

Eelgrass Mapping Review:

Eelgrass Mapping Initiatives in Coastal British Columbia

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Acknowledgement

Figures 2 through 11 are adapted from Canadian Hydrographic Chart L/C 3000, Juan de Fuca Strait to Dixon Entrance 1: 1 250 000, 1994.

ACRONYMS

| | |
|-------------|--|
| CMPB | Coast and Marine Planning Branch, MSRM |
| CWS | Canadian Wildlife Service, Environment Canada |
| DFO | Department of Fisheries and Oceans Canada |
| IOS | Institute of Oceanographic Sciences |
| LRMP | Land Resource Management Plan |
| LUCO | Land Use Coordination Office, now in part Decision Support Services of the Resource Management Division, MSRM. |
| LWBC | Land and Water British Columbia |
| MAFF | B.C. Ministry of Agriculture, Fisheries and Food |
| MSRM | B.C. Ministry of Sustainable Resource Management |
| NGO | Non-governmental Organisation |
| OCP | Official Community Plan |
| PBS | Pacific Biological Station, Nanaimo (DFO) |
| RLUP | Regional Land Use Plan |

DEFINITIONS

Eelgrass Eelgrass (*Zostera marina* and *Zostera japonica*). *Z. japonica* is an introduced non-native species.

Foreshore (intertidal) area The area between the mean high tide and low tide mark (i.e. below zero tide).

Fine-scale Fine-scale maps (also known as large-scale maps) depict a small geographic area, with a large amount of detail.

Intertidal The shore zone between the mean low water and the mean high water mark. The substrate is exposed and flooded by tides.

Nearshore The subtidal area below low tide mark (i.e. below zero tide), generally extending to the 20 metre isobathymetric depth.

Seagrass Eelgrass (*Zostera marina* and *Zostera japonica*) and surfgrass (*Phyllospadix scouleri* and *Phyllospadix torreyi*).

Coarse-scale Coarse-scale maps (also known as small-scale maps) depict a large geographic area, with a small amount of detail.

1.0 Introduction

Since the turn of the millennium there has been an upsurge in grassroots interest in mapping and monitoring coastal eelgrass beds at the local level. Linked to that interest is the finite amount of funding, resources and support staff available to support grassroots initiatives. The overarching need for this review was to determine where there are geographical gaps in our knowledge of fine-scale eelgrass distribution throughout coastal B.C. In order to determine where new efforts should be focussed, it is important to know what work has already been initiated, and what areas are in most need of assistance due to resource management and other pressures.

Three questions were asked: Where has eelgrass mapping been completed? And conversely, where has little or no eelgrass mapping been done? The answer to the first question forms Section 4.0 of this report, while the answer to the second question is summarized in Section 1.3 (Results) and Section 1.4 (Recommendations) below. Once the gaps were determined, the third question attempted to ask what areas most urgently needed mapping assistance or help organizing a mapping initiative, and what areas were under the most pressure (for example, finfish or shellfish aquaculture expansion, harbour development)?

During the course of this project it became apparent that in addition to finding answers to the two mapping questions, it would also be worthwhile documenting eelgrass restoration and eelgrass research projects in each marine ecoregion. Eelgrass restoration projects date back to around 1990, and there are several reasons for keeping track of where they have been done: 1) to ensure that contemporary mapping, monitoring and restoration projects are cognizant of the locations of previous restoration efforts; 2) to allow grassroots groups and others to continue monitoring restoration projects in their areas long after “official” or statutory monitoring has ended; and 3) to provide contemporary restoration projects with a local benchmark for comparative purposes.

The eelgrass research category is a start at documenting the research efforts of universities, government agencies and industry. The projects in the 1980’s and 1990’s have for the most part provided insight into marine vegetation inventory, mapping and classification techniques. The results are often useful to contemporary eelgrass mappers because the plot data from research sites provide both historical context and valuable information about specific places. More recent research appears to be focussing on the eelgrass ecosystem and its role as habitat for individual fish species, fish assemblages, benthic invertebrates and other marine flora and fauna.

1.1 Study Limitations

The Province of British Columbia is in a state of reorganization and many of the people that were knowledgeable about eelgrass mapping, or were “keepers” of eelgrass data, have retired, been assigned new job responsibilities, or have moved to other jurisdictions. Further discussion of the outcomes of these events in terms of data ownership and storage is provided in the section titled “Recommendations”.

It is also understood that new regional Coastal Resources Inventory mapping will be completed soon by CMPB. When available, this new information should be used to update and refine the information reported in the first entry in Section 1 below.

Similarly, in the time available some individuals, groups and organisations (non-government and government) were unable to submit information on their current projects. This paper should therefore be considered a “work in progress”, to which new information can be added when it becomes available and existing entries can be changed when there is new information.

1.2 Methods

For convenience, information has been geographically organized into the Marine Ecosections recognised by the B.C. Ministry of Sustainable Resource Management – see Figure 1. Note that two Marine Ecosections (Subarctic Pacific and Transitional Pacific) are offshore and do not contain eelgrass. Under this mapping scheme, it should be noted that the North Coast Fjords Ecosection also includes the fjords of the Central Coast.

Section 3.0 provides descriptions of the five general categories into which the information was sorted. The colour coding shown below is keyed to each entry in Section 4.0.

1. **Coarse-scale (regional) Mapping Projects**
2. **Fine-scale (local) Mapping Projects**
3. **Eelgrass Restoration Projects**
4. **Historical Eelgrass Mapping Projects**
5. **Eelgrass Research Projects**

Coarse-scale (regional) mapping projects by provincial government agencies are fairly well known in B.C., and are documented on various government websites. Several people in the B.C. Seagrass Conservation Working Group made additional suggestions regarding people to contact.

A direct request for fine-scale mapping project information was initially sent out to the B.C. Seagrass Conservation Working Group via their internet mailing list. The request asked only for basic information that could verify the location of a project in time and space, and most importantly, confirm contact information for the people or group involved in the project. The information requested is shown in the box below, and provided the structure of Sections 2 to 5 of the report.

In many cases, the initial information provided was sufficient to include in the report. Several requests were followed up with phone calls to confirm details, and in most cases this led to suggestions for additional contacts that were then pursued.

| |
|--|
| Project Name/Organisation |
| Contact Person: (name/phone/email) |
| Geographical Location (place name and Lat/Long or UTM coordinates) |
| Year/Dates of Project |
| Type of project: mapping (scale) monitoring restoration |
| Is your data in digital format? |
| How often will you be updating the data? |
| Have you shared your data with government (local, regional, provincial, federal) agencies? |

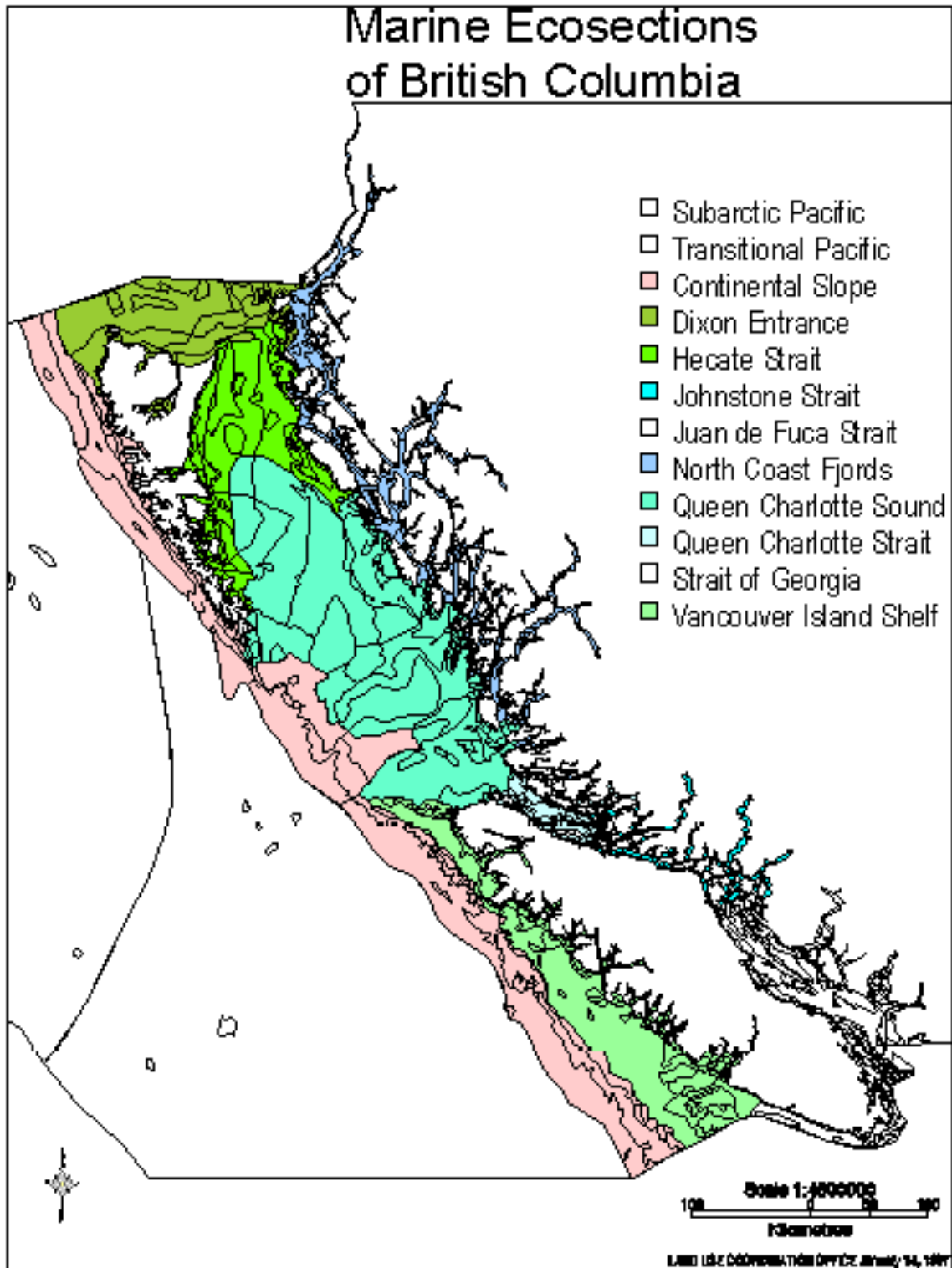


Figure 1. Marine Ecoregions of British Columbia (source: LUCO)

1.3 Results

A quick scan of Table 1 shows that both coarse-scale and fine-scale eelgrass mapping initiatives are occurring in coastal British Columbia. The coarse-scale mapping projects provide regional overviews of the general location of eelgrass beds and have been used in various LRMP and RLUP planning initiatives. Coarse-scale projects can set the stage for more detailed larger-scale mapping projects to confirm presence, abundance and precise locations of eelgrass beds.

However, local projects often locate and map the locations of eelgrass beds that have been omitted from regional mapping initiatives because of their small size. Thus while coarse-scale projects give a general picture of eelgrass distribution in coastal B.C., it is the fine-scale projects that detail the specifics and are most useful for applied conservation and management activities, including Official Community Plan map schedules, Land Use Zoning By-law development, and conservation based marine resource use.

| Marine Ecosection (Report Section 4.#) | Offshore, no eelgrass | Several coarse-scale mapping | Some coarse- scale mapping | Some fine- scale mapping |
|---|-----------------------------|------------------------------------|-------------------------------|-----------------------------|
| Subarctic Pacific | ✓ | | | |
| Transitional Pacific | ✓ | | | |
| Continental Slope (4.1) | | | ✓ | |
| Dixon Entrance (4.2) | | | ✓ | ✓ (QCI) |
| Hecate Strait (4.3) | | | ✓ | ✓ (QCI) |
| Queen Charlotte Sound (4.4) | | | ✓ | |
| North Coast Fjords (4.5) | | | ✓ | ✓ |
| Queen Charlotte Strait (4.6) | | ✓ | | |
| Johnstone Strait (4.7) | | ✓ | | |
| Strait of Georgia (4.8) | | ✓ | | ✓ |
| Juan de Fuca Strait (4.9) | | | ✓ | ✓ |
| Vancouver Island Shelf (4.10) | | ✓ | ✓ | ✓ |

Table 1. Summary of Recent¹ Eelgrass Mapping Coverage by Marine Ecosection (Foreshore and Nearshore Areas; QCI= Queen Charlotte Islands)

1.3.1 Coarse-scale Mapping Gaps

LUCO and its replacement department for marine and coastal planning (the Coastal Planning, Projects & Marine Initiatives section of the B.C. Ministry of Sustainable Resource Management) have initiated numerous coarse-scale regional mapping projects for much of coastal B.C. Updated and refined maps are expected sometime in 2003 or 2004 (John Harper, personal communication).

The noted exceptions are the Strait of Georgia in its entirety (including Howe Sound and Burrard Inlet), Juan de Fuca Strait, and the central and north coast fjords. Some mapping is available for the proposed Southern Gulf Islands Marine Protected Area. Smaller sub-regions of the Strait of

¹ For this project, "recent" is defined as occurring since 1998.

Georgia have been mapped (e.g. Baynes Sound). The north coast fjords are part of the North Coast Fjords LRMP region, and the central coast fjords are part of the Central Coast LRMP Region. Marine resource and marine conservation maps are sometimes produced during the LRMP process. The central coast fjords overlap with the North Island Straits Integrated Coastal Plan.

The Living Oceans Society has attempted to use data from various government agencies to look at the impact of fish farms and shellfish aquaculture farms on eelgrass, kelp, clam beds and other sensitive habitat identified by DFO. These maps are one of the first efforts by an NGO to apply government map data to local resource management and conservation planning problems and will be refined when new data becomes available (Jeff Ardron, personal communication).

1.3.2 Fine-scale Mapping Gaps

Fine-scale eelgrass mapping projects are occurring in nearly every marine ecosection, with the exception of Johnstone Strait and Queen Charlotte Strait.

Coastal B.C. is a geographically large, relatively unpopulated entity and consequently there are many gaps where there are no local eelgrass mapping groups or projects identified to date, or where the size of the area may be beyond the resources of a single stewardship group. Specifically, the following places (in alphabetical order) have been recognised as possible gaps:

- **Johnstone Strait and Queen Charlotte Strait.** Living Oceans Society has been active in this area working on regional conservation issues. The area is under intense pressure for finfish aquaculture. The small (3 members) Broughton Archipelago Stewardship Alliance would like to get involved in fine-scale eelgrass mapping, restoration and monitoring in this area.
- **North Central Coast – Cape Caution to Kitimat.** This is a very large area with many fjords, islands, and estuaries. It is relatively uninhabited and the few stewardship groups have a very large area to cover.
- **Queen Charlotte Islands.** Outside the Gwaii Haanas National Park Reserve (where eelgrass and surfgrass have been mapped as point occurrences), the North Graham Island Streamkeepers Society is currently working with SeaChange on a small project. First Nations (Haida) should be contacted regarding opportunities for partnership projects.
- **Southern Vancouver Island – Juan de Fuca Strait (Sooke to Port Renfrew).** There is some restoration work going on in Sooke Harbour (Cindi Durance, personal communication). No marine stewardship or conservation groups working on fine-scale eelgrass mapping, restoration or monitoring between Sooke and Port Renfrew have been located to date. T'Souke First Nations may be a potential partner (Georgia Strait Alliance, communication).
- **Strait of Georgia – Howe Sound.** A small group from Squamish, Lions Bay, Furry Creek and Bowen Island met in Squamish in 2002 to discuss common ground and will begin working together sometime in 2003. Some consulting mapping work has been undertaken in the past around the Britannia mine site (John Harper, personal communication) that needs to be considered when setting priorities. The B.C. Ministry of Fisheries has conducted shellfish aquaculture capability studies in and around Howe Sound, noting eelgrass in

places. Development pressure in west Howe Sound includes a proposed deep sea boat terminal north of Gibsons. Other issues include restoration around abandoned log dumps and sorting yard, and long-term cleanup of Howe Sound from Britannia Mine and the pulp & paper mills. The Islands Trust has not mapped the nearshore habitats in this area.

- **Strait of Georgia – Burrard Inlet (from Capilano River through to Port Moody Arm and Indian Arm).** This area was mapped by Burrard Clean and is part of the Oil Spill Response Atlas². Local fine-scale initiatives have not been identified to date. First Nations (Squamish and Tsleil-waututh) should be consulted to determine if there are opportunities for partnership projects. This area is under the greatest waterfront development pressure in British Columbia.
- **Strait of Georgia – Southern Gulf Islands.** This area was mapped by Burrard Clean and is part of the Oil Spill Response Atlas. There are only a few local fine-scale NGO efforts (Salt Spring, Saturna, Galiano) but about 300 islands and islets are in this area. LUCO has done some work for the proposed Marine Protected Area, but there are many data omissions at the fine-scale because of the regional level (coarse-scale) of the mapping. There is some pressure for increased industrial shellfish aquaculture (e.g. McFadden Creek Estuary, Salt Spring Island), which would be in conflict with eelgrass habitat. First Nations (Sencot'en Alliance, Tsawwassen First Nation and Cowichan Tribes) could be contacted regarding opportunities for partnership projects. The Islands Trust has not mapped the nearshore habitats in this area.
- **Strait of Georgia – Lasqueti Island and Thormanby islands.** Several residents of Lasqueti Island were contacted during the study and all agreed that eelgrass had not been mapped around the island, or around the islands surrounding Lasqueti. The B.C. Ministry of Fisheries has conducted shellfish aquaculture capability studies in and around Lasqueti and Thormanby islands, noting eelgrass in many places (and high capability for shellfish aquaculture). The Islands Trust has not mapped the nearshore habitats in this area.
- **West Coast Vancouver Island - Tofino to Cape Scott.** While coarse-scale mapping is underway because of the potential for aquaculture on the north-west coast of Vancouver Island, no marine stewardship or conservation groups working on fine-scale eelgrass mapping, restoration or monitoring have been located to date north of Tofino. This region falls within the Vancouver Island RLUP. Queen Charlotte Sound is currently an area of interest for B.C. Offshore Hydrocarbon Development.

1.4 Recommendations

1.4.1 Building the Working Group Network

A great deal of effort was given to identifying all groups working on eelgrass conservation in coastal B.C. During the course of the project several new groups were identified and by their request, were added to the B.C. Seagrass Conservation Working Group network. It is likely that there are still some groups (particularly field naturalist clubs, DFO Stewardship Groups and First Nations) that are interested in eelgrass conservation. There may still be isolated groups that have begun mapping projects without knowledge of the existence of the B.C. Seagrass Conservation Working Group. Wider distribution of the newsletter to umbrella organisations

² Howes, D.E., P. Wainwright and J. Haggarty. 1993. **Coastal Resources and Oil Spill Response Atlas for the Southern Strait of Georgia.** Victoria: B.C. Ministry of Environment, Lands and Parks. Environmental Emergency Coordination Office.

such as the Land Trust Alliance of B.C., T. Buck Suzuki Foundation, Federation of B.C. Naturalists, Union of B.C. Municipalities, DFO community stewardship network and First Nations organisations might be one way to reach additional groups and let coastal B.C. communities know about the work of the B.C. Seagrass Conservation Working Group.

1.4.2 Literature Search and Bibliography Development

Several groups contacted suggested that it would be worthwhile conducting a detailed search of the various DFO libraries and databases for projects that had an eelgrass component. This would help expand both the historical mapping database and the research database. Parks Canada has also undertaken a number of eelgrass-related studies throughout coast British Columbia that should be added to the database.

1.4.3 Information Sharing and Securing Existing Information

- Various government websites such as the LUCO ftp website, contain regional maps of great interest to eelgrass mappers. The reorganization of the provincial government raises concern about the long-term accessibility and maintenance of these websites:

<ftp://ftp.gis.DecisionSupportServices.gov.bc.ca/pub>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/baynes/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/kyuquot/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/mris/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/ncoast/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/nis/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/nootka/>
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/quatsino/>
ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/sf_capability/
<ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/sgulf/>
http://www.luco.gov.bc.ca/regional/vanisle/vanisl_core_data_gis.html
www.luco.gov.bc.ca/coastal/mris/resource.htm
www.luco.gov.bc.ca/coastal.mris/sog_mpa.htm
<http://www01.u-page.so-net.ne.jp/db3/mari/PART-2BJ.HTM>

- Ministry of Fisheries shellfish aquaculture capability studies should be thoroughly reviewed for eelgrass bed location data. The best website to begin searching for maps and documents is: ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/sf_capability/
- One of the areas missing accessible digital regional maps is the southern Strait of Georgia, including Howe Sound and Burrard Inlet. Burrard Clean should be contacted and asked to release digital eelgrass data and maps to a responsible agency such as CWS, for use by NGOs in their eelgrass conservation efforts.
- Local governments and regional districts should be contacted for possible eelgrass map data that might have been assembled during OCP planning processes.
- It should be ensured that any maps stored at IOS that are not being digitized by DFO, are secured in a map library accessible to NGOs.

1.4.4 Funding Possibilities and Partnerships

Many groups interviewed indicated that the greatest threats to eelgrass habitat were related to inappropriate siting of finfish and shellfish aquaculture operations. In part this may be because small eelgrass beds were often not mapped during LUCO regional resource planning studies. The solution is to map eelgrass at a fine-scale appropriate to site planning and management.

The Aquaculture Research and Development Committee of the Science Council of B.C. should be contacted to explore potential funding partnerships for fine-scale eelgrass mapping and conservation initiatives, between the B.C. Seagrass Conservation Working Group (or other appropriate agency) and the newly created Aquaculture and the Environment Fund, which has been established with \$3.75 million from the provincial government.

1.5 Summary

Up until 2000, most eelgrass mapping in British Columbia has been undertaken by government agencies as a part of various regional resource planning, management and resource-use activities. Since 2000 there has been a groundswell of grassroots interest in mapping, monitoring and restoring eelgrass throughout coastal British Columbia. Most of this activity is fine-scale and site (or place)-specific, but there are still thousands of square kilometres remaining to be mapped throughout the coast.

The formation of the B.C. Seagrass Conservation Working Group has been an important development in the coordination of fine-scale eelgrass conservation efforts, and establishment of a communications network between NGOs, First Nations, university researchers, and various levels of government. Similarly, the initiatives of the SeaChange Marine Conservation Society to act as an NGO umbrella group in order to coordinate funding, training and mapping ventures that involve many different groups should be recognised as an excellent way to avoid duplication of effort, minimize administration time and encourage cooperation between groups.

The need for fine-scale mapping is increasing because of the demands, often conflicting, being placed on the coastal zone. As a DFO “sensitive habitat”, eelgrass is ecologically significant because it is a keystone species that provides a number of important functions within intertidal and subtidal marine ecosystems, including primary production, nutrient processing, wave and current energy buffering, organic matter (detritus) input, food and habitat for fish and invertebrates, and food for birds. Through photosynthesis, eelgrass is the major contributor to the detritus used in both nearshore and deeper water food chains and webs. Detritus formed when eelgrass dies back is consumed by copepods, amphipods and isopods. These benthic invertebrates directly incorporate carbon energy from eelgrass detritus and in turn are consumed by fish, birds and so on up the food chain to Orcas (*Orcinus orca*), First Nations and other human consumers.

2.0 People Contacted

North Graham Island Streamkeepers Society
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Lasqueti Island
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Rose Willow (Regional District Director and Islands Trust trustee)

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3.0 Mapping Initiatives

Background information about each category is provided in the sub-sections below.

3.1 Coarse-Scale (Regional) Mapping Projects

Coarse-scale mapping projects are those completed at a scale of >1: 40 000 or greater. They are regional in nature and cover large areas of land and water, such as the North Coast Fjords (Figure 6). The LUCO Shore Zone Unit Maps are based on potential physical habitat (capability and suitability) for supporting eelgrass and have been used as the baseline for various other studies initiated by the Province of British Columbia and others.

Because data is as much as ten years old these maps should be considered the “first pass” at noting presence of eelgrass, but may not reflect current site-specific conditions. For example, small patches were often not mapped, because they can only be mapped as point occurrences at >1: 40,000. Ecologically, every patch of eelgrass is important, and it is important to map these small patches at a finer scale because of the DFO No Net Loss Policy.

Regional eelgrass mapping for Burrard Inlet and the Southern Strait of Georgia was undertaken by Burrard Clean as part of their oil spill response initiative, and is published in hard copy in the Oil Spill Response Atlas. The digital maps have not been released for public use.

3.2 Fine-scale (Local) Mapping Projects

Fine-scale mapping projects are undertaken scales of less than 1: 40,000. The project areas can be very small (for example, a single estuary that is <1 hectare, to an area that is several square kilometres in size) and are typically place specific.

Entries include First Nations, NGOs, consultants, local government (regional districts), and several higher-level government agencies such as Parks Canada. Many of the NGO groups are just beginning inventory and mapping work and are linked to the overarching coastal eelgrass mapping project managed by SeaChange Marine Conservation Society. A few of the entries are double-listed because they cover more than one Marine Ecoregion.

3.3 Eelgrass Restoration Projects

Regionally-appropriate eelgrass restoration techniques have been developed and tested by Cynthia Durance (Precision Identification) over the past ten years. This section provides a brief summary by Precision Identification of the fifteen restoration projects known in coastal British Columbia. Table 2 is taken from the following reference:

Durance, C. 2002. “A Review and Assessment of Eelgrass Transplant Projects in British Columbia.” Unpublished Report for Fisheries and Oceans Canada.

| Site | Goal | Transplant Date | Area (m ²) | Number of Transplants | Monitoring Dates |
|---|------------------|-----------------|------------------------|-----------------------|------------------|
| Lower Mainland | | | | | |
| Tsawwassen | NNL ³ | 1991 | 114,600 | 202,842 | 1992-1994 |
| Vancouver Island | | | | | |
| Nanaimo Harbour | NNL | 1994 | 5,420 | 15,000 | 1995-1997 |
| Comox Harbour ⁴ | enhancement | 1990 | 18,000 | 0 | 1995 |
| Campbellton – sewage outfall pipeline | NNL | 1996 | - | 12,000 | 1997 |
| Campbell River Discovery Marina | NNL | 1994 March | 810 | 2,525 | 1994 |
| | NNL | 1994 April | 540 | 750 | 1994 |
| | NNL | 1994 November | 600 | 1,100 | 1995 |
| Menzies Bay – Marine Link | NNL | 1996 | 24 | 1,200 | none |
| Port McNeil – Broughton Strait Resort | NNL | 1996 | - | 10,000 | none |
| Bazen Bay – sewage outfall pipeline | NNL | 1998-1999 | - | 6,000 | 1999-2001 |
| Tofino – 4 th St. Dock | NNL | 1990 | 700 | 15,100 | none |
| Tofino – Long Beach Shellfish Ltd. | NNL | 1990 | 370 | 3,990 | 1990 |
| Tofino – Tofino Airlines Ltd. | NNL | 1999 | 200 | 2,000 | 2000-2002 |
| Tod Inlet ⁵ - Goward Tod Park | enhancement | 2000 | - | 1,800 | 2000,2001 |
| Tod Inlet ⁶ - Tsartlip Reserve | enhancement | 2000 | - | 2,300 | 2001 |
| Sunshine Coast | | | | | |
| Gibsons Harbour | NNL | 1985 | 164 (estimate) | 1,223 | 1987 |
| Gibsons | research | 1987-1988 | 250 | 450 | 1988-1989 |

Table 2. Summary of Eelgrass Transplant Projects by Precision Identification.

3.4 Historical Eelgrass Mapping Projects

The historical mapping projects capture the locations of eelgrass beds in various places, going back as far as 1945. Besides eelgrass, many of the maps provide valuable information on other marine features. The first example from the Sunshine Coast Regional District shows how DFO records can be used to create an ArcView map showing historic locations, which can then be layered with other information for planning and management purposes.

³ NNL – No Net Loss

⁴ A bench was created to provide eelgrass habitat through natural recolonization.

⁵ SeaChange Marine Conservation Society project, see Strait of Georgia Section 4.8

⁶ SeaChange Marine Conservation Society project, see Strait of Georgia Section 4.8

The 100+ fine-scale herring spawning grounds maps produced primarily by C.W. Haegele in the 1970s are being digitized and geo-referenced by DFO (contact Brad Mason), and will be invaluable to groups working on eelgrass conservation.

3.5 Eelgrass Research Projects/Theses

This category includes research and thesis projects that have been located during this project. A thorough literature search will likely turn up many more useful articles and research documents that used coastal B.C. places for field studies.

Many of the documents listed in this report were originally part of research projects studying various marine and estuarine phenomena. However, the map products associated with the research have become very useful for historical map data purposes and are thus listed as "Historical Eelgrass Mapping Projects".

The two research projects listed below have not been checked for geographical locations but may be of use to researchers:

Gower, K. 1994. **Identifying Eelgrass Using CASI and TM Imagery** (1994). University of Victoria, Department of Geography. B.Sc. Honour's Thesis. Shelved in UVic Geography Chair's Office, Cornett B228 (see secretary for access).

Morris, M. 1996. **Testing a Nearshore Biophysical Classification System**. M.Sc. Thesis, Department of Botany, University of B.C. 64 p. Using multivariate models, in her project she examined ecological relationships between data from 297 shoreline units (biophysically based) and 361 quadrats (plants, animals).

4.0 Inventory

This section is sub-divided into the ten Marine Ecoregions. Each sub-section provides details about projects that have taken place in an ecoregion, and / or supplies details about current and on-going eelgrass mapping and monitoring projects.

Brief summaries of project details are provided, along with geographical locations and sources (confirmed to January 2003) to directly contact for more information.

4.1 Continental Slope

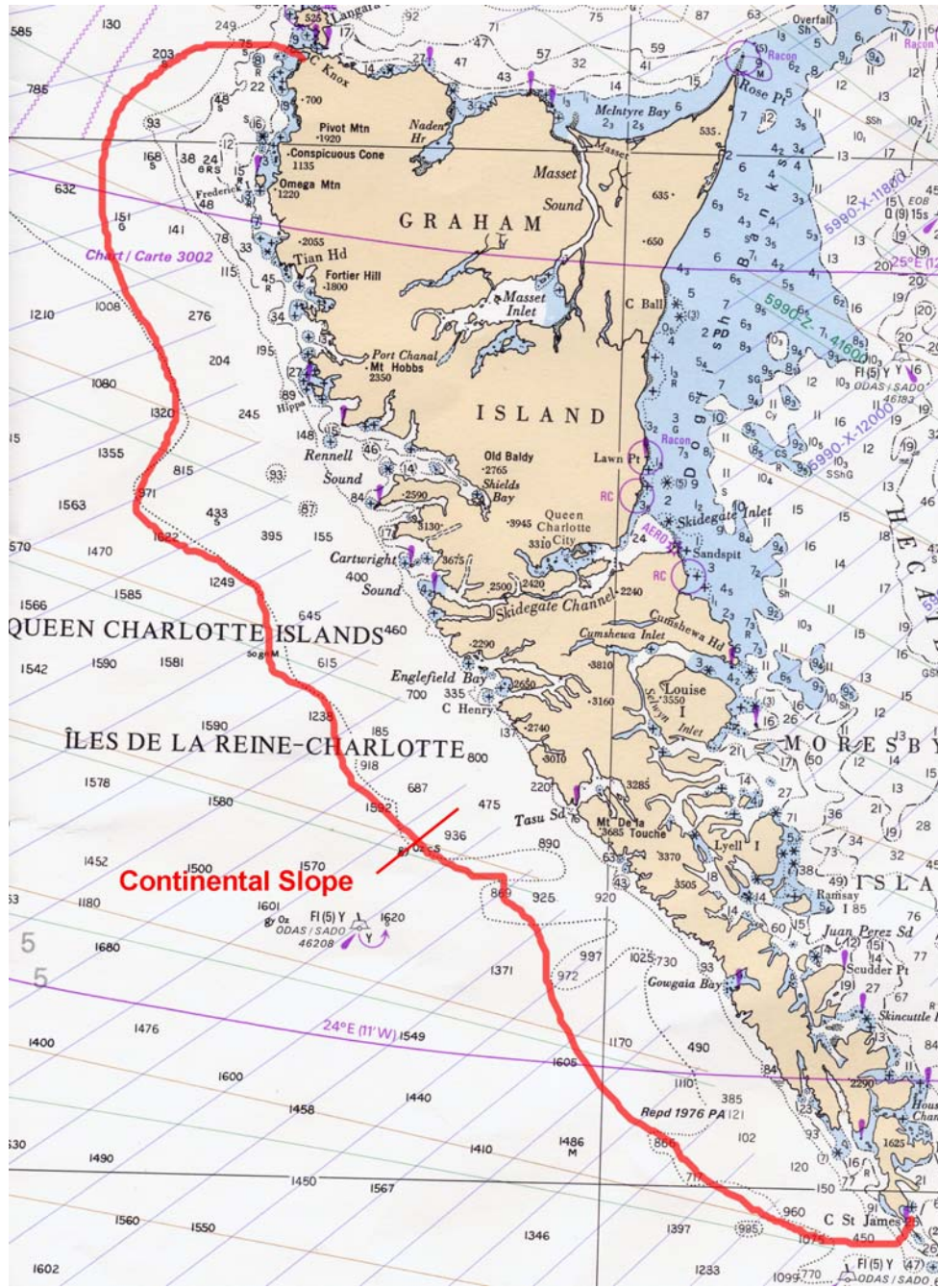


Figure 2. Continental Slope Area.

Category: Coarse-Scale
Marine Ecosection: Continental Slope

AGENCY/PERSON/PROJECT

Gwaii Haanas National Park Reserve and Haida Heritage Site
Parks Canada
P.O. Box 37
Queen Charlotte City, B.C. Canada V0T 1S0

tel 250-559-6342
fax 250- 559-8366
email norm.sloan@pc.gc.ca

GIS/Mapping contact person: Dr. Norm Sloan

Maps available from: see above

Date of Work:2002

Scale: N/A

Place: Gwaii Haanas

Description: Have ground-truthed linear extent of eelgrass in Gwaii Haanas and put data on GIS system. No polygon data available currently. Also synthesized data from a number of previous marine plant surveys and mapped herbarium records. Previous records thought to be *Z. japonica* were confirmed to be *Z. marina*. Only *Z. marina* occurs in Gwaii Haanas. Gwaii Haanas includes the larger islands of South Moresby, Lyell, Burnaby, Kunghit as well as many smaller islands located on the Queen Charlotte Sound (eastern side of South Moresby).

Eelgrass and surfgrass in the Haida language are known as "T'aanuu".

Publication:

Sloan, N.A. and P.M. Bartier. 2000. **Living Marine Legacy of Gwaii Haanas I: Marine Plant Baseline to 1999 and Plant-related Management Issues.** Report 027, Parks Canada Technical Reports in Ecosystem Science. Ecosystem Management Section, Gwaii Haanas National Park Reserve/Haida Heritage Site. Queen Charlotte City, B.C.

4.2 Dixon Entrance

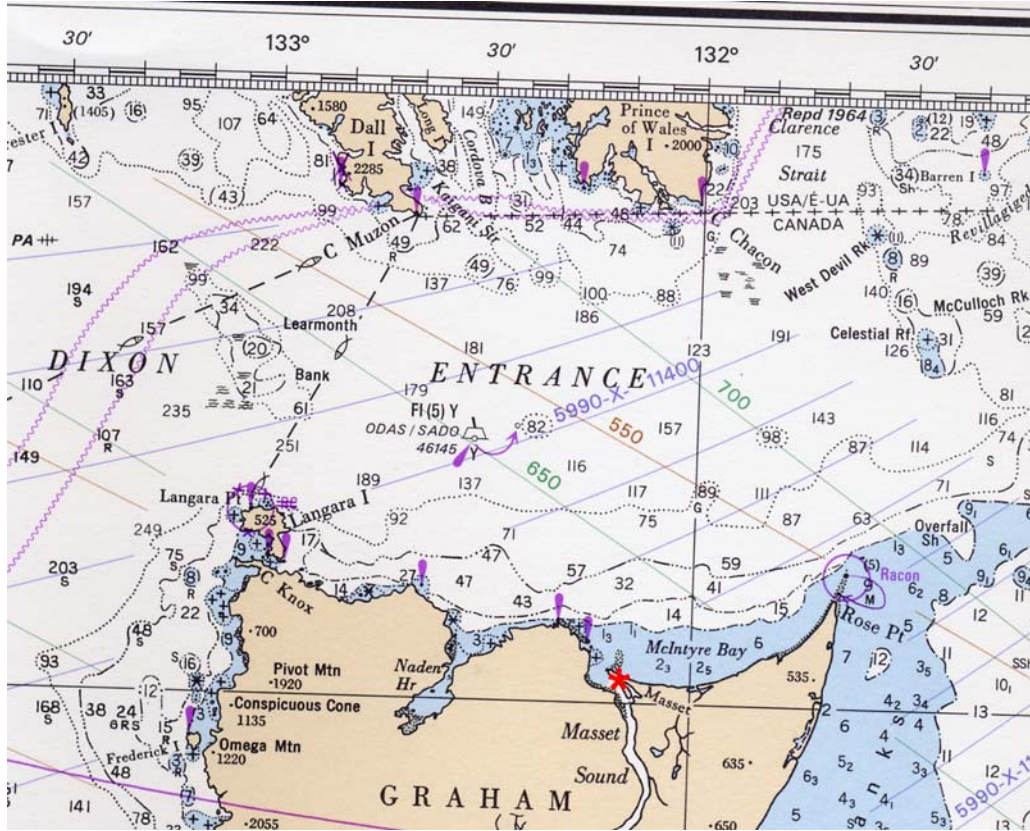


Figure 3. Dixon Entrance Area.

Category: Fine-Scale

Marine Ecosection: Dixon Entrance

AGENCY/PERSON/PROJECT

North Graham Island Streamkeepers

North Graham Island, Haida Gwaii, B.C.

tel 250- 557-4574

email marrs@island.net

GIS/Mapping contact person: Chris Marrs

Maps available from: see above

Date of Work: July 2002 -

Scale: ArcView Format

Place: Port Clements, Haida Gwaii

Description: Eelgrass monitoring project in Yakoun River estuary, Masset Inlet, Masset Sound, MacIntyre Bay. 1.5 square kilometres mapped.

Working with SeaChange Marine Conservation Society.

4.3 Hecate Strait

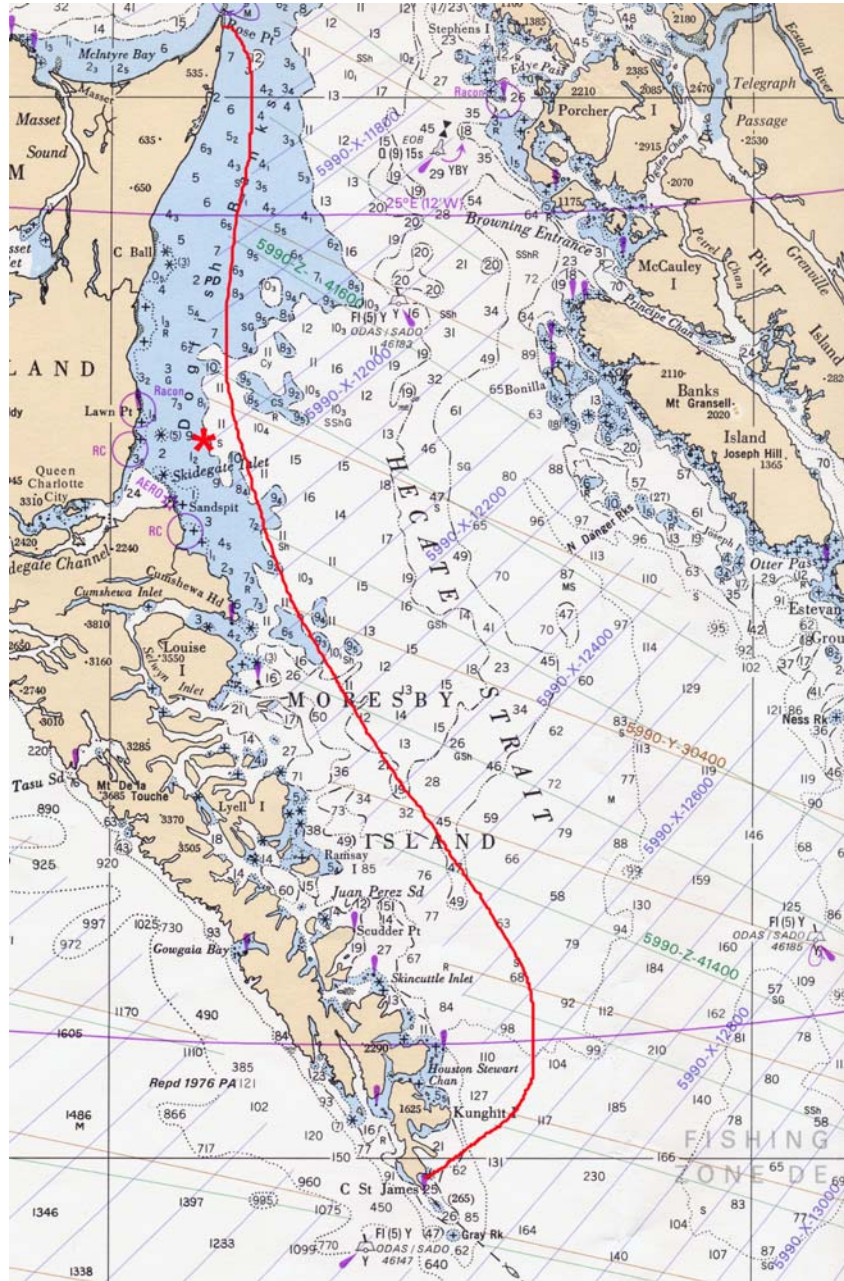


Figure 4. Hecate Strait Area.

Category: Coarse-Scale
Marine Ecosection: Hecate Strait

AGENCY/PERSON/PROJECT
Gwaii Haanas National Park Reserve and Haida Heritage Site
Parks Canada
P.O. Box 37
Queen Charlotte City, B.C. Canada V0T 1S0

tel 250-559-6342
fax 250- 559-8366
email norm.sloan@pc.gc.ca

GIS/Mapping contact person: Dr. Norm Sloan

Maps available from: see above

Date of Work: 2002

Scale: N/A

Place: Gwaii Haanas

Description: Have ground-truthed linear extent of eelgrass in Gwaii Haanas and put data on GIS system. No polygon data available currently. Also synthesized data from a number of previous marine plant surveys and mapped herbarium records. Previous records thought to be *Z. japonica* were confirmed to be *Z. marina*. Only *Z. marina* occurs in Gwaii Haanas. Gwaii Haanas includes the larger islands of South Moresby, Lyell, Burnaby, Kunghit as well as many smaller islands located on the Queen Charlotte Sound (eastern side of South Moresby).

Eelgrass and surfgrass in the Haida language are known as "T'aanuu".

Publication:

Sloan, N.A. and P.M. Bartier. 2000. **Living Marine Legacy of Gwaii Haanas I: Marine Plant Baseline to 1999 and Plant-related Management Issues.** Report 027, Parks Canada Technical Reports in Ecosystem Science. Ecosystem Management Section, Gwaii Haanas National Park Reserve/Haida Heritage Site. Queen Charlotte City, B.C.

4.4 Queen Charlotte Sound

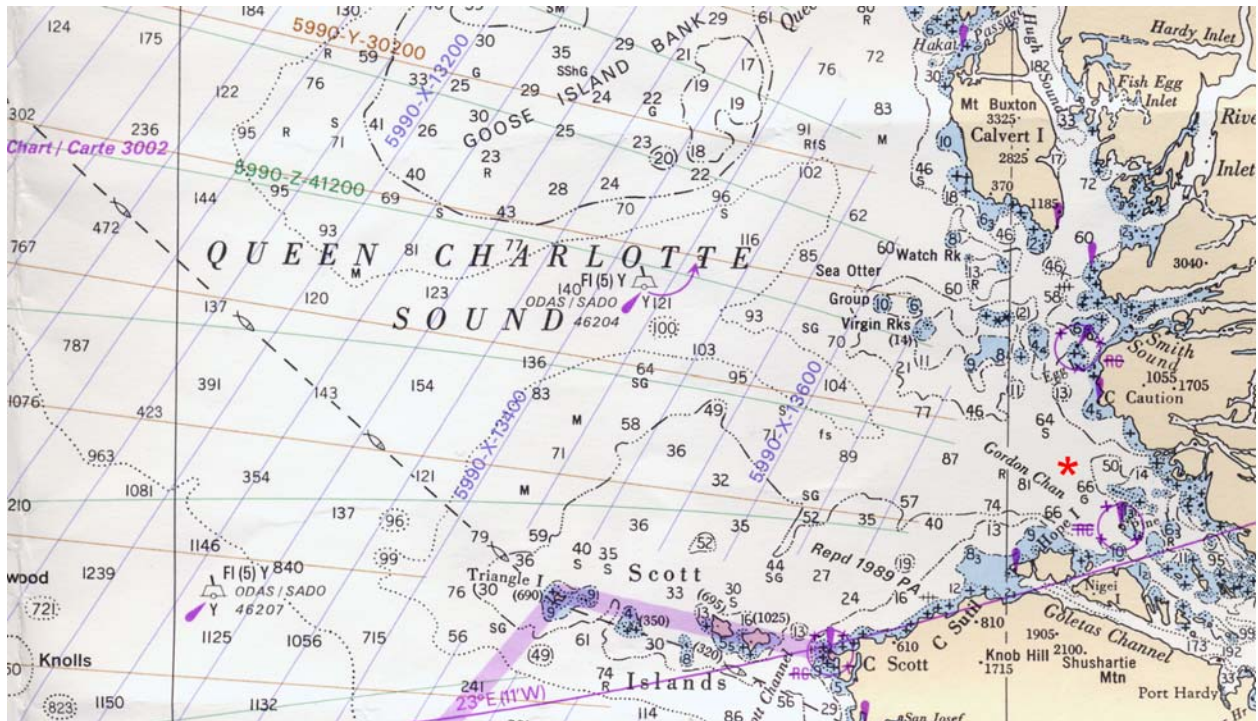


Figure 5. Queen Charlotte Sound Area.

Category: Coarse-Scale

Marine Ecosection: Queen Charlotte Sound

AGENCY/PERSON/PROJECT

**Gwaii Haanas National Park Reserve and Haida Heritage Site
Parks Canada**

P.O. Box 37

Queen Charlotte City, B.C. Canada V0T 1S0

tel 250-559-6342

fax 250- 559-8366

email norm.sloan@pc.gc.ca

GIS/Mapping contact person: Dr. Norm Sloan

Maps available from: see above

Date of Work: 2002

Scale: N/A

Place: Gwaii Haanas

Description: Have ground-truthed linear extent of eelgrass in Gwaii Haanas and put data on GIS system. No polygon data available currently. Also synthesized data from a number of previous marine plant surveys and mapped herbarium records. Previous records thought to be *Z. japonica* were confirmed to be *Z. marina*. Only *Z. marina* occurs in Gwaii Haanas. Gwaii Haanas includes the larger islands of South Moresby, Lyell, Burnaby, Kunghit as well as many smaller islands located on the Queen Charlotte Sound (eastern side of South Moresby).

Eelgrass and surfgrass in the Haida language are known as "T'aanuu".

Publication:

Sloan, N.A. and P.M. Bartier. 2000. **Living Marine Legacy of Gwaii Haanas I: Marine Plant Baseline to 1999 and Plant-related Management Issues.** Report 027, Parks Canada Technical Reports in Ecosystem Science. Ecosystem Management Section, Gwaii Haanas National Park Reserve/Haida Heritage Site. Queen Charlotte City, B.C.

4.5 North Coast Fjords

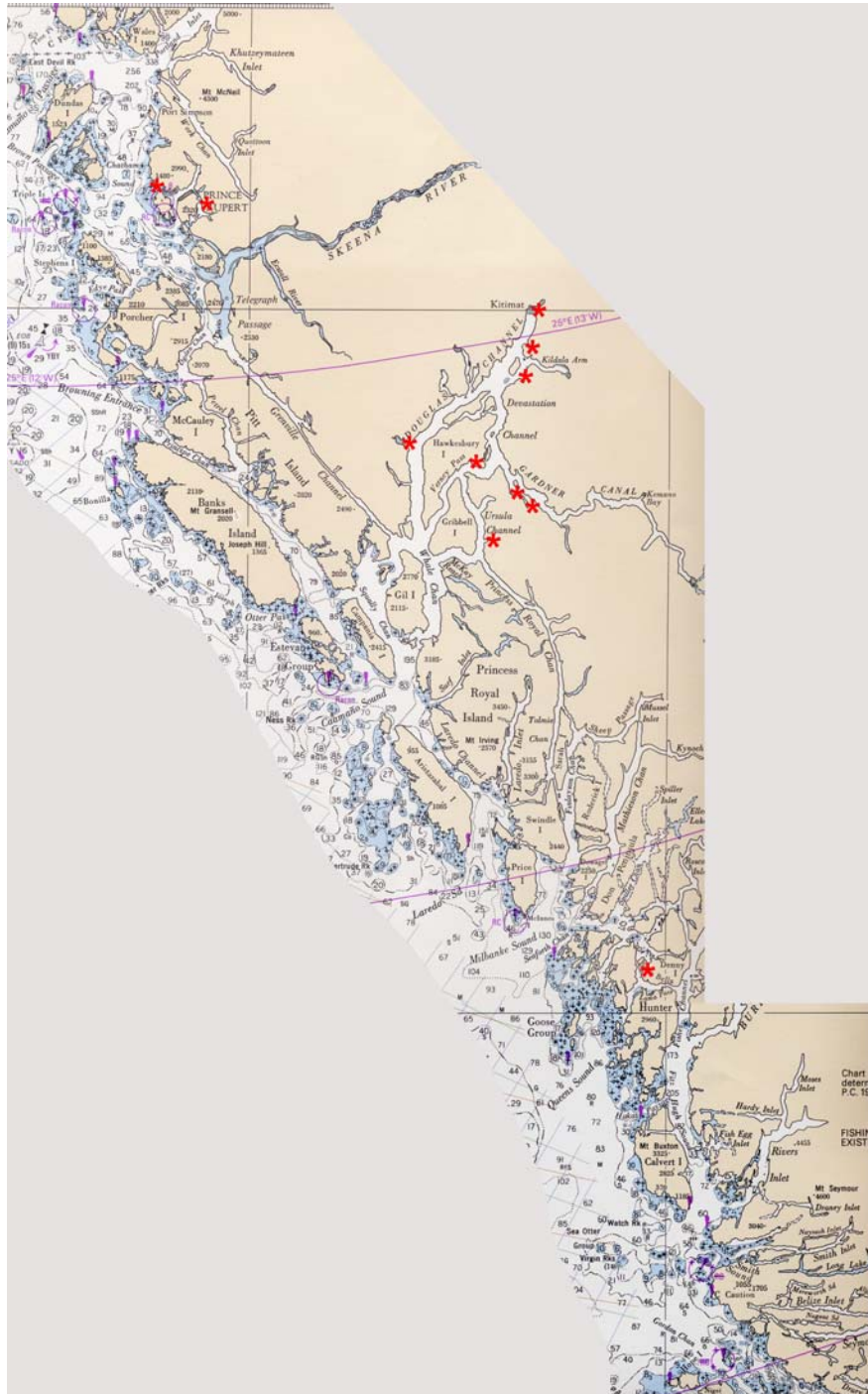


Figure 6. North Coast Fjords Area.

Category: Coarse-Scale

Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Incomplete draft May 2002

Scale: ArcView format

Place: North Central Coast (Jackson Passage & Arthur Island)

Description: Eelgrass & kelp *not yet* mapped in area around Waglisa, Shearwater and Klemtu. Aquaculture lease locations mapped. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Fine-Scale
Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT
Northwest Stewardship Society
202-4716 Lazelle Avenue
Terrace, B.C. Canada V8G 1T2

Dennis Horwood
email dbhorwood@uniserve.com
tel 250-632-2004

Debra Stokes, Habitat Steward
tel 250-638-1676
email dstokes@telus.net

GIS/Mapping contact person: see above

Maps available from: N/A

Date of Work: May 2002-November 2002

Scale: n/a

Place: Kitimat River Estuary

Description:

In 2002 undertook an initial survey of potential eelgrass sites using an underwater camera in the Douglas Channel area from Bish Creek north to the Kitimat River Estuary. Will begin detailed mapping in early Spring 2003. 100 sq. m.

Will also be taking salinity, temperature and pH readings on a regular basis throughout the winter in Minette Bay, which is a potential eelgrass reclamation site.

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT
Heiltsuk Fisheries Program Eelgrass Project
P.O. Box 880
Waglisla, B.C. V0T 1Z0

tel 250-957-2303
email rossw@bellabella.net

GIS/Mapping contact person: Ross Wilson

Maps available from: N/A

Date of Work: 2002 -

Scale: N/A

Place:

Description: Project began in June 2002 with preliminary reconnaissance of an intertidal lagoon with (former) extensive eelgrass beds. The lagoon is currently being mined for marine clays, despite the presence of eelgrass. Restoration potential is being explored.

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT

Prince Rupert Community Fisheries Development Centre (CFDC)

Bree McLaren, Coordinator

bmclaren@citytel.net

tel 250-624-8566

fax 250-624-8590

GIS/Mapping contact person: see above and Dawn Webb dwebb@citytel.net

Maps available from: data loaded onto the SHIM website www.shim.bc.ca

Date of Work: 2002

Place: Prince Rupert area

Description: Eelgrass Stewardship Project

Currently, the initial planning phase of the Eelgrass Stewardship Project has been completed with the development of preliminary partnerships and crew training. Utilizing partnerships with local First Nations Band Council's (Kincolith, Metlakatla, Kitkatla, Hartley Bay, and Lax Kw' Alaams and Fisheries and Oceans Canada Habitat Enhancement Branch), CFDC has been able to establish lines of communication that cover much of the North Coast and will aid in the coordination of eelgrass bed mapping, the focus of the Eelgrass Stewardship Project.

The proposed plan for the Prince Rupert area is a broad, low-level (Level 1) survey. This will allow maximum coverage of the North Coast's eelgrass beds. Upon completion, a meeting between all interested parties and stakeholders will be held to decide which beds are of highest priority in the North Coast. Once this identification has occurred, detailed characteristics of the priority eelgrass beds will be recorded. This approach was developed through a series of meetings with DFO and local World Wildlife Fund representatives to ensure that available funds and field time was spent on areas deemed more critical to the North Coast's marine ecosystem.

In 2002, mapping and monitoring of intertidal eelgrass was undertaken by boat and underwater camera at: Delusion Bay (Lat N54 15.54", Long W130 23.060"), Casey Cove (Lat N54 16.775", Long W130 23.063"), and Dodge Cove (Lat N54 17.303", Long W130 22.848").

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT
Coastal & Ocean Resources Inc.
214 – 9865 W. Saanich Road
Sidney, B.C. V8L 5Y8

tel 250-655-4035
fax 250-655-1290
email john@coastalandoceans.com

GIS/Mapping contact person: John Harper

Maps available from: see www.coastalandoceans.com

Date of Work: various

Scale: various

Place: Douglas Channel

Description: SIMS (towed underwater Seabed Imaging and Mapping System) eelgrass mapping in the Douglas Channel area near Kitimat. Data is owned by the University of Victoria.

Sites Mapped:

Kitimat Arm
Kitkiata Inlet
Hawkesbury Island Goat Harbour
Gardner Channel (2 sites)

Category: Historical

Marine Ecosection: North Coast Fjords

AGENCY/PERSON/PROJECT

Prince Rupert Port Authority

110 Third Avenue West

Prince Rupert, B.C. V8J 1K8

tel 250- 627-7545

fax 250- 627-7101

email pcorp@rupertport.com

web www.rupertport.com

Consultant: Borstad Associates Remote Sensing Services
Sidney, B.C.

web: www.borstad.com/papers/rupertpaper.html

Maps available from: report

Date of Work: 1996-1997

Scale:

Place: Chatham Sound (Prince Rupert Harbour)

Description: This project was a Compact Air Spectrographic Imager (CASI) survey of Prince Rupert Harbour and vicinity (Digby, Kaien & Ridley Islands) to chart ecologically sensitive areas within Prince Rupert Harbour, including location and extent of eelgrass beds.

Publication:

Forsyth, F., G. Borstad, W. Horniak and L. Brown. 1998. **Prince Rupert Intertidal Habitat Inventory Project.** Unpublished report to the Prince Rupert Port Corporation, Canadian Department of Fisheries and Oceans, and the City of Prince Rupert. 33 pp.

Category: Research
Marine Ecosection: North Coast Fjords

W. MacKenzie, W., D. Remington and J. Shaw. 2000. **Estuaries on the North Coast of British Columbia: A Reconnaissance Survey of Selected Sites.** May 1, 2000
*A cooperative project of the Ministry of Environment, Lands and Parks and the Ministry of Forests, Research Branch **Funded by Forest Renewal BC.** B.C. Ministry of Forests, Research Branch. Bag 5000 Smithers, B.C. V0J 2N0.*

This is a “DRAFT DOCUMENT, NOT FOR DISTRIBUTION”.

“This survey had two primary purposes. The first was to acquire ecological information on plant community types occurring in estuaries on the north coast and to create a site classification. The second was to survey and describe a range of estuaries on the north coast, summarizing basic biological and geomorphological information on each estuary and identifying estuaries with particularly high habitat values or presence of rare ecosystems. This document outlines the findings of this survey and includes a proposed ecosystem classification framework for estuarine wetlands, a component of a broader Wetland and Riparian classification (MacKenzie and Banner 2000). This report describes 14 estuarine ecosystem associations and summarizes biological information collected or compiled for 28 estuaries of the central and north coast of B.C. Estuary summaries include resource resource value ranking and additional information on social, cultural, protection status and development issues.”

A map is provided showing the 28 sampled estuaries. The research sites within the North Coast Fjords marine ecosection, but three sites are located south of Waglisa. Eelgrass is mentioned in passing as important habitat for herring spawning.

4.6 Queen Charlotte Strait

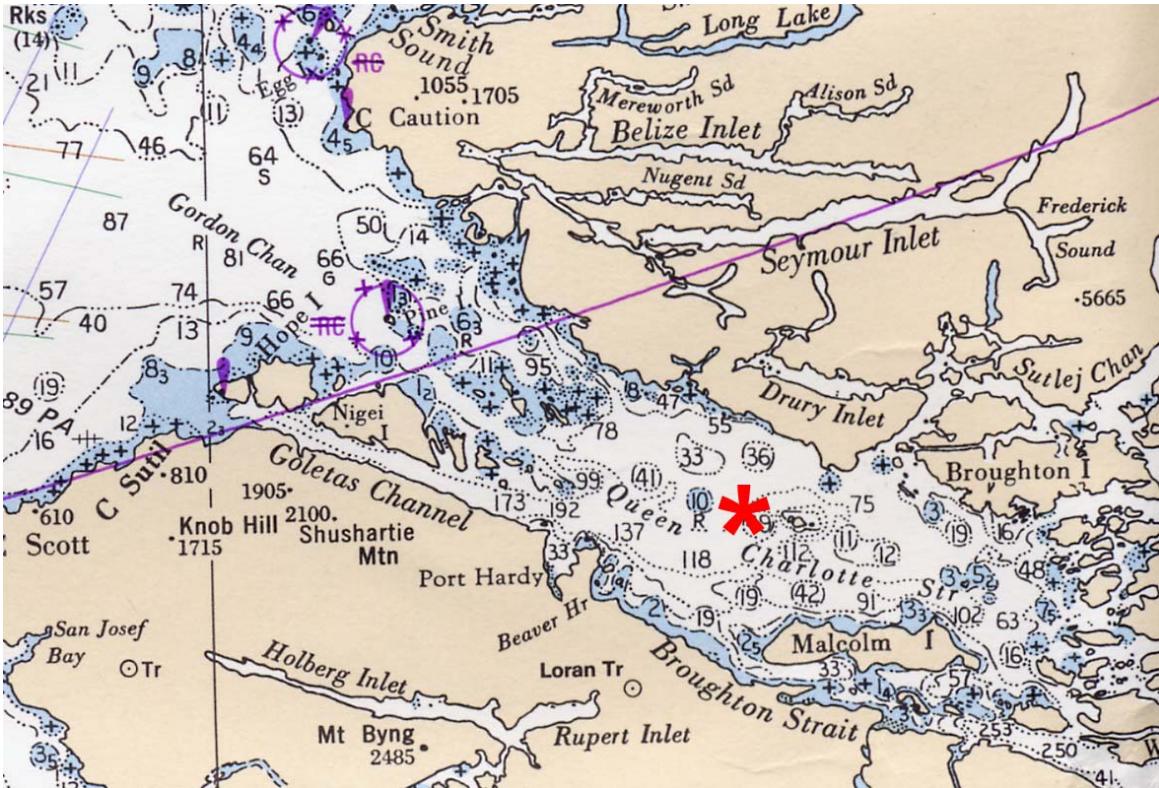


Figure 7. Queen Charlotte Strait Area.

Category: Coarse-Scale

Marine Ecosection: Queen Charlotte Strait

AGENCY/PERSON/PROJECT

**North Island Straits Integrated Coastal Plan
Coastal Planning, Projects & Marine Initiatives
Ministry of Sustainable Resource Management**

Maps available from: <ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/nis>

formats: .pdf .gif .eps

Date of Work: Draft, June 6, 2002

Scale: n/a

Place: Johnstone & Queen Charlotte Straits

Description:

The North Island Straits (NIS) Integrated Coastal Plan Area includes the foreshore and nearshore areas of Vancouver Island, the mainland coast and the associated islands and islets from Port Neville in Johnstone Strait to Cape Caution in Queen Charlotte Strait. It extends approximately 138 km from east to west, encompassing some 560,000 ha of marine waters.

The plan includes 8 maps. Each map is divided into an east and west half. **Map 1** covers Biological Resources: **marine plants**, clam beds, estuary wetlands, fish rivers, herring spawning segments, bald eagle nest sites, salmon rearing rivers, seal and sealion haul-outs, red and blue listed species, and anadromous rivers.

Publication: North Island Straits Integrated Coastal Plan. Draft June 6, 2002.
Ministry of Sustainable Resource Management, Coast and Marine Planning Branch.

Category: Coarse-Scale

Marine Ecosection: Queen Charlotte Strait

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Broughton Archipelago

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale

Marine Ecosection: Queen Charlotte Strait

AGENCY/PERSON/PROJECT

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tel 250-973-6580

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Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Queen Charlotte Strait

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

4.7 Johnstone Strait

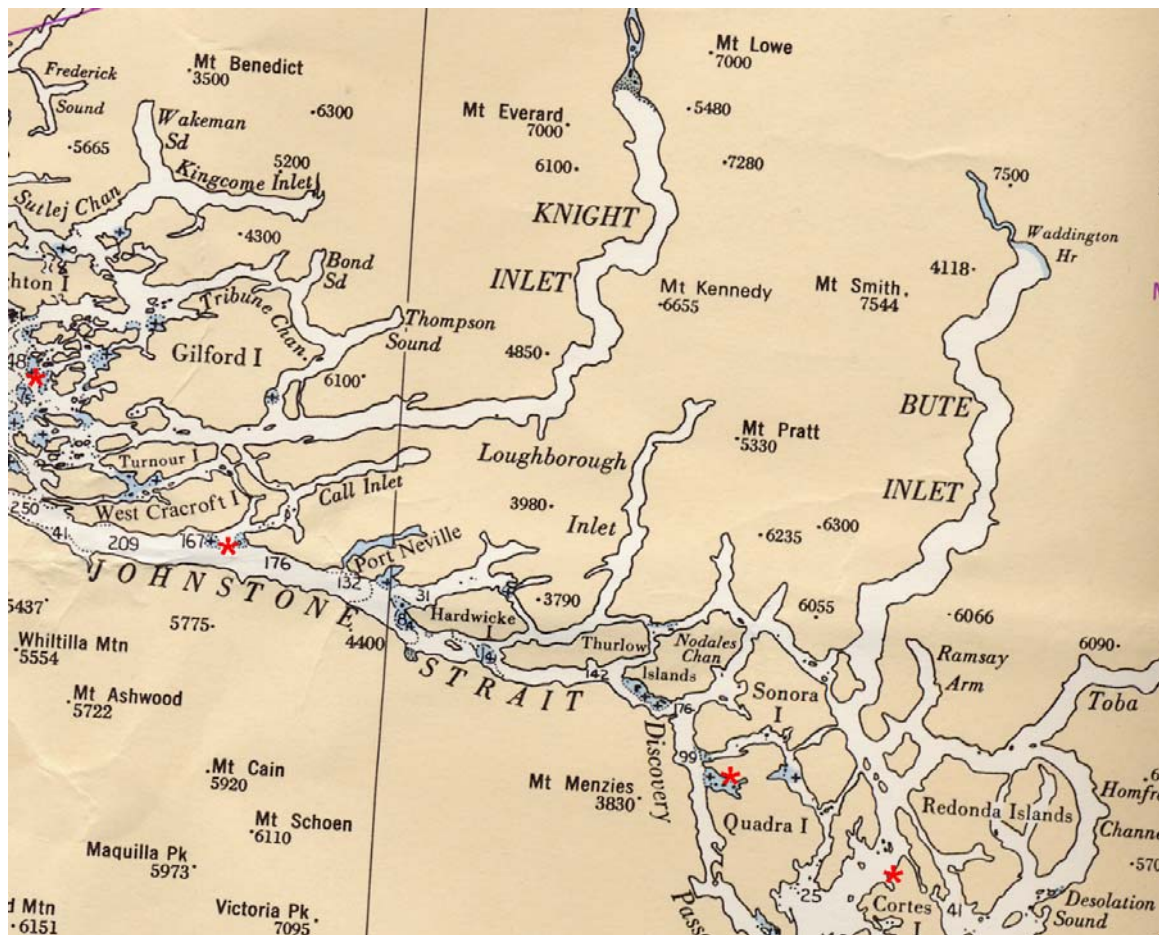


Figure 8. Johnstone Strait Area.

Category: Coarse-Scale

Marine Ecosection: Johnstone Strait

AGENCY/PERSON/PROJECT

**North Island Straits Integrated Coastal Plan
Coastal Planning, Projects & Marine Initiatives
Ministry of Sustainable Resource Management**

Maps available from: <ftp://ftp.gis.luco.gov.bc.ca/pub/coastal/nis>

formats: .pdf .gif .eps

Date of Work: Draft, June 6, 2002

Scale: n/a

Place: Johnstone & Queen Charlotte Straits

Description:

The North Island Straits (NIS) Integrated Coastal Plan Area includes the foreshore and nearshore areas of Vancouver Island, the mainland coast and the associated islands and islets from Port Neville in Johnstone Strait to Cape Caution in Queen Charlotte Strait. It extends approximately 138 km from east to west, encompassing some 560,000 ha of marine waters.

The plan includes 8 maps. Each map is divided into an east and west half. **Map 1** covers Biological Resources: **marine plants**, clam beds, estuary wetlands, fish rivers, herring spawning segments, bald eagle nest sites, salmon rearing rivers, seal and sealion haul-outs, red and blue listed species, and anadromous rivers.

Publication: **North Island Straits Integrated Coastal Plan.** Draft June 6, 2002. Ministry of Sustainable Resource Management, Coast and Marine Planning Branch.

Category: Coarse-Scale

Marine Ecosection: Johnstone Strait

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Johnstone Strait / The Narrows

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale
Marine Ecosection: Johnstone Strait

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166
Sointula, B.C. Canada
V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Broughton Archipelago

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Fine-Scale

Marine Ecosection: Johnstone Strait

AGENCY/PERSON/PROJECT

Quadra Island Mapping Project Association

P.O. Box 685

Quathiaski Cove, B.C. Canada V0P 1N0

tel 250-285-2827

email ian@islandsynergy.com

GIS/Mapping contact person: Ian Douglas

Maps available from: see above

Date of Work: 2000 - ?

Scale: large

Place: Quadra Island (Northern Strait of Georgia & Johnstone Strait)

Description: Mapping eelgrass & kelp beds around Quadra Island.

NB. Southern end of Quadra is in Strait of Georgia Marine Ecoregion.

Category: Fine-Scale
Marine Ecosection: Johnstone Strait

AGENCY/PERSON/PROJECT
Friends of Cortes Island (FOCI)
P.O. Box 211
Whaletown, B.C. Canada V0P 1Z0

GIS/Mapping contact person: Sabina Leader- Mense

tel 250-935-6467
fax 250-
email dmense@rfu.org

Maps available from: N/A

Date of Work: summer 2001

Scale: large

Place: Cortes Island (Northern Strait of Georgia & Johnstone Strait)

Description: Low tide circumnavigation of Cortes Island to observe eelgrass occurrences. Locations were mapped and submitted to Joe Truscott, Provincial Government coordinator for the Cortes Island Shellfish Action Plan. This data will be used as a starting point for FOCI's community eelgrass mapping/monitoring programme.

Working with SeaChange Marine Conservation Society.

Note: Southern end of Cortes is in Straight of Georgia Marine Ecoregion.

4.8 Strait of Georgia

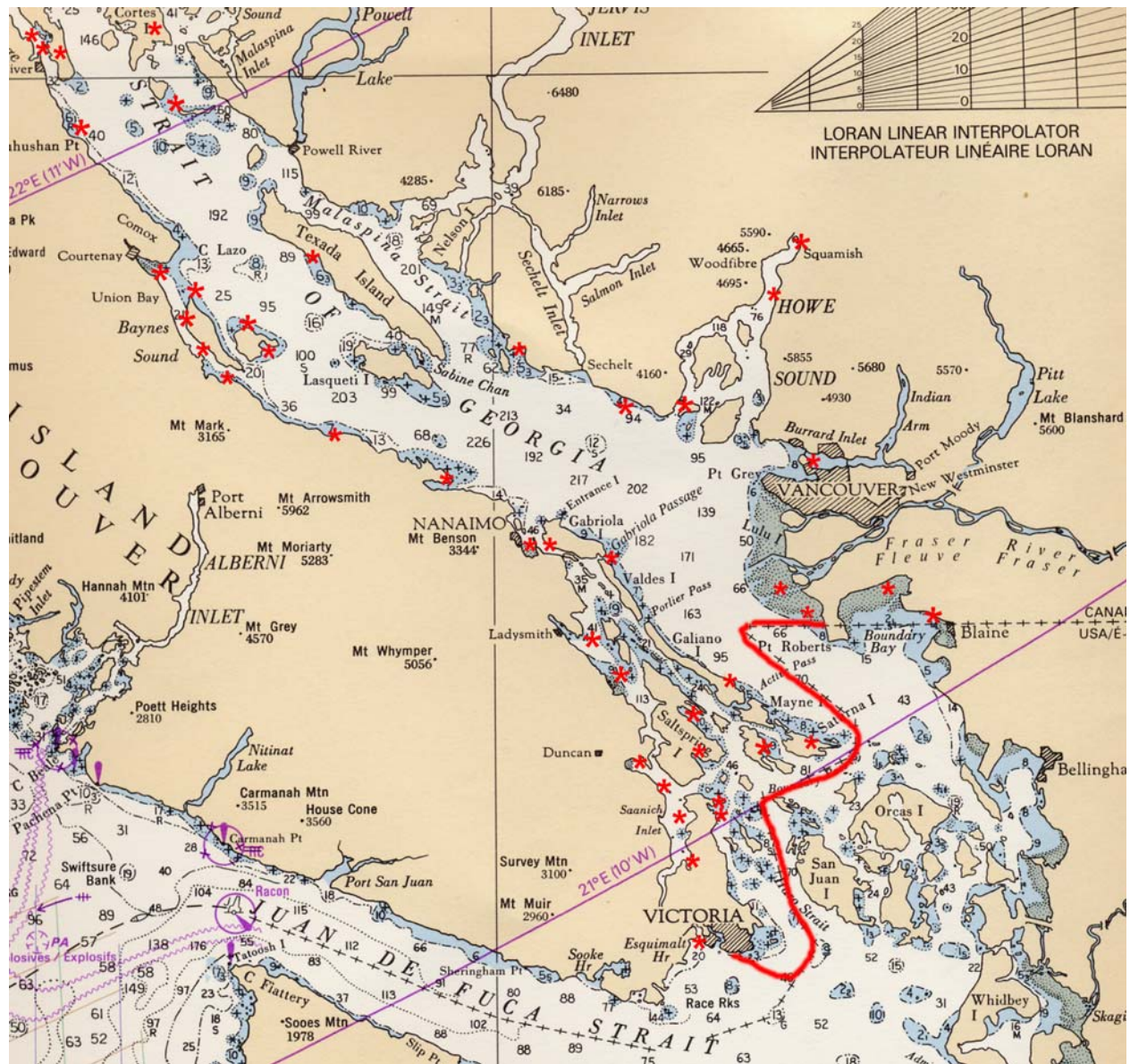


Figure 9. Strait of Georgia Area.

Category: Coarse-Scale

Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Incomplete draft, June 2002

Scale: ArcView format

Place: Northern Strait of Georgia (Jervis & Sechelt Inlets)

Description: Eelgrass & kelp *not* mapped. Aquaculture lease locations mapped. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale

Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT

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tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: incomplete

Scale: ArcView format

Place: Strait of Georgia (Cape Mudge to Parksville)

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Aquaculture lease locations mapped. There is only partial coverage for the east side of Strait of Georgia. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale

Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: n/a

Scale: ArcView format

Place: South Coast – Strait of Georgia (Parksville to U.S. border)

Description: Eelgrass & kelp digital data *not* currently available. Aquaculture lease locations mapped. Clam bed locations available for southern Gulf islands and adjacent Vancouver Island. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Quadra Island Mapping Project Association
P.O. Box 685
Quathiaski Cove, B.C. Canada V0P 1N0

tel 250-285-2827
email ian@islandsynergy.com

GIS/Mapping contact person: Ian Douglas

Maps available from: see above

Date of Work: 2000 - ?

Scale: large

Place: Quadra Island (Northern Strait of Georgia & Johnstone Strait)

Description: Mapping eelgrass & kelp beds around Quadra Island.

NB. Northern end of Quadra falls within Johnstone Strait Marine Ecoregion.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Friends of Cortes Island (FOCI)
P.O. Box 211
Whaletown, B.C. Canada V0P 1Z0

GIS/Mapping contact person: Sabina Leader- Mense

tel 250-935-6467
fax 250-
email dmense@rfu.org

Maps available from: N/A

Date of Work: summer 2001

Scale: large

Place: Cortes Island (Northern Strait of Georgia & Johnstone Strait)

Description: Low tide circumnavigation of Cortes Island to observe eelgrass occurrences. Locations were mapped and submitted to Joe Truscott, Provincial Government coordinator for the Cortes Island Shellfish Action Plan. This data will be used as a starting point for FOCI's community eelgrass mapping/monitoring programme.

Note: Northern end of Cortes falls within Johnstone Strait Marine Ecoregion.

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Sunshine Coast Conservation Association
P.O. Box 1969
Sechelt, B.C. Canada V0N 3A0

tel 604-885-6283

email D_sanford@sunshine.net or moonstone@sunshine.net

GIS/Mapping contact person: Dianne Sanford

Maps available from: N/A

Date of Work: Summer 2002 – (two year project)

Scale: ArcView Format

Place: Sunshine Coast

Description:

Mapping 188,975 m² (18.89 hectares of eelgrass) located between:

| | | |
|-------------------------------|------------|-------------|
| Sargents Bay | N49°28'30" | W123°50'30" |
| to end of Porpoise Bay | N49°28'94" | W123°45'46" |

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Waterbird Watch Collective
272 Beddis Road
Salt Spring Island, B.C. Canada
V8K 2J1

Nina Raginsky
tel 250- 537-4515

GIS/mapping contact person: Jacky Booth
tel 250- 653-4766 or 653-4761
email booth@saltspring.com

Maps available from: see above

Date of Work: 1998 - ongoing

Scale: ArcView Format

Place: Salt Spring Island

Description: Map showing distribution of eelgrass beds around Salt Spring Island. Data collected by volunteers on low tide walks and by kayak.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Project Watershed/Baynes Sound
P.O. Box 3007
Courtenay, B.C. V9N 5N3 Canada

tel 250-339-1619
fax 250-339-9619
email

GIS/Mapping contact person: Don Chamberlain

Maps available from: see above

Date of Work: 2002

Scale: n/a

Place: **Baynes Sound**

Description:

Tested DFO underwater video camera and GPS with Brad Mason in 2002. Funding permitted would like to:

1. Compile, digitize and review past inventories of Baynes Sound foreshore ecotypes and land use.
2. Analyze past inventories to identify specific causes of changes in location, density and/or health of eelgrass bed occurrences in Baynes Sound.
3. Report the results of the analysis of past inventories to local and regional planners and decision makers, project partners, foreshore landholders, and the community at large.
4. Identify which eelgrass parameters are appropriate for use as indicators of nearshore ecosystem health in Baynes Sound.
5. Determine how to provide consistent and reliable data to a central database.
6. Design a community eelgrass monitoring and mapping program.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Baynes Sound Shellfish Action Plan
Ministry of Sustainable Resource Management
Decision Support Services

tel
fax
email

GIS/Mapping contact person: n/a

Maps available from: see above

Date of Work: January 2002

Scale: Software: ArcGIS 8.1;
Datum: NAD 83; Primary Base: 1:40,000

Place: **Baynes Sound Sensitive Marine Resources**

Description:

At 1: 40 000, this map falls on the borderline between small- and fine-scales. It provides an overview of the shellfish aquaculture areas of Baynes Sound. The small region it covers is from Comox Harbour in the north and all of Baynes Sound, including the east coast of Vancouver Island, Sandy Island Marine Provincial Park and Denman Island. Data has been synthesized from other sources and the map includes: sealion haul-outs, harbour seal occurrences, kelp beds, eelgrass beds, DFO Clam Atlas beaches, and salmon escapement streams.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Shellfish Culture Capability Appraisal
B.C. Ministry of Fisheries
1802 Blanshard St.
Victoria, British Columbia
CANADA
V8W 2Z7

GIS/Mapping contact person:

Maps available from: Ministry of Fisheries

Date of Work: October 1998

Scale: n/a

Place: **Howe Sound and Texada Island Region**

Description: This study examined site capability for deep water and bottom shellfish culture. Where appropriate, waterways have been subdivided into a number of associated reaches and beach areas. Derived shellfish culture capability ratings are presented for each reach and beach area. Specific data and shellfish culture appraisals for intertidal (bottom) culture of the Pacific oyster (*Crassostrea gigas*) and the Manila clam (*Tapes philippinarium*) for beaches are provided. Detailed results from intertidal surveys including all biophysical variables are presented in the form of a data sheet for each beach surveyed in the study area. The data sheet provides a description of the location with a photograph, details the biophysical variables and summarises the capability of the site for bottom culture. When eelgrass is present, it is noted on the data sheets. 184 bays and beaches were included in the inventory.

Publication: *Blyth, C. Ann, Allison M. Peacock and Brian C. Kingzett. 1998. Shellfish Culture Capability Appraisal for the Howe Sound and Texada Island Region: Deep Water Culture Potential for the Pacific Oyster and the Japanese Scallop; Beach Culture Potential for the Pacific Oyster and the Manila Clam.* Victoria, B.C., B.C. Ministry of Fisheries. (AXYS Environmental Consulting Ltd. 2045 Mills Road West, Sidney, British Columbia, Canada V8L 3S8).

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Snuneymuxw First Nation
P.O. Box
Nanaimo, B.C. Canada

tel 250-
fax 250-
email Andrewm@snuneymuxwtreaty.ca

GIS/Mapping contact person: Andrew McNaughton

Maps available from: see above

Date of Work: 2002

Scale: N/A

Place: Nanaimo River Estuary

Description: Mapped eelgrass distribution in the Nanaimo River estuary (1 square kilometre), working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Marine Ecology Station
Khoyatan Marine Laboratories
9835 Seaport Place
Sidney, B.C. Canada V8L 4X3

Phone: (250) 655-1555
Fax: (250) 655-1573
Email: baustin@mareco.org

GIS/Mapping contact person: Dr. Bill Austin

Maps available from: see above

Date of Work: 2002

Scale:

Place: Sidney

Description: The Marine Ecology Station is an independent NGO that operates a research laboratory and aquarium, undertakes field research and conducts educational programmes. It has recently moved from Cowichan Bay to the Town of Sidney. To date they have mapped the distribution of eelgrass around Sidney Harbour (900 metres)

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
Friends of Semiahmoo Bay Society
P.O. Box
B.C. Canada

tel 604-
fax 604-
email Independenthouse@hotmail.com

GIS/Mapping contact person: Margaret Cuthbert

Maps available from: N/A

Date of Work: 2002

Scale:

Place: Semiahmoo Bay

Description: Mapped distribution of eelgrass around Semiahmoo Bay (1322 metres)

Working with SeaChange Marine Conservation Society.

Category: Fine-Scale
Marine Ecoregion: Strait of Georgia

AGENCY/PERSON/PROJECT
Coastal & Ocean Resources Inc.
214 – 9865 W. Saanich Road
Sidney, B.C. V8L 5Y8

tel 250-655-4035
fax 250-655-1290
email john@coastalandoceans.com

GIS/Mapping contact person: John Harper

Maps available from: see www.coastalandoceans.com

Date of Work: various

Scale: various

Place: Strait of Georgia

Description: SIMS (towed underwater Seabed Imaging and Mapping System) eelgrass mapping projects for various clients.

Middle Bay, near Campbell River (Omega Sea Farms)
Gillies Bay, Texada Island (Texada Construction Aggregates Dock)
Deep Bay, Denman Island, Herring Roe Survey (CORI)
Parksville (MSRM)
Nanoose Bay
Nanaimo Harbour Area (confidential data)
Gap Pass, Gabriola Island (data on CORI website)
Britannia Mine Site, Howe Sound (Environment Canada)
Lions Gate Bridge area (Ministry of Transportation and Highways)
Boatswain Bank, Cobble Hill (GSX PL)
Pat Bay, Vancouver Island (MSRM)
Sidney Reef Balls (DFO)
Race Rocks, Victoria (CORI)

Category: Historical

Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT

Sunshine Coast Regional District

5477 Wharf Road

P.O. Box 800

Sechelt, B.C. Canada V0N 3A0

tel 604-885-2261

fax 604-885-7909

GIS/Mapping contact person: Cheryl Trent, Habitat Steward 604-886-7705
ctrent@dccnet.com

Maps available from: SCRD also www.scrd.bc.ca

Date of Work: 1997

Scale: 1:50,000 ArcView

Place: Sunshine Coast

Description: Herring Spawn Eelgrass Beds for Fisheries Sections 162 and 163

Have produced a map showing historical (1943-1998) distribution of eelgrass on eastern side of Strait of Georgia mostly in vicinity of Texada Island, Harwood Island and Malaspina Strait south of Earls Cove. Data synthesised from DFO records, digitized from a Canadian Hydrographic Survey Nautical Chart. Part of Sunshine Coast Digital Habitat Atlas.

Category: Historical

Marine Ecosection: Strait of Georgia

Romaine, M.J. 1981. **East Coast of Vancouver Island (Race Point to Hatch Point and adjacent islands). Volume II.** Coastal Resources Folio, Lands Directorate, Environment Canada, Vancouver, B.C. Map series - 81-1 to 6 or 305892-4.

Places:

Cowichan Estuary Cowichan seaweeds, marshes, intertidal fauna, marine birds and surficial sediments. Cowichan Bay between Tzouhalem Rd. and Skinner Point. 4 maps on 2 sheets: surficial sediments, 2: marine birds, 3: seaweeds and marshes, 4: Intertidal fauna. Detailed summary of methodology -fathom line (0-5-10) - intertidal algae and **eelgrass** + marsh (detailed species list - common names) - fauna: invertebrates: common names. 1981

Chemainus Estuary Chemainus seaweeds, marshes, marine birds, surficial sediments and land and water use. South of Chemainus Bay to Canadian Pacific Railway just north of Crofton Pulp Mill. 6 maps on 3 sheets + 2 copies; 1: surficial sediments, 2: marine birds, 3: seaweeds and marshes, 4: intertidal fauna, 5. Zoning and foreshore leases, 6. Land use plans and proposals. Copies of 3 and 4 - summary of methodology - fathom line (0-5-10) - no georeference system (UTM added from cadastral map on copy 3) - **intertidal vegetation** + general marsh (no classification) - fauna: invertebrates and one species of fish; general names. 1981

Qualicum Beach to Buckley Bay, East Coast Vancouver Island

Seaweeds, salt marshes and marine mammals. General zone (**Zostera**-seaweed) (identified by Austin and Adams, 1972 and 1975) and others- salt marshes- kelp beds) - harbour seals and sea lions location, killer whales migration route). 1 map. 1980

Courtenay-Comox Courtenay-Comox seaweeds, marshes, intertidal fauna, marine birds and surficial sediments. 4 maps on 2 sheets; 1. Surficial sediments, 2: marine birds, 3: seaweeds and marshes, 4: intertidal fauna. Detailed summary of methodology - fathom line (0-5-10) - intertidal algae and **eelgrass** + marsh (Carex, Scirpus, Salicornia and other) - fauna: invertebrates: common names. 1981

Campbell River Campbell River seaweeds, marshes, intertidal fauna, marine birds and surficial sediments. Campbell River estuary from the Island Highway Southeast and the mouth of the river to Pengelly Road south of Orange Point. 4 maps on 2 sheets; 1: surficial sediments, 2: marine birds, 3: seaweeds and marshes, 4: intertidal fauna. Detailed summary of methodology -fathom line (0-5-10) - low subtidal and intertidal algae and **eelgrass** + marsh (Carex, Scirpus, Salicornia and other) - fauna: invertebrates, sculpins and juvenile fishes; common names. 1981

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Squamish Estuary Management Plan, Habitat Working Group. 1981. Final Report. original map at the back) available at the West Vancouver DFO library (QH106.2 B8 S77). Surveys and Mapping Branch, Ministry of Environment.

Scale: 1: 10 000 Projection UTM

Place: Squamish River Estuary

Description:

Squamish River Estuary habitat classification in 1976. 1 map which is a photocopy of an air photo. Classification by zones and classes: open water (4 classes: e.g. deep water marine, brackish slough), **intertidal (5 classes: e.g. open mud/sand flats**, low marsh), backshore/lowland (8 classes: e.g. estuarine meadow, forest, disturbed-undeveloped), upland (6 classes: e.g. pioneer shrub, scrub/rock).

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Haegele, C.W. and Hamey, M.J. 1976. **Shoreline Vegetation Maps of Nanoose and Ganges Herring Management Units**. Fish. Res. Board Can. Manuscript. Rep. Ser. 1408.

Place: Nanoose

Scale: 1:3 700

Description:

Shoreline Vegetation of Nanoose Herring Management Unit, 1976. 11 maps;

1. Nanoose Herring Management unit
2. Departure Bay
3. Hammond Bay
4. Sunrise Beach
5. Icarus Point
6. Blunder Point
7. Nanoose Bay (south shore)
8. Nanoose Bay (head)
9. Wallis Point
10. Schooner Cove
11. Dorcas Point.

General classification: **sea grasses**, rockweed and red, green and brown algae - bathymetry: 0, 1, 3, 5, 10, 20 fathoms. Original maps obtained from Doug Hay (Bruce McCarter) of PBS.

Stored at IOS. Being digitized for Brad Mason (DFO).

Category: Historical

Marine Ecosection: Strait of Georgia

Courtenay River Estuary Research Committee. 1979.

Scale: 1:10 000

Place: Comox Harbour

Description:

Comox Harbour vegetation. 1 map - very general classification of vegetation: 4 groups (**eelgrass**, **eelgrass + algae**, algae, marsh) - depth in fathom - linked with Baynes Sound Vegetation map ref. # 350. CHS 3599.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Waddell, B. and Markowski, S. 1983. **Campbell River Foreshore Biophysical Inventory**. Water Use Unit, Habitat Management Division, Department of Fisheries and Oceans, Vancouver.

Scale: 1:12 500

Place: **Campbell River**

Description:

1982. Campbell River foreshore biophysical inventory. 13 maps + 3 legend sheets; 2 very big ones on mylar (scale about 1: 8 300) fig 1: Substrate composition of study area & fish sampling sites, fig 2: Kelp & **eelgrass** beds; 4 mylar sheets of the lower and 4 mylar sheets of the upper part of the study area:

1. Location site, substrate, intertidal vegetation, kelp and **eelgrass** beds.
2. Paper copy of the lower vegetation and upper vegetation.
3. Legend Sheets-vegetation from visual observations from a boat and from the foreshore at low tide and from false infrared photographs: classification by species or families (*Alaria*, *Fucus*, *Laminaria*, *Ulva*, brown or green algae, grasses, epiphyte, unvegetated); relative density is also given-substrate from a modified Wentworth scale.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Haegele, C.W. and Hamey, M.J. 1976. **Shoreline Vegetation Maps of Nanoose and Ganges Herring Management Units.** Fish. Res. Board Can. Manuscript. Rep. Ser. 1408.

Scale: 1: 3 700

Place: Salt Spring Island, Prevost Island.

Description:

1976 Shoreline vegetation of Ganges herring management unit. 9 maps; 1 velum of each:

1. Ganges Herring Management Unit
2. Long Harbour (entrance)
3. Long Harbour (head)
4. Ganges Harbour (entrance)
5. Ganges Harbour (head)
6. James Bay
7. Annette Inlet
8. Ellen Bay
9. Diver Day.

General classification: **sea grasses**, rockweed and red, green and brown algae - bathymetry: 0, 1, 3, 5, 10, 20 fathoms. Original maps obtained from Doug Hay (Bruce McCarter) of PBS.

Stored at IOS. Being digitized for Brad Mason (DFO).

Category: Historical

Marine Ecosection: Strait of Georgia

Haegele, C.W. and Hamey, M.J. 1979.. **Shoreline Vegetation on Herring Spawning Grounds in Stuart Channel, Strait of Georgia, British Columbia.** Fisheries and Marine Service, Manuscript. Rep Ser. No 1534. 29 p.

Scale: 1:5 880

Place: **Stuart Channel, Strait of Georgia**

Description:

1979 Shoreline vegetation of Stuart Channel, Strait of Georgia, British Columbia. 13 maps; 1 vellum of each;

1. Yellow Point study area
2. False Narrows
3. Boat Harbour
4. North of Yellow Point
5. Yellow Point
6. Coffin Point (missing)
7. Ladysmith Harbour (entrance)
8. Ladysmith Harbour (head)
9. North Cove
10. Crescent Point
11. Preedy Harbour
12. Clam Bay
13. Josling Point.

General classification; **sea grasses**, rockweed, red algae, brown algae, green algae - Bathymetry: 0, 1, 3, 5, 10 and 20 fathoms. Original maps obtained from Doug Hay (Bruce McCarter) of PBS. Map series: Herring spawning grounds

Stored at IOS. Being digitized for Brad Mason (DFO).

Category: Historical

Marine Ecosection: Strait of Georgia

1. Austin, A. 1972. **Development of a method for surveying red algal resources in Canadian Pacific waters.** Botany Department, University of Victoria.

Scale: 1: 10 000 Community boundaries were defined from infrared false colour, and natural colour air photographs at a mean scale of 1: 2500 - high water line and +2 foot water contour.

Place: Denman Island, Southeast coast

Description: 1972 Algal vegetation map of southeast coast of Denman Island. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance in terms of survey goals. 1 map.

Stored at CWS.

2. Austin, A. 1972. **Development of a Method for Surveying Red Algal Resources in Canadian Pacific Waters** and Austin A., and R. Adam 1973. **Red Algae Resources Studied in Canadian Pacific Waters. Annual report.** Austin, A. Botany Department, University of Victoria and Adam, R.

Scale: 1: 10 000

Place: Denman Island, Northeast coast

Description: 1972-3 Algal vegetation map of northeast coast of Denman Island. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance. 2 maps; 1 map for each year (1972, 1973) - a few more transects than in 71. Doesn't look like there is a difference in the zone/polygon between the two maps.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Haegele, C.W. and Hamey, M.J. 1981. **Shoreline Vegetation on Herring Spawning Grounds for Comox, Denman Island and Hornby Island.** Can. Manusc. Rep. Fish. Aquat. Sci. No. 1617, 41 p.

Scale: 1: 5 900

Place: Comox, Denman Island and Hornby Island

Description:

1981 Shoreline vegetation of Comox, Denman Island and Hornby Island. 18 maps; 1 velum of each;

1. Comox Harbour
2. Comox Bar
3. Gartley Point
4. Union Bay
5. Hindoo Creek
6. Buckley Bay
7. Ship Point
8. Deep Bay (missing)
9. Seal Islets
10. Henry Bay
11. Komas Bluff
12. Fillongley Park
13. Boyle Point
14. Repulse Point
15. Shingle Spit
16. Collishaw Point
17. Tralee Point
18. Tribune Bay
19. Norman Point.

General classification; **sea grasses**, rockweed, red algae, brown algae, green algae - Bathymetry: 0, 1, 3, 5, 10 and 20 fathoms. Original maps obtained from Doug Hay (Bruce McCarter) of PBS.

Stored at IOS. Being digitized for Brad Mason (DFO).

Category: Historical

Marine Ecosection: Strait of Georgia

Austin, A. 1972. **Development of a Method for Surveying Red Algal Resources in Canadian Pacific Waters.** and Austin, A. 1973. **Red Algae Resources Studies Canadian Pacific Waters, Annual Report.** Botany Department, University of Victoria

Scale: 1: 10 000 Calculated UTM on the 1973 map.

Place: Little River to Williams Beach Coast, East Coast Vancouver Island - North of Comox

Description:

1973 Algal vegetation map Little River to Williams Beach. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance. 2 maps one of each for each year

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Austin, A. 1972. **Development of a Method for Surveying Red Algal Resources in Canadian Pacific Waters.** Botany Department, University of Victoria

Scale: 1: 1 600

Place: Kye Bay, Vancouver Island

Description:

1972 Algal vegetation map Kye Bay. 1 map. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Austin, A. 1975. **Red Algae Resources Studies in Canadian Pacific Waters. Carrageenophyte inventory and experimental/cultivation phase 1974/75. Vol. II appendices.** Botany Department, University of Victoria

Scale: 1:10 000

Place: Elma Bay to Shelter Point, East Coast Vancouver Island, south of Campbell River.

Description:

1975 Algal vegetation map Elma Bay to Shelter Point. 1 map. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Austin, A. 1975. **Red Algae Resources Studies in Canadian Pacific Waters. Carrageenophyte inventory and experimental/cultivation phase 1974/75. Vol. II appendices.** Botany Department, University of Victoria

Scale: 1:10 000

Place: **Hernando Island, Strait of Georgia**

Description:

1973-74 Algal vegetation map Hernando Island. 1 map. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance.

Stored at IOS.

Category: Historical

Marine Ecosection: Strait of Georgia

Austin, A. 1972. **Development of a Method for Surveying Red Algal Resources in Canadian Pacific Waters**

Austin, A. 1973. **Red Algae Resources Studies Canadian Pacific Waters Annual Report.** Botany Department, University of Victoria.

Scale: 1: 10 000

Place: **Willemar Bluff to Little River Coast, East Coast Vancouver Island - North of Comox**

Description:

1973 Algal vegetation maps Willemar Bluff to Little River Coast. 2 identical maps. Algae, sand dollars, **eelgrass**; not classified by habitat but by species present - major algal communities distinguished by dominant or co-dominant algal species observed by ground truth survey, and are listed in order of significance.

Stored at IOS.

Category: Restoration
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
SeaChange Marine Conservation Society

tel: 250-383-7790
email: seachange@axion.net

GIS/Mapping contact person:

Nikki Wright

Maps available from: see above

Date of Work: August 01, 2000 to March 31, 2001

Scale: n/a

Place: Saanich Inlet, Vancouver Island

Description: Community Eelgrass Restoration Program

Restore salmon habitat by increasing eelgrass in Saanich Inlet by 20%; Increase spawning habitat by increasing plant density in 0.3 ha area; determine growth rate and species diversity by monitoring for one year. Two projects – one in Goward Tod Park, one in Tsartlip Reserve.

Category: Research

Marine Ecosection: Strait of Georgia

Durance, C. 1996a. **Baynes Sound Air Photo Interpretation: Eelgrass Habitat Assessment.** Prepared for Water Quality Branch, British Columbia Ministry of Environment, Lands and Parks and Marine Environment and Habitat Science Division, Department of Fisheries and Oceans. 20p + diskettes.

Durance, C. 1996b. **Saanich Inlet Study: Eelgrass Habitat Assessment.** Prepared for Water Quality Branch, British Columbia Ministry of Environment, Lands and Parks and Marine Environment and Habitat Science Division, Department of Fisheries and Oceans. 10p + appendices + diskettes.

Lessard, J., M.S. North, C.D. Levings and D.J.H. Nishimura. **1996. Field Survey Report for Saanich Inlet Eelgrass, July 1995.** Can. Data Rep. Fish. Aquat. Sci. 975: **29p.**

Category: Research

Marine Ecosection: Strait of Georgia

Kennedy, K.A. 1982. **Plant communities and their standing crops on estuaries of the east coast of Vancouver Island**. M.Sc. Thesis, University of British Columbia. 412 pages.

Nanoose-Bonell Creeks' estuary
Englishman River Estuary
Goldstream Estuary
Cowichan River Estuary
Nanaimo Estuary
Nanoose-Bonell Creeks' estuary
Little Qualicum River Estuary

Available at UBC. The following related maps are stored at IOS:

Big Qualicum River Estuary

Emergent plant communities of Big Qualicum River estuary around the Island Highway bridge: 1 vellum and 1 black and white copy.

Courtenay River Estuary

Emergent plant communities of Comox Harbour from Robb Bluff and Chinook Rd to the first bridge at the mouth of the river. 2 maps; 1 vellum and 1 black and white.

Campbell River

Emergent plant communities of Campbell River estuary delimited by the Island Highway and, the east and north side of Tyee spit. 2 maps; 1 vellum and 1 black and white copy.

Category: Research

Marine Ecosection: Strait of Georgia

Swinbanks, D.D. 1979. **Environmental factors controlling floral zonation and the distribution of burrowing and tube-dwelling organisms on Fraser Delta tidal flats.** Ph.D. Thesis, University of British Columbia. 274 pages.

The vegetation and sedimentation of Roberts Banks tidal flats north of the coal port were mapped from colour aerial photographs in 1978. The area between the coal port and the ferry terminal causeway, and south of the ferry terminal causeway was mapped from colour aerial photographs in 1977. Eelgrass was mapped as dense and patchy units.

Available at UBC.

Category: Research
Marine Ecosection: Strait of Georgia

[Dr. Terri Sutherland](#)

Coastal and Marine Habitat Science Section
Department of Fisheries and Oceans
West Vancouver Laboratory
4160 Marine Drive
West Vancouver, BC, V7V 1N6

Phone: (604) 666-8537

Fax: (604) 666-3497

Email: sutherlandt@pac.dfo-mpo.gc.ca

Dr. Sutherland is a plankton and benthic ecologist with a diverse background in coastal ecosystem research. Recently, Dr. Sutherland has carried out a research project in collaboration with Environment Canada on the relationship between eelgrass production and invertebrate biodiversity on the tidal banks of the Fraser River delta.

Category: Research
Marine Ecosection: Strait of Georgia

AGENCY/PERSON/PROJECT
TRITON Environmental Consultants Ltd.
150- 13091 Vanier Place
Richmond, B.C.

tel 604- 504.279.2093
fax 604-604.279.2047

Date of Work: 1994

Scale: N/A

Place: Roberts Bank, Strait of Georgia

Description: Recent Physical and Biological Changes on Roberts Bank Study

Client: Roberts Bank Environmental Review Committee
Owner: BC Ferry Corporation and Vancouver Port Corporation

Triton Consultants was retained to investigate the eroding dendritic channels and eelgrass beds located on the tidal flats between the Roberts Bank Coal Terminal and Tsawwassen Ferry Terminal causeway. Triton reviewed recent physical and biological changes on the tidal flats through historical mapping of the eelgrass bed and dendritic drainage channel areas with correlation to marine construction activity in the area.

The study used aerial photography, field measurements and GIS mapping techniques to assess the historical variation of eelgrass extent from its pre-construction state through 30 years of shoreline evolution. The study determined that the marine structures delimiting the study area were almost wholly responsible for providing the positive environment suitable for eelgrass growth.

NB see also Eelgrass Restoration (Precision Identification, Durance).

4.9 Juan de Fuca Strait

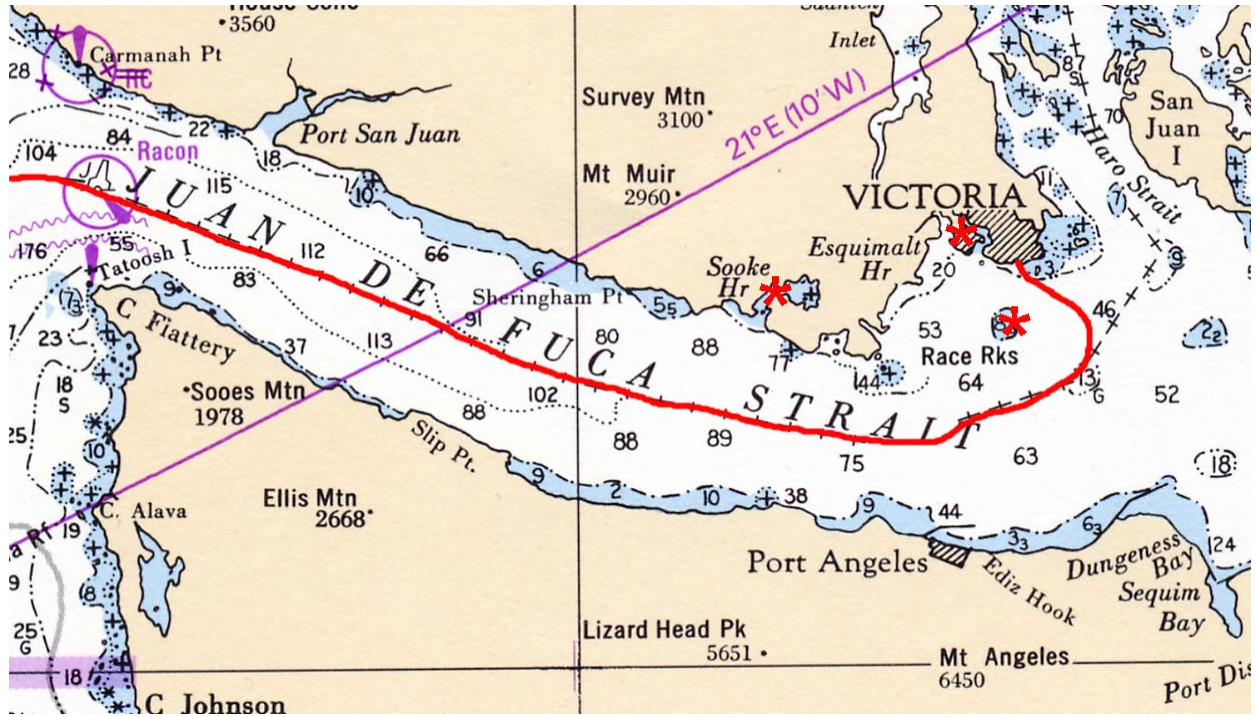


Figure 10. Juan de Fuca Strait Area.

Category: Fine-Scale

Marine Ecosection: Juan de Fuca Strait

AGENCY/PERSON/PROJECT

Victoria & Esquimalt Harbours Environmental Action Program (VEHEAP)

Esquimalt Lagoon Stewardship Initiative (ELSI)

Capital Regional District

524 Yates Street

Victoria, B.C. Canada

V8W 2S6

tel 250-360-3065

fax 250-360-3270

email jwatson@crd.bc.ca

GIS/Mapping contact person: Jody Watson

Maps available from: www.veheap.crd.bc.ca (as html files)

Date of Work: 1999-2000

Scale: n/a

Place: Esquimalt Lagoon, Portage Inlet and Gorge Waterway.

Description: Complete mapping of eelgrass as part of Harbours Ecological Inventory & Rating Project (HEIR). The purpose of HEIR is to allow all levels of government and the public to access detailed credible data about the harbours. Victoria and Esquimalt Harbours have been mapped but data is in draft form. Used underwater video.

4.10 Vancouver Island Shelf

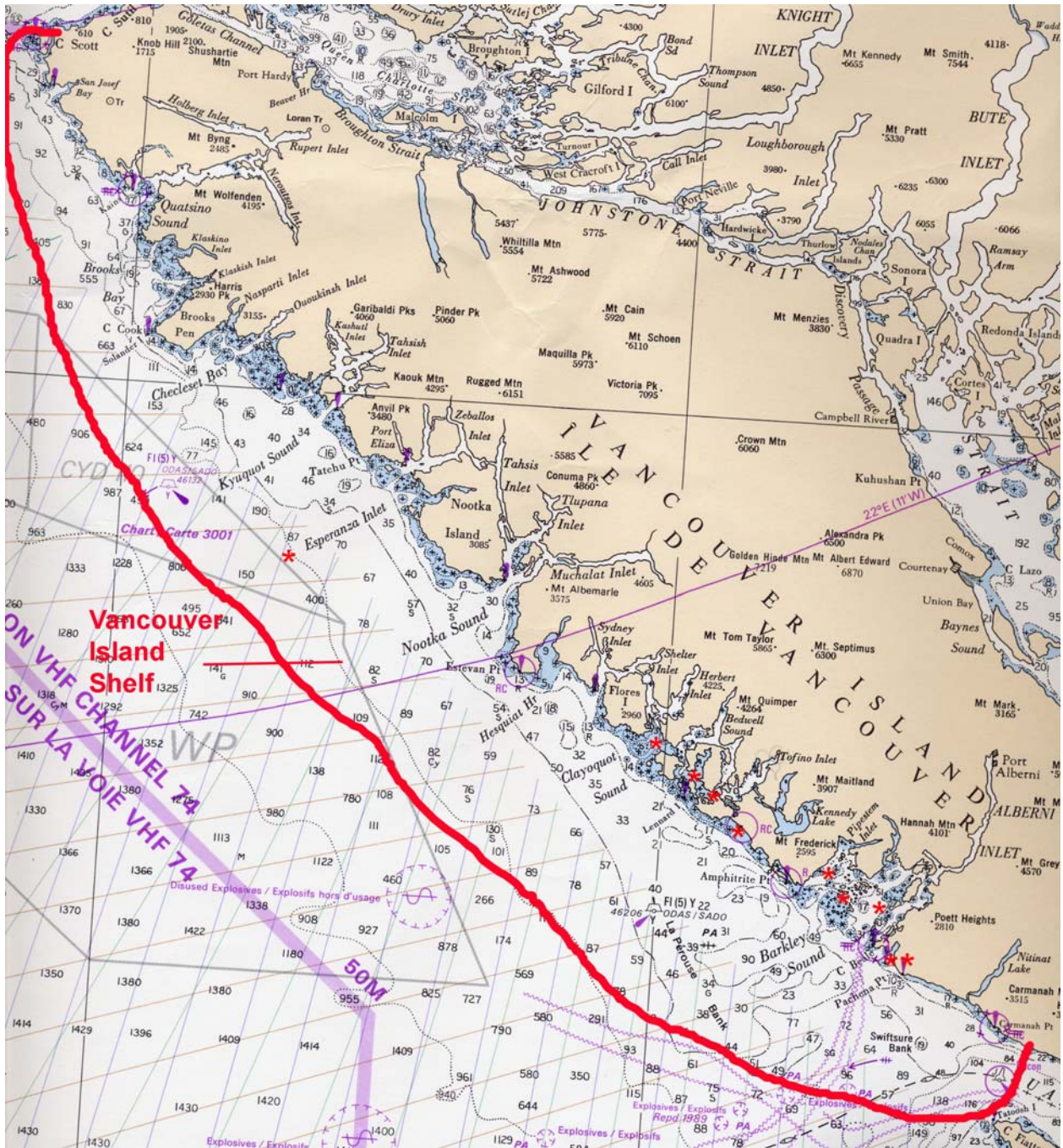


Figure 11. Vancouver Island Shelf Area

Category: Coarse-Scale

Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

V0N 3E0

tel 250-973-6580

fax 250-973-6581

email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Northwest Coast Vancouver Island

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale

Marine Ecoregion: Vancouver Island Shelf

AGENCY/PERSON/PROJECT

Living Oceans Society

P.O. Box 166

Sointula, B.C. Canada

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tel 250-973-6580

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email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: Quatsino Sound

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Coarse-Scale
Marine Ecoregion: Vancouver Island Shelf

AGENCY/PERSON/PROJECT
Living Oceans Society
P.O. Box 166
Sointula, B.C. Canada
V0N 3E0

tel 250-973-6580
fax 250-973-6581
email info@livingoceans.org

Jeff Ardron, GIS Specialist 250-653-9219 jardron@livingoceans.org

Maps available from: www.livingoceans.org/fishfarm_maps.htm

Date of Work: Draft, June 2002

Scale: ArcView format

Place: **Barkley & Clayoquot Sounds**

Description: Eelgrass & kelp maps superimposed over aquaculture lease locations. Maps created with data synthesised from Canada Department of Fisheries and Oceans; B.C. Ministry of Sustainable Resource Management; Land and Water B.C. aquaculture tenure data; LUCO: BC Shore Zone Units Mapping and Living Oceans Society.

Category: Fine-Scale
Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT
Barkley Sound Eelgrass Project
Bamfield Marine Science Centre
P.O. Box
Bamfield, B.C. Canada

tel 250-728-3301 ext 226
fax 250-728-3452
email see below

GIS/Mapping contact person: Anne Stewart astewart@bms.bc.ca
Megan Saunders saunders@bms.bc.ca

Maps available from: ArcView maps still being developed.

Date of Work: 2001 -

Scale: ArcView Format

Description: Mapping in southeastern Barkley Sound showing distribution of eelgrass, wasting disease, fish diversity and distribution. Other related projects in same geographical area include research on ophiuroids, education and outreach.

Working with SeaChange Marine Conservation Society.

Category: Fine-scale
Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT
Nuu-chah-nulthaht/WCVI Aquatic Management Society
www.rams-wcvi.org
P.O. Box 1037
Ucluelet, B.C. Canada V0R 3A0

tel 250-726-7040
email gerry@island.net

RAMS is a First Nations/non First Nations non-profit society formed in May 1997 with the purpose of establishing a framework for regional management of aquatic resources in the Nuuchahnulth Territory/WCVI. This area is home to the Hesquiaht, Ahousaht, Tla-o-qui-aht, Ucluelet, and Toquaht First Nations people and two small non-first nations towns: the District of Ucluelet and the District of Tofino. The balance of the land base falls under the jurisdiction of the Alberni-Clayoquot Regional District (ACRD).

GIS/Mapping contact person: Gerry Schreiber, Pacific Rim & Area Stewardship Coordinator (HCSP-DFO)

Maps available from: n/a

Date of Work: 2001-2002

Scale: ArcView Format

Place: Ucluelet Harbour

Description: The Ucluelet Harbour Project

Conducting biological inventories of the harbour, which is about 7 km long by ½ km wide. Have found both *Zostera marina* and *Z. japonica*. Completed an eelgrass survey (presence) in September 2002. Survey included GPS 1,000 points, and did some stem counts. Will be converting to polygons this winter. The Project is also working on a clam stock assessment in the harbour (which is badly contaminated with fecal coliform). Will be doing more detailed mapping and density estimates in the next year.

Publications

- 1) Traditional, Historical and Current Uses of the Harbour (written by Arlene Suski).
- 2) **The Ucluelet Harbour Project: Community Action Plan (written by Arlene Suski).**

Category: Fine-scale
Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT
Strawberry Island Research Society
Rod Palm
P.O. Box 213
Tofino, B.C. Canada V0R 2Z0

tel 250- 725-2211
fax 250-
email sisle@island.net

GIS/Mapping contact person: Rod Palm

Maps available from: see above

Date of Work: 1998 - ongoing

Scale: ArcView format

Place: **Clayoquot Sound**

Description: Partnered with Camosun College (Environmental Technology) to GPS extent of eelgrass beds in Grice Bay and in and around Tofino/Clayoquot Sound. Has six years of substrate sampling data from Grice Bay. Also has partnered with Parks Canada.

Category: Research

Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT

Pacific Rim National Park Reserve

Parks Canada

P.O. Box

Uclulet, B.C. Canada

tel 250-

fax 250-

email

GIS/Mapping contact person:

Jennifer Yakimishyn, University of Victoria, Geography Department, (MSc research)

Cliff Robinson, Parks Canada

Maps available from: see above

Date of Work: April to September 2002

Scale:

Place: Pacific Rim National Park

Description: Examines current status of eelgrass beds in Clayoquot Sound and relation to fish biodiversity. Research includes sampling eelgrass fish diversity and measuring several eelgrass bed habitat characteristics. Data will be use to characterize and assess seasonal variation in eelgrass study sites and establish a baseline for monitoring. More than 40 fish spp. identified amongst all sites combined, with an average of 15 spp. per bed. Each bed appears to have a relatively unique assemblage of 5 to 10 rare fish species. Found that fish species richness decreased on average from May to September.

Publication:

Yakimishyn, J.L. and C. Robinson. 2002. **Diversity of Fish Assemblages in Eelgrass Beds of Pacific Rim National Park Reserve of Canada, British Columbia.** Conference paper presented June 10, 2002 as ASLO 2002 Summer Meeting, Esquimalt.

Category: Research

Marine Ecosection: Vancouver Island Shelf

AGENCY/PERSON/PROJECT

Ramona de Graaf

Graduate Student

Department of Zoology

University of British Columbia

tel 604-731-3006

fax

email rcdegraaf@hotmail.com

GIS/Mapping contact person:

Ramona de Graaf

Maps available from: see above

Date of Work: 2002

Scale:

Place: Barkley Sound

Description:

This is a U.B.C. Master's research project examining the within and between habitat variation and relations (including genetic differences) of bay pipefish in Barkley Sound eelgrass beds.

Publications:

Category: Research

Marine Ecoregion: Vancouver Island Shelf

AGENCY/PERSON/PROJECT

Parks Canada

Sarah Carty (UBC Botany)

P.O. Box

tel 250-

fax 250-

email

GIS/Mapping contact person:

Maps available from: see above

Date of Work:

Scale:

Place: Tofino

Description:

“Seagrass and Ghost Shrimp as Indicators of Ecosystem Integrity in Grice Bay, B.C.”

Publication: