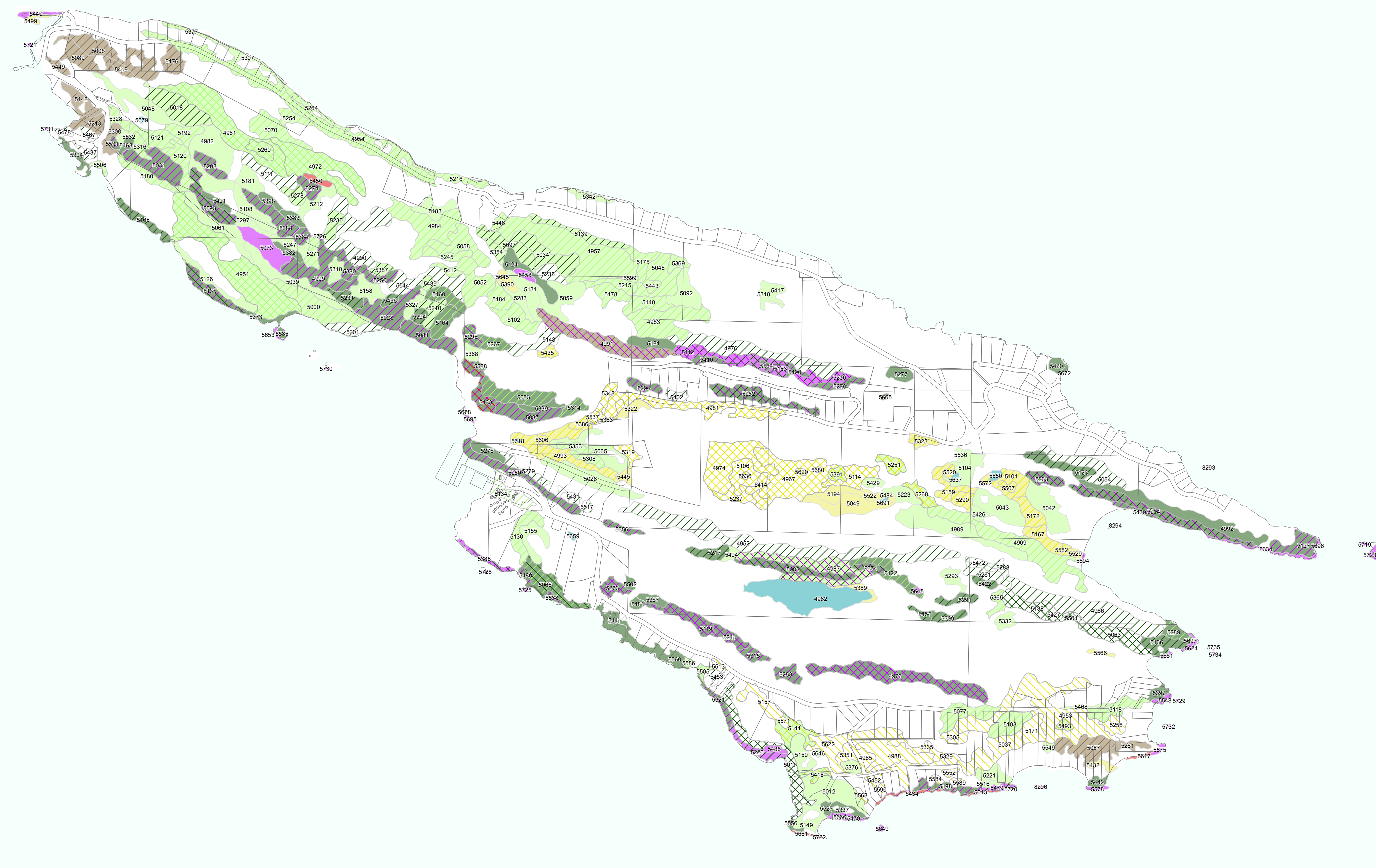
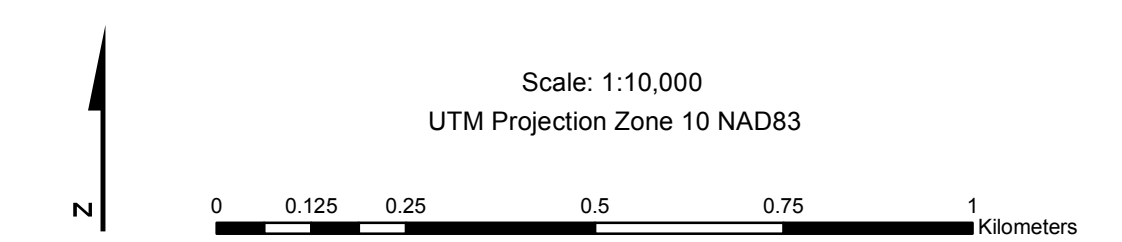


South Pender Island Sensitive Ecosystem Mapping Airphoto - 2004



4851*	4952	4853*	4954*	4857*	4951	4862*
CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4	CDfmm 8/10/04 0.6 2004/04/04 0.4 10/10/04 0.4

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 1990 to 1999 the Provincial and Federal Governments completed a Sensitive Ecosystems Inventory of East Vancouver 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 will allow specific ecological information that can be used to flag sites 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 Mappings (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 data is changing rapidly, references to the data held in the information source is advised.

What can be done to protect the sensitive ecosystems?

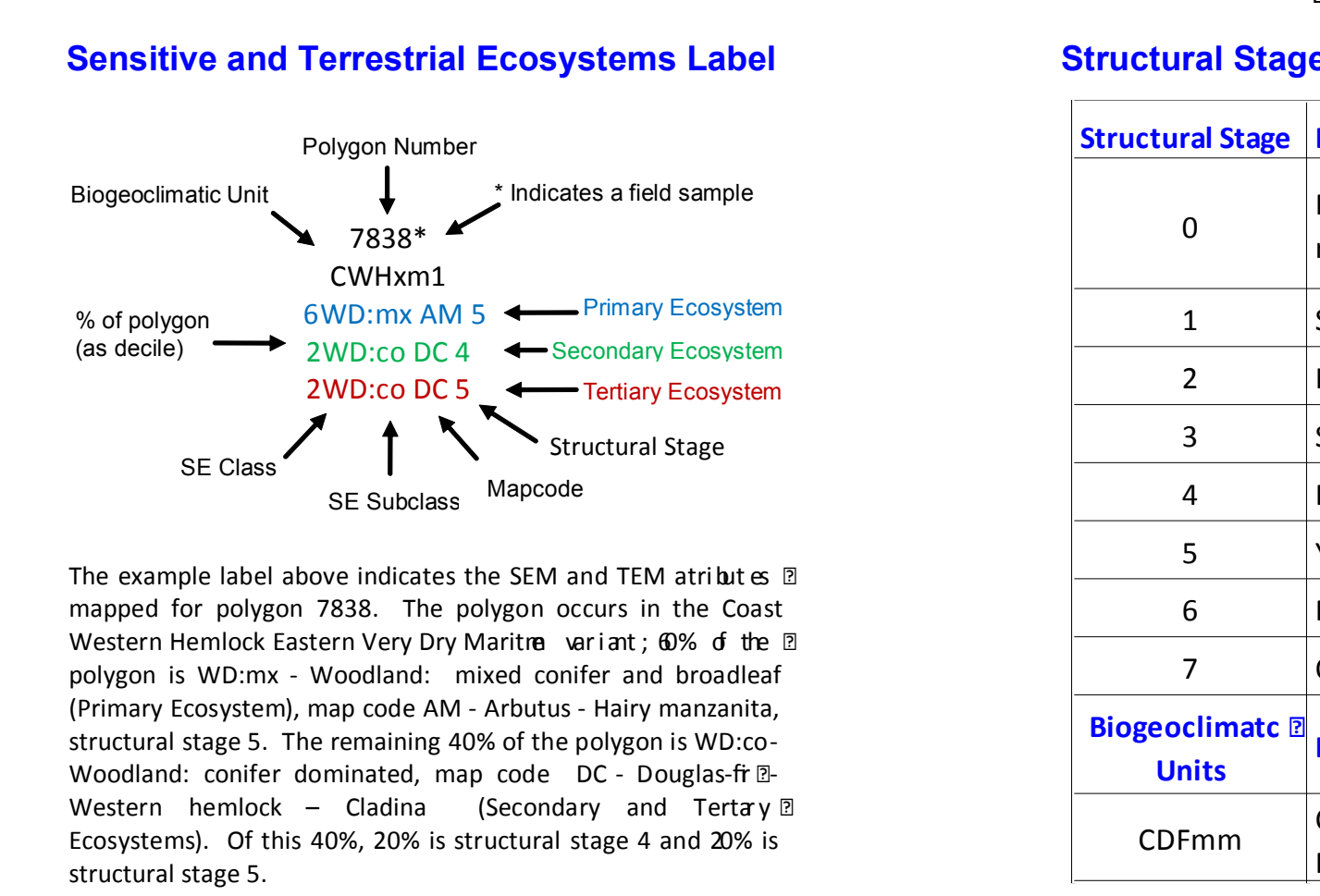
Direct and indirect impacts to these ecosystems can be avoided by:

- 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.

Due to the mapping scale of the aerial photographs, the minimum polygon size is generally 1/2 hectare. Engagement of the data beyond the source scale may result in unacceptable distortion and faulty registration with other data sets.

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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

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	AS Aspen - Slough sedge	E01	Tufted harrigan - Meadow barley estuarine meadow	W51	Silka sedge - Peat moss fen	RE	Reservoir
CS	Western noddy - Slough sedge	Em02	Glasswort - Sea-milwort estuarine marsh	W52	Sweet gale - Silka sedge fen	RW	Rural residential
CDf	Black cottonwood - willow	Em03	Seaforth saltgrass	W53	Slender sedge - White bear-ear fen	RZ	Road surface
DA	Douglas-fir - Shore Pine - Arbutus	Em05	Lynx-like sedge estuarine marsh	W55	Canada goose - Peat moss fen	UR	Urban
DS	Douglas-fir - Grand Fir - Oregon Grape	FC	Fescue - Camas	W56	Silka sedge - Hemlock-canopy marsh	W	Water
DD	Douglas-fir - Sitka spruce	HL	Harshack - Labrador tea	W57	Pink spurge - Silka sedge swamp	Map Code Site Unit Name	
DO	Douglas-fir - Salix	LM	Dunegrass - Beach pea	W58	Silka sedge - Pacific willow - Saurik cabbage swamp	Sparsely Vegetated	
GO	Garry oak - Oakparony	OM	Garry oak - moss	W59	Silka sedge - Pacific willow - Saurik cabbage swamp	IE	Intersect
LS	Shore pine - Sparganium	OR	Ocean spray - rose	Map Code Site Unit Name	CL	Cliff	
RC	Western noddy - Skunk cabbage	OB	Garry oak - Brome (or mixed grasses)	LA	Lake		
RF	Western noddy - Grand Fir - Foamflower	OA	Nootka rose - Pacific ornate apple	CU	Cultivated field	MU	Mudflat
RK	Western noddy - Douglas-fir - Oregon beaked moss	OC	Cultivated orchard	OW	Open water (< 2m deep)		
RP	Western noddy - Indian plum	SC	Cladonia - Wallace's setaeprella	PD	Pond (> 2m deep)		
RS	Western noddy - Snowberry	SL	Sedge - Coastal Douglas-fir	PI	Pine		
RV	Western noddy - Vanilla-leaf	SS	Spruce - Sedge wetland	GP	Gravel pit	RO	Rock outcrop
		W50	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
- me (mixed conifer and deciduous): forests dominated with a mixture of conifers and broadleaf trees (<5% 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 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 drawn to these ecosystems due to the forest structure, habitat and proximity to the open. Garry oak woodlands, for example support the highest plant species diversity of any terrestrial ecosystem in British Columbia and are especially vulnerable to forest development.

Subclasses:

- me (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, silt, dunes and shorelines vegetated with grasses and herbs.

Importance: Terrestrial herbaceous ecosystems are characterized by thin soils which are easily fragmented. Herbaceous plants can be easily trampled or displaced onto bare rock where they cannot 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 forbs and mosses
- co (coastal herbaceous): rocky shoreline or silt, influenced by the marine environment and characterized by less than 20% vegetation cover of grasses and forbs, includes silt and rocks
- sp (silt): fringe-like extension of beach, comprised of sand or gravel deposited by longshore drifting, low to moderate cover of salt-tolerant grasses and herbs
- ar (arbutus ridge or pit or beach area created by windblown sand, may be open or less vegetated depending on depositional activity, beach dunes will have low cover of salt-tolerant grasses and herbs
- hb (herb): >20% of total vegetation cover is shrub cover, with grasses and herbs
- ro (rock): rock outcrops or bedrock dominated by alga

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, soil influences or poor drainage conditions.

Importance: Wetland ecosystems are sensitive and important because they exhibit early, high biodiversity, fugility, 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
- fb (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
- po (poor): 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 (swampy 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
- wt (wet meadow): periodically saturated soil 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 cliffs.

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

Subclasses:

- cc (cave cliff): cliffs with a marine influence, generally near vertical bedrock with accumulation of soil limited to fissures and ledges
- ic (inland cliff): inland cliffs, typically formed as a result of erosion, catastrophic failures or mass wasting. Generally characterized by rapid change 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 Block 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 Secondary Tertiary

Definition: Usually conifer-dominated, occasionally deciduous, dry to moist forest types, structural stage 6, generally >50yrs.

Importance: Mature forest forests: Within 20 years after a major forest fire that was logged early in the century will become Old Forest. 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.

Landscap connectivity: Mature Forest stands provide connections between other natural areas that support the movement and dispersal of many tree-dwelling species across the landscape.

Buffer: 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 old 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
- me (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):

Primary Ecosystem Secondary Tertiary

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):

Primary Ecosystem Secondary Tertiary

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

Non-Sensitive (NA):

Primary Ecosystem Secondary Tertiary

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

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

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