092F.039

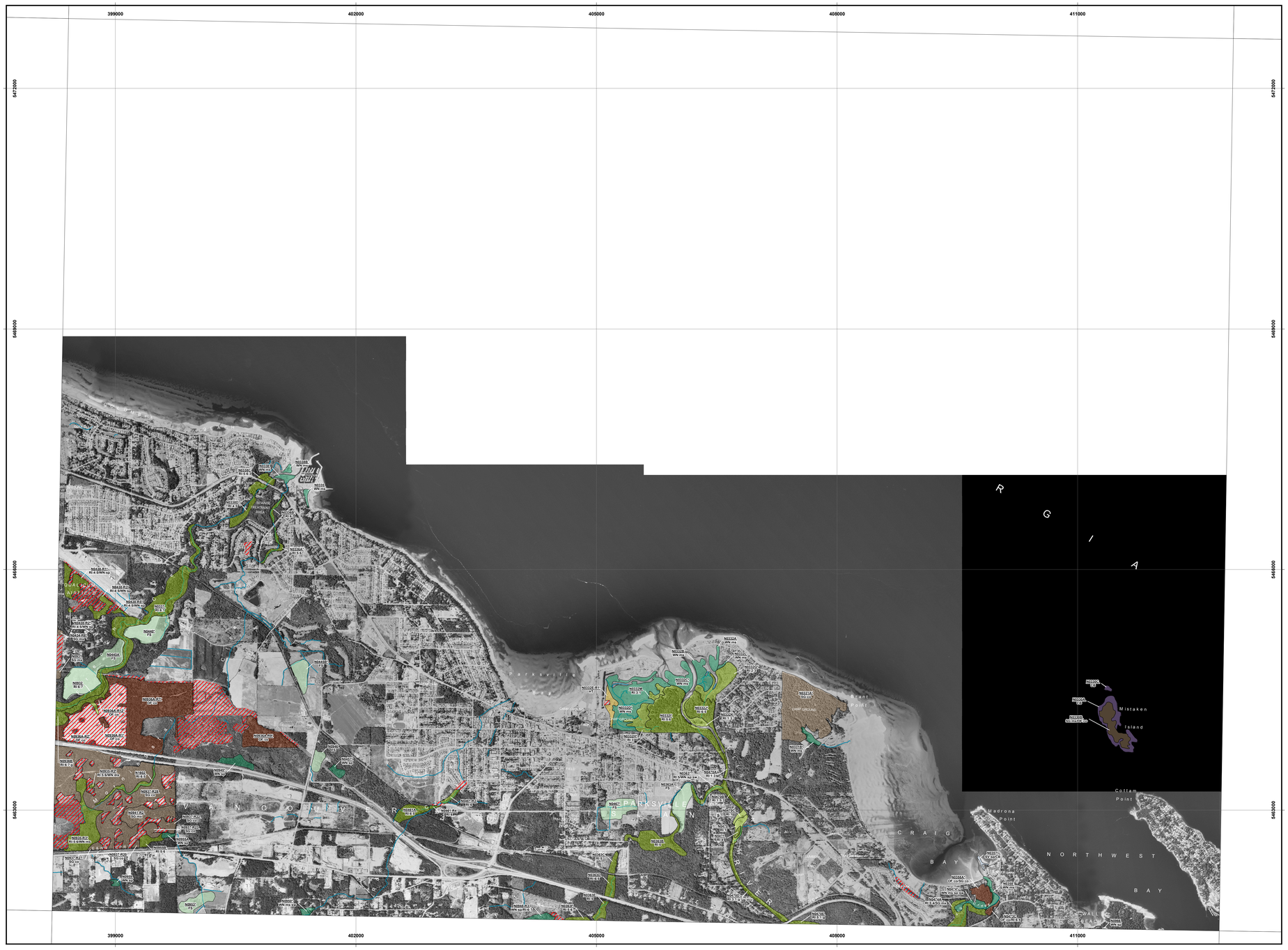
Environment Canada / Environnement Canada
Canadian Wildlife Service / Service Canadien de la faune

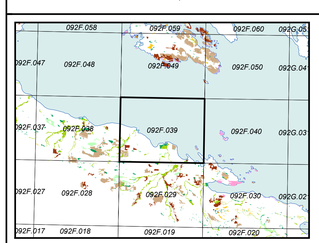
WORKING TOGETHER TO PROTECT GEORGIA BASIN
AU TRAVAIL POUR LE BASSIN DE GEORGIA

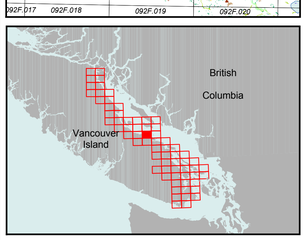
Sensitive Ecosystems Inventory of East Vancouver Island and Gulf Islands
Disturbance Mapping and Re-evaluation of Major Riparian Corridors
March 2004

HABITAT CONSERVATION TRUST FUND

BRITISH COLUMBIA
Ministry of Sustainable Resource Management
Ministry of Water, Land and Air Protection







Background

By the late 1980s it had become clear that ecologically significant lands and important wildlife habitats were fast disappearing throughout the lowlands surrounding the Strait of Georgia. This loss was due to intense development pressure fueled by population and economic growth. To address this concern, the joint federal/provincial Sensitive Ecosystems Inventory (SEI) of East Vancouver Island and Gulf Islands was undertaken in 1993 as a pilot project.

Seven rare and ecologically fragile sensitive ecosystems were mapped and selectively ground truthed from 1993-1997: wetland, riparian, older forest, woodland, terrestrial herbaceous, sparsely vegetated and coastal bluff ecosystems (see map legend for descriptions). These ecosystems typically have high biodiversity and are home to many rare and endangered animals, plants and plant communities. They are also a vital part of the overall landscape, providing ecosystem services that support a healthy economy and our social well-being. For example, they regulate climate, clean our fresh water, generate and clean our soils, recycle nutrients and pollinate our crops. Two other important ecosystems - although clearly altered by human use - were also mapped because of their general biodiversity values: seasonally flooded agricultural field and older second growth forest ecosystems.

A technical report (Ward et al. 1998) and Conservation Manual (McPhee et al. 2000) provide information on the values and importance of each ecosystem, management guidelines and recommendations for each ecosystem, and information about the conservation tools available to local and senior governments, landowners and other citizens.

The Vancouver Island SEI was the first of its kind in British Columbia and was designed to provide a scientific ecosystem-based tool for land use planning. Additional SEI projects have now been completed in other parts of BC where there are similar development pressures, namely the Central Okanagan and the Sunshine Coast.

Disturbance Mapping

This second version of the SEI maps is an update of the ones that were published in 1997. The new maps identify those portions of the original SEI polygons that have been disturbed - by logging, urban or rural use, roads, trail(s), recreation, agriculture or industrial use - over the past decade. The disturbed areas identified have been retained on the maps (see red hatched areas) to increase awareness of the escalating loss of natural ecosystems and to encourage conservation of those that remain.

The areas of disturbance were identified by digitally overlaying the original polygons (identified on air photos taken primarily between 1990 and 1992) on more recent photographs taken in late July and early August 2002 (AXYS 2004). In addition, the intact remnants of each altered polygon were reviewed to determine if they still qualified for inclusion in the SEI (Buechert 2004).

Results of this disturbance mapping showed that over 8,800 ha (11%) of the area occupied by the nine SEI ecosystem types in the early 1990s had been disturbed by 2002. Over 1,480 ha of disturbed area had originally been occupied by the seven sensitive ecosystems. Older forests had the highest rate of loss at 8.6% (915 ha) followed by riparian (4.6%), woodland (2.6%) and wetland (2.0%) ecosystems. The largest area of loss was 7,360 ha (15.5%) in the older second growth forest category.

Re-evaluation of Major Riparian Corridors and Other Areas

The original SEI mapping of riparian ecosystems avoided areas showing recent human disturbance. However, the linear corridors formed by riparian ecosystems comprise a continuous ecological unit with very high conservation values overall. Major riparian corridors were re-evaluated to reflect these values and to encourage land use decisions that consider entire riparian ecosystems as well as the larger watersheds of which they are a part.

These new maps include 256 new riparian polygons in major corridors such as the Cowichan, Chemainus, Koksilah, Nanaimo, Englishman, Little Qualicum, Puntledge, Quinsam, Oyster, Tsolum and Trent River valleys. Where riparian ecosystems were identified within an existing non-riparian polygon, the riparian ecosystem code was added.

For consistency, the new air photo interpretation was conducted at a scale of 1:10,000. Since this scale was larger than some of the original 1990s photos (many of which were between 1:15,000 and 1:20,000), more accurate interpretation was possible. However, budget and time constraints did not allow for a comprehensive re-interpretation of the entire study area at this scale.

Where previously unidentified SEI ecosystems were noticed during the riparian re-evaluation, new polygons were added. Approximately 25 non-riparian polygons were identified, representing older forests, wetlands and seasonally flooded agricultural fields. A few older second growth forest polygons were also identified where they occurred adjacent to a sensitive ecosystem.

What can be done to protect these ecosystems?

It is critical that all possible land use options be evaluated before initiating any further changes to these rare and fragile ecosystems. Direct and indirect impacts to these ecosystems can be avoided by:

Creating vegetated buffers around sensitive ecosystems to isolate the ecosystem from outside disturbance such as windthrow, invasive species colonization, and increased light and human access.
Controlling land and water access to fragile ecosystems by using appropriate management tools such as fencing, trails, elevated boardwalks, railings, seasonal restrictions, signs and livestock restrictions.
Controlling invasive species including plants, feral animals and pets by using active control methods such as hand clearing, pruning, mowing, excavation, animal fencing and planting of appropriate native species, and discouraging plantings of Scotch Broom, English Ivy, Himalayan Blackberry, Yellow Flag Iris, Purple Loosestrife and Spurge Laurel.
Allowing natural disturbances to occur because natural ecological functions are critical to the creation and maintenance of a sensitive ecosystem; these include hydrologic and nutrient regimes, coastal erosion, sediment accretion, flooding, seasonal drawdown, groundwater recharge and discharge, stream channel movement, windthrow, tree death, fire and disease.
Preventing disturbance of nesting or breeding areas - the nesting and breeding season for most coastal wildlife occurs in spring but can extend year round. Avoid disturbance of habitat features such as dens, nest or perch trees, ground nests, roosting sites, and cavities.
Maintaining water quality - clean water is essential to the survival of a wide variety of organisms, from aquatic insects and molluscs to the birds and mammals that feed on them.

If development is the only option - develop carefully!

Before any development takes place:

Conduct an ecological inventory, ideally through the seasons over a period of a year. Identify the existing flora and fauna, and in particular identify 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. A qualified professional can interpret the ecological inventory data and work to incorporate designs that maintain the functions and values of the natural ecosystem.

If you are…

A property owner: learn more about the natural values of your land, including the location of any sensitive ecosystems. Find out how to protect, maintain, and enhance those values. Consider using conservation covenants or other measures to ensure that the natural features you value are protected in perpetuity.
A developer: consider a design for your project that is creative and flexible enough to protect and enhance sensitive ecosystems. Treed lots and neighbourhood greenspaces can increase market values.
A planner: ensure that conservation is given as high a priority as other community programs such as housing, transportation, recreation, employment, public works, and community services. Encourage use of the many legal and planning tools available, such as development permit areas, tree protection by-laws, and conservation covenants to protect sensitive ecosystems as described in the Conservation Manual (McPhee et al. 2000).
A decision-maker (such as a politician or government manager): ensure that protection of remaining sensitive ecosystems is a priority at all levels, and support plans and programs that will help protect sensitive ecosystems. Encourage and facilitate the development and implementation of biodiversity conservation strategies.
A member of an advocacy group: contribute your time and expertise to help locate and protect sensitive ecosystems. For example, ratepayers' groups, service organizations, naturalist clubs, land trusts, and conservancies often provide a link between local landowners and voluntary stewardship programs. As a member of one of these groups, you can work cooperatively with local governments to promote land use decisions that protect sensitive ecosystems.
A volunteer: participate in educational programs, conservation fundraising, or in programs to remove invasive species (such as "broom-bashing" events).
A scientist: use your expertise to help identify sensitive ecosystems, define issues that need to be addressed, formulate conservation plans, contribute to the development of conservation and management strategies and explain to other professionals the importance of sensitive ecosystems.

Resources (available on the SEI website)

AXYS Environmental Consulting Ltd. 2004. *Redigitizing of Sensitive Ecosystems Inventory Polygons to Exclude Disturbed Areas*. Unpublished report submitted to the Canadian Wildlife Service, Environment Canada, Pacific and Yukon Region.
Buechert, Ron. 2004. *Analysis of remnant SEI polygons, 2002*. Unpublished report submitted to Canadian Wildlife Service, Environment Canada, Pacific and Yukon Region.
McPhee, M., P. Ward, J. Kirkby, L. Wolfe, N. Page, K. Dunster, N. K. Dawe and I. Nykwist. 2000. *Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993 - 1997. Volume 2: Conservation Manual*. Technical Report Series No. 345, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia, 328pp.
Ward, P., G. Radcliffe, J. Kirkby, J. Illingworth and C. Cadrin. 1998. *Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993 - 1997. Volume 1: Methodology, Ecological Descriptions and Results*. Technical Report Series No. 320, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia, 160pp.
Saving Sensitive Ecosystems a series of eight colour brochures describing sensitive ecosystems, their status (based on 1997 inventory results) and their importance. They also present management recommendations that can be used to protect each ecosystem.
PowerPoint presentations designed for four audiences: Local Government; Developers; General Public; Planners and Consultants.

Contact: For copies of these materials or more information on either the program or a specific polygon, please contact Jan Kirkby, Landscape Ecologist, Canadian Wildlife Service, Environment Canada at Jan.Kirkby@ec.gc.ca or *tel:* 604.940.4657, *cell:* 250.616.3234
Website: http://srmwww.gov.bc.ca/sei/index.html

Acknowledgments

Sensitive Ecosystems Inventories are a joint federal/provincial initiative of Environment Canada (Canadian Wildlife Service), the BC Ministries of Sustainable Resource Management (Conservation Data Centre) and Water, Land and Air Protection, and the Habitat Conservation Trust Fund. SEI projects have also received support and funding from regional districts, local governments and industry.
Disturbance Mapping and Plot Generation: AXYS Environmental Consulting Ltd, Sidney, B.C.
Remnant and Riparian Assessments: Ron Buechert, Qualicum Beach, B.C.
Photo Credits: Neil K. Dawe, Trudy Chatwin, Mark Kaarremaa, Marlene Caskey, Nick Page, Colleen Bryden, Tim Ennis.

Ecosystem Classes

Sensitive Ecosystems

CB Coastal Bluff Ecosystems

CB: Coastal Bluff Ecosystems consist of low-lying, wind-swept rocky shorelines, rocky islets and steep coastal cliffs that are influenced by proximity to the ocean. Shallow soils are often present as soil pockets in rock cracks or crevices, or are absent altogether. Vegetation consists of salt-tolerant communities of mosses and lichens, grasses and herbs and sometimes low shrubs. Specialized habitats within these sites, including vernal pools, crevices, and seepage areas, support numerous rare plant and animal species.

Subclasses

CB:cl: coastal cliffs

SV Sparsely Vegetated Ecosystems

SV: Sparsely vegetated ecosystems include coastal sand dunes, coastal sand and gravel spits and inland cliffs and bluffs with patches of vegetation interspersed with bare sand, gravel or exposed bedrock. Spits and dunes are important resting, feeding and nesting areas for migrating shorebirds and waterbirds. Inland cliffs provide nesting and roosting sites for birds and bats, and shelter and hibernation habitat for snakes and lizards.

Subclasses

SV:sp (spits): finger-like extension of beach, comprised of sand or gravel deposited by longshore drifting, low to moderate cover of salt-tolerant grasses and herbs; **SV: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; **SV:cl (inland cliffs and bluffs):** very steep slope, often exposed bedrock with lichens.

HT Terrestrial Herbaceous Ecosystems

HT: These are non-forested ecosystems with less than 10% tree cover, generally with shallow soils and often with bedrock outcroppings. They typically occur as openings in forested areas and are vegetated with grasses and herbs and sometimes low shrubs; moss and lichen communities occur on rock outcrops. These grassy hilltops and wildflower meadows provide spectacular spring time scenes; they also provide specialized habitats, such as vernal pools and seepage zones for several rare and endangered species.

Subclasses

HT:ro: bedrock outcrops; **HT:sh:** >20% shrub cover

OF Older Forest Ecosystems

OF: Older Forest ecosystems are usually conifer-dominated, occasionally deciduous, dry to moist forest types. They are generally more than 100 years, have a multi-species canopy, large woody debris - both standing and fallen - and have trees of every age. The diverse habitats found in older forests support a rich community of plant and animal species. High levels of biodiversity result from the extraordinary abundance and variety of fungi, canopy insects, soil invertebrates and lichens (many still unknown to science), all critically important parts of the forest ecosystem.

Subclasses

OF:co (conifer-dominated): >85% coniferous species; **OF:mx (mixed conifer and deciduous):** a minimum of 15% cover of either group is included in the total tree cover

WD Woodland Ecosystems

WD: Dry, open woodland ecosystems consist of between 10 and 25% tree cover and include mixed stands of Garry oak/Arbutus, Garry oak/Douglas-fir and Arbutus/Douglas-fir. Because of the open canopy they will include non-forested openings, often with shallow soils and bedrock outcroppings. A rich assemblage of plants, insects, reptiles and birds are attracted to the habitat diversity and food sources of woodland ecosystems. Garry oak ecosystems in particular support the highest diversity of plants in coastal British Columbia and are home to nearly 100 species at risk.

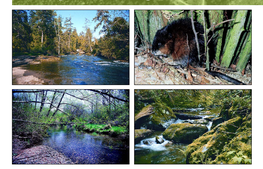
WN Wetland Ecosystems

WN: Wetland ecosystems are 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. Most wetlands are nodes of high biological diversity supporting many species such as ducks, songbirds, amphibians, and invertebrates that need both wetland and adjacent terrestrial ecosystems for their life-cycle. Wetlands also help to reduce levels of sediments, nutrients and toxic chemicals in the water. Estuarine wetlands in particular are one of the world's most productive ecosystems.

Subclasses

WN:bg (bog): acidic nutrient-poor wetland, on organic soils (peatland), water source predominantly from precipitation, may be treed or non-treed; **WN:fn (fen):** nutrient-medium peatland with non-acidic groundwater flowing through, open water channels common, usually dominated by sedges, grasses and mosses. **WN:ms (marsh):** wetland with fluctuating water table, often with shallow surface water, usually nutrient rich on mineral soils, dominated by rushes, reeds, grasses and sedges; can be saline, brackish or freshwater. **WN:sp (swamp):** poor to very rich wetland on organic or mineral soils, with gently flowing water table, treed or shrubby vegetation. **WN:sw (shallow water):** standing or slow flowing water less than 2m deep, transition between deep water bodies and other wetland ecosystems (i.e. bogs, swamps, fens, etc.), often with emergent vegetation. **WN:wm (wet meadow):** periodically saturated but seldom inundated with water, rich mineral soils, grasses, sedges, rushes and forbs dominate.

RI Riparian Ecosystems



RI: Riparian ecosystems are adjacent to water bodies (rivers, lakes, ocean, wetlands) which are influenced by factors such as erosion, sedimentation, nutrient loading, flooding, and subsurface irrigation due to proximity to the water body. These conditions support plants that are distinct from surrounding land areas. Riparian ecosystems have an exceptionally high number of species for the area that they occupy, because they include the three critical habitat components for wildlife water, cover and food. They provide important corridors for mammals, birds, amphibians, fish, insects and aquatic invertebrates, help to regulate the flow of water, filter the water entering the stream and provide bank stability. These ecosystems are classified by structural stage, which is based on the structure and age of dominant vegetation; gullies are also noted as a subcategory.

Subclasses

RI:1 (coarse /bryoid): moss and lichen dominated, <10% treed, <20% shrub/herb; **RI:1a:** <10% vegetation; **RI:1b:** bryophyte and lichen-dominated communities; **RI:2 (herb):** herb dominated, <20% shrub, <10% treed; **RI:3 (shrub/herb):** >20% shrub, <10% treed; **RI:3a**: <2m tall; **RI:3b:** 2-10m tall; **RI:4 (pole/sapling):** trees >10m tall, densely stocked, may be coniferous, deciduous, or mixed stand between 10 and 40 years old; **RI:5 (young forest):** natural thinning has occurred and structural diversity increases, uniform age and lack of snags or downed logs; trees are generally less than 80 years old; **RI:6 (mature forest):** distinct layering of the canopy, understorey more developed as canopy opens up; generally 80 to more than 200 years old; **RI:7 (old forest):** trees >250 years old; structurally complex stands with shade tolerant tree species; snags and coarse woody debris in various stages of decay; **RI:g (gully):** watercourse is within a V-shaped gully.

Other Important Ecosystems

FS Seasonally Flooded Agricultural Field Ecosystems

FS: Many of these agricultural lands that flood during the winter months were once wetlands. They continue to provide critically important winter habitat for waterfowl as well as for shorebirds and birds of prey during specific times of the year, particularly as the number of natural wetlands has diminished.

SG Older Second Growth Forest Ecosystems

SG: These forested ecosystems have a dominant age class of 60 - 100 years. While not as biologically rich as Older Forests, they can serve as important buffers around sensitive ecosystems and vital links between habitat patches. They often provide critical habitat for species that require both open and forested areas during their life-cycle. The biological diversity of forests generally increases with age. Where older forests are rare or absent, older second growth forests become more important as they gradually develop old forest characteristics.

Subclasses

SG:co (conifer-dominated): >85% coniferous species; **SG:mx (mixed conifer and deciduous):** a minimum of 15% cover of either group is included in the total tree cover.

Disturbed SEI Ecosystems

Disturbed Areas

These areas were originally identified as SEI ecosystems but they have been disturbed by logging, urban or rural use, roads, trails, recreation, agriculture or industrial use since the original inventory was conducted. In some cases, the remaining intact portion of a partially disturbed polygon was too small or isolated to be considered a viable example of a sensitive ecosystem. These small remnants were also mapped as disturbed areas.

Polygon Label

Map Sheet: 092F.039

0 500 1,000 1,500 2,000
Metres

Scale: 1:20,000
UTM Projection, NAD83
March 2004

092F.039