barkley Sound) and many species of sculpins. No water samples were collected.

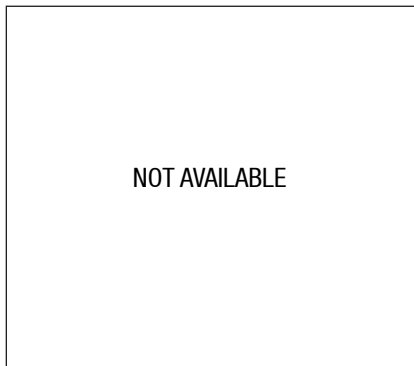


## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 18.8	<b>SEDIMENT COMPOSITION:</b> N/A
<b>SALINITY (ppt):</b> 28.1	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b>	<b>SLOPE:</b> 5 - 10°
<b>NITRATES (um):</b>	<b>ESTIMATED EXPOSURE:</b> semi-exposed
<b>FLUORESCENCE (FU):</b> N/A	<b>TURBIDITY:</b> N/A



## Mayne Bay (MB) - Barkley Sound



### Biological Characteristics of Eelgrass Bed and Epiphytes

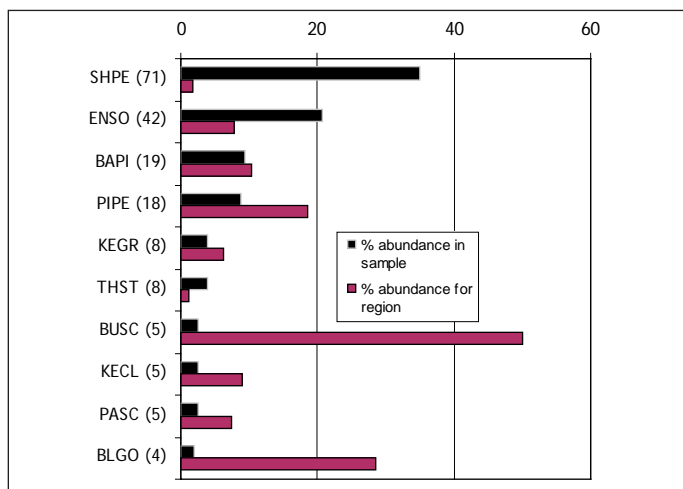
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Intertidal & subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 13
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 900	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 16
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 72	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,433
<b>LEAF AREA INDEX:</b> 1.2	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 16,550

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 21	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 203
<b>PIELOU'S EVENNESS:</b> 0.706	<b>TAXONOMIC DISTINCTIVENESS:</b> 94

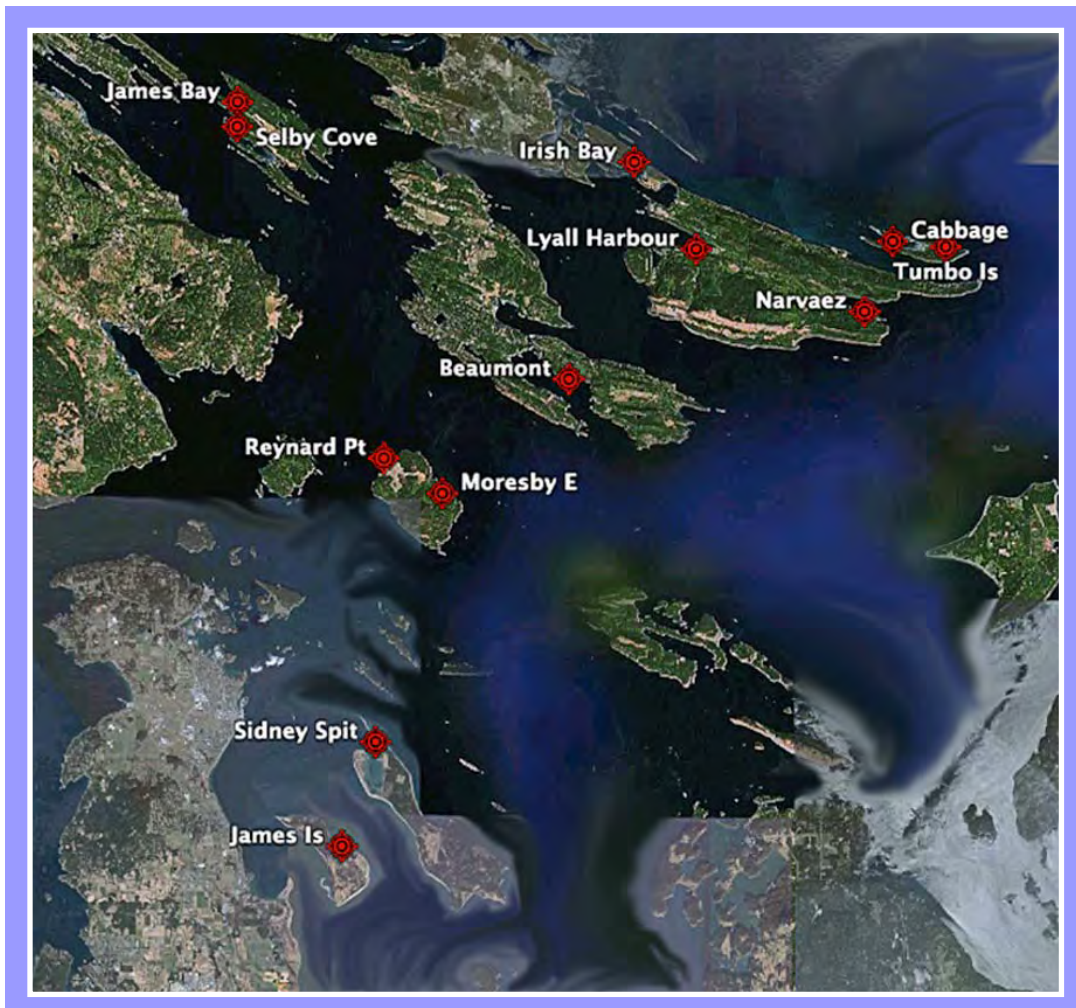
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE
VERO			GUNNELS	CRGU ●
	YERO	●		PEGU
SCULPINS	BUSC	●		ROGU
	CABE	●		SAGU ●
FLSC			PRICKLEBACKS	SNPR
	GRSC			BLPR
MASC				HICO
PASC	●			SLCO
RBSC			FLATFISHES	COSO
REIL	●			ENSO ●
SISC	●			ROSO
SMSC	●			SPSA ●
STSC	●			STFL
TASC			GREENLINGS	WHGR
TISC	●			KEGR ●
PLATED FISHES	THST	●		PAGR
	TUBE			ROGR
BAPI	●			LING
CLINGFISHES	KECL	●	PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO	●	GADIDS	TOMC
TOADFISH	PLMI	●	SALMONIDS	CHIN
POACHER	TUPO			CHUM
KELPFISH	CRKE			CUTT

#### PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)





## 2.5 Gulf Islands Site Descriptions



## Lyall Harbour

UTM Coordinates : 486801 E  
: 5404618 N  
Date Sampled: August 05, 2006 @ 8:00  
Years Sampled: 2004, 2005, 2006  
Weather: sunny & calm

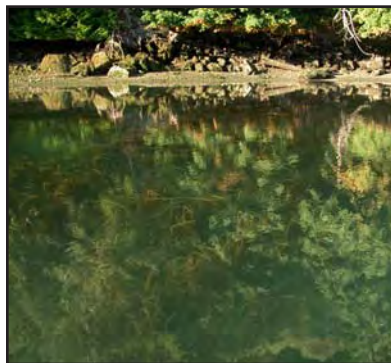


Highly disturbed site close to a small marina. The portion of the bed sampled at the SE end of the bay was narrow and thin and is part of a larger bed extending across the bay. It is located near the only salmon-bearing stream of the Southern Gulf Islands. The bed is mostly subtidal over mud/sand/gravel substrate. The surrounding area was sand/mud with heavy cover sea lettuce and some patchy *Gracilaria* cover. The intertidal and subtidal epiphyte loads appeared heavy as judged from the video and dominated by

diatoms mixed with some sea lettuce. Incidence of wasting disease could not be ascertained due to high epiphyte cover.

The site had the highest fish catches in the Gulf Islands region, as in the previous year (21% of the total number, same as in 2005), and second highest overall in 2006. It was once again dominated by shiner perch (85% of the total catch) - highest catch of this species overall - which partly explains why it ranked second lowest for diversity and third lowest for species

evenness overall. It also had the lowest Taxonomic Diversity of any site in 2006, indicating that many species were related (it had all perch species, for example). It had the highest pile perch catches of any site in 2006, perhaps due to its proximity to a wharf. Its high sticklebacks numbers (highest for the region) may relate to the influence from the nearby creek. As in 2005, snake pricklebacks numbers were high for the region.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 15.7	<b>SEDIMENT COMPOSITION:</b> mud, sand, gravel
<b>SALINITY (ppt):</b> 24.4	<b>SILT-CLAY FRACTION:</b> 1.8%
<b>CHLOROPHYLL a (ug/L):</b> 11.47	<b>SLOPE:</b> 5 - 10°
<b>NITRATES (um):</b> below detection	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 4.95	<b>TURBIDITY:</b> 0.134 NTU



## Lyall Harbour (LH) - Gulf Islands



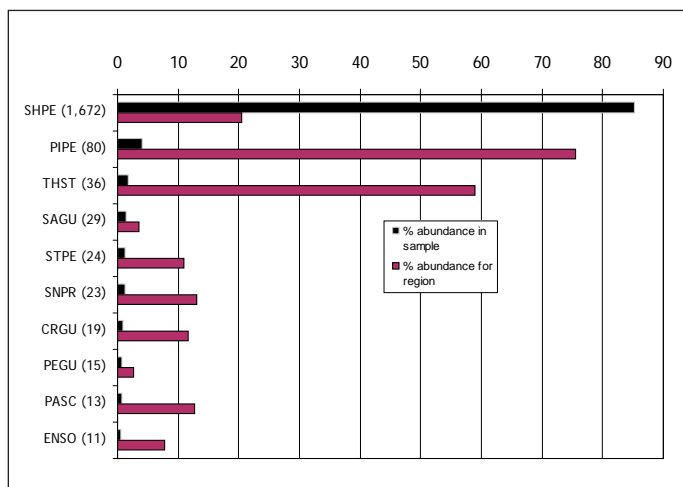
### Biological Characteristics of Eelgrass Bed And Epiphytes

<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Diatoms with some silt-clay
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> N/A
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> Not collected in 2006	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> N/A	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 10,600

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 19	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 1,960
<b>PIELOU'S EVENNESS:</b> 0.6261	<b>TAXONOMIC DISTINCTIVENESS:</b> 77

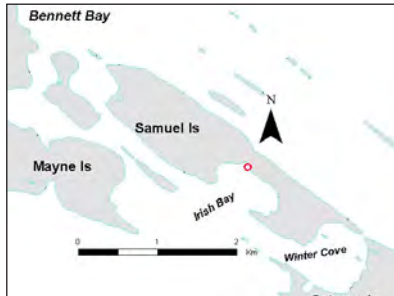
**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE ●
UNRO			GUNNELS	CRGU ●
	YERO			PEGU ●
SCULPINS	BUSC			ROGU
	CABE			SAGU ●
REIL			PRICKLEBACKS	SNPR ●
GRSC	●			BLPR
TASC	●			HICO
PASC	●			SLCO ●
RBSC			FLATFISHES	COSO
FLSC				ENSO ●
SISC				ROSO
SMSC				SPSA
STSC	●			STFL
SHSC			GREENLINGS	WHGR ●
TISC	●			KEGR
PLATED FISHES	THST	●		PAGR
	TUBE			ROGR
BAPI	●			LING
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI	●		WALL
POACHER	NSPO		SALMONIDS	CHUM
KELPFISH	CRKE			CUTT

## Irish Bay

UTM Coordinates : 484656 E  
 : 5407660 N  
 Date Sampled: August 05, 2006 @ 10:00  
 Years Sampled: 2005, 2006  
 Weather: sunny, calm



Thin and disturbed subtidal bed in open bay over gravel over mud/sand and among understory of sea lettuce and laminariales. Some Gracilaria. The bed sampled was abutted to a sandstone shoreline on its NE side. No eelgrass samples were collected so the epiphyte load could not be assessed. It was heavy in 2005 (30%).

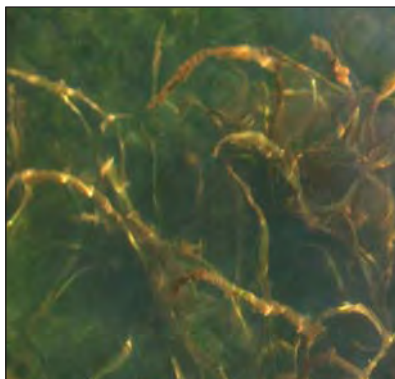
As was the case the previous year, the site was dominated by shiner perch. It had the lowest species diversity and evenness of any site in 2006, and also ranked among the three lowest sites for Taxonomic Distinctness, indicating that many species were related. For example, the four species of perch accounted for 90% of the total catch (as compared to 75% in 2005). As opposed to the previous year, no copper rockfish juveniles were caught in 2006.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16.5	<b>SEDIMENT COMPOSITION:</b> gravel, sand
<b>SALINITY (ppt):</b> 23.0	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 3.13	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.64	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.47	<b>TURBIDITY:</b> 0.105 NTU

## Irish Bay (IB) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

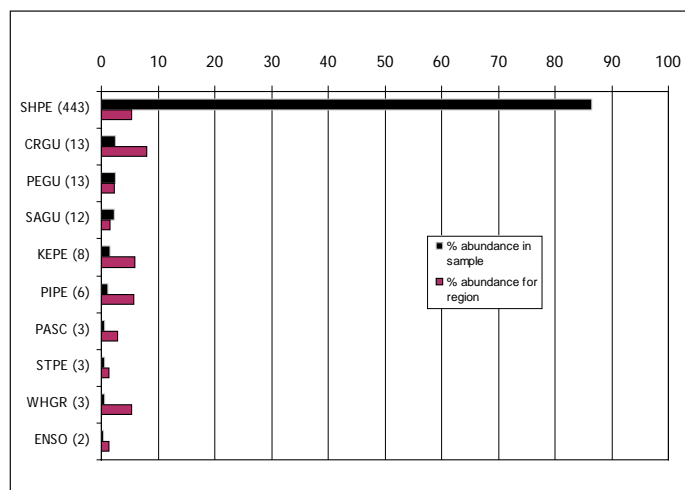
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms (based on photographs)
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> No collection
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> No collection	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> N/A	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> N/A
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 3,994

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
16	512
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.253	79

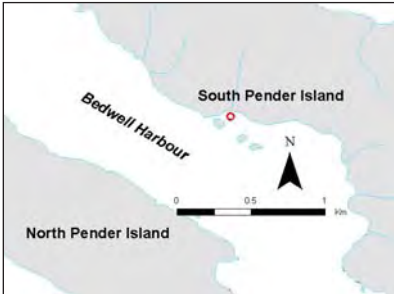
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
	UNRO		GUNNELS	CRGU	●
	YERO			PEGU	●
SCULPINS	BUSC			ROGU	
	CABE	●		SAGU	●
	REIL		PRICKLEBACKS	SNPR	
	GRSC	●		BLPR	
	MASC			HICO	
	PASC	●		SLCO	
	RBSC		FLATFISHES	COSO	
	FLSC			ENSO	●
	SISC			ROSO	
	SMSC			SPSA	
	STSC	●		STFL	
	SHSC		GREENLINGS	WHGR	●
	TISC	●		KEGR	
PLATED FISHES	THST	●		PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI	●		WALL	
POACHER	NSPO		SALMONIDS	CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



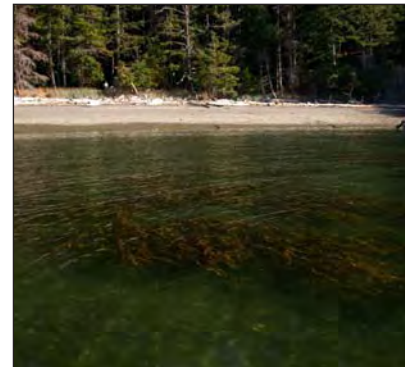
## Beaumont

UTM Coordinates : 482354 E  
 : 5400132 N  
 Date Sampled: August 06, 2006 @ 8:15  
 Years Sampled: 2004, 2005, 2006  
 Weather: Sunny & calm



Patchy subtidal bed in a gravel/cobble sheltered cove. The bed was thin at times and interspersed with woody debris and some laminariales; its surrounding area was diatom mat-covered mud, with many siphons (possibly roughmyas) protruding. As in 2005, the epiphyte load was heavy with blades covered with diatoms (5th highest in 2006).

As in the previous year, shiner perch dominated the fish catches. Bay pipefish were however much rarer than in 2005, although the total catch was similar (326 vs. 318 fishes). The site had only two species of perch, but harboured three of the six smooth head sculpins caught in the Gulf Islands sites, and all Red Irish Lords (2). A brood of river otters (at least four individuals) occupied the area.



### Physical Characteristics

<b>TEMPERATURE ( °C):</b> 15.3	<b>SEDIMENT COMPOSITION:</b> mud and gravel
<b>SALINITY (ppt):</b> 26.3	<b>SILT-CLAY FRACTION:</b> 15.4%
<b>CHLOROPHYLL a (ug/L):</b> 3.99	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 1.62	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 2.625	<b>TURBIDITY:</b> 0.04 NTU



## Beaumont (BM) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

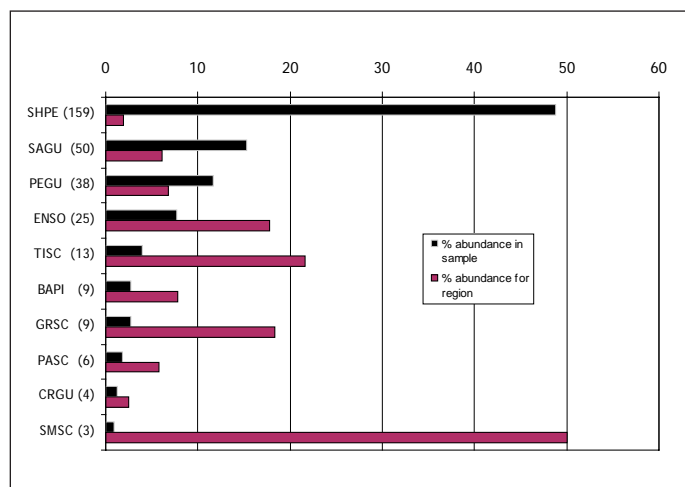
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms; some <i>Smithora</i> and filamentous red
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 97
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 58
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 170	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 2.3	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 6,000

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
18	326
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.606	89

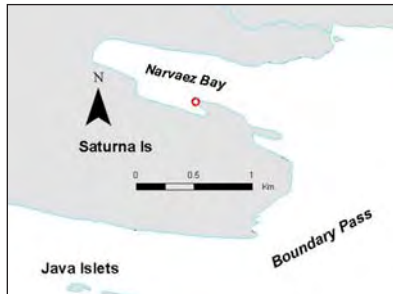
	SPECIES			SPECIES		
ROCKFISH	BLRO		SEA PERCHES	KEPE		
	BOCC			PIPE	•	
	BRRO			SHPE	•	
	CORO			STPE		
SCULPINS	UNRO		GUNNELS	CRGU	•	
	YERO			PEGU	•	
	BUSC			ROGU		
	CABE			SAGU	•	
	REIL	•	PRICKLEBACKS	SNPR	•	
	GRSC	•		BLPR		
	MASC			HICO		
	PASC			SLCO		
	RBSC		FLATFISHES	COSO		
	FLSC			ENSO	•	
	SISC			ROSO		
	SMSC	•		SPSA		
	STSC	•		STFL		
	UNSC		GREENLINGS	WHGR	•	
	TISC	•		KEGR		
	PLATED FISHES	THST	•	PAGR		
	TUBE			ROGR		
	BAPI	•		LING		
	CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM		
GOBIES	ARGO			SAND		
	BLGO		GADIDS	TOMC		
TOADFISH	PLMI	•	SALMONIDS	CHIN		
POACHER	NSPO	•		CHUM		
KELPFISH	CRKE			CUTT		

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



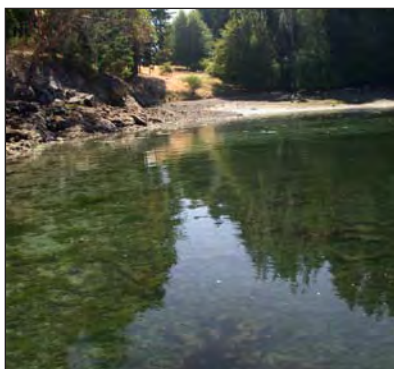
## Narvaez

UTM Coordinates : 492635 E  
 : 5402426 N  
 Date Sampled: August 06, 2006 @ 10:00  
 Years Sampled: 2005, 2006  
 Weather: sunny, calm



Thin and small subtidal bed at the tip of the north point of a small cove. The subtidal eelgrass shoots were heavily loaded with epiphytes (diatoms) and well spaced. The understory was covered by sea lettuce on mud/sand bottom, with some laminariales scattered throughout. Stiletto shrimps and juvenile green sea urchins were present.

As was the case the previous year, the site had the lowest fish abundance of the region. It also had the third lowest species richness and the second lowest Taxonomic Distinctness overall. There was only one juvenile copper rockfish whereas they were common last year. The site had however the only brown rockfish caught in the region. There were no sticklebacks nor flatfish and this was the only Gulf Island eelgrass bed without any staghorn sculpin in the catches, which does not necessarily mean that they were not present.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.5	<b>SEDIMENT COMPOSITION:</b> gravel, cobbles
<b>SALINITY (ppt):</b> 27.3	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 1.79	<b>SLOPE:</b> 15 - 20°
<b>NITRATES (um):</b> 8.42	<b>ESTIMATED EXPOSURE:</b> Semi-protected
<b>FLUORESCENCE (FU):</b> 0.726	<b>TURBIDITY:</b> 0.011 NTU

## Narvaez (N) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

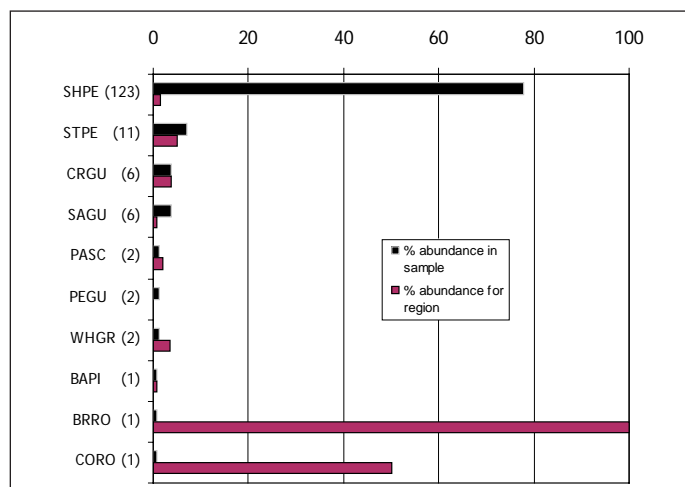
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> <i>Ulva</i> sp., diatoms based on photographs
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> Not collected
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> Not collected	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> N/A	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 1,500

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
13	158
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.385	79

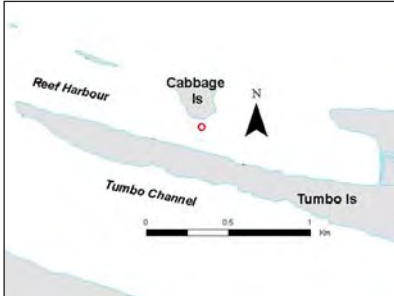
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO	•		SHPE	•
	CORO	•		STPE	•
	UNRO		GUNNELS	CRGU	•
	YERO			PEGU	•
SCULPINS	BUSC			ROGU	
	CABE			SAGU	•
	REIL		PRICKLEBACKS	SNPR	
	GRSC	•		BLPR	
	TASC			HICO	
	PASC	•		SLCO	
	ROSC		FLATFISHES	COSO	
	UNSC			ENSO	
	SISC			ROSO	
	SMSC	•		SPSA	
	STSC			STFL	
	SHSC		GREENLINGS	WHGR	•
	TISC			KEGR	
PLATED FISHES	THST			PAGR	
	TUBE			ROGR	
	BAPI	•		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI			WALL	
POACHER	NSPO	•	SALMONIDS	CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



## Cabbage

UTM Coordinates : 493634 E  
 : 5404873 N  
 Date Sampled: August 07, 2006 @ 9:00  
 Years Sampled: 2005, 2006  
 Weather: sunny, some ripples



Thick, stressed and mostly subtidal bed in an area heavily used by boaters (moorage site, recreation). As in the previous year, the site had the second heaviest epiphyte load (112% eelgrass DW; mostly *Ulva*, diatoms, *Smithora* and *Kormmannia*) after Tumbo Is, its adjacent site. It was one of the few sites where the presence of *Z. marina* var. *latifolia* was confirmed. This partly explains the high eelgrass biomass (2nd overall). As in 2005, many bubble shells were crawling on the blades and sea perch were feeding on their egg masses. A bed of laminariales was at the western edge of the eelgrass bed on the rocky slope.

Shiner perch dominated the catches as was the case the previous year. The site had one of the lowest diversity (Simpson's) and species evenness of all 2006 sites, and the third lowest taxonomic distinctness. It however boasted the highest catches of kelp perch (mostly juveniles) overall, the most tidepool sculpins and the second highest catches of bay pipefish in the region, second only to its adjacent site, Tumbo Island. It was also one of two Gulf Islands sites sampled with C-0 soles.



### Physical Characteristics

<b>TEMPERATURE ( °C):</b> 17.3	<b>SEDIMENT COMPOSITION:</b> gravel, sand
<b>SALINITY (ppt):</b> 24.9	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 1.83	<b>SLOPE:</b> 10 - 20°
<b>NITRATES (um):</b> 0.11	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 0.725	<b>TURBIDITY:</b> 0.072 NTU



## Cabbage (CA) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

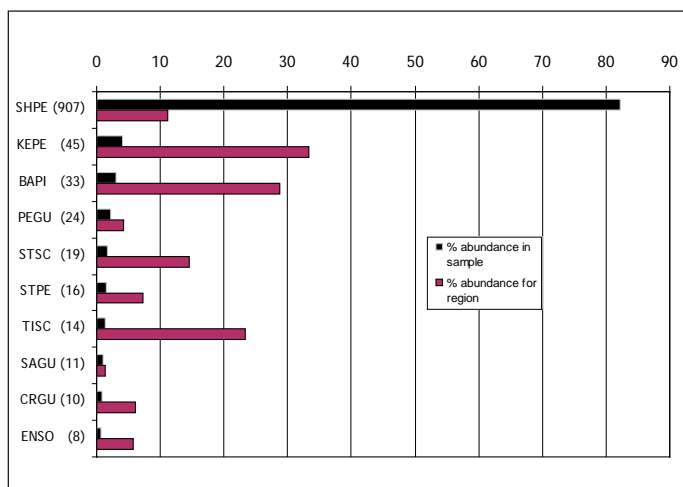
<b>ECOTYPE:</b>	<i>Zostera marina, var. latifolia</i> some <i>Z. marina</i> var. <i>phillipsi</i>	<b>EPIPHYTE(S):</b>	100% diatoms
<b>TIDAL RANGE:</b>	Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b>	301
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b>	200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b>	113
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b>	302	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b>	0
<b>LEAF AREA INDEX:</b>	3.5	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b>	81,900

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
19	1,103
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.299	81

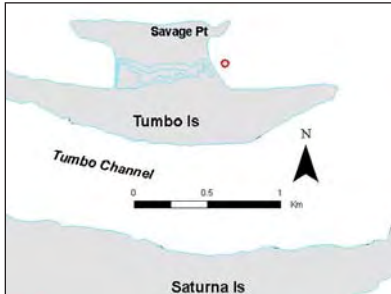
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
	UNRO		GUNNELS	CRGU	●
	YERO			PEGU	●
SCULPINS	BUSC	●		ROGU	
	CABE			SAGU	●
	REIL		PRICKLEBACKS	SNPR	
	GRSC	●		BLPR	
	MASC			HICO	
	PASC	●		SLCO	
	RBSC		FLATFISHES	COSO	●
	FLSC			ENSO	●
	SISC			ROSO	
	SMSC	●		SPSA	
	STSC	●		STFL	
	UNSC		GREENLINGS	WHGR	●
	TISC	●		KEGR	●
PLATED FISHES	THST	●		PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI		SALMONIDS	CHIN	
POACHER	NSPO			CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



## Tumbo Island

UTM Coordinates : 495476 E  
 : 5404688 N  
 Date Sampled: August 07, 2006 @ 11:00  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and calm



Thin and patchy subtidal bed on a gravel and mud substrate in the shallow subtidal, becoming sandy in the deeper area. Weak slope (1-3%). Dense understory of sea lettuce and some laminariales. A sea lettuce band lied between the shore end of the bed and the intertidal zone. The epiphyte load was the heaviest of all sites measured in 2006 (diatoms, 150% of eelgrass biomass). Mud shrimp (*Crangon* sp) were common.

The site had the 5th largest catches overall, most of which made by shiner perch. These fish were much more numerous than in 2005 (when only 46 were caught). Saddleback gunnels were however as abundant as in the previous year. The site had the most bay pipefish, crescent gunnels, padded sculpins, cabezons and English and C-O soles in the region. The site also harboured one of the four juvenile rockfish caught in the region. A northern spearnose poacher was seen in the eelgrass bed but none were caught



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 16.7	<b>SEDIMENT COMPOSITION:</b> sand, mud
<b>SALINITY (ppt):</b> 25.8	<b>SILT-CLAY FRACTION:</b> 6.1%
<b>CHLOROPHYLL a (ug/L):</b> 1.50	<b>SLOPE:</b> <10 <sup>0</sup>
<b>NITRATES (um):</b> 0.95	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 0.7663	<b>TURBIDITY:</b> 0.044 NTU

## Tumbo Island (TI) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

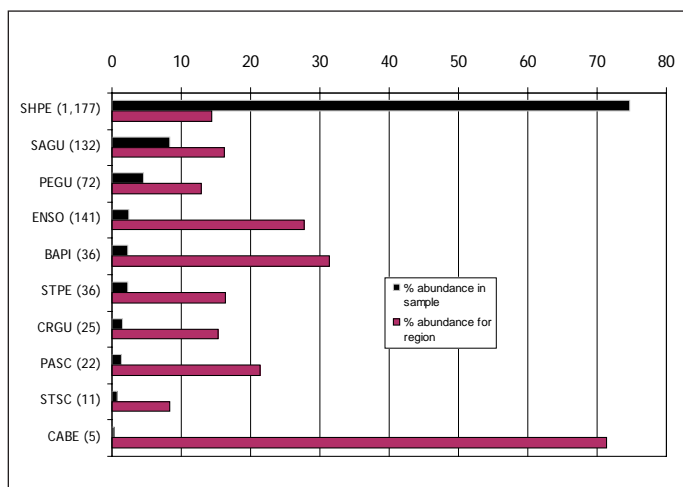
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms; some filamentous red
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 183
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 200	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 143
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 142	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 1.8	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 60,000

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 18	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 1,575
<b>PIELOU'S EVENNESS:</b> 0.377	<b>TAXONOMIC DISTINCTIVENESS:</b> 85

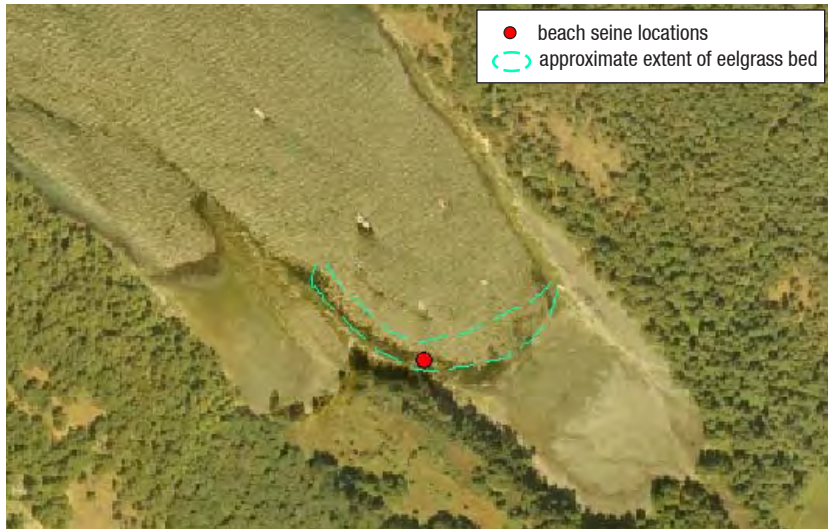
	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE
	BOCC			PIPE
	BRRO			SHPE
	CORO	•		STPE
	UNRO		GUNNELS	CRGU
	YERO			PEGU
SCULPINS	BUSC	•		ROGU
	CABE	•		SAGU
	REIL		PRICKLEBACKS	SNPR
	GRSC	•		BLPR
	MASC			HICO
	PASC	•		SLCO
	ROSC		FLATFISHES	COSO
	SASC	•		ENSO
	SISC			ROSO
	SMSC			SPSA
	STSC	•		STFL
	SHSC		GREENLINGS	WHGR
	TISC	•		KEGR
PLATED FISHES	THST			PAGR
	TUBE			ROGR
	BAPI			LING
CLINGFISHES	KECL		PREY FISHES	HERR
	NOCL			SUSM
GOBIES	ARGO			SAND
	BLGO		GADIDS	TOMC
TOADFISH	PLMI			WALL
POACHER	NSPO		SALMONIDS	CHUM
KELPFISH	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



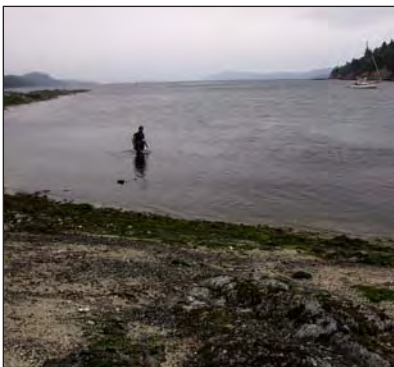
## James Bay

UTM Coordinates : 470854 E  
 : 5409793 N  
 Date Sampled: August 08, 2006 @ 9:15  
 Years Sampled: 2004, 2005, 2006  
 Weather: overcast, some ripples (wind 10 knts from W)



Stressed subtidal bed in a narrow bay on Prevoist Island. Bed patchy, thin at times, on mud with an understory of laminariales by a small beach bordered on two sides by rocky outcrops. Sea lettuce common in the surrounding area. The epiphyte load was the lowest for the region (20% DW) and as the previous year consisted of diatoms and Smithora. There were many juvenile Dungeness crabs and kelp crabs.

The site was dominated by shiner perch, and all perch species were present, which partly accounts for its low Taxonomic Distinctness (fifth lowest overall). There were few sculpins and the site had the lowest catches of saddleback gunnels of the region. Plainfin midshipman juveniles were very common the previous year (88% of the region's catch) and although less numerous in 2006, accounted for more than half of the region's catch for this species.

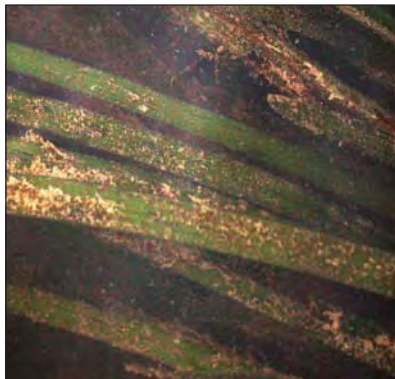


### Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.3	<b>SEDIMENT COMPOSITION:</b> gravel, sand
<b>SALINITY (ppt):</b> 27.2	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 5.84	<b>SLOPE:</b> 5 - 10°
<b>NITRATES (um):</b> 1.60	<b>ESTIMATED EXPOSURE:</b> Very protected
<b>FLUORESCENCE (FU):</b> 3.105	<b>TURBIDITY:</b> 0.024 NTU



## James Bay (J) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

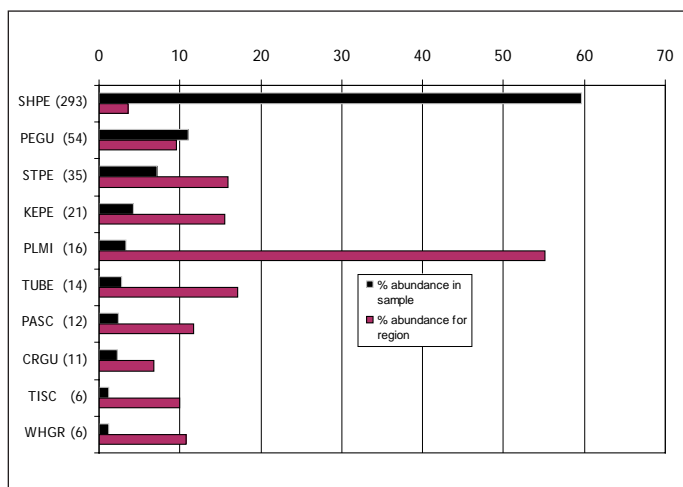
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms; some <i>Smithora</i>
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 73
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 20
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 295	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 3.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 6,400

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
19	491
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.547	82

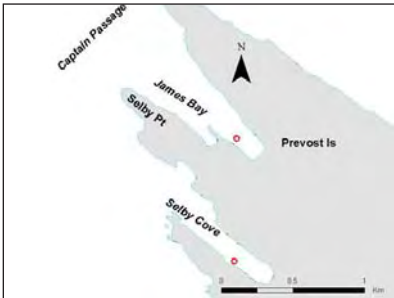
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
SCULPINS	UNRO		GUNNELS	CRGU	●
	YERO			PEGU	●
	BUSC	●		ROGU	
PLATED FISHES	CABE			SAGU	●
	REIL		PRICKLEBACKS	SNPR	
	GRSC	●		BLPR	
	MASC			HICO	
	PASC	●		SLCO	
TOADFISH	RBSC		FLATFISHES	COSO	
	FLSC			ENSO	●
	SISC			ROSO	
GOBIES	SMSC			SPSA	
	STSC	●		STFL	
	UNSC		GREENLINGS	WHGR	●
POACHER	TISC	●		KEGR	●
	THST			PAGR	
KELPFISH	TUBE	●		ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GADIDS	ARGO			SAND	
	BLGO			TOMC	
SALMONIDS	PLMI	●		WALL	●
	NSPO			CHUM	
	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



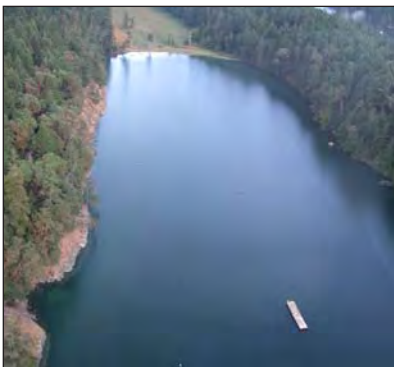
## Selby Cove

UTM Coordinates : 470840 E  
 : 5408935 N  
 Date Sampled: August 08, 2006 @ 11:00  
 Years Sampled: 2005, 2006  
 Weather: cloudy, misty and calm



Subtidal bed in a narrow bay south of James Bay. While the eelgrass bed was recorded as dense in 2005, it was patchy in 2006. The subtidal substrate was primarily muddy bottom. The substrate in the low intertidal was primarily boulders and cobbles. Algae belonging to the *Gracilaria/Gracilariopsis* complex were common near the eelgrass. The epiphyte load as judged in the field was medium. As in the previous year, egg masses (likely nudibranch) were also common on the blades, and bubble shells were abundant. Juvenile *Pycnopodia* (sea star) and red rock crabs were very common. Oysters (*Crassostrea gigas*) were common in the intertidal zone.

Shiner perch did not dominate the site's catches as much as other sites in the region. There were only 5 tidepool sculpins caught - these fish had been the most abundant fish at this site in 2005. The site had the highest snake prickleback catches of any site in 2006.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 14.3	<b>SEDIMENT COMPOSITION:</b> sand, mud, gravel, woody debris
<b>SALINITY (ppt):</b> 27.9	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 1.20	<b>SLOPE:</b> 10 <sup>0</sup>
<b>NITRATES (um):</b> 2.77	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 0.625	<b>TURBIDITY:</b> 0.081 NTU

## Selby Cove (SEC) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

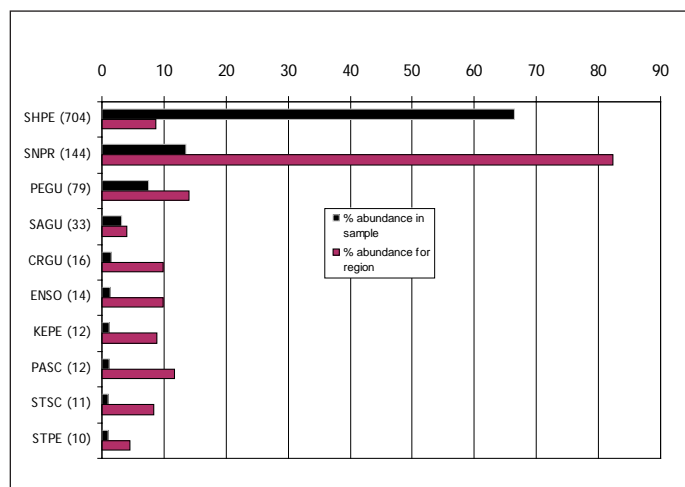
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms (from photographs)
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> Not collected
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> Not collected	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> N/A
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> N/A	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> N/A	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 16,500

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 18	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 1,059
<b>PIELOU'S EVENNESS:</b> 0.445	<b>TAXONOMIC DISTINCTIVENESS:</b> 83

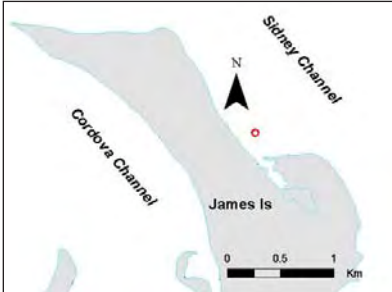
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
SCULPINS	UNRO		GUNNELS	CRGU	●
	YERO			PEGU	●
	BUSC			ROGU	
SCULPINS	CABE			SAGU	●
	REIL		PRICKLEBACKS	SNPR	●
	GRSC	●		BLPR	
	TASC			HICO	
SCULPINS	PASC	●		SLCO	●
	ROSC		FLATFISHES	COSO	
	UNSC			ENSO	●
	SISC			ROSO	
SCULPINS	SMSC			SPSA	
	STSC	●		STFL	
	SHSC		GREENLINGS	WHGR	●
SCULPINS	TISC	●		KEGR	
	THST			PAGR	
	TUBE	●		ROGR	
SCULPINS	BAPI	●		LING	
	KECL		PREY FISHES	HERR	
SCULPINS	NOCL			SUSM	
	ARGO			SAND	
SCULPINS	BLGO		GADIDS	TOMC	
	PLMI	●		WALL	
POACHER	NSPO		SALMONIDS	CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



## James Island

UTM Coordinates : 474410 E  
 : 5383956 N  
 Date Sampled: August 09, 2006 @ 9:30  
 Years Sampled: 2004, 2005, 2006  
 Weather: Information overcast, calm



Thick but stressed subtidal bed over muddy substrate adjacent to a golf course and a dock. As in 2005, a thick band of sea hair and sea lettuce between the high subtidal zone and the edge of the eelgrass bed harboured many juvenile Dungeness crabs (5-22 mm carapace width). Also as in 2005, juvenile green sea urchins (*Strongylocentrotus droebachiensis*) were recorded. The epiphyte load as seen from above was heavy (mostly *Smithora naiadum*), but its dry weight was medium for the region (25 % vs 18% DW in 2005), primarily diatoms and *Ulva linza*. There were many gastropod egg masses in the eelgrass. A school of juvenile salmonids was seen swimming over the eelgrass bed and the region's only salmonid was later caught at the site.

As in 2005, saddleback gunnels dominated the catch (the highest catch for any site in 2006). Buffalo sculpins, unusually common in 2005, were also common in 2006. The starry flounder catches were the second highest overall. Shiner perch catches were low (4), which is unusual for the region. One yellowtail/black rockfish was also caught. This may reflect the site's marine influences



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 13.4	<b>SEDIMENT COMPOSITION:</b> mud, sand
<b>SALINITY (ppt):</b> 28.8	<b>SILT-CLAY FRACTION:</b> 2.1%
<b>CHLOROPHYLL a (ug/L):</b> N/A	<b>SLOPE:</b> 5 - 10 <sup>0</sup>
<b>NITRATES (um):</b> 6.09	<b>ESTIMATED EXPOSURE:</b> Semi-protected
<b>FLUORESCENCE (FU):</b> 13.86	<b>TURBIDITY:</b> 0.558 NTU



## James Island (JI) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

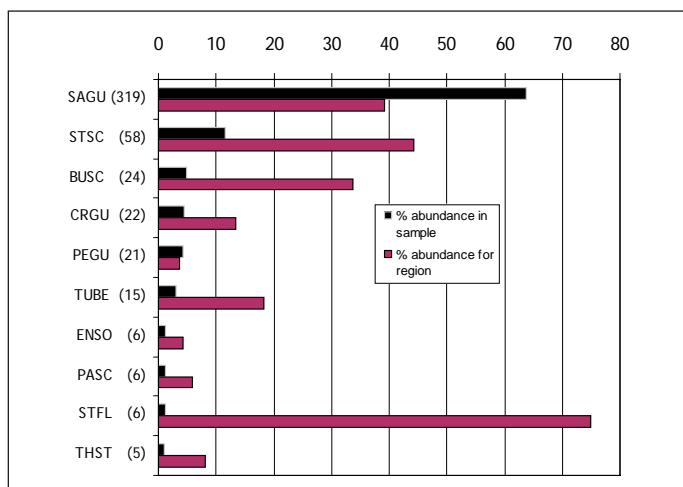
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some filamentous red and <i>Ulva</i> sp.
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 108
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 25
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 399	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 5.2	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 25,000

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 20	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 501
<b>PIELOU'S EVENNESS:</b> 0.490	<b>TAXONOMIC DISTINCTIVENESS:</b> 86

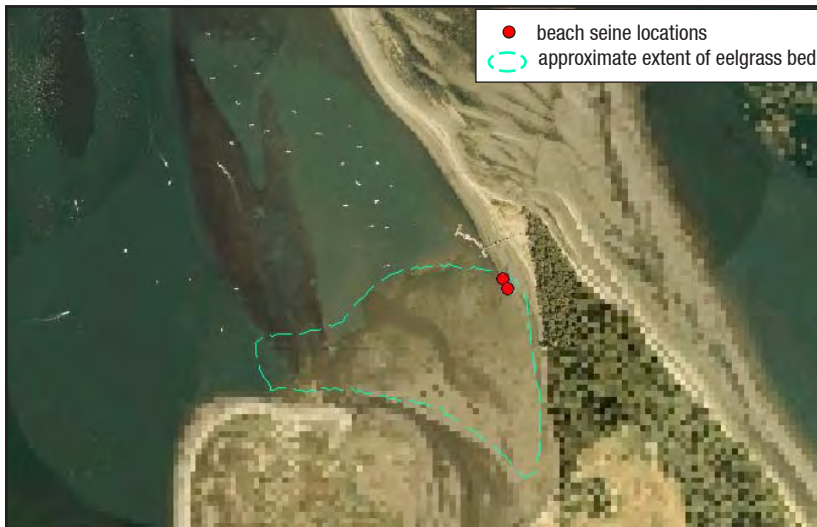
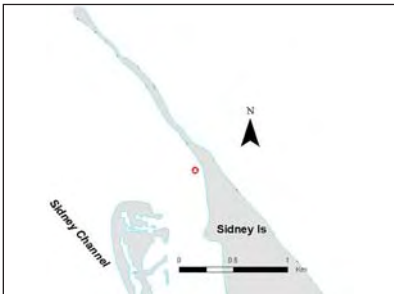
	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	
	BOCC			PIPE	
	BRRO			SHPE	•
	CORO			STPE	
	UNRO		GUNNELS	CRGU	•
	YERO	•		PEGU	•
SCULPINS	BUSC	•		ROGU	
	CABE			SAGU	•
	REIL		PRICKLEBACKS	SNPR	•
	GRSC	•		BLPR	
	TASC	•		HICO	
	PASC	•		SLCO	
	RBSC		FLATFISHES	COSO	
	FLSC			ENSO	•
	SISC			ROSO	
	SMSC			SPSA	
	STSC	•		STFL	•
	SHSC	•	GREENLINGS	WHGR	
	TISC	•		KEGR	
PLATED FISHES	THST	•		PAGR	
	TUBE	•		ROGR	
	BAPI	•		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI			WALL	•
POACHER	NSPO		SALMONIDS	CHUM	•
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



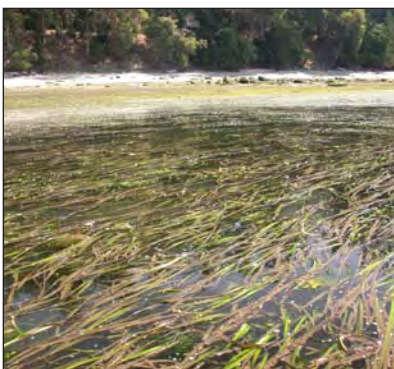
## Sidney Spit

UTM Coordinates : 475597 E  
 : 5387573 N  
 Date Sampled: August 09, 2006 @ 12:00  
 Years Sampled: 2004, 2005, 2006  
 Weather: sunny and calm



By far the most extensive bed in the region. Thick and mostly subtidal, but with a small intertidal component on muddy substrate. The sampling site was located near the dock in a heavily used recreation area and ranked as disturbed. Bubble shells were not as numerous as last year. The epiphyte load was the sixth heaviest overall and consisted primarily of diatoms and *Smithora*. Had the epifauna been taken into account, it would probably have been the heaviest overall. The eelgrass biomass was the fourth largest overall.

The site ranked 5th overall in terms of diversity (Simpson's index). Its buffalo sculpin catches were the highest for any site in 2006 (the site also had high catches of this species the previous year). Sticklebacks, the second most abundant fish caught at the site in 2005, were fewer in 2006 and the only flatfish caught was a starry flounder. Greater sculpins were unusually abundant for the region. Great Blue herons are known to forage here.



## Physical Characteristics

<b>TEMPERATURE ( °C):</b> 15.1	<b>SEDIMENT COMPOSITION:</b> sand, mud
<b>SALINITY (ppt):</b> 28.9	<b>SILT-CLAY FRACTION:</b> 17.2%
<b>CHLOROPHYLL a (ug/L):</b> 12.37	<b>SLOPE:</b> < 10°
<b>NITRATES (um):</b> 0.43	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 5.54	<b>TURBIDITY:</b> 0.182 NTU

## Sidney Spit (SS) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

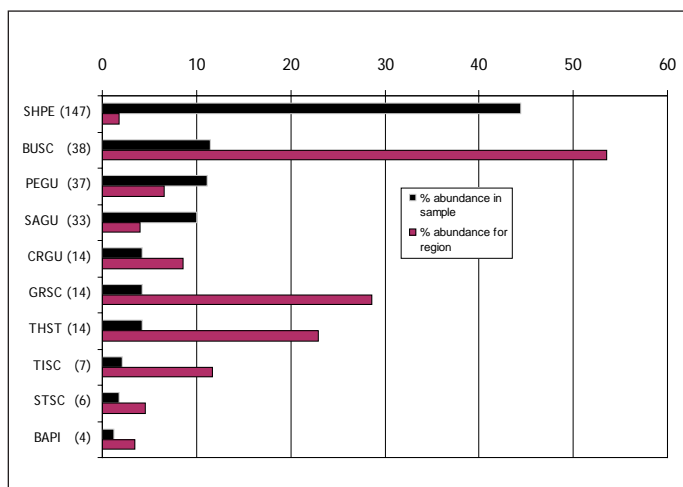
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, <i>Smithora</i> and filamentous red.
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 142
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 400	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 54
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 255	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 2,500
<b>LEAF AREA INDEX:</b> 4.7	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 183,000

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b> 18	<b>TOTAL NUMBER OF INDIVIDUALS:</b> 331
<b>PIELOU'S EVENNESS:</b> 0.674	<b>TAXONOMIC DISTINCTIVENESS:</b> 88

	SPECIES			SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE	●
	BOCC			PIPE	●
	BRRO			SHPE	●
	CORO			STPE	●
	UNRO		GUNNELS	CRGU	●
	YERO			PEGU	●
SCULPINS	BUSC	●		ROGU	
	CABE			SAGU	●
	REIL		PRICKLEBACKS	SNPR	●
	GRSC	●		BLPR	
	TASC	●		HICO	
	PASC			SLCO	
	ROSC		FLATFISHES	COSO	
	UNSC			ENSO	
	SISC	●		ROSO	
	SMSC			SPSA	
	STSC	●		STFL	●
	SHSC		GREENLINGS	WHGR	
	TISC	●		KEGR	
PLATED FISHES	THST	●		PAGR	
	TUBE			ROGR	
	BAPI	●		LING	
CLINGFISHES	KECL		PREY FISHES	HERR	
	NOCL			SUSM	
GOBIES	ARGO			SAND	
	BLGO		GADIDS	TOMC	
TOADFISH	PLMI			WALL	
POACHER	NSPO		SALMONIDS	CHUM	
KELPFISH	CRKE			CUTT	

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)



## Reynard Point

UTM Coordinates : 475913 E  
 : 5397412 N  
 Date Sampled: August 10, 2006 @ 10:45  
 Years Sampled: 2006  
 Weather: cloudy, calm



Sheltered bay on the northwest side of Moresby Island, hemmed in by a large rocky outcrop on its northwest end and close to a pasture. The beach was sandy with woody debris. *Laminaria*, *Ulva*, *Chondracanthus* and *Rhodomela* were the most common algae in the subtidal. Kelp and red rock crabs were common. The epiphyte load was similar to that of Moresby East both in terms of ratio (48 vs 54% of eelgrass weight) and species (mostly diatoms).

A school of salmonids was seen swimming over the eelgrass bed but none were captured. The site had the highest species richness in the region and second highest overall. It also had the highest numbers of tadpole sculpins and striped seaperch of any 2006 site. All perch species were present and the site had a high sculpin diversity. Along with the other Moresby Island site, Moresby East, it was the only site where northern spearnose poachers were caught in 2006. The two Moresby Island sites were also the only sites with rosylip sculpins, Pacific tomcods and high catches of tadpool sculpins in the region. Both sites also had high catches of whitespotted greenlings. The 7 silverspotted sculpins caught accounted for half of the region's catches



### Physical Characteristics

<b>TEMPERATURE ( °C):</b> 12.8	<b>SEDIMENT COMPOSITION:</b> sand, woody debris
<b>SALINITY (ppt):</b> 29.1	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 2.11	<b>SLOPE:</b> 10 - 15°
<b>NITRATES (um):</b> 7.46	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.225	<b>TURBIDITY:</b> 0.074 NTU



## Reynard Point (RP) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

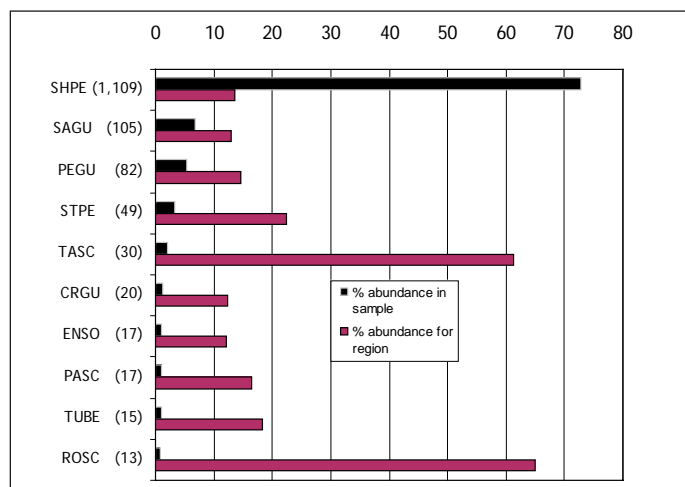
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> 100% diatoms
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 117
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 48
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 195	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 2.6	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 7,150

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
26	1,525
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.388	85

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE ●
SCULPINS	UNRO		GUNNELS	CRGU ●
	YERO			PEGU ●
	BUSC			ROGU ●
PRICKLEBACKS	CABE			SAGU ●
	REIL			SNPR ●
	GRSC	●		BLPR
	TASC	●		HICO
	PASC	●		SLCO ●
	ROSC	●	FLATFISHES	COSO
	UNSC	●		ENSO ●
PLATED FISHES	SISC			ROSO
	SMSC	●		SPSA
	STSC	●		STFL
	SHSC		GREENLINGS	WHGR ●
CLINGFISHES	TISC			KEGR ●
	THST			PAGR
	TUBE	●		ROGR
GOBIES	BAPI	●		LING
	KECL		PREY FISHES	HERR
TOADFISH	NOCL			SUSM
	ARGO			SAND
POACHER	BLGO		GADIDS	TOMC ●
	PLMI	●		WALL
KELPFISH	NSPO	●	SALMONIDS	CHUM
	CRKE			CUTT

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES (N in parentheses)**



**Moresby East**

UTM Coordinates : 477993 E  
 : 5396234 N  
 Date Sampled: August 10, 2006 @ 13:00  
 Years Sampled: 2006  
 Weather: sunny, calm



Small protected beach framed by two large rocky outcrops and adjacent to two other small beaches. The eelgrass bed was patchy, mostly subtidal over a flat sandy area. Many juvenile Dungeness crabs and red rock, decorator and kelp crabs. Isopods (*Idotea ressecata*) and cockles (*Clinocardium nuttalli*) common. The epiphyte load was heavy (7th heaviest ratio in 2006), composed mainly of diatoms. *Laminaria*, *Ulva* and *Gracilaria/Gracilariopsis* were common in the low subtidal.

The site had the second highest catches in the region (fourth highest overall) and second highest species richness of the region. The site's catches were dominated by shiner perch (third highest overall). The two Moresby Island sites (this one and Reynard Point) were the only sites with rosy lip sculpins, Pacific tomcods and high catches of tadpole sculpins in the region. The site boasted the highest abundance of penpoint gunnels overall and highest whitespotted greenlings catches in the region. It also had the lowest crescent gunnels catches of the region (3).



**Physical Characteristics**

<b>TEMPERATURE ( °C):</b> 12.8	<b>SEDIMENT COMPOSITION:</b> sand, woody debris
<b>SALINITY (ppt):</b> 29.1	<b>SILT-CLAY FRACTION:</b> N/A
<b>CHLOROPHYLL a (ug/L):</b> 2.11	<b>SLOPE:</b> 10 - 15°
<b>NITRATES (um):</b> 7.46	<b>ESTIMATED EXPOSURE:</b> Protected
<b>FLUORESCENCE (FU):</b> 1.225	<b>TURBIDITY:</b> 0.074 NTU

## Moresby East (ME) - Gulf Islands



### Biological Characteristics of Eelgrass Bed And Epiphytes

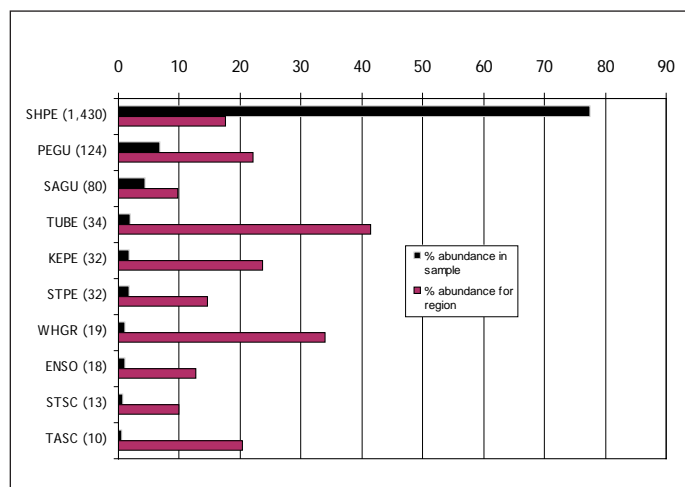
<b>ECOTYPE:</b> <i>Zostera marina</i>	<b>EPIPHYTE(S):</b> Mostly diatoms, some <i>Smithora</i> , <i>Ulva</i> sp. and filamentous red
<b>TIDAL RANGE:</b> Subtidal	<b>EPIPHYTE DRY BIOMASS (median; g/m<sup>2</sup>):</b> 88
<b>DENSITY (median nb shoots/m<sup>2</sup>):</b> 300	<b>EPIPHYTE LOAD (median ratio epiphytes/eelgrass):</b> 54
<b>BIOMASS (median dry wt; g/m<sup>2</sup>):</b> 201	<b>INTERTIDAL BED AREA (m<sup>2</sup>):</b> 0
<b>LEAF AREA INDEX:</b> 2.4	<b>SUBTIDAL BED AREA (m<sup>2</sup>):</b> 7,900

### Fish Summary

<b>NUMBER OF DIFFERENT SPECIES:</b>	<b>TOTAL NUMBER OF INDIVIDUALS</b>
24	1,844
<b>PIELOU'S EVENNESS:</b>	<b>TAXONOMIC DISTINCTIVENESS:</b>
0.331	84

	SPECIES		SPECIES	
ROCKFISH	BLRO		SEA PERCHES	KEPE ●
	BOCC			PIPE ●
	BRRO			SHPE ●
	CORO			STPE ●
SCULPINS	UNRO		GUNNELS	CRGU ●
	YERO			PEGU ●
	BUSC			ROGU ●
PLATED FISHES	CABE ●			SAGU ●
	REIL		PRICKLEBACKS	SNPR ●
	GRSC ●			BLPR ●
	TASC ●			HICO ●
	PASC ●			SLCO ●
CLINGFISHES	ROSC ●		FLATFISHES	COSO ●
	UNSC ●			ENSO ●
	SISC ●			ROSO ●
TOADFISH	SMSC ●			SPSA ●
	STSC ●			STFL ●
	SHSC ●		GREENLINGS	WHGR ●
	TISC ●			KEGR ●
POACHER	THST ●			PAGR ●
	TUBE ●			ROGR ●
KELPFISH	BAPI ●			LING ●
	KECL ●		PREY FISHES	HERR ●
GOBIES	NOCL ●			SUSM ●
	ARGO ●			SAND ●
TOADFISH	BLGO ●		GADIDS	TOMC ●
	PLMI ●			WALL ●
KELPFISH	NSPO ●		SALMONIDS	CHUM ●
	CRKE ●			CUTT ●

**PERCENT ABUNDANCE OF TEN MOST COMMON SPECIES**  
(N in parentheses)







### 3.0 DESCRIPTION OF SAMPLING METHODS

In section 3 of this report we describe the sampling approaches used for the collection of each environmental, eelgrass and fish parameter.

#### 3.1 Environmental Properties - Field Sampling

Measurements of water temperature, salinity, and dissolved oxygen were taken using a YSI meter replicate at each eelgrass bed after each beach seine (3 measurements total). Measurements were taken 50 cm below the surface, and recorded to the nearest decimal place. Replicate surface water samples were also taken at each site. The one litre Nalgene bottle should be rinsed twice with surface water, and then filled, labelled and placed in a coleman cooler.

#### 3.2 Environmental Properties - Laboratory Sampling

##### 3.2.1 Equipment

- Filtering apparatus (1L reservoir base, circular plastic screen, 500 ml top reservoir, rubber tubing attached to hand pump, and plug for one side of reservoir base)
- Microfiber filter paper (4.7 cm diameter, 1 per sample)
- 20 ml plastic Nalgene® bottle (1 per sample)
- Tin foil, charcoal pencil, waterproof paper for labels



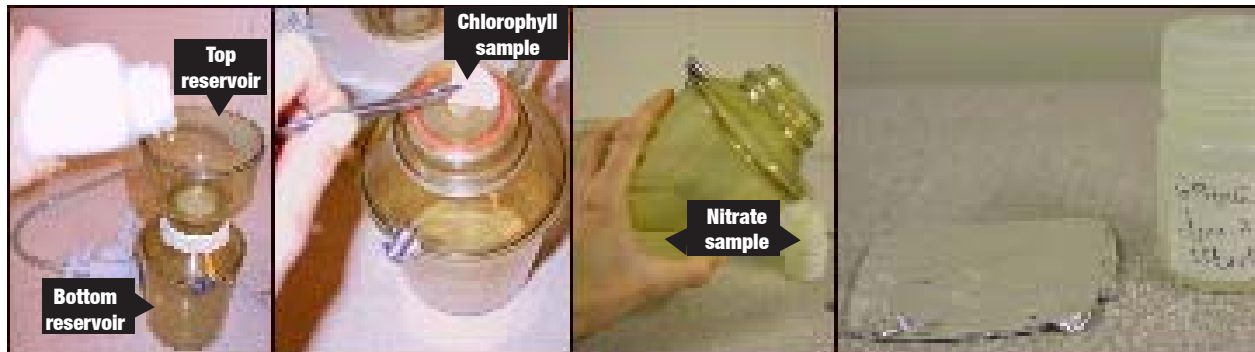
FIGURE 2.1 Nitrate, chlorophyll and fluorescence lab equipment

- Distilled water, fluorometer, eyedropper, lens paper

##### 3.2.2 Nitrate and chlorophyll lab protocol

1. Keep water samples cool until you work them up, and work up water samples the same day they are collected.
2. Cut a square piece of tin foil (15 cm X 15 cm), and include a label written on waterproof paper ( site name, sampling date, and amount of water filtered).
3. Using the charcoal pencil write the site name, sampling date and amount of water filtered on the outside of the 25 ml Nalgene bottle.
4. Using forceps, place one glass microfiber filter paper (4.7 cm) on the water filter apparatus.

FIGURE 2.2 Nitrate and chlorophyll lab analysis steps



Do not touch the filter paper with your fingers, as it will contaminate the sample.

5. Assemble water filter apparatus and lightly shake the 1 l water sample. Shaking water sample ensures that particles are evenly distributed throughout the sample.
6. Pour 500 ml into the top filter apparatus reservoir.
7. Strain water through the filter by creating a suction using the hand pump attached to base of apparatus. Continue pumping until all the water has been filtered into the base reservoir.
8. Look at the filter paper and if the paper is still white filter another 500 ml. If the filter paper is brown then no more water filtering is required. Always write down the amount of water you filter. The lab requires this information to work up the samples.
9. Once an adequate amount of water is filtered remove filter paper with forceps by folding in half and then in quarters. Place folded filter paper in tin foil and include a label written on waterproof paper.
10. Pour approximately 20 ml of the filtrate (water in the reservoir base) into the labelled 25ml Nalgene bottle. Remember that this sample will be frozen so leave adequate space for liquid expansion as it freezes.
11. Put both the chlorophyll (filter paper wrapped in tin foil) and nitrate (filtrate in 25 ml Nalgene bottle) in a freezer. The samples must stay frozen and will later be shipped to a lab for further analysis.
12. Always rinse the filter apparatus with distilled water between samples.

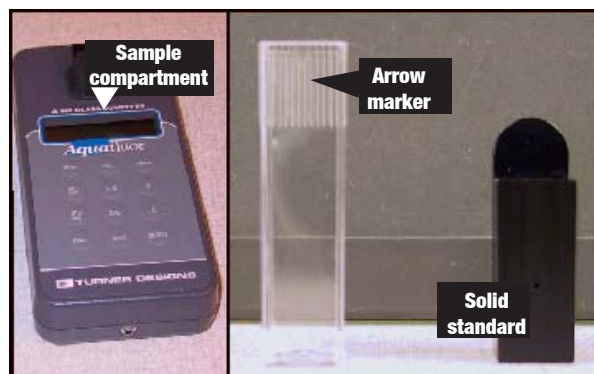
### 3.2.3 Fluorometer lab protocol

1. Turn on fluorometer and calibrate the meter by first inserting the solid black cubette (solid standard) into the sample compartment and close the lid. Press the <CAL> button and then the <ENT> to measure the fluorescence signal of the solid standard.
2. Next you will be required to place your calibration solution into the sample compartment. Use one of the clear plastic cubette filled with distilled water to the lines. Hold the cubette with two fingers on the lined area on the top of the tube to avoid putting fingerprints on the clear plastic. Use an eyedropper to slowly fill the clear cubette, this will ensure that no bubbles are present in the cubette. Wipe the outside of the clear cubette

with lens paper, therefore you will not scratch the plastic.

3. Insert the clear cubette filled with distilled water (calibration solution) into the sample compartment. Note the placement of the arrow on the top of cubette and always insert the cubette in this direction for future measurements. Press <ENT> and the fluorometer is calibrated for all your subsequent samples.
4. The fluorometer will turn off if it is left idle and you will lose your calibration. To prevent this from happening just press the <READ> button every once in awhile. However, if the fluorometer does turn off you will need to recalibrate the instrument.
5. Gently shake the 1L Nalgene bottle containing your water sample before you take every sample. Use the eyedropper to acquire and pour the water sample into the SAME clear plastic cubette you used to measure your calibration solution. Rinse the cubette three times with the water sample and then fill the cubette to the line with the water sample.
6. Wipe the outside of the cubette with lens paper to remove all water droplets and place it into the sample compartment. Ensure that the arrow on cubette is in the same position as when it was used for calibration.
7. Close the compartment and press <READ>. Record the fluorescence value onto the site description data sheet (p.23).
8. Repeat steps 5 to 7 two more times. Always rinse the clear plastic cubette with distilled water between each sample.
9. Three separate fluorescence signals should be taken for each sample.

FIGURE 2.3 Fluorometer and cubettes



### 3.3 Eelgrass Properties – field methods

We have used standard methods reported in several good overviews available in this scientific literature. The reader should consult the following references for more detailed information.

- Bortone, S.A. (ed) 2000. Seagrasses: monitoring, ecology, physiology, and management. CRC Marine Science Series. 318 pp.
- Kirkman H. 1996. Baseline and monitoring methods for seagrass meadows. Journal of Environmental management. 47:191-201.
- Short, F.T. and R.G. Coles (eds.) 2001. Global Seagrass Research Methods. Elsevier Science B.V., Amsterdam. 472 pp.
- Precision Identification Biological Consultants 2002. Methods for mapping and monitoring eelgrass habitat in British Columbia. Report to Environment Canada. 38 pp.

In this study, the selection of a 10 X 10 cm quadrat was necessary (compared to the standard 25 X 25 cm) to reduce the impacts of destructive sampling in the eelgrass beds (eelgrass shoots need to be removed to scrape epiphytes and weigh). Below we discuss the results of this quadrat on parameter estimates.

#### 3.3.1 Equipment

- 10 cm X 10 cm sampling quadrat
- Clear plastic tube (5 cm diameter, 30 cm long)
- Square piece of sheet metal (10 cm x 10 cm)
- 27 cm X 28 cm Ziploc® bags (each bag labelled as described under sampling protocol)
- 1 cooler
- 1 bucket

- GPS
- Boat

#### 3.3.2 Pre-Field Sampling Protocol

1. Ziploc bag labelling
  - 12 Ziploc bags for each site (6 for eelgrass samples and 6 for sediment samples)
  - Using a permanent marker label each bag with the date, site identification code, and sample number
2. Program the coordinates for each site location into a GPS.
3. Consult a local tide table to determine sampling dates with low tides 0.6m (2.0ft) or less. Some eelgrass bed sites may be sampled at higher tidal heights. Preliminary bed assessments will help to determine this. Each bed will be sampled within a 2-hour window before and after low tide.

#### 3.3.3 Eelgrass Field Sampling Protocol

1. Use programmed GPS coordinates to find each site or record coordinates if the site is being sampled for the first time. This ensures that future sampling efforts will occur in the same area.
2. Record the time you take the eelgrass and sediment samples and then tidal height can be calculated at a later time.
3. Go to water's edge, as low in the intertidal as you can go without too much water becoming a problem.
4. Randomly drop the quadrat, try not to drop where there is the most eelgrass. It is tempting so try closing your eyes when you drop the quadrat.

FIGURE 3.4 Eelgrass field sampling protocol





5. Gently move the shoots within the quadrat so that you can see the base of each eelgrass shoot within the quadrat.
6. Collect all the eelgrass shoots within the quadrat as close to the sediment as possible. You do not need to collect the roots, but try to pick them as close to the roots as you can.
7. Place the eelgrass and any attached epiphytes (algae growing on the blades) into a labelled Ziploc bag and seal.
8. Proceed to collect 2 sediment samples, refer to protocol below.
9. After 1 eelgrass and 2 sediment samples are taken, walk 10 steps along shore and repeat eelgrass and sediment sampling.
10. Always separate your sample areas by approximately 10 steps.
11. Repeat steps 4 through 9 to collect another eelgrass sample in the same location.
12. The first 3 samples you will collect 1 bag of eelgrass and 2 bags of sediment at each sampling location. You do NOT collect sediment with the last 3 eelgrass samples.
13. You will collect a total of 6 bags of eelgrass at each site.
14. Put all samples in the cooler and you will transfer into freezer back at the lab.

### 3.3.4 Sediment Field Sampling Protocol

Soft substrates, such as mud and sand characterize the benthic habitats that seagrass colonize. In seagrass studies assessing sediment composition and structure can help to better understand factors affecting nutrient dynamics, eutrophication, and seagrass health (Erftemeijer and Koch 2001). For example, an indirect measurement of fluid energy is sediment composition. Course, sandy

sediment indicates high energy, whereas fine silty sediment indicates low energy (Fonseca et al. 1982). Therefore, we provide techniques for collection and analysis of seagrass sediment characteristics.

1. Take the clear plastic tube and push it approximately 5 cm into the mud adjacent to where you sampled the eelgrass. Push the eelgrass aside to avoid getting it in the sediment sample.
2. Once the tube is in the mud dig your hand into the mud and hold the sediment in your tube as you pull it up.
3. Once you have removed the tube from the ground you can slowly pour off excess water in the tube. DO NOT pour out any of the fine surface organic material it is an important component of the sample. Remember it the top 5 cm of the sediment sample you want to collect.
4. If you have too much sediment in the tube (more than 5 cm) then slowly let some fall through the bottom of the tube. Use the square piece of sheet metal to cut through the sediment and shorten the sample.
5. Put the sample into a Ziploc bag and don't worry if there is water in the sample. It is better to have some water in the sample than to lose the surface sediments suspended in the water.
6. Repeat steps 1 through 6 to get another sediment sample from the same location.
7. You will have 2 sediment samples from your first 3 eelgrass samples, for a total of 6 sediment samples for each site. Do not sample sediment for the last 3 eelgrass quadrats.
8. Put all samples in the cooler and you will transfer into freezer back at the lab.

**FIGURE 3.5** Sediment field sampling protocol



Sediment corer pushed 5 cm into the sediment.

Dig your hand into the mud to secure sediment sample in the corer as you pull it up.

Use the metal to cut the sediment samples to be 5 cm deep.

Place sediment in a labelled Ziploc bag.



### 3.4 Eelgrass Properties – lab analysis

#### 3.4.1 Equipment

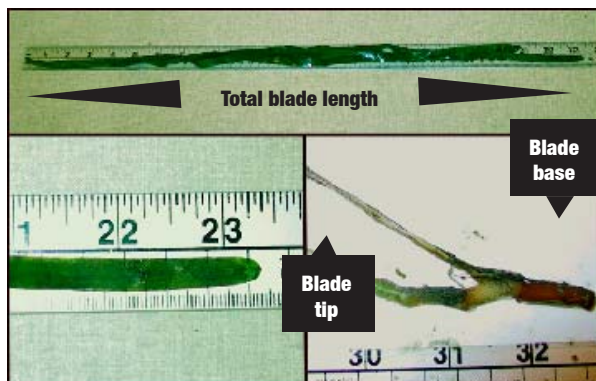
- Eelgrass lab data sheets (pp.24 & 25)
- Clipboard and pencil
- 1 laminated sheet of paper (approximately 28 cm X 22 cm)
- 1 Razor blade
- 1 metre ruler
- Drying oven (80°C)
- Balance (resolution at least 0.1g)
- 30 large aluminium tins (for drying seagrass, tart tins: 7.5 cm base diameter, 12 cm top diameter, 4 cm deep)
- 30 small aluminium tins (for drying epiphytes, smaller tins: 6.5 cm diameter, 1.5 cm deep)

#### 3.4.2 Eelgrass Lab Analysis

1. Remove 6 frozen eelgrass bags from freezer and thaw samples. To prevent data recording confusion work up the eelgrass samples taken from a single site together.
2. Photocopy eelgrass lab data sheets provided on pages 24 and 25 and record all data on these sheets.
3. While eelgrass samples are thawing label and weigh 6 large and 6 small aluminium tins.
4. Work up one bag of eelgrass at a time.
5. Measure the total length of the longest blade for each shoot to the nearest millimetre. Begin measurement from the shoot base, where the roots end, and finish at the tip of the blade. If the blade is broken make a note of this on the data sheet.

**Blade length**

**FIGURE 2.6** Blade length



6. Blade width is measured on the same blade as length was measured. Width measurement is taken about 1 cm above where the shoot grows out of the sheath. Measure blade width to the nearest millimetre.
7. Count and record the number of senescent shoots, new shoots and all other shoots per blade.
8. Count and record the total number of shoots collected in each sample.
9. Record only the total length and the presence of all reproductive shoots in the sample.

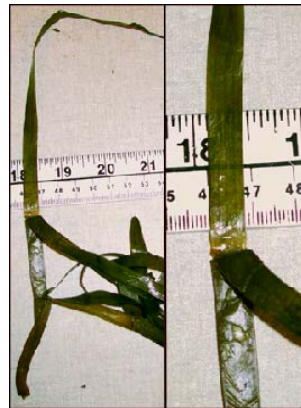
**Blade width**

**Number of blades per shoot**

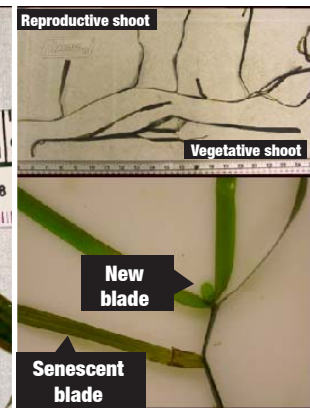
**Number of shoots per sample**

**Number of reproductive shoots**

**FIGURE 2.7** Blade width



**FIGURE 2.8** Shoot and blade types

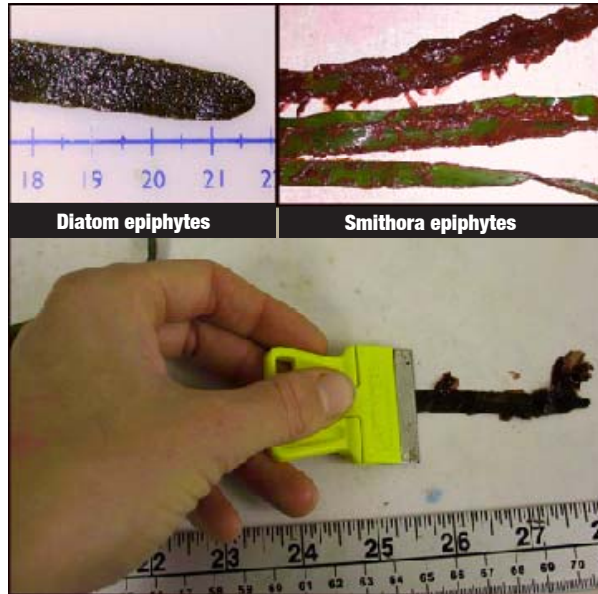


10. Gently scrape all algal epiphytes off the eelgrass blades in each sample. Use a razor to scrape the epiphytes onto a plastic laminated sheet of paper. This ensures easy transfer of the epiphytes into the aluminium tin. Also scrape off the animal epifaunal community, but do NOT include them in your biomass samples. Appropriately discard these organisms.
11. Epiphytic algal category and relative abundance will be assessed for each sample. Use the following epiphytic algal categories:
  - Diatoms = fine brown filamentous algae
  - *Smithora* = red blades
  - *Enteromorpha* = green blades
  - Filamentous red = filamentous red algae

**Epiphytes**

Relative abundance of each type of epiphytic algae will be given in percentages. For example: 20% *Smithora*, 10% *Enteromorpha*, 70% Diatoms. You do need to include a percentage of algal type if it is not present.

**FIGURE 2.9** Epiphytic Algae



12. Record a single measurement of epiphytic algal proportions and relative abundance for the entire sample (one per bag of eelgrass).

**Eelgrass and Epiphyte Biomass**

13. Place the separate eelgrass and epiphyte samples into the drying set at 80°C. If you are interested in organic carbon or nitrogen content the samples should not be dried at a temperature >60°C. Record the date and time the samples were placed in the oven.



**FIGURE 2.10** Wet eelgrass & scraped epiphytes

14. Remove dried samples to weigh in 24 hours or until the samples have reached a constant weight.

15. Weigh the samples immediately after removal from oven as dried algae quickly reabsorb water. If a desiccator is available use this to weigh samples in, but it is not necessary.
16. Record the dry weight of each sample to the nearest 0.01g.
17. Place dried eelgrass and epiphytes in a bucket and appropriately dispose of the samples.

## 3.5 Sediment Properties - Lab Analysis

### 3.5.1 Equipment

- Sediment lab data sheets (p.26)
- Clipboard and pencil
- 63µm mesh sieve (#230)
- 500 ml spray bottle
- Distilled water
- 250 ml glass beaker
- Stirring rod
- Spoon
- 4L ice cream bucket
- Drying oven (100°C)
- Balance (resolution at least 0.1g)
- 30 large aluminium tins (for drying silt-clay fraction, tart tins: 7.5 cm base diameter, 12 cm top diameter, 4 cm deep)
- 30 small aluminium tins (for drying >63µm sediment, smaller tins: 6.5 cm diameter, 1.5 cm deep)

### 2.5.2 Sediment Lab Analysis

1. Remove 3 frozen sediment bags from freezer and thaw samples.
2. Photocopy sediment lab data sheets provided on page 25. Record all data on these sheets.
3. While sediment samples are thawing label and weigh 3 large and 3 small aluminium tins.
4. Work up one bag of sediment at a time
5. Quarter sediment sample and weigh approximately a 20g wet sediment sample.

**FIGURE 2.11** Sediment lab analysis equipment

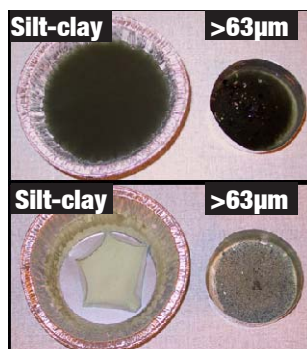


6. Put the 20g wet sediment sample into a 250 ml glass beaker and stir sample for one minute. This ensures that the clay particles do not amalgamate.
7. Place the sieve over a clean 4L ice bucket and pour the stirred sediment onto the sieve.
8. Use the spray bottle to ensure all sediment particles are removed from beaker. Next spray sediment sample to wet sieve the silt-clay particles through the sieve. Continue to spray sediment until all the silt-clay particles have gone through the sieve.
9. Scoop sediment left in the sieve into the smaller aluminium tin; this is the  $>63\mu\text{m}$  sediment particles.

**FIGURE 2.12** Sediment wet sieving



10. Use the spray bottle to pour all the silt-clay ( $<63\mu\text{m}$ ) particles in the ice cream bucket into the larger aluminium tin. If there is too much liquid use two aluminium tins.
11. Place the separate silt-clay and  $<63\mu\text{m}$  samples into the drying set at  $100^{\circ}\text{C}$ . If you are interested in organic carbon content the samples should not be dried at a temperature  $>60^{\circ}\text{C}$ . Record the date and time the samples were placed in the oven.
12. Remove dried samples to weigh in 24 hours or until the samples have reached a constant weight.
13. Weigh the dried sediment samples immediately after removal from oven to ensure they do not reabsorb water. If a dessicator is available use this to weigh samples in, but it is not necessary.



**FIGURE 2.13** Wet & dried sediment samples

14. Record the dry weight of each sample to the nearest 0.01g.
15. Place dried sediment in a bucket and appropriately dispose of the samples.

### 3.6 Fish Sampling Methods

A variety of sampling techniques have been employed to sample fish species in eelgrass. Methods include passive sampling gear such as gill, drop and pop nets, to active sampling gear including seines and trawls. A monitoring program requires using a method that is inexpensive, effective at sampling a variety of fish species, and is easily deployed multiple times within a short time window. Previous work has identified beach seining as a sampling methodology that meets these criteria (Connolly 1994, Edgar et al. 2001). Therefore, fish diversity within eelgrass beds was sampled using a small beach seine, 2-3 personal and a small aluminium boat.

#### 3.6.1 Equipment

- Beach seine (10.0 m long, 3.0 m in height at the centre and tapering to a 1.0 m height at either end with 4.0 mm mesh throughout the net, having a 3 m drop in the centre, and tapering to 1m at the wings. Two 15.0 m long lines were attached at each end, one on the lead line and the other on the float line, each marked at a 10.0 m distance from the net)
  - 2 dip nets
  - 2 buckets
  - 3 Rubbermaid® totes (50 cm X 30 cm X 50 cm)
  - 2 pairs of chest waders
  - 2 fish measuring boards (30 cm long)
  - Clipboard and pencils, Fish data sheets (3 per site, printed waterproof paper)
  - Fish identification books (“Coastal Fishes of the Pacific Northwest” Lamb and Edgell 1986, “Pacific Fishes of Canada” Hart 1988, “A Guide to Fishes in Eelgrass Beds of Pacific Rim and Gwaii Haanas National Parks Reserves” Yakimishyn and Robinson 2003)
  - Site description and environmental parameter data sheets (1 per site, printed waterproof paper, see Appendix 1)
  - 1 litre plastic Nalgene® bottles (1 per site), 1 Coleman cooler
  - Temperature-salinity probe, GPS, Digital camera



### 3.6.2 Fish field sampling protocol

1. Use programmed GPS coordinates to find each site or record GPS coordinates if site has not been previously sampled. This ensures that future sampling efforts will occur in the same general area.
2. Each site must be sampled during daylight hours within a 2-hour window before or after a low tide of 0.6m (2.0ft) or less.
3. Typically, two beds can be sampled each day during the low tide. Sites should be relatively close geographically to ensure shorter travel distances.
4. Two individuals wearing chest waders, using a motor driven boat will deploy the beach seine. One individual or an anchor would be dropped off on the bed, holding two lines from one end of the seine. The net and 10 m of rope will be stretched perpendicular to shore. When fully extended, the seine should be stretched parallel to shore, then the second individual will be dropped off on shore, and two individuals will pull the seine to shore. An area approximately 10 m X 10 m area (100 m<sup>2</sup>) of the eelgrass bed will be sampled.
5. Record the time and approximate depth of each beach seine set. Seine depth is estimated when the net is fully extended parallel to shore.
6. Once the beach seine is brought to shore, the seine containing fish will be taken to the boat.
7. All fish will be dip netted out of the beach seine and placed into totes containing fresh seawater aboard the boat. Keep all replicate fish beach seines separate.
8. All fish are counted, identified using field guides (Lamb and Edgell 1986, Yakimishyn and Robinson 2003) and recorded on fish data sheets.

**FIGURE 3.14** Fish field sampling protocol



Beach seine fed out and stretched perpendicular to shore



Beach seine stretched parallel to shore and then pulled to shore



Beach seine at boat and fish caught are netted into buckets



All fish species caught are counted and identified



Fish fork length measured to nearest millimetre



9. The fork lengths of at least the first 25 individuals of each fish species need to be measured to the nearest millimetre and then returned to the ocean.
10. Triplicate sets are required for each site, with a minimum 10-metre distance between each haul to avoid the physical disturbance effect caused by pulling the beach through the eelgrass.

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