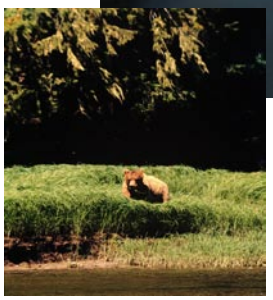
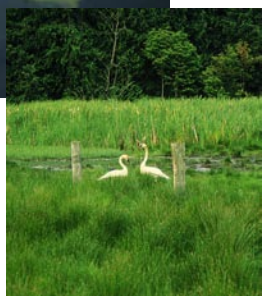
Estuaries on the North Coast of British Columbia:

a reconnaissance survey of selected sites





DRAFT DOCUMENT

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"Rivers not only replenish the water of the oceans, they endow it with nutrients washed from the forests and grasslands of the continental interior. These nutrients are not immediately distributed throughout the ocean but are concentrated and held for long periods at the river's mouth, creating one of the richest environments on earth, the estuary."
Richard and Sydney Cannings in *British Columbia A Natural History*, 1996.

1. Introduction

The coast of British Columbia north of 51 degrees latitude is a rugged landscape of rocky islands, fjords and granitic mountains. Coniferous rainforest and blanket bog are the primary ecosystem types found here. However, scattered throughout this region, at the juncture of rivers and ocean, are estuaries with communities biologically and structurally distinct from the surrounding forest. Estuaries provide critical habitat for many wildlife species but comprise much less than 1% of the coastal landscape. Natural estuaries could be the most endangered of B.C.'s ecosystems (Foster 1993). However, river mouths and estuaries are often the only practical access points to resources located farther up the watershed and are a convenient location for log booms and camps. The potential conflict between industrial development and extremely high ecological values provided the impetus to carry out a reconnaissance level survey of estuaries along the north coast.

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 value ranking and additional information on social, cultural, protection status and development issues.

1.1 Classification of Ecosystems in British Columbia

Experience has demonstrated that the management and preservation of individual species is often difficult from both ecological and political standpoints. In response, several inventory and analysis tools have been developed for the conservation of ecosystems. These tools are collectively known as 'ecosystem approaches' and include ecosystem classification, landscape ecology and gap analysis. Ecosystem approaches map biological and physical data over large areas to identify 'representative' and 'distinct' areas, as well as 'rare' areas and gaps in the habitat ranges of species of concern so that mitigation strategies for their conservation can be developed (Scott and others 1993). One of the most important tools for understanding ecosystems and applying ecosystem management principles is an ecologically based classification system. Classification allows for the ordering, comparing, synthesizing, mapping and inventorying of information and give resource workers a common language to communicate results.

The biogeoclimatic ecosystem classification (BEC) was developed by the B.C. Forest Service to describe terrestrial ecosystems (Meidinger and Pojar 1991). This system is based on an understanding of how B.C.'s climate and physiography combine to create distinctive environments. During approximately the same period, BC Environment developed the ecoregion classification, which is based upon physiography and macroclimatic processes (Demarchi 1988, Demarchi and others 1990). The ecoregion classification includes both terrestrial and marine components.

Identification and modification of site series and associations within BEC is an ongoing process province-wide. Recently, B.C. Environment has proposed further components of the marine ecosystem classification (Zacharias and others 1998). The Wetland and Riparian Ecosystem Classification (WREC) project of the B.C. Forest Service Research Branch is developing standardized definitions for the major groups of wetland and riparian ecosystems found in the province (MacKenzie and Banner 2000).

A multi-agency Resources Inventory Committee (RIC) approved the Standards for Terrestrial Ecosystem Mapping (TEM), which integrates BEC and Ecoregion classification in 1995. The B.C. Physical Shore-Zone Mapping System (RIC 1994) and Biological Shore-Zone Mapping System (RIC 1995) have also been approved.

In a further attempt to standardize data collection and mapping methodologies, the B.C. Estuary Mapping System version 1.0 (LUCO) was tabled with RIC in March 1999. This document attempts to reconcile differences and inconsistencies in standards between TEM and physical and biological shore-zone mapping. We hope that RIC-approved inventory and mapping methodology and estuarine ecosystem classification will stimulate further inventory of estuaries, which is largely lacking in the region. We also trust that the additional layering of biological, social and development information will be of use to land-use planners at many levels.

1.2 Government Policy and Biodiversity

There are several ways of protecting ecologically sensitive areas, which additionally help to conserve biodiversity. They include national parks and marine protected areas, provincial parks, ecological reserves, wildlife management areas, protected areas and private land purchased a non-government conservation organization and leased to a government agency for management purposes. A goal of the federal-provincial Marine Protected Areas Strategy, which is interlinked with the marine component of the B.C. Protected Areas Strategy, for Canada's Pacific Coast is to develop a national system of marine protected areas on the Pacific coast by the year 2010 .

Special management of riparian and wetland ecosystems is an important component of the Forest Practices Code (FPC) in B.C., through regulations and the *Riparian Management Area Guidebook* (FPC 1995*)*. The *Biodiversity Guidebook* (FPC 1995) addresses the preservation and management of biodiversity at a stand and landscape level. And the protection of biodiversity at a species and plant association level is addressed through the *Identified Wildlife Management Strategy* (FPC 1999).

1.3 Terms of Endangerment: Red and Blue lists, COSEWIC and the Conservation Data Centre

The Wildlife Branch periodically reviews and updates Red and Blue lists of species considered at risk in B.C. The Red and Blue lists serve two purposes: 1) list of species for consideration for more formal designation as Endangered or Threatened, either provincially under the *Wildlife Act*, or nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and 2) as a method of assigning conservation priorities for species considered at risk in B.C. For example, Operational Planning Regulations in the Forest Practices Code use the Red and Blue lists in the development of the list of Identified Wildlife. Since 1992, the Conservation Data Centre (CDC) has used an international ranking system to develop the Red and Blue lists (Harper and others 1994).

2. Estuarine Ecosystems as Habitat

British Columbia supports the highest biological diversity in Canada. The north and central coast support a considerable range of species unique to Canada or B.C., and supports breeding and critical wintering habitat for populations of world significance for a number of species. Biodiversity is not distributed evenly across the landscape. Certain ecosystems are especially rich in the numbers of species and unique habitats they support. Estuaries are a clear example of such areas, in that they are a unique interface between terrestrial, freshwater and marine ecosystems and are highly productive. Estuaries comprise a small fraction of the shoreline of the of the entire B.C. shoreline, but are used by 80% of all coastal wildlife species (Pacific Estuary Conservation Program 1995).

2.1 Waterbirds

Estuaries along the B.C. coastline provide wintering habitat for Canada Geese (*Branta canadensis)* and a variety of ducks, including Mallard (*Anas platyrhynchos)*, American Wigeon *(A. americana)*, Northern Pintail *(A. acuta)*, Bufflehead *(Bucephala albeola)*, Common Goldeneye *(B. clangula)*, Barrow's Goldeneye (*B. islandica)*, Harlequin Duck (*Histrionicus histrionicus)*, Oldsquaw (*Clangula hyemalis)*, three Scoter species (*Melanitta* spp.), two Merganser species (*Mergus* spp.), and two Scaup species *(Aythya spp*.). The coast of B.C. is an important corridor for millions of migrating birds, especially waterfowl and shorebirds (Campbell and others 1990). The health of the migrating waterfowl population along the Pacific coast dependents largely upon estuaries because the quality and number of these habitats directly affects the productivity of the females on the breeding grounds and the survival of the current years offspring in the fall.

Declining populations of waterfowl since the 1960's have concentrated conservation attention on wetland habitat securement along the entire Pacific flyway through programs such as the Pacific Coast Joint Venture (North American Waterfowl Management Plan) and the North Coast Wetlands Program (Pacific Estuary Conservation Program) (Remington 1993). The B.C. Waterfowl Technical Committee (B.C. Ministry of Environment, Canadian Wildlife Service, Ducks Unlimited, Canada) has identified the Skeena complex of wetlands, which includes Big Bay, Kitkatla Inlet/Billy Bay, Moore Cove, and the lower Skeena estuary, to be of provincial and national significance to breeding, migrating and wintering waterfowl (Hayes et al. 1993).

Trumpeter Swan (*Cygnus buccinator)* is a blue-listed species for B.C. and considered VULNERABLE by COSEWIC. Once widely distributed throughout much of North America, Trumpeter Swans declined drastically in the late 1800's and early 1900's due to overharvest and habitat alteration. Concern for North America's largest waterfowl species has resulted in substantial management efforts to protect swans and their habitat. Although no longer considered in danger of extinction, the population of Trumpeter Swans is now largely confined to the Pacific Coast. Most of the world's population of Trumpeter Swans (estimated at 11,000) breed in central Alaska and winter along the B.C. coast (Campbell and others 1990). Preferred winter habitats are estuaries, while smaller groups of swans are found on inland water bodies, which remain ice-free, such as lake outlets (McKelvey 1980). The main Trumpeter Swan wintering concentrations are known to occur on Vancouver Island and the Fraser Lowlands. There is no recent inventory information but, in the late 1970's, low numbers of Trumpeter Swans over-wintered in larger estuaries all along the north coast (B.C. Environment Coastal Waterbird Inventory File). Approximately 65 Trumpeter Swans winter each year in the Bella Coola estuary (McKim-Fletcher 1992).

Western Grebe *(Aechmophorus occidentalis)*, is a red-listed species known to winter in the Skeena estuary and Kitkatla Inlet. B.C. is the major breeding and wintering area in the world for Barrow's Goldeneye (Savard 1987). B.C. supports most of the Canadian population of Harlequin Ducks, a large portion of which are flightless along the marine shoreline in summer during molt (Fuhr and Edie 1988). Wintering/molting concentrations of Harlequin Ducks have been found in Chatham Sound, at the mouth of the Skeena (Breault and Savard 1991). It is believed that a sizeable proportion of the North American population of Surf Scoter (*Melanitta perspicillata)* (blue-listed) winter along the B.C. coast (Campbell and others 1990).

Spring migration of a many waterbirds follows the timing and location of spawning Pacific Herring *(Clupea harengus)*, northward along the coast. Two of the largest herring spawning occurrences on the B.C. coast take place in Big Bay, north of Prince Rupert, and Kitkatla Inlet (including Billy Bay) on Porcher Island. Spectacular numbers of Surf Scoters *(Melanitta perspicillata)* (blue-listed) as well as Oldsquaw (blue-listed), Western Grebe and gulls are often seen where herring are spawning. Martin (1980) reported a flock of 300,000 scoter, almost exclusively Surf Scoter, in Big Bay, suggesting that

the birds move considerable distances to those sites. It is believed that a sizeable proportion of the North American Surf Scoter population winter along the B.C. Coast.

Another spring migrant often associated with herring spawning is the Brant *(Branta bernicla)*. Brant are of conservation concern along the Pacific Flyway of North America, because their numbers have been in a long-term decline. In the late 1980's the Brant was an abundantalong the B.C. coast during winter. Due to over-harvest and other human disturbance, Brant has declined drastically as a wintering species in B.C. (Campbell and others 1990). Theestimated 600-700 Brant which winterin Haida Gwaii/Queen Charlotte Islands comprises the largest population now wintering in Canada (Goudie and Hearne 1997).

The Great Blue Heron, *Ardea herodias*, (blue-listed) is a year round resident on the B.C. coast. Although most coastal breeding colonies are located on the Strait of Georgia, isolated pairs breed near the mouth of the Skeena and southern Queen Charlotte Islands. Sandhill Cranes *(Grus canadensis*) (blue-listed) breed on islands along the central coast and the Queen Charlotte Islands. Large numbers of shorebirds migrate along the north coast, and Black Turnstone *(Arenaria melanocephala*) and Black Oystercatcher (*Haematopus bachmani*) winter there.

The Bald Eagle (*Haliaeetus leucocephalus*), which are listed as an endangered species in the United States, nest and winter along the coast, and are drawn to estuaries particularly during the runs of Pacific salmon. Peale's Peregrine Falcon (*Falco peregrinus pealei)* and other raptors prefer coastal habitats that support large numbers of shorebirds and waterfowl (Campbell and others 1990).

Marbled Murrelet (*Brachyramphus marmoratus)* inhabit protected coastal waters throughout the year, such as inlets and lagoons, as well as exposed waters. The Marbled Murrelet is believed to breed along the entire coast of the province, but because population levels and breeding biology are poorly understood, the Marbled Murrelet has been placed on the B.C. Red list and is designation as THREATENED by the COSEWIC. Large Marbled Murrelet concentrations are reported for Kynoch, Mussel, Green, Khutze, Aaltanhash and Klekane inlets, and these areas are Canadian Wildlife Service Areas of Interest for migratory birds (Dunn 1994).

2.2 Mammals

Harbour Seals (*Phoca vitulina)*, River Otter *(Lontra canadensis)*, Mink (*Mustela vison)*, Grey Wolf *(Canis lupus)*, Sitka Deer *(Odocoileus hemionus sitkensis)*, Black Bear *(Ursus americanus)*, and Grizzly Bear *(Ursus arctos)* are drawn to estuarine areas due to the abundant food resources found there. The highest density of Harbour Seals on the B.C. coast is found in the Skeena-Nass region (Olesiuk and others 1990). The "Kermode" Black bear is endemic to north coastal British Columbia from Burke Channel to the Nass River.

Estuaries are very important habitats for Grizzly Bear. Studies in the Kimsquit (Hamilton and Bunnell 1986) and Khutzeymateen (MacHutchon and others 1993) show that Grizzly Bears actively select habitats for feeding and bedding and within each season they prefer certain habitats. The preferred and most heavily used habitats in all seasons are those on lower slopes and valley bottoms. Forested habitats such as floodplain old growth and skunk cabbage old growth were consistently preferred in all seasons, as are wetlands and estuaries. Estuaries are particularly important early spring foraging habitats and are heavily used again in late Summer/Fall during salmon spawning.

The Grizzly Bear is Blue listed in B.C. and classed as VULNERABLE by COSEWIC (Banci 1991) because of declining or extirpated populations throughout their historic range in North America. An excessive rate of legal and illegal Grizzly Bear kills in some areas has largely resulted from increased human access (Fuhr and Demarchi 1990). The B.C. government identified the first area in Canada to be protected specifically for grizzlies in the Khutzeymateen River valley in 1992. The large Khutzeymateen estuary is the focus of guided bear viewing and photography in Khutzeymateen Provincial Park, particularly in the spring.

2.3 Salmonids

All five Pacific salmon species are found on the north coast: Sockeye *(Oncorhynchus nerka)*; Coho *(O. kisutch),* Pink *(O.gorbuscha),* Chum (*O. keta),* and Chinook (*O. tshawytscha)*. Other salmonids which have anadromous populations include the Steelhead, or Rainbow Trout (*O. mykiss*), Cutthroat Trout (*Salmo clarki clarki)* and Dolly Varden *(Salvelinus*

malma). Anadromous salmonid species use estuaries during their juvenile stages for 1) productive foraging, 2) physiological transition from fresh to salt water, and 3) refugia from predators. Of the five Pacific salmon species, Chum and Chinook salmon utilize estuaries most extensively. Abundant, uniquely estuarine prey organisms are eaten by juveniles of all species, and contribute to high growth rates in estuaries (Healey 1982; Simenstad and others 1982).

Pacific salmon constitute the principal commercial fishery resource of the Pacific Northwest. The Skeena River is second only to the Fraser in salmon production, with annual escapements exceeding 3 million fish. Anadromous fish stocks are the focus of guided and unguided sport fishing worth hundreds of million of dollars to local and regional economies. Federal and provincial conservation interest is focused on Coho, Steelhead and Chinook stocks, partly because of serious population declines in the past twenty years.

The B.C. Classified Waters System is a licensing system designed to protect the unique fishing opportunities in the most highly productive trout streams in the province. The Dean River, the only Class I river in the province, is a world class wilderness fishing river, famous for its summer-run Steelhead. Portions of the Skeena, Nass, Kwinamass and Kilbella/ Chuckwalla rivers are internationally renowned destinations for steelhead anglers and are designated as Class II waters. As well as providing important habitat for juvenile salmonids, many estuaries support excellent sport fishing, and are an important part of a quality sport fishing experience.

2.4 Eulachon, Pacific Herring and shellfish

Several north coastal estuaries support the spawning of Eulachon (*Thaleichthys pacificus)*. The Eulachon, also known as oolichan or candlefish, have a long history of value to northwest coast aboriginal peoples (Sturtevant 1990). Three large spawning runs in the Nass estuary were the focus of a large annual early Spring aboriginal gathering to harvest, render the "grease" and carry out trade (Langer and others 1977). Other runs occur on the Skeena, Kitamat, Kildala, Dala, Kemano, Kowesas, and Kitlope rivers (B.C. Ministry of Forests, 1998)

Pacific Herring spawning areas are often associated with estuaries and inshore kelp and eelgrass beds. The commercial herring fishery (herring roe and herring spawn on kelp) is second only to salmon in landed value in B.C. (Williams 1989). The largest herring spawning and herring fishery areas are centered at Big Bay and in Kitkatla Inlet (including Billy Bay) near Prince Rupert (Hay and others 1989). Spectacular numbers of waterbirds are often recorded feeding on herring roe during these spawning events. Herring and their eggs are a rich food source for waterbirds during migration and prior to breeding and may be crucial to some species (Savard and Kaiser 1982).

Numerous shellfish species are dependent upon estuaries for all or portions of their life cycles (Williams 1989). The commercial shellfish fishery has grown not only in variety of species harvested, but landed catch and value in recent years. Dungeness Crab *(Cancer magister)* and, to a lesser extent, Red Rock Crab (*C. productus)*, support valuable commercial, aboriginal and recreational crab trap fisheries. Historically, most of B.C. commercial crab catch has been taken by trap in Hecate Strait, Chatham Sound and northern Graham Island. Prawn *(Pandalus platyceros)* and other Pandalidae shrimp species are fished by trap in many north coastal inlets (Jamieson and Francis 1986).

3. Study Area

The form of the landscape in the north coast is primarily shaped by the glacially scoured granite batholith of the Coast Mountains. This area falls within three ecoregions: Hecate Lowland, Kitamat Ranges, and the North Pacific Mountains. The marine ecoregions of Hecate Strait and Queen Charlotte Sound bound the study area to the west. The Hecate Lowland is the most subdued part of this landscape and is comprised mainly of islands and rolling terrain. Estuaries are relatively few in this landscape because watersheds are small and primarily rain fed-- most of the larger rivers draining the interior flow into fjords that lie within the mountainous landscape of the Kitimat Ranges. The climate region on this outer most part of the coast is classified as the very wet, hypermaritime subzone of the Coastal Western Hemlock zone(CWHvh2). Upland forests in these areas are dominated by poorly growing bog forest.

The Kitamat Ranges and North Pacific Mountains are rugged mountainous areas. Most of the large to medium sized estuaries on the northern coast occur at the end of the long fjords that penetrate these mountains. The climate in these more interior areas is still very wet. Upland forests are described by the very wet, maritime subzones of the Coastal Western Hemlock zone (CWHvm1). Estuaries of these areas are fed by streams that are either primarily rain and local snow pack fed, glacial fed, or from large rivers draining the interior.

All estuaries in this study fall within the Skeena Region of the Ministry of Environment. Most estuaries studied fall within the jurisdiction of the North Coast District of the Prince Rupert Forest Region. Some estuaries that occur at the end of deep fjords in the north are in the Kalum District. Estuaries at the south end of the study area are in the Central Coast District of the Vancouver Forest Region.

4. Methods

4.1 Estuary Sampling

Estuaries were sampled along the northern coast of British Columbia from the Alaska panhandle south to the Kilbella estuary south of Bella Coola (Figure 1). Surveys were carried out in August-September, 1997 and July, 1998. A list of priority study sites was generated from a gap analysis (Remington and Dickinson 1996). The primary initial criteria for selecting estuaries were based on potential for future development and documented high wildlife habitat values. However, we also wished to sample a wide range of estuary sizes and types and additional estuaries that were adjacent or on the travel route to target estuaries were sampled to acheive this aim. While most of the large and mid-sided estuaries in this region were sampled, this reconnaissance survey was not comprehensive.

The primary focus of field sampling was on intertidal and supratidal vascular plant-dominated communities found in the estuarine environment. The classification does not address non-vegetated or macroalgae-dominated communities. Ecosystem plots were subjectively located on suitable sites that are homogeneous and relatively undisturbed, and their location fixed by GPS. A sample plot size of 20 m by 20 m (400 m^2) was used for most sites but was reduced or skewed to fit smaller areas where required. On each plot, vegetation and environmental data were collected on the FS882 ecosystem field form according to standard procedures outlined in *Field Manual for Describing Terrestrial Ecosystems* (Province of BC 1998). Plant species on the site were listed by layer with an estimate of species percent cover for each layer and for total cover. Unknown specimens were collected and preserved for verification. Taxonomy for vascular plants follows Douglas et al. (1989, 90, 91, 94).

One soil pit (for mineral soils) or peat core (for organic soils) was located in each plot. Texture/decomposition, depth, and other descriptors where noted for each soil horizon and the soil type classified by the *Canadian System of Soil Classification* (Agriculture Canada Expert Committee on Soil Survey 1987). Site features, location within the estuary, and adjacent plant communities were also described. Frequency and duration of tidal inundation were subjectively assessed. Rough maps of ecosystem distribution within the estuary were sketched and an oblique photo taken from the air where possible.

An estuarine site classification was developed using vegetation and environmental data from 65 plots. A combination of ordination and tabular analysis was used to classify ecosystem plots into Site Associations. Tabular analysis using Braun-Blanquet methods (Mueller-Dombois and Ellenberg 1974) was initially performed on plots with the assistance of an ecological database program, VPRO97ver2.0 (MacKenzie and Klassen 1999). Ordination by Detrended

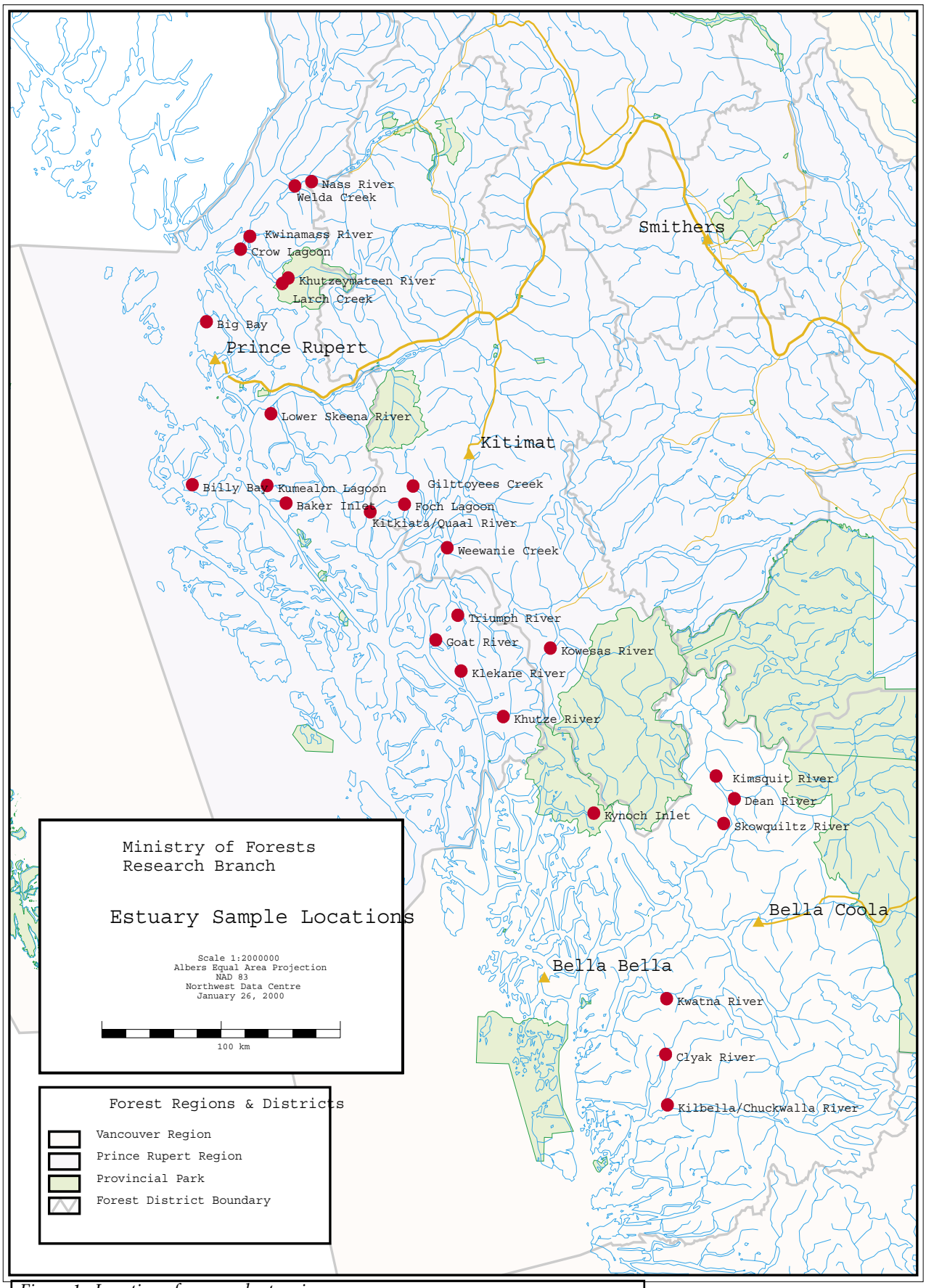


Figure 1. Location of surveyed estuaries

Correspondence Analysis (DCA) using PC-ORD ver. 3.0 (McCune and Mefford 1995) was performed and combined with an overlay of the initial tabular classification to aid in assigning plots and differentiating units. Further tabular analysis and ordination using the summary values of the subzone units generated the Site Associations appearing in this document. Summary environmental tables run for each of the site associations using VPRO97ver2.0 provided environmental descriptions for each unit.

4.2 Ranking Biological Resources

The biological resource criteria for each estuary were developed in consultation with B.C. Environment regional biologists and are modeled after the classification in *Coastal wetlands habitat assessment and classification for northwestern British Columbia* (Remington 1993). Emphasis is placed on species that rely on estuaries for all or critical portions of their life cycle, specifically: A) waterfowl; B) waterbird species at risk (red- and blue-listed species); C) Grizzly Bear (blue-listed species, VULNERABLE COSEWIC status); D) Salmon escapement; E) salmonid stocks or streams of special management concern; and F) Eulachon, Pacific Herring and shellfish stocks. All rankings are within a regional scope (mid- and north coastal B.C.) except for Grizzly Bear, which are given a provincial ranking.

Waterfowl inventory— The waterfowl inventory ranking (Appendix A) is based largely on data compiled in the Coastal Waterbird Inventory File, a collection of surveys conducted by federal and provincial agencies and recorded by the Terrestrial Studies Branch circa 1980. Other waterfowl inventory data sources are Savard (1979), Savard and Kaiser (1982), Martin (1980) and surveys conducted by the North Coast Wetlands Program in 1992-1993. Ranks are regional for the north and central coast.

Waterbird species at risk— The waterbird species-at-risk ranking (Appendix B) emphasizes critical habitats for species that are red- or blue-listed by the B.C. Wildlife Branch (1999); e.g., Trumpeter Swan wintering habitat. Ranks are regional for the north and central coast.

Grizzly Bear habitat — The Grizzly Bear habitat capability ranking (Appendix C) is based on the professional knowledge of B.C. Environment regional biologists, and reflects provincial significance. Other information sources are Hamilton and Bunnell (1986), MacHutchon et al. (1993), and Fuhr et al. (1995).

Salmon escapement— The data source for the salmon escapement ranking (Appendix D) is the DFO/BCE Stream Summary Catalogues. Much of the summary data was extracted from a database compiled by J. Booth and Associates (1993). The term escapement refers to the number of adult fish making their way to upstream spawning beds, having 'escaped' from commercial harvest. It should be noted that escapements may not reflect the true habitat capability or management targets due to the possible over-harvest of individual species or stocks during the period of record. Ranks are regional for the north and central coast.

Salmonid stocks— The ranking for salmonid stocks or streams of special management concern (Appendix E) is based on 1) unique salmonid stocks, such as Coho, Steelhead and Chinook, which are of special management concern, and 2) especially productive streams and unique sport fishing opportunities (recognized by the intensity of commercial guiding and the need for special Classified Waters regulations). Information sources include DFO/BCE Stream Summary Catalogues, B.C. Environment stream files, Classified Rivers management plans and knowledge of regional biologists. Ranks are regional for the north and central coast.

Eulachon, Pacific Herring and shellfish— The Eulachon, Pacific Herring and shellfish ranking (Appendix F) recognizes the management concern for Eulachon and herring stocks, the significance of the Eulachon fishery to aboriginal culture, and the commercial and recreational value of the herring, crab and prawn fishery. Sources are DFO/BCE Stream Summary Catalogues, Langer and others (1977), Farlinger and Bates (1985), Farlinger and Thomas (1986), Jamieson and Francis (1986) and Hay and others (1989). Ranks are regional for the north and central coast.

4.3 Social and Cultural Information

Sturtevant (1990) was the source of aboriginal cultural information. The presence of modern day villages, Indian Reserves, and historical village sites reflects the cultural value associated with the estuary. This information reflects the biological resource value as well, because village sites were often located near major food sources, such as important salmon streams. Other social information, such as public appreciation for sport fishing and recreation, came from a

variety of sources, including B.C. Environment regional biologists and Forest Ecosystem Specialists.

4.4 Protection Status and Development issues

Information on protection status information came from B.C. Lands land status maps and PAS gap analysis documents prepared by the Regional Protected Areas Team, Northwest PAS Region (BC Environment 1994) and the Land Use Coordination Office (Lewis and others 1997). There is strong public interest in the protection of entire wilderness watersheds and bear habitats along the mainland coast (McAllister and others 1997). Moore (1991) identified the remaining undeveloped primary watersheds on the north coast and associated conservation proposals. Development issues were identified during field season preparation and research (Remington and others 1997). Information sources were forestry development plans and consultation with planners and Forest Ecosystem Specialists in coastal forest districts.

4.5 Geographic Details

Geographic details are summarized for each estuary in Section 6. Methods for calculating or categorizing basin size, estuary size, estuary type and stream source are as follows.

- **Basin size:** The size of the catchment that drains into the estuary was calculated from 1:250, 000 NTS map sheets by tracing the apparent height of land using a planimeter.

- **Estuary size:** The aerial extent of estuary area was calculated from Canadian nautical charts using a planimeter. Two areas were determined: the area from the tree line to zero chart datum and from tree line to the 2m isobath. Both values are presented.

- **Estuary type**: The classification of estuary types used in this document is presented in Section 5.

- **Stream source:** This describes the dominant water source and sediment transport of streams feeding the estuary.

  - **Glacier** - streams fed by glacial melting and generally with high sediment transport
  - **Interior** - typically larger rivers primarily fed by catchments on the lee-side of the Coast Mountains; dominated by extended periods of spring run-off and high levels of sediment transport.
  - **Lake** - systems moderated by a lake(s) and generally very low in sediments.

  Rain/snow- streams primarily fed by run-off and storm events within the watershed; floods often of short duration and sediment transport generally low to moderate.

5. Estuary classification

The wetland and riparian ecosystem classification (MacKenzie and Banner 2000) presents a classification system for wetland ecosystems including estuaries. We use this classification approach to characterize estuaries of the north coast. This classification framework uses both a biological and and physical system to describe sites. The physical classification describes and estuary by geomorphic form and the arrangement of ecosystems. The ecosystem classification is a description of estuarine biological communities and site features. Therefore, we distinguish between an "Estuary" as a physical entity and an "Estuarine ecosystem" as a biological community.

An "Estuary" is a hydrogeomorphological and landscape level term describing:

> a contiguous landscape unit occurring at the confluence of a freshwater source and the marine environment where seawater and freshwater mix. The estuary extends to the upper limit of saltwater intrusion into the river course and the marine limit by the low water mark where benthic communities are periodically affected by brackish water.

Conversely, an "Estuarine ecosystems" are defined as:

> coastal sites dominated by plants and other organisms tolerant of wet, brackish soils found at the confluence of a freshwater source and the marine environment and affected by occasional or diurnal tidal inundation. Estuarine ecosystems occur specifically where:

- at least periodically, the land supports predominantly hydrophytic plant species or invertebrates adapted to brackish water.
- the substrate is predominantly undrained hydric soil, organic or inorganic. In mineral soils, gleying occurs within the top 30cm; or the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season.
- the site is tidally influenced and at least occasionally affected by brackish water.

5.1 Hydrogeomorphic Classification of Estuary Form

Classification of estuary form is based on the geomorphological form and the pattern of estuarine ecosystem development. The form of an estuary reflects both stream hydrological characteristics and valley form at the confluence of the stream and the ocean. We have recognized eight estuary forms on the north coast (Figure 2).

Fjord estuary
The estuary occurs in a fjord and therefore is greatly constrained by steep valley walls. Estuarine communities occur only at the head of the fjord in a small delta. Source streams are generally small to medium in size and fed by sediment-bearing streams, often glacier fed.

Fjard estuary
The estuary occurs in a fjord but is sourced by larger river systems that push freshwater through most of the length of the inundated valley. Estuarine communities develop in lateral bays or as islands. Watersheds are always very large and drain interior basins.

Ria estuary
The estuary occurs in broader valleys that are moderately constrained and the feeder streams often have pronounced meanders at the river confluence. Estuarine development similar to fjord estuaries. Streams generally small to medium in size and fed by local glaciers.

Coastal Plain estuary
A funnel shaped estuary occuring in watershed with low relief. Often with sediment islands, bars, and extensive mudflats. Estuarine ecosystem develop at the confluence and may occur lateraly for some distance up the river channel. On the north coast these are generally smaller systems without an abundant sediment source; fed by rain and snow.

Strand estuary
The estuary is poorly developed and estuarine communities occur as a narrow fringe on beach or shoreline adjacent to stream or river inflow. These are typically in lake- controlled watersheds where streams transport little or no sediment.

Lagoon estuary
The estuary occurs in an enclosed bay where there is little ocean current, wind, or wave action and a surface freshwater lens can persist. These estuaries are generally fed by smaller streams with minor sediment inputs.

Delta estuary
The estuary extrudes into the open ocean and is relatively unprotected. Usually large systems with very high sediment load.

Fan estuary
Small estuaries formed at the terminus of small, steep headwater creeks. The estuary is fan-shaped, sloping, and usually composed of coarse fragments rather than fine-textured sediments. The streams are typically fed by rain and snow from local slopes

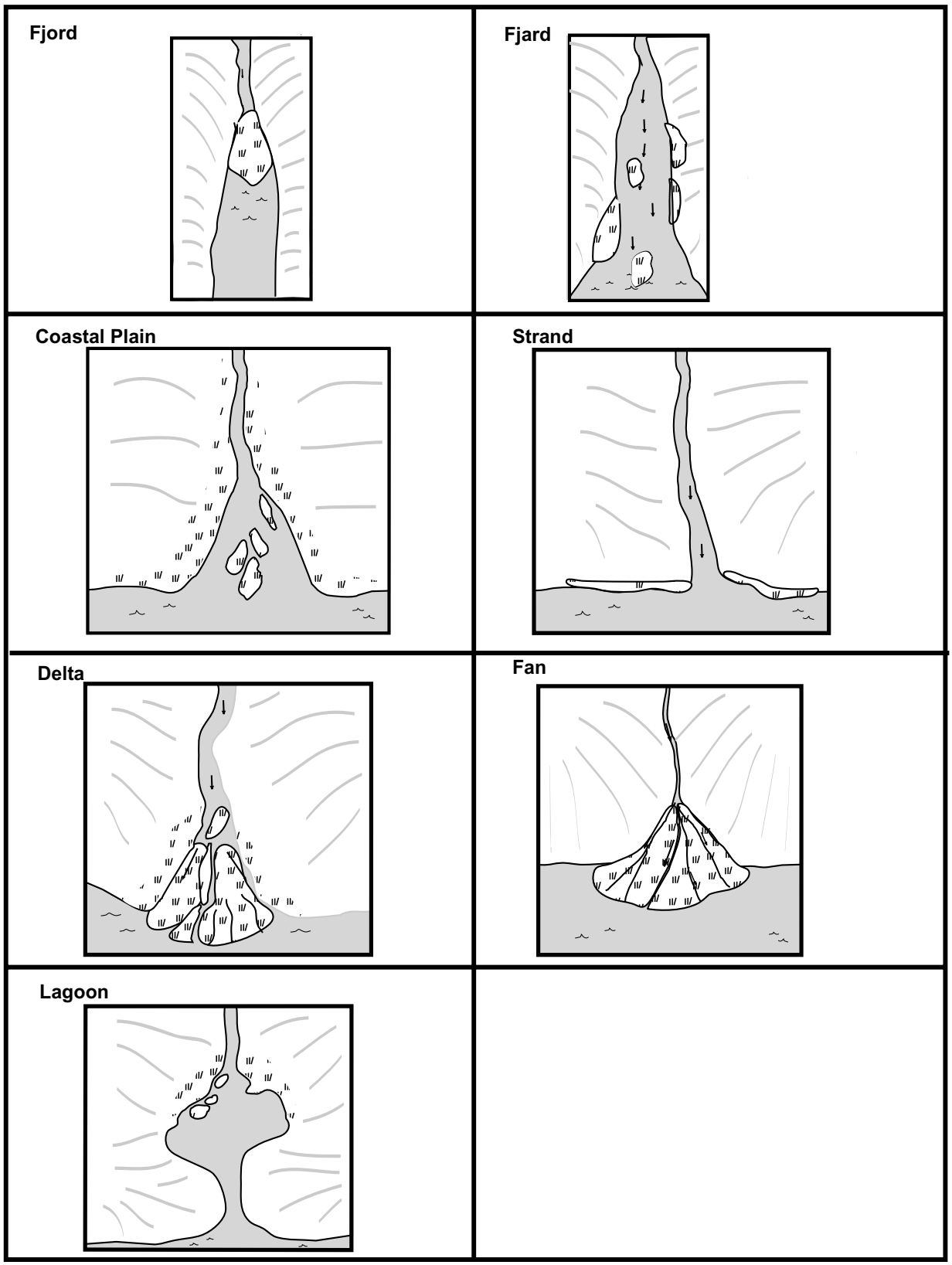


Figure 2. Estuary types or forms found on the North Coast. Short hatching indicates the location of estuarine plant communities

5.2 Site classification of Estuarine ecosystems

Estuarine ecosystems can be described at several functional scales. At the broadest level, the estuarine ecosystem realm is distinguished from permanently inundated brackish water ecosystems (wedge ecosystem realm), intertidal sites that do not receive freshwater inputs except by rainfall (intertidal ecosystem realm), wetlands not affected by oceanic salts (wetland ecosystem realm) and upland ecosystems (terrestrial ecosystem realm).

At a specific level, the site association is used as the fundamental classification unit of ecosystem classification in British Columbia. This unit describes distinct vegetation communities (and associated soils and landforms) that occur repeatedly in the landscape. Estuarine site associations of the north coast are presented in Section 6. Site associations can be grouped in Site Classes based on broadly similar vegetation and environment characteristics. Four Estuarine ecosystem classes are recognized Estuarine Swamp, Estuarine Meadow, Estuarine Marsh, Estuarine Tidal flat.

Estuarine Swamp Class

Estuarine swamps are treed or shrubby mineral ecosystems that occur in brackish lagoons, on channel and estuary edges with occasional tidal flooding and waterlogged, slightly saline soils. Thickets of tall shrubs and trees tolerant of wet, slightly saline soils are typical. Soils are usually mineral though some sites have significant well-humified organic horizons.

Estuarine Meadow Class

Estuarine meadows are ecosystems dominated by tall forbs and graminoids that develop in the high intertidal and supratidal zones of estuaries, where tidal flooding is less frequent than daily. These sites are flooded during higher high tides, storm events, or during river flood. Soils are often waterlogged during portions of the growing season and are oligo- to eusaline mineral soils. The Estuarine meadow is the equivalent to the High Marsh described by Tarnocai in Glooschenko et al. (1993).

Estuarine Marsh Class

An Estuarine marsh is an intertidal ecosystem dominated by salt-tolerant emergent graminoids and succulents. They occur in the middle to upper tidal zones of estuaries where fresh water and salt water mix. Sites are alternately flooded and exposed during most tidal cycles. Elevationally banded surface patterns that reflect degree of tidal inundation are common. Estuarine marshes are the equivalent of the Low Marsh of Tarnocai (in Glooschenko et al. 1993)

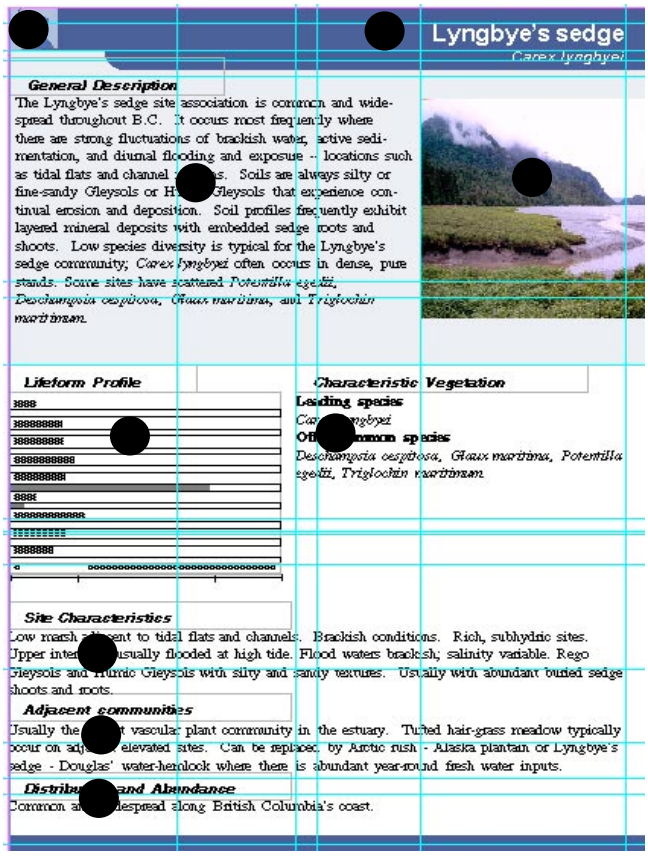
Estuarine Tidal Flat Class

Estuarine Tidal Flat sites are intertidal ecosystems dominated by benthic/burrowing fauna and macroalgae. They occur in the mid to lower tidal zones of estuaries, where freshwater and saltwater mix. Sites are flooded and exposed with most tidal cycles or sometime permanently in estuary ponds. Large flats of silts, sands, or pebbles are common.

6. Estuarine Site Associations

One-page factsheets describe estuarine site associations, as a range or as a summary of average conditions. Factsheets seldom describe the precise conditions of a given community, but provide insight into the typical conditions that can be expected. Fourteen vascular plant dominated associations have been described for estuaries on the north coast. These fourteen describe most of the reoccurring communities known to occur on the north coast. However, other associations also occur in some locations. Several uncommon types already noted are mudflats of *Callitriche stagnalis*, *Ranunculus cymbalaria* mats on buried organic debris, *Hippus tetraphylla* stands in small ponds of the back marsh, and *Equisetum fluviatile* marshes in the freshwater tidal reaches of larger rivers. We have not described any associations that fall with in the Estuarine Tidal flat class.

Layout and Conventions



System icon (1): Symbol(s) for the hydrogeomorphic groups defined on page 12.

Name (2): Name of site association defined by diagnostic or leading plant species. Common names above scientific names. Parentheses enclose less frequent species that can be locally dominant or may define a Subassociation.

General description (3): Brief description of distribution, landscape position, hydrology, soils, vegetation, and related Site Associations. "(N=#)" is the number of ecosystem plots used to generate the description.

Photograph (4): A photograph of an example of the Site Association.

Lifeform profile (5): The profile shows the average vegetation cover by lifeform for the unit.

Characteristic vegetation (6): A list of plant species commonly found in the site association. Species are listed as:
Leading species, that occur in > 60% of the plots and >10% cover;
Other common species that occur in > 20% of plots with an average cover > 1%.
Leading species are listed by layer, and other common species are listed in order of abundance (i.e., the first species occurs with greatest cover and the last species occurs with the least cover).

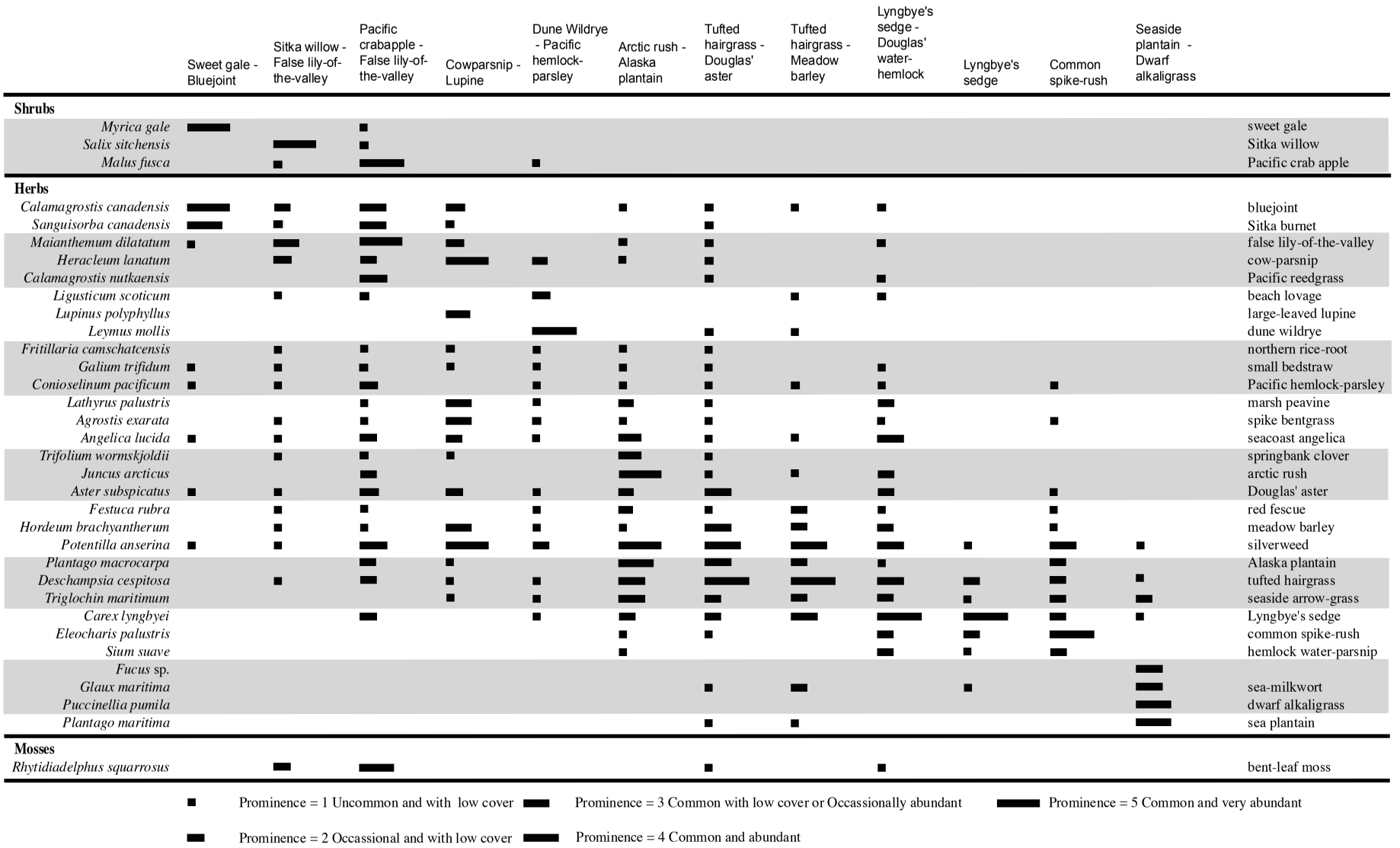
Site Characteristics (7): Summary of common hydrological systems, flood regime, water levels, soil saturation, soil types, and other site factors.

Adjacent communities (8): Description of ecosystems commonly spatially associated with the site association.

Distribution and Abundance (9): Outlines climatic or regional affinities and general prevalence of the unit.

Contents

Table 1. Vegetation prominence table for estuarine site associations of the north coast

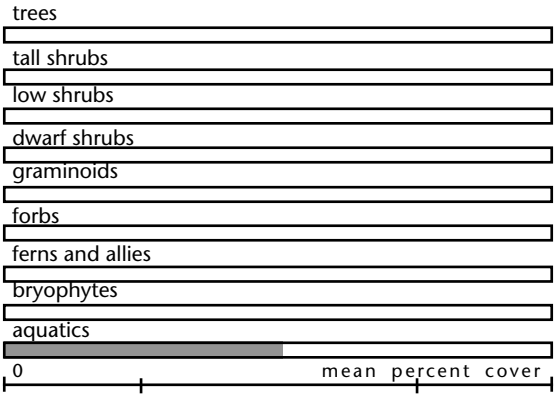


Widgeon-grass
Ruppia maritima

General Description

The Widgeon-grass site association occurs in brackish, mud-bottomed pools, lagoons, backwater sloughs, and drainage channels that dissect lower portions of estuarine marshes. This species-poor community usually consists of pure stands of *Ruppia maritima*. Sites are usually small and localized but can also occur over large areas of tidal flats where sedimentation rates are low. Soils are silty Rego-Gleysols. Flooding can be permanent or prolonged during each tidal cycle.

Lifeform Profile



Characteristic Vegetation

Leading species

Ruppia maritima

Other common species

Site Characteristics

Brackish, mud-bottomed pools, lagoons, backwater sloughs, and drainage channels where there is a low rate of sediment input. Permanent to prolonged innundation. Rarely exposed except briefly at low tides or during drawdown periods in upper marsh. Substrate almost always saturated. Gleysols with silty and fine sandy textures.

Adjacent communities

Can be found in conjunction with any estuarine meadow or marsh in depressions or pools but most commonly below the limit of emergent vascular plants in the mid intertidal.

Distribution and Abundance

This ecosystem is common throughout coastal B.C. but is usually small in areal extent. Occasionally more extensive mats establish on protected middle intertidal mudflats.

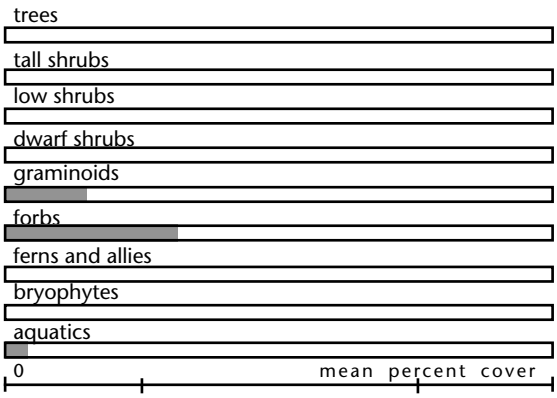
Seaside plantain - Dwarf alkaligrass

Plantago maritima - Puccinellia pumila

General Description

The Seaside plantain - Dwarf alkali grass site association occurs on pebbly or gravelly flats in the middle and upper intertidal. These sites are protected from wave action and often have little freshwater influence. Tidal flooding and exposure occur with most tides. Suitable habitats occur in protected embayments where there is no accumulation of fine-textured sediments; such sites appear to be infreqent on the North Coast. Seaside plantain - Dwarf alkali grass communities are often small in extent and consist of scattered cover of *Plantago maritima, Puccinellia pumila, Glaux maritima, Spergularia canadensis*, and *Fucus*. Species diversity is low. The substrate is almost always sandy and gleyed.

Lifeform Profile



Characteristic Vegetation

Leading species

Plantago maritima, Puccinellia pumila

Other common species

Glaux maritima, Triglochin maritimum, Spergularia canadensis, Potentilla anserina, Fucus spp., *Carex lyngbyei*

Site Characteristics

Occurs in the middle to upper intertidal zone where prolonged flooding during most tidal cycles is typical. Generally eusaline or strongly brackish conditions prevail. This community type can also occur outside of estuarine areas on protected shorelines of pebbly deposits.

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Adjacent communities

Often at the lower limit of vascular plant communities and occurring just above *Fucus* flats. Site with similar tidal characteristics, but where fine textured sediments are actively accummulating, are usually dominated by *Carex lyngbyei*.

Distribution and Abundance

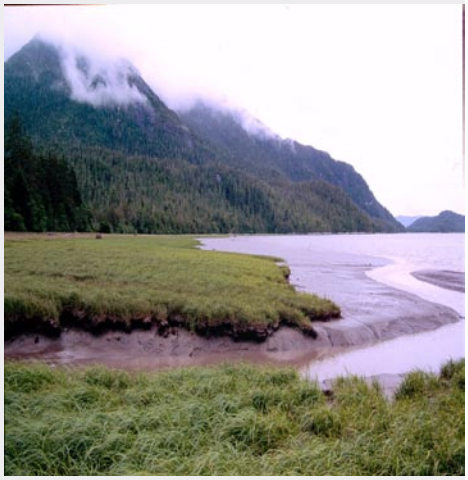
Uncommon on the North Coast. Not observed or described for the southern coast.

Lyngbye's sedge

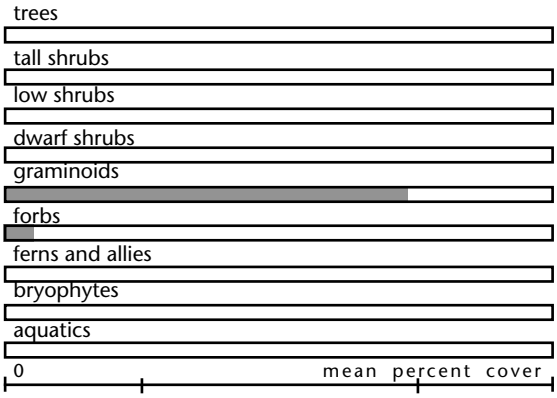
Carex lyngbyei

General Description

The Lyngbye's sedge site association is common and widespread throughout B.C. It occurs most frequently where there are strong fluctuations of brackish water, active sedimentation, and diurnal flooding and exposure -- locations such as tidal flats and channel margins. Soils are always silty or fine-sandy Gleysols or Humic Gleysols that experience continual erosion and deposition. Soil profiles frequently exhibit layered mineral deposits with embedded sedge roots and shoots. Low species diversity is typical for the Lyngbye's sedge community; *Carex lyngbyei* often occurs in dense, pure stands. Some sites have scattered *Potentilla egedii, Deschampsia cespitosa, Glaux maritima*, and *Triglochin maritimum*.



Lifeform Profile



Characteristic Vegetation

Leading species

Carex lyngbyei

Other common species

Deschampsia cespitosa, Glaux maritima, Potentilla egedii, Triglochin maritimum

Site Characteristics

Low marsh adjacent to tidal flats and channels. Brackish conditions. Rich, subhydric sites. Upper intertidal; usually flooded at high tide. Flood waters brackish; salinity variable. Rego Gleysols and Humic Gleysols with silty and sandy textures. Usually with abundant buried sedge shoots and roots.

Adjacent communities

Usually the lowest vascular plant community in the estuary. Tufted hair-grass meadow typically occur on adjacent elevated sites. Can be replaced by Arctic rush - Alaska plantain or Lyngbye's sedge - Douglas' water-hemlock where there is abundant year-round fresh water inputs.

Distribution and Abundance

Common and widespread along British Columbia's coast.

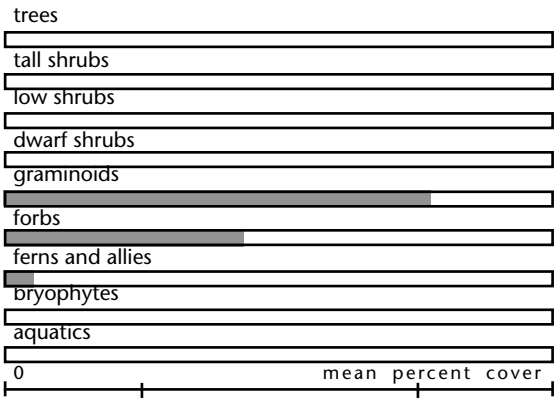
Lyngbye's sedge - Douglas' water-hemlock

Carex lyngbyei - Cicuta douglasii

General Description

The Lyngbye's sedge - Douglas' water-hemlock site association occurs in Fjard type estuaries where large freshwater inputs reduce salinity in the intertidal year round. On the north coast this association has been observed along tidal reaches of the Skeena and Nass rivers. It occurs where there are strong fluctuations of weakly brackish water, active sedimentation, and diurnal flooding and exposure -- usually in lateral bays. Soils are always silty or fine-sandy Gleysols or Humic Gleysols that experience continual erosion and deposition. Species diversity is high relative to the similar Lyngbye's sedge association common in other estuary types. Many species intolerant of high salinity occur.

Lifeform Profile



Characteristic Vegetation

Leading species

Carex lyngbyei

Other common species

Deschampsia cespitosa, Aster subspicatus, Cicuta douglasii, Conioselinum pacificum, Sium suave, Agrostis exarata, Equisetum fluviatile, Calamagrostis canadensis, Eleocharis palustris, Scirpus microcarpus, Ranunculus orthorhynchus, Oenanthe sarmentosa

Site Characteristics

Middle or lower marsh adjacent to tidal river reaches. Weakly brackish to fresh conditions. Upper intertidal; usually flooded during all tidal cycles. Rego Gleysols and Humic gleysols with silty and sandy textures. Often with abundant buried layers of sedge shoots and roots.

Adjacent communities

Can occur adjacent to pure stands of Lyngbye's sedge, Common spike-rush, or Water horsetail. Occurs in locations similar to slightly elevated above those typical of the Lyngbye's sedge association.

Distribution and Abundance

Common in suitable habitats but apparently only associated with large river estuaries such as the Skeena and Nass rivers.

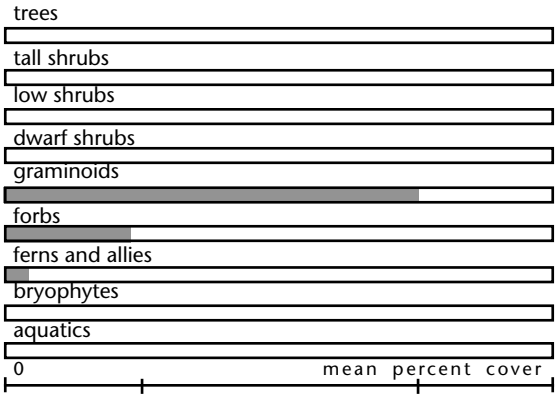
Common spike-rush

Eleocharis palustris

General Description

The Common spike-rush association occurs in locations with prolonged tidal flooding but low salinity. These can be in protected inlets where there is little tidal flushing or along major river systems where tidal reaches can be fresh water. This association is often represented by a near monoculture of *Eleocharis palustris* on heavily inundated sites in drainage channels, or with *E. palustris* as the dominant in a mixure of meadow species in more protected areas. These latter sites can have *Deschampsia cespitosa, Triglochin maritimum, Potentilla egedii* and *Plantago macrocarpa*. The soils are either Gleysols or Organics (in protected sites only).

Lifeform Profile



Characteristic Vegetation

Leading species

Eleocharis palustris, Carex lyngbyei, Potentilla egedii

Other common species

Deschampsia cespitosa, Triglochin maritimum, Plantago macrocarpa

Site Characteristics

Marsh communities limited to drainage channel pools, freshwater tidal areas, or protected lagoon estuaries with little tidal flushing. Frequent, prolonged flooding; diurnal if low in estuary.
Gleysols of silty and fine sandy texture or Fibrisols of poorly decomposed sedge and spike-rush.

Adjacent communities

Adjacent to Lyngbye's sedge - Douglas' water-hemlock, Water horsetail or other estuarine marshes.

Distribution and Abundance

Uncommon but can form large stands where found.

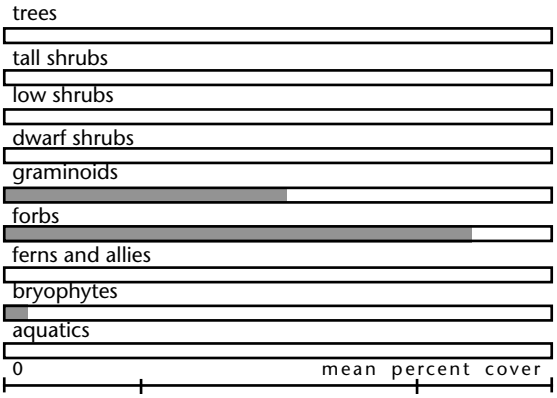
Arctic rush - Alaska plantain

Juncus arcticus - Plantago macrocarpa

General Description

The Arctic rush - Alaska plantain association occurs where there is a well-developed freshwater lens that reduces the salinity of tidal waters. Locations can be protected estuaries where fresh water is retained, brackish tidal reaches on larger rivers or in estuaries near larger systems. The association occurs in the high intertidal zone with brief diurnal tidal indundation -- locations that would support Tufted hairgrass communities in more saline environments. Soils are nearly always silty textured Gleysols, sometimes minerally enriched Fibrisols. *Juncus arcticus* is the site dominant with *Plantago macrocarpa* and *Potentilla egedii* common in the herb layer. The herb layer is well developed and displays moderate species diversity in both the graminoid and forb layers. This site association can also occur in localized depressions within a meadow, on flats where water is retained for longer periods.

Lifeform Profile



Characteristic Vegetation

Leading species

Juncus arcticus, Plantago macrocarpa, Potentilla anserina, Triglochin maritimum, Deschampsia cespitosa, Aster subspicatus

Other common species

Agrostis exarata, Festuca rubra, Carex lyngbyei, Achillia millefolium, Angelica lucida, Castilleja spp., Conioselinum pacificum, Fritillaria camschatcensis, Lathyrus palustris, Platanthera dilatata, Trifolium wormskjoldii

Site Characteristics

Generally found in the upper intertidal marsh in estuaries with a significant freshwater lens. Diurnal flooding. Low wave action. Gleysols and Humic Gleysols in silty fine textured materials, and Fibrisols with tenacious, matted organics.

Adjacent communities

The association has been observed in conjunction with Lyngbye's sedge at lower elevation and Sitka willow above. Can occur in locations similar to those of the Tufted hairgrass meadows but where there is little flushing of fresh water from the estuary.

Distribution and Abundance

Not common in the study area. Most sample locations are from the Dean Channel, where there is a significant permanent freshwater lens.

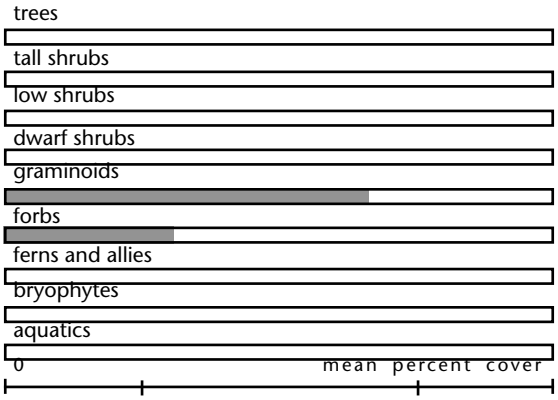
Tufted hairgrass - Meadow barley

Deschampsia cespitosa - Hordeum brachyantherum

General Description

The Tufted hairgrass association occurs in the upper intertidal zone on fan estuaries, creekside areas within moderate sized estuaries, and as narrow bands on steep coastal sites with abundant groundwater seepage. These sites experience daily but generally brief flooding by brackish water. The soils are usually sandy or loamy textured Gleysols and Regosols with little or no humus form development. Tufted hairgrass association is characterized by relatively low species diversity, the absence of tree, shrub, and moss layers, and a dominance of *Deschampsia cespitosa*. *Potentilla anserina, Glaux maritima*, and *Carex lyngbyei* are often present with low cover. Lyngbye's sedge and Seaside plantain - Dwarf alkaligrass can be adjacent at lower elevations and Beach dunegrass - Beach lovage at higher elevations. This site association represents a wetter phase of the Tufted hairgrass - Douglas' aster unit that occurs on less-frequently flooded and less saline estuary flats.

Lifeform Profile



Characteristic Vegetation

Leading species

Deschampsia cespitosa

Other common species

Carex lyngbyei, Hordeum brachyantherum, Leymus mollis, Glaux maritima, Potentilla egedii

Site Characteristics

Occurs in the high intertidal zone, along creek flats, and on protected beach fronts. Shallowly flooded or saturated on higher tides. Flood waters are brackish.

Adjacent communities

The highest estuarine community in some estuaries, or next to elevated sites with Dune wildrye - Beach lovage or Pacific crabapple. The Lyngbye's sedge is the most common associate at lower elevations.

Distribution and Abundance

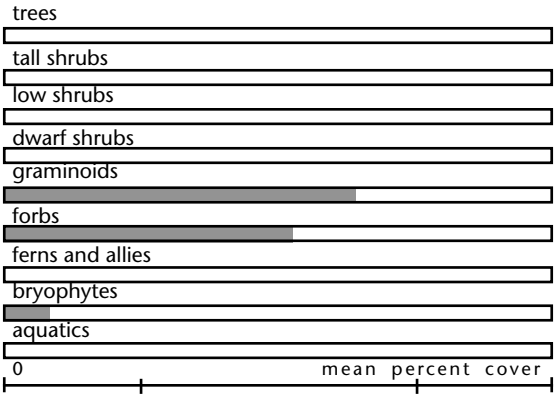
Common on small fan-type estuaries and on elevated berms along creeks.

Tufted hairgrass - Douglas' aster

General Description

The Tufted hairgrass - Douglas' aster association is one of the most floristically diverse and widespread ecosystems in medium to large estuaries on the north and central coast. The association occurs in the high marsh zone between the backshore shrub communities and the low marsh, usually in broad and extensive flats. These sites are limited to zones within the estuary where weakly brackish conditions predominate and inundation is infrequent. Soils are mostly Humic Gleysols with silty and sandy textures. *Deschampsia cespitosa* and *Aster subspicatus* are dominant and diagnostic species though other species can also be prominent on some sites. This community likely replaces the Lyngbye's sedge as tidal flats accrete to above diurnal inundation.

Lifeform Profile



Characteristic Vegetation

Leading species

Deschampsia cespitosa, Aster subspicatus, Carex lyngbyei, Hordeum brachyantherum, Achillea millefolium, Potentilla egedii

Other common species

Plantago macrocarpa, Galium trifidum, Triglochin maritimum, Festuca rubra, Conioselinum pacificum, Brachythecium spp., *Angelica lucida, Ranunculus orthorhynchus, Agrostis exarata, Hierochloe odorata. Maianthemum dilatatum, Trifolium wormskjoldii, Juncus arcticus, Castilleja miniata, Fritillaria camschatcensis.*

Site Characteristics

Brief flooding during higher high tide events and the spring freshet or inundation during storm events. Soils are mainly Humic Gleysols but Brunisols, Fibrisols, and Mesisols can also occur. Most textures are fine-sandy or silty. Organic materials are often mesic.

Adjacent communities

Broad flats in low supratidal zones along feeder streams, usually between the backshore shrub communities of Pacific crabapple or pink spiraea and the lower Lyngbye's sedge marsh.

Distribution and Abundance

Common and widespread in medium and large estuaries. Often forms extensive estuary flats.

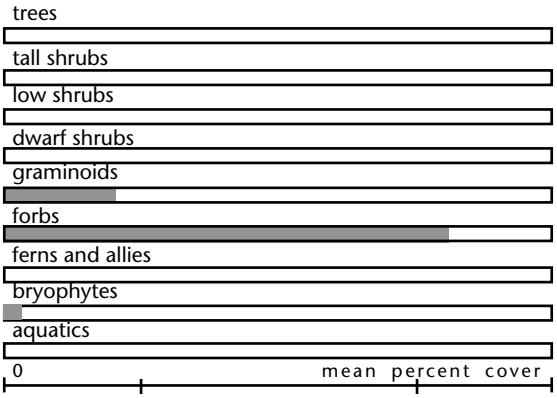
Cow-parsnip - Lupine

Heracleum lanatum - Lupinus spp.

General Description

The Cow-parsnip - Lupine association occurs as isolated patches on raised microsites within Tufted hairgrass - Douglas' aster flats. These patches appear to establish on bands or mounds of fluvial sands deposited during floods and are somewhat drier and better drained than adjacent estuary meadows. These sites are probably not influenced by brackish water and have gleyed soils caused by subirrigation. Because of the unique circumstances resulting in establishment of these communities, they are relatively uncommon and considered to be successional. *Heracleum lanatum* dominates the community with smaller forbs and grasses below. There is no shrub layer and little development of the moss layer.

Lifeform Profile



Characteristic Vegetation

Leading species

Heracleum lanatum, Potentilla egedii, Agrostis exarata, Hordeum brachyantherum

Other common species

Achillia millefolium, Aster subspicatus, Lupinus polyphyllus, Lupinus arcticus, Lupinus nootkatensis, Lathyrus palustris

Site Characteristics

Protected estuaries, on mounds or ridges of fluvial deposits. Typically drier, less saline conditions than other estuarine meadows. Rarely innundated by tides. Gleyed Regosols and Brunisols. Sandy and silty loam textures.

Adjacent communities

Usually within Tufted hairgrass - Douglas' aster meadows.

Distribution and Abundance

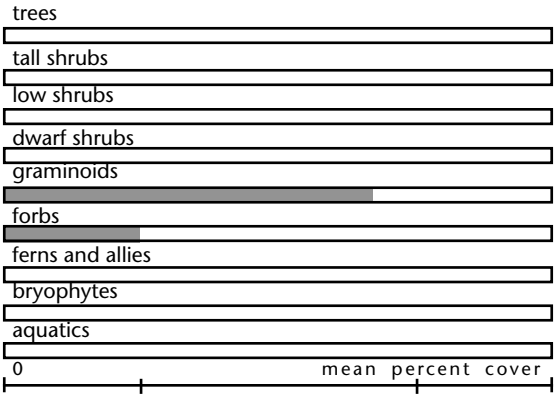
Uncommon and usually of small extent.

Dune Wildrye - Pacific hemlock-parsley

General Description

The Dune wildrye - Pacific hemlock-parsley association is common on raised beach ridges or berms where coarse textured materials have been deposited by beach-forming processes. These sites generally experience little or no flooding. However, salt spray and inundation can occur during higher high tides and storm events. The herb layer is dominated by *Leymus mollis*. Other species such as *Conioselinum pacificum, Achillea millefolium*, and *Heracleum lanatum* are often scattered throughout. *Ligusticum scoticum* can also be present, sometimes in relatively high abundance. The tree, shrub, and bryophyte layers are nearly absent. Small flowering plants such as *Fritillaria camschatcensis* can be found where the site is adjacent to a more protected high marsh community such as Tufted hairgrass- Douglas' aster.

Lifeform Profile



Characteristic Vegetation

Leading species

Leymus mollis

Other common species

Conioselinum pacificum, Achillea millefolium, Heracleum lanatum, Ligusticum scoticum, Potentilla egedii

Site Characteristics

Beach ridges and inactive beach fronts of coarse sands or gravels in the storm line. Exposed to high winds and storm waves. Rarely flooded.

Adjacent communities

Often occurs above Tufted hairgrass meadows. Frequently this is the highest estuarine community before upland forest.

Distribution and Abundance

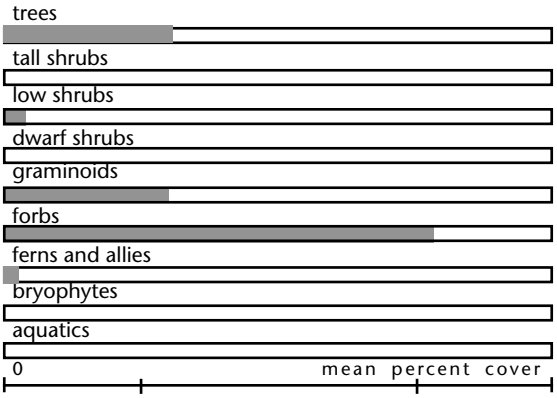
Widespread and common.

Pacific crabapple - False lily-of-the-valley

General Description

The Pacific crabapple - False lily-of-the-valley association occurs at the upper limit of tidal influence and many sites experience only saltspray and subirrigation. Inundation can occur but is generally brief and often during the spring freshet, when salinity is low. Soils are typically Gleysols with silty to sandy textures and varying degrees of humic enrichment. *Malus fusca* is the site dominant, accompanied by a well developed and diverse forb dominated understory. *Picea sitchensis* can be present on raised microsites on sites with limited tidal influence. On floodplains Pacific crabapple can progress to Sitka spruce forests as sediments accumulate and the site is raised higher above floodwaters.

Lifeform Profile



Characteristic Vegetation

Leading species

Malus fusca, Maianthemum dilatatum, Conioselinum pacificum, Potentilla egedii

Other common species

Lonicera involucrata, Myrica gale, Rubus spectabilis, Calamagrostis canadensis, Angelica genuflexa, Angelica lucida, Aster subspicatus, Equisetum arvense, Fritillaria camschatcensis, Heracleum lanatum, Ranunculus orthorhynchus, Sanguisorba canadensis, Rhytiadelphus squarrosus

Site Characteristics

Usually supratidal transitional between forested upland and intertidal communities. Locations in estuaries where tidal influence and brackish conditions are reduced. Subhygric to subhydric soil moisture regime. Brief to temporary spring flooding of relatively low velocity. Gleysols and Humic Gleysols of silty to sandy textures.

Adjacent communities

Usually adjacent to upland forest of Sitka spruce. Commonly bordered by Tufted hairgrass estuarine meadow communities at lower elevations.

Distribution and Abundance

Widespread and common; usually of relatively small areal extent in suitable habitats.

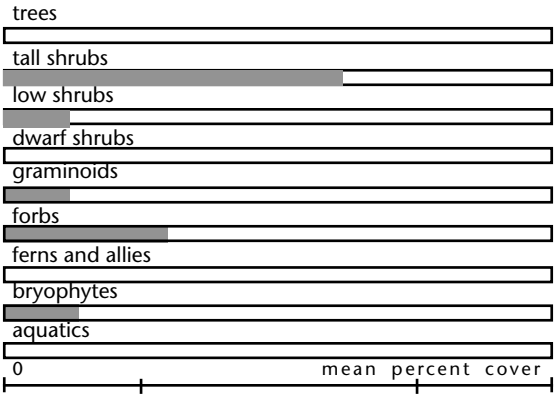
Sitka willow - False lily-of-the-valley

Salix sitchensis - Maianthemum dilatatum

General Description

The Sitka willow - False lily-of-the-valley association is generally found at the transition between the fresh water conditions of the fluvial system and the uppermost reaches of brackish influence. This flood site may differ from similar low bench sites farther inland in the presence of species from the parsley family, such as *Angelica lucida* and *Conioselinum pacificum*. Sitka willow sites can experience brief or temporaty annual floods during the spring freshet but are much elevated above the mid-season water table. Soils are nearly always loamy to sandy textured Gleysols or Regosols. The shrub layer is dominated by *Salix sitchensis,* and there is often little development of other shrub species. The herb layer is moderately well developed and supports *Calamagrostis canadensis* as well as other graminoid species and forbs such as *Aster subspicatus* and *Sanguisorba canadensis*. The moss layer is poorly developed.

Lifeform Profile



Characteristic Vegetation

Leading species

Salix sitchensis, Maianthemum dilatatum, Angelica genuflexa, Aster subspicatus

Other Common species

Lonicera involucrata, Rubus spectabilis, Calamagrostis canadensis, Angelica lucida, Conioselinum pacificum, Galium trifidum, Heracleum lanatum, Prenanthes alata, Sanguisorba canadensis, Rhytidiadelphus squarrosus.

Site Characteristics

Along fluvial channels at or above tidal influence. Subhygric to subhydric soil moisture regime. Brief to temporary spring and winter flooding with deposition of silts and fine sands. Humic Gleysols, Gleyed Regosols, and Humic Regosols with loamy and sandy textures

Adjacent communities

Usually directly adjacent to the stream and bordered by Sitka spruce floodplain forest or by meadows such as Arctic rush - Alaska plantain or Tufted Hairgrass - Douglas' aster.

Distribution and Abundance

Common throughout the north coast.

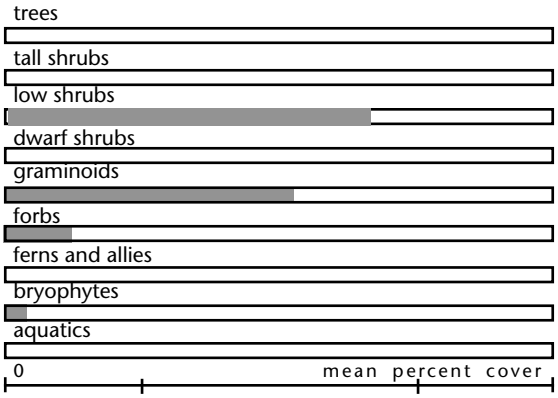
Sweet gale - Bluejoint

Myrica gale - Calamagrostis canadensis

General Description

The Sweet gale - Bluejoint association occurs in wet supratidal locations between the high intertidal meadow and the backshore forest. These sites generally occur at or above the upper reaches of tidal influence and brackish conditions. They are periodically exposed to waves and flooding during storms or spring freshet. The low shrub layer is well-developed. *Myrica gale* is the site dominant while *Calamagrostis canadensis* dominates the herb layer. Species diversity is generally low to moderate. Soils are poorly drained Gleysols sometimes capped by poorly decomposed organic material.

Lifeform Profile



Characteristic Vegetation

Leading species

Myrica gale, Calamagrostis canadensis

Other common species

Malus fusca, Angelica spp., Sanguisorba canadensis

Site Characteristics

Near upper reaches of tidal influence and brackish conditions. Brief to temporary spring flooding. Sometimes exposed to storm waves. Gleysols with loamy and sandy textures. Can have minerally enriched, poorly decomposed organics at surface.

Adjacent communities

Backshore flats between swamp and low marsh communities.

Distribution and Abundance

Uncommon at most sampled locations.

7. Estuary Summary Descriptions

This section presents standardized descriptions for 28 estuaries on the northern coast of British Columbia. Each summary is laid out with the following information boxes.

General description

A brief summary of the physical and biological characteristics of the estuary and its watershed. Any notable ecological features are summarized.

Geographic details

The geographic details sidebar provides :

- Locational information of the estuary including Forest Region, Forest District, NTS Mapsheet, Latitude/Longitude, and Ecosection.
- The Biogeoclimatic subzone in which the estuary is located.
- The Watershed Atlas number for the entire drainage, for reference to Ministry of Environment, Lands and Parks data sources.
- The watershed area and areal extent of estuary intertidal habitats .
- A classification of the estuary form (see section 5 for descriptions).
- Stream source, describing the hydrological characteristics of the system (see section 5 for descriptions).

Site Associations

A listing of site associations sampled or observed during field reconnaissance or during previous studies.

Information sources

Field based information sources

Biological ranking

Presents a ranking of habitat values of the estuary for waterfowl, waterbird species-at -risk, Grizzly Bear, salmon, salmonid stocks, and eulachon, herring, and shellfish. Methods of ranking are outlined in section 4. Specific criteria for ranks of each category are outlined in Appendices A-F.

Biological resource notes

Specific observations and survey results on use of the estuary by wildlife and fish.

Social and cultural information

A summary of known historical and contemporary uses of the estuary by first nations peoples, recreational users, and others.

Protection status and development issues

Outlines any special protection designation given to the estuary and identifies ongoing or potential industrial development in the estuary.

Additional information sources

Reports and other references pertinent to the estuary.

Contents

Table 1. Summary of characteristics for estuaries sampled on the north coast

Estuary	Type	Source	Basin size (ha)	Estuary size (0 m)	Estuary size (2 m)
Baker Inlet Estuary	Strand	Lake	1810	16	
Big Bay Estuary	Coastal plain	Rain/snow	9810		941
Billy Creek Estuary	Coastal plain	Rain/snow	3690		96
Chief Matthews Bay/Kowesas River Estuary	Fjord	Glacier	26 190		140
Clyak River Estuary	Fjord	Glacier	24 300		85
Crow Lagoon/Kumeon Bay/Kemain Point	N/A	Rain/snow			
Dean River Estuary	Delta/Fan	Interior	757 000		165
Foch Lagoon	Lagoon	Rain/snow	12 800		75
Gilttoyees Creek Estuary	Fjord	Glacier	24 700		288
Goat River Estuary/Goat Harbour	Strand	Lake		38	
Khutze Estuary	Fjord	Glacier	26 700	162	
Khutzeymateen River Estuary	Fjord	Glacier	38 400		205
Kilbella/Chuckwalla River Estuary	Fjord	Glacier	70 600		215
Kimsquit River Estuary	Fjord	Glacier	102 900		93
Kitkiata/Quaal River Estuary	Ria	Rain/snow	20 300		619
Klekane River Estuary	Fjord	Rain/snow	9 650	15	
Kumealon Creek Estuary	Lagoon	Lake	8 700	63	
Kwatna River Estuary	Fjord	Glacier	39 300		247
Kwinamass River Estuary	Ria	Rain/snow	34 200		225
Kynoch Inlet Estuary (Lard and Kainet cr.)	Fjord	Rain/snow	5 380	(29)/(48)	
Larch Creek Estuary	Fan	Rain/snow		22	
Nass River Estuary	Fjard	Interior	1 850 000		2 410
Skeena River Estuary	Fjard	Interior	4 220 000		2 556
Skowquiltz River Estuary	Fjord	Glacier	28 500		85
Triumph River Estuary	Strand	Lake	10 560	59	
Weewanie Creek Estuary	Fan	Rain/snow		11	
Welda Creek Estuary	Fan	Rain/snow	15 540	27	

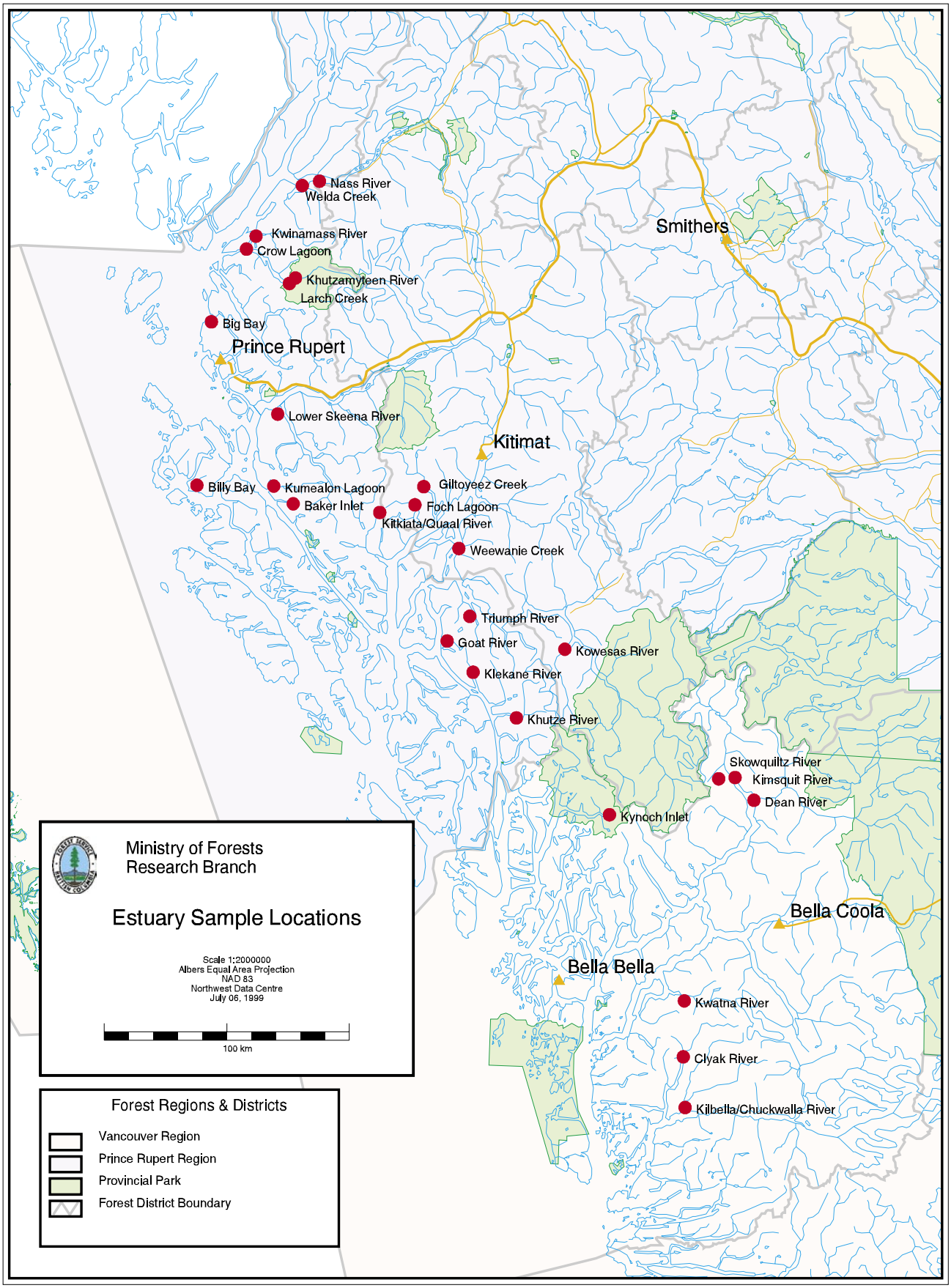


Figure 1. Location of estuaries described in this report.

Baker Inlet Estuary

General Description

Baker Inlet is located on the east side of Grenville Channel south of Kumealon Inlet. The estuary is formed by a small watershed with a drainage area of approximately 18 km^2. The primary source is an unnamed system originating at the height of land with Kumealon Creek. The valley is gently sloped throughout most of its length and terminates at a small lake. Baker Inlet is protected from Grenville Channel by Watts Narrows. This constriction protects the estuary from strong waves and maintains the freshwater lens. The resulting intertidal vegetation is largely dominated by forb-rich estuarine meadow communities.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS map sheet	103H
Lat./Long.	53D48M/129D50M
BCG Unit	CWH vh2
Ecosection	Hecate Lowland
Watershed Atlas No.	Not available
Basin size (ha)	1810
Stream source	Lake
Estuary size (ha)	16
Estuary type	Strand

Site Associations

Dune wildrye - Pacific hemlock-parsley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (2 plots). September 11, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	U	Unknown - no waterfowl data available
Waterbird Species at Risk	U	Unknown - no waterfowl data available
Grizzly Bear	M	Located at edge of expected Grizzly Bear range
Salmon	L	Mean escapement <1000 or no information
Salmonid Stocks	M	Coho present; sport fishing opportunities unknown
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crabbing

Biological resource notes

- Located at edge of expected Grizzly bear range, but forested linkages exist to the Ecstall and Kumealon watersheds. Possible usage of early seral habitats created by past forest harvesting.
- Coho & Pink spawning to 0.2 km in Unnamed creek which flows SW into head of Baker Inlet. Coho & Pink present in the Unnamed Creek which flows NW into Baker Inlet from Alvin Lake; Cutthroat present in Alvin Lake.
- Juvenile herring are reported to winter in Kumealon, Baker & Lowe Inlets.

Social and cultural information

- Baker Inlet is within the traditional territories of the Southern Tsimshian and near the village of Kitkatla.

Protection status and development issues

- Administrative area has recently been transferred from Small Business Forest Enterprise Program to West Fraser. Development activity is anticipated within the next two years.

Big Bay Estuary

General Description

The Big Bay estuary is at the mouth of a wide, low elevation watershed with a drainage area of approximately 100 km^2. Although there are a number of small streams emptying into the bay, Georgetown Creek is the primary drainage supporting the estuary. Waters from Georgetown Lake and numerous smaller lakes form the source of the system. The watershed is wide and gently sloped throughout, dominated by coastal blanket bog and upland forest communities. The Big Bay estuary is notable for its extensive Widgeon-grass tidal flats. The large foreshore mud flats support three low intertidal marsh communities and abundant seashore life. The remainder of the estuary is composed of forb-dominated marsh and meadow communities.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103J
Lat./Long.	54D27M/130D25M
BCG Unit	CWH vh2
Ecosection	Hecate Lowland
Watershed Atlas No.	910 - 823300
Basin size (ha)	9 810
Stream source	Lake
Estuary size (ha)	941
Estuary type	Coastal plain

Site Associations

Dune wildrye - Pacific hemlock-parsley
Tufted hairgrass - Meadow barley
Lyngbye's sedge
Seaside plantain - Dwarf alkali grass
Widgeon-grass

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (3 plots). September 11, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue-listed species (Trumpeter Swan)
Grizzly Bear	Nil	Outside of known Grizzly Bear range
Salmon	M	Mean escapement >1000
Salmonid Stocks	M	Coho present, but sport fishing opportunities are not unique
Eulachon/Herring/Shellfish	VH	Provincially significant herring roe fishery, commercial shellfish fishery

Biological resource notes

- 300,000 & 400,000 waterfowl were recorded in Big Bay during herring spawning 16 & 17 April 1975. Over 2000 waterfowl have been recorded over winter, as well as hundreds of shorebirds.
- Waterbird species recorded during spring migration include: hundred thousands of Surf Scoter (blue-listed), thousands of gulls & shorebirds, hundreds of Trumpeter and Tundra Swans, Snow Geese & Brant Geese.
- Four Trumpeter Swans (blue-listed) recorded wintering in Big Bay 19 January 1978. Surf Scoter, Oldsquaw, Great Blue Heron (blue-listed) also recorded in estuary.
- The B.C. Waterfowl Technical Committee (Ministry of Environment, Canadian Wildlife Service, Ducks Unlimited Canada) has identified this area to be of national or provincial significance to waterfowl int he "Critical waterfowl habitats in British Columbia (Hayes et al. 1993).
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) states the area is of great importance for wintering/summering Canada Geese, migrant Brant Geese and shorebirds.
- Mean annual salmon escapement La Hou Creek: Coho (200); Pink (22,930); total (23,130).
- Local sport fishing for Coho & Steelhead.
- A very large and regular (annually for 50 years) herring spawning occurs in Big Bay. The Big Bay herring roe fishery is the largest on the coast, average annual harvest 2463 tones.
- Commercial and recreational crab trap fishery.

Social and cultural information

- Tsimpsean Indian Reserve 2 covers most of the Tsimpsean Peninsula and surrounds Big Bay.
- Historic ruins of Georgetown Mills, a water-powered sawmill, on private property at the mouth of Georgetown Creek.
- Public appreciation of the area centres around local and guided fishing and crabbing, as well as visiting the Georgetown Mills ruins.

Protection status and development issues

- Big Bay is a Northwest PAS Region Goal I Study Area.

Billy Creek Estuary

General Description

Billy Bay is located at the south end of Porcher Island off Kitkatla Channel. The Billy Creek estuary is at the mouth of an undeveloped, wide low elevation watershed with a drainage area of approximately 37 km^2. Waters from numerous small lakes and streams also feed this system, but Billy Creek is the primary drainage supporting the estuary. The watershed is gently sloped throughout, dominated by coastal blanket bog and upland forest communities. The estuary itself consists of a narrow fringe along the shore and two or three small intertidal islands.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103G
Lat./Long.	53D51M/130D26M
BCG Unit	CWH vh2
Ecosection	Hecate Lowland
Watershed Atlas No.	915 - 765500 - 06000
Basin size (ha)	3690
Stream source	Rain
Estuary size (ha)	96
Estuary type	Coastal plain

Site Associations

Tufted hairgrass - Meadow barley
Lyngbye's sedge
Seaside plantain - Dwarf alkali grass

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (2 plots). September 11, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Red & Blue listed species
Grizzly Bear	Nil	Outside of known Grizzly Bear range
Salmon	M	Mean escapement >1000
Salmonid Stocks	M	Coho present, but sport fishing opportunities are unknown
Eulachon/Herring/Shellfish	H	Herring spawning with fishery and commercial shellfish fishery

Biological resource notes

- 30,000 Surf Scoter (Blue-listed) recorded in Billy Bay 8 March 1979.
- Western Grebe (Red-listed) wintering, Surf Scoter, Oldsquaw, Great Blue Heron (Blue-listed) recorded. Large concentrations of Surf Scoter, Oldsquaw, gulls & Brant Geese move up the coast during Spring migration in timing with herring spawning.
- CWS considers Kitkatla Inlet (including Billy Bay) to be 'Critical waterfowl habitat for BC'.
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) states Kitkatla Inlet is of great importance for marine feeding habitats; major use by scoters and gulls, Western Grebes and Harlequin Ducks.
- Mean annual salmon escapement: Coho (117); Pink (3300); total (3,417).
- Local sport fishing for Coho, Steelhead.
- A large herring spawning occurs annually in Kitkatla Inlet and the mouth of Billy Bay, supporting a major herring roe fishery. Commercial and recreational crab trap fishery.

Social and cultural information

- Billy Bay is within the traditional territory of the Southern Tsimshian, and lies across the inlet from the modern village of Kitkatla.
- Billy Bay was once a Crown Granted homestead; remnants of salt marsh dyking are evident. Trespass homesites established in the 1970s have been abandoned and removed.
- Public appreciation of the area is centred on local and guided sport fishing and crabbing.

Protection status and development issues

- Billy Bay is part of the Stephens/Porcher Islands Northwest PAS Region Goal 1 Study Area.

Chief Matthews Bay/Kowesas River Estuary

General Description

Chief Matthews Bay is located south of Kemano Bay off Whitbey Channel. The estuary is at the mouth of a large, undeveloped watershed with a drainage area of approximately 260 km^2. Although there are several small streams emptying into the bay, the Kowesas River is the primary drainage supporting the estuary. The Kowesas River originates in the icefields of the Kitimat Ranges at the height of land with the Khutze, Kiltuish, and Mussel Rivers. The valley is wide throughout its lower reaches with steep sided avalanche/seepage slopes dominating the upper reaches. The estuary is notable for its diverse plant communities and lack of mudflat development. It has an extensive high intertidal zone supporting diverse meadow communities. The deep, steep sided bay provides little possibility for mudflat development. As a result, the meadows extend all the way to the edge of the estuary where they are abruptly terminated. Well developed meadows and deeply incised channels provide an effective buffer from brackish water, allowing backshore swamp communities to develop.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	55D19M/128D06M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	**910 - 608300**
Basin size (ha)	26 190
Stream source	Glacier
Estuary size (ha)	140
Estuary type	Fjord

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - False lily-of-the-valley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (3 plots). September 12, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red listed species recorded.
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	L	Mean escapement <1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	VH	Eulachon spawning, herring spawning, and commercial shellfish

Biological resource notes

- 139 waterfowl were recorded in the Kowesas estuary 9 April 1980.
- Resident Marbled Murrelet (Red listed) population of approximately 30+ breeding pairs reported by G. Hazelwood & J. Kelson (1996). Reconnaissance surveys were conducted by boat May - July 1995 and periodically 1991-1993.
- Fuhr and others (1995) report good floodplain habitats for Grizzly Bear with available fish, wetland and avalanche chute complexes for Spring feeding. Signs of old beds, trails and mark trees.
- Mean annual salmon escapement: Coho (135); Pink (335); Chum (322); Chinook (72); total (864).
- Guided and unguided sport fishing for Coho & Chinook.
- Significant Eulachon spawning run. Hazelwood & Kelson (1996) state that the Kowesas and Kitlope are the only two of fifteen sizeable Eulachon runs in BC that have not been impacted by hydrological and/or industrial distur-

bance. Native food fishery.
- Herring spawning (very small) occurs irregularly; also commercial prawn trap fishery.

Social and cultural information

- Although no historical village sites are known, culturally modified trees indicate that the Kowesas was used extensively by the Haisla people in early historic and prehistoric times.
- Because the runs in the Eulachon-bearing rivers in the Gardner Canal/Kitlope region are sequential, the Haisla consider management of the later runs in the Kowesas and Kitlope to be significant.
- The only Crown land tenure presently in the watershed is the Haisla Lodge near the estuary.

Protection status and development issues

- Part of largest contiguous area of undeveloped primary watersheds in the coastal temperate forest of BC; including Kitlope, Kowesas, Tsaytis and four others (Moore 1991).
- Proposed log dumping and booming, and forestry road construction (2001).

Additional information sources

Hazelwood, G. & J. Kelson. 1996. *In* Kowesas watershed assessment: summary report. Schoonmaker, P. & E. Wolf, (editors). Prepared by Interrain Pacific, Portland, OR. with Nanakila Institute, Haisla Nation, Ecotrust Canada & Ecotrust.

Clyak River Estuary

General Description

The Clyak estuary is located at the head of Moses Inlet off the northeast end of Rivers Inlet. The estuary is at the mouth of a large watershed with a drainage area of approximately 240 km^2. The Clyak and Young Rivers are the primary drainages supporting the estuary. These rivers originate in the icefields of the Northern Pacific Ranges at the height of land with the Kilbella, Kwatna, and Milton Rivers. The valley is wide throughout most of its length. The Clyak estuary is notable for its diverse plant communities. Well developed estuarine meadows are bounded by an elevated forested berm, estuarine swamp communities, and a bog forest. The berm reduces tidal influence and heavy winds, encouraging development of meadows and swamps. Extensive timber harvesting has occurred within the drainage.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	92M
Lat./Long.	51D52M/127D21M
BCG Unit	CWH vm1
Ecosection	Northern Pacific Ranges
Watershed Atlas No.	910 - 141200
	910 - 141200 - 09800
Basin size (ha)	24 300
Stream character	Glacier
Estuary size (ha)	85
Estuary type	

Site Associations

Pacific crabapple - False lily-of-the-valley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Threatened or Endangered Plant Species

- *Hippuris tetraphylla* was found in a pool in the back marsh.
- *Sanguisorba menziesii* was found in the Tufted hairgrass - Douglas' aster community.

Information Sources

Field observations of Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots). July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue listed species
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	H	Mean escapement >40,000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 183 waterfowl recorded wintering on Clyak estuary 11 January 1977, including 12 Trumpeter Swans
- (Blue listed). Western Grebe (Red listed) & Great Blue Heron (Blue listed) recorded in estuary.
- High Grizzly Bear habitat capability, probable use of estuary, high fishery value.
- Mean annual salmon escapement: Sockeye (2); Coho (1053); Pink (51,691); Chum (43,393); Chinook (68); total (96,207).
- Guided and unguided sport fishing for Coho, Chinook & Steelhead.
- Commercial prawn trap fishery.

Social and cultural information

- The Clyak estuary is within the traditional territories of the Oowekeeno, who live on the Katit Reserve on the Wannock River near Rivers Inlet.
- Public appreciation of the area centres around guided and local sport fishing and recreational crabbing.

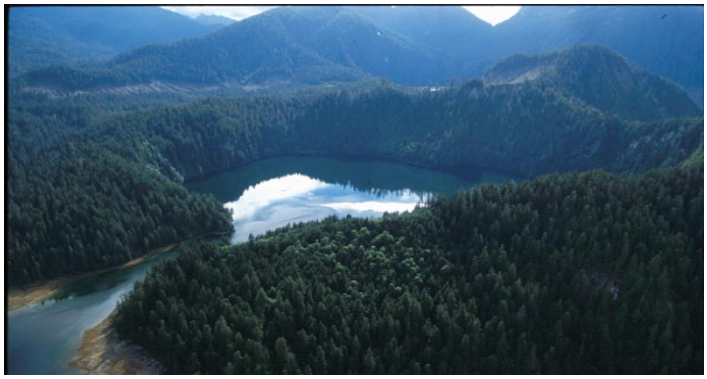
Protection status and development issues

- The Clyak Estuary is a Goal 2 Study Area for the Central Coast LRMP (LUCO 1997).
- Several log handling tenures, forestry road and airstrip associated with estuary.

Crow Lagoon/Kumeon Bay/Kemain Point

General Description

Crow Lagoon is a lagoon surrounded by volcanic tephra ridges on the south side of Khutzeymateen Inlet. This feature is notable for its steep to vertical walls and moderately large intertidal flats of volcanic sand and gravel. This site is not an estuary, but represents a unique feature on the north coast. As a result, brackish conditions are not present and plant communities are dominated by saline tolerant species.



Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D42M/130D13M
BCG Unit	CWHvm1
Ecosection	Kitamat Ranges
Watershed Atlas No.	
Basin size (ha)	2900
Stream source	Rain
Estuary size (ha)	N/A
Estuary type	N/A

Site Associations

Seaside plantain - Dwarf alkali grass

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (1 plot). September 10, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	L	<100 waterfowl recorded on any survey
Waterbird Species at Risk	L	No Red or Blue listed species recorded
Grizzly Bear	M	Located at edge of expected Grizzly Bear range
Salmon	L	Mean escapement <1000 or no information
Salmonid Stocks	M	Coho present, but sport fishing opportunities unknown
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- Shorebird flocks have been observed in 2 of 3 aerial surveys of this site (maximum 336 shorebirds). Grizzly Bear habitat capability limited by small estuary, relatively low fishery value. Located on the edge of expected Grizzly Bear range.
- Coho, Pink & Steelhead are present in the unnamed creek which shares estuary with Crow Lagoon. Cutthroat & Dolly Varden are present in the unnamed creek entering Kumeon Bay and its headwater lake (which is also a volcanic caldera).
- Coho & Steelhead present, but sport fishing opportunities unknown.
- Commercial and recreational crab trap fishery.

Social and cultural information

- A Coast Tsimshian Reserve and site of a 19th century village are located on Kumeon Bay.
- The Kumeon Cannery, in Kumeon Bay, operated from 1918-1920, specializing in Coho and Pink.
- Public appreciation of the area is centred around the unique geological feature of Crow Lagoon, an extinct volcanic caldera which has been breached by the tide and can be entered by small craft.

Protection status and development issues

- UREP (Use Recreation & Enjoyment of the Public) Reserve 0301924 encompasses Crow Lagoon and its tidal inlet. Crow Lagoon is also a Northwest PAS Region Goal 2 Study Area.
- A Small Business Forest Enterprise Program road and harvesting has recently occurred between Crow Lagoon and the lake, with a log dump & booming site in Kumeon Bay.

Additional information sources

Blyth, G. 1991. Salmon canneries - British Columbia north coast. Oolichan Books, 180 pp.

Souther, J.G. & I. Weiland. 1993. Crow Lagoon tephra -- new evidence of recent volcanism in west-central British Columbia. Current Research, Part A; Geological Survey of Canada, Paper 93-1A, p. 57-62.

Dean River Estuary

General Description

The Dean River estuary is located at the north end of Dean Channel south of Kimsquit Bay. The estuary is at the mouth of a very large watershed with a drainage area of approximately 7 500 km^2. The Dean River and its many tributaries are the primary drainages supporting the estuary. Waters from Sigutlat Lake, Iltasyuko Lake, Stick Lake, numerous smaller lakes of the Interior plateau, as well as ice fields of the Kitimat Ranges form the headwaters of the system. The watershed is wide and sprawling across the Interior Plateau, becoming steep throughout the lower reaches of the Dean River valley. The Dean estuary is notable for its high habitat values for waterfowl, all species of anadromous salmon, and grizzly bears. It is a very large deltaic fan with a strand-like estuary dominated by extensive Arctic rush meadows and tall shrub swamp communities. A well developed freshwater lens persists well out into the channel.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	93D
Lat./Long.	52D23M/127D04M
BCG Unit	CWH mm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 318700
Basin size (ha)	757 000
Stream source	Interior
Estuary size (ha)	165
Estuary type	Delta /Fan

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - False lily-of-the-valley
Dunegrass - Pacific hemlock-parsley
Arctic Rush - Alaska plantain

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots). July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Blue listed species and CWS 'Area of interest'
Grizzly Bear	H	High habitat capability, known use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	VH	Class I River; provincially significant fish stocks
Eulachon/Herring/Shellfish	H	Eulachon and herring spawning; commercial shellfish fishery

Biological resource notes

- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) notes the area's importance for wintering waterfowl; likely to have resident populations of Vancouver Canada Geese. Great Blue Heron (Blue-listed species) also recorded.
- High Grizzly Bear habitat capability, documented use of small estuary by Kimsquit Watershed Grizzly Bear Study (Hamilton & Archibald 1985).
- Ranked as #2 priority for protection of Grizzly Bear/salmon ecosystems in the Central Coast planning area (LUCO 1997).
- Mean annual salmon escapement for Dean R & Kimsquit Bay C: Sockeye (104); Coho (3312); Pink (21,898); Chum (2163); Chinook (2504); total (29,981).
- Class I River; Special regulations for world class summer-run Steelhead sport fishing; unique shoal spawning of

Chum in Kimsquit Bay.

- The Eulachon run in the Dean is described as occasional. A very small herring spawning occurred 19 in 50 years 1937-1986. Commercial prawn trap fishery; recreational crab fishery.

Social and cultural information

- Several 19th century winter village sites, shared by the Bella Bella and Bella Coola, were located on and around Kimsquit Reserve on the Dean estuary. In the early 1920's the last of the Kimsquit people joined the villages at the mouth of the Bella Coola River.
- A Native Recovery Program is conducted every year at a traditional village site on Kimsquit Reserve.
- General public appreciation of the area centres around world class fly-in Steelhead fishing. The Dean is identified as the #4 priority for protection of recreation and tourism values for the Central Coast planning area (LUCO 1997).

Protection status and development issues

- Part of the Dean Corridor Goal 1 Study Area for the Central Coast LRMP.
- Private land and airstrip are located adjacent to estuary.
- Existing and proposed log dump, equipment & fuel storage tenures.

Additional information sources

Hamilton, A.N. and W.R. Archibald. 1985. Grizzly bear habitat in the Kimsquit River valley, coastal British Columbia: evaluation. Pages 50-57 in G.P. Contreras and K.E. Evans, compilers. Proceedings - grizzly bear habitat symposium. Missoula, Mont. 30 Apr-2 May 1985. Gen. Tech. Rep. INT-207. U.S. Dep. Of Agric., For. Serv. Intermountain Res. Stn., Ogden, Utah. 252pp.

Foch Lagoon

General Description

Foch Lagoon is at the mouth of a undeveloped, mid-sized watershed with a drainage area of approximately 130 km^2. Although there are a number of small streams emptying into the lagoon, the primary drainage supporting the estuary is an unnamed system originating at the height of land with the Ecstall and Gilttoyees Rivers. The valley is steep throughout most of its length. Foch Lagoon is notable for its well developed meadow communities. It has an extensive undulating fluvial plain supporting at least three estuarine meadow communities. A rocky headland at the mouth of the lagoon protects the estuary from saltwater and results in largely riverine conditions.

Geographic Details

Forest Region	Prince Rupert
Forest District	Kalum
NTS Mapsheet	103H
Lat./Long.	53D50M/129D05M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	Not available
Basin size (ha)	12 800
Stream source	Rain/snow
Estuary size (ha)	75
Estuary type	Lagoon

Site Associations

Tufted hairgrass - Douglas' aster
Cow parsnip - Silverweed
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (3 plots). September 13, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	H	>400 waterfowl recorded on any survey
Waterbird Species at Risk	M	Blue listed species recorded
Grizzly Bear	H	High Grizzly Bear habitat capability, probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crabbing

Biological resource notes

- 470 waterfowl recorded 2 November 1992, including 380 Oldsquaw (Blue listed).
- Surf Scoter & Oldsquaw (Blue listed) recorded.
- High Grizzly Bear habitat capability, probable use of estuaries, high fishery value.
- Mean annual salmon escapement Unnamed C which flows into head of Foch Lagoon: Coho (475); Pink (16,870); Chum (3690); Chinook (85); total (21,120).
- Guided and unguided sport fishing for Coho, Chinook & Steelhead.
- Popular recreational area for Kitimat boaters, recreational crabbing.

Social and cultural information

- A Haisla Reserve & historical village site is associated with Foch Lagoon. The Haisla live in nearby Kitamaat Village.
- Public appreciation of the area centres around scenic boating areas, local and guided sport fishing and crabbing.

Protection status and development issues

- Undeveloped primary watershed larger than 5,000 ha; four adjacent pristine watersheds (Moore 1991).
- Included in Foch/Miskatla/Kitsaway PAS Study Area; Kalum LRMP.

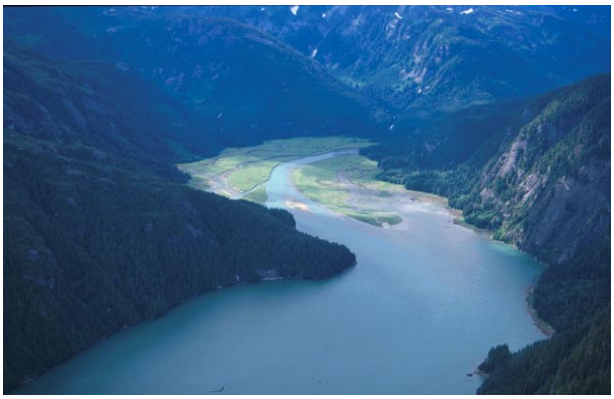
Gilttoyees Creek Estuary

General Description

The Gilttoyees estuary is located at the head of Gilttoyees Inlet off Douglas Channel. The estuary is at the mouth of a mid-size watershed with a drainage area of approximately 245 km^2. Gilttoyees and Peechugh Creeks are the primary drainages supporting the estuary. Peechugh Lake and the large icefields of the Kitimat Ranges at the height of land with the Ecstall River form the headwaters of this system. The valley is narrow and winding, with steep hillsides and cliffs throughout most of its length. The Gilttoyees estuary is notable for its well developed intertidal flats and relatively under developed mud flats. The intertidal flats are dominated by marsh and meadow communities. There is a noticeable lack of community diversity as there are little or no foreshore or backshore communities in the way of mudflats or estuarine swamps. This drainage has not been developed.

Geographic Details

Forest Region	Prince Rupert
Forest District	Kalum
NTS Mapsheet	103H
Lat./Long.	53D54M/129D02M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 695400 910 - 695400 - 25500
Basin size (ha)	24 700
Stream source	Glacier
Estuary size (ha)	288
Estuary type	Fjord



Site Associations

Tufted hairgrass - Douglas' aster
Cow parsnip - Silverweed
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots). July 6, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	M	Blue-listed species recorded
Grizzly Bear	H	High habitat capability; probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crabbing

Biological resource notes

- 480 waterfowl recorded wintering in the Gilttoyees estuary 20 January 1977 (mainly Mallard, Canada Geese & Goldeneyes); 1089 waterfowl recorded 24 March 1977 during migration.
- Surf Scoter, Oldsquaw (Blue-listed) recorded.
- High Grizzly Bear habitat capability, probable use of estuary, high fishery value.
- Mean annual salmon escapement: Coho (1250); Pink (5900); Chum (4640); Chinook (54); total (11,844).
- Guided and unguided sport fishing for Coho & Chinook.
- Popular recreation area for Kitimat boaters; recreational crabbing.

Social and cultural information

- A Haisla Reserve & historical village site is associated with the Gilttoyees estuary. The Haisla live in nearby Kitamaat Village.
- Public appreciation of the area centres around local and guided sport fishing and crabbing.

Protection status and development issues

- Undeveloped primary watershed larger than 5,000 ha; four adjacent pristine watersheds (Moore 1991).
- Included in Foch/Miskatla/Kitsaway Northwest PAS Region Study Area; Kalum LRMP.

Goat River Estuary/Goat Harbour

General Description

The Goat River estuary is at the mouth of a small, low elevation watershed with a drainage area of approximately 56 km^2. Goat River is the primary drainage supporting the estuary. Waters from numerous small lakes form the source of the system. The watershed is wide and gently sloped throughout, dominated by coastal upland forest communities. Brackish conditions persist throughout the estuary resulting in the absence of low shrub and swamp communities.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D22M/128D50M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	
Basin size (ha)	5620
Stream source	Lake
Estuary size (ha)	38
Estuary type	Strand

Site Associations

Dune wildrye - Pacific hemlock-parsley
Tufted hairgrass - Meadow barley
Seaside plantain - Dwarf alkali grass

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw September 11, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	U	Unknown, no waterfowl data available
Waterbird Species at Risk	U	Unknown, no waterbird data available
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	L	Mean escapement <1000
Salmonid Stocks	M	Sport fishing opportunities not known
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- High Grizzly Bear habitat capability, probable use of estuary
- Mean annual salmon escapement: Coho (present); Pink (501); Chum (19); total (520).
- Coho present, but sport fishing opportunities unknown.
- Commercial prawn trap fishery, recreational crabbing in association with moorage.

Social and cultural information

- Goat Harbour is within the traditional territories of the Southern Tsimshian, whose nearest modern village is at Hartley Bay.
- Goat Harbour contains the closest alternative moorage to Bishop Bay Hotsprings, thus is popular with boaters. Public appreciation of the area centres around recreational angling and crabbing.

Protection status and development issues

- 35 ha logged around estuary in 1950s. The administrative area is shared by Biport and the Small Business Forest Enterprise Program. Existing log dump, extension of road network up the valley is anticipated.

Khutze Estuary

General Description

The Khutze River estuary is located at the end of Khutze Inlet along the east side of the Inside Passage, opposite the midpoint of Princess Royal Island. The estuary is at the mouth of a large watershed with a drainage area of approximately 270 km^2. The Khutze River is the primary drainage supporting the estuary. The river originates in the icefields of the Kitimat Ranges at the height of land with the Kowesas River. The valley is rugged and steep throughout most of its length. The Khutze estuary is notable for its diverse plant communities, productive estuary, and dramatic views. The delta is dissected into many channels and there is a cascading waterfall adjacent to the estuary. The Khutze River estuary combines a broad floodplain supporting extensive fertile meadows with dense cover along the edges. A north-facing avalanche chute giving access to the alpine lies at the south edge of the estuary.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D05M/128D24M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 545100
Basin size (ha)	26 700
Stream source	Glacier
Estuary size (ha)	162
Estuary type	Fjord

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - False lily-of-the-valley
Tufted hairgrass - Douglas' aster
Arctic rush - Alaska plantain
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (3 plots) September 11, 1997.
Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (1 plot) July 7, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red- and Blue-listed species recorded
Grizzly Bear	H	High habitat capability, known use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	H	Herring spawning and commercial shellfish fishery

Biological resource notes

- 203 waterfowl recorded in Khutze estuary 9 April 1980.
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) notes the area's importance for large Marbled Murrelet concentrations (red-listed). Surf Scoter (blue-listed) also present.
- High Grizzly Bear habitat capability, known use of estuary by both Black and Grizzly Bear; undisturbed watershed; high fishery values.
- Ranked as the #4 priority for protection of grizzly/salmon ecosystems within the Central Coast planning area (LUCO 1997).
- Mean annual salmon escapement: Sockeye (1); Coho (890); Pink (23,265); Chum (1580); Chinook (27); total (25,763).
- Guided and unguided sport fishing for Coho & Chinook.
- A very small herring spawning occurred 7 in 50 years 1937-86. Commercial prawn trap fishery, recreational crab-bing in association with anchorage.

Social and cultural information

- The Khutze is within the 19th-century territory of the Haihais, who vacated their former villages about 1870 to move to Klemtu on Swindle Island. A village site and fish trap are reportedly associated with the Khutze estuary.
- Public appreciation of the area centres around recreational angling and crabbing in association with a small, scenic anchorage near the estuary.

Protection status and development issues

- Khutze Inlet and watershed are a Goal 1 Study Area for the Central Coast LRMP (LUCO 1997).
- Railway and mine were active in 1930. Unlogged watershed except in association with mine.

Khutzeymateen River Estuary

General Description

The Khutzeymateen River estuary is located at the end of Khutzeymateen Inlet. The estuary is at the mouth of a large watershed with a drainage area of approximately 385 km^2. Although there are a number of small streams emptying into the inlet, the Khutzeymateen and Kateen Rivers are the primary drainages supporting the estuary. These rivers originate in the icefields of the Kitimat Ranges at the height of land with the Khyex, Exchamsiks, Exstew, and Ishkheenickh Rivers. The valley is steep and narrow throughout most of its upper reaches , widening toward the mouth with extensive floodplain communities. The Khutzeymateen River estuary is notable for its high quality Grizzly Bear habitat. It has extensive intertidal flats and backshore thickets supporting lush vegetation. The estuary is dissected by channels and has moderate mudflat development. The long, steep, and narrow fjord-type inlet provides protection from storm waves and encourages deposition of fine textured materials, forming large intertidal and subtidal flats. These flats are dominated by forbs and sedges, providing excellent forage for bears.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D37M/129D54M
BCG Unit	CWH wm
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 887500
Basin size (ha)	38 400
Stream source	Glacier
Estuary size (ha)	205
Estuary type	Fjord

Site Associations

Sitka willow - False lily-of-the-valley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (1 plot) September 10, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	H	>400 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue-listed species
Grizzly Bear	VH	High habitat capability, known heavy use of estuary
Salmon	H	Mean escapement >40,000
Salmonid Stocks	H	Unique fish stocks and special management concerns
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 29 Trumpeter Swans (blue-listed) recorded wintering in the estuary 20 January 1977. Oldsquaw & Great Blue Heron (blue-listed) also recorded.
- High Grizzly Bear habitat capability; densest Grizzly Bear concentration in the region; heavy spring use of the estuary (MacHutchon and others 1993).
- Mean annual salmon escapement: Sockeye (6), Coho (3970), Pink (44,700), Chum (7000), Chinook (365), total (56,041).
- Cutthroat, Dolly Varden, Steelhead and all salmon species present. Closed to sport fishing because of Grizzly Bear management concerns.
- Commercial and recreational crab trap fishery.

Social and cultural information

- One Coast Tsimshian Reserve and historical village site are associated with the estuary.
- Two canneries, Douglas & Sommerville, operated from the small bay just north of Kwinamass Bay, 1882-83 and 1918-1924.
- Khutzeymateen and Kwinamass salmon were also harvested for canning at the Arrandale Cannery, located near the mouth of Nass Bay, which operated under various ownership from 1905-1942.
- Because of the unusual density of Grizzly Bear found in the Khutzeymateen, it was declared the first and only Grizzly Bear sanctuary in British Columbia.
- Public appreciation of the area centres around (mostly guided) wildlife viewing and nature photography, much of which takes place in the estuary.

Protection status and development issues

- Khutzeymateen 'Class A' Provincial Park

Additional information sources

Blyth, G. 1991. Salmon canneries - British Columbia north coast. Oolichan Books, 180 pp.

MacHutchon, A.G., S. Himmer, C.A. Bryden. 1993. Khutzeymateen valley Grizzly Bear study: final report. BC MELP Wildlife Rep. No. R-25, Wildl. Hab. Res. Rep. No. 31.

Kilbella/Chuckwalla River Estuary

General Description

The Kilbella/Chuckwalla River estuary is located at the head of Kilbella Bay on Rivers Inlet. The estuary is at the mouth of a large watershed with a drainage area of approximately 705 km^2. The Kilbella and Chuckwalla Rivers are the primary drainages supporting the estuary. The rivers originate in the icefields of the North Pacific Ranges at the height of land with the Clyak, Kwatna, Tzeo Rivers. The valleys are wide throughout most of their length with logging roads extending up both drainages. The Kilbella/Chuckwalla estuary is notable for its size and its extensive meandering channels of variable depths. The estuary supports extensive intertidal marsh communities and swamp thickets. This drainage has been extensively timber harvested.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	92M
Lat./Long.	51D42M/127D20M
BCG Unit	CWH vm1
Ecosection	Northern Pacific Ranges
Watershed Atlas No.	910 - 130900 910 - 130900 - 04100
Basin size (ha)	70 600
Stream source	Glacier
Estuary size (ha)	315
Estuary type	

Site Associations

Sitka willow - False lily-of-the-valley
Arctic rush - Alaska plantain
Lyngbye's sedge
Widgeon-grass

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plot) July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	H	>400 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical winter habitat for Blue-listed species
Grizzly Bear	VH	High habitat capability, known heavy use of estuary
Salmon	H	Mean escapement >40,000
Salmonid Stocks	VH	Class II River; provincially significant fish stocks
Eulachon/Herring/Shellfish	H	Eulachon and herring spawning and commercial shellfish fishery

Biological resource notes

- 435 waterfowl recorded on the Kilbella estuary 11 January 1977, including 7 Trumpeter Swans (Blue-listed). Western Grebe (Red-listed) & Great Blue Heron (Blue-listed) also recorded.
- High Grizzly Bear habitat capability, known heavy use of estuary, high fishery value.
- Mean annual salmon escapement: Sockeye (6); Coho (1208); Pink (45,220); Chum (2029); Chinook (517); total (48,980).
- Class II River; several floating and one land-based sport fishing lodges; Coho, Chinook & Steelhead.
- Eulachon spawning is present. A medium sized herring spawning occurs in most years, supporting a modest herring roe fishery. Commercial prawn trap fishery and recreational crabbing.

Social and cultural information

- Two 19th century Oowekeeno winter village sites were located on the estuary and Kiltala Reserve.
- From 1900 to 1935 most Oowekeeno villages were vacated as groups moved to join those at Katit Reserve on the Wannock River near Rivers Inlet.
- Public appreciation of the area centres around guided and local sport fishing and recreational crabbing.

Protection status and development issues

- The Kilbella/Chuckwalla Estuary is a Goal 2 Study Area for the Central Coast LRMP (LUCO 1997).
- Several log handling tenures, logging camp, airstrip & forestry road are associated with estuary.
- Fragmentation of the larger watershed due to logging activities.
- Private properties adjacent to the estuary and inlet.

Kimsquit River Estuary

General Description

The Kimsquit River estuary is located at the end of Dean Channel, north of the Dean River estuary. The estuary is at the mouth of a large watershed with a drainage area of approximately 1 030 km^2. Although there are a number of small streams emptying into the inlet, the Kimsquit River and its many tributaries are the primary drainages supporting the estuary. Waters from Kimsquit Lake, numerous smaller lakes, as well as the ice fields of the Kitimat Ranges at the height of land with the Kitlope River, form the headwaters of the system. The valley is wide throughout most of its length with valley bottom wetland complexes occupying the upper reaches of the drainage. The Kimsquit valley has been extensively harvested.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	93D
Lat./Long.	52D53M/127D04M
BCG Unit	CWH mm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 322400
Basin size (ha)	102 900
Stream source	Glacier
Estuary size (ha)	93
Estuary type	

Site Associations

Sea milk-wort
Lyngbye's sedge
Arctic rush - Alaska plantain
Tufted hairgrass - Douglas' aster
Sweet gale - Bluejoint
Pacific crabapple - False lily-of-the-valley
Sitka willow - False lily-of-the-valley

Threatened or Endangered Plant Species

Hippuris tetraphylla was found in a wood choked pool within the Myrica gale - Bluejoint community.

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots) July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	L	<100 waterfowl recorded on any survey
Waterbird Species at Risk	H	Blue-listed species and CWS 'Area of interest'
Grizzly Bear	VH	High habitat capability, known heavy use of estuary
Salmon	VH	Mean escapement >100,000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Herring spawning

Biological resource notes

- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) notes the area's importance for wintering waterfowl; likely to have resident populations of Vancouver Canada Geese. Great Blue Heron (Blue-listed species) also recorded.
- High Grizzly Bear habitat capability, known heavy use of estuary, high fishery value (Hamilton & Archibald 1985).
- Mean annual salmon escapement: Sockeye (12,309); Coho (2357); Pink (342,941); Chum (39,222); Chinook (201); total (397,030).
- Guided and unguided sport fishing for Coho, Chinook, Steelhead & Cutthroat.
- A very small herring spawning occurred 19 in 50 years 1937-1986. Recreational crabbing in association with anchorage.

Social and cultural information

- A 19th century winter village site, shared by the Bella Bella and Bella Coola, was located on Chatschah Reserve on the Kimsquit estuary. In the early 1920's the last of the Kimsquit people joined the villages at the mouth of the Bella Coola River.
- Public appreciation of the area centres around sport fishing and crabbing associated with a traditional anchorage, beach area and fresh water source.

Protection status and development issues

- Kimsquit estuary is a Goal 2 Study Area for the Central Coast LRMP (LUCO 1997).
- An MOF log handling reserve covers a portion of the estuary; also log dump and booming, logging camp, forestry roads.

Additional information sources

Hamilton, A.N. and W.R. Archibald. 1985. Grizzly bear habitat in the Kimsquit River valley, coastal British Columbia: evaluation. Pages 50-57 in G.P. Contreras and K.E. Evans, compilers. Proceedings - grizzly bear habitat symposium. Missoula, Mont. 30 Apr-2 May 1985. Gen. Tech. Rep. INT-207. U.S. Dep. Of Agric., For. Serv. Intermountain Res. Stn., Ogden, Utah. 252pp.

Clement, C. 1984. Habitat types of the Kimsquit River estuary. Unpublished report. Ministry of Environment, Fish and Wildlife Branch, Victoria

Last Updated: January 5, 1999

Kitkiata/Quaal River Estuary

General Description

The Kitkiata/Quaal River estuary is located at the head of Kitkiata Inlet on the west side of Douglas Channel. The estuary is at the mouth of a mid-size watershed with a drainage area of approximately 200 km^2. Although there are a number of small streams emptying into the inlet, the Quaal River and its tributary, Kitkiata Creek, are the primary drainages supporting the estuary. Waters from Gavel Lake, Kitkiata Lake, numerous smaller lakes, as well as small icefields form the headwaters of the system. The valley is wide throughout most of its length with valley bottom wetland complexes occupying the middle reach of the Quaal drainage. The Kitkiata/Quaal River estuary is notable for its diverse plant communities. It has extensive foreshore mud flats supporting at least two low intertidal marsh communities. The mouth of the river is relatively protected by a beach ridge that has formed across the mouth reducing the upstream influence of storm waves and tides.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D38M/129D18M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 713300 910 - 713900
Basin size (ha)	20 300
Stream source	Rain/Snow
Estuary size (ha)	619
Estuary type	Ria

Site Associations

Pacific crabapple - False lily-of-the-valley
Sweet gale - Bluejoint.
Dune wildrye - Pacific hemlock-parsley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge
Seaside plantain - Dwarf alkali grass
Widgeon-grass

Threatened or Endangered Plant Species

Eleocharis kamtschatica (blue-listed species) was found in the Lyngbye's sedge low marsh community.

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (4 plots) July 7, 1998.
Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (7 plots) September 13, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue listed species
Grizzly Bear	H	High Grizzly Bear habitat capability, probable use of estuary
Salmon	VH	Mean escapement >100,000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 1060 waterfowl recorded wintering in Kitkiata/Quaal estuary 21 January 1977. 1213 waterfowl recorded 24 March 1977; including 300 Surf Scoter (blue-listed).
- Four Trumpeter Swan (Blue-listed) recorded wintering in estuary 19 February 1976.
- 100- 200+ Bald Eagles estimated along the Quaal river (aerial overview by S. Liepens,, D. delLeauw, October 1995)
- High Grizzly Bear habitat capability, very high fishery value, very high probability of Grizzly Bear use.
- Mean annual salmon escapement Kitkiata C: Sockeye (1215); Coho (966); Pink (37,900); Chum (142); total (40,223).

- Mean annual salmon escapement Quaal R: Sockeye (75); Coho (6000); Pink (141,750); Chum (16,850); Chinook (2); total (164,677).
- Total combined salmon escapement for the Kitkiata/Quaal estuary: 204,900.
- Guided and unguided sport fishing for Coho, Chinook, Steelhead; native food fishing.
- Native, commercial and recreational crab trap fishery.

Social and cultural information

- Four Southern Tsimshian Reserves are associated with the estuary. The historic village of Kitkiata was abandoned between the 1860s & 1880s when the people joined the mission village of Metlakatla. The present village of Hartley Bay (located to the south) was founded in 1887 by 27 people who returned rather than follow the missionary to New Metlakatla, Alaska.
- Extensive shallows and mudflats at head of inlet support flatfish as well as rock and dungeness crabs. Public appreciation of the area centres around native, local and guided sport fishing and crabbing.

Protection status and development issues

- West Fraser administrative area. Existing log handling and booming foreshore tenures and roads into lower portions of both watersheds; proposed water drop zones.

Klekane River Estuary

General Description

The Klekane River estuary is located at the head of Klekane Inlet adjacent to Work Island in Fraser Reach. The estuary is at the mouth of a small watershed with a drainage area of approximately 95 km^2. Although there are several small streams emptying into the inlet, the Klekane River is the primary drainage supporting the estuary. The Klekane River originates in lakes and streams at the height of land with the Goat, Triumph, and Aaltanhash Rivers. The valley is steep sided throughout. A protected location has resulted in a small but well developed assemblage of estuarine communities. The estuary is notable for extensive patches of *Trifolium wormskjoldii*. These patches could be a result of cultivation by first nations people in years past.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D14M/128D41M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 556700
Basin size (ha)	9650
Stream source	Rain/snow
Estuary size (ha)	15
Estuary type	Fjord

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - False lily-of-the-valley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plot) July 7, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red- and Blue- listed species recorded
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Herring spawning

Biological resource notes

- 108 waterfowl recorded in Klekane estuary 7 November 1979.
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) notes the area's importance for large Marbled Murrelet concentrations (Red-listed). Surf Scoter (Blue-listed) also present.
- High Grizzly Bear habitat capability, undisturbed watershed, probable use of estuary.
- Mean annual salmon escapement: Sockeye (3); Coho (8); Pink (2327); Chum (22); total (2,360).
- Guided sport fishing for Coho.
- A very small herring spawning occurred 7 in 50 years 1937-86.

Social and cultural information

- The Klekane is at the edge, or overlap, of two traditional territories: the Southern Tsimshian to the west and the Haihais to the east. Both groups are now centred at Klemtu on Swindle Island.

Protection status and development issues

Undeveloped primary watershed larger than 5,000 ha (Moore 1991).

Kumealon Creek Estuary

General Description

The Kumealon Creek estuary is located at the head of Kumealon Inlet off Grenville Channel on the east side of Pitt Island. The estuary is at the mouth of a small watershed with a drainage area of approximately 85 km^2. Although there are a number of small streams emptying into the inlet, Kumealon Creek is the primary drainage supporting the estuary. Waters from Kumealon Lake and numerous smaller lakes form the source of the system. The valley is wide throughout most of its length. The Kumealon estuary is notable for its sheltered foreshore and extensive high inter tidal flats. The estuary is exceptionally well protected from storm waves and tidal events by a small peninsula jutting out into the inlet to the west of the estuary as well as the shielding effect of Pitt Island at the mouth of Kumealon Inlet. The creek cuts deep channels through well developed meadows. Swamp communities are less developed and occur mostly as a fringe transition between the meadows and the adjacent upland forest.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D52M/129D58M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 768900
Basin size (ha)	8 700
Stream source	Lake
Estuary size (ha)	NW = 17; SE=46
Estuary type	Lagoon

Site Associations

Tufted hairgrass - Douglas' aster
Common spikerush
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots) July 11, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	L	<100 waterfowl recorded on any survey
Waterbird Species at Risk	L	No Red- or Blue-listed species recorded
Grizzly Bear	H	High Grizzly Bear habitat capability, known use of estuary.
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crab fishery

Biological resource notes

- Only one waterfowl survey has been conducted of Kumealon Lagoon, recording 26 waterfowl, 21 January 1977, with no Red- or Blue-listed species recorded.
- Known Grizzly Bear use of estuarine, floodplain and avalanche chute habitats at Kumealon Creek, estuary and Kumealon Lake. Grizzly Bear trails and mark trees observed near estuary. The most prominent sign is located along the shoreline forests surrounding Kumealon Lake.
- Mean annual salmon escapement in Kumealon Cr, which flows into the SE corner of Kumealon Lagoon: Coho (181); Pink (29,850); Chum (33); Chinook (47). (Main Pink producer for the area.) N. Kumealon C, which flows into the NW corner of Kumealon Lagoon: Coho (24); Pink (3,450). Total for Kumealon Lagoon: Coho (205); Pink (33,300); Chum (33); Chinook (47); total (33,585).
- Guided and local sport fishing; unique winter sport fishery for 'feeder' (5-15 lb.) Chinook. Cutthroat, Dolly Varden & Rainbow Trout present in Kumealon Lake.

- Juvenile herring are reported to winter in Kumealon, Baker & Lowe Inlets.
- Recreational crabbing in association with popular anchorage.

Social and cultural information

- Geologically unusual limestone units with karst topography and caves. Abundant large cedar in the area may be a vegetative response to limestone units. Many of the low- and mid-slope sites have already been harvested.
- Kumealon Lagoon is within the traditional territories of the Southern Tsimshian and near the village of Kitkatla. Groves of culturally modified trees (CMT) are reported. First Nations concern regarding rate of cedar harvest.
- Public appreciation of the area centres around the good anchorage in Kumealon Inlet; tidal rapids/falls at Kumealon Narrows (entrance to Kumealon Lagoon); sport fishing & crabbing.

Protection status and development issues

- UREP (Use, Recreation & Enjoyment of the Public) Reserve No. 0219050 encompasses the head of Kumealon Inlet, Kumealon Narrows and Kumealon Creek to the lake.
- 72 ha logged in 1950's along lower river. INTERFOR administrative area. Existing and proposed log dumps, log booming, water drop zones and camp (2000) for Kumealon Inlet, lagoon and lake. Injunctions invoked by Kitkatla First Nations may influence how developments proceed.

Additional information sources

Cave/Karst compilation maps for the Prince Rupert Forest Region. Prepared by Terra Firma Geological Services, Nanaimo.

Kwatna River Estuary

General Description

The Kwatna estuary is located at the head of Kwatna Bay in Kwatna Inlet on Burke Channel adjacent to King Island. The estuary is at the mouth of a large watershed with a drainage area of approximately 390 km^2. Although there are a number of small streams emptying into the bay, the Kwatna River and its primary tributary Oak Beck Creek are the primary drainages supporting the estuary. Waters from numerous lakes as well as the icefields of the Northern Pacific Ranges at the height of land with the Clyak River and several unnamed drainages form the headwaters of the system. The valley is wide throughout most of its length with steep peaks above. The Kwatna River estuary is notable for its size as well as the many meandering brackish channels and large intertidal flats surrounding a low rocky hill at the mouth of the estuary. The extensive flats support diverse herb and graminoid communities, and are bounded by well developed estuarine swamp thickets.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	93D
Lat./Long.	52D05M/127D21M
BCG Unit	CWH vm1
Ecosection	Northern Pacific Ranges
Watershed Atlas No.	210 - 246500
Basin size (ha)	39 300
Stream source	Glacier
Estuary size (ha)	247
Estuary type	Fjord

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - Flase lily-of-the-valley
Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw July 8, 1998 (2 plots).

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	H	>400 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue-listed species
Grizzly Bear	VH	High habitat capability, known heavy use of estuary
Salmon	H	Mean escapement >40,000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crabbing

Biological resource notes

- 353 waterfowl recorded wintering on Kwatna estuary 11 January 1977, including 11 Trumpeter Swans (Blue-listed). 9 Trumpeter Swans recorded 6 November 1979. 413 waterfowl recorded during migration 8 April 1980.
- High Grizzly Bear habitat capability, known heavy use of estuary, high fishery value.
- Mean annual salmon escapement: Sockeye (83); Coho (3000); Pink (76,111); Chum (6450); Chinook (60); total (85,704).
- Guided and unguided sport fishing for Coho, Chinook & Steelhead.

Social and cultural information

- Several 19th century winter village sites, shared by the Bella Bella and Bella Coola, surrounded the Kwatna estuary or were located on Kwatlena Reserve at the mouth of the river. By the early 1920's the last of the Kwatna people joined with the villages at the mouth of the Bella Coola R.
- Archeological value of the area is high; Dr. Hobler of SFU has extensively excavated the estuary. Materials are in the SFU Archeological museum.
- Public appreciation of the area centres around guided and local sport fishing and recreational crabbing.

Protection status and development issues

- The Kwatna Estuary is a Goal 2 Study Area for the Central Coast LRMP (LUCO 1997).
- Several log handling reserves, logging camp, forestry roads & airfield are associated with the estuary.

Kwinamass River Estuary

General Description

The Kwinamass River estuary is located at the head of Kwinamass Bay off Portland Channel between Khutzeymateen Inlet and Nasoga Gulf. The estuary is at the mouth of a mid-sized watershed with a drainage area of approximately 340 km^2. Although there are a number of small streams emptying into the inlet, the Kwinamass River is the primary drainage supporting the estuary. Waters from Lachballach Lake and several small icefields form the headwaters of the system. The valley is wide throughout most of its length with valley bottom wetland complexes occupying the upper and middle reaches of the Kwinamass drainage. The Kwinamass estuary is notable for its diverse plant communities. The complex of large saltmarshes, mudflats and swamps receives much wildlife use, including waterfowl and grizzly bear. There has been extensive timber harvesting in the lower reaches of this watershed.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D46M/130D10M
BCG Unit	CWH vh2
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 896600
Basin size (ha)	34 200
Stream character	Rain/snow
Estuary size (ha)	225
Estuary type	Ria

Site Associations

Pacific crabapple - False lily-of-the-valley
Sitka willow - False-lily-of-the-valley
Tufted hairgrass - Douglas' aster
Dune wildrye - Pacific hemlock-parsley
Lyngbye's sedge
Widgeon-grass

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (1 plot) September 9, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	M	Blue-listed species recorded
Grizzly Bear	VH	High habitat capability, known heavy use of estuary
Salmon	VH	Mean escapement >100,000
Salmonid Stocks	VH	Provincially significant fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 213 waterfowl recorded in Kwinamass estuary 2 April 1981.
- Great Blue Heron (Blue-listed) recorded.
- High Grizzly Bear habitat capability; not as productive as nearby Khutzeymateen, but known heavy use of estuary. Large wetland complex found in low elevation pass linking Kwinamass to the Ishkheenickh (Nass watershed) is excellent Moose and Grizzly Bear habitat.
- Mean annual salmon escapement: Sockeye (14); Coho (3605); Pink (123,000); Chum (311); Chinook (315); total (127,245).
- Class II River; guided & unguided sport fishing for Coho, Chinook & Steelhead.
- Commercial and recreational crab trap fishery.

Social and cultural information

- Four Nisga'a Reserves are associated with the Kwinamass estuary, one the site of a 19th century settlement.
- Two canneries, Douglas & Sommerville, operated from the small bay just north of Kwinamass Bay.
- Kwinamass and Khutzeymateen salmon were also harvested for canning at the Arrandale Cannery, located near the mouth of Nass Bay, which operated under various ownership from 1905-1942.

Protection status and development issues

- Ministry of Forests Sec. 12 reserve for log handling (85 ha) covers Kwinamass Bay. The north side of the inlet and lower watershed have been logged. West Fraser administrative area.

Additional information sources

Blyth, G. 1991. Salmon canneries - British Columbia north coast. Oolichan Books, 180 pp.

Kynoch Inlet Estuary

General Description

The Kynoch estuary is part of Fjordlands Provincial Park and is located at the head of Kynoch Inlet off Mathieson Channel on the east side of Roderick Island. The estuary is at the mouth of a very small watershed with a drainage area of approximately 55 km^2. Although there are a number of small streams emptying into the inlet, Kainet and Lard Creeks are the primary drainages supporting the estuary. Waters from small lakes and icefields form the headwaters of the system. The valley is steep throughout most of its length. The Kynoch estuary is notable for its diverse plant communities and its sheltered inlet.. It has extensive intertidal flats.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	93D
Lat./Long.	52D44M/127D49M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 498900 910 - 498900 - 14000
Basin size (ha)	5 380
Stream character	Rain/snow
Estuary size (ha)	Lard crk=29/Kainet=48
Estuary type	Fjord

Site Associations

Tufted hairgrass - Douglas' aster
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots) July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red-listed species recorded
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	H	Mean escapement >40,000
Salmonid Stocks	M	Coho present, but sport fishing opportunities are unknown
Eulachon/Herring/Shellfish	L	None recorded or occasional recreational crabbing

Biological resource notes

- 166 waterfowl recorded in Kynoch Inlet estuaries 9 April 1980.
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) notes the area's importance for large Marbled Murrelet concentrations (Red listed).
- High Grizzly Bear habitat capability, undisturbed watersheds, probable use of estuaries, very high fishery value.
- Mean annual salmon escapement Lard C (flows into head of Culpepper Lagoon): Coho (present); Pink (2,248); Chum (1684); total (3,932). Mean annual salmon escapement Kainet and Unnamed Big' Cs (share estuary at entrance to Culpepper Lagoon): Coho (302); Pink (54,506); Chum (25,154); Chinook (3); total (81,256). Total for both estuaries at head of inlet: 85,188.
- Coho, Chinook & Steelhead present; sport fishing opportunities unknown

Social and cultural information

- A winter village site of the Haihais was associated with the Kainet/Big C estuary. The Haihais vacated their former villages about 1870 to move to Klemtu on Swindle Island.

Protection status and development issues

- Part of Fiordland Recreation Area.

Larch Creek Estuary

General Description

The Larch Creek estuary is at the mouth of a steep sloped watershed adjacent to the outflow of the Khutzeymateen River. Larch Creek is the primary drainage supporting the estuary. Waters from Ryan Lake and numerous smaller lakes form the source of the system. The stream is steep and incised throughout most of its length. The Larch Creek estuary is primarily on fluvial and colluvial gravels and cobbles and has little or no mudflat development. Estuarine meadow communities dominate.

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw September 11, 1997.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D36M/129D56M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	
Basin size (ha)	22
Stream source	Rain/Snow
Estuary size (ha)	
Estuary type	Fan

Site Associations

Tufted hairgrass - Douglas' aster
Tufted hairgrass - Meadow barley
Lyngbye's sedge

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	L	<100 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue-listed species
Grizzly Bear	H	High habitat capability, known use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	L	Fish present, special management concerns
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 8 Trumpeter Swans (Blue-listed) recorded wintering in Larch estuary 20 January 1977.
- High Grizzly Bear habitat capability; small estuary but part of greater Khutzeymateen ecosystem. Larch Valley is movement corridor to Toon and Khyex watersheds.
- Mean annual salmon escapement: Pink (2500).
- Closed to sport fishing because of Grizzly Bear management concerns.
- Commercial and recreational crab trap fishery.

Protection status and development issues

- Part of Khutzeymateen 'Class A' Provincial Park

Nass River Estuary

General Description

The Nass River estuary is at the mouth of a very large watershed with a drainage area of approximately 18, 500 km^2. Although there are a number of streams emptying into the bay, the Nass River and its tributaries are the primary drainages supporting the estuary. The Nass River originates in the Skeena Mountains in the interior; smaller drainages originate in the icefields of the Kitimat Ranges at the height of land with the Kitsumkalum and Exstew Rivers. The valley is steep and narrow throughout most of its upper reaches , widening toward the mouth and supporting extensive floodplain communities. The Nass River estuary is notable for its size and its high quality wildlife habitat. It has extensive intertidal flats and backshore thickets supporting lush vegetation. The estuary is dissected by channels and has moderate mud flat development. The high volumes of freshwater carrying heavy loads of fluvial materials result in large intertidal and subtidal flats. These flats are dominated by forbs, providing excellent forage for bears.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D58M/129D46M
BCG Unit	CWH wm
Ecosection	Kitimat Ranges
Watershed Atlas No.	500
Basin size (ha)	1 850 000
Stream source	Interior
Estuary size (ha)	2410
Estuary type	Fjard

Site Associations

To date, little sampling has been conducted in the Nass estuary. Site associations observed in the estuary proper and at Welda Creek adjacent include only these units
Tufted hairgrass - Douglas' aster
Lyngbye's sedge - Douglas' water-hemlock
Lyngbye's sedge
More associations are probable.
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Other observations:

- *Phalaris arundinacea* occurs in heavy concentrations along deep channels in high intertidal marsh community.
- *Sagina maxima* was observed in the shore zone.

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie and Jen Shaw (1plot) September 10, 1997.
Personal observations of Will MacKenzie September 10, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red- and Blue-listed species recorded
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	VH	Mean annual escapement >100,000
Salmonid Stocks	VH	Provincially significant fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	VH	Provincially significant Eulachon fishery, commercial shellfish fishery

Biological resource notes

- Large concentrations of waterbirds (especially gulls) gather in Nass Bay during Eulachon spawning.
- Western Grebe (Red listed); and Great Blue Heron, Surf Scoter (Blue-listed) recorded in estuary.
- High Grizzly Bear habitat capability, probable use of estuary, very high fisheries value.
- Mean annual salmon escapement: Sockeye (207,233); Coho (25,537); Pink (161,008); Chum 5,853); Chinook (10,118); total (409,749).
- Major commercial and sport fish producer; guided and unguided sport fishing for Coho, Chinook & Steelhead.
- Provincially significant Eulachon fishery - 3 major runs; largest native food fishery on the west coast. Commercial crab trap fishery.
- Mud Island is a seal haulout, also reported to be used by sea lions

Social and cultural information

- At least four winter villages and numerous seasonal settlements (now reserves) of the Nisga'a surrounded Nass Bay in the 19th century. The Nass Bay Nisga'a are now centred in the two modern villages of Kinkolith and Lachkaltsap (Greenville).
- The culturally significant native Eulachon fishery in the Nass estuary is the largest on the coast.
- Nine salmon canneries, targeting Nass River fish, were operated under various ownership from the 1870's to 1940's. The largest were: Mill Bay Cannery, Nass Harbour Cannery (in Iceberg Bay), and Arrandale Cannery.
- Nisga'a floating sport fishing lodge often centres in Iceberg Bay. Wildlife viewing opportunities for large numbers of waterbirds, Northern Sea Lion and Harbour Seal during Eulachon runs. Sea lion and seal haulout on Mud Island.
- The Nisga'a Final Agreement (1998) has settled aboriginal rights and title for lands and resources surrounding the Nass River estuary/Nass Bay.

Protection status and development issues

- Portions of the Nass estuary are Northwest PAS Region Goal 2 Study Areas.
- Numerous existing and proposed log dumps, barge landings and water drop zones exist in Nass Bay. Small Business Forest Enterprise Program administrative area.
- A road connecting Kinkolith to Lachkaltsap is in planning which may result in in-filling of portions of the estuary and loss of Grizzly Bear habitat.

Additional information sources

Blyth, G. 1991. Salmon canneries - British Columbia north coast. Oolichan Books, 180 pp.

Langer, O.E., B.G. Shepherd, and P.R. Vroom. 1977. Biology of the Nass River Eulachon *(Thaleichthys pacificus*). Can. Fish. Mar. Ser. Tech. Rep. PAC/T-77-10.

Skeena River Estuary

General Description

The Lower Skeena River is at the mouth of one of the largest watersheds on the west coast of North America with a watershed area of 42,200 km^2. Although the Skeena River is the primary channel, its lower reaches are fed by many large systems such as the Ecstall, Exchamsiks, and Khyex Rivers. These rivers originate in the icefields of the Kitimat Ranges at the height of land with the Nass and Kitimat Systems. The valleys of its tributaries are steep and narrow throughout most of their upper reaches, widening toward the mouth. The enormous volume of water transported by the river generally limits floodplain communities to large channel islands or lateral bays. The Lower Skeena River is notable for its extreme size, its extensive floodplain development, and some of the largest fish populations on the west coast. The lower reaches of this immense system are dissected by channels and large islands.

Threatened or Endangered Plant Species

- *Callitriche heterophylla* var *heterophylla* and *Lilaea scilloides* (both Blue-listed) were found on the mud flats at the confluence of the Khyex River.

Information Sources

- Field observations of Will MacKenzie and Jen Shaw (2 plots). July 6, 1998.
- Personal observations of Jim Pojar. 1974-1997.
- Pojar, Jim. 1975. Interesting angiosperms from Cathedral Lakes Park and the Lower Skeena River. Syesis 8: 391.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D08M/129D58M
BCG Unit	CWHvh2
Ecosection	Hecate Lowland
Watershed Atlas No.	400
Basin size (ha)	4 220 000
Stream source	Interior
Estuary size (ha)	2 556
Estuary type	Fjard

Site Associations

Sitka willow - False lily-of-the-valley
Arctic rush - Alaska plantain
Common spike-rush
Lyngbye's sedge
Lyngbye's sedge - Douglas' water-hemlock
Water horsetail
Widgeon-grass

Observations

Callitriche stagnalis mudflat community at the Khyex-Skeena confluence including *Callitriche heterophylla var heterophylla, Lilaea scilloides, Ranunculus cymbalaria, Ruppia maritima, Sparganium emersum, Limosella aquatica, Alisma plantago-aquatica, Sagittaria latifolia, Eleocharis palustris, and Eleocharis acicularis*

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	VH	>600 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Red- & Blue-listed species
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	VH	Mean escapement >100,000
Salmonid Stocks	VH	Provincially significant fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	H	Eulachon spawning & commercial shellfish fishery

Biological resource notes

- 1206 waterfowl recorded 27 March 1978 (possibly during Eulachon spawning).
- Western Grebe (Red-listed); Trumpeter Swan & Surf Scoter (Blue-listed); concentrations of Canada Geese and ducks recorded over winter. Great Blue Heron & Oldsquaw (Blue-listed) recorded.
- CWS considers the lower Skeena as 'Critical waterfowl habitat for BC'.
- CWS 'Area of interest for migratory birds' submitted to Skeena Region Protected Areas Team (1994) states the Skeena is of great importance for migration/wintering waterfowl.
- Islands provide important moose winter and calving range
- High Grizzly Bear habitat capability, probable use of estuary, very high fisheries values.
- Harbour Seal nursery colonies on Ecstall and Raspberry Islands, at mouth of Ecstall River.
- The Skeena is second only to the Fraser River in salmon production, with annual escapement of over 3 million fish. Mean annual escapement: Sockeye (1,178,945); Coho (42,642); Pink (2,039,446); Chum (26,556); Chinook (44,272); total (3,331,861).
- Class II River (portions); Special angling regulations for guided & unguided sport fishing for Coho, Chinook and Steelhead. Native food fishery.
- Eulachon spawning and native food fishery. Commercial crab trap fishery.
- Ephemeral sloughs are used extensively by juvenile coho salmon

Social and cultural information

- The eight Coast Tsimshian Reserves along the lower Skeena are sites of historical winter settlements. In late pre-historic times new villages were built at Venn Pass, but people returned to the Skeena for salmon fishing. These people now comprise the Lax Kw'alaams (Port Simpson) and Metlakatla bands.
- Eight salmon canneries operated on the lower Skeena from the 1880's to 1930's. Three large plants at Port Essington: British American, Skeena River Commercial and Skeena. The Balmoral Cannery was located on the lower Ecstall and an additional ten canneries were located in the outer Skeena estuary. The commercial fishing fleet & all fish processing is now based in Prince Rupert.
- Public enjoyment of the area is centred on local and guided sport fishing; wildlife viewing (Trumpeter Swans, concentrations of waterbirds, Northern Sea Lion and Harbour Seal during Eulachon runs); ruins at Port Essington; Frizzell Hot Springs.

Protection status and development issues

- Portions of the lower Skeena River are Northwest PAS Region Goal 2 Study Areas.
- Intertidal habitat loss has historically occurred along the north shore of the lower Skeena, as the result of in-filling for railway and Highway 16 construction. Other concerns include blockage of fish access to tributary streams and side channels. Rock groins have been constructed between the Lachmach and McNeil rivers as intertidal habitat mitigation for recent Highway 16 reconstruction.
- Natural gas pipeline and power transmission line corridors cross and parallel both sides of river. A recent proposal for liquefied natural gas plant at Prince Rupert could require additional gas pipeline construction.
- Extensive past forestry development of the floodplain islands. INTERFOR administrative area. Forestry camp, numerous log dumping and booming sites and barge landing sites exist at mouth of Scotia River. Forestry road recently constructed along southern shore between Scotia and Ayton Creek. Further proposals for additional roading on the south shore exist.

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Skowquiltz River Estuary

General Description

The Skowquiltz River estuary is located at the head of Skowquiltz Bay off Dean Channel northeast of Cascade Inlet. The estuary is at the mouth of a mid-sized watershed with a drainage area of approximately 285 km^2. The Skowquiltz River is the primary drainage supporting the estuary. Waters from icefields of the Kitimat Ranges at the height of land with the Kitlope River form the headwaters of the system. The valley is steep and narrow throughout most of its length with braided channels occupying the upper and middle reaches of the drainage. Well developed intertidal flats support marsh and meadow communities. Abundant freshwater discharge into the Dean inlet and a slightly elevated backshore reduce the influence of brackish waters relatively close to the mouth of the river. As a result, swamp thickets have become well established in the estuary. The Skowquiltz valley has not been harvested.

Geographic Details

Forest Region	Vancouver
Forest District	Mid Coast
NTS Mapsheet	93D
Lat./Long.	52D53M/127D10M
BCG Unit	CWH mm1
Ecosection	Kitimat Ranges
Watershed Atlas No.	910 - 334000
Basin size (ha)	28 500
Stream source	Glacier
Estuary size (ha)	83
Estuary type	

Site Associations

Sitka willow - False lily-of-the-valley
Arctic rush - Alaska plantain
Lyngbye's sedge

Information Sources

Field observations of Sarma Liepins, Will MacKenzie, Jim Pojar, and Jen Shaw (2 plots) July 8, 1998.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	VH	Critical wintering habitat for Blue-listed species
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 322 waterfowl recorded wintering on Skowquiltz estuary 10 January 1977, including 5 Trumpeter Swans (Blue-listed). Also a migratory stopover for Surf Scoter (Blue-listed) and shorebirds. Great Blue Heron (Blue-listed) recorded.
- High Grizzly Bear habitat capability, probable use of estuary.
- Mean annual salmon escapement: Coho (2); Pink (3018); Chum (394); total (3,414).
- Guided and unguided sport fishing for Coho & Steelhead.
- Commercial prawn trap fishery.

Social and cultural information

- A 19th century winter village site, shared by the Bella Bella and Bella Coola, was located on Skowquiltz R Reserve, which covers portions of the estuary. By the early 1900's few of the traditional villages in the inlets remained, having joined with the villages at the mouth of the Bella Coola River.
- Public appreciation of the area centres around guided and local sport fishing and recreational crabbing.

Protection status and development issues

- Skowquiltz (28,875 ha) is part of the largest contiguous area of undeveloped primary watersheds in the Mid Coast; together with the Nascall and Sutslem (Moore 1991).
- Skowquiltz Estuary is a Goal 2 Study Area for the Central Coast LRMP (LUCO 1997).
- A log handling reserve covers 6% of estuary and extends into inlet.

Triumph River Estuary

General Description

Triumph Bay is a long narrow bay located on Alan Reach near Devastation Channel. The estuary is at the mouth of a mid-sized watershed with a drainage area of approximately 105 km^2. The Triumph River is the primary drainage supporting the estuary and it flows into Triumph lake near the estuary. Triumph River originates in high elevation lakes at the height of land with the Klekane and Goat Rivers. The valley is wide throughout its lower reaches, becoming steeper inland of Triumph Lake. The estuary is very small and has been subjected to extensive timber harvesting.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	53D26M/128D38M
BCG Unit	CWH vm1
Ecosection	Kitimat Ranges
Basin size (ha)	
Stream source	Lake
Estuary size (ha)	
Estuary type	Strand

Site Associations

Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (3 plots). September 11, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	M	Blue-listed species recorded
Grizzly Bear	M	Habitat capability limited
Salmon	L	Mean escapement <1000
Salmonid Stocks	H	Unique fish stocks and special management concerns
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 375 waterfowl recorded in estuary 9 April 1980.
- Surf Scoter (Blue-listed) recorded.
- Grizzly Bear habitat capability limited by small estuary, low fishery availability (no salmon).
- Salmon are not present due to waterfall at entrance to Triumph River.
- The most northerly known summer-run Steelhead are found in the Triumph. Guided and unguided sport fishing for Steelhead is restricted to catch & release (due to management concerns).
- Commercial prawn trap fishery.

Social and cultural information

- The Triumph is within the traditional territories of the Haisla, who live in Kitamaat Village.

Protection status and development issues

- Small area of old logging. Recent active logging, including existing and proposed log booms, float camp, barge ramp, water drop zones, forestry roads.

Weewanie Creek Estuary

General Description

The Weewanie Creek estuary is located on the east side of Devastation Channel adjacent to Hawkesbury Island. The estuary is at the mouth of a mid-sized watershed. Weewanie Creek and Sleeman Creek are the primary drainages supporting the estuary. These creeks originate in small lakes and streams at the height of land with Pike and Hugh Creeks and the Falls River. The valleys are steep throughout. Although the estuary is small and poorly developed, it is notable for a community of *Ranunculus cymbalaria* over a buried horizon of well humified organic material not observed at any of the other estuaries in this survey.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103H
Lat./Long.	54D41M/128D46M
BCG Unit	CWHvm1
Ecosection	Kitamat Ranges
Watershed Atlas No.	
Basin size (ha)	
Stream source	Rain/snow
Estuary size (ha)	
Estuary type	Fan

PHOTO NOT AVAILABLE

Site Associations

Dunegrass - Pacific hemlock-parsley
Tufted hairgrass - Meadow barley
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (1 plot). September 12, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	M	100-400 waterfowl recorded on any survey
Waterbird Species at Risk	L	No Red- or Blue-listed species recorded
Grizzly Bear	H	High Grizzly Bear habitat capability, probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	H	Unique fish stocks and sport fishing opportunities
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 278 waterfowl recorded 21 January 1977 in Weewanie estuary.
- High Grizzly Bear habitat capability, probable use of small estuary.
- Mean annual salmon escapement: Coho (1320); Pink (3400); Chum (735); total (5,455).
- Guided and unguided sport fishing for Coho and Steelhead.
- Commercial prawn trap fishery; recreational crabbing.

Social and cultural information

- Weewanie is within the traditional territory of the Haisla, who live in nearby Kitamaat Village.
- Weewanie Hot Springs UREP Reserve is located in small cove north of Weewanie estuary.

Protection status and development issues

- Extensive past logging in lower watershed, logging camp, forestry roads.

Welda Creek Estuary

General Description

The Welda Creek estuary is located near the mouth of the Nass River in Nass Bay near Burton Creek. The estuary is at the mouth of a mid-sized watershed with a drainage area of approximately 155 km^2. Welda Creek is the primary drainage supporting the estuary. Welda Creek originates at the height of land with Burton and Chambers Creeks and the Kwinamass River. The valley is steep and narrow throughout. The estuary has an sloping intertidal zone with meadow communities graduating into mixed sand and cobble tidal flats.

Geographic Details

Forest Region	Prince Rupert
Forest District	North Coast
NTS Mapsheet	103I
Lat./Long.	54D56M/129D52M
BCG Unit	CWHvm1
Ecosection	Alaska Panhandle
Watershed Atlas No.	
Basin size (ha)	15540
Stream source	Rain/Snow
Estuary size (ha)	
Estuary type	Fan

Site Associations

Pacific crabapple - False lily-of-the-valley
Dunegrass - Pacific hemlock-parsley
Lyngbye's sedge

Information Sources

Field observations of Carmen Cadrin, Will MacKenzie, and Jen Shaw (1 plot). September 10, 1997.

Biological Resource Ranking

	Ranking	*Notes*
Waterfowl	H	>400 waterfowl recorded on any survey
Waterbird Species at Risk	H	Red listed species recorded
Grizzly Bear	H	High habitat capability, probable use of estuary
Salmon	M	Mean escapement >1000
Salmonid Stocks	M	Coho present, but sport fishing opportunities are unknown
Eulachon/Herring/Shellfish	M	Commercial shellfish fishery

Biological resource notes

- 427 waterfowl recorded in Welda estuary 2 April 1981.
- Western grebe (Red-listed) recorded in estuary.
- High Grizzly Bear habitat capability, probable use of estuary.
- Mean annual salmon escapement: Coho (present), Pink (2,259).
- Coho present, but sport fishing opportunities are unknown.
- Commercial and recreational crab trap fishery.

Social and cultural information

- If ratified, the Nisga'a Final Agreement (1998) will result in settlement of aboriginal rights and title for lands and resources surrounding the Nass River estuary/Nass Bay.

Protection status and development issues

- Small Business Forest Enterprise Program administrative area. Existing and proposed log dumps, barge landing and water drop zones between Welda Creek and Iceberg Bay.

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Contents

Appendix A. Waterfowl Inventory Ranking

Ranking	Criteria
U	Unknown - no waterfowl data available
L	<100 waterfowl recorded on any survey
M	100-400 waterfowl recorded on any survey
H	>400 waterfowl recorded on any survey
VH	>600 waterfowl recorded on any survey

Sources: Skeena Region Coastal Waterbird Inventory File; Savard 1979; Savard and Kaiser 1982; Martin 1980; Remington 1993

Waterfowl: number of ducks, geese and swans counted during one survey

Survey type: A=Aerial; B=Boat; G=Ground

Nass R Estuary/Nass Bay (including Iceberg Bay) **RANKING=VH**

CWIF Polygon 571 - Nass R. Estuary/ Nass Bay

Date	Survey	Waterfowl	Notes
10/17/77	A	1,442	
11/16/77	A	516	
9/11/79	A	290	
4/10/80	A	893	SHOREBIRD 252
4/2/81	A	857	GULL 80,000+

Welda C Estuary (Jacques Pt to Leading Pt in Nass Bay) **RANKING=H**

(These surveys are included in those for Nass Bay shown above)

CWIF Polygon 571 - Nass R. Estuary/ Nass Bay

Date	Survey	Waterfowl	Notes
10/17/77	A	253	
11/16/77	A	155	
9/11/79	A	73	
4/2/81	A	427	

Kwinamass R Estuary **RANKING=M**

CWIF Polygon 572 - Portland & Observatory Inlets

Date	Survey	Waterfowl	Notes
4/10/80	A	123	
4/2/81	A	213	
10/6/93	A	77	SHOREBIRD 100
9/9/98	G	76	

Crow Lagoon (including Kumeon Bay, Keemain Pt, Crow Lagoon Bay) **RANKING=L**

CWIF Polygon 572 - Portland & Observatory Inlets

Date	Survey	Waterfowl	Notes
1/20/77	A	81	
9/11/79	A	3	SHOREBIRD 336
4/10/80	A	66	SHOREBIRD 50

Khutzeymateen R Estuary **RANKING=H**

CWIF Polygon 572- Portland & Observatory Inlets

Date	Survey	Waterfowl	Notes
1/20/77	A	212	SWAN - 28 AD, 1 JU
4/10/80	A	44	
4/2/81	A	433	

Larch C Estuary **RANKING=L**

CWIF Polygon 572- Portland & Observatory Inlets

Date	Survey	Waterfowl	Notes
1/20/77	A	68	SWAN - 2 AD, 6 JU

Big Bay (including La Hou C estuary & Pearl Harbour) **RANKING=VH**

CWIF Polygon 553 - Tsimpsean Peninsula

Date	Survey	Waterfowl	Notes
4/16/75	B	402,000	SURF SCOTER 300,000
4/17/75	B	300,215	SWAN 41, SNOW GOOSE 150, SURF SCOTER 400,000
1/20/77	A	300	SHOREBIRD 200
9/14/77	B	949	
9/24/77	A	473	SHOREBIRD 100
10/18/77	A	393	
11/5/77	B	2,643	SHOREBIRD 3600+
11/16/77	A	949	SHOREBIRD 150
1/11/78	A	374	
1/19/78	B	2,426	TRUMPETER SWAN 4
2/16/78	A	271	SHOREBIRD 50
3/14/78	B	877	
3/27/78	A	463	
3/8/79	A	827	BRANT GOOSE 400, SHOREBIRD 360
9/11/79	A	329	SHOREBIRD 35
4/10/80	A	6,462	BRANT GOOSE 301, SHOREBIRD 1000
7/30/80	A	85	SHOREBIRD 19
3/24/81	A	208	BRANT GOOSE 40
4/2/81	A	15,826	
11/2/92	A	787	
4/27/93	A	332	SHOREBIRD 558, SURF SCOTER 251

Relative habitat carrying capacity for waterfowl highest in Chatham Sound area (Martin 1980)
Canadian Wildlife Service 'Critical Waterfowl Habitat for BC' (Hayes and others 1993)

Lower Skeena River **RANKING=VH**

CWIF Polygon 563 - Lower Skeena R

Date	Survey	Waterfowl	Notes
1/30/75	A	316	SWAN 5 (lower Ecstall R)
1/18/77	A	356	
10/17/77	A	164	SWAN 9
11/15/77	A	153	
11/17/77	G	128	SWAN 5
2/16/78	A	205	
3/27/78	A	1206	

Canadian Wildlife Service 'Critical Waterfowl Habitat for BC' (Hayes and others, 1993)

Billy C Estuary/Billy Bay **RANKING=VH**

CWIF Polygon 561 - Kitkatla Inlet

Date	Survey	Waterfowl	Notes
1/10/78	A	357	
2/16/78	A	169	SHOREBIRD 25
3/27/78	A	214	
3/8/79	A	30,000	SURF SCOTER 30,000
3/24/83	A	208	BRANT GOOSE 40

93/4/28	A	540	SURF SCOTER 500

Canadian Wildlife Service 'Critical Waterfowl Habitat for BC' (Hayes and others 1993)

Kumealon C Estuary/Kumealon Lagoon **RANKING=L**

CWIF Polygon 542 - Grenville Channel

Date	Survey	Waterfowl	Notes
1/21/77	A	26	

Baker Inlet Estuary **RANKING=U**

CWIF Polygon 542 - Grenville Channel

No waterfowl data available

Gilttoyees C Estuary **RANKING=VH**

CWIF Polygon 532 - Douglas Channel

Date	Survey	Waterfowl	Notes
2/19/76	A	292	OLDSQUAW 37+
1/20/77	A	480	
3/24/77	A	1089	SURF SCOTER 2
11/8/79	A	282	SHOREBIRD 20
11/2/92	A	54	

Foch Lagoon **RANKING=H**

CWIF Polygon 532 - Douglas Channel

Date	Survey	Waterfowl	Notes
2/19/76	A	146	
1/21/77	A	231	
3/24/77	A	306	
11/8/79	A	328	
11/2/92	A	470	OLDSQUAW 380

Weewanie C Estuary **RANKING=M**

CWIF Polygon 531 - Devastation Channel - Gardner Canal

Date	Survey	Waterfowl	Notes
1/21/77	A	278	
11/7/79	A	32	

Kitkiata/Quaal R Estuary **RANKING=VH**

CWIF Polygon 532 - Douglas Channel

Date	Survey	Waterfowl	Notes
2/19/76	A	256	TRUMPETER SWAN 4
1/21/77	A	1060	
3/24/77	A	1213	SURF SCOTER 300
11/8/79	A	632	
11/2/92	A	65	

Triumph R Estuary **RANKING=M**

CWIF Polygon 531 - Devastation Channel - Gardner Canal

Date	Survey	Waterfowl	Notes
9/12/79	A	0	
4/9/80	A	375	

Kowesas R Estuary/Chief Mathews Bay **RANKING=M**

CWIF Polygon 531 - Devastation Channel - Gardner Canal

Date	Survey	Waterfowl	Notes
9/12/79	A	32	
4/9/80	A	139	

Goat R Estuary/Goat Harbour **RANKING=U**

CWIF Polygon 534 - Verney & Ursula Passages

No waterfowl data available

Klekane R Estuary **RANKING=M**

CWIF Polygon 524 - Princess Royal Channel

Date	Survey	Waterfowl	Notes
11/7/79	A	108	
4/9/80	A	63	

Khutze R Estuary **RANKING=M**

CWIF Polygon 524 - Princess Royal Channel

Date	Survey	Waterfowl	Notes
11/7/79	A	64	
4/9/80	A	203	

Kynoch Inlet Estuaries (Kainet, Lard C estuaries & Culpepper Lagoon) **RANKING=M**

CWIF Polygon 512 - Mathieson Channel

Date	Survey	Waterfowl	Notes
11/7/79	A	52	
4/9/80	A	166	

Kimsquit R Estuary **RANKING=L**

CWIF Polygon 502 - Fisher/Dean Channels

Date	Survey	Waterfowl	Notes
1/10/77	A	28	
11/7/79	A	39	
4/8/80	A	74	

Dean R Estuary/Kimsquit Bay **RANKING=M**

CWIF Polygon 502 - Fisher/Dean Channels

Date	Survey	Waterfowl
1/10/77	A	118
11/7/79	A	131
4/8/80	A	199

Skowquiltz R Estuary **RANKING=M**

CWIF Polygon 502 - Fisher/Dean Channels

Date	Survey	Waterfowl	Notes
1/10/77	A	322	SWAN 5
5/13/79	A	90	
11/7/79	A	134	
4/8/80	A	217	
4/27/93	A	302	SURF SCOTER 300, SHOREBIRD 150

Kwatna R Estuary **RANKING=H**

CWIF Polygon 501 - Burke Channel

Date	Survey	Waterfowl	Notes
1/11/77	A	353	SWAN 11 - AD 6, JU 5
11/6/79	A	145	SWAN 9
4/8/80	A	413	

Clyak R Estuary **RANKING=M**

CWIF Polygon 483 - Rivers Inlet , Stone Point N.

Date	Survey	Waterfowl	Notes
1/11/77	A	183	SWAN 12
11/6/79	A	170	WESTERN GREBE 50

Kilbella/Chuckwalla Estuary **RANKING=H**

CWIF Polygon 483 - Rivers Inlet, Stone Point N.

Date	Survey	Waterfowl	Notes
1/11/77	A	435	SWAN 7
11/6/79	A	75	WESTERN GREBE 50
4/8/80	A	83	
4/28/93	A	173	

Appendix B. Waterbird Species at Risk Ranking (Red & Blue lists for BC)

Ranking *Criteria*

U Unknown - No waterbird data available
L No Red or Blue listed species recorded
M Blue listed species recorded
H Red listed species recorded
VH Critical wintering habitat for Red or Blue listed species

Sources: Skeena Region Coastal Waterbird Inventory File; Savard 1979; Savard and Kaiser 1982; Martin 1980; Hayes and others 1993; Remington 1993; Dunn 1994.

Nass R Estuary/Nass Bay (including Iceberg Bay) **Ranking=H**
Western Grebe (Red listed) and Great Blue Heron, Surf Scoter (Blue listed) recorded.
Large concentrations of waterbirds (especially gulls) gather during Eulachon spawning.

Welda C Estuary (Jacques Pt to Leading Pt in Nass Bay) **Ranking=H**
(These observations also included in those for Nass Bay)
Western Grebe (Red listed) recorded.

Kwinamass R Estuary **Ranking=M**
Great Blue Heron (Blue listed) recorded.

Crow Lagoon (including Kumeon Bay, Keemain Pt, Crow Lagoon Bay) **Ranking=L**
No Red or Blue listed species recorded.

Khutzeymateen R Estuary **Ranking=VH**
Trumpeter Swan, Oldsquaw, Great Blue Heron (Blue listed) recorded.
Trumpeter Swan wintering recorded in estuary.

Larch C Estuary **Ranking=VH**
Trumpeter Swan wintering recorded in estuary.

Big Bay (including La Hou C estuary & Pearl Harbour) **Ranking=VH**
Trumpeter Swan wintering recorded in estuary.
Surf Scoter, Oldsquaw, Great Blue Heron (Blue listed) recorded.
Large concentrations of waterbirds recorded during herring spawning.
CWS considers 'Critical Waterfowl habitat for BC' (Hayes and others 1993).
Great importance for wintering/summering Canada Geese; migrant Brant Geese, shorebirds. CWS Area of Interest for Migratory Birds (Dunn 1994)

Lower Skeena River **Ranking=VH**
Western Grebe (Red listed) Trumpeter Swan, Surf Scoter (Blue listed) wintering.
Great Blue Heron, Oldsquaw (Blue listed) recorded.
CWS considers 'Critical Waterfowl habitat for BC' (Hayes and others 1993).
Great importance for migration/wintering waterfowl; large number of Brant Geese, shorebirds and Canada Geese. CWS Area of Interest for Migratory Birds (Dunn 1994).

Billy C Estuary/Billy Bay **Ranking=VH**
Western Grebe (Red listed) wintering, Surf Scoter, Oldsquaw, Great Blue Heron (Blue listed) recorded
CWS considers Kitkatla Inlet 'Critical Waterfowl habitat for BC' (Hayes and others 1993).
Kitkatla Inlet - Major use by scoters and gulls; Western Grebes and Harlequin Ducks; marine feeding habitats. CWS Area of Interest for Migratory Birds (Dunn 1994).

Kumealon C Estuary/Kumealon Lagoon **Ranking=L**
No Red or Blue listed species recorded.

Baker Inlet **Ranking=U**
No waterbird data available

Gilttoyees C Estuary **Ranking=M**
Surf Scoter, Oldsquaw (Blue listed) recorded.

Foch Lagoon **Ranking=M**
Surf Scoter, Oldsquaw (Blue listed) recorded.

Weewanie C Estuary **Ranking=L**
No Red or Blue listed species recorded.

Kitkiata/Quaal R Estuary **Ranking=VH**
Trumpeter Swan (Blue listed) wintering. Surf Scoter, Oldsquaw (Blue listed) recorded.

Triumph R Estuary **Ranking=M**
Surf Scoter (Blue listed) present.

Kowesas R Estuary/Chief Mathews Bay **Ranking=H**
Resident Marbled Murrelet (Red listed) approximately 30 breeding pairs reported by G. Hazelwood and J. Kelson (*in* Schoonmaker & Wolf, eds. 1996).

Goat R Estuary/Goat Harbour **Ranking=U**
No waterbird data available

Klekane R Estuary **Ranking=H**
Surf Scoter (Blue listed) recorded. Large Marbled Murrelet concentrations (Red listed); CWS Area of Interest for Migratory Birds (Dunn 1994).

Kynoch Inlet Estuaries (Kainet, Lard C estuaries and Culpepper Lagoon) **Ranking=H**
Large Marbled Murrelet concentrations (Red listed); CWS Area of Interest for Migratory Birds (Dunn 1994).

Khutze R Estuary **Ranking=H**
Surf Scoter (Blue listed) recorded. Large Marbled Murrelet concentrations (Red listed); CWS Area of Interest for Migratory Birds (Dunn 1994).

Kimsquit R Estuary **Ranking=H**
Great Blue Heron (Blue listed) recorded
Wintering waterfowl habitat; likely to have resident populations of Vancouver Canada Geese. CWS Area of Interest for Migratory Birds (Dunn 1994)

Dean R Estuary/Kimsquit Bay **Ranking=H**
Great Blue Heron (Blue listed) recorded.
Wintering waterfowl habitat; likely to have resident populations of Vancouver Canada Geese. CWS Area of Interest for Migratory Birds (Dunn 1994).

Skowquiltz R Estuary **Ranking=VH**
Trumpeter Swan (Blue listed) wintering. Surf Scoter, Great Blue Heron (Blue listed) recorded.

Kwatna R Estuary **Ranking=VH**

Trumpeter Swan (Blue listed) wintering.

Clyak R Estuary **Ranking=VH**

Trumpeter Swan (Blue listed) wintering. Western Grebe (Red listed), Great Blue Heron (Blue listed) recorded.

Kilbella/Chuckwalla Estuary **Ranking=VH**

Trumpeter Swan (Blue listed) wintering. Western Grebe (Red listed), Great Blue Heron (Blue listed) recorded.

Appendix C. Grizzly Bear Habitat Capability Ranking (Blue listed species; COSEWIC status VULNERABLE)

Ranking	*Criteria*
Nil	Outside of known Grizzly Bear range
M	Grizzly Bear habitat capability limited by estuary location, small size or low fishery value
H	High Grizzly Bear habitat capability, known or probable use of estuary
VH	High Grizzly Bear habitat capability, known heavy use of estuary

Sources: Hamilton & Bunnell 1986; MacHutchon & others 1993; Fuhr & others 1995; BC Environment Biologists.

Nass R Estuary/Nass Bay **Ranking=H**
High habitat capability, probable use of estuary, high fishery value

Welda C Estuary **Ranking=H**
High habitat capability, probable use of estuary

Kwinamass R Estuary **Ranking=VH**
High habitat capability. Not as productive as Khutzeymateen, but known heavy use of estuary, high fishery value (MacHutchon and others 1993).

Crow Lagoon (including Kumeon Bay, Keemain Pt, Crow Lagoon Bay) **Ranking=M**
Small estuary, relatively low fishery value, located at edge of expected Grizzly Bear range.

Khutzeymateen R Estuary **Ranking=VH**
High habitat capability, undisturbed watershed with known heavy Spring use of estuary. Densest Grizzly Bear concentration in region (MacHutchon and others 1993).

Larch C Estuary **Ranking=H**
Part of greater Khutzeymateen ecosystem, known use of small estuary. Larch valley is movement corridor to Toon and Khyex rivers (MacHutchon and others 1993).

Big Bay (including La Hou C estuary & Pearl Harbour) **Ranking=Nil**
Tsimpsean Peninsula is outside the known range of Grizzly Bear.

Lower Skeena River (including lower Ecstall R) **Ranking=H**
High habitat capability, high fishery value, probable use of estuary.

Billy C Estuary/Billy Bay **Ranking=Nil**
Porcher Island is outside the known range of Grizzly Bear.

Kumealon Creek Estuary/Kumealon Lagoon **Ranking=H**
Known Grizzly Bear use of estuary, floodplain and avalanche chute habitats near Kumealon Creek, estuary and Kumealon Lake. Signs of Grizzly Bear trails, mark trees and (den?) excavations (S. Liepins, FES)

Baker Inlet Estuary **Ranking=M**
Small estuary, low fishery value, located at edge of expected Grizzly Bear range.

Gilttoyees C Estuary **Ranking=H**
High habitat capability, probable use of estuary, high fishery value.

Foch Lagoon **Ranking=H**
High habitat capability, probable use of estuary, high fishery value.

Weewanie C Estuary **Ranking=H**
High habitat capability, probable use of small estuary.

Kitkiata/Quaal R Estuary **Ranking=H**
High habitat capability, very probable use of estuary, high fishery value.

Triumph R Estuary **Ranking=M**
Small estuary, low fishery availability (no salmon) (Fuhr and others 1995).

Kowesas R Estuary/Chief Mathews Bay **Ranking=H**
Good floodplain habitats with available fish, wetland and avalanche chute complexes for Spring feeding. Signs of old beds, trails and mark trees (Fuhr and others 1995).

Goat R Estuary/Goat Harbour **Ranking=H**
High habitat capability, probable use of small estuary.

Klekane R Estuary **Ranking=H**
High habitat capability, undisturbed watershed, probable use of estuary.

Khutze R Estuary **Ranking=H**
High habitat capability, known use of estuary, undisturbed watershed, high fishery value (Fuhr and others 1995).

Kynoch Inlet Estuaries **Ranking=H**
High habitat capability, undisturbed watersheds, probable use of estuaries, high fishery value.

Kimsquit R Estuary **Ranking=VH**
High habitat capability, known heavily used estuary, high fishery value (Hamilton & Archibald 1985).

Dean R Estuary/Kimsquit Bay **Ranking=H**
High habitat capability. Documented use of small estuary by Kimsquit watershed Grizzly Bear (Hamilton & Archibald 1985).

Skowquiltz R Estuary **Ranking=H**
High habitat capability, probable use of estuary.

Kwatna R Estuary **Ranking=VH**
High habitat capability, known heavy use of estuary, high fishery value.

Clyak R Estuary **Ranking=H**
High habitat capability, probable use of estuary, high fishery value.

Kilbella/Chuckwalla Estuary **Ranking=VH**
High habitat capability, known heavy use of estuary, high fishery value.

Appendix D. Salmon Escapement Ranking

Mean annual escapement for all salmon species combined 1981-1991

Ranking	Criteria
L	Mean escapement <1000 or no information
M	Mean escapement >1000
H	Mean escapement >40,000
VH	Mean escapement >100,000

Sources: DFO/BCE Stream Summary Catalogues; database by J. Booth & Associates (1993).

The mean has been totaled for all streams entering the estuary. If no run was observed (or not surveyed) in a particular year, then that year was not counted in the calculation for the mean.

Note that escapement figures may not reflect true habitat capability or management targets due to possible over-harvest of individual species or stocks.

	Sockeye	Coho	Pink	Chum	Chinook	Total	Ranking
Nass R	207,233	25,537	161,008	5,853	10,118	409,749	**VH**
Welda C		Present	2,259			2,259	**M**
Kwinamass R	14	3,605	123,000	311	315	127,245	**VH**
Crow Lagoon Cs		Present	Present			Present	**L**
Khutzeymateen R	6	3,970	44,700	7,000	365	56,041	**H**
Larch C	0	0	2,500	0	0	2,500	**M**
Big Bay (La Hou C)	0	200	22,930	0	0	23,130	**M**
Skeena R	1,178,945	42,642	2,039,446	26,556	44,272	3,331,861	**VH**
Billy C	0	117	3,300	0	0	3,417	**M**
Kumealon Lagoon						33,585	**M**
Kumealon C	0	181	29,850	33	47	30,111	
N. Kumealon C	0	24	3,450	0	0	3,474	
Baker Inlet Cs		Present	Present			Present	**L**
Gilttoyees C	0	1,250	5,900	4,640	54	11,844	**M**
Foch Lagoon						21,120	**M**
Unnamed C at head	0	475	16,870	3,690	85	21,120	
Weewanie C	0	1,320	3,400	735	0	5,455	**M**
Kitkiata/Quaal						204,900	**VH**
Kitkiata C	1,215	966	37,900	142	0	40,223	
Quaal R	75	6,000	141,750	16,850	2	164,677	
Triumph R	No salmon present					No salmon	**L**
Kowesas R	0	135	335	322	72	864	**L**
Goat R	0	Present	501	19	0	520	**L**
Klekane R	3	8	2,327	22	0	2,360	**M**
Khutze R	1	890	23,265	1,580	27	25,763	**M**
Kynoch Inlet						85,188	**H**
Kainet C	1,291	302	47,430	25,140	3	74,166	
Unnamed "Big" C		Present	7,076	14		7,090	
Lard C		Present	2,248	1,684		3,932	
Kimsquit R	12,309	2,357	342,941	39,222	201	397,030	**VH**
Dean R/Kimsquit Bay						29,981	**M**
Dean R	104	3,312	21,888	248	2,504	28,056	
Kimsquit Bay C	0	0	10	1,915	0	1,925	
Skowquiltz R	0	2	3,018	394	0	3,414	**M**
Kwatna R	83	3,000	76,111	6,450	60	85,704	**H**
Clyak R	2	1,053	51,691	43,393	68	96,207	**H**
Kilbella R	6	1,208	45,220	2,029	517	48,980	**H**

Appendix E. Salmonid Stocks or Streams of Special Management Concern Ranking

Ranking	Criteria
L	Fish present, but little or no sport fishing information
M	Coho present, but sport fishing opportunities are unknown or not unique
H	Unique fish stocks and sport fishing opportunities or special management concerns
VH	Class I or II River; Provincially significant fish stocks and sport fishing opportunities

Sources: DFO/BCE Stream Summary Catalogues; BCE Stream files; BCE Classified Rivers Management Plans; BC Environment Biologists

Stream	Comments	Ranking
Nass R	Major commercial and sport fish producer - all species. Largest na	**VH**
Welda C	Coho present, sport fishing opportunities unknown	**M**
Kwinamass R	Class II River; guided & unguided sport fishing - Coho, Steelhead,	**VH**
Crow Lagoon Cs	Coho & Steelhead present, sport fishing opportunities unknown	**M**
Khutzeymateen R	Major commercial fish producer - all species; closed to sport fishin	**H**
Larch C	Fish present, but closed to sport fishing for Grizzly Bear managem	**L**
Big Bay (La Hou C)	Local sport fishing - Coho, Steelhead	**M**
Skeena R	Class II River (portions); major commercial, native food, guided an	**VH**
Billy C	Coho present; sport fishing opportunities unknown	**M**
Kumealon Lagoon	Coho present; guided & local sport fishing; unique winter sport fish	**H**
Baker Inlet C	Coho present; sport fishing opportunities unknown	**M**
Gilttoyees C	Guided sport fishing - Coho, Chinook; popular recreational area	**H**
Foch Lagoon C	Guided sport fishing - Coho, Chinook, Steelhead; popular recreatio	**H**
Weewanie C	Guided sport fishing - Coho, Steelhead	**H**
Kitkiata C/Quaal R	Guided, unguided sport fishing and native food fishing - all species	**H**
Triumph R	Catch & release for summer-run Steelhead. Most northerly known	**H**
Kowesas R	Guided sport fishing - Coho, Chinook; native food fishing - Eulach	**H**
Goat R	Coho present; sport fishing opportunities unknown	**M**
Klekane R	Guided sport fishing - Coho	**H**
Khutze R	Guided sport fishing - Coho, Chinook; popular recreational area	**H**
Kynoch Inlet Cs	Coho, Chinook, Steelhead present; sport fishing opportunities unk	**M**
Kimsquit R	Guided sport fishing - Coho, Chinook, Steelhead	**H**
Dean R/Kimsquit Bay	Class I River - World class summer-run Steelhead sport fishing; un	**VH**
Skowquiltz R	Guided sport fishing - Coho, Steelhead	**H**
Kwatna R	Guided & unguided sport fishing - Coho, Chinook, Steelhead	**H**
Clyak R	Guided sport fishing - Coho, Chinook, Steelhead	**H**
Kilbella/Chuckwalla Rs	Class II River; several floating guide camps - Coho, Chinook, Steel	**VH**

Appendix F. Eulachon; Pacific Herring and Shellfish Ranking

Ranking	Criteria
L	None recorded or occasional recreational crabbing
M	Pacific Herring (*Clupea harengus*) spawning or commercial shellfish fishery
H	Eulachon (*Thaleichthys pacificus*) spawning; or herring spawning with herring roe fishery and commercial shellfish fishery
VH	Provincially significant Eulachon fishery or herring roe fishery

Sources: DFO/BCE Stream Summary Catalogues; Langer & others 1977; Hay & others 1989; Farlinger & Bates 1985, Farlinger & Thomas 1988; Jamieson & Francis 1986; DFO fishery officers.

Herring spawn years/50 years 1937-1986 [or spawn years/documented years]. Herring roe harvest shown in tones (t).

Shellfish commercial trap fishery: crab harvest mainly Dungeness (*Cancer magister),* prawn and shrimp harvest mainly *Pandalus platyceros* & smaller Pandalidae spp. C=commercial, R=recreational

	Eulachon	Herring			Shellfish	**Ranking**
		Spawn	Magnitude	Fishery		
Nass R Estuary/Nass Bay	3 runs (major native food fishery)				Crab-C&R	**VH**
Welda C Estuary					Crab-C&R	**M**
Kwinamass R Estuary					Crab C&R	**M**
Crow Lagoon					Crab C&R	**M**
Khutzeymateen R Estuary					Crab-C&R	**M**
Larch C Estuary					Crab-C&R	**M**
Big Bay (including Pearl Harbour)		50 in 50	Very Large	2463 t	Crab-C&R	**VH**
Lower Skeena R	Present				Crab-C&R	**H**
Billy C Estuary/Billy Bay[a]		42 in 42	Large	2580 t	Crab-C&R	**H**
Kumealon C Estuary/Kumealon Lagoon					Crab-R	**L**
Baker Inlet Estuary						**L**
Gilttoyees C Estuary					Crab-R	**L**
Foch Lagoon					Crab-R	**L**
Weewanie C Estuary					Prawn-C, Crab-R	**M**
Kitkiata/Quaal R Estuary					Crab-C&R	**M**
Triumph R Estuary					Prawn-C, Crab-R	**M**
Kowesas R Estuary/Chief Matthew	Significant	15 in 50	Very Small		Prawn-C	**VH**
Goat R Estuary/ Goat Harbour					Prawn-C, Crab-R	**M**
Klekane R Estuary		7 in 50	Very Small			**M**
Khutze R Estuary		7 in 50	Very Small		Prawn-C, Crab-R	**H**
Kynoch Inlet Estuaries						**L**
Kimsquit R Estuary		19 in 50	Very Small		Crab-R	**M**
Dean R Estuary/Kimsquit Bay	Occasional	19 in 50	Very Small		Prawn-C, Crab-R	**H**
Skowquiltz R Estuary					Prawn-C	**M**
Kwatna R Estuary						**L**
Clyak R Estuary					Prawn-C, Crab-R	**M**
Kilbella/Chuckwalla Estuary	Present	48 in 50	Medium	897 t	Prawn-C, Crab-R	**H**

[a] Herring fishery records are for all of Kitkatla Inlet (including Billy Bay).