092K.004

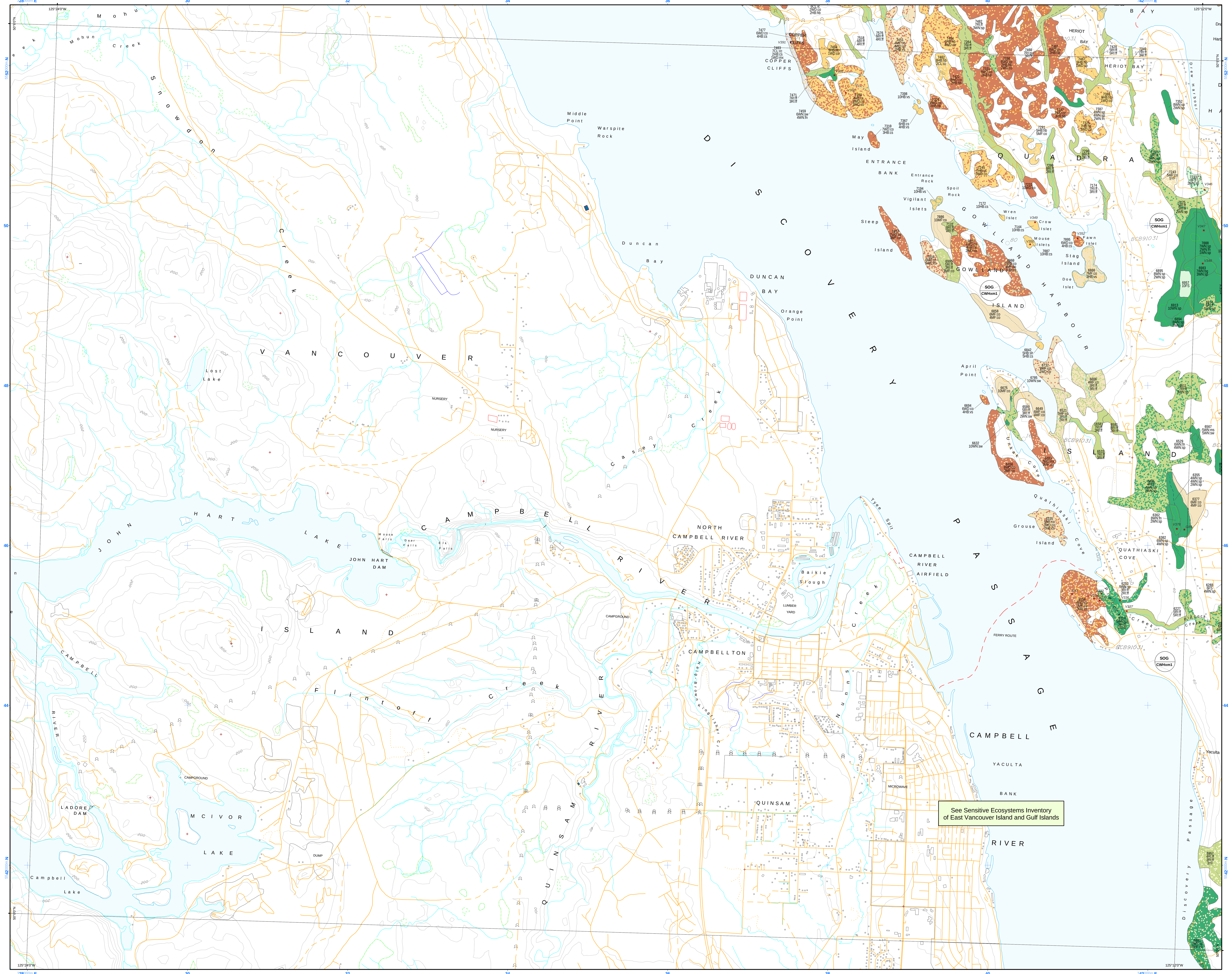
Sensitive Ecosystems Inventory of the Sunshine Coast and Adjacent Islands

Environment Canada / Environnement Canada

British Columbia

Comox-Strathcona Regional District

Sensitive and Terrestrial Ecosystems Labels



Sensitive and Terrestrial Ecosystems Label

- Polygon Number → **7838 ***
- * indicates a field sample was completed but was not mapped
- Biogeoclimatic Zone, Subzone & Variant → CWHxm1
- 6RI:ff RS 5 → 1st component
- 2RI:ff RF5 → 2nd component
- 2WD:co DC 6 → 3rd component
- % of polygon (as decile); SE Class; SE subclass; Mapcode; Structural Stage

The example label above indicates the SEI and TEM attributes mapped for polygon 7838. The polygon occurs in the Coastal Western Hemlock Eastern Very Dry Maritime variant; 80% of the polygon is RI:ff - Riparian: fluvial fringe (component 1 and 2). Of this 80%, 60% is site unit Western red-cedar - salmonberry (RS), structural stage 5 and 20% is site unit Western red-cedar - foamflower (RF), structural stage 5. The remaining 20% of the polygon is WD:co - Woodland:conifer dominated, site unit Douglas-fir - lodgepole pine - Cladina (DC), structural stage 6.

Structural Stage[1]

1	Sparse/bryoid	Substages 1a Sparse 1b Bryoid
2	Herb	Substages 2a Forb-dominated 2b Graminoid-dominated 2c Aquatic 2d Dwarf shrub
3	Shrub/Herb	Substages 3a Low shrub; less than 2 m. tall 3 Tall shrub; 2 – 10 m. tall
4	Pole/Sapling	Trees > 10 m. tall; typically densely stocked
5	Young Forest	Generally 40 – 80 years old depending on species and ecological conditions; forest canopy has begun to differentiate
6	Mature Forest	Generally 80 – 250 years since last disturbance; understory becomes well developed as canopy opens up; shade tolerant trees established
7	Old Forest	Generally over 250 years since last disturbance; structurally complex stands; Coarse woody debris (CWD) common.

[1] In the assessment of structural stage, structural features and age criteria are considered together. Broadleaf stands will generally be younger than coniferous stands belonging to the same structural stage.

Abbreviated from Standard for Terrestrial Ecosystem Mapping in British Columbia (RIC 1998)

Terrestrial Ecosystem Map Codes and Site Unit Names

Map Code	Site Unit Name	Map Code	Site Unit Name	Map Code	Site Unit Name
CDFmm		**CWHvm1 con't**		**CWHdm**	
CD*	black cottonwood - red-osier dogwood	AS	amabilis fir - western red-cedar - salmonberry	CD*	black cottonwood - red-osier dogwood
CS*	western red-cedar - slough sedge	SS*	Sitka spruce - salmonberry	CS*	western red-cedar - slough sedge
DA*	Douglas-fir - lodgepole pine - arbutus	**CWHxm1**		CW*	black cottonwood - willow
DG*	Douglas-fir - grand fir - Oregon grape	CD*	black cottonwood - red-osier dogwood	DC*	Douglas-fir - lodgepole pine - *Cladina*
DO*	Douglas-fir - oniongrass	CS*	western red-cedar - slough sedge	DF*	Douglas-fir - sword fern
DS*	Douglas-fir - salal	CW*	black cottonwood - willow	DS*	Douglas-fir - western hemlock - salal
EM*	estuarine marsh	DB	dune grass - beach pea	EM*	estuarine marsh
FC*	fescue - camas	DC*	Douglas-fir - lodgepole pine - *Cladina*	FC*	fescue - camas
FG*	fescue - gumweed	DF*	Douglas-fir - sword fern	FG*	fescue - gumweed
FO*	red fescue - poverty oatgrass - *Racomitrium*	DS*	Douglas-fir - western hemlock - salal	FO*	red fescue - poverty oatgrass - *Racomitrium*
HS	hardhack - sedge swamp	EM*	estuarine marsh	HD*	western hemlock - western red-cedar - deer fern
JM*	juniper - hairy manzanita	FC*	fescue - common camas	HM*	western hemlock - flat moss
LP*	Labrador tea - bog laurel - peat moss bog	FG*	fescue - gumweed	HS	hardhack - sedge swamp
LR	western hemlock - lodgepole pine - *Racomitrium*	FO*	red fescue - poverty oatgrass - Racomitrium	JM*	juniper - hairy manzanita
LS*	lodgepole pine - *Sphagnum* bog	HD*	western hemlock - western red-cedar - deer fern	LP	Labrador tea - bog laurel - peat moss bog
MS	sweet gale - Sitka sedge fen	HK*	western hemlock - Douglas-fir - *Eurhynchium*	LS	lodgepole pine - *Sphagnum*
NF	northern wormwood - red fescue - gumweed	HS	hardhack - sedge swamp	MS*	sweet gale - Sitka sedge fen
OR	oceanspray - rose	JM*	juniper - hairy manzanita	RB*	western red-cedar - salmonberry
RC*	western red-cedar - skunk cabbage	LP	Labrador tea - bog laurel - peat moss bog	RC*	western red-cedar - Sitka spruce - skunk cabbage
RF*	western red-cedar - grand fir - foamflower	LS	lodgepole pine - *Sphagnum*	RF*	western red-cedar - foamflower
RK*	western red-cedar - Douglas-fir - *Eurhynchium*	MS*	sweet gale - Sitka sedge fen	RS*	western red-cedar - sword fern
RP*	western red-cedar - Indian-plum	RB*	western red-cedar - salmonberry	SB*	slender sedge - white beak-rush fen
RS*	western red-cedar - snowberry	RC*	western red-cedar - Sitka spruce - skunk cabbage	SM	sedge marsh
RV*	western red-cedar - vanilla-leaf	RF*	western red-cedar - foamflower	SS*	Sitka spruce - salmonberry
SB*	slender sedge - white beak-rush fen	RS*	western red-cedar - sword fern	WP	water shield - pond lily
SM*	sedge marsh	RT*	western red-cedar - black twinberry		
SS	spirea - sedge wetland	SB*	slender sedge - white beak-rush fen	**Sparsely and Non-vegetated Units**	
WP*	water shield - pond lily	SM*	sedge marsh	CL	cliff: steep vertical or overhanging rock face
CWHvm1		SP*	Sitka spruce - Pacific crab apple	RI	river
AB	western hemlock - amabilis fir - blueberry	SS*	Sitka spruce - salmonberry	CF	cultivated field, subject to agricultural practices
AD*	amabilis fir - Sitka spruce - devil's club	WG*	white beak-rush - green sedge fen	OC	ocean
AF	amabilis fir - western red-cedar - foamflower	WP*	water shield - pond lily	PI	spit

* Indicates site unit is correlated to a red or blue listed natural plant community. See report for further details.
Consult with the BC Conservation Data Centre (CDC) for changes in classification since printing. http://srmapps.gov.bc.ca/apps/eswp/

Table adapted from the Provincial Site Series and Mapcodes List (mapcodes_jan2003.xls) available at: http://srmwww.gov.bc.ca/ecology/tem/list.html

What is a Sensitive Ecosystem?

For the purpose of this study, an *ecosystem* is considered to be a portion of the landscape with relatively uniform dominant vegetation.

Sensitive ecosystems are those which are fragile and/or rare, or those ecosystems which are ecologically important because of the diversity of species they support.

Rationale

Ecologically significant lands and important wildlife habitats are fast disappearing throughout the lowlands surrounding the Strait of Georgia. Intense development pressures fuelled by population and economic growth have fragmented and degraded many terrestrial ecosystems. A high proportion of these ecosystems are now designated as "at risk". Sensitive ecosystems typically have high biological diversity and are a vital part of the landscape. They provide ecosystem services for a healthy economy and for social well being. They regulate climate, clean water, generate and clean soils, recycle nutrients and pollinate our crops. To protect these areas, sensitive ecosystems must be located, identified and mapped. Along the Sunshine Coast the wave-beaten shorelines, coastal plains, rugged mountain slopes, fjords and estuaries contribute to high biodiversity values. Here one finds coastal temperate rainforests, dry shoreline woodlands, herbaceous meadows and rocky coastal bluffs, wetlands and riparian ecosystems.

Purpose

The purpose of the Sensitive Ecosystems Inventory (SEI) of the Sunshine Coast is to identify, classify and map sensitive terrestrial ecosystems along the coastal lowlands (including the adjacent islands) from Howe Sound to Desolation Sound. The goal of the SEI is to encourage informed land-use decisions that will conserve sensitive ecosystems. The SEI on Vancouver Island and Gulf Islands (1993 – 1997) shows that this information can be used in a variety of land-use planning processes and can contribute to the conservation of many sites. Decision makers, consultants and non-government organizations have found the SEI to be an effective planning and management tool. SEI data provides site-specific ecological information that can be used to flag sites of conservation concern, to prompt detailed field studies prior to development projects, and to provide input to Forest Stewardship Plans.

Methodology

The mapping methods are based on the Vancouver Island SEI project and the Resources Information Standards Committee (RISC) Standard for Terrestrial Ecosystem Mapping (TEM) in BC. Ecosystem categories include six *Sensitive Ecosystem (SE)* classes, two *Important Ecosystem* classes, and one *Other Ecosystem* class. The legend to the right of the map provides definitions. Ecosystem classes, subclasses, the corresponding Terrestrial Ecosystem site units and structural stages, and stream and drainage corridors not included in TRIM, are mapped. Field survey protocols followed Describing Terrestrial Ecosystems in the Field (RISC 1998) with the addition of a conservation evaluation form to document ecosystem condition and viability. Approximately 20% of the polygons were field checked.

Data Limitations

The SEI is a tool to alert decision makers to the existence of sensitive ecosystems, however when land-use changes are proposed detailed site-level assessments are necessary. For sites not field checked, the accuracy of the data depends heavily on the professional judgement of the mapper and the availability of source data. Because the area is changing rapidly, reference to the date of the information source is advised.

Aerial photographs used were flown between 1994 and 1999, most are at 1:10,000 scale, some at 1:16,000 scale. Due to the mapping scale, minimum polygon size is usually ½ hectare. Minimum riparian polygon width is 20 metres regardless of the stream channel width. Enlargement of the data beyond the source scale may result in unacceptable distortion and faulty registration with other data sets.

What can be done to protect sensitive ecosystems?

Direct and indirect impacts to these ecosystems can be avoided by:

- Retaining or creating vegetated buffers around sensitive ecosystems to isolate them from outside disturbance;
- Controlling land and water access to fragile ecosystems;
- Controlling invasive species;
- Allowing natural disturbances to occur;
- Maintaining water quality.

If development must occur, develop carefully!

Conduct an ecological inventory to identify the existing flora and fauna and to locate any threatened or endangered plant and animal species, plant communities, and habitat features needing protection;

Plan and implement all development activities in a manner that will not adversely affect or disturb the sensitive ecosystem.

Consult a qualified professional to interpret the ecological inventory data and work to incorporate designs that maintain the functions and values of the natural ecosystem.

If you are:

A property owner: learn more about the natural values of your land, including the location of any sensitive ecosystems. Find out how to protect, maintain, and enhance those values. Consider using conservation covenants or other measures to ensure that the natural features you value are protected in perpetuity.

A developer: consider a design for your project that is creative and flexible enough to protect and enhance sensitive ecosystems. Treed lots and neighbourhood greenspaces can increase market values.

A planner: ensure that conservation is given as high a priority as other community programs such as housing, transportation, recreation, employment, public works, and community services. Encourage use of the many legal and planning tools available, such as development permit areas, tree protection by-laws, and conservation covenants to protect sensitive ecosystems.

A decision-maker (such as a politician or resource manager): ensure that protection of remaining sensitive ecosystems is a priority at all levels, and support programs, plans and operational activity that will help protect sensitive ecosystems. Encourage and facilitate the development and implementation of biodiversity conservation strategies.

A member of an advocacy group: contribute your time and expertise to help locate and protect sensitive ecosystems. For example, ratepayers' groups, service organizations, naturalist clubs, land trusts, and conservancies often provide a link between local landowners and voluntary stewardship programs. As a member of one of these groups, you can work cooperatively with local governments to promote land use decisions that protect sensitive ecosystems.

A volunteer: participate in educational programs, conservation fundraising, or in programs to remove invasive species.

A scientist: use your expertise to help identify sensitive ecosystems, define issues that need to be addressed, formulate conservation plans, contribute to the development of conservation and management strategies and explain to other professionals and decision makers the importance of sensitive ecosystems.

Acknowledgements

Environment Canada (Canadian Wildlife Service) and the B.C. Ministry of Sustainable Resource Management (MSRM) jointly managed this project. Major funding came from Environment Canada and MSRM as part of the Georgia Basin Ecosystem Initiative, BC Habitat Conservation Trust Fund, and the Sunshine Coast Regional District. The multi agency steering committee included the above agencies as well as B.C. Ministry of Water, Land and Air Protection (WLAP), Sechelt Indian Band, Sliammon First Nation, Powell River Regional District, Comox-Strathcona Regional District, Fisheries and Oceans Canada (DFO), and Terminal Forest Products Ltd.

Co-ordination and extension: Carmen Cadrin, Judith Cullington, Jan Kirkby, Jo-Anne Stacey and Peggy Ward.

Ecosystem Mappers: Carmen Cadrin, Corey Erwin, Bob Fuller, Claudia Schaefer, Shearwater Mapping Ltd. and Jo-Anne Stacey.

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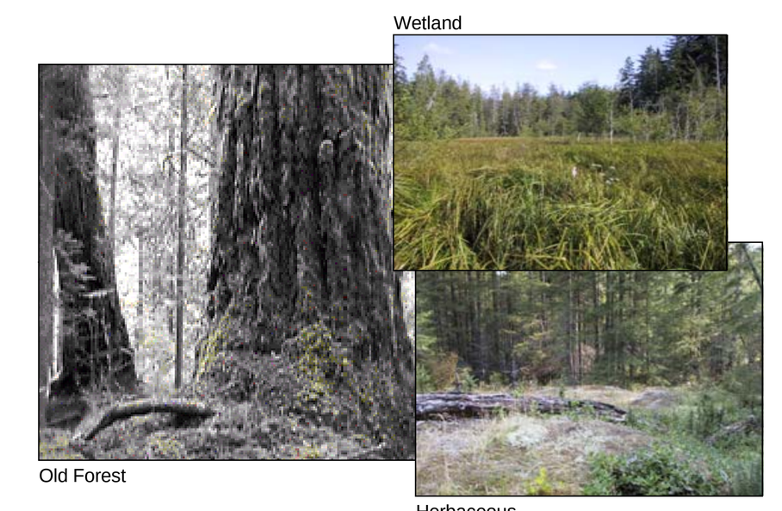
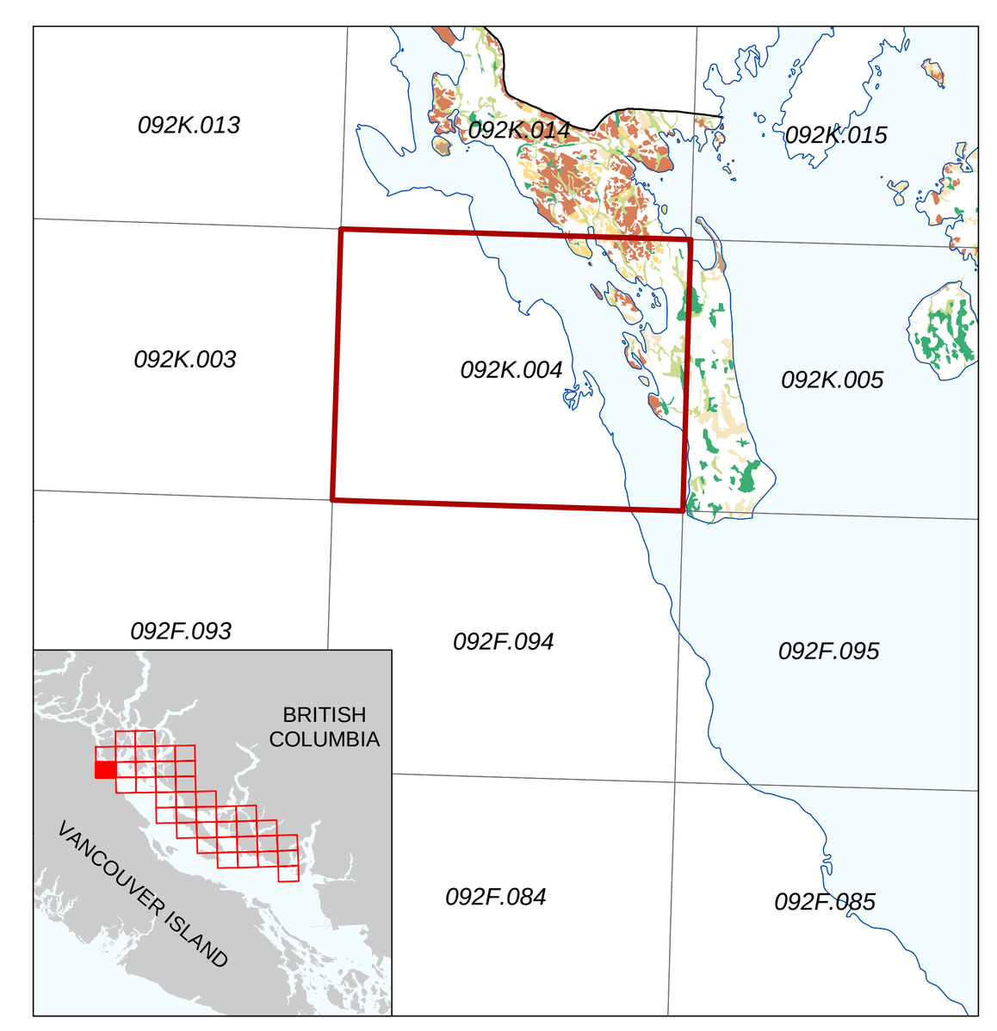
Field Crews: Louise Blight, Carmen Cadrin, Corey Erwin, Deepa Spaeth Filatow, Moraia Grau, Edwin Hubert, Stephen Hureau, Marc Johnson, Anre McIntosh, Will MacKenzie, Claudia Schaefer, Jo-Anne Stacey and Leah Westereng.



Old Forest — Wetland — Herbaceous



200 0 200 400 600 800 1,000 metres

Scale: 1:20,000

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UTM Projection Zone 10 NAD83, Contour Interval 20 metres
March 2005

Sensitive Ecosystems

Sensitive ecosystems are fragile and/or rare, or are ecologically important because of the diversity of species they support.

Old Forest (OF):

Conifer-dominated dry to moist forest types, structural stage 7 (see table), generally >250yrs.

Subclasses:

co (conifer dominated) – greater than 75% coniferous species

Woodland (WD):

Dry open forests, generally between 10 and 30% tree cover, can be conifer dominated or mixed conifer and arbutus stands; because of open canopy, will include non-forested openings, often with shallow soils and bedrock outcroppings.

Subclasses:

co (conifer dominated) – greater than 75% coniferous species

mx (mixed conifer and deciduous) – a minimum of 25% cover of either group is included in the total tree cover

Herbaceous (HB):

Non-forested ecosystems (less than 10% tree cover), generally with shallow soils and often with bedrock outcroppings; includes large openings within forested areas, coastal headlands, shorelines vegetated with grasses and herbs, sometimes low shrubs, and moss and lichen communities on rock outcrops.

Subclasses:

hb (herbaceous) – central concept of the category, non-forested, less than 10% tree cover, generally shallow soils, often with exposed bedrock; predominantly a mix of grasses and forbs, also lichens and mosses

cs (coastal herbaceous) - as **hb** but influenced by proximity to ocean, windswept shoreline and slopes; > 20% vegetation, grasses and herbs, some rock outcrops, moss and lichen communities

vs (vegetated shoreline) - low-lying rocky shoreline, soil pockets in rock cracks and crevices; salt-tolerant vegetation, generally with < 20% vegetation cover

sp (spit) - finger-like extension of beach, comprised of sand or gravel deposited by longshore drifting; low to moderate cover of salt-tolerant grasses and herbs

du (dunes) - ridge or hill, or beach area created by windblown sand; may be more or less vegetated depending on depositional activity, beach dunes will have low cover of salt-tolerant grasses and herbs

sh (shrub component) - > 20 % of total vegetation cover is shrub cover, with grasses and herbs

Riparian (RI):

Areas adjacent to water bodies (rivers, lakes, ocean, wetlands) which are influenced by factors such as erosion, sedimentation, flooding and/or subterranean irrigation due to proximity to the water body. Structural stages 1 – 7.

Subclasses:

fl (low bench floodplain) - flooded at least every other year for moderate periods of growing season; plant species adapted to extended flooding and abrasion, low or tall shrubs most common

fm (medium bench floodplain) - flooded every 1-6 years for short periods (10-25 days); deciduous or mixed forest dominated by species tolerant of flooding and periodic sedimentation, trees occur on elevated microsites

fh (high bench floodplain) - only periodically and briefly inundated by high waters, but lengthy subsurface flow in the rooting zone; typically conifer-dominated floodplains of larger coastal rivers

ff (fringe) - narrow linear communities along open water bodies (rivers, lakes and ponds) where there is no floodplain, irregular flooding

gu (gully riparian) - watercourse is within a steep sided V-shaped gully

ri (river) – watercourse is large enough to represent >10% of the polygon

Wetland (WN):

Areas that are saturated or inundated with water for long enough periods of time to develop vegetation and biological activity adapted to wet environments. This may result from flooding, fluctuating water tables, tidal influences or poor drainage conditions.

Subclasses:

bg (bog) – nutrient poor wetland, on organic soils (sphagnum peat), water source predominantly from precipitation; may be treed or shrub dominated

fn (fen) – nutrient medium wetland (sedge peat) where ground water inflow is the dominant water source, open water channels common; dominated by sedges, grasses and mosses

ms (marsh) – wetland with fluctuating water table, often with shallow surface water, usually organically enriched mineral soils; dominated by rushes, reeds, grasses and sedges

sp (swamp) – poor to very rich wetland on mineral soils or with an organic layer over mineral soil, with gently flowing or seasonally flooding water table; woody vegetation

sw (shallow water) – standing or flowing water less than 2 m. deep, transition between deep water bodies and other wetland ecosystems (i.e. bogs, swamps, fens, etc.); often with vegetation rooted below the water surface

wm (wet meadow) – periodically saturated but not inundated with water, organically enriched mineral soils; grasses, sedges, rushes and forbs dominate

Cliffs (CL):

Very steep slope, often exposed bedrock, may include steep sided sand bluffs; habitat for rare species.

Subclasses:

cc (coastal cliffs)

ic (inland cliffs)

Other Important Ecosystems

Other important ecosystems have high biodiversity values.

Mature Forests (MF):

Usually conifer-dominated, occasionally deciduous, dry to moist forest types, structural stage 6, generally >80yrs; > 25 ha. or buffering sensitive ecosystems.

Subclasses:

co (conifer dominated) – greater than 75% coniferous species

mx (mixed conifer and deciduous) - a minimum of 25% cover of either group is included in the total tree cover

Seasonally Flooded Agricultural Fields (FS):

Annually flooded cultivated fields or hay fields; important migrating and wintering waterfowl habitat.

Other Mapped Ecosystems

Other mapped ecosystems occur in mosaic with sensitive ecosystems and are not possible to delineate separately at the mapping scale.

Young Forests (YF):

Limited to areas of young forest dispersed among sensitive and other important ecosystems.

Polygon Label

- Polygon Number → **2167 ***
- * indicates a field sample was completed but was not mapped
- 5 RI:ff → 1st component
- 3 MF:co → 2nd component
- 2 WN:sp → 3rd component
- 20% of polygon (as decile); SE Class; SE subclass

Some polygon labels will have class and subclass repeated up to three times. This is not an error; it reflects the variability in site units and structural stages occurring within a polygon. More than one site unit can be correlated to a SE class and subclass. Polygon labels on the map do not include the site units. The Sensitive and Terrestrial Ecosystem Labels on the left side of the map provide details about site units mapped in each polygon.

Ecosystem Components

This cartographic product uses Dot Density to indicate where more than one ecosystem class is mapped in a polygon. The number of dots indicates the proportion of the polygon represented by the 2nd and 3rd ecosystem; the colour of the dots indicates the 2nd and 3rd ecosystem class.

The base colour represents the first ecosystem component.

Coloured dots overlaid upon the base colour indicate a second ecosystem component.

Two colours of dots indicate a second and third ecosystem.

Biogeoclimatic Units

CDFmm	Coastal Douglas-fir Moist Maritime Subzone
CWHxm1	Coastal Western Hemlock Eastern Very Dry Maritime Variant
CWHdm	Coastal Western Hemlock Dry Maritime Subzone
CWHvm1	Coastal Western Hemlock Submontane Very Wet Maritime Variant

Ecosection Unit: GEL — Biogeoclimatic Unit: CWHxm1

Biogeoclimatic Zone: CWH — Subzone: xm — Variant: 1

Ecosections

GEL	Georgia Lowlands Ecosection
SOG	Strait of Georgia Ecosection
OUF	Outer Fiordland Ecosection
SPR	Southern Pacific Ranges Ecosection

Map Symbols

- Polygon Boundary
- Biogeoclimatic Boundary
- Ecosection Boundary
- Study Area Boundary
- Roads
- 20m contours
- TRIM Streams
- Additional streams
- Intermittent/Potential Stream
- Drainage Route
- G153 — Field sample point
- BCC984145 — Flight line
- 106 — Air photo centre

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