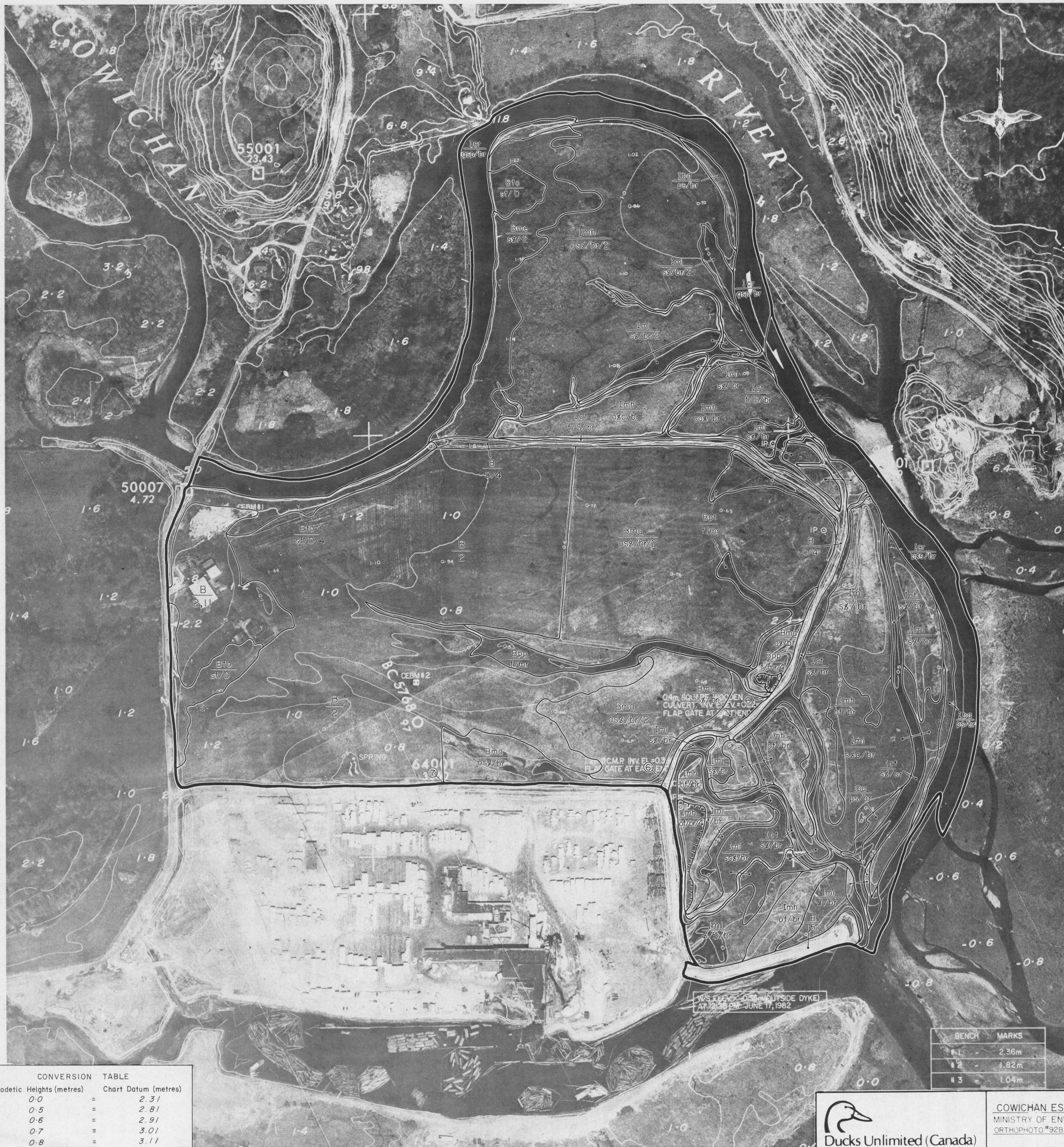
COWICHAN ESTUARINE HABITAT INVENTORY



BENCH	MARKS
#1	2.36m
#2	1.82m
#3	1.04m

CONVERSION TABLE

Geodetic Heights (metres)		Chart Datum (metres)
0.0	=	2.31
0.5	=	2.81
0.6	=	2.91
0.7	=	3.01
0.8	=	3.11
0.9	=	3.21
1.0	=	3.31
1.1	=	3.41

COWICHAN ESTUARY

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

ZONE (see Box 3) → Sss ← COMPONENT (see Box 3)

s / S / mr / 12

SUBSTRATES (see Box 4); VEGETATION (see Box 4); SALINITY (see Box 4); ANTHROPOGENIC (see Box 4)

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	s	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

SYMBOL	DESCRIPTION	AREA (ha)	TOTAL
	INTERTIDAL ZONE	26.6	46.2
Iba	This habitat type consists mainly of small pebble and sand areas formed by fluvial processes along the inside of river bends. Although vascular plants are usually absent, these areas are the precursors to intertidal marshes.	0.7	1.2
Icr	The northern and eastern side of the study area is bordered by the north arm of the Cowichan River. Low flows occur during June-September while freshet occurs during late fall and early winter. During normal flow conditions approximately 50% of the total flow is via the north arm. Although the Cowichan River flows have been regulated since 1958 at the outlet from the lake, freshet flows are nonetheless quite variable and flooding is common. In flood conditions, waters back up and are diverted into the south arm above the Pimbury bridge. Upstream overbanking also occurs resulting in water flooding the highway and flowing onto the farm directly north of the fill area occupied by Doman Industries' mill. Freshet conditions are compounded by high tides and the resultant tidal damming which further restricts north arm flows. In order to reduce flooding pressures, frequent upstream maintenance such as gravel removal, is conducted. This is a continuous stop-gap measure and other options to alleviate the problem are being explored.	5.3	9.2
Ict	Included in this habitat type are numerous sandy silt to fine textured, moderate to steep-sided channels which drain the intertidal marshes. Mats of ditch-grass, and on occasion duckweed, line the finer textured, slower moving, waterfilled channels. Channels which dry at low tide are often bordered by Canadian sand spurrey. Low marsh plants, especially Lyngbye's sedge are common along bank borders. Several of the channels have been blocked by dykes.	2.3	4.0
Imh	Found in the upper intertidal areas, this habitat type occurs on organic rich, fine to sandy silt substrates. In the eastern portion of the study area, high marshes are dominated by Douglas' aster and Arctic rush in association with Pacific silverweed, lamb's quarters, creeping bent grass and fescue. Adjacent to the dyke a few small dense patches of common cattail are found. Three units of high marsh habitat types occur within the northern part of the study area. Grasses, particularly creeping bent grass (60% cover) predominate in the larger grazed unit. In the ungrazed areas a grass (30% creeping bent grass, 8% tall fescue, 5% tufted hair grass)/Arctic rush (40%)/Pacific silverweed (20%) mixture occurs except in the highest sites where a marsh peavine (60%)/Arctic rush (50%) community predominates. The high marsh habitat type occurs within a tidal range of approximately 2.8 to 3.6 metres and is most frequently found between the 3.3 (mean higher high water) and 3.5 metre tidal range.	10.4	18.1
Imi	Occurring on silty substrates, this transitional habitat type is dominated by Arctic rush (50% cover), tufted hair grass (50% cover), and Lyngbye's sedge (25% cover) with Pacific silverweed, sea-side arrow-grass and sea milkwort commonly present. Ponds within the intermediate marsh near the jetty support dense mats of ditch-grass. The average tidal range for this habitat type is 2.8 to 3.3 metres (mean higher high water level).	4.0	6.9
Iml	This habitat type is characterized by Lyngbye's sedge dominated areas on sandy silt and sandy clayey silt substrates. At lower elevations monospecific stands of the sedge colonize and provide an average cover of 70%. At slightly higher elevations minor amounts of sea-side arrow-grass, spike-rush, tufted hair grass and pointed rush are commonly present. Drift Enteromorpha intestinalis is commonly found in this habitat. The tidal range for this habitat type is 2.3 to 2.8 metres. The mean water level for Cowichan Bay is 2.4 metres.	3.9	6.8
	BACKSHORE ZONE	31.0	53.8
Bfo	This habitat type is composed of mainly black cottonwood (along the river channel) and to a lesser extent, bigleaf maple. Willows are common understory species in the cottonwood areas.	1.5	2.6
Bma	Comprised of former intertidal lands that have been dyked off, this habitat type is dominated by organic substrates. Two major marsh communities are present. Seashore salt grass occurs in almost monospecific stands (60% cover) with minor occurrences of creeping bent grass, brassbuttons and lamb's quarters in distrubed areas. The other major community is more diverse being dominated by creeping bent grass (60% cover), with lesser amounts of Arctic rush, Pacific silverweed, seacoast angelica, and Lyngbye's sedge. Numerous pan areas sparsely vegetated by brassbuttons occur throughout. Wetter sites may have stands of alkali bulrush, often associated with three-square bulrush, American great bulrush, toad rush, Arctic rush, spike-rush, lamb's quarters and brassbuttons. Drainage channels border all but the western side of the marsh. If unprotected by the dyke this habitat type would be inundated by tides above 2.9 m. Haying and occasional cattle grazing occur in this habitat type.	9.6	16.7
Bme	This habitat type is comprised of grazed grass areas growing on silty sand substrates which are infrequently inundated and annually flooded. The dominant plant species are creeping bent grass, Yorkshire fog, blue grass and white clover. Greater plantain, Pacific common rush, ribwort plantain and Arctic rush occur to lesser extents. Minor amounts of buttercup, dandelion, foxtail and Canada thistle are present. In an effort to control the Pacific common rush, this habitat type was burned in 1980.	1.9	3.3
Bpp, Bpt	Temporary and permanent pond habitat types occupy relic channel areas. Lyngbye's sedge, alkali bulrush, three-square bulrush, American great bulrush, brassbuttons and Canadian sand spurrey often line these areas. The permanent pond contains ditch-grass and drift Enteromorpha intestinalis. At the eastern end of the pond numerous corophium tubes are present. It is likely that the algae entered the pond via the wooden floodgate at the eastern end. Bottom salinities in the unvegetated pond areas generally ranged from 20 to 23 ppt with extreme values of 27 ppt (edge) and 38 ppt (bottom) readings recorded in the dyked permanent pond.	1.3	2.3
B/2	This habitat type consists of former intertidal lands now used for crop production. Crops include a mixture of reed canary grass, orchard grass, oats and red and white clover. Unvegetated areas within this unit are restricted to former channels.	13.6	23.6
B/2,11	Included in this habitat type are meadows and farm buildings (barns and houses).	1.8	3.1
B/4	This habitat type is comprised of a hog-fuel core earthern dyke partially surrounding the farmland and Doman Industries. Channels created from dyke sidecasting border both sides of the northern section of the dyke. Another channel also borders the inside of the eastern portion of the dyke. Shrub communities, dominated by blackberry, have developed along the dyke. The average height of the dyke is equivalent to a 4.3 metre tidal elevation, which is the 30 year recorded highest high water extreme (based on Fulford Harbour). Due to age, materials and root and general erosion, the dyke is in a weakened condition. Annual blow-outs have recently occurred in the southeast section adjacent to Doman Industries.	0.9	1.5
B/15	An unconsolidated fill jetty bordering the northeast entrance to Doman's mill pond.	0.4	0.7
	Total of entire study area	57.6	100

6. Anthropogenic On Site Symbols

- bridge
- jetty
- dyke
- submarine cable
- float/wharf
- ramp
- rip rap
- (5) culvert
- floodgate (6)
- (7) outfall
- intake (8)
- study area boundary

7. Sources of Further Information

Bell, L.M. and R.J. Kallman. 1976. The Cowichan-Chemainus River Estuaries Status of Environmental Knowledge to 1975. Special Estuary Series No. 4. Report of the Estuary Working Group, Department of the Environment.

Environmental and Land Use Committee Secretariat. 1980. Cowichan Estuary Task Force Report. Province of British Columbia, Victoria, B.C.

Marshall, D.E., R.F. Brown, V. Chahley and D.G. Demontier. 1976. Catalogue of Spawning Stream and Statistical Escapements of Statistical Areas 17 and 18. Environment Canada, Fisheries and Marine Service, Pacific Region. Data Report TAC-D-76-6.

Planning and Resource Management Division. Coastal Water Bird Data Base. Surveys and Resource Mapping Branch, Ministry of Environment, Victoria, B.C.

8. Credits

Mapping supervised by R.A. Hunter
Mapped by M.M. Wayne
Field work by M.M. Wayne, A. Campbell, H.J. Quesnel
Date of field work, July 1982
Photography used BCC264:24-25, 39-42
Maps drafted by Cartography, Surveys and Resource Mapping Branch, January 1983.
Base map provided by Ducks Unlimited, Canada

ELEVATIONS RUN FROM
MUNICIPALITY OF NORTH
COWICHAN BENCH MARK
#78H8189 ELEV = 30.969m
GEODETIC

Ducks Unlimited (Canada)

COWICHAN ESTUARY
MINISTRY OF ENVIRONMENT
ORTHOPHOTO #92B 07.4.2 used for base
SCALE = 1:2500
FILE No.

PROVINCIAL MANAGER
ENGINEER

SURVEYED BY D.L.
DESIGNED BY
DRAFTED BY
CHECKED BY
DATE 82/6/17