CHEMAINUS ESTUARINE HABITAT INVENTORY

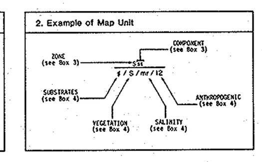
Revision Date: 1982. 08. 18

LEGEND

1. Explanatory Notes

The estuarine habitat mapping and classification system is designed to delineate habitat types and describe them as a function of substrate, vegetation, salinity and anthropogenic influences. Information is derived from interpretation of recent large scale colour air photos and ground truthing, and is supplemented by information derived from historical reports and air photos. Specific descriptions of habitat types are presented in Box 5 along with area summaries expressed in hectares and as percentages. Because of the dynamic nature of estuarine systems maps may require updating. Users should therefore refer to the date of mapping shown in Box 8. Users are encouraged to consult APD Technical Paper, Estuarine Habitat Mapping and Classification System Manual 1982, for descriptions of inventory and mapping methods and terminology utilized in the classification system.

2. Example of Map Unit



3. Habitat Type

ZONE	SYMBOL	COMPONENT	SYMBOL
SUBTIDAL	S	reef	re
		deep subtidal	sd
		shallow subtidal	ss
INTERTIDAL	I	bar	ba
		berm/beach face	bf
		back channel	cb
		river channel	cr
		side channel	cs
		tide channel	ct
		flat	fl
		marsh	ma
		high marsh	mh
		intermediate marsh	mi
		low marsh	ml
		platform	pl
		reef	re
BACKSHORE	B	bar	ba
		bog	bo
		back channel	cb
		river channel	cr
		side channel	cs
		fen	fe
		forest	fo
		marsh	ma
		meadow	me
		permanent pond	pp
		semi-permanent pond	ps
		temporary pond	pt
		shrub	sh
		storm ridge	sr
		swamp	sw

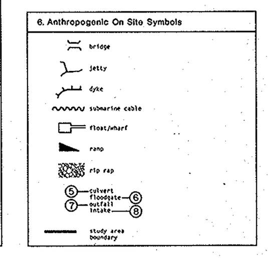
4. Habitat Modifier

TYPE	SYMBOL	TYPE	SYMBOL
SUBSTRATES		SALINITY	
clay	c	brackish	br
silt	$	fresh	fr
fines	f	marine	mr
sand	s		
small pebble	p		
large pebble	g		
cobble	k		
boulders	b		
bedrock	r		
organic	o		
shell	m		
VEGETATION		ANTHROPOGENIC	
coniferous	C	log handling	1
deciduous	D	agriculture	2
mixed	M	landfill	3
non-vascular	N	dyke, seawall, causeway	4
submerged vascular	S	culvert	5
		floodgate	6
		outfall	7
		pollution	8
		intake	9
		residential	10
		industrial	11
		marina	12
		port facility	13
		substrate removal	14
		jetty, groin, weir	15
		log debris	16
		logged	17

5. Descriptions of Habitat Types (CHEMAINUS HABITAT CLASSIFICATION)

SYMBOL	DESCRIPTION	AREA (ha)	% TOTAL
	INTERTIDAL ZONE	414.9	54.2
Iba	Generally unvegetated intertidal areas formed and controlled by fluvial and marine processes. Coarser textured sand and pebble bars are primarily influenced by riverine factors whereas the finer sediment areas experience more marine control.	4.5	0.6
Ibf	This habitat type is characterized by unconsolidated sands and gravels and is principally limited to the Shoal Islands.	0.5	0.1
Icb	Dead-end channels of variable depths connected to the Chemainus River and characterized by low current velocities. The channels are lined by emergent vegetation and deciduous trees. Due to low current velocities, substrates are finer and contain higher amounts of organic material than adjacent fast flowing areas.	2.6	0.3
Icr	Included in this habitat are mainstem areas of the Chemainus River and Bonsall Creek which are affected by saltwater penetration and regular elevational fluctuations due to tidal influences. Bonsall Creek, which has much lower flows than the Chemainus River, empties into the more saline southern portion of the estuary. The Chemainus empties into the northern portion of the estuary. In slower moving sections of the river, filamentous green algae are common.	10.9	1.4
Ics	This habitat type includes fluvially dominated channels connected to river mainstems. Previously some of these channels have functioned as the main river channel. Unlike the mainstem, these areas are characterized by lower flows and occasional drying. Filamentous green algae are found attached to coarse substrates within these habitats.	1.7	0.2
Ict	This habitat type includes channels dominated by marine processes which drain intertidal portions of the estuary. The beds, usually composed of silty sand or sandy silt are finer textured than the main or side channels.	50.6	6.6
	Average depths of the channels are 0.25 to 2.0 m. Shallower channels dry at low tide whereas larger channels remain partially filled, and support eel-grass in some areas. Channel banks are usually steep, particularly within the marshes of the southern portion of the estuary. Low marsh vegetation, especially Lyngbye's sedge often border the channels.		
Ifl	This extensive habitat type, exposed only on low tides, extends from the seaward limit of the marshes and central islands within the estuary to the Shoal Islands. These islands provide protection from the currents of Stuart Channel, facilitating delta development. Substrates are predominantly silty sand with some finer textured material along the northern section. Mats of drift filamentous green algae occur on portions of the flats, aiding accretion by trapping sand and silt. Along the north-western, more marine section of the estuary, the Japanese oyster (<u>Crassostrea gigas</u>) occurs in small numbers near a discontinued commercial oyster lease. Another bivalve <u>Macoma inconspicua</u> occurs throughout the flats. Other common invertebrates include the burrowing shrimp (<u>Callianassa californiensis</u>), polychaete worms and shore crabs (<u>Hemigrapsus spp.</u>). Northern portions of this habitat type have been affected by log booming and storage activities. Evidence of grounding, abrasion, wood debris deposition and shading is apparent. Sediment discharge from the Crofton pulp and paper mill water filtration station in the south-east may contribute to the formation of flats in that area of the estuary.	222.1	28.9
Imh	This habitat type occurs on upper intertidal areas within the northeastern portion of the estuary. The marsh surface is relatively level and is drained by numerous incised channels. Vegetatively, these areas are characterized by the dominant occurrence of Arctic rush. Grasses, such as creeping bent grass and seashore salt grass, are abundant; Lyngbye's sedge, Pacific silverweed, sea-milk wort, and sea-side arrow-grass form minor vegetative constituents. Total cover averages 88%. High marsh habitat types of the southern portion of the estuary have been eliminated by dyking activity, and existing high marshes are subject to cattle grazing.	10.2	1.3
Imi	This habitat type which is covered by all high tides and some moderate tides, exhibits less plant diversity than the adjacent high marsh. Substrates are fine throughout. Intermediate marsh vegetation shifts in dominance from entire-leaved gumweed and seashore salt grass in the southeast to Lyngbye's sedge dominated vegetation towards the northwest. These shifts in dominance coincide with decreased salinity toward the northwest. Other common plants within this habitat type are sea-milk wort, sea plantain and sea-side arrow-grass. Total cover averages 80-90%. Drift filamentous green algae are also present. The southern side of the estuary receives fine sediment discharge from the Crofton pulp and paper mill water filtration station. Cattle grazing of intermediate marsh areas is particularly common in the north-west portion of this habitat type. Sea-side arrow-grass is a preferred food source.	74.8	9.8
Iml	This habitat type occupies the mid-intertidal area adjacent to the intertidal flats and is drained by the river and numerous tidal channels. The low marsh is characterized by pioneer plant species. American glasswort, occurring as dense mats and as scattered single plants, is dominant on the south-east side of the estuary in areas of higher salinity. Lyngbye's sedge is dominant in less saline areas that are closer to fresh water influences. Two species transitional between the low and intermediate marsh, sea-milk wort and seashore salt grass, commonly occur with the sedge. Total percent cover ranges from 40- 90%. Drift filamentous green algae is also common throughout this habitat type. <u>Corophium spp.</u> and other amphipods are found in tide pools and under marsh vegetation.	31.4	4.1
Ipl	This habitat type is limited to the Shoal Islands and is generally composed of bedrock overlain by sand, large pebbles and/or cobble. Exposed mainly to marine processes, these areas are formed by erosional wave action.	6.0	0.8
Ire	Included within this habitat are rock outcrops located within the intertidal flats. Upper areas are sparsely vegetated with grasses and herbs.	0.5	0.1
	BACKSHORE ZONE	351.0	45.8
Bba	This habitat type includes bars within the Chemainus River. These areas are continually modified by sediment transport and deposition and may exhibit changes in location and extent depending on river flow characteristics. Vegetative components consist of deciduous shrubs such as red alder and willow.	0.9	0.1
Bcr	Mainstem areas of the Chemainus River and Bonsall Creek which are not influenced by tidal action. Flows of the Chemainus River are much greater than that of Bonsall Creek, the former averaging 17 cms. Peak flows occur in the winter months, as a result of rainfall. <u>Enteromorpha intestinalis</u> is common on coarse substrates within both streams.	5.6	0.7
Bcs	This habitat type consists of a channel diverting the Chemainus River around a large bar. Flows are slightly slower than the mainstem.	0.4	0.1
Bfo	Coniferous, deciduous and mixed forests are found within the study area. Coniferous forests, dominated by coast Douglas fir are located above the floodplain on areas with moderate to steep topography. Salal forms an almost continuous shrub layer. Oceanspray, Pacific trailing blackberry and dull Oregon grape are also characteristic. Drier sites, with exposed rocky areas may contain significant amounts of Pacific madrone and Garry oak, while depressional areas are dominated by western hemlock and western red cedar. Most of these areas have been selectively logged in the past.	193.0	25.2
	Deciduous and mixed forests are located on lower portions of the floodplain. Deciduous trees such as big-leaf maple, balsam poplar, red alder and willow dominate stream side areas while conifers such as coast Douglas fir, western hemlock and western red cedar form much of the canopy in adjacent areas. The shrub layer is very diverse; salal and dull oregon-grape are important constituents.		
Bma	Backshore marshes are located within areas which have been dyked, but which are subject to periodic inundation by fresh and tidal water. The dominant plant species, usually occurring as relatively monospecific stands, are three-square bulrush, alkali bulrush, American great bulrush, cattail and Pacific common rush. Pacific silverweed, common cleavers and creeping bent grass occur in minor amounts along better drained fringe areas. Total cover averages 90%.	5.1	0.7
Bme	This grass dominated habitat type occurs in areas along river channels and former intertidal lands that have been dyked. Adjacent to backshore marsh areas on elevations intermediate between the marsh and pasture fields, seashore salt grass dominates, growing as a monoculture in some areas. Other areas support a more diverse assemblage of grasses and forbes with creeping bent grass and minor components of Arctic rush and Lyngbye's sedge. Total percent cover is about 65%. These areas are subject to cattle grazing and hay cropping.	23.9	3.1
Bpp	Permanent freshwater bodies which have been created by blockage of backchannels by road construction. These areas possess similar features to backchannel habitats.	0.5	0.1
Bpt	Depressional areas which normally dry by late summer. Many areas of this habitat type have been created by dyking of former intertidal channels. These basins are filled in the winter months through a combination of rainfall and overdyke flooding of marine water during extreme tides. Saline conditions result through evapotranspiration in the summer months. Edge vegetation is dominated by halophytic species such as glasswort, seashore salt grass and common orache.	0.8	0.1
Bsh	These habitat types are mainly hedgerow areas which have developed adjacent to cultivated fields. These are typically dominated by Himalayan blackberry and Nootka rose, and may contain shrubs such as Pacific crab apple, bitter cherry, and black hawthorn. Grasses, including quack grass, Yorkshire fog, blue grass, and bent grass, as well as yarrow, goldenrod and plantain are common along the fringes of these areas.	3.3	0.4
Bsw	Not a common unit within the study area, this habitat type occurs on poorly drained sites adjacent to backshore marshes. Characteristic vegetation is a mixture of deciduous and coniferous shrubs and trees.	1.2	0.2
B/2 B/2,4	This habitat type includes agricultural areas created by land clearing or dyking activites. These areas are used primarily as pasture or for hay cropping. Vegetation is dominated by forage species such as Yorkshire fog, quack grass, white clover, bent grass, brome grass and rye grass.	113.4	14.8
B/4	This unit consists of a railway causeway and agricultural dykes which extend across former intertidal areas. Drainage of the marshes bounded by the railway causeway is channeled through a floodgate located at the eastern end of the causeway. Drainage structures are also present in the larger agricultural dykes.	2.9	0.4
	Total area of entire study area.	791.9	100

6. Anthropogenic On Site Symbols



7. Sources of Further Information

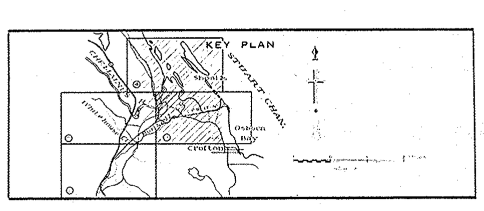
Bell, L.M. and R.J. Kallman. 1976. The Cowichan-Chemainus river estuaries status of environmental knowledge to 1975. Fisheries and Marine Service. Pacific Environment Institute, special estuary series, No. 4.' pp. 23-27, 48-49 and 78.

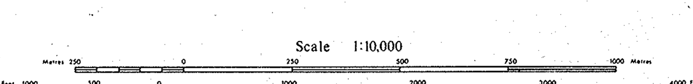
Hunter, R.A., L.E. Jones and M.M. Wayne. 1982. Estuarine Habitat mapping and classification system manual. APD Tech. Paper (in prep.). B.C. Ministry of Environment, Victoria, B.C.

Historical Photos Used. BC7751:201-204, BC7708:118-124, BC505 7:116-120, BC5002:16-19, 21-23, BC2082:48-49

8. Credits

Mapping supervised by R.A. Hunter
Mapped by A. Campbell, L.E. Jones, M.M. Wayne
Field Work by A. Campbell, L.E. Jones, R. Hunter, M.M. Wayne
Date of Field Work, June 1981
Photography Used BCC261:183-223
Map drafted by Cartography, Terrestrial Studies Branch
Base map provided by Surveys and Mapping Branch, Department of Lands and Forests, 1958 (updated by T.S.B.)





BRITISH COLUMBIA
DEPARTMENT OF LANDS AND FORESTS
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CHEMAINUS RIVER

DATE: MAY 1958	DRAWING NO. M-67
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