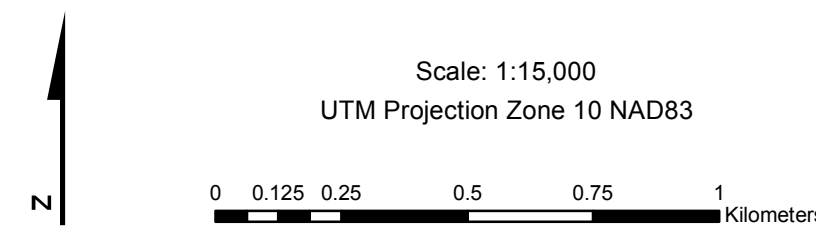
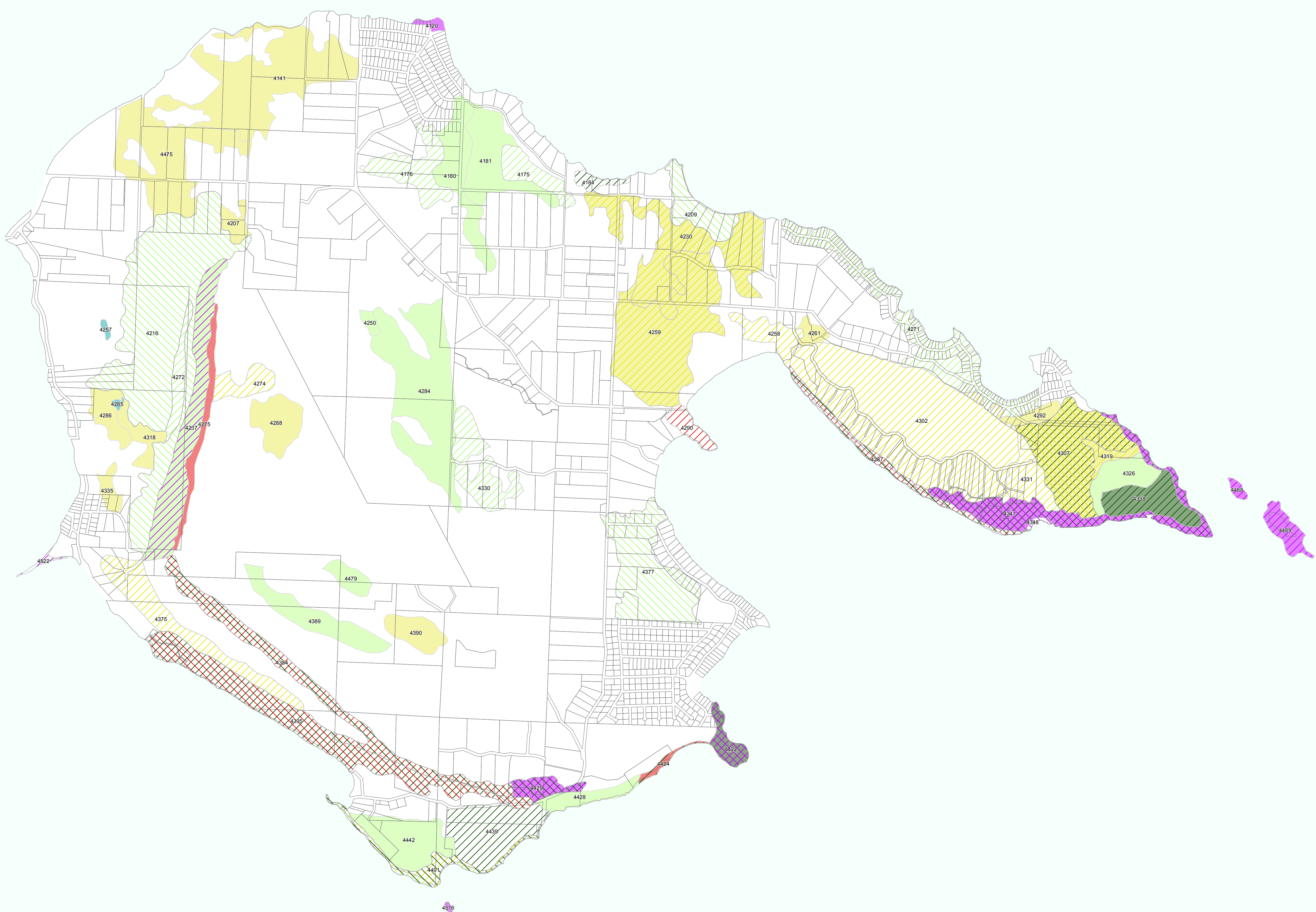


Hornby Island Sensitive Ecosystem Mapping Airphoto - 2001



4120	4141	4175	4176	4180*	4181	4184
CDfmm W8W ca RD 2 9NA BE 1	CDfmm 5W1W ca RW 5 2YF DS 5 2NA RW 5	CDfmm 4YF DS 5 2MF ca DS 6	CDfmm 4YF DS 5 3MF ca RW 5 2YF DS 5	CDfmm 5W1W ca DS 5 9NA RW 5 2YF DS 5	CDfmm 5W1W ca DS 5 9NA DS 5	CDfmm 5YF DS 5 3W2W ca DS 5 2NA RW 5
4207	4209*	4216	4230*	4237*	4250	4257
CDfmm 10W ca RW 5	CDfmm W8W ca RW 5 2YF DS 5 2MF ca DS 6	CDfmm 4YF DS 5 2YF DS 5 2MF ca DS 6	CDfmm 5W1W ca DS 5 2NA RW 5	CDfmm 5W1W ca DS 5 2NA RW 5	CDfmm 5W1W ca DS 5 2NA RW 5	CDfmm 5W1W ca DS 5 2NA RW 5
4258	4259*	4261	4271	4272	4274	4275*
CDfmm 5YF DS 2 4W ca RW 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5
4284*	4285	4286	4287	4288	4290	4292
CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5
4302	4307	4318	4319	4326	4330	4331
CDfmm 5YF DS 5 2NA RW 5	CDfmm 4W1W ca DS 5 4W1W ca DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5
4335	4338	4347	4348	4375	4377	4384
CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5	CDfmm 5W1W ca RW 5 2NA RW 5
4389	4390	4395*	4422	4424	4428	4429
CDfmm 10W ca DS 6	CDfmm 10W ca DS 6	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5
4439	4442	4475*	4479	4488	4489	4491
CDfmm 5YF DS 2 4W ca RW 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5	CDfmm 5W1W ca RW 5 2YF DS 5
4516	4517	4522				
CDfmm 10W ca RD 1	CDfmm 10W ca RD 1	CDfmm 10W ca RD 1				



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 >250y.

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 naturally, provincially and regionally rare and highly fragmented. A rich assemblage of plants, insects, reptiles and birds are often to these ecosystems due to the food sources, habitat and proximity to the ocean. Carry oak woodlands, for example support the highest plant species diversity of any terrestrial ecosystem in British Columbia and are especially vulnerable and in need of 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 vegetated 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 herbs, also ferns and mosses
ca (coastal herbaceous) - rocky shoreline or island, influenced by the marine environment and characterized by less than 20% vegetation cover of grasses, herbs, mosses and lichens
sp (spits) - fringing extension of beach, composed 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
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, highly specialized habitats, specialized functions and connectivity.

Subclasses: **bd** (bog) - nutrient poor wetland, on organic soils (sphagnum peat), water source predominantly from precipitation, may be tree 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
ma (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 poorly growing or seasonally flooding water table, woody vegetation
sh (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
wet (wet meadow) - periodically saturated but not inundated with water, organically enriched mineral soils, grasses, sedges, rushes and ferns dominant

Cliff (CL): Primary Ecosystem Secondary Tertiary

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

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: **cl** (coastal cliffs) - cliffs with a marine influence, generally near vertical bedrock with accumulation of soil limited to fissures and ledges
in (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.

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 >80y.

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.
Landscaping connectivity Mature Forest stands provide connections between other natural areas that promote the movement and dispersal of many forest-dwelling species across the landscape.
Buffer Mature Forest can minimize disturbance to sensitive ecosystems that occur within or adjacent to the forest path. 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): 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): Limited to areas of annually flooded cultivated fields or hay fields dispersed amongst sensitive and important ecosystems.

Non-Sensitive (NA): 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

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

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

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. The mapping project 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 ecosystem 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 derived from TEM data using the RISC Standard for Mapping Ecosystems at Risk in BC. Field survey protocols followed Describing Terrestrial Ecosystems in the Field (DTEF, 1996).

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 sets is used as the information source is advised.

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 factors and values of the natural ecosystem.

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Shi Tsang - BC Ministry of Environment
GIS Mapping Support: Mark van Bakel - Islands Trust

Sensitive and Terrestrial Ecosystems Label

Biogeoclimatic Unit: 7838*
Polygon Number: CWHem1
% of polygon: 6WDC:mx AM 5
2WDC:DC 4
2WDC:DC 5
SE Classes: SE Subclass: Mapcode

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, 80% of the polygon is WDzmx - Woodland, mixed conifer and broadleaf (Primary Ecosystem), map code AM - Arbutus - Hairy manzanita, structural stage 5. The remaining 40% of the polygon is WDzco - 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 M1 & 2
CDfmm	Sub one

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		Map Code <td>Site Unit Name</td> <td>Map Code <td>Site Unit Name</td> </td>	Site Unit Name	Map Code <td>Site Unit Name</td>	Site Unit Name
AS	Aspen - Slough sedge	ED1	Tufted hairgrass - Meadow barley estuarine meadow	WB1	Sika sedge - Peat moss fen	RE	Renssencer
CS	Western redcedar - Slough sedge	EM2	Grasswort - Seemilkwort estuarine marsh	WR2	Sweet gale - Sika sedge fen	RW	Rural residential
CW	Black cottonwood - willow	EM3	Seashore saltgrass	WB3	Slender sedge - White oak-rush fen	RZ	Road surface
DA	Douglas-fir - Shore Pine - Arbutus	EM5	Lyngby's sedge estuarine marsh	UR	Cattail marsh	UR	Urban
DD	Douglas-fir - Grand Fir - Oregon Grape	FC	Fescue - Gamas	WV6	Sika sedge - Hemlock-parsley marsh	Map Code	Site Unit Name
DI	Douglas-fir - Oribongass	HA	Hardhack - Labrador tea	WV60	Pink spirea - Sika sedge swamp	Map Code	Site Unit Name
DS	Douglas-fir - Sidal	LA	Diagnosis - Heart pea	RE	Beach	Map Code	Site Unit Name
GO	Garry oak - Oshesprany	LM	Garry oak - virens	WV1	Sika sedge - Pacific willow - Slurk cabbage swamp	CL	Cliff
LS	Shore pine - Oshesprany	OM	Oshesprany - rose	Map Code	Site Unit Name	LA	Lake
RC	Western redcedar - Slurk cabbage	OB	Garry oak - Blome (or mixed grasses)	OC	Cultivated field	MU	Mudflat
RF	Western redcedar - Grand Fir - Foamflower	RA	Nootka rose - Pacific crab apple	OF	Cultivated orchard	OW	Open water (< 2m deep)
RK	Western redcedar - Douglas-fir - Oregon blacked moss	SC	Cladina - Wall's sedge	OS	Exposed soil	PD	Pond (> 2m deep)
RP	Western redcedar - Indian-plum	SL	Sedge - Western wetland	GC	Out course	RI	River
RS	Western redcedar - Snowberry	SS	Spirea - Sedge wetland	GP	Gravel pit	RO	Rock outcrop
RV	Western redcedar - Bog laurel - Peat-moss bog	WV50	Labrador tea - Bog laurel - Peat-moss bog	N	Industrial		

