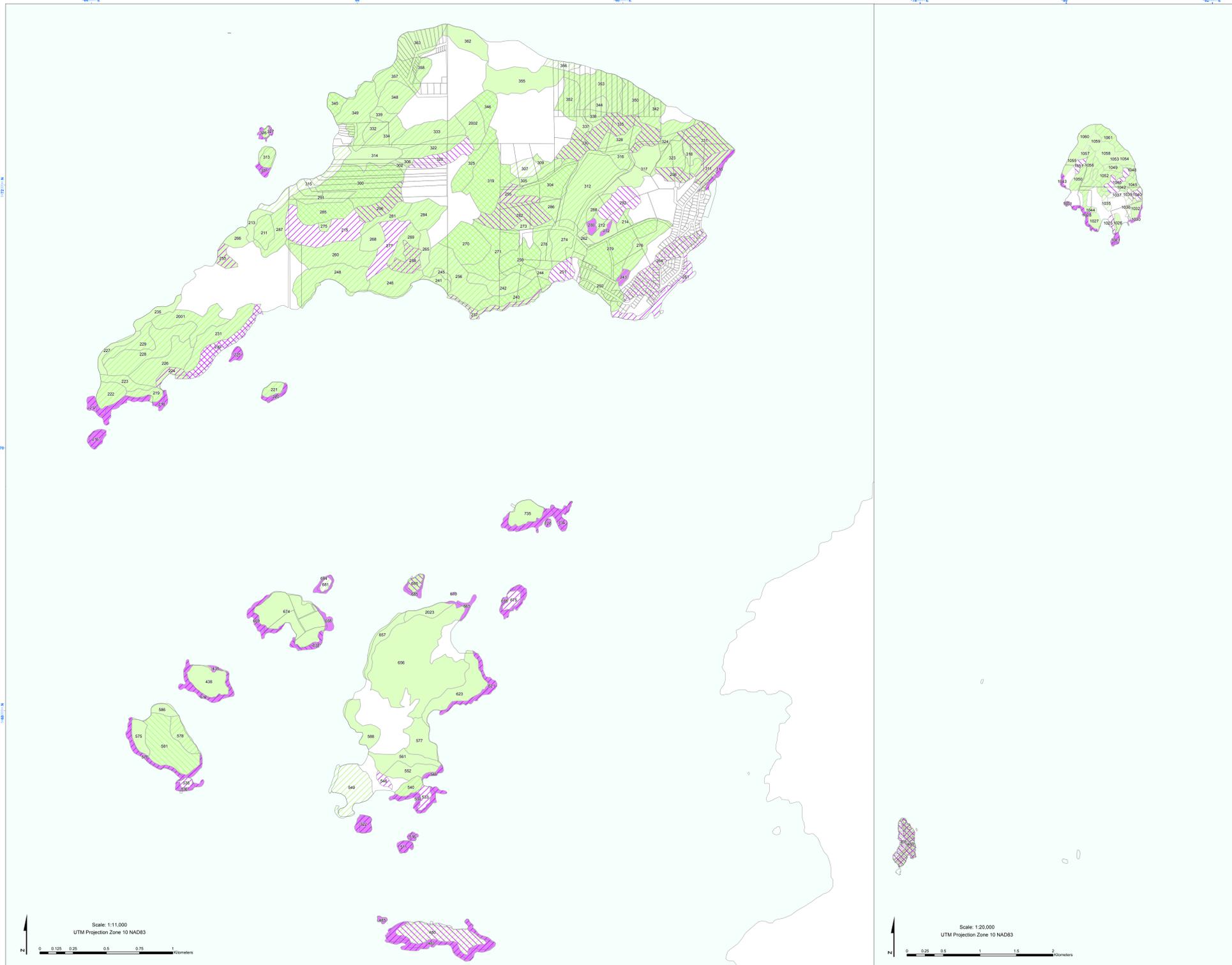


Sensitive and Terrestrial Ecosystems Label

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Keats Islands Bowyer and Passage Islands Sensitive Ecosystem Mapping Airphoto - 2006

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 >250yr.
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: **cd** (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 their canopy, they 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 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 into bare rock where they cannot re-establish. 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
ca (coastal herbaceous) - rocky shoreline or dune, influenced by the marine environment and characterized by less than 20% vegetation cover of grasses, herbs, mosses and lichens
sp (spits) - ridge-like 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 width and 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

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/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 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 drainage, sedges, grasses and mosses
ml (medium bench floodplain) - flooded every 1-4 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 lengthy submergence in the rooting zone, typically conifer-dominated floodplains of larger coastal rivers
fr (fringe) - narrow linear communities along open water bodies (rivers, lakes and ponds) where there is no floodplain, irregular flooding (glly riparian) - watercourse is within a steep sided V-shaped gully
fl (flood) - watercourse is large enough to represent >10% of the polygon
sh (shrub) - 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. 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, fragile, specialized habitat, specialized functions and connectivity.
Subclasses: **sp** (swamp) - nutrient poor wetland, on organic soils (sphagnum peat), water source predominantly from precipitation; may be tree or shrub 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
ml (marsh) - wetland with fluctuating water table, often with shallow surface water, usually organically enriched mineral soils, dominated by sedge, meadow grasses and sedges
sp (swamp) - poor to very rich wetland on mineral soils or with an organic layer over mineral soil, with gentle flooding or seasonally flooding water table; woody vegetation
sl (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
ml (marsh) - 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 slopes, 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: **ca** (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 failure or mass wasting. Generally characterized by steep gorges 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 Secondary Tertiary

Definition: Usually conifer-dominated, occasionally deciduous, dry to moist forest types, structural stage 6, generally >80yr.
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 increase 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 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 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: **cd** (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 yr 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
- 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

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 project is an updated version of the 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 provide detailed field surveys and consideration of ecological values before changes to the land are initiated.

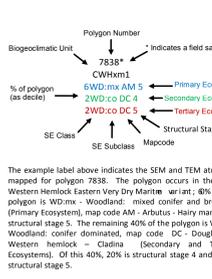
Methodology
Mapping methods are based on the Resource Information Standards Committee (RISC) Standard for Terrestrial Ecosystem Mapping (TEM) in BC. This Sensitive Ecosystems map was themed from TEM data using the RISC Standard for Mapping Ecosystems at Risk in BC. Field survey protocols followed Describing Terrestrial Ecosystems in the Field (DTEF 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 ecological information that is based on the remote, local knowledge, and professional judgment of the mapper. Because the area is changing rapidly, reference to the data source is used as the information source is advised.
Due to the mapping scale of the aerial photographs, the minimum polygon size is generally 1/2 hectare. Enlargement of the data beyond the source scale may result in unacceptable distortion and faulty vegetation 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.
Acknowledgements:
Project Co-ordinator: Kate Emmings - Islands Trust Fund
Biodata Project - Islands Trust, Local Planning Services
Terrestrial Ecosystem Mapping: Madrone Environmental Services Ltd.
Sensitive Ecosystems Mapping Consultant: Madrone Environmental Services Ltd.
Sensitive Ecosystem Mapping Review: Kate Emmings - Islands Trust Fund
GIS Mapping Support: Mark van Bekel - Islands Trust



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
CWHm2	Coastal Western Hemlock Very Wet Maritime Subzone, Maritime Variant
CWHkm1	Coastal Western Hemlock Very Dry Maritime Subzone, Eastern Variant

Terrestrial Ecosystem Map Codes and Site Unit Names