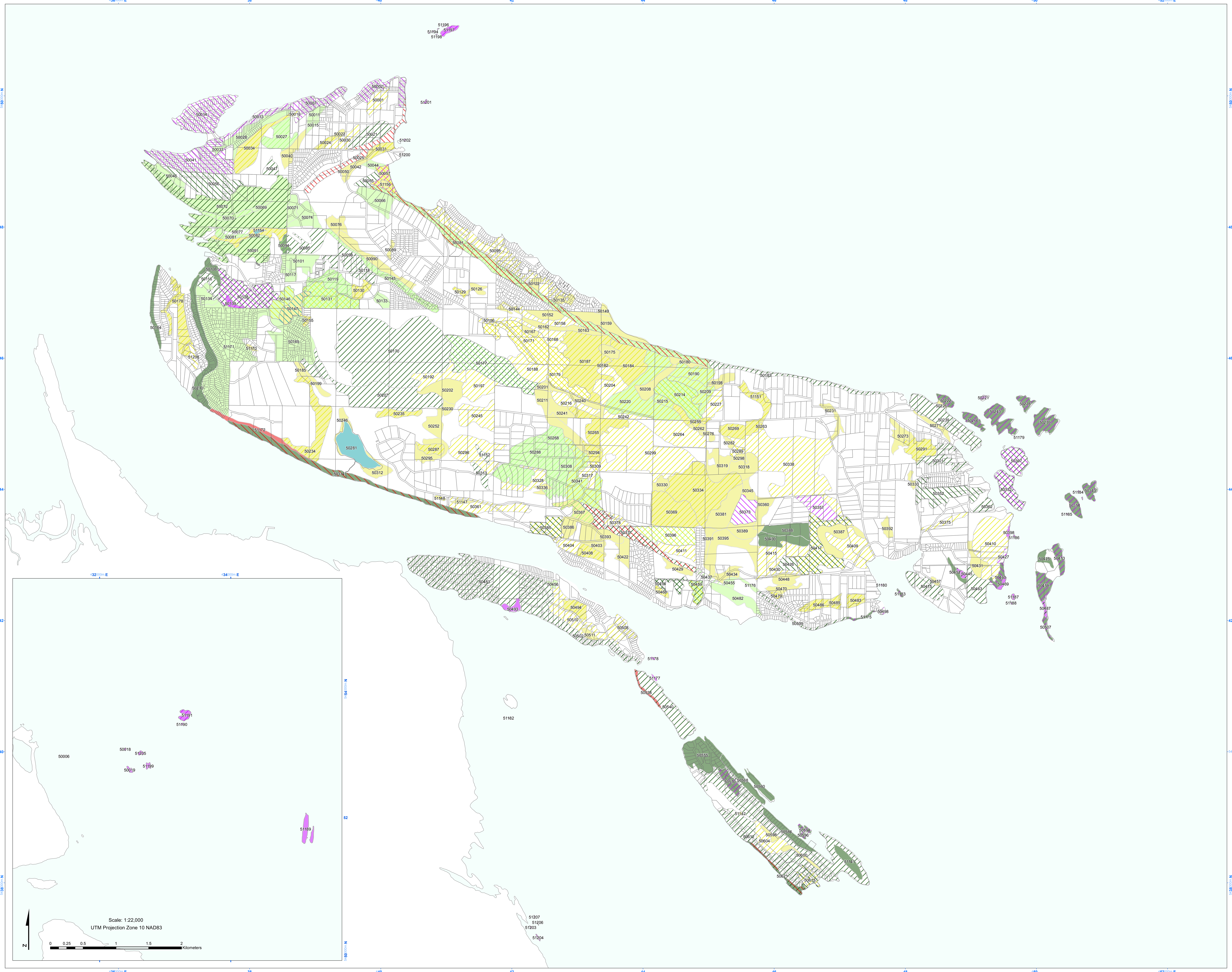
Gabriola Island
Sensitive Ecosystem Mapping
Airphoto - 2007

Scale: 1:22,000
UTM Projection Zone 10 NAD83

Sensitive and Terrestrial Ecosystems Label



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

Intense development pressure fueled by population and economic growth has fragmented and degraded many terrestrial ecosystems. A high proportion of these ecosystems are now designated as 'at risk' in BC. 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. From 1993 to 1999 the Provincial and Federal Governments completed a Sensitive Ecosystems Inventory of East Vancouver Island and the Gulf Islands. This mapping product is an updated version of that product.

Purpose

The purpose of this Sensitive Ecosystems map is to identify the location of sensitive ecosystems. The goal of this mapping exercise is to encourage informed land use decisions that will conserve sensitive ecosystems. This map and the accompanying data provide site-specific ecological information that can be used to flag sites of conservation concern, to promote land stewardship and to prompt detailed field surveys and consideration of ecological values before changes to the land are initiated.

Methodology

Mapping methods are based on the Resource Information Standards Committee (RISC) Standard for Terrestrial Ecosystem Mapping (TEM) in BC. This Sensitive Ecosystems map was themed from TEM data using the RISC Standard for Mapping Ecosystems at Risk in BC. Field survey protocols followed Describing Terrestrial Ecosystems in the Field (RISC 1998).

Data Limitations

The Sensitive Ecosystems map is a tool to alert decision makers to the existence of sensitive ecosystems. However, **when land-use changes are proposed, detailed on-the-ground site assessments are necessary**. For sites that were not field checked, the accuracy of the data depends heavily on the expertise, local knowledge, and professional judgment of the mapper and the quality and quantity of available source data. Because the area is changing rapidly, reference to the data set(s) used as the information source is advised.

Due to the mapping scale of the aerial photographs, the minimum polygon size is generally ½ hectare. 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 the 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 disturbances;
- 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.

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Project Co-ordination:
Kate Emmings – Islands Trust Fund
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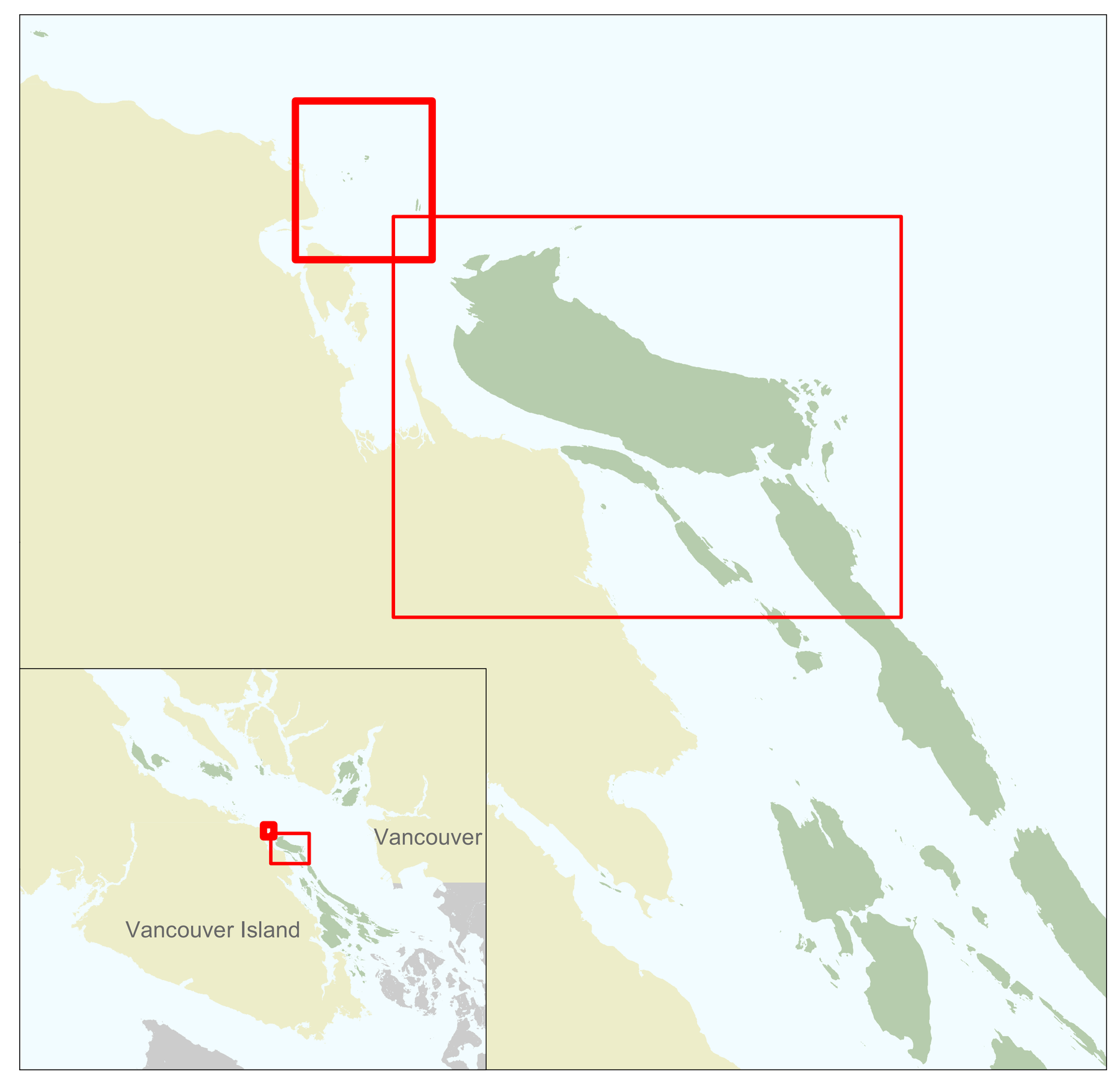
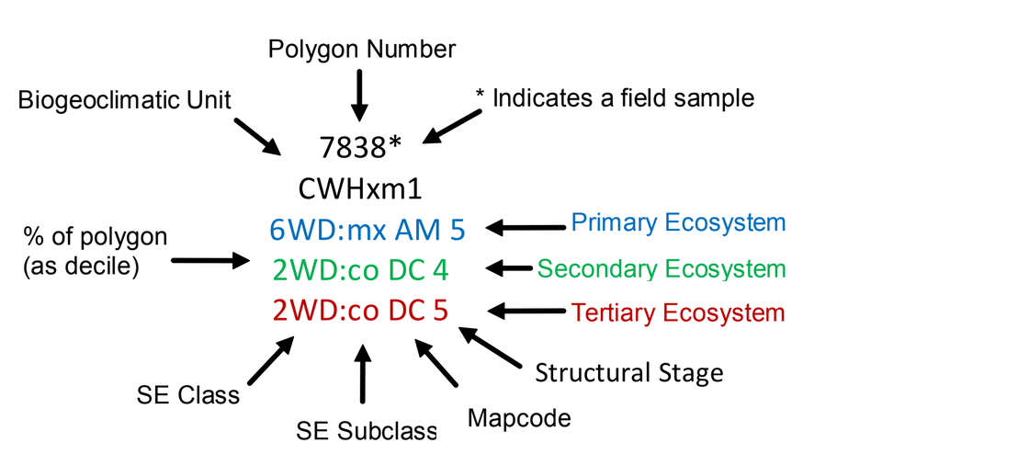


Sensitive and Terrestrial Ecosystems Label



The example label above indicates the SEM and TEM attributes mapped for polygon 7838. The polygon occurs in the Coast Western Hemlock Eastern Very Dry Maritime variant; 60% of the polygon is WD:mx - Woodland: mixed conifer and broadleaf (Primary Ecosystem), map code AM - Arbutus - Hairy manzanita, structural stage 5. The remaining 40% of the polygon is WD:co - Woodland: conifer dominated, map code DC - Douglas-fir - Western hemlock – Cladina (Secondary and Tertiary Ecosystems). Of this 40%, 20% is structural stage 4 and 20% is structural stage 5.

Structural Stage & Biogeoclimatic Units

Structural Stage	Description
0	No Structural Stage (usually rock or open water)
1	Sparse/bryoid
2	Herb
3	Shrub/Herb
4	Pole/Sapling
5	Young Forest
6	Mature Forest
7	Old Forest
Biogeoclimatic Units	**Description**
CDFmm	Coastal Douglas-fir Moist Maritime Subzone

Terrestrial Ecosystem Map Codes and Site Unit Names

Map Code	Site Unit Name	Map Code	Site Unit Name	Map Code	Site Unit Name	Map Code	Site Unit Name
CDFmm - Forested		CDFmm - Non-Forested		CDFmm - Non-Forested		Anthropogenic	
AS	Aspen - Slough sedge	Ed01	Tufted hairgrass - Meadow barley estuarine meadow	Wf51	Sitka sedge - Peat moss fen	RE	Reservoir
CS	Western redcedar - Slough sedge	Em02	Glasswort - Sea-milkwort estuarine marsh	Wf52	Sweet gale - Sitka sedge fen	RW	Rural residential
CW	Black cottonwood - willow	Em03	Seashore saltgrass	Wf53	Slender sedge - White beak-rush fen	RZ	Road surface
DA	Douglas-fir - Shore Pine - Arbutus	Em05	Lyngbye's sedge estuarine marsh	Wm05	Cattail marsh	UR	Urban
DG	Douglas-fir - Grand Fir - Oregon Grape	FC	Fescue - Camas	Wm50	Sitka sedge - Hemlock-parsely marsh	Map Code	Site Unit Name
DO	Douglas-fir - Oniongrass	HL	Hardhack - Labrador tea	Ws50	Pink spirea - Sitka sedge swamp	Sparsely Vegetated	
DS	Douglas-fir - Salal	LM	Dunegrass - Beach pea	Ws51	Sitka willow - Pacific willow - Skunk cabbage swamp	BE	Beach
GO	Garry oak - Oceanspray	OM	Garry oak - moss	Map Code	Site Unit Name	CL	Cliff
LS	Shore pine - Sphagnum	OR	Oceanspray - rose	Anthropogenic		LA	Lake
RC	Western redcedar - Skunk cabbage	QB	Garry oak - Brome (or mixed grasses)	CF	Cultivated field	MU	Mudflat
RF	Western redcedar - Grand fir - Foamflower	RA	Nootka rose - Pacific crab apple	CO	Cultivated orchard	OW	Open water (< 2m deep)
RK	Western redcedar - Douglas-fir - Oregon beaked moss	SC	Cladina - Wallace's selaginella	ES	Exposed soil	PD	Pond (> 2m deep)
RP	Western redcedar - Indian-plum	SL	Sedge - Western lilaeopsis	GC	Golf course	RI	River
RS	Western redcedar - Snowberry	SS	Spirea - Sedge wetland	GP	Gravel pit	RO	Rock outcrop
RV	Western redcedar - Vanilla-leaf	Wb50	Labrador tea - Bog laurel - Peat-moss bog	IN	Industrial		

Sensitive Ecosystems

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

Old Forest (OF): Primary Ecosystem / Secondary / Tertiary

Definition: Conifer-dominated dry to moist forest types, structural stage 7, generally >250yrs.

Importance: Due to the lack of disturbance, old forest ecosystems are often associated with rich communities of plants and animals that may be dependent upon the unique environmental conditions created by these forests.

Subclasses:

co (conifer-dominated) - greater than 75% coniferous species
mx (mixed conifer and deciduous) - forests dominated with a mixture of coniferous and broadleaf trees (<75% coniferous and >25% broadleaf)

Woodland (WD): Primary Ecosystem / Secondary / Tertiary

Definition: 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.

Importance: Woodlands are nationally, provincially and regionally rare and highly fragmented . A rich assemblage of plants, insects, reptiles and birds are drawn to these ecosystems due to the food sources, habitat and proximity to the ocean. Garry oak woodlands, for example support the highest plant species diversity of any terrestrial ecosystem in British Columbia and are especially vulnerable to rural development.

Subclasses:

bd (broadleaf) - dominant broadleaf with <15% coniferous species
mx (mixed conifer and deciduous) - mixed conifer and broadleaf with a minimum of 25% cover of either group is included in the total tree cover

Herbaceous (HB): Primary Ecosystem / Secondary / Tertiary

Definition: Non-forested ecosystems (less than 10% tree cover), generally with shallow soils. They include bedrock outcroppings, large openings within forested areas, spits, dunes and shorelines vegetetated with grasses and herbs.

Importance: Terrestrial Herbaceous ecosystems are characterized by thin soils which are easily disturbed. Herbaceous plants can be easily trampled or dislodged onto bare rock where they cannot re-establish. Thus they are highly vulnerable to a range of human disturbance factors including residential development and various recreational uses.

Subclasses:

hb (herbaceous) - 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) - rocky shoreline or islet, influenced by the marine environment and characterized by less than 20% vegetation cover of grasses herbs, mosses and lichens.
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) - >20% of total vegetation cover is shrub cover, with grasses and herbs
ro (rock) - rock outcrops not dominated by shrubs

Wetland (WN): Primary Ecosystem / Secondary / Tertiary

Definition: 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.

Importance: Wetland ecosystems are sensitive and important because they exhibit rarity, high biodiversity, fragility, specialized habitat, specialized functions and connectivity.

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 2m 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

Cliff (CL): Primary Ecosystem / Secondary / Tertiary

Definition: Very steep slope, often exposed bedrock, may include steep-sided sand bluffs.

Importance: Open ledges and horizontal fissures on cliffs are known to provide nesting sites. Cliff crevices are used for roosting bats while deep crevices are used for shelter and overwintering of snakes and lizards.

Subclasses:

cc (coastal cliffs) - cliffs with a marine influence, generally near vertical bedrock with accumulation of soil limited to fissures and ledges.
ic (inland cliffs) - inland cliffs: typically formed as a result of erosion, catastrophic failures or mass wastage. Generally characterized by rapid drainage and the accumulation of soil that is limited to bedrock fissures and ledges

Freshwater (FW): Primary Ecosystem / Secondary / Tertiary

Definition: Freshwater ecosystem includes bodies of water such as lakes and ponds that usually lack floating vegetation.

Importance: Freshwater ecosystems are home to numerous organisms such as, fish, amphibians, aquatic plants, and invertebrates. Lakes and ponds play a vital role in the lifecycle of many species.

Subclasses:

la (lake) - a naturally occurring static body of water, greater than 2m deep in some portion.
pd (pond) - a small body of water greater than 2m deep, but not large enough to be classified as a lake

Rare Ecosystems

Other important ecosystems have high biodiversity values.

Mature Forest (MF): Primary Ecosystem / Secondary / Tertiary

Definition: Usually conifer-dominated, occasionally deciduous, dry to moist forest types, structural stage 6, generally >80yrs.

Importance:

Future older forests Within 20 years, many Mature Forests that were logged early this century will become Older Forests. The biodiversity values of Mature Forests generally become higher with age. This means it will be able to sustain more and larger species of plants and animals.

Landscape connectivity Mature Forest stands provide connections between other natural areas that promote the movement and dispersal of many forest-dwelling species across the landscape.

Buffers Mature Forest can minimize disturbance to sensitive ecosystems that occur within or adjacent to the forest patch. Where they border or surround wetlands, patches of older forest or other sensitive ecosystems, the Mature Forest area serves an important role in buffering the adjacent sensitive areas.

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
bd (broadleaf) - greater than 75% broadleaf species

Other Mapped Ecosystems

Young Forest (YF):

Definition: Limited to areas of young forest dispersed amongst sensitive and important ecosystems. Forest is 40 - 80 yrs old depending on species and ecological conditions; canopy has begun to differentiate.

Seasonally Flooded Agricultural Fields (FS):

Definition: Limited to areas of annually flooded cultivated fields or hay fields dispersed amongst sensitive and important ecosystems.

Non-Sensitive (NA):

Definition: Limited to areas of disturbance or human impact dispersed amongst sensitive and important ecosystems.

Ecosystem Map Symbols

Ecosystem composition is complex and often contains a dominant ecosystem with secondary and tertiary ecosystems. In this map the dominant ecosystem has a solid shading and the secondary and tertiary ecosystems are identified by cross-hatched lines.

Example of a primary sensitive Woodland ecosystem with a secondary sensitive Herbaceous ecosystem

Occassionally sensitive ecosystems will mix with non-sensitive ecosystems. In this map a sensitive ecosystems mixed with non-sensitive is identified by cross-hatched lines with solid white shading.

Example of a secondary sensitive Herbaceous and tertiary sensitive Woodland ecosystems mixed with a non-sensitive primary ecosystem

Sensitive ecosystems can also mix with important ecosystems. In this map a sensitive ecosystem mixed with an important ecosystem is identified by cross-hatched lines with solid green shading.

Example of a tertiary sensitive Herbaceous ecosystem mixed with a primary important Mature Forest ecosystem