

4**80**000m.**E**

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What is a Sensitive Ecosystem?

For the purpose of this study, an ecosystem is considered to be a portion of diversity and are a vital part of the landscape. They ecological information that can be used to flag sites of accuracy of the data depends heavily on the expertise, sensitive ecosystems to isolate them from outside the landscape with relatively uniform

Rationale

Sensitive ecosystems are those which are must be located, identified and mapped. From 1993 to Methodology fragile and/or rare, or those ecosystems a Sensitive Ecosystems Inventory of East Vancouver Mapping methods are based on the Resource Information minimum polygon size is generally ½ hectare. which are ecologically important because Island and the Gulf Islands. This mapping product is an Standards Committee (RISC) Standard for Terrestrial Enlargement of the data beyond the source scale may of the diversity of species they support. updated version of that product.

dominant vegetation.

Sensitive and Terrestrial Ecosystems Label										
Biogeoclimatic Unit	Polygon Number * Indicates a field sample									
% of polygon (as decile)	CWHxm1 6WD:mx AM 5									
SE Class	SE Subclass Mapcode									

The example label above indicates the SEM and TEM atributes 🛛 mapped for polygon 7838. The polygon occurs in the Coast Western Hemlock Eastern Very Dry Maritne 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-fr 2-Western hemlock – Cladina (Secondary and Tertary 🛽 Ecosystems). Of this 40%, 20% is structural stage 4 and 20% is structural stage 5.



our crops. To protect these areas, sensitive ecosystems 1999 the Provincial and Federal Governments completed Ecosystems map was themed from TEM data using the other data sets.

RISC Standard for Mapping Ecosystems at Risk in BC. Field survey protocols followed Describing Terrestrial Ecosystems in the Field (RISC 1998). 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 Unit	Description				
CWHdm	Coastal Western Hemlock Dry Maritime Subzone				
CWHvm2	Coastal Western Hemlock Very Wet Maritime Subzone, Montane Variant				
CWHxm1	Coastal Western Hemlock Very Dry Maritime Subzone, Eastern Variant				

Intense development pressure fueled by population and The purpose of this Sensitive Ecosystems map is to The Sensitive Ecosystems map is a tool to alert decision terrestrial ecosystems. A high proportion of these this mapping exercise is to encourage informed land use However, when land-use changes are proposed, avoided by: ecosystems are now designated as 'at risk' in BC. decisions that will conserve sensitive ecosystems. This detailed on-the-ground site assessments are provide ecosystem services for a healthy economy and for conservation concern, to promote land stewardship and to local knowledge, and professional judgment of the mapper disturbances; social well being. They regulate climate, clean water, prompt detailed field surveys and consideration of and the quality and quantity of available source data. generate and clean soils, recycle nutrients and pollinate ecological values before changes to the land are initiated. Because the area is changing rapidly, reference to the data set(s) used as the information source is advised. • Controlling invasive species; Due to the mapping scale of the aerial photographs, the Maintaining water quality Ecosystem Mapping (TEM) in BC. This Sensitive result in unacceptable distortion and faulty registration with

What can be done to protect the sensitive

economic growth has fragmented and degraded many identify the location of sensitive ecosystems. The goal of makers to the existence of sensitive ecosystems can be and an and to locate any threatened or Brodie Porter – Islands Trust Fund Brodie Porter – Islands Trust, Local Planning Services

- Sensitive ecosystems typically have high biological map and the accompanying data provide site-specific necessary. For sites that were not field checked, the Retaining or creating vegetated buffers around
 - ecosystems;
 - Allowing natural disturbances to occur;

Terrestrial Ecosystem Man Codes and Site Unit Names

If development must occur, develop carefully!

and habitat features needing protection.

natural ecosystem.

	Terrestrial Ecosystem Map Codes and Site Onit Names													
Map Cod	e Site Unit Name	Map Code	Site Unit Name	Map Cod	de Site Unit Name	Map Code	Site Unit Name	Map Code	Site Unit Name					
CWHdr	n - Forested	CWHvm2	2 - Forested	CWHxr	m1 - Forested	CWHxm -	Non-Forested	Anthropog	enic					
CD	Black cottonwood - Red osier dogwood	AB	Western hemlock - Amabilis fir - Blueberry	DF	Douglas-fir - Sword fern	RO	Rock outcrop	RW	Rural					
DC	Douglas-fir - Shorepine - Cladina	AF	Amabilis fir - Western redcedar - Foamflower	DS	Douglas-fir - Western hemlock - Salal	SC	Cladina - Wallace's selaginella	RZ	Road surface					
DF	Douglas-fir - Sword fem	AS	Amabilis fir - Western redcedar - Salmonberry	HD	Western hemlock - Western redcedar - Deer fern	SW	Sedge wetland	UR	Urban / Suburban					
DS	Douglas-fir - Western hemlock - Salal	HD	Western hemlock - Amabilis fir - Deer fern	нк	Western hemlock - Douglas-fir - Oregon beaked moss	Wb50	Labrador tea - Bog laurel - Peat-moss bog	Map Code	Site Unit Name					
HD	Western hemlock - Western redcedar - Deer fern	HS	Western hemlock - Western redcedar - Salal	RB	Western redcedar - Salmonberry	Wf53	Slender sedge - White beak-rush fen	Sparsely	/egetated					
HM	Westem hemlock - Flat moss	LC	Western hemlock - Shorepine - Cladina	RC	Westem redcedar - Sitka spruce - Skunk cabbage	Ws50	Pink spirea - Sitka sedge swamp	BE	Beach					
LS	Shore pine - Sphagnum	RS	Western redcedar - Western hemlock - Sword fern	RF	Western redcedar - Foamflower	Ws51	Sitka willow - Pacific willow - Skunk cabbage swamp	CL	Cliff					
RC	Westem redcedar - Skunk cabbage	YG	Western redcedar -Yellow-cedar Goldthread	RS	Western redcedar - Swordfern	Map Code	Site Unit Name	LA	Lake					
RF	Western redcedar - Foamflower	Map Code	Site Unit Name	RT	Western redcedar - Black twinberry	Anthropog	, enic	MU	Mudflat					
RS	Western redcedar - Snowberry	CWHvm2	* Non-Forested	SS	Sitka spruce - Salmonberry	CF	Cultivated field	OW	Open water (< 2m deep)					
Map Cod	e Site Unit Name	Wf52	Sweet gale - Sitka sedge fen	Map Cod	de Site Unit Name	СО	Cultivated orchard	PD	Pond (> 2m deep)					
CWHdm	Non-Forested	Map Code	Site Unit Name	CWHxm	- Non-Forested	ES	Exposed soil	RI	River					
SC	Cladina - Wallace's selaginella	CWHxm	1 - Forested	AM	Arbutus - Hairy manzanita	GC	Golf course	RO	Rock outcrop					
Wb50	Labrador tea - Bog laurel - Peat-moss bog	CS	Western redcedar - Slough sedge	CL	Cliff	GP	Gravel pit							
Wf50	Narrow-leaved cotton-grass - Peat moss fen	CW	Black cottonwood - willow	FC	Fescue - Camas	IN	Industrial							
Wf52	Sweet gale - Sitka sedge fen	DC	Douglas-fir - Lodgepole pine - Cladina	HL	Hardhack - Labrador tea	RE	Reservoir							



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Bowyer and Passage Islands Sensitive Ecosystem Mapping Airphoto - 2006

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% Woodland (WD): Primary Ecosystem

Subclasses: bd (broadleaf) - dominant broadleaf with <15% coniferous species tree cover

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

Riparian (RI): species for the area they occupy. Subclasses:

sh (shrub) - shrub-dominated floodplain or lakeshore

<u>Subclasses</u>: shrub dominated 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

Subclasses:

Non-Sensitive (NA):

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.



Conduct an ecological inventory to identify the existing Kate Emmings – Islands Trust Fund endangered plant and animal species, plant communities, Terrestrial Ecosystem Mapping: Madrone Environmental Services Ltd. Plan and implement all development activities in a manner Sensitive Ecosystem Mapping Conversion: that will not adversely affect or disturb the sensitive Madrone Environmental Services Ltd. ecosystem. Consult a qualified professional to interpret the ecological inventory data and work to incorporate Sensitive Ecosystem Mapping Review: designs that maintain the functions and values of the Kate Emmings – Islands Trust Fund GIS Mapping Support: Mark van Bakel - Islands Trust



4**78**000m.**E**

Passage Island



Scale: 1:15,000 UTM Projection Zone 10 NAD83

Sensitive Ecosystems

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

Tertiary

Tertiary

Tertiary

Tertiary

Tertiary

Old Forest (OF): Primary Ecosystem Secondary **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.

Secondary **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.

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

Herbaceous (HB): Primary Ecosystem

Definition: Non-forested ecosystems (less than 10% tree cover), generally with shallow soils. They include bedro iteroppings, 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.

Secondary

Secondary

Secondary

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 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

ro (rock) - rock outcrops not dominated by shrubs

Primary Ecosystem

Definition: 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. Importance: Riparian ecosystems support a disproportionately high number of vascular plant, moss, amphibian and small mammal

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 with open water bodies (rivers, lakes and ponds) where there is no floodplain, irregular flodding 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): Primary Ecosystem

Definition: Areas that are saturated or inundated with water for long enough periods of time to develop vegetation. 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. bg (bog) - nutrient poor wetland, on organic soils (sphagnum peat), water source predominantly from precipitation; may be treed or 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

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: Lakes and ponds play a vital role in the lifecycle of many species. 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 Tertiary Secondary **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.

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.

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

> 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