



Mount Tuam Ecological Reserve Management Plan

October 2012



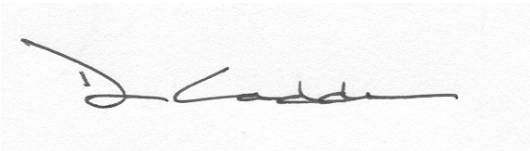
BC Parks

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This document replaces the
Mount Tuam Ecological Reserve
Purpose Statement (2003).

Mount Tuam Ecological Reserve Management Plan

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Harry Parsons and Shannon Macey-Carroll of Bufo Incorporated assisted in the stakeholder and community consultation, then drafted and revised the management plan based on direction from the management planning team. Peggy Burfield wrote the final version of the management plan.

Paul Linton, the Salt Spring Island Ecological Reserve Warden, provided his knowledge and familiarity of the area in the development of the management plan as well as led several field trips to the ecological reserve with the management planning team and Bufo Incorporated staff.

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1.0 Introduction

1.1 Management Plan Purpose

The purpose of this management plan is to provide strategic management direction for Mount Tuam Ecological Reserve.

This management plan replaces the 2003 Mount Tuam Ecological Reserve Purpose Statement.

The primary objectives of the management plan are to:

- outline the role the ecological reserve plays in British Columbia's (BC) protected areas system;
- identify management objectives and strategies for the protection of natural and cultural values; and,
- identify the role of First Nations, the local community and others in implementing the management plan.



Figure 1: View from Mount Tuam Ecological Reserve

1.2 Planning Area

Mount Tuam Ecological Reserve is located on the west side of Salt Spring Island, in the southern Gulf Islands off the east coast of Vancouver Island, about half way between Nanaimo and Victoria. The ecological reserve contains a variety of features, including Garry oak meadows, moss-covered rocky outcrops and bluffs, and several species-at-risk.

The ecological reserve is one of a group of provincial parks, provincial ecological reserves, regional parks, and private protected areas on Salt Spring Island. These protected areas include Ruckle Provincial Park, Cyril Cunningham Nature Reserve, Mill Farm Regional Park Reserve, Burgoyne Bay Provincial Park, Mount Maxwell Provincial Park, Mount Maxwell Ecological Reserve, Manzanita Ridge Nature Reserve, Mount Erskine Provincial Park, and Lower Mount Erskine Nature Reserve (Figure 2).

Overlooking Satellite Channel on the steep and rugged southeastern slopes of Mount Tuam, this ecological reserve protects a representative area of Gulf Islands' forest ecosystems including stands of Garry oak, pure stands of arbutus, coastal Douglas-fir forests, and rare ecosystems and plant species. The ecological reserve consists of three discontinuous areas of land (Figure 3), two of which include part of the rocky shoreline. Creeks, swamps and waterfalls shape the eastern section of the ecological reserve, which contains mixed second-growth Douglas-fir, arbutus, and western redcedar forest. There is also a documented archaeological site found in the ecological reserve.

Salt Spring Island is home to one of Canada's largest Garry oak ecosystems, one of the most threatened ecosystems in the country. In Canada, Garry oak ecosystems are found only on southern Vancouver Island, the Gulf Islands, and in two isolated locations in the Fraser River Valley. The ecological reserve conserves stands of Garry oak and associated vegetation that are representative of this ecosystem.

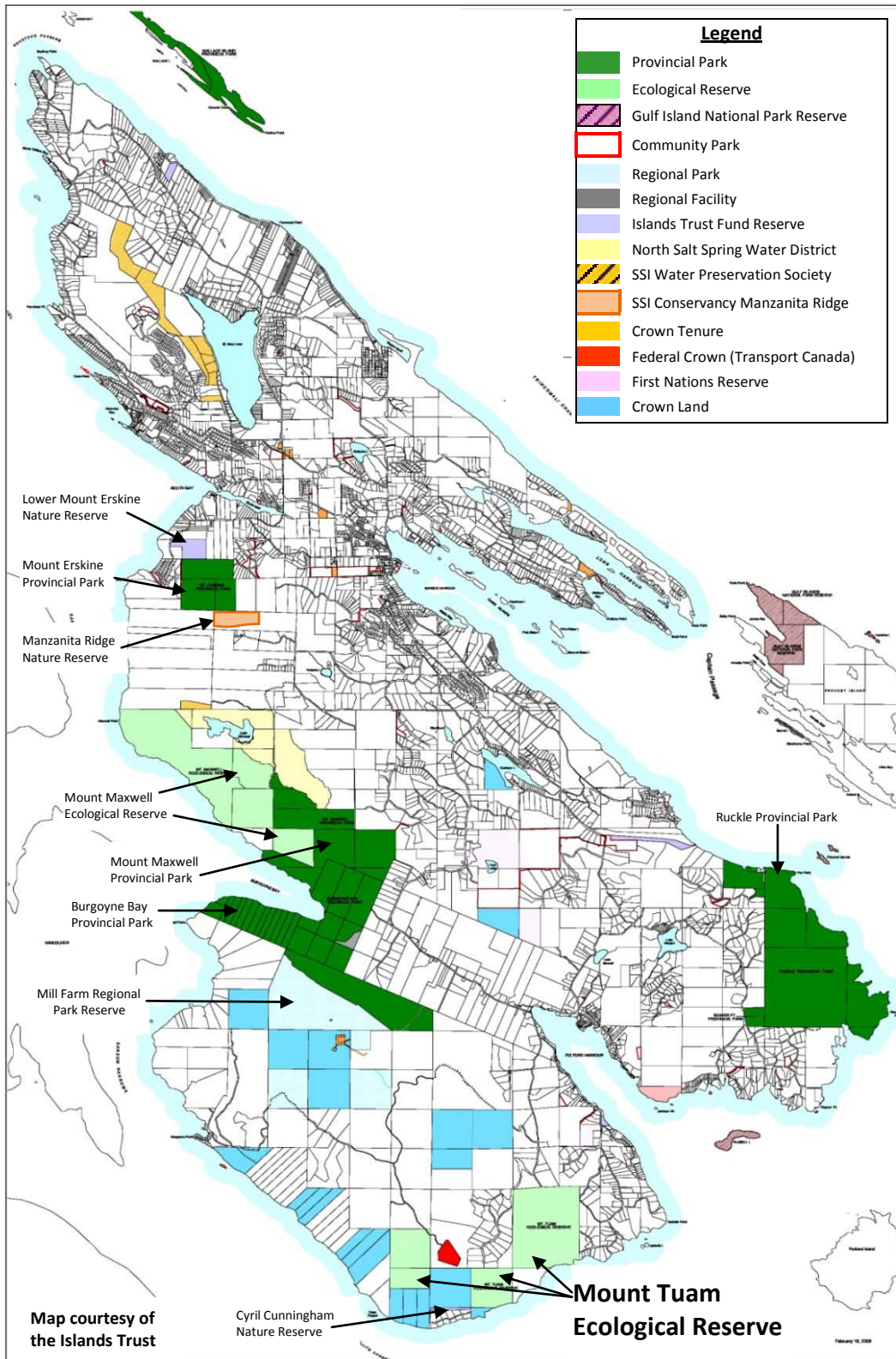


Figure 2: Salt Spring Island Protected Areas Context Map (2010)

1.3 Legislative Framework

In 1971, 254 hectares of land in the southern portion of Salt Spring Island were established as Mount Tuam Ecological Reserve. In 2004, an additional 108 hectares of acquired lands were added to the ecological reserve, increasing its size to 362 hectares.

Mount Tuam Ecological Reserve will be managed under the *Ecological Reserve Act* and this management plan. The purpose of the *Ecological Reserve Act* is to reserve Crown land for ecological purposes, including:

- areas suitable for scientific research and educational purposes associated with studies in productivity and other aspects of the natural environment;
- areas that are representative examples of natural ecosystems in British Columbia;
- areas that serve as examples of ecosystems that have been modified by human beings and offer an opportunity to study the recovery of the natural ecosystem from modification;
- areas where rare or endangered native plants and animals in their natural habitat may be preserved; and
- areas that contain unique and rare examples of botanical, zoological, or geological phenomena.

Although recreational use in the ecological reserve is not encouraged by BC Parks, non-consumptive and non-mechanized recreation is permitted.

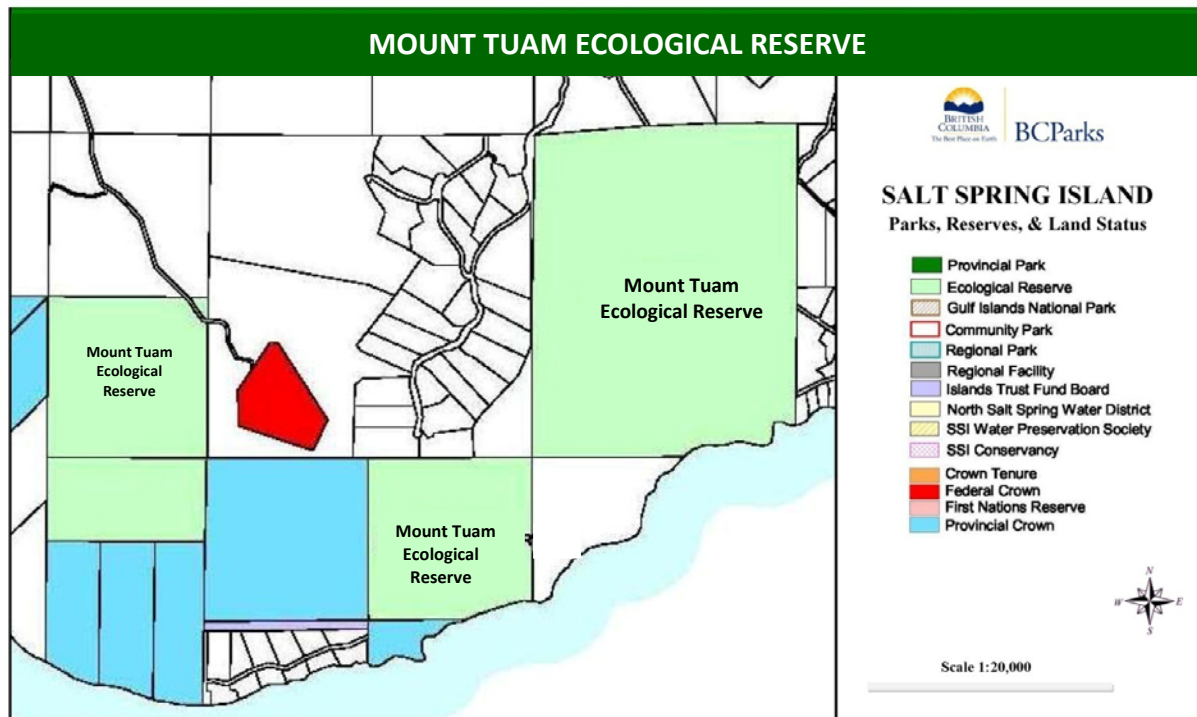


Figure 3: Mount Tuam Ecological Reserve

1.4 Relationship with First Nations

The Province and First Nations governments are working towards a new relationship based on respect, recognition, and accommodation of aboriginal title and rights. In addition, the Government of Canada and the Province are in treaty negotiations with the Hul'qumi'num Treaty Group, whose member nations have interests in the management of Mount Tuam Ecological Reserve. Any future formal agreement reached with First Nations with respect to the management of the ecological reserve may require changes to this management plan.

1.5 Relationship with Communities, Agencies and Stakeholders

In addition to BC Parks, several other agencies have interests in and around the ecological reserve including:

- The BC ministry responsible for archaeology has an interest in cultural heritage and archaeological sites in Mount Tuam Ecological Reserve.
- The BC ministry responsible for transportation has an interest in Mountain Road, which goes to the boundary of the ecological reserve.
- The BC ministry responsible for wildfire management has an interest in wildfire management and response on Salt Spring Island.
- Capital Regional District Parks Department and the Capital Regional District Salt Spring Island Recreation Commission manage a number of community and regional parks and reserves on Salt Spring Island and have developed a regional park strategy.
- Environment Canada and the Canadian Wildlife Service are responsible for protection of species-at-risk critical habitat once it is designated on federal lands, including the lands adjacent to the ecological reserve.
- Ganges Fire/Rescue Department has an interest regarding fire management and response on Salt Spring Island, as well as public safety.
- Islands Trust Fund owns and manages the 3.84 -hectare Cyril Cunningham Nature Reserve, bordering the Crown land adjacent to Mount Tuam Ecological Reserve.
- Transport Canada, Navigation (NAV) Canada, and the Victoria Airport Authority have several ground-based aircraft navigation aids on Mount Tuam, including a VHF OMNI Range and three navigational beacons, one of which is in the ecological reserve. In addition, Transport Canada holds a transportation licence for Mountain Road, which runs through the ecological reserve and the adjacent Crown land and has access to the summit of Mount Tuam via a road at the end of Mount Tuam Road. This road runs through the northwestern corner of the ecological reserve and is gated at the edge of the federal lands.
- Islands Trust is the managing government body responsible for land use planning, policy development, and the overall protection of the Gulf Islands, including Salt Spring Island.

- BC Hydro has a power line running through the ecological reserve to Transport Canada navigation aids for aircraft.

Several other key stakeholder groups have interests in and around the ecological reserve including:

- Ecological reserve wardens have an interest in the protection and management of B.C.'s ecological reserves. They contribute their knowledge of natural history, enthusiasm for conservation and their time and effort to the protection of ecological reserves. Mount Tuam ecological reserve has an ecological reserve warden in place.
- Friends of Ecological Reserves have an interest in the BC Ecological Reserve program.
- Friends of Saltspring Parks Society have an interest in ensuring protection of natural values and the continuance of low impact recreational activities in the parks and protected areas on Salt Spring Island.
- The Garry Oak Ecosystems Recovery Team was established to coordinate efforts to protect and restore endangered Garry oak ecosystems and the species-at-risk that inhabit them.
- The Garry Oak Meadow Preservation Society has an interest in saving the Garry oaks and their ecosystems. The society organizes activities that protect Garry oaks and their habitats.
- Private land owners have an interest in any impacts from the ecological reserve on their property and their impacts on the ecological reserve.
- Salt Spring Island Conservancy has an interest in preserving natural habitats on Salt Spring Island. It has been negotiating for several years the purchase of land on Salt Spring Island for protection, including private land in the Mount Tuam area.
- Salt Spring Island Trail and Nature Club has an interest in the availability of walking and hiking trails on Salt Spring Island.

1.6 Adjacent Patterns of Land Use

Mount Tuam Ecological Reserve is surrounded by land owned by the Islands Trust Fund, Transport Canada, and private owners as well as provincial Crown land.

Adjacent Crown Land Parcels

Three adjacent Crown land parcels are of interest to BC Parks for addition to Mount Tuam Ecological Reserve (Figure 4). These parcels were included in the Madrone Environmental Services Terrestrial Ecosystem Mapping Project study area. Each of these parcels were given a high to very high conservation ranking by Madrone and were found to contain several ecosystems-at-risk and species-at-risk. Addition of these areas to the ecological reserve would make the overall protection of these ecosystems more viable.

The three Crown land parcels are described below:

Parcel 1 consists of 58 hectares along the southern shore of Salt Spring Island on the lower slopes of Mount Tuam. This parcel's borders include Mount Tuam Ecological Reserve to the north, private land to the west, and a combination of private land and Crown land to the east. The Ministry of Environment holds a Use, Recreation, and Enjoyment of the Public (UREP) Reserve on this property. Adjacent private landowners hold transportation licences from the Ministry of Forests, Lands, and Natural Resources Operations (FLNRO) for use of the section of Mountain Road that runs through this property.

Parcel 2 consists of 65 hectares and is located just below the peak of Mount Tuam. This parcel's borders include Mount Tuam Ecological Reserve to the east, private and federal Crown land to the north, Islands Trust Fund land to the south and a combination of Mount Tuam Ecological Reserve and Crown land to the west. The Ministry of Environment holds a Notation of Interest (NOI) on this property.

Parcel 3 consists of 6 hectares and is located on the southern most shore of Salt Spring Island. This parcel's borders include Mount Tuam Ecological Reserve to the north, and private land to the west. The Ministry of Environment holds a UREP on this property. Transport Canada and adjacent private landowners hold transportation licences from the FLNRO for use of the section of Mountain Road that runs through this property.

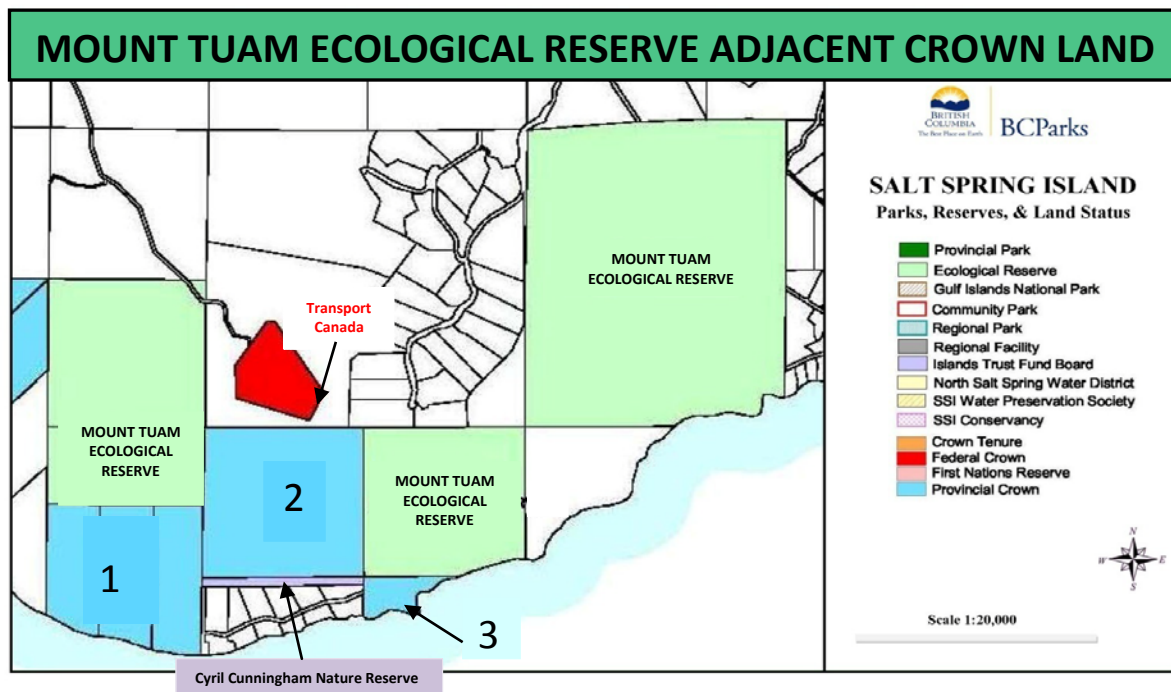


Figure 4: Mount Tuam Ecological Reserve Adjacent Crown Land Parcel Map

Mount Tuam Special Management Area

Two parcels of Mount Tuam Ecological Reserve and surrounding Crown land parcels are included in the Mount Tuam Special Management Area (SMA) (Figure 5). The SMA is recognized by an informal, collaborative initiative between the Salt Spring Island Conservancy, Transport Canada, NAV Canada, Victoria Airport Authority, BC Parks, FLNRO, Islands Trust Fund, Canadian Wildlife Service, the Garry Oak Ecosystems Recovery Team, Parks Canada, and Cowichan Tribes. The Special Management Area Resource Team (SMART), consisting of representatives from each of the groups and the Mount Tuam Ecological Reserve Warden, strives to improve the management of sensitive ecosystems, species-at-risk, and critical habitat on southern Salt Spring Island through collaborative conservation actions. In 2011, a consultant working with the SMART prepared the Mount Tuam Special Management Area Management and Restoration Plan, which outlines the group's goals and objectives and provides direction for protection of this sensitive area.

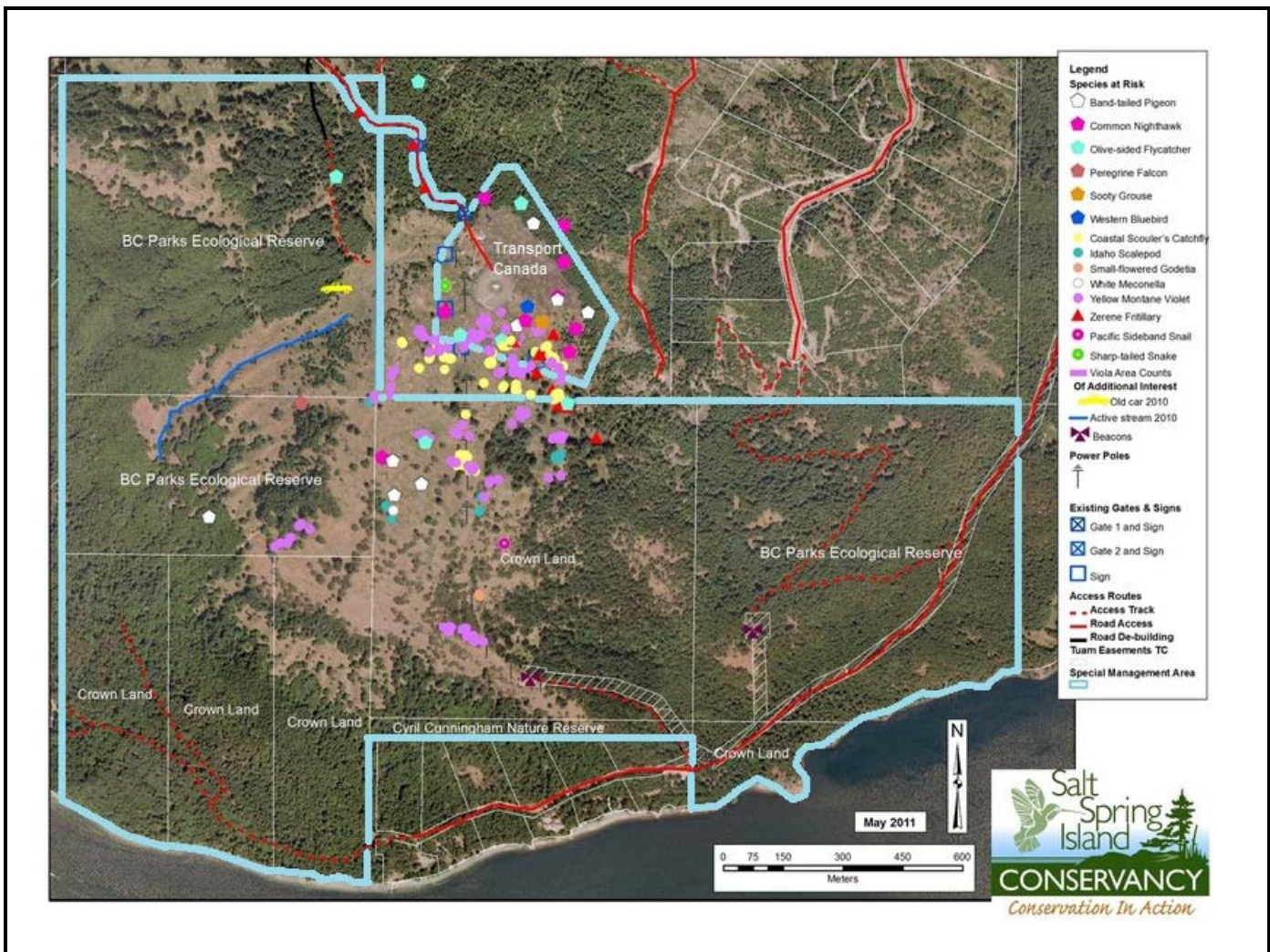


Figure 5: Mount Tuam Special Management Area (boundaries shown in blue)

Access from Adjacent Lands

There is no designated public access into the ecological reserve; however, Mountain Road comes into the ecological reserve from the east. Mountain Road passes through the two eastern sections of the ecological reserve and travels to adjacent private and Crown land properties (Figure 6). In 1981, Order in Council #576 removed Mountain Road (a 20-metre road allowance) from Mount Tuam Ecological Reserve. This road is administered by the FLNRO under the *Land Act*. Transport Canada and adjacent private landowners hold temporary transportation licences to use the sections of Mountain Road that run through the ecological reserve and the adjacent Crown land.

Mount Tuam Road, a spur off Musgrave Road, passes through the northwest corner of the ecological reserve. Transport Canada has a gate on the road to prevent access into their lands.

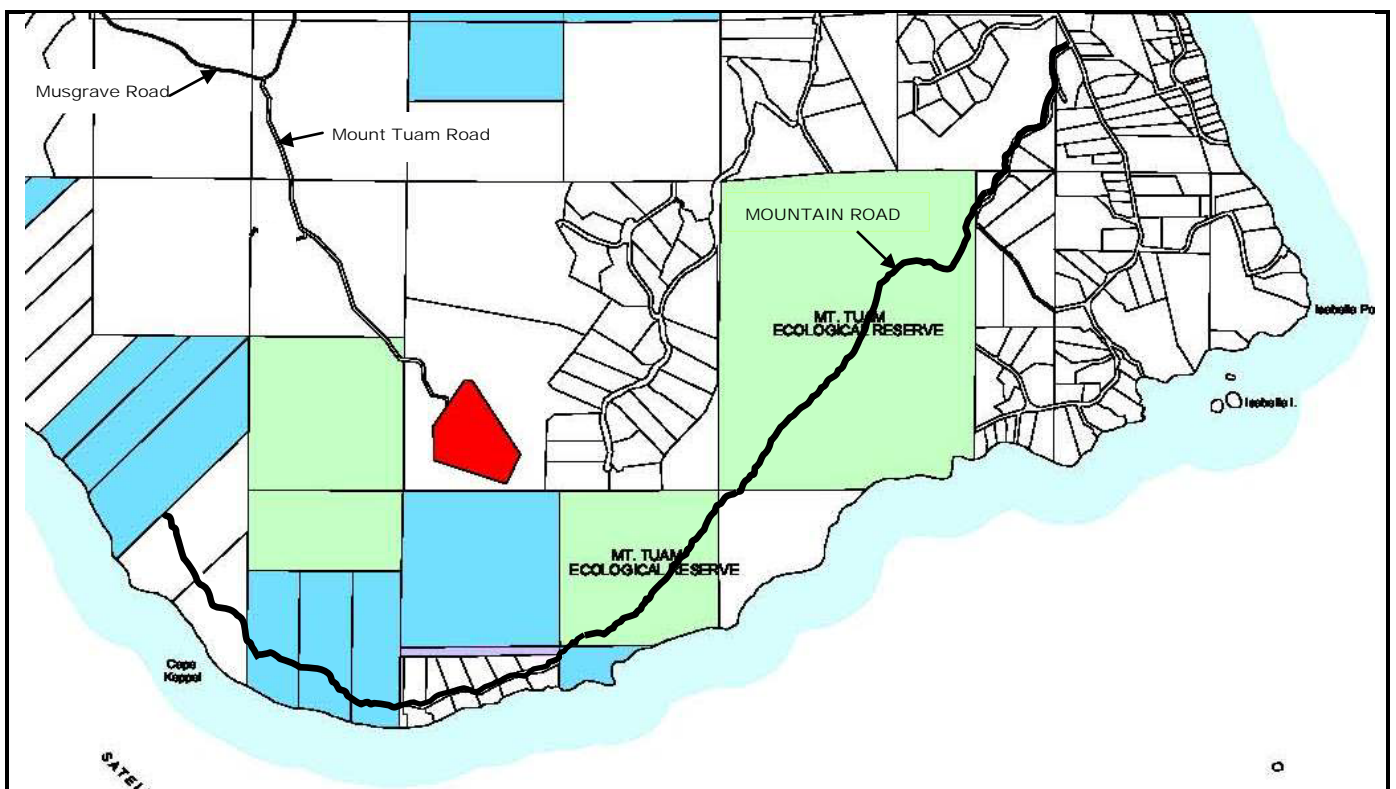


Figure 6: Mount Tuam Access Roads

1.7 The Planning Process

This management plan was developed between the summer of 2006 and summer 2012. It was developed concurrently with the management plans for the five other provincial protected areas on Salt Spring Island: Burgoyne Bay, Mount Maxwell, Mount Erskine, and Ruckle provincial parks and Mount Maxwell Ecological Reserve. Each provincial protected area on Salt Spring Island has its own special features, values, and roles; however, they all share common characteristics and management needs. A combined management planning process provided BC Parks with the benefit of effectively understanding Salt Spring Island's unique characteristics and efficiently provided opportunities for public involvement in the management planning process.

In the winter of 2007, a technical advisory committee was formed to assist BC Parks with the Salt Spring Island Protected Areas Management Planning project. The technical advisory committee included representatives from the Salt Spring Island Conservancy, the Nature Conservancy of Canada, BC Parks, the Islands Trust, the Capital Regional District, The Land Conservancy of British Columbia, The Nature Trust of British Columbia, the Friends of Saltspring Parks Society, and the planning consultants working on the project. To assist BC Parks in preparing the management plans, a series of technical advisory committee meetings were held.

A series of meetings, focus group discussions, and field trips with partners, stakeholders, and individuals expressing an interest in Salt Spring Island's provincial parks and ecological reserves and the BC Parks' management planning process occurred during the summer and fall of 2007. Open houses and public meetings were held on Salt Spring Island in July 2007 and January 2008. In addition, information on the protected areas was posted on the BC Parks website. The information gathered from the public consultation was used in the development of the draft management plans. Appendix I provides a summary of what the public identified as Mount Tuam Ecological Reserve's key values and management issues.

In the summer of 2009, the draft Mount Tuam Ecological Reserve Management Plan, along with the five other Salt Spring Island protected area draft management plans, was posted on the BC Parks website for public review and comment. In addition, public meetings took place on Salt Spring Island in October 2009. These meetings included an open house and a public forum where the public had the opportunity to discuss the draft management plans and provide comments. The information from this stage of the public process was considered in the development of the final management plans.

The ecological reserve is within the traditional territory of the Chemainus First Nation, Cowichan Tribes, Halalt First Nation, Lake Cowichan First Nation, Lyackson First Nation, and Penelakut First Nation (all members of the Hul'qumi'num Treaty Group) and the Malahat Indian Band and Tsawwassen First Nation. BC Parks invited all the First Nations to participate in the Salt Spring Island management planning process.

2.0 Values and Roles of the Ecological Reserve

2.1 Significance in the Parks and Protected Areas System

Mount Tuam Ecological Reserve is significant to BC's parks and protected areas system. The role of this ecological reserve is to:

- Protect 350 hectares of the red-listed Coastal Douglas-fir moist maritime biogeoclimatic subzone (CDFmm), equalling 4.0% of the CDFmm protected provincially;
- Protect critical habitat for thirteen provincially red-listed and blue-listed species; and,
- Protect a series of coastal ecosystems, which have very low representation in the protected areas system, including eleven red-listed CDFmm ecosystems.
- Provide a critical natural benchmark for monitoring these ecosystems, including the impacts of climate change; and
- Provide opportunities for researchers, scholars, and students for on-site data collection.

The group of provincial parks and protected areas on Salt Spring Island is important for a number of reasons, including:

- Protection of globally significant examples of northern Garry oak ecosystems – particularly in terms of having the extensive areas necessary to support a diversity of landscape, successional, and natural processes
- Protection of 17.2% of the provincially protected, red-listed Coastal Douglas-fir moist maritime biogeoclimatic subzone, twelve red-listed ecosystems, and habitat for several species-at-risk;
- Protection for, and opportunities for interpretation of, the island's cultural values, including First Nations and farming history;
- Protection for some of the most extensive and significant First Nations cultural landscapes, which are of increasing interest for cultural research, landscape conservation, and ecosystem restoration;
- The provincial parks provide low-impact recreational opportunities for Salt Spring Island residents and visitors; and
- These protected areas provide important opportunities for ecosystem protection and public recreation in a regional context in which most land is privately owned.

2.2 Natural Heritage

The information in this section comes primarily from the *Salt Spring Island Parks and Ecological Reserves – Terrestrial Ecosystem Mapping and Conservation Assessment* completed by Madrone Environmental Services in 2007. Definitions for technical terms are summarized in the glossary in Section 6.0.

Ecosystem Representation

As a group, the provincial protected areas on Salt Spring Island, including Mount Tuam Ecological Reserve, play an important role in protecting significant representative ecosystems in the Southern Gulf Islands Ecoregion. The provincial protected areas on Salt Spring Island protect 1,656 hectares of the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic subzone, representing 17.2% of the total CDFmm protected provincially. In addition, they also protect 487 hectares of the Coastal Western Hemlock very dry maritime subzone, eastern variant (CWHxm1), representing 4.89% of the total CWHxm1 protected provincially (see Table 1).

The most prominent biogeoclimatic subzone found in Mount Tuam Ecological Reserve is the CDFmm. It is significant that the ecological reserve protects 350 hectares of the CDFmm since only 4.0% of this biogeoclimatic subzone has been conserved within provincial and federal protected areas. Small amounts of additional CDFmm lands have been protected in other government and private conservation lands.



Figure 7: Mount Tuam Garry Oak Meadow

Table 1: Ecosystem Representation

Ecoprovince	Georgia Depression	
Ecoregion	Georgia Puget Basin	
Ecosection	Southern Gulf Islands	
Biogeoclimatic Subzone	Coastal Douglas-fir moist maritime (CDFmm) Coastal Western Hemlock xeric very dry maritime subzone eastern variant (CWHxm1)	
Representation: Area (hectares)	CDFmm	CWHxm1
Total biogeoclimatic subzone area within BC	245,313	435,310
Total biogeoclimatic subzone area protected within B.C. (BC Parks and National Parks of Canada)	9,783	9,985
Total biogeoclimatic subzone area protected within the six Salt Spring Island provincial parks and ecological reserves	1,678	487
Total biogeoclimatic subzone area protected within Mount Tuam Ecological Reserve	350	12
Representation: Proportion (%) of area	CDFmm	CWHxm1
% of total biogeoclimatic subzone area protected within BC (BC Parks and National Parks of Canada)	4.0%	2.29%
% of BC's total biogeoclimatic subzone area protected within the six Salt Spring Island provincial parks and ecological reserves	0.7%	0.16%
% of BC's total protected biogeoclimatic subzone area within the six Salt Spring Island provincial parks and ecological reserves	17.2%	4.89%
% of BC's total biogeoclimatic subzone area protected within Mount Tuam Ecological Reserve	0.14%	0.003%
% of BC's total protected biogeoclimatic subzone area within Mount Tuam Ecological Reserve	3.58%	0.12%
% of Salt Spring Island provincial parks and ecological reserves biogeoclimatic subzone protected within Mount Tuam Ecological Reserve	20.9%	2.5%

Ecosystems

Mount Tuam Ecological Reserve supports a series of ecosystems that have very restricted distribution on Salt Spring Island. With a Mediterranean-type climate and long growing season, the southern Gulf Islands and the southeastern part of Vancouver Island form a unique ecological region in Canada. This ecological region supports many ecosystems, which are at risk because of intense human pressure.

Mount Tuam Ecological Reserve supports eleven red-listed ecosystems and one blue-listed ecosystem, including a mosaic of areas that comprise the Garry oak meadow. These rare ecosystems have a very restricted distribution on Salt Spring Island.

The southern and western sides of the upper slope contain herbaceous meadows and scattered medium to large Garry oaks. This area includes the Garry oak/California brome/mixed grass and Garry oak - Douglas-fir – Oniongrass ecosystems. These communities are red-listed ecosystems, and several red-listed and blue-listed species are frequently found in these ecosystem types, by virtue of their ecologically restricted niches, and the limited extent of these communities.

The lower slopes and the southern part of the ecological reserve support young to mature second-growth stands of Douglas-fir, western redcedar, and arbutus and the ecosystems of Douglas-fir – Salal and Western redcedar – Douglas-fir – Oregon Beak Moss.

All ecosystems found in the ecological reserve are shown on the map in Appendix II along with a list of each polygon found in the ecological reserve and its conservation information. In addition, Appendix III provides a description of each ecosystem found in the Salt Spring Island parks and ecological reserves and its status according to the British Columbian Conservation Data Centre (2009).

The ecological reserve's ecosystems have all been assigned a conservation ranking (see Appendix II). The conservation ranking provides objective and quantitative rankings of the ecological reserve's ecosystems with respect to:

- their rarity;
- the occurrence of rare elements;
- their sensitivity to disturbance;
- their resilience;
- the level of fragmentation;
- the age of the stand; and
- the presence of invasive species.

Conservation rankings within the ecological reserve range widely, reflecting the diversity of habitats and ecosystem condition. Overall, the majority of the polygons in the ecological reserve ranked high to very high for conservation value due to their association with:

- a relatively large, contiguous, non-fragmented ecosystem;
- the CDFmm biogeoclimatic subzone;
- the sites supporting communities of Garry oak and Garry oak meadows;
- the ecosystems supported by very shallow soils;
- the ecosystems supported by herbaceous meadows;
- the historic disturbance in the ecological reserve was restricted to more productive forested sites and only a small portion of the area; and
- the abundance of species-at-risk, including several red-listed species.

The younger forest ecosystem polygons were rated as moderate. These young forested areas are examples of ecosystems-at-risk, and as they mature, their conservation ranking will increase, as mature forests are more ecologically diverse than younger forests.

The adjacent Crown land parcels (see Figure 4) also have a very high conservation ranking and are known to have an abundance of red-listed animal and plant species including critical habitats for Sharp-tailed Snake, the second largest population of yellow montane violet recorded in Canada and several other provincially and federally ranked species-at-risk (Salt Spring Island Conservancy, 2008).

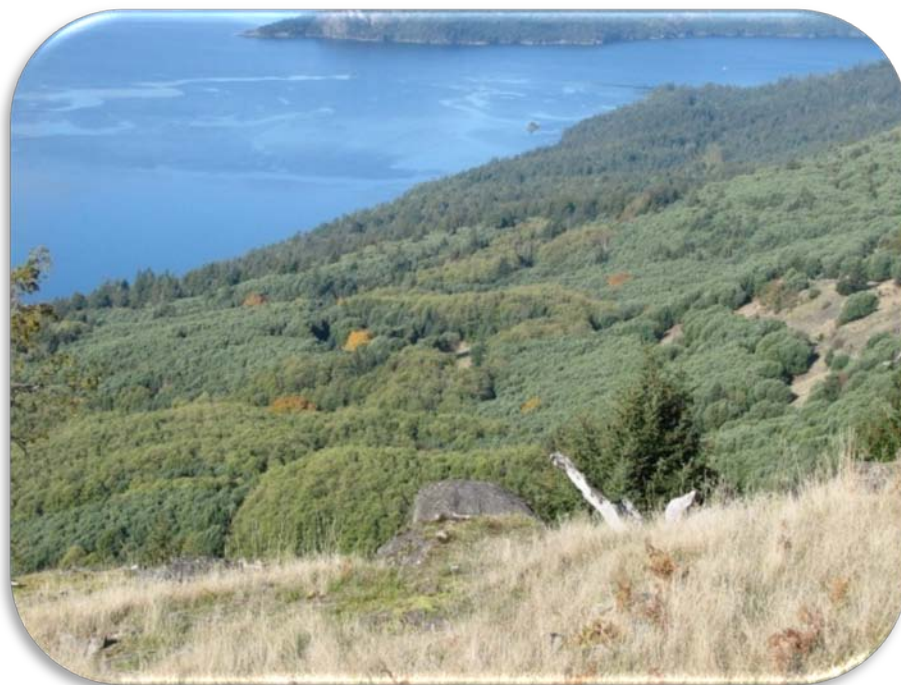


Figure 8: Mount Tuam Forest Mosaic

Vegetation

Mount Tuam Ecological Reserve and the adjacent Crown land parcels contain a very interesting assemblage of plant communities, including a very unusual second-growth stand of pure arbutus along the ecological reserve's southwestern edge. This stand regenerated after a Douglas-fir forest was harvested on the site. The site consists of extremely thick, well-drained soils, intersected with riparian areas along with wetter sites abundant with red alder and stinging nettle.

The ecological reserve and adjacent Crown lands contain significant stands of Garry oak. Garry oak ecosystems are often associated with red-listed plant species. There are several significant rare species recorded in this area, all indicating very high conservation values. Several plant associations, such as the vulnerable Douglas-fir/arbutus and endangered Douglas-fir/salal and western redcedar/vanilla leaf associations are protected in this ecological reserve. About 160 species of vascular plants have been identified up to 2007, of which twenty one (13%) are rated as rare in the province but common in dry sites of the Coastal Douglas-fir biogeoclimatic subzone. A complete list of the plants observed during surveys by Dr. Adolf Ceska and Oluna Ceska in 2007 and by the Salt Spring Island Conservancy in 2008 to 2010 is provided in Appendix IV.

Six red-listed plant species were recorded in the ecological reserve and in adjacent Crown land parcels during rare plant surveys done by Dr. Ceska and Oluna Ceska, Dr. Hans Roemer, and the Salt Spring Island Conservancy from 2007 - 2010. These include coastal Scouler's catchfly, scalepod, small-flowered godetia, white meconella, yellow montane violet, and California hedge-parsley.

In addition to the Garry oak ecosystem, almost all mature coniferous and mixed forest ecosystems within this ecological reserve and the adjacent Crown lands have the potential to support red-listed and blue-listed plant communities. These areas are ranked as having high to very high conservation values.

The ecological reserve has relatively few invasive species. The herbaceous meadows and grass dominated sites did contain up to 25% exotic grasses, such as hedgehog dogtail and sweet vernalgrass, but overall most of the area had 0 – 5% invasive species. The feral sheep found in the ecological reserve are a possible cause of elevated levels of invasive species in these isolated, otherwise intact, meadows. Common foxglove and Scotch broom were found by the roadsides.

Wildlife Species and Habitat

The Mount Tuam Ecological Reserve and adjacent Crown lands contain habitat for a variety of species-at-risk throughout the herbaceous meadows and south-facing Garry oak ecosystems with new occurrences discovered every year. In 2010, Salt Spring Island Conservancy researchers found a live Sharp-tailed Snake in Crown Land Parcel #2, the first of this species to be found in the southern part of Salt Spring Island since research on this species began on the island.

Much of this area contains a good distribution of large veteran Douglas-fir snags that are suitable perching and roosting habitat for raptors and sites for cavity nesting birds. The meadow areas provide suitable habitat for small mammals such as field mice, voles, and shrews. Other evidence of wildlife in the area includes Red Squirrel caches of Douglas-fir cones and Columbian Black-tailed Deer browse. In addition, the red-listed Peregrine Falcon and the blue-listed Band-tailed Pigeon, Olive-sided Flycatcher, Northern Pygmy-owl, Sooty Grouse, and the Pacific Sideband have been recorded in the area. In 2010, a rare red-listed Western Bluebird (Georgia Depression Population) was seen on the Transport Canada land at the summit of Mount Tuam by Salt Spring Island Conservancy researchers.

The blue-listed butterfly, *Propertius Duskywing*, was observed in April 2007 among the Garry oak stands and leaf litter in Crown land Parcel #2. Three adults were seen while crews traversed the area during ecosystem surveys. The British Columbia Conservation Data Centre (CDC) also has records of other observations of this species in this area (CDC, 2007). In addition, the butterfly, *Zerene Fritillary*, *bremnerii* subspecies, a red-listed species, was also found in the CDC records.



Figure 9: Mount Tuam Ecological Reserve Butterfly - Propertius Duskywing

Level of Human Disturbance

Historic homestead use of the area included freely foraging livestock, which has resulted in extensive grazing of native vegetation and the dispersal of invasive herbaceous grasses. A flock of feral sheep continue to live in the area grazing in the meadow.



Figure 10: Mount Tuam Ecological Reserve's Feral Sheep

Some informal trails are evident in the ecological reserve, but the level of use appears to be low. Mountain Road, the road running through the ecological reserve, receives relatively little traffic and it is difficult to assess its impact on the ecological reserve.

Natural and anthropogenic fires have historically influenced the establishment, persistence and health of Garry oak and their associated terrestrial herbaceous ecosystems. Fire suppression over the past century has likely led to changes in species composition of communities; however, there is little historic data to determine if this is the case for this particular site. There is a large fescue-camas meadow with no growth of any tree species on the southwest upper slope. This may be caused primarily by soils rather than climate. Past logging of a second-growth Douglas-fir forest on the western slope has resulted in a dense stand comprised entirely of arbutus.

2.3 Cultural Heritage

First Nations

Mount Tuam Ecological Reserve is within the traditional territory of Chemainus First Nation, Cowichan Tribes, Halalt First Nation, Lake Cowichan First Nation, Lyackson First Nation and Penelakut First Nation (all members of the Hul'qumi'num Treaty Group), Malahat Indian Band and the Tsawwassen First Nation.

Only one archaeological site has been identified in the ecological reserve. Outside of the ecological reserve, in close proximity, other archaeological sites have been located including an inland shell midden on the slopes of Mount Tuam. Eric McLay (Driftwood, September 16, 2004) provided the 1998 account of this unusual location:

“This archaeological excavation was conducted as a salvage project before gravel mining operations had completely destroyed the site in advance of a proposed subdivision. Positioned on a high, flat terrace overlooking Fulford Harbour, local residents had been recovering artifacts from the quarry site for years, including a rare human-seated figure bowl and other possibly ceremonial-related objects. The remnant portions of the site were revealed by archaeologists in 1988 to represent a formerly large and variably deep, stratified shell deposit reaching up to 0.80 meters in depth. The structure and depth of the site indicated that the site had been used over a period of time on a repetitive basis. The diversity of shellfish, fish and other faunal remains and the different types of artifacts and their manufactured stages suggested that a range of settlement activities had occurred at this location. Two carbon-14 dates estimated the inland shell midden site at Mount Tuam to date around two millennia ago and occupied over a four hundred year period. Except for its perplexing location, the Mount Tuam site may be considered typical of many coastal shell midden sites found in the southern Gulf Islands.”

Additional archaeological research may identify additional sites in the ecological reserve and adjacent Crown lands.

European Settlers

The first written mention of Salt Spring Island appeared in a letter written by Governor James Douglas in 1853, a year after he explored the east coast of Vancouver Island by canoe. Douglas believed that his discovery of salt springs on the island "would be of the greatest importance and become a wealth to the country." His report was published with a map on which Salt Spring Island was labelled Chuan. The Cowichan First Nation had given this name, which means, "facing the sea," to Mt. Tuam on the south end of the island. Over time, Chuan became Tuan and eventually Tuam, which it remains today (Kahn, 2001).

2.4 Research and Education

Scientific research and study of values contained in protected areas are part of BC Parks' ongoing commitment to knowledge and information gathering. Ecological research and education are appropriate activities under the *Ecological Reserve Act*. Appropriate ecological scientific research and education must be consistent with the purposes set out in the *Ecological Reserve Act*.

Research Values

Mount Tuam Ecological Reserve is rich in opportunities for scientific research. The Salt Spring Island Conservancy has carried out several research projects on adjacent land including the Crown Land Parcel #2, Transport Canada land on the summit of Mount Tuam, and the adjacent private land. In 2007, the Salt Spring Island Conservancy, along with Dr. Hans Roemer, carried out a detailed inventory project on the red-listed yellow montane violet on the adjacent Crown land. There they recorded the second largest yellow montane violet population in Canada. The ecological reserve and adjacent Crown land provide potential for long-term, scientific studies associated with the area's unique ecosystems and abundance of species-at-risk.



Figure 11: Salt Spring Island Conservancy Yellow Montane Research Project 2009

Education Values

The diversity of landscapes and habitats in Mount Tuam Ecological Reserve and adjacent lands offers numerous education opportunities for local schools and other groups. Education will promote understanding of the rare dry coastal ecosystems represented here, as well as the ecological and cultural importance of the ecological reserve.

3.0 Management Direction

Management direction for Mount Tuam Ecological Reserve is guided by the *Ecological Reserve Act*. Ecological reserves are areas selected to conserve representative and special natural ecosystems, plant and animal species, landscape features, and phenomena. The goals of ecological reserves are to contribute to the maintenance of biological diversity and the protection of genetic materials. Appropriate scientific research and educational functions are the primary uses of ecological reserves. Ecological reserves are not established for recreation, though most ecological reserves are open to the public for non-consumptive, observational uses. Activities such as hunting, camping, removal of plants or animals, and the use of motorized vehicles are prohibited.

3.1 Vision

Mount Tuam Ecological Reserve conserves a representative example of the dry Coastal Douglas-fir biogeoclimatic zone, in particular the red-listed Garry oak ecosystem and associated species-at-risk. It provides opportunities for research and education on the natural environment including important baseline information on the effects of climate change, which can be useful information for managing these effects elsewhere.



Figure 12: Garry Oak on the Slopes of Mount Tuam

3.2 Management Objectives, Issues, and Strategies

Table 2 outlines the management objectives, issues, and strategies to address them.

Table 2: Management Objectives, Issues, and Strategies

Objectives	Issues	Strategies
CONSERVE AND PROTECT NATURAL ECOLOGICAL VALUES		
To maintain the natural diversity of ecosystems in the ecological reserve, and to conserve and protect natural values including species-at-risk.	<p>Species-at-risk are likely found in the ecological reserve but there is limited information about the presence and location of these species.</p> <p>The health of the Garry oak trees and meadows in the ecological reserve has not been assessed.</p>	<ul style="list-style-type: none"> • Encourage authorized groups and universities to participate in research and vegetation management initiatives. • Implement, where feasible, the Garry Oak Ecosystems Recovery Teams' Goals and Strategies (Appendix IV). • Initiate and foster research on Garry oak ecosystems and species-at-risk. • Continue to collaborate with the Mount Tuam Special Management Area Resource Team (SMART) on the management of critical habitat and species-at-risk. • Work with the relevant provincial agencies, Pacific Forestry Centre, Garry Oak Ecosystem Recovery Team, and others to determine the health of the Garry oak trees and to monitor the stand for harmful insects.
	Sensitive ecosystems are threatened by the introduction of invasive plant and animal species.	<ul style="list-style-type: none"> • Collaborate with the Invasive Species Council of BC, other agencies, stakeholders and the public on the reduction and/or eradication of invasive plants and feral animals. • Feral animals (e.g. sheep) are causing impacts to the native plant species. Conduct control and/or removal of feral animals as resources permit. • Assess and monitor the impacts of deer on sensitive ecosystems and species-at-risk. • Monitor the results of management controls.
	Protection of conservation values in adjacent crown lands	<ul style="list-style-type: none"> • Pursue the addition of the three adjacent Crown land parcels, excluding Mountain Road, to the ecological reserve to protect critical habitat and species-at-risk, and to provide for a contiguous protected area.
	<p>Sensitive ecosystems are threatened by natural succession and long-term fire suppression.</p> <p>There is a threat of a severe forest fire from unnatural forest fuel loads in the ecological reserve and on adjacent properties.</p>	<ul style="list-style-type: none"> • Develop a fuel management plan that defines long-term fuel management objectives and actions. • Assess the potential for controlled burns or mechanical thinning to maintain Garry oak meadow ecosystem. • Update the fire management and emergency response plans to recommend minimum levels of heavy equipment and retardant use in the ecological reserve.

Objectives	Issues	Strategies
To maintain the natural diversity of ecosystems in the ecological reserve, and to conserve and protect natural values including species-at-risk. (con't)	Some types of recreational use are negatively impacting sensitive ecosystems.	<ul style="list-style-type: none"> • Monitor recreational use and take appropriate compliance and enforcement action against inappropriate uses, including unauthorized trail building, mountain biking and motorized vehicle use (ATVs and dirt bikes). • Sign access points in the ecological reserve to identify the boundaries. • Install signs to provide information on the natural and cultural values being conserved and appropriate visitor behaviour in the ecological reserve. • Work with the SMART to determine the best approach to reduce impacts from recreational use in the area.
CLIMATE CHANGE		
To gain a better understanding of the effects of climate change on the ecological reserve's natural values.	Species and ecosystems-at-risk may be negatively impacted by climate change related variations to precipitation and temperature.	<ul style="list-style-type: none"> • Encourage ongoing research on species and ecosystems to get a better understanding of the effects of climate change on these sensitive ecosystems. • Adopt, as appropriate, management actions that may be identified through climate change research regarding the ecological reserve.
RESEARCH AND EDUCATION		
To improve knowledge regarding ecological values and impacts of invasive species.	Scientific research on subjects including ecosystems and species at risk, invasive species, effects of long-term fire suppression, etc. is needed.	<ul style="list-style-type: none"> • Encourage research projects and initiate long term relationships with a variety of research partners including other government agencies, ENGO's, post secondary institutions, etc. • Encourage and support research activities in the ecological reserve to increase the knowledge of its' natural ecological values. • Ensure the results of research conducted in Mount Tuam are made available to site managers.
	Research permits are required for all research in the ecological reserve.	<ul style="list-style-type: none"> • Ensure all research activities in the ecological reserve follow BC Parks guidelines.
	Public knowledge is lacking regarding the purpose of this ecological reserve and ecological reserves generally.	<ul style="list-style-type: none"> • Develop signage for information shelters in the provincial parks on Salt Spring Island that includes pertinent information regarding the ecological reserves on Salt Spring Island.
CONSERVE, PROTECT, AND RESPECT CULTURAL HERITAGE VALUES		
To conserve, protect, and respect cultural values and maintain First Nations' social, ceremonial, and cultural uses.	Limited knowledge of the ecological reserve's cultural values, including archaeological sites and First Nations' cultural uses, makes it difficult to protect these values.	<ul style="list-style-type: none"> • Continue building relationships with First Nations concerning the protection of archaeological sites and their cultural use of the ecological reserve. • Ensure management direction is developed for any new sites or values identified.

Objectives	Issues	Strategies
RELATIONSHIP WITH STAKEHOLDERS AND NEIGHBOURS		
To establish and maintain a good relationship with other agencies, stakeholders, and neighbours.	Collaboration with other agencies and groups for the management of the ecological reserve and surrounding properties will improve the protection of the ecological reserve's values.	<ul style="list-style-type: none"> • Work collaboratively with the SMART and other stakeholders to manage the lands in the area. • Continue to maintain the volunteer ecological reserve warden program.
LAND USE AND INTERESTS MANAGEMENT		
To integrate adjacent land use issues and interests in the management of the ecological reserve.	<p>Accurate identification of boundary location on the ground is needed.</p> <p>Potential impacts from development of adjacent private and protected lands.</p>	<ul style="list-style-type: none"> • Post signs in key areas to identify the ecological reserve's boundary. • Sign and monitor access points into the ecological reserve. • Monitor development on adjacent land and work with adjacent land managers and private landowners to mitigate any negative impacts from development of lands adjacent to the ecological reserve.
	Increased public use of Mountain Road and the Transport Canada access road may lead to increased visitor impacts in the ecological reserve.	<ul style="list-style-type: none"> • Monitor and, if necessary, mitigate impacts from public use of Mountain Road use on the ecological reserve. • Pursue the exclusion of the Transport Canada access road in the northeast corner of the ecological reserve from the ecological reserve boundaries.
	BC Hydro's management of their right of way in the ecological reserve may affect the values of the ecological reserve.	<ul style="list-style-type: none"> • Work with BC Hydro to review and, if necessary, mitigate the impacts of brushing and maintenance activities along the BC Hydro right-of-way. • Continue communication with BC Hydro on the management of this right-of-way.

4.0 Plan Implementation

4.1 Policy Context

In addition to any protected area specific policies highlighted in the management plan, there are numerous other provincial/regional policies and guidelines that will be considered during management plan implementation. This includes items such as BC Parks' policies on conservation, permitting, and impact assessment processes.

4.2 Implementation

The management of Mount Tuam Ecological Reserve will conform to the directions set forth in this management plan. The implementation of the outlined management strategies is subject to the availability of resources. As capacity allows, BC Parks will facilitate discussions with SMART, First Nations, partner groups, and stakeholders to identify and determine how to implement management strategies. Monitoring of the ecological reserve will require close cooperation and involvement with SMART, First Nations, partner groups, stakeholders, the ecological reserve warden and the local community to ensure that the ecological reserve is well managed and that its values are maintained and protected.

4.3 Adaptive Management

In order to ensure the management of Mount Tuam Ecological Reserve remains relevant and effective, an adaptive management approach will be used. Adaptive management involves a five-step process of planning, action, monitoring, evaluation, and revision of the management plan to reflect lessons learned, changing circumstances, and/or objectives achieved. Adaptive management is flexible, collaborative, and responsive to public input.

The management plan will be reviewed as required by BC Parks. A review of the management plan should generally be triggered by the complexities of the management issues in the protected area and/or a significant change in circumstances (e.g., a natural disaster, major environmental change or discovery of a major new archaeological site), and not by a specific time period.

A management plan review determines whether any updates to the management plan are required to: keep management direction current and relevant; correct the intent of a policy statement; address some error or omission; and/or address a new proposal. Any updates or

changes to the content of the management plan will be addressed through a formal management plan amendment process including an opportunity for public input.



Figure 13: Mount Tuam Ecological Reserve

5.0 References

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6.0 Glossary

Blue List	List of ecosystems, and indigenous species and subspecies of special concern (formerly vulnerable) in British Columbia.								
COSEWIC	Committee on the Status of Endangered Wildlife in Canada is a committee of experts that assesses and designates which wildlife species are in some danger of disappearing from Canada.								
Ecosystem	The BC Conservation Data Centre and NatureServe use this term to include natural plant communities and plant associations and the full range of ecosystems that occur in British Columbia. These may represent ecosystems as small as a vernal pool, or as large as an entire river basin, an Ecoregion or a Biogeoclimatic Zone.								
Ecoregion	The Ecoregion Classification system is used to stratify British Columbia's terrestrial and marine ecosystem complexity into discrete geographical units at five levels. The two highest levels, Ecodomains and Ecodivisions, are very broad and place British Columbia globally. The three lowest levels, Ecoprovinces, Ecoregions, and Ecoregions are progressively more detailed and narrow in scope and relate segments of the province to one another. They describe areas of similar climate, physiography, oceanography, hydrology, vegetation, and wildlife potential. Within each terrestrial ecoregion, climatic zones occur where specific soils, plant and animal communities and aquatic systems develop because of the interaction of climate with the land surface and surficial materials. These zones are defined within the Biogeoclimatic Ecosystem Classification system . For a complete explanation of this complex classification system, visit http://www.env.gov.bc.ca/ecology/ecoregions/index.html/								
Ecosystem	An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. Ecosystems vary enormously in size: a temporary pond in a tree hollow and an ocean basin can both be ecosystems.								
Ecosystem at Risk	An extirpated, endangered or threatened ecosystem or an ecosystem of special concern (formerly called vulnerable).								
Endangered	Facing imminent extirpation or extinction.								
Extinct	Species that no longer exist.								
Extirpated	A species or an Ecosystem that no longer exist in the wild in an area but does occur elsewhere.								
Forest	An ecosystem group in BC Species and Ecosystems Explorer: ecosystems with greater than 10% tree cover including coniferous, deciduous, and mixed forests with more-or-less continuous canopies and trees not clumped.								
Forest Structure	<table> <tr> <td>Pole/Sapling Trees</td> <td>less than 40 years old</td> </tr> <tr> <td>Young Forest</td> <td>40 - 80 years old</td> </tr> <tr> <td>Mature Forest</td> <td>80 - 250 years old</td> </tr> <tr> <td>Old Growth Forest</td> <td>250 years or older</td> </tr> </table>	Pole/Sapling Trees	less than 40 years old	Young Forest	40 - 80 years old	Mature Forest	80 - 250 years old	Old Growth Forest	250 years or older
Pole/Sapling Trees	less than 40 years old								
Young Forest	40 - 80 years old								
Mature Forest	80 - 250 years old								
Old Growth Forest	250 years or older								
Herbaceous	An ecosystem group in BC Species and Ecosystems Explorer: ecosystems dominated by herbaceous vegetation. Shrubs generally account for less than 20% of vegetation cover, and tree cover is generally less than 10%.								

Invasive Species Species those are not native to an area and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Polygons In mapping, any multi-sided area that shares the same characteristics; commonly used to map ecosystems.

Provincial Conservation Status Ranking Conservation status rank for an element occurring or formerly occurring in B.C.

Status	Definition
SX	Presumed Extirpated—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered
SH	Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
S1	Critically Imperilled—Critically imperilled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2	Imperilled—Imperilled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
S3	Vulnerable—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	Secure—Common, widespread, and abundant in the nation or state/province.
SNR	Unranked—Nation or state/province conservation status not yet assessed

Provincial Lists List of elements considered to be either endangered or threatened (Red List), special concern (Blue List) or not at risk (Yellow List) in B.C.

Red List List of ecosystems, and indigenous species and subspecies that are extirpated, endangered, or threatened in British Columbia. Red-listed species and sub-species may be legally designated as, or may be considered candidates for legal designations as Extirpated, Endangered, or Threatened under the *Wildlife Act* (see <http://www.env.gov.bc.ca/wld/faq.htm#2>). Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

Riparian An ecosystem group in BC Species and Ecosystems Explorer: ecosystems influenced by proximity to water bodies (rivers, streams, lakes) and processes associated with moving water.

Riparian Habitats	Areas situated, or dwelling on the bank of a river or other body of water
Sparsely Vegetated	An ecosystem group in BC Species and Ecosystems Explorer:ecosystems dominated by exposed rock or mineral soil, with a generally sparse vegetation layer (less than 10 - 25% cover) dominated by lichens and xerophytes, or low herbaceous vegetation.
Species at Risk	An extirpated, endangered, or threatened species or a species of special concern (formerly called vulnerable).
Special Concern	Particularly sensitive to human activities or natural events but not endangered or threatened (as used by COSEWIC - A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.) Special Concern was formerly referred to as Vulnerable.
Threatened	Likely to become endangered if limiting factors are not reversed.
Vulnerable	Particularly sensitive to human activities or natural events. (As used by NatureServe - Vulnerable due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.)
Yellow List	List of ecosystems and indigenous species that are not at risk in British Columbia.

Appendix I: Mount Tuam Ecological Reserve Summary of Public Consultation

Through input provided at one public meeting, two public open houses, one stakeholder meeting, and through mail, e-mail, and the website, in 2007 and 2008, the public showed overall support for the key values and management issues identified for this ecological reserve.

The significance of the Garry oak meadows and the sensitivity of the ecosystem in the ecological reserve were the main concerns voiced in the comments received and the need for the highest protection possible and maintaining as small an impact footprint as possible. The need for better knowledge of the natural and cultural history for this site was also brought forward. In addition, there were requests for more information on site about the natural and cultural history of the ecological reserve and trails that were accessible in it.

Many of the public are in favour of increased management to achieve protection of this area in terms of monitoring and education through signs and programming. In addition, there is support for increasing the size of the reserve through the addition of the Crown lands adjacent to the ecological reserve.

Mountain Road that runs through two sections of the Ecological Reserve is a concern because it provides access into the reserve. The road is important access for the residence in the area, BC Hydro, fire and rescue services. There was concern regarding potential impacts from the road's maintenance and use on the natural environment.

Key values, activities, and management issues identified through the management planning process included:

Key Ecological Values:

- Rare and sensitive ecosystems and plants;
- Pristine nature; and,
- Natural and cultural history.

Appropriate Activities:

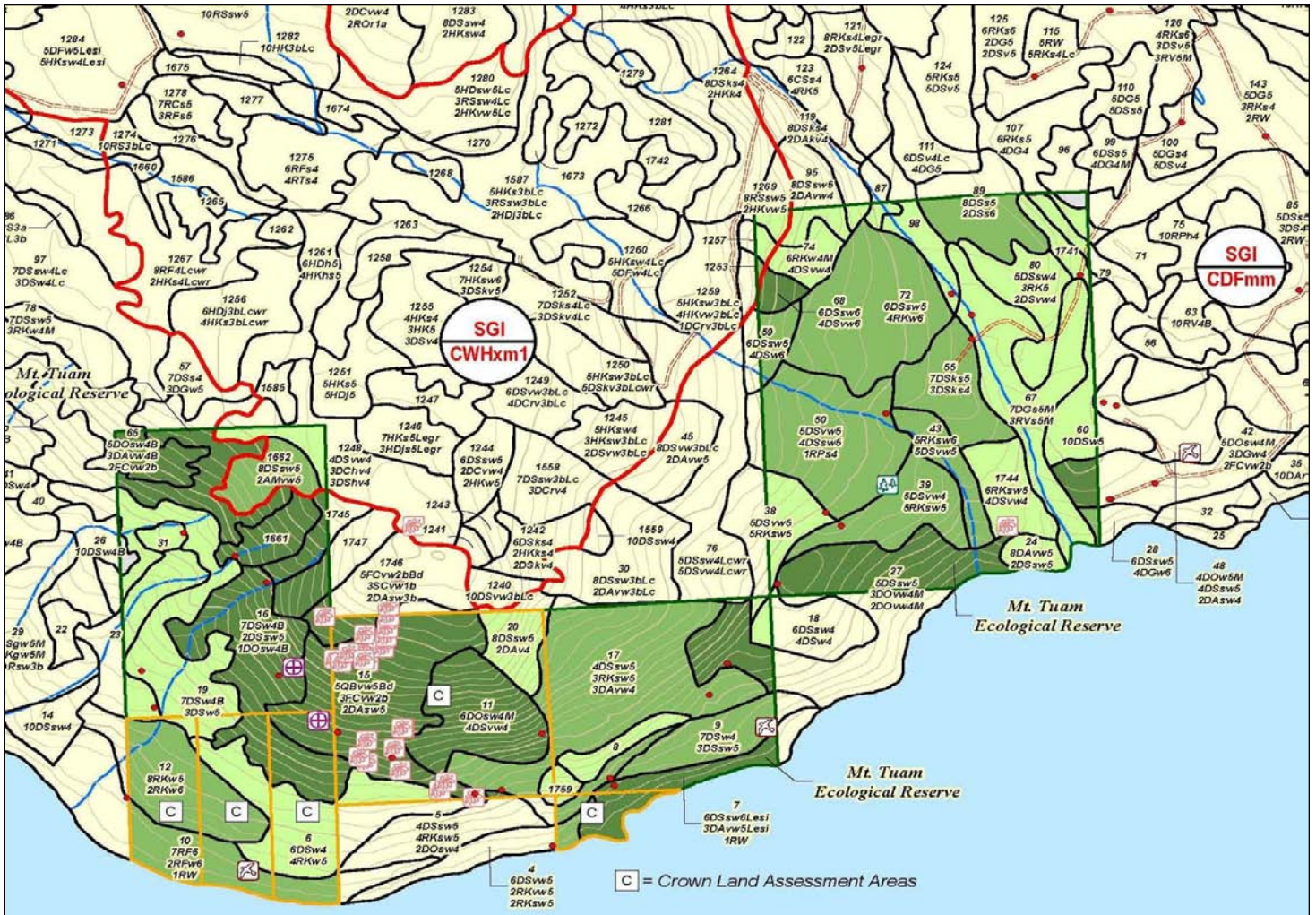
- Research and education.

Key Management Issues:

- Access - Limit or deny access for conservation;
- Protection of the sensitive ecosystems;
- Expansion of the ecological reserve to include adjacent Crown land parcels;

- The impacts of recreation use including camping, hunting, wood cutting, and off road vehicle traffic (ATV's, motor bikes, mountain bikes);
- Wildfires;
- The introduction and control of non-native species including plants and animals (sheep);
- Lack of public information on the role of an ecological reserve and the reasons for limited access into the area;
- Lack of knowledge of aboriginal history, archaeological sites, unique flora and forest, eagles nesting and other forest birds;
- The need for protection of aboriginal history, archaeological sites, unique flora and forest, eagle nests, and other forest birds;
- The impacts of Mountain Road on the ecological reserve; and,
- Addressing unsanctioned trail building.

Appendix II: Terrestrial Ecosystem Mapping



LEGEND

ECOSECTION & BIOGEOCLIMATIC UNITS		ECOSYSTEM UNIT LABEL	
	Ecosection	Polygon ID — 32	Site Modifier
	Biogeoclimatic Unit	Percentile — 60Ez5 C Lc	Disturbance Code
		60Fz5 M	Ecosystem Unit
			Stand Composition
			Structural Stage
MAP SYMBOLS			
	Road		Plot Location - CDF TEM (2007)
	Rivers & Creeks - Definite		Rare Bird
	Rivers & Creeks - Indefinite		Rare Plant
	Biogeoclimatic Unit		Rare Plant Community (Forest)
	Ecosystem Unit		Rare Plant Community (Oak)
	Ecological Reserves		Rare Butterfly
	Crown Lands Assessment Areas		
		Conservation Rank	
			Very High
			High
			Moderate
			Low
			Very Low

Appendix III: Terrestrial Ecosystem Mapping Polygon Codes and Status

Mount Tuam Ecological Reserve and adjacent Crown land ecosystems in **bold italic red and blue**

COASTAL DOUGLAS FIR MOIST MARITIME BIOGEOCLIMATIC SUBZONE			
Polygon Code	Ecosystem	Rating	Status
CS	western redcedar / slough sedge	S2S3	Blue
DA	Douglas-fir - arbutus (lodgepole pine or shore pine)	S2	Red
DG	Douglas-fir - grand fir / dull Oregon-grape	S2	Red
DO	Douglas-fir / Alaska oniongrass	S1	Red
DS	Douglas-fir / salal (Dry Maritime)	S2	Red
FC	Roemer's fescue – camas	S1	Red
GO	Garry oak / oceanspray	S1	Red
HL	hardhack – Labrador tea	S3	Blue
QB	Garry oak / California brome/mixed grasses	S1	Red
RF	western redcedar – grand fir/three-leaved foamflower (Very Dry Maritime)	S2	Red
RK	western redcedar - Douglas-fir / Oregon beaked-moss	S1	Red
RP	western redcedar / Indian-plum	S1	Red
RS	western redcedar / common snowberry	S1	Red
RV	western redcedar / vanilla leaf	S1	Red
SC	Cladina (reindeer lichen) – Wallace's selaginella	S2	Red

COASTAL WESTERN HEMLOCK, VERY DRY MARITIME BIOGEOCLIMATIC SUBZONE			
Polygon Code	Ecosystem	Rating	Status
AM	arbutus / hairy manzanita	S2	Red
DC	Douglas-fir - lodgepole pine / Cladina (reindeer lichen)	S2	Red
DF	Douglas-fir / sword fern	S2	Red
DS	Douglas-fir - western hemlock / salal (Dry Maritime)	S2S3	Blue
HD	western hemlock - western redcedar / deer fern	S2	Red
HL	hardhack – Labrador tea	S3	Blue
HK	western hemlock - Douglas-fir / Oregon beaked-moss	S2	Red
RF	western redcedar / three-leaved foamflower (Very Dry Maritime)	S2	Red
RS	western redcedar / sword fern (Very Dry Maritime)	S2S3	Blue
SC	Cladina (reindeer lichen) – Wallace's selaginella	S2	Red

OTHER features found in Mount Tuam Ecological Reserve in bold italic			
Polygon Code	Feature	Polygon Code	Feature
BE	Beach	ES	Exposed Soil
CF	Cultivated Field	GP	Gravel Pit
CL	Cliff	RO	Rocky Outcrop
CO	Cultivated Orchard	RW	Rural Residential

Appendix IV: Mount Tuam Plant Species List

List of Plants in the Mount Tuam Ecological Reserve and Adjacent Crown Lands by Dr. Adolf Ceska & Oluna Ceska, April 2007 and Salt Spring Island Conservancy 2010.

Alphabetical Scientific Name (BC CDC **red-listed species in red** and **blue-listed in blue**)

Scientific Name	English Name
<i>Acer macrophyllum</i>	bigleaf maple
<i>Achillea millefolium</i>	yarrow
<i>Agoseris grandiflora</i>	large-flowered agoseris
<i>Agoseris retrorsa?</i>	mountain dandelion (could be a new species for BC - ID still in question)
<i>Agrostis scabra</i>	hair bentgrass
<i>Aira praecox</i>	early hairgrass
<i>Allium acuminatum</i>	Hooker's onion
<i>Allium cernuum</i>	nodding onion
<i>Alnus rubra</i>	red alder
<i>Anthoxanthum odoratum</i>	vernal grass
<i>Aphanes microcarpa</i>	small-fruited parsley-piert
<i>Arabis glabra</i>	tower rockcress
<i>Arbutus menziesii</i>	arbutus
<i>Arctium minus</i>	common burdock
<i>Arenaria serphyllifolia</i>	thymeleaf sandwort
<i>Athysanus pusillus</i>	common sandweed
<i>Brodiaea coronaria</i>	harvest brodiaea
<i>Bryum miniatum</i>	Bryum moss
<i>Calandrinia ciliata</i>	desert rock purslane
<i>Camassia leichtlinii</i>	great camas
<i>Camassia quamash</i>	common camas
<i>Campanula scouleri</i>	Scouler's harebell
<i>Cardamine nuttallii</i>	Nuttall's bitter-cress
<i>Cardamine sp.</i>	bitter-cress
<i>Carex garberi</i>	elk sedge
<i>Carex hoodii</i>	Hood's sedge
<i>Carex inops</i>	long-stoloned sedge
<i>Cerastium arvense</i>	field chickweed
<i>Cerastium glomeratum</i>	sticky chickweed

Scientific Name	English Name
<i>Cerastium semidecandrum</i>	mouse-ear chickweed
<i>Cirsium vulgare</i>	bull thistle
<i>Clarkia amoena</i> (blue-listed)	farewell-to-spring
<i>Clarkia purpurea</i> subbsp. <i>qudrivulnera</i> (red-listed)	small-flowered godetia
<i>Claytonia perfoliata</i>	miner's-lettuce
<i>Claytonia rubra</i>	redstem springbeauty
<i>Clinopodium douglasii</i>	yerba buena
<i>Collinsia grandiflora</i> var. <i>pusilla</i>	large-flowered blue-eyed Mary
<i>Corallorhiza maculata</i>	spotted coral-root
<i>Crataegus monogyna</i>	common hawthorn
<i>Cynosurus echinatus</i>	hedgehog dog-tail grass
<i>Cystopteris fragilis</i>	fragile fern
<i>Dactylis glomerata</i>	orchard grass
<i>Danthonia californica</i>	California oatgrass
<i>Danthonia intermedia</i>	timber oat-grass
<i>Daucus pursillus</i>	American wild carrot
<i>Delphinium menziesii</i>	Menzies' larkspur
<i>Digitalis purpurea</i>	common foxglove
<i>Dodecatheon hendersonii</i>	broad-leaved shooting star
<i>Draba verna</i>	common draba
<i>Elymus glaucus</i>	blue wildrye
<i>Epilobium brachycarpum</i>	tall annual willow herb
<i>Epilobium minutum</i>	small-flowered willowherb
<i>Eriophyllum lanatum</i>	woolly eriophyllum
<i>Erodium cicutarium</i>	stork's bill
<i>Erythronium oregonum</i>	white fawn lily
<i>Festuca roemerii</i>	Roemer's fescue
<i>Festuca rubra</i>	red fescue
<i>Fragaria vesca</i>	wood strawberry
<i>Fragaria virginiana</i>	wild strawberry
<i>Fritillaria affinis</i>	chocolate lily
<i>Galium aparine</i>	cleavers
<i>Geranium molle</i>	dove-foot geranium
<i>Geranium pusillum</i>	small-flowered crane's-bill
<i>Gnaphalium purpureum</i>	purple cudweed
<i>Grindelia integrifolia</i>	gumweed
<i>Holodiscus discolor</i>	oceanspray
<i>Hypericum perforatum</i>	common St. John's wort

Scientific Name	English Name
<i>Hypochaeris glabra</i>	smooth cat's ear
<i>Hypochaeris radicata</i>	hairy cat's-ear
<i>Idahoia scapigera</i> (red-listed)	scalepod
<i>Juncus effuses</i>	common rush
<i>Juncus ensifolius</i>	swordleaf rush
<i>Lathyrus nevadensis</i>	purple peavine
<i>Linanthus bicolor</i>	bi-coloured linanthus
<i>Lithophragma glabrum</i>	smooth woodland star
<i>Lithophragma parviflorum</i>	small-flowered fringe-cup
<i>Lomatium utriculatum</i>	spring gold
<i>Lonicera hispidula</i>	hairy honeysuckle
<i>Lotus micranthus</i>	small-flowered birds-foot trefoil
<i>Lupinus bicolor</i>	two-coloured lupine
<i>Luzula subsessilis</i>	short-stalked wood-rush
<i>Lychnis coronaria</i>	rose campion
<i>Madia glomerata</i>	clustered tarweed
<i>Mahonia aquifolium</i>	tall Oregon-grape
<i>Marrubium vulgare</i>	horehound
<i>Meconella oregana</i> (red-listed)	white meconella
<i>Mimulus alsinoides</i>	chickweed monkey-flower
<i>Mimulus guttatus</i>	common monkey-flower
<i>Mimulus sookensis</i>	Sooke monkey-flower
<i>Montia dichotoma</i>	dwarf montia
<i>Montia fontana</i>	blinks (water chickweed)
<i>Myosotis discolor</i>	common forget-me-not
<i>Nemophila parviflora</i>	small-flowered nemophila
<i>Opuntia fragilis</i>	prickly-pear cactus
<i>Orobanche uniflora</i>	naked broomrape
<i>Osmorhiza berteroi</i>	mountain sweet-cicely
<i>Paxistima myrsinites</i>	falsebox
<i>Pentagramma triangularis</i>	goldenback fern
<i>Perideridia gairdneri</i>	yampah root
<i>Piperia sp.</i>	rein orchid
<i>Plantago lanceolata</i>	ribwort plantain
<i>Pleuridium subulatum</i>	pleuridium moss
<i>Poa canbyi</i>	Canby bluegrass
<i>Polygonum sp.</i>	smartweed
<i>Polypodium glycyrrhiza</i>	licorice fern

Scientific Name	English Name
<i>Polystichum munitum</i>	sword fern
<i>Polytrichum juniperinum</i>	juniper haircap moss
<i>Prunella vulgaris</i>	self-heal
<i>Pseudotsuga menziesii</i>	Douglas-fir
<i>Psilocybe Montana</i>	potent Psilocybe (mushroom)
<i>Pteridium aquilinum</i>	bracken fern
<i>Quercus garryana</i>	Garry oak
<i>Racomitrium elongatum</i>	roadside rock moss
<i>Ranunculus occidentalis</i>	western buttercup
<i>Ribes lobbii</i>	gummy goose-berry
<i>Rosa gymnocarpa</i>	baldhip rose
<i>Rubus ursinus</i>	trailing blackberry
<i>Rumex acetosella</i>	sheep sorrel
<i>Sanicula crassicaulis varcassicaulis</i>	Pacific sanicle
<i>Sanicula crassicaulis var. tripartite</i>	gamble weed
<i>Saxifraga integrifolia</i>	grassland saxifrage
<i>Sedum spathulifolium</i>	broad-leaved stonecrop
<i>Selaginella wallacei</i>	Wallace's selaginella
<i>Senecio vulgaris</i>	common groundsel
<i>Sherardia arvensis</i>	field madder
<i>Silene gallica</i>	small-flowered catchfly
<i>Silene scouleri ssp. grandis</i> (red-listed)	Scouler's catchfly
<i>Spiranthes romanzoffiana</i>	ladie's tresses
<i>Stellaria media</i>	chickweed
<i>Stellaria nitens</i>	shining starwort
<i>Symphoricarpos albus</i>	common snowberry
<i>Taraxacum officinale</i>	common dandelion
<i>Teesdalia nudicaulis</i>	shepherd's cress
<i>Torilis arvensis</i>	spreading hedge parsley
<i>Tragopogon porrifolius</i>	oyster plant
<i>Trifolium microcephalum</i>	small-headed clover
<i>Trifolium microdon</i>	thimble clover
<i>Trifolium sp.</i>	clover
<i>Trifolium variegatum</i>	white-tipped clover
<i>Trifolium willdenowii</i>	tomcat clover
<i>Triphysaria pusilla</i>	dwarf owl's clover
<i>Triteleia hyacinthina</i>	white triteleia (fool's onion)
<i>Urtica dioica</i>	stinging nettle

Scientific Name	English Name
<i>Verbascum thapsus</i>	great mullein
<i>Veronica arvensis</i>	corn speedwell
<i>Vicia lathyroides</i>	spring vetch
<i>Vicia sativa</i>	common vetch
<i>Viola adunca</i>	early blue violet
<i>Viola praemorsa</i> (red-listed)	yellow montane violet
<i>Yabea microcarpa</i> (red-listed)	California hedge-parsley
<i>Zigadenus venenosus</i>	meadow death-camas

Alphabetical English Name (BC CDC red-listed species in red and blue-listed in blue)

English Name	Scientific Name
American wild carrot	<i>Daucus pursillus</i>
arbutus	<i>Arbutus menziesii</i>
baldhip rose	<i>Rosa gymnocarpa</i>
bi-coloured linanthus	<i>Linanthus bicolor</i>
bigleaf maple	<i>Acer macrophyllum</i>
bitter-cress	<i>Cardamine sp.</i>
blinks (water chickweed)	<i>Montia fontana</i>
blue wildrye	<i>Elymus glaucus</i>
bracken fern	<i>Pteridium aquilinum</i>
broad-leaved shooting star	<i>Dodecatheon hendersonii</i>
broad-leaved stonecrop	<i>Sedum spathulifolium</i>
Bryum moss	<i>Bryum miniatum</i>
bull thistle	<i>Cirsium vulgare</i>
California hedge-parsley (red-listed)	<i>Yabea microcarpa</i>
California oatgrass	<i>Danthonia californica</i>
Canby bluegrass	<i>Poa canbyi</i>
chickweed	<i>Stellaria media</i>
chickweed monkey-flower	<i>Mimulus alsinoides</i>
chocolate lily	<i>Fritillaria affinis</i>
cleavers	<i>Galium aparine</i>
clover	<i>Trifolium sp.</i>
clustered tarweed	<i>Madia glomerata</i>
common burdock	<i>Arctium minus</i>
common camas	<i>Camassia quamash</i>
common dandelion	<i>Taraxacum officinale</i>
common draba	<i>Draba verna</i>
common forget-me-not	<i>Myosotis discolor</i>
common foxglove	<i>Digitalis purpurea</i>
common groundsel	<i>Senecio vulgaris</i>

English Name	Scientific Name
common hawthorn	<i>Crataegus monogyna</i>
common monkey-flower	<i>Mimulus guttatus</i>
common rush	<i>Juncus effuses</i>
common sandweed	<i>Athysanus pusillus</i>
common snowberry	<i>Symphoricarpos albus</i>
common St. John's wort	<i>Hypericum perforatum</i>
common vetch	<i>Vicia sativa</i>
corn speedwell	<i>Veronica arvensis</i>
desert rock purslane	<i>Calandrinia ciliata</i>
Douglas-fir	<i>Pseudotsuga menziesii</i>
dove-foot geranium	<i>Geranium molle</i>
dwarf montia	<i>Montia dichotoma</i>
dwarf owl's clover	<i>Triphysaria pusilla</i>
early blue violet	<i>Viola adunca</i>
early hairgrass	<i>Aira praecox</i>
elk sedge	<i>Carex garberi</i>
falsebox	<i>Paxistima myrsinites</i>
farewell-to-spring (blue-listed)	<i>Clarkia amoena</i>
field chickweed	<i>Cerastium arvense</i>
field madder	<i>Sherardia arvensis</i>
fragile fern	<i>Cystopteris fragilis</i>
gamble weed	<i>Sanicula crassicaulis var. tripartite</i>
Garry oak	<i>Quercus garryana</i>
goldenback fern	<i>Pentagramma triangularis</i>
grassland saxifrage	<i>Saxifraga integrifolia</i>
great camas	<i>Camassia leichtlinii</i>
great mullein	<i>Verbascum thapsus</i>
gummy goose-berry	<i>Ribes lobbii</i>
gumweed	<i>Grindelia integrifolia</i>
hair bentgrass	<i>Agrostis scabra</i>
hairy cat's-ear	<i>Hypochaeris radicata</i>
hairy honeysuckle	<i>Lonicera hispidula</i>
harvest brodiaea	<i>Brodiaea coronaria</i>
hedgehog dog-tail grass	<i>Cynosurus echinatus</i>
Hood's sedge	<i>Carex hoodii</i>
Hooker's onion	<i>Allium acuminatum</i>
horehound	<i>Marrubium vulgare</i>
juniper haircap moss	<i>Polytrichum juniperinum</i>
ladie's tresses	<i>Spiranthes romanzoffiana</i>
large-flowered agoseris	<i>Agoseris grandiflora</i>
large-flowered blue-eyed Mary	<i>Collinsia grandiflora var. pusilla</i>

English Name	Scientific Name
licorice fern	<i>Polypodium glycyrrhiza</i>
long-stoloned sedge	<i>Carex inops</i>
Meadow death-camas	<i>Zigadenus venenosus</i>
Menzies' larkspur	<i>Delphinium menziesii</i>
miner's-lettuce	<i>Claytonia perfoliata</i>
mountain dandelion (Could be a new species for BC(ID still in question)	<i>Agoseris retrorsa?</i>
mountain sweet-cicely	<i>Osmorhiza berteroi</i>
mouse-ear chickweed	<i>Cerastium semidecandrum</i>
naked broomrape	<i>Orobanche uniflora</i>
nodding onion	<i>Allium cernuum</i>
Nuttall's bitter-cress	<i>Cardamine nuttallii</i>
oceanspray	<i>Holodiscus discolor</i>
orchard grass	<i>Dactylis glomerata</i>
oyster plant	<i>Tragopogon porrifolius</i>
Pacific sanicle	<i>Sanicula crassicaulis var. cassicaulis</i>
pleuridium moss	<i>Pleuridium subulatum</i>
potent Psilocybe (mushroom)	<i>Psilocybe Montana</i>
prickly-pear cactus	<i>Opuntia fragilis</i>
purple cudweed	<i>Gnaphalium purpureum</i>
purple peavine	<i>Lathyrus nevadensis</i>
red alder	<i>Alnus rubra</i>
red fescue	<i>Festuca rubra</i>
redstem springbeauty	<i>Claytonia rubra</i>
rein orchid	<i>Piperia sp.</i>
ribwort plantain	<i>Plantago lanceolata</i>
roadside rock moss	<i>Racomitrium elongatum</i>
Roemer's fescue	<i>Festuca roemeri</i>
rose campion	<i>Lychnis coronaria</i>
scalegod (red-listed)	<i>Idaho scapigera</i>
Scouler's catchfly (red-listed)	<i>Silene scouleri ssp. grandis</i>
Scouler's harebell	<i>Campanula scouleri</i>
self-heal	<i>Prunella vulgaris</i>
sheep sorrel	<i>Rumex acetosella</i>
shepherd's cress	<i>Teesdalia nudicaulis</i>
shining starwort	<i>Stellaria nitens</i>
short-stalked wood-rush	<i>Luzula subsessilis</i>
small-flowered birds-foot trefoil	<i>Lotus micranthus</i>
small-flowered catchfly	<i>Silene gallica</i>
small-flowered crane's-bill	<i>Geranium pusillum</i>
small-flowered fringe cup	<i>Lithophragma parviflorum</i>

English Name	Scientific Name
small-flowered godetia (red-listed)	<i>Clarkia purpurea</i>
small-flowered nemophila	<i>Nemophila parviflora</i>
small-flowered willowherb	<i>Epilobium minutum</i>
small-fruited parsley-piert	<i>Aphanes microcarpa</i>
small-headed clover	<i>Trifolium microcephalum</i>
smartweed	<i>Polygonum sp.</i>
smooth cat's ear	<i>Hypochaeris glabra</i>
smooth woodland star	<i>Lithophragma glabrum</i>
Sooke monkey-flower	<i>Mimulus sookensis</i>
spotted coral-root	<i>Corallorhiza maculata</i>
spreading hedge parsley	<i>Torilis arvensis</i>
spring gold	<i>Lomatium utriculatum</i>
spring vetch	<i>Vicia lathyroides</i>
sticky chickweed	<i>Cerastium glomeratum</i>
stinging nettle	<i>Urtica dioica</i>
stork's bill	<i>Erodium cicutarium</i>
sword fern	<i>Polystichum munitum</i>
swordleaf rush	<i>Juncus ensifolius</i>
tall annual willow herb	<i>Epilobium brachycarpum</i>
tall Oregon-grape	<i>Mahonia aquifolium</i>
thimble clover	<i>Trifolium microdon</i>
thymeleaf sandwort	<i>Arenaria serphyllifolia</i>
timber oatgrass	<i>Danthonia intermedia</i>
tomcat clover	<i>Trifolium willdenowii</i>
tower rockcress	<i>Arabis glabra</i>
trailing blackberry	<i>Rubus ursinus</i>
two-coloured lupine	<i>Lupinus bicolor</i>
vernal grass	<i>Anthoxanthum odoratum</i>
Wallace's selaginella	<i>Selaginella wallacei</i>
western buttercup	<i>Ranunculus occidentalis</i>
white fawn lily	<i>Erythronium oregonum</i>
white meconella (red-listed)	<i>Meconella oregana</i>
white-tipped clover	<i>Trifolium variegatum</i>
white triteleia (Fool's onion)	<i>Triteleia hyacinthine</i>
wild strawberry	<i>Fragaria virginiana</i>
wood strawberry	<i>Fragaria vesca</i>
woolly eriophyllum	<i>Eriophyllum lanatum</i>
yampah root	<i>Perideridia gairdneri</i>
yarrow	<i>Achillea millefolium</i>
Yellow montane violet (red-listed)	<i>Viola praemorsa</i>
yerba buena	<i>Clinopodium douglasii</i>

Appendix V: Garry Oak Ecosystem Recovery Team Goals & Strategies

The Garry Oak Ecosystem Recovery Team identifies five strategic approaches for recovery of Garry oak ecosystems (GOERT, 2008).

Goals	Strategies
1. Complete the inventory, mapping and plant community classification	Develop standardized plant community classification, and determine and map the historical and current extend of Garry oak and associated ecosystems.
2. Protection of ecosystems and essential ecosystem characteristics	Secure high priority sites towards the establishment of a network of protected areas that represent the full diversity of Garry oak and associated ecosystems throughout their geographic range in Canada that are of sufficient size and appropriately situated to sustain essential ecosystems characteristics over the long term
3. Restoration and management of protected areas, landscape linkage, buffers, and the general landscape	Facilitate the establishment of landscape linkages and buffers and promote the restoration and management of protected areas, landscape linkages, buffers, and the general landscape to sustain essential ecosystem characteristics over the long term.
4. Protection and recovery of species at risk	Complete assessment and initial planning, initiate actions towards sustaining and expanding populations of species at risk in Garry oak, and associated ecosystems that are designated Endangered, Threatened, or are of management concerns.
5. Research	Expand basic and applied research relevant to conserving and restoring Garry oak and associated ecosystems.
6. Outreach	<ul style="list-style-type: none"> • Ensure that conservation of Garry oak and associated ecosystems in incorporated into the planning and programs of governmental and non-governmental agencies • Develop public awareness of, support for, and participation in recovery activities • Facilitate communication, coordination, and information sharing among recovery partners to ensure efficient, coordinated delivery of the recovery program.