

North Pender Associate Southern Islands Sensitive Ecosystem Mapping Airphoto - 2004

Scale: 1:16,000
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.

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)
bd (broadleaf) - dominated by large old broadleaf trees

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 deciduous 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 drawn to these ecosystems due to the food sources, habitat and proximity to the ocean. Many oak woodlands, for example support the highest plant species diversity of any temperate ecosystem in British Columbia and are especially vulnerable to rural development.
Subclasses:
ml (mixed 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: Temperate herbaceous ecosystems are characterized by thin soils which are easily disturbed. Herbaceous plants can be easily trampled or obliterated into 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
co (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 (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 rim of beach area created by wind-blown sand, may be more or less vegetated depending on depositional activity, beach dunes will have low cover of salt-tolerant grasses and herbs
st (strath) - 100% of total vegetation cover is shrub cover, with grasses and herbs
ro (rock) - rock outcrops not dominated by shrubs

Riparian (RI): Primary Ecosystem Secondary Tertiary

Definition: Areas adjacent to water bodies (rivers, lakes, ocean, wetlands) which are influenced by factors such as erosion, sedimentation, flooding and submergence together with the water body. Structural stages 1 - 7.
Importance: Riparian ecosystems support a disproportionately high number of vascular plant, moss, amphibian and small mammal species for the area they occupy.
Subclasses:
fl (low bench floodplain) - flooded at least every other year for moderate periods of growing season; plant species adapted to extended flooding and desiccation, low or tall shrubs most common
ml (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
hl (high bench floodplain) - only periodically and briefly inundated by high waters, but largely submerse flow in the rooting zone; typically conifer-dominated floodplains of larger coastal rivers
fr (fringe) - narrow linear communities along with open water bodies (rivers, lakes and ponds) where there is no floodplain, irregular flooding only (light riparian); watercourse is within a steep sided V-shaped gully
rl (river) - watercourse is large enough to represent 10% of the polygon
st (strath) - shrub-dominated floodplain or lakeshore

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, including water tables, tidal influences or poor drainage conditions.
Importance: Wetland ecosystems are sensitive and important because they exist rarely, high biodiversity, fragile, specialized habitat, specialized functions and connectivity.
Subclasses:
bd (bog) - nutrient poor wetland, on organic soils (sphagnum peat), water source predominantly from precipitation, may be bedrock or silt/clay dominated
fl (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 reeds, reeds, grasses and sedges
sw (swamp) - grassy wetland on mineral soils, often with an organic layer over mineral soil, with gently flowing or seasonal 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 (e.g. bogs, swamps, fens, etc.) often with vegetation rooted below the water surface
wet (wetland) - 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 spiffs.
Importance: Open ledges and horizontal fissures on cliffs are known to provide nesting sites. Cliff crevices are used for roosting bats while rock crevices are used for shelter and overwintering of snakes and lizards.
Subclasses:
co (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 wasting. 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 >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 difficult to sustain the diversity of plants and animals.
Landscapes 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. When 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

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

Sensitive and Terrestrial Ecosystems Label

19*	21*	22	23*	24*	28	30
35	36*	48	56	59	68	71*
73	75*	95*	99*	100	103*	106
114	128	129	137*	140	145	149
150	155	162	163	170	178	
180	181	183	184	187	190	192
193	194	197*	202*	208	209	210
217	221	224	226	242*	243	
247	248	250	251*	253	260	263
265*	268	269	270	271	278	281
294	295	302	303	307	309	310
311*	312	313	316*	319	320	321
323	325	329	330	331*	333	335
337*	338*	342	343	345	348	349
353	354*	356	360	361	367*	380
381*	382	386	387	389	395	397*
400	405	408	413	417	420	421
422	424	428	437	440	444	445
446	448	451*	453*	467*	468*	472
474	476	477	479	486	493	496
497	498	501	502	504	506	515
516	517	520	524*	526*	527*	532
537	544	546	549	551	552	554
555	575	576	584	586	589	597
600*	605	608	613	614	615*	617
620	625*	626	628	631	646	647
648*	651	653	655	657	659	668
674*	675	676	677	678	679	683
685	687	693	694	701	704*	707
721	722	726	728	733	759	761
764	768	772	783	793	794	795
806	809*	814	820	824	827	830
831	833	834	835	837*	838	839*
840	841	842	843*	844	845	846*
847	848	849	850*	851	852*	853*
854	855	856	857	858*	859	860
861	862	863	864	865	866	867*
868	869	870*	871	872	873	874
875*	876	877	878*	879	880	881
882	883	884	886	887	888	889
890	891	893	895	896	897	898
899	900	901	903	904	907	908
909	910	911	912	913	915	916
918	920	922	924	925	1075	1076
1077	1080	1081*	1082	1083	1084	1092
32004	32006	32006	32007	32008	32009	32010
32011	32012	32013	32014	32015	32016	32017
32018	32019	32020	32021	32022	32023	32024
32025	32026	32027	32028	32029	32030	32031

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 temperate 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 require climate, clean water, and protection from air pollution, noise, and other pollutants. To protect these areas, sensitive ecosystems must be located, identified and mapped. From 1990 to 1995 the Provincial and Federal Governments completed a Sensitive Ecosystems Inventory of East Vancouver Island and the Gulf Islands. This 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 areas of conservation concern, to promote land stewardship and to promote 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 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 (RISC 1998).

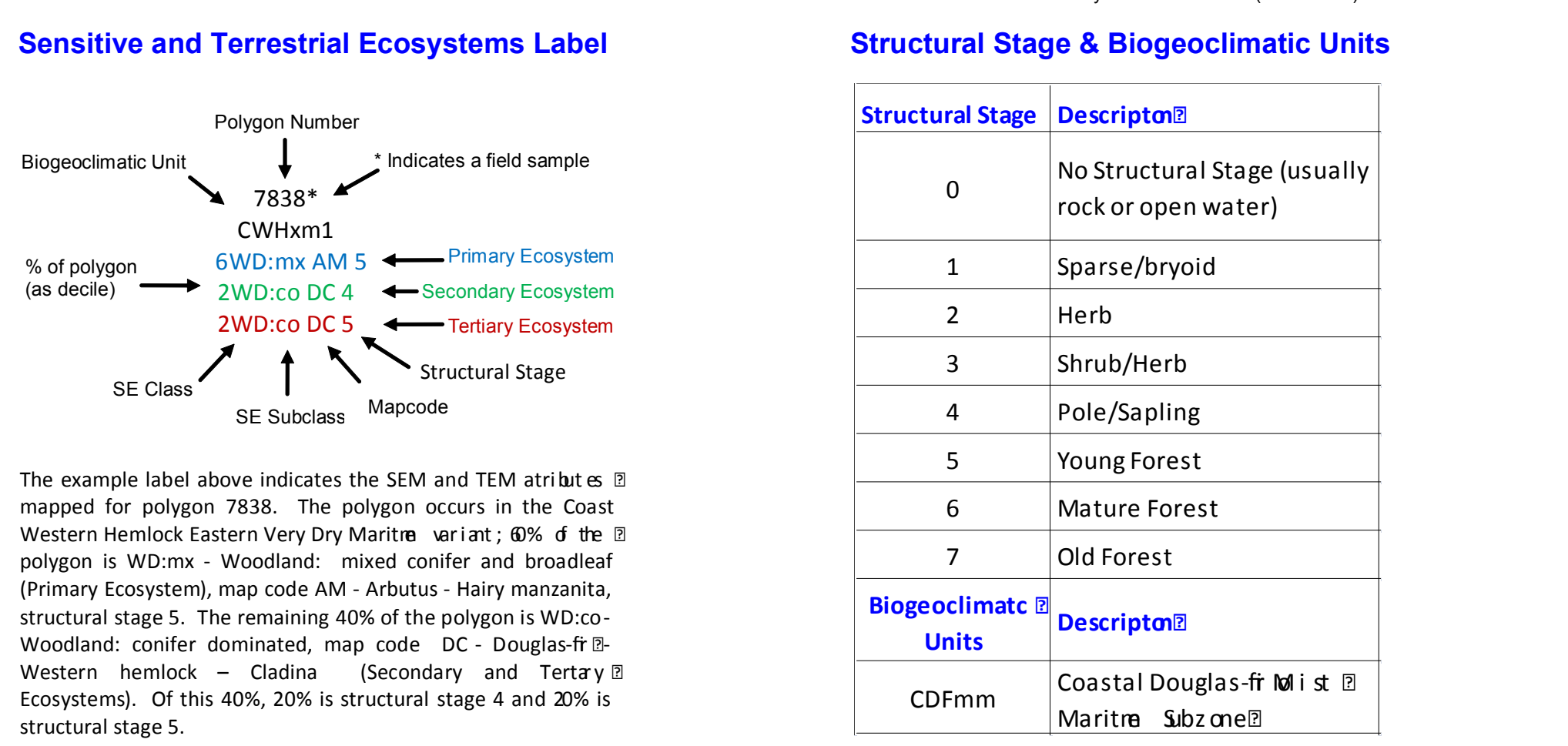
Data Limitations
The Sensitive Ecosystems map is a tool to assist decision makers to the existence of sensitive ecosystems. However, when land-use changes are proposed, detailed on-the-ground site assessments are necessary. For sites that were not field checked, the accuracy of the data depends heavily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

Due to the mapping scale of the aerial photographs, the minimum polygon size is generally 1/4 hectare. 100% of the Provincial and Federal Governments completed a Sensitive Ecosystems Inventory of East Vancouver Island and the Gulf Islands. This mapping project is an updated version of that product.

What can be done to protect the sensitive ecosystems?
Direct and indirect impacts to these ecosystems can be avoided by:
• Relocating 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

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 ecosystems. Consult a qualified professional to re-assess the ecological inventory data and work to incorporate design that maintain the functions and values of the natural ecosystem.
Sensitive Ecosystem Mapping Review:
Kale Ermiing - Islands Trust Fund
Corey Ewers - BC Ministry of Environment
Sui Tsang - BC Ministry of Environment
GIS Mapping Support:
Mark van Bakel - Islands Trust

Acknowledgements:
Project Co-ordinator:
Kale Ermiing - Islands Trust Fund
Bridie Porter - Islands Trust, Land Planning Services
Terrestrial Ecosystem Mapping:
Madrona Environmental Services Ltd.
Sensitive Ecosystem Mapping Conversion Tables:
Carmen Cadden - BC Ministry of Environment
Jo-Anne Stacey - BC Ministry of Environment
Andy MacKinnon - BC Ministry of Forests and Range
Todd Coulombe - Gulf Islands National Park Reserve
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Terrestrial Ecosystem Map Codes and Site Unit Names

Map Code	Site Unit Name	Map Code	Site Unit Name	Map Code	Site Unit Name
CDfmm - Forested	7838-1	CDfmm - Non-Forested		Antropogenic	
AS	Aspen - Slough sedge	E01	Tufted hairgrass - Meadow barley estuarine meadow	RE	Residential
CS	Western redbud - Slough sedge	E02	Glasswort - Sea-murder estuarine marsh	RW	Rural residential
CV	Black cottonwood - Willow	E03	Swamp sedge - White oak-bark fen	RZ	Rural urban
DA	Douglas-fir - Snow Free-Altitude	E04	Lyngbya sedge estuarine marsh	UR	Urban
DD	Douglas-fir - Grand Fir - Oregon Grape	FC	Fescue - Canas		
DD	Douglas-fir - Oregonas	HL	Herb-rich - Labrador tea		
DD	Douglas-fir - Satal	LM	Dunegrass - Beach pea		
GO	Garry oak - Ocean spray	OR	Garry oak - moss		
LS	Shore pine - Sparganium	OM	Ocean spray - moss		
RC	Western redbud - Skunk cabbage	OB	Garry oak - Brome (or mixed grasses)		
RF	Western redbud - Grand Fir - Foamflower	RA	Nootka rose - Pacific rock apple		
RK	Western redbud - Douglas-fir - Oregon beaked moss	SC	Cladonia - Wallace's selaginella		
RP	Western redbud - Indian-plum	SL	Sedge - Western leekspike		
RS	Western redbud - Snowberry	SS	Spine - Sedge wetland		
RV	Western redbud - Vanilla fern	WB	Labrador tea - Bog lupine - Post-moss bog		

