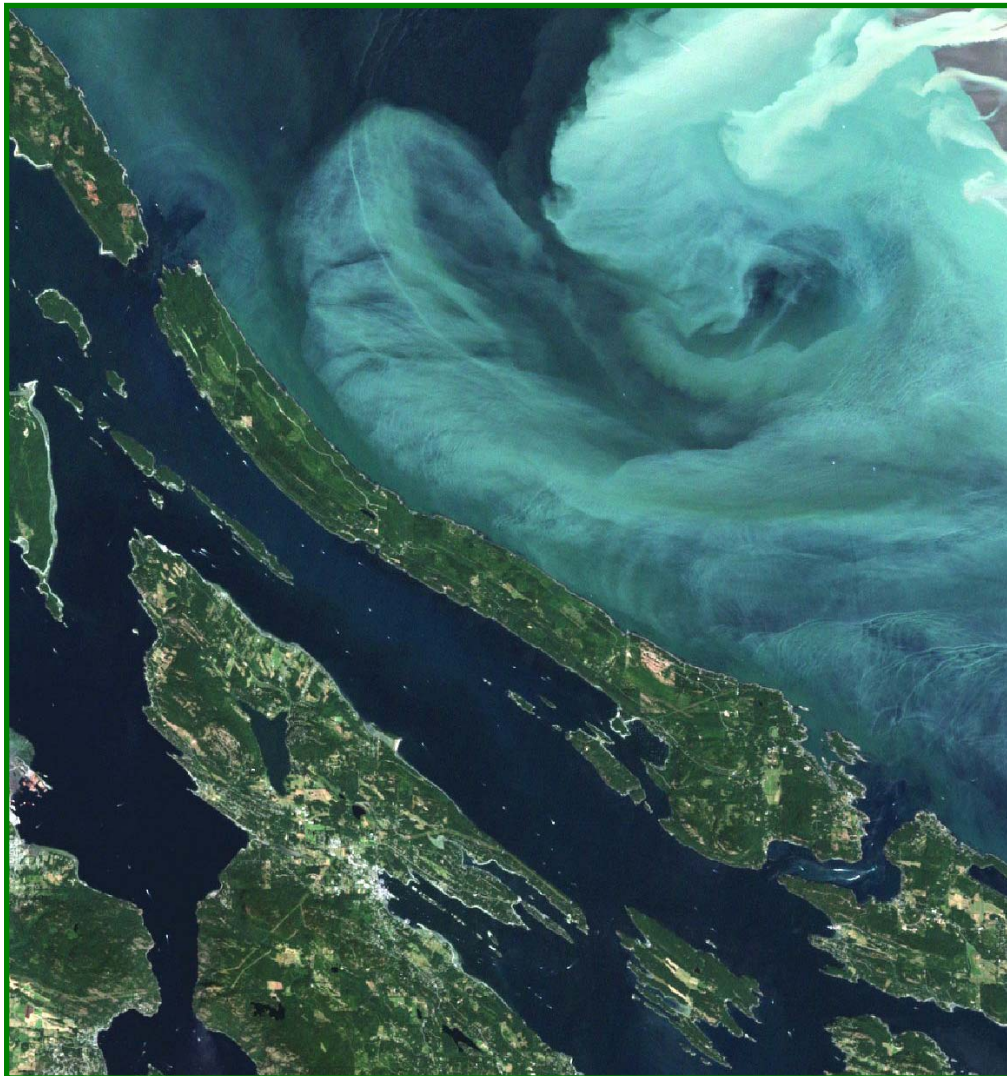


Galiano Island Landscape Classification and UP-CLOSE Workshop Series Final Report

Galiano Island Habitat Conservation Project



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Introduction

Galiano Island is a special place. Nestled in between two growing urban centres, Vancouver and Victoria, it has managed to remain a small rural community, retaining much of its natural splendor. The island is home to majestic Douglas-fir forests, rare Garry oak woodlands, quaint streams and lakes, and intricately carved sandstone cliffs and shorelines. These natural areas make Galiano Island one of the most unique places in Canada.



Figure 1: Galiano Island Location

In 1989, as concern about the conservation of Galiano's natural and human landscapes was increasing, community members founded the Galiano Conservancy Association. The primary mandate of the Galiano Conservancy Association was to preserve, protect and enhance the quality of the human and natural environment of Galiano Island. With this mandate in mind the Galiano Conservancy Association began its conservation initiatives with the help of numerous dedicated volunteers.

As the Conservancy's work progressed, it soon became apparent that conservation of the natural

environment would require a greater understanding of the habitats present on Galiano Island. A map was needed to identify priority areas. This desire for a visual representation of Galiano's natural landscapes inspired the creation of the Galiano Island Landscape Classification.

The Galiano Island Landscape Classification was begun in 2000 with funding from Wildlife Habitat Canada. The goals of the project were to:

1. Create an accurate map of Galiano Island's landscape including an information database.
2. Involve the Galiano community in a process that incorporates community input into the landscape classification and raises awareness of local ecosystems.
3. Apply the Galiano Island Landscape Classification and the input from the local community to conservation initiatives on Galiano Island.

Between 2000 and 2003, air photo interpretation and ground-truthing¹ resulted in the creation of a draft Galiano Island Landscape Classification. In November 2003, this draft was reviewed by the public at the "Galiano Island UP-CLOSE" community open houses. In early 2004 the final draft of the landscape classification was completed and used in the proceedings of the "Galiano Island UP-CLOSE" Workshop Series.

The following report contains information obtained from the Galiano Island Landscape Classification. Querying the data obtained through the creation of this landscape classification helped to create the maps and statistics that accompany the text. A large component of the report also focuses on the results of the "Galiano Island UP-CLOSE" public process that accompanied the completion of the mapping. The scientific information obtained from the maps, accompanied by the input from Galiano community members, forms the basis for the recommendations found towards the end of the report.

¹ Ground-truthing: Visiting a site or area to verify that what has been observed from aerial photographs is actually what exists on the ground.

Creation of the Galiano Island Landscape Classification

The Galiano Island Landscape Classification is an interpretation of the current ecological state of Galiano Island. All forested, aquatic, natural non-forested and developed areas have been mapped forming a contiguous cover of Galiano's entire 6000-hectare landscape. The Landscape Classification is interpreted from, or includes, the following sources of data:

- May 20th, 1998 colour aerial photography, (flown at 1:15,000 scale)
- May 20th, 1998 georeferenced and ortho-corrected colour aerial photography (1m pixel resolution)
- 2002 black and white orthophoto (0.5m pixel resolution) (Islands Trust Fund / CRD)
- 1997 black and white aerial photography (flown at 1:10,000 scale)
- July 30th, 2000 Landsat 7 ETM+ satellite imagery
- Forest Cover and Road maps – 1:20,000 scale (MacMillan Bloedel, 1987)
- Forest Management Plan for LOT 8, Galiano Island (H.A. Forest Management LTD, 1992)
- Forest Management Plan for LOT 51, Galiano Island (H.A. Forest Management LTD, 1992)
- Galiano Stream and Wetland Project (Galiano Conservancy Association, 1999-2001)
- Galiano Forest Restoration Project (Galiano Conservancy Association, 2001)
- Laughlin Lake Management Plan (Galiano Conservancy Association, 2002)
- Pebble Beach Reserve Management Plan (Galiano Conservancy Association, 1998)
- Base Line Inventory, District Lot 44 (Galiano Conservancy Association, 2002)
- Sensitive Ecosystems Inventory (Env. Canada / BC Conservation Data Centre, 1992-97)
- Terrain Resource Information Management Program (TRIM) road and contour data (Province of British Columbia, Ministry of Environment, Lands and Parks, Geographic Data BC, 1997)

All mapped polygons are greater than or equal to 0.01 hectares in area. Overall the map is accurate to a 1:5,000 scale, although specific areas of the island have been classified at a larger scale with greater detail and adapted according to the classification scheme used for this project.

The vast majority of data was interpreted directly from the 1998 air photography and orthophoto. Interpretation was aided by the local knowledge of the mapper. In addition, approximately 25% of the total mapped area was verified through project specific ground-truthing. Polygon types and boundaries were adjusted according to Global Positioning System surveys and on the ground revisions to field maps. Data describing dominant vegetation and site characteristics was collected for over 25% of all ground-truthed polygons; the rest were simple visual inspections. Ground-truthing data was completed specifically for this map and also includes data from several recent inventory initiatives.

The landscape classification was made available to local residents and property owners through a series of three open houses in November 2003. The open houses provided islanders with the chance to verify the accuracy of the landscape classification and identify incorrect data. The 2002 air photo and the Landscape Classification were printed at a 1:5,000 scale (18' x 42") for display at the open houses. A computer terminal running Arc View GIS was also available for more detailed and flexible viewing of the computer mapping. Participants identified errors by drawing on the paper maps and provided corresponding comments on a separate form. All comments were addressed and in many cases verified through additional ground-truthing.

UP-CLOSE

Workshop Series -- Community Process

The UP-CLOSE Workshop Series was designed to provide information to the Galiano community about the island's natural ecosystems and to gain an understanding of the human values associated with these ecosystems. With these goals in mind, workshop speakers for five workshops were invited to come to Galiano Island to share their knowledge. Workshop speakers were as follows (see Appendix I for workshop flyer with short speaker biographies):

February 6-7, Galiano Island Forest Ecosystems
Herb Hammond, Forest Ecologist and Registered Professional Forester

February 13-14, Garry Oak and Associated Ecosystems
Emily Gonzales, MSc, PhD Student University of British Columbia

February 20-21, Marine and Foreshore Ecosystems
Doug Biffard, Marine Ecologist, BC Parks

March 5-6, Freshwater Aquatic Ecosystems
Richard Hebda, PhD, Curator of Botany and Earth History, Royal BC Museum

March 19-20, Landscape Connections
Geoffrey Scudder, PhD, Professor Emeritus, University of British Columbia

Each workshop was scheduled to incorporate a Friday evening lecture/slide show, a Saturday morning field trip to the topic ecosystem and a Saturday afternoon facilitated discussion. The Friday evening lecture provided background on the workshop topic, a sense of how Galiano fits into the larger global picture and information on threats to the topic ecosystem. Saturday morning field trips allowed workshop participants to visit some of Galiano Island's natural areas with the speakers. At afternoon discussions, participants

shared with the workshop group what they felt was most important about local ecosystems.

Facilitated discussions were done in collaboration with a professional facilitator and involved exercises that led to answers to the following questions:

1. What is valuable to you about the ecosystem highlighted in this workshop?
2. Why are these values important?
3. What do you and people you know do in the ecosystem? (walk, gather wood, paint, etc.)
4. What places are special to you on Galiano Island and why?

Workshop participants were divided into groups of four to six people to answer questions. Results from each group were recorded on flip chart paper and presented to the larger group. Questions and discussion followed presentations. Results from the last question were recorded on island maps.

The final workshop, about Landscape Connections, focussed on obtaining suggestions from the workshop group that might help the community in preserving the values that were raised during the other workshop sessions. Workshop participants were provided with a summary of the results from the preceding four sessions which fell into six distinct categories. Three groups were formed to address two of the categories per group. Small groups recorded their suggestions on flip chart paper and presented them to the larger group where they were discussed. Comments transcribed from the flip charts from all five workshops can be found in Appendix II.

Invitations to attend the UP-CLOSE Workshop Series were sent to thirty community groups and flyers advertising the workshops were mailed to every island household. Several community groups were invited personally at their monthly board meetings through presentations about habitat mapping on Galiano Island and the need for public input. Additional information about the workshop series and how to attend was posted at local notice boards. A monthly article about the UP-CLOSE process appeared in the Galiano monthly magazine, the Active Page, from October 2003 to March 2004. (See Appendix III)

Introduction to Project Results

The results of the Galiano Island Habitat Conservation Project are divided into five categories: Forests, Garry Oak Meadows, Freshwater, Marine and Foreshore, and Landscape Connections. These categories broadly represent all of the ecosystems on the Island. The Landscape Connections category emphasizes the need for a bigger perspective, discussing ecology and human values that tie ecosystems together.

Each category has been broken down into two major sections.

The first describes the ecological characteristics, threats and current status of the broad habitat type, as it occurs on Galiano Island. The written discussion is accompanied by a map showing the occurrence of the ecosystem in question. The map and all statistics were produced from the Galiano Island Landscape Classification.

The second describes the results of facilitated discussions held with island residents and property owners during the UP-CLOSE Workshop series. Six broad categories of values permeated all of the workshops and are discussed for each of the broad ecosystem types. These are: Resource Use, Ecology, Spiritual/Aesthetic, Education, Recreation, and Historical/Cultural.

To better understand the landscape classification system used for Galiano Island please refer to Appendix IV for appropriate definitions of terms such as “natural” and “developed.”

Summaries of guest speaker presentations and field trips for each of the workshops are available in Appendix V.

Forests



Magnificent Western Redcedar (Murchison Creek) *Brian Mitchell*

Shaped by water, soil, terrain and climate, our forests are a sanctuary for hundreds of thousands if not millions of species of plants, fungi, mammals, insects and microorganisms. They provide shelter, clean water, and food, the foundations for a complex web of life to which we are intricately connected.

Galiano's forests are categorized generally as Coastal Douglas-fir, which is the dominant tree species of old-growth or climax forest. We share this designation with only the Southern Gulf Islands, the southeast coast of Vancouver Island from Sooke to Courtney, and a small strip along the mainland's Sunshine Coast. On Galiano, the Douglas-fir classification can be broken down into a variety of types depending on where the forest is located on our varied terrain or when and how it was last disturbed.

In an older forest, the ecosystem type is largely determined by the moisture and nutrient content of the soil. Moisture and nutrient levels are a product

of physical factors such as degree of slope, direction the slope is facing, position on a slope (on a ridge top, in the middle, at the bottom or in a valley depression), and type of soil present. These physical factors result in dramatically different appearances. Dry ridges or steep southwest facing slopes with nutrient poor, shallow soils tend to be dominated by a mix of gnarled Douglas-fir and Arbutus, and shrubby species such as Baldhip Rose, Dull Oregon Grape or Hairy Honeysuckle. Moister, moderately sloped, northeast facing forests are characterized by towering Douglas-fir and robust Western Redcedar, understories thick with salal, sword fern and a myriad of mosses. These older forests are models of complexity, exhibiting a vast diversity of composition (the parts), structure (the arrangement of the parts), and function (how the parts interact with one another). Trees exist in all stages of their life cycles including standing dead snags and fallen debris, large or small. The result is a forest mosaic that varies from dense, dark canopies with little or no understory growth to open, light-filled gaps profuse with shrubs, herbs, ferns, seedlings, and a variety of other plants.

Threats

At this time, all types of undisturbed or older Coastal Douglas-fir forest ecosystem, including those on Galiano, are endangered in British Columbia.

Four major types of disturbance affecting forests on Galiano Island are wind, fire, logging and development.

Wind is a constant force behind change in Galiano's forests, most evident along our shorelines where exposed forest edges rarely permit a tree to keep its top. In more sheltered interior forests, wind combines forces with natural pathogens such as laminated root rot and various heart rots to put trees on the ground. Fallen trees, especially larger ones, create canopy gaps where sunlight is allowed onto the forest floor. This triggers vigorous regeneration for a wide variety of plant-life. Wind ensures that all different ages and species of trees are able to perpetuate within the forest. Wind is also responsible for maintaining a constant supply of woody debris for



Multi-layered, multi-species mature forest (Bodega Ridge Prov. Park)

the forest floor, an essential component of a healthy functioning ecosystem.

Fire is a traditional disturbance, but has been largely suppressed over the last 100 years. Small fires of varying intensity would have burned here on a relatively regular interval with larger, more destructive events occurring every 200 to 500+ years, leaving the forest in a mosaic of differently aged patches. Even patches exposed to a larger, and more intense fire would not have lost every tree to the burn. Because the thick bark of the veteran Douglas-fir is fire resistant, many such trees would have persisted. The scattered survivors were then able to provide regenerative seed to the burned areas. Snags and large pieces of woody debris would have also remained, providing refuge for wildlife from all kingdoms. The suppression of smaller natural burns has led to the buildup of fuel in many of our forests. As a result we are now faced with serious implications such as the threat of widespread fires burning at intensities not previously experienced in this region.

Logging has been the most influential form of disturbance on Galiano for the past 100 years. One is hard pressed to identify an area larger than an acre that has not been logged at least once, though the removal of trees has varied in its intensity over the years. Logging of the early 20th century targeted areas that were easy to access and removed only the straightest and biggest Douglas-fir timber. Gnarly, twisted firs were left behind along with cedars and other less economically

valuable species. This has resulted in a higher than normal concentration of Western Redcedar and Big Leaf Maple in many of our 80 to 120 year old forests. With the development of power equipment and roads, timber harvesting began to increase in its scope, moving towards the industrial clearcutting employed by MacMillan Bloedel throughout the second half of the century. Clearcuts and tree planting have transformed drastically the condition of forests on Galiano. The inherent diversity of the wind and fire disturbed forest mosaic is lost in the uniform, intensively managed plantations. These areas are commonly stocked with evenly spaced, even-aged Douglas-fir. Any naturally regenerating trees and vegetation were considered to be competing with planted timber producing species, and were



26 year old Douglas-fir Plantation (District Lot 63)

therefore removed. Shrubs and broadleaf tree species however, have persisted along roadsides where the fast growing fir have not blocked out all the light. They also survive on moist benches or in depressions where they are better adapted to growing in the wet soils.

Development has occurred in many areas of Galiano that were once forested. Over 15% of the Island's forests have been cleared to enable other uses of the land such as agriculture, residence, roads and utility corridors. These disturbances are major sources of long-term fragmentation in the forest landscape.

Current status

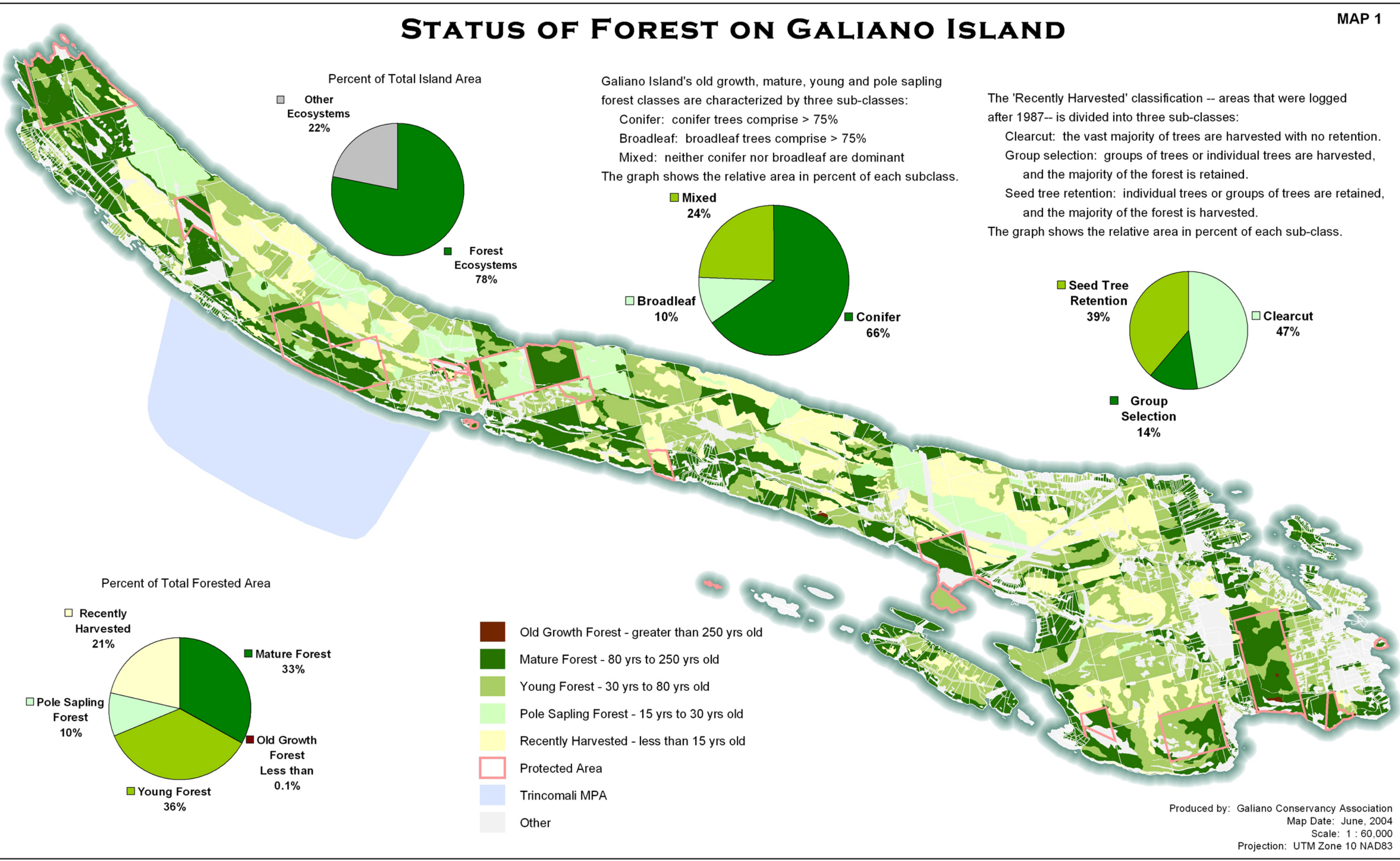
Forest ecosystems account for over 78% of Galiano's landscape.

The remaining mature forests on Galiano are found mostly on lands that were logged in the early 1900's. Most of them were not subject to intensive post-logging silvicultural management such as scarification, tree planting, brushing and thinning. They have had about 100 years to redevelop the kinds of natural composition, structures and functions that were present before the logging disturbance. These relatively healthy ecosystems are now the storage banks of forest diversity on Galiano Island. They comprise approximately 33% of the Island's forest landscape or just under 25% of the entire land-base, but are largely fragmented into small patches. Over 85% of all mature forest patches on the island are smaller than five hectares in size. 28% have been protected through land acquisition for conservation purposes in areas such as Bluff Park, The Pebble Beach Reserve, Retreat Island, and Matthew's Point.

The remainder of Galiano's forested land is comprised of young and regenerating clearcuts. The age of these forests or plantations ranges between 0 and 80 years although most are less than 50 years old. Young plantations and regenerating clearcuts account for over 52%² of the island landscape.

² This number does not include areas cleared for agriculture or development.

STATUS OF FOREST ON GALIANO ISLAND



Forest Values

Resource Use

Forests on Galiano Island have been providers of food, medicines, building materials, firewood, clean air and water, jobs and monetary profits. Each of these items has been highly valued by Galiano residents and property owners. Use of the forest to meet human needs ranked as one of the top three values for most workshop participants.

Human uses of the forest, as determined by a workshop group, could be divided into 3 categories:

1. **Personal/Household:** Personal/household uses included such things as trees for building materials and firewood, mushrooms / berries / herbs for consumption and medicinal purposes, shrubs for flower arrangements and wood for carving.
2. **Economic:** Economic uses include any uses of forest products for sale in exchange for money. Typically on Galiano Island these have been timber sales, either of whole logs or milled lumber. They also include herbal tinctures, salal branches for florists, firewood sales, artistic wood carvings and the sale of wood furniture and functional items (eg. cutting boards). Employment of individuals throughout these industries is also an economic benefit to Galiano residents and property owners.



Building a bridge out of local wood (Laughlin Lake) *Odin Scholz*

3. **Nature Services:** The term “nature services” refers to the ways in which nature benefits human beings without being manipulated. Nature services on Galiano Island include such things as water purification, air purification, and shade for temperature and glare reduction. These services are not usually measured economically or used directly. Nevertheless, they are seen as huge benefits by people on Galiano.

Ecology

Residents and property owners on Galiano Island rated ecological health as one of their top 3 values for the island’s forest ecosystems. They saw healthy forest ecology as a benefit to more than creatures and plants. There was a personal significance. Of importance were:

1. **Forests as Habitats for Animals and Plants:** Homes for animals and a variety of plants were important components of forests for workshop participants. Being a part of the ecosystem and of forests being part of a human habitat was also important.
2. **Age of Forests:** Because of their rarity and great age, the old forests on Galiano Island were of great importance to workshop participants. There were also feelings of awe and respect for the life expectancy and life cycle of trees on Galiano. Workshop participants were particularly captivated by the notion of a tree’s lifecycle extending beyond its standing life to its existence as a piece of woody debris on the forest floor for a period equal to its living life.
3. **Quantity and Diversity of Life:** The idea of being surrounded by life was also very important. Participants felt that a variety of species in reasonable numbers were also essential.
4. **Forest Cycles:** Forest cycles were discussed by workshop participants. They saw life cycles and element cycles (oxygen and water) as symbols of the connections between all life. In particular, these cycles highlighted the connection of humans to forest ecosystems and served as a reminder that people are a part of natural systems.

Aesthetic / Spiritual

Along with ecology and human uses, aesthetics and spiritual services were seen as a part of the top three values associated with forest ecosystems on Galiano Island. These values were defined as follows:

1. **Aesthetic:** For workshop participants, aesthetic values were about more than appearance. They included melodic sounds, fragrant smells, brilliant and soft colours, and a variety of shapes and textures. No single forest aesthetic was described as beautiful. However, the major examples of a valuable forest aesthetic included: bird songs, dappled light (ie. through tree boughs), the smell of damp earth and soil, old trees, lush, green vegetation, and soft mosses and forest floors.
2. **Spiritual:** Forest ecosystems, like many of the other ecosystems in this report, were spiritual places for most workshop participants. Spiritual places were perceived as a necessity for mental health and were seen as contributing to building/maintaining good interpersonal relationships and healthy working habits among local residents and property owners. Forest qualities that fostered spiritual health included quiet, peacefulness, stillness, privacy, space, and perception of mystery and of being a part of nature and the greater whole. Workshop participants also felt that time spent in forests established in them a sense of belonging, place and connection.

Education

Galiano residents and property owners saw forest ecosystems as an effective outdoor classroom for young and old. In particular, forests were appreciated as indicators of the source of many products that humans use, as teachers of how the natural world works, and as trainers of young people for future careers. The theme of education was isolated as important in itself, but was also seen as an important part of other values. For example, a forest ecosystem might be used to teach young people about ecosystem values or it might be used to teach about places to collect wood for carving or roots for medical tinctures.

Recreation

Forests on Galiano Island offer recreational opportunities that are valued by local residents and property owners. Recreation is seen as important for physical fitness, fun, and maintaining a peaceful and balanced lifestyle. Recreational activities of particular importance were walking, running, bird watching, camping, trailmaking, bicycling and play, among others.

Historical / Cultural

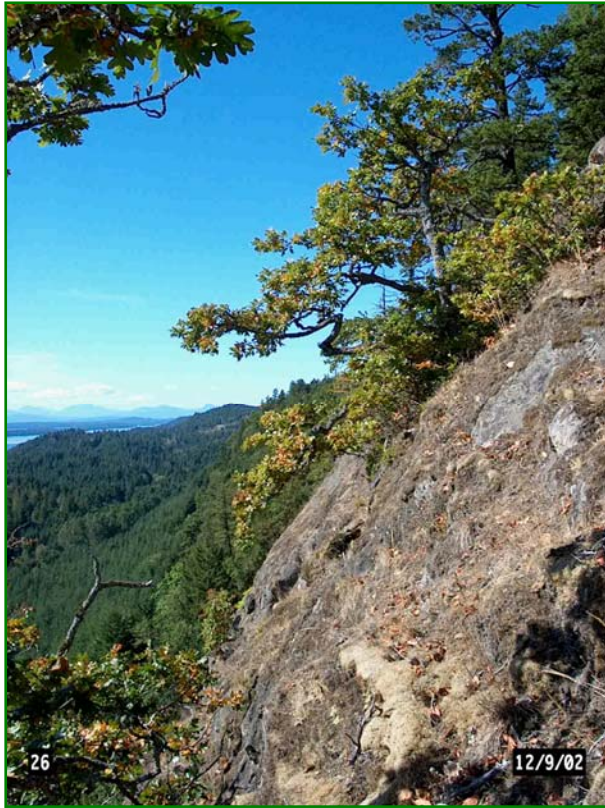
Historically the forests of Galiano Island have been used to support First Nations tribes and many of the early pioneer families. The historical and cultural patterns of using the forest were particularly strong for many workshop participants. Many people felt that encouraging the use of the forest, while protecting ecological values, was important for both individuals and the community of Galiano Island.



Forest education program (Murchison Creek)

Brian Mitchell

Garry Oak Meadows



Garry oak cliff ecosystem (DL44)

Keith Erickson

Garry Oak and associated ecosystems are critically important to maintaining the Island's biodiversity. "Together, Garry oak and associated ecosystems are home to more plant species than any other terrestrial ecosystem in coastal British Columbia. Many of these species occur nowhere else in Canada...Collectively, Garry oak ecosystems are among the most endangered in Canada – less than 5% of the original habitat remains in a near-natural condition." (GOERT, 2003)

On Galiano, Garry oak and associated ecosystems are generally limited to steep, south-southwest facing slopes and shoreline areas. They tend to occur in areas with very dry shallow soils or that are too exposed to wind and sun for forest ecosystems to flourish. The term 'Garry oak and associated ecosystems' refers to two distinct sets of ecological communities, those with Garry oak trees present and those without (Associated). The common bond rests with the grasses, wildflowers,

and other plants and animals that make up the communities.

Garry oak ecosystems

"A Garry oak ecosystem is one with naturally occurring Garry oaks and some semblance of the ecological processes and communities that prevailed before European settlement." (GOERT 2003) On the Island this ranges from sparsely scattered, shrubby trees on exposed, steep slopes to contiguous patches of trees on the more gently sloped sites characterized by deeper soils. Garry oak ecosystems may also include scattered arbutus, bigleaf maple and Douglas-fir trees. The Garry oak understory, often referred to as meadowland or savannah, is largely comprised of grasses, forbs and shrubby vegetation. These areas are best known for their spectacular displays of wildflowers in the spring.

Associated ecosystems

Associated ecosystems that lack any oak cover are generally interspersed with ecosystems exhibiting Garry oak trees. "These associated sites share many characteristics with Garry oak ecosystems including disturbance regimes and ecological processes." (GOERT, 2003) On Galiano, these areas include treeless grasslands, rocky outcrops, cliffs, coastal bluffs, and vernal pools.



Garry oak ecosystem in March (Mt. Sutil)

Odin Scholz

Threats

Like our older forests, all Garry oak ecosystems are endangered. "Approximately 100 species of plants, mammals, reptiles, birds, butterflies and

other insects, and an earthworm, are officially listed as “at risk” in these ecosystems.” (GOERT, 2003)

This status is due to a number of factors including development, agriculture, fire suppression, and invasive exotic species. Development has had the greatest impact on Galiano’s Garry oak ecosystems. This is due to their location on south and southwest facing slopes coinciding with the most sought after waterfront and view real estate on the Island.

Fire suppression is also having an effect. Fire has in the past been the major disturbance in Garry oak and associated ecosystems. First Nations burning in these areas was historically undertaken in order to promote food crops such as camas bulbs. In fact, burning at regular intervals was responsible for maintaining the oak or associated ecosystems in some areas on Galiano. Preventing natural fires on these sites combined with the cessation of First Nations burning has in places created a condition more conducive to forest growth. The invasion or progression of young Douglas-fir trees and common forest understory species out into traditional Garry oak ecosystems has been observed in several locations on Galiano. Despite this, most of our Garry oak ecosystems exist on steep exposed slopes with soils too shallow to support a forest, and do not require the frequent burning traditionally employed by First Nations.

With development and the suppression of fire came the spread of exotic plant species such as Scotch broom, orchard grass and velvet grass. These and other fast growing, aggressive alien species were brought to Galiano by humans from as far away as Europe. Scotch broom for example originated from Spain. Exotics have managed to thrive in the sunny open meadows characteristic of the Garry oak ecosystem. These species tend to choke out our native vegetation, alter soil conditions, and change natural processes needed by microorganisms, insects, and other wildlife. The spread of invasive exotic plants and decline of native plants in Garry oak and associated ecosystems has also been linked to high levels of herbivore grazing (Gonzales, 2004) such as by Galiano’s large resident deer population or any domestic livestock.



Clearing broom from Garry oak meadow on Mt. Sutil

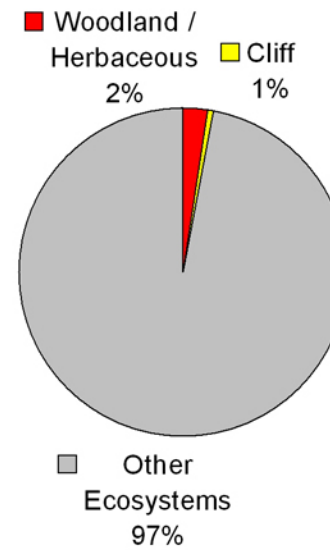
Current Status

Garry Oak and associated ecosystems can be found on approximately 3% of Galiano’s landscape.

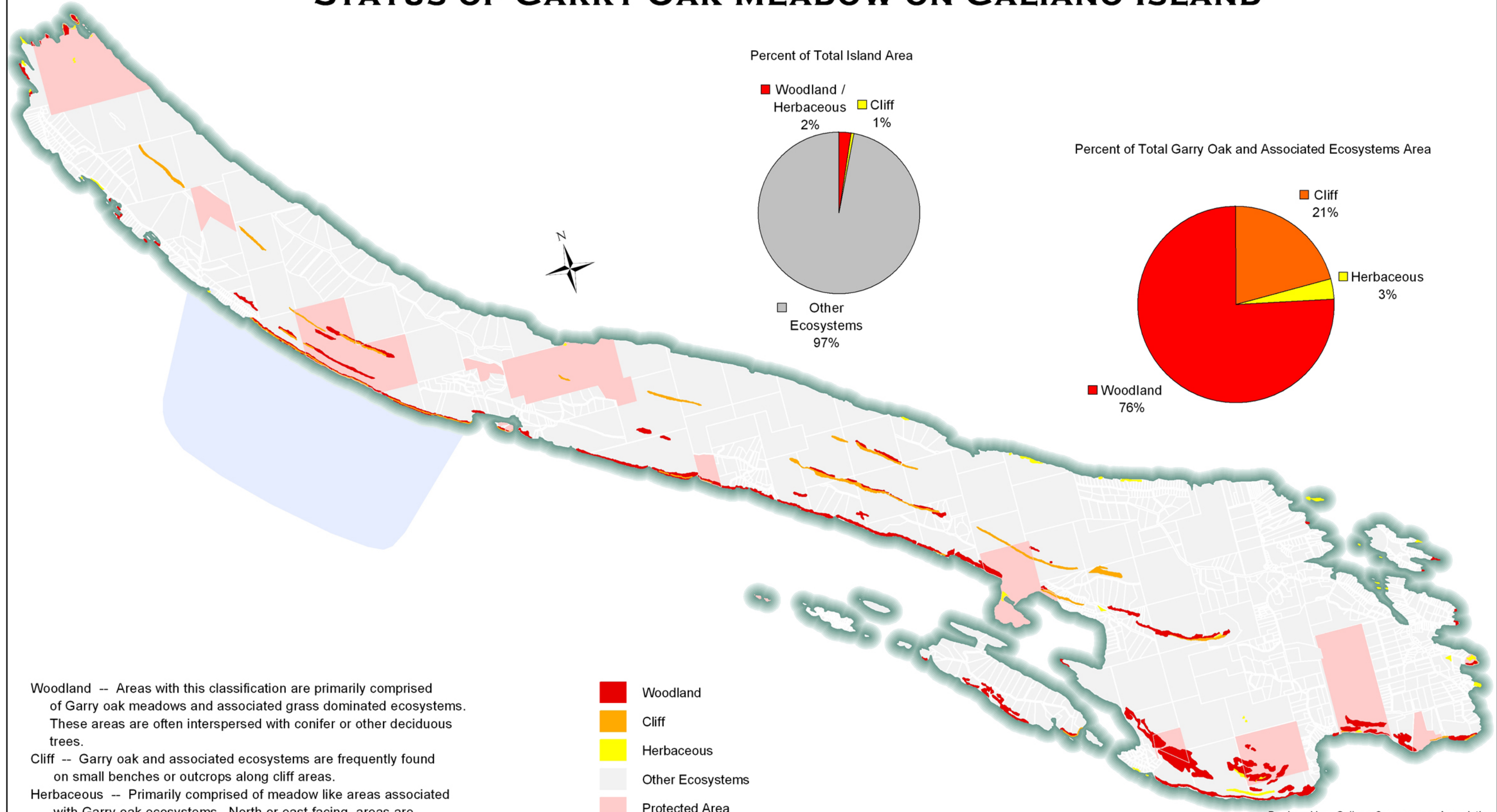
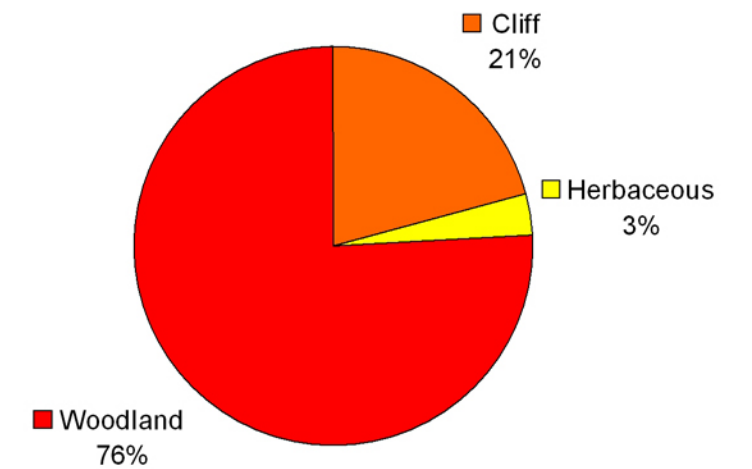
Many of the larger patches of Garry oak and associated ecosystems occurring on Galiano have been protected in parks and reserves. They flourish in areas such as Mt. Sutil, Bluff Park, and Mt. Galiano or Bellhouse, Bodega Ridge and Dionisio Provincial Parks. In addition, many of the Garry oak and associated ecosystems occurring along the island’s southwestern shoreline are protected by their inaccessibility along steep cliffs and coastal bluffs. Almost 27% of these ecosystems have been protected through land acquisition. However, 20% or 40 hectares are located within 50m of a developed or settled area. Furthermore, invasive exotic species are pervasive regardless of protected status.

STATUS OF GARRY OAK MEADOW ON GALIANO ISLAND

Percent of Total Island Area



Percent of Total Garry Oak and Associated Ecosystems Area

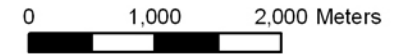


Woodland -- Areas with this classification are primarily comprised of Garry oak meadows and associated grass dominated ecosystems. These areas are often interspersed with conifer or other deciduous trees.

Cliff -- Garry oak and associated ecosystems are frequently found on small benches or outcrops along cliff areas.

Herbaceous -- Primarily comprised of meadow like areas associated with Garry oak ecosystems. North or east facing areas are commonly moss dominated communities and are not associated with Garry oak.

- Woodland
- Cliff
- Herbaceous
- Other Ecosystems
- Protected Area
- Proposed Marine Protected Area



Produced by: Galiano Conservancy Association
 Map Date: June, 2004
 Scale: 1 : 60,000
 Projection: UTM Zone 10 NAD83
 Rotation: 15 deg. counterclockwise

Garry Oak Meadow Values

Resource Use

Workshop participants considered Garry oak ecosystems providers of high quality “space”. Due to the openness of Garry oak meadows and their frequent southern exposure they were determined to be ideal house sites by some workshop participants. The herbaceous/meadow quality of Garry oak sites was also appealing as a place to graze livestock such as sheep and goats.

Ecology

A healthy Garry oak ecology was of high importance for most workshop participants who saw the rarity of Garry oak meadows and associated animal species as a compelling reason to value and protect them. Galiano residents and property owners participating in the workshop series found the preservation of wildflowers, rare butterflies and rare insects as particularly important. To preserve native plant and animal varieties, removal of invasive species was deemed important. Work to remove invasives was also considered as a source of potential employment for island residents.

Aesthetic / Spiritual

Garry oak meadows were considered particularly appealing due to their sunny, open qualities and their access to ocean views. In the spring, the colours of the wildflowers were described as aesthetically pleasing, as were the gnarled shapes of the trees themselves. Several workshop participants commented on the value of Garry oak meadows for artistic inspiration especially for painting, drawing and photography. Spiritually, the sunny qualities of the meadows were equated with hope and optimism, while the Garry oak trees were suggestive of tenacity and perseverance. Workshop participants found spiritual value in being able to link positive human qualities with the natural aspects of Garry oak meadows. Garry oak meadows were also considered good places to meditate.

Education

Garry oak meadows were seen as important sites for education of young and old due to their rarity. Workshop participants felt that education about what makes Garry oak ecosystems important in this area was essential for their protection. Not only the rarity of Garry oak ecosystems, but also their uniqueness in Canada, makes them perfect topics for landowner outreach and education programs. Workshop participants felt that it was important to raise awareness about Garry oak ecosystems, especially among those with Garry oak on their properties.

Recreation

Workshop participants enjoyed Garry oak areas as viewpoints and sunny picnic spots. They engaged in a variety of recreational endeavours including horseback riding, walking, hiking, stargazing, birdwatching, and photography. To enable these activities to take place, trail building was considered another potential activity. Garry oak areas were considered attractive recreational areas due to their openness of space, their sunny nature and their unique flora and fauna.

Historical / Cultural

Garry oak meadows were historically used by First Nations for food collection and cultivation. The bulb of *Camassia quamash* (Camas) was a known food source in this area. Whether Galiano’s Garry oak meadows were used for this purpose or not is unknown. However, the idea that ancient peoples may have used Garry oak sites on Galiano for food gathering and cultivation made Garry oak meadows important sites in the eyes of workshop participants.

Marine / Foreshore



Intertidal life (Montague Harbour)

Galiano's shoreline is part of one of the richest, most biologically productive marine animal and plant communities in the world (Habro, 1997). Our nearshore waters are renowned for their spectacular displays of plant and animal life. This diversity of marine life is a result of the unique topography and warmer water found in the southern Gulf's archipelago (Habro, 1997). The marine environment influences all life on Galiano, most evident in its regulating effect on our climate and in the limitations placed on land based organisms coming to and going from the island.

Galiano's marine environment can be simplified into three major regions: terrestrial interface, intertidal zone, and nearshore sub-tidal.

Terrestrial / marine interface

The terrestrial / marine interface includes coastal cliffs or bluffs, forest edges, and shrubby plant communities that border on the ocean. While land based, these areas play an integral role in marine food webs and wildlife diversity. On Galiano this relationship is demonstrated by looking at bird species such as cormorants or eagles and mammals such as the river otter. These species all require the ocean for feeding while they nest or den on cliffs and along forest edges. Marine mammals such as seals and sea lions are also users of the interface, frequently hauling out of the water onto small islets.

Intertidal

The intertidal zone is the region along a shoreline that is affected by the rising and falling of the tides. It ranges from the rarely wetted level of the highest, high tides down to the rarely dry level of the lowest, low tides. The zone is highly diverse due to variation in the slope and aspect at which the land meets the sea, its exposure to wind, currents and wave action, levels of light changes, of temperature, and the amount of oxygen, salinity, and nutrients in the water (McConnaughey, 1985). These factors are responsible for the formation of a wide variety of ecosystems, each exhibiting a unique assemblage of interdependent plants and animals. Major variation in this ecosystem can be seen when comparing Galiano's relatively exposed Georgia Strait coast with the steep cliff's along the Trincomali coast plunging into the channel. Another is seen in the jagged shorelines of Active Pass and Porlier Pass.

Galiano's beaches bridge the Terrestrial and intertidal habitats. Beaches usually form in protected bays or on the lee side of rock promontories where currents are slowed and wave action is pacified, enabling fine materials such as sand, shells or pebbles to settle out.

Estuaries – bodies of water at the mouths of streams where fresh and saltwater mix – are among the most productive of marine ecosystems (McConnaughey, 1985). They are a vital part of Galiano's intertidal zone. Estuaries located in protected bays are characterized by mud bottoms, luxurious growths of algae, and beds of vascular plants such as eelgrass. This makes estuaries critically important as breeding and rearing grounds for organisms ranging from marine snails to herring to Coho salmon.

Eelgrass beds are a vital component of the estuarine food chain, both through direct consumption and through the detritus cycle. Detritus, or decomposing plant material, drifts through the water and accumulates as a fine loose layer on the surface of the mud. The bacteria in that layer serves as food for many small organisms such as crabs. The intense bacterial activity of the

detritus cycle removes all free oxygen, creating a layer of black mud that is rich in iron sulfide. This mud gives off a characteristic rotten-egg smell, which is generated by the trapped hydrogen sulfide gas. (McConnaughey, 1985). The smell is associated with many of our Island's shallow, muddy estuaries. In the case of Whaler Bay, the naturally occurring detritus cycle is compounded by the decomposition of introduced organic material such as bark and sewage.

Sub-tidal nearshore

Sub-tidal nearshore ecosystems are characterized by diverse structural components and allow high levels of light penetration. Unlike the inter-tidal zone these areas are never exposed to the air. Many of Galiano's more gently sloped sub-tidal areas are ideal habitat for floating beds of bull kelp. These underwater forests provide a structure that supports a complex web of ecological interactions. Similarly, Galiano's steep, unstable cliffs overlooking the Trincomali Channel provide near shore ecosystems with complex rock and boulder habitats that are home to an abundance of fish and marine invertebrates. The rocky nearshore habitat on the southwest side of the island is renowned as a rockfish nursery. Structure in the fast moving Porlier Pass current is provided by some of the most profuse assemblages of cold-water corals found in BC (Habro, 1997).

Deeper water

Water properties also differ between the Georgia Strait side and Trincomali side of the island. The northeast shoreline is influenced by the Fraser River plume, which consists of brackish, muddy water that has been stratified and flows at the top of the water column, warming up quickly in the summer. In contrast, water off the southeast shoreline is clear and cold. This is a result of cooler, deep water mixing with the warmer, surface water while travelling through Active Pass and Porlier Pass.

The deeper water surrounding Galiano also supports a vigorous biodiversity. Resident killer whales and migrating salmon frequent these protected waters. Even a humpback whale has been recently sighted in the Trincomali channel.

Herring and other small fish support a wealth of bird life with sea bird colonies found throughout the Trincomali Channel and Active Pass areas.

Threats

Despite the former richness of ocean life observed on and off Galiano's shoreline, it has been declining since the first European settlers arrived. While sailing through the Southern Gulf Islands inland sea in June of 1792, Captain George Vancouver described in his log book, "in the course of the forenoon a great number of whales were playing about in every direction...there seemed more about us now, than the whole of those we had before seen, if collected together" (Lamb, 1984). The abundance described in this passage no longer exists. The decline can be attributed to many factors, ranging from overfishing and hunting to pollution to habitat destruction. On Galiano the scale of these destructive factors varies greatly.

Identified sources of pollution affecting Galiano's shores include: oil and gasoline spills, sewage from waterfront residences and boats, and long-term exposure of Galiano's Georgia Strait shoreline to accumulated toxins spreading from the plume of the Fraser River.



Fraser River Plume hitting Galiano (Landsat ETM+ Satellite Image)

Local habitat destruction results from the construction of docks, the shading effect of docks, dragging anchors and fishing gear along the seafloor, log dumps, and the construction of pipelines or cable lines to and from the mainland or other islands. Marine-based invasive exotic

species such as the Japanese oyster have reduced habitat availability for competing native species and have disrupted natural food webs. Impacts on native species from aquaculture such as fish farms and shell fish farms have also been documented.

Overfishing and marine mammal hunting have also played their roles in marine life declines. Reductions to salmon, herring and groundfish stocks have endangered these local populations with effects travelling up the food chain to birds and large mammals. Sea otters for example, may no longer be found in local waters due to a century of hunting efforts.

Even eco-tourism, a seemingly “green” industry is impacting marine life, most notably on our endangered resident orca population.

Current Status

In the shadow of these continuing threats to marine life, scientists and policy makers have recognized the need to establish marine protected areas. Galiano’s waters are involved in two major marine protected area initiatives: the National Marine Conservation Area (NMCA) and the Orca Pass Transboundary Initiative. The lead agency involved in the NMCA is Parks Canada. They are working to establish a large marine conservation area in the Georgia Strait and throughout the waters surrounding the Gulf Islands. (Canadian Parks and Wilderness Society, 2002) Active Pass and a portion of the Trincomali Channel, from Retreat Cove to Shaw’s Landing are included in the NMCA proposal. The portion of the Trincomali is currently subject to a conditional “no-take” status that prohibits any fishing for rockfish and ground fish. This is one of the rockfish conservation areas established by the Fisheries and Oceans Canada. The Orca Pass transboundary initiative is a grass roots effort that was started in 1999 by a coalition of citizen’s groups from the Georgia Strait in Canada and Puget Sound in the United States. More than 20 groups recognized that these shared waters are part of a single ecosystem, despite political boundaries, and came together around the need to establish a conservation area. The transboundary initiative, led by the Georgia Strait Alliance and People for Puget Sound, hopes to protect the area’s natural

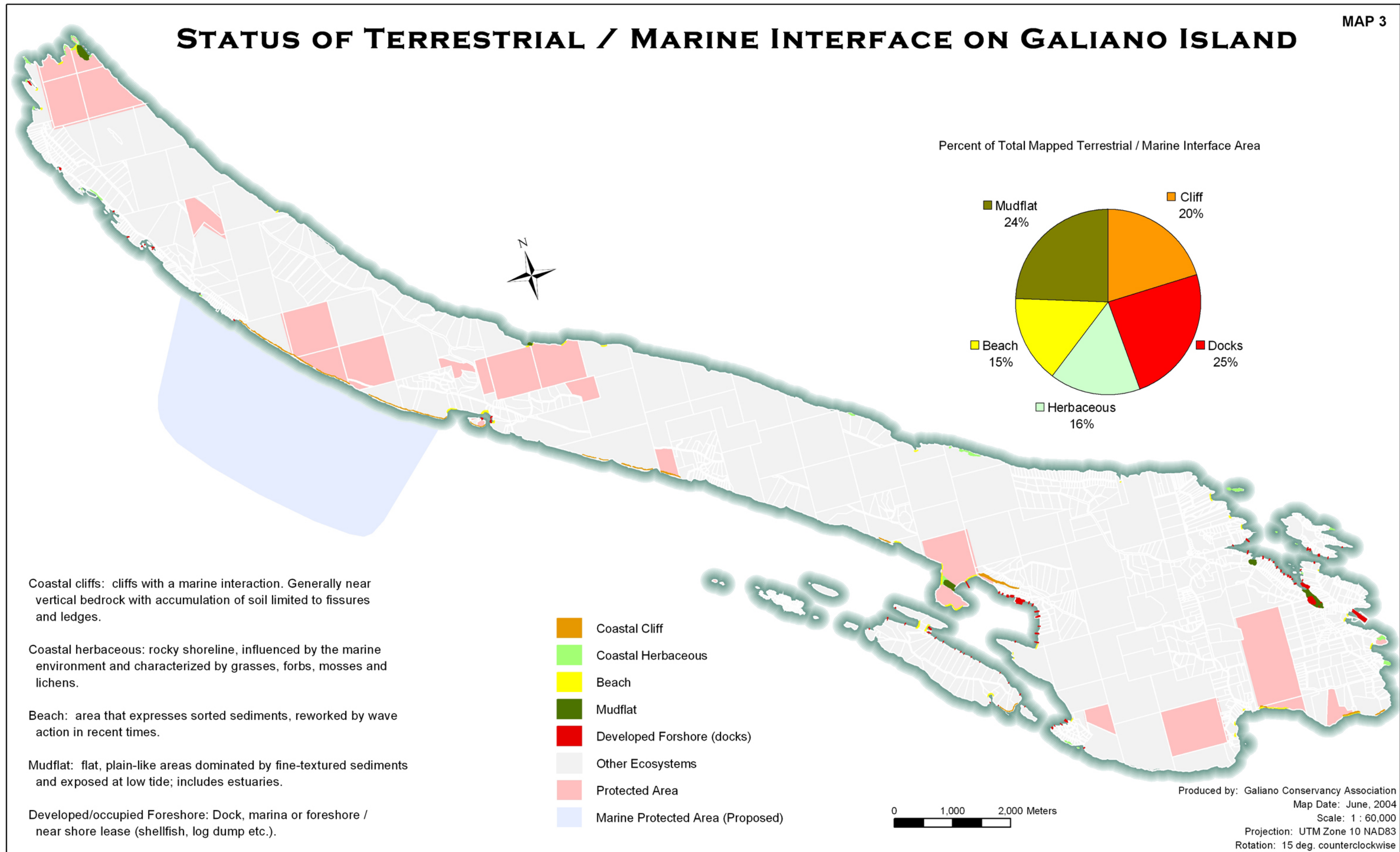
beauty, marine biodiversity, environmentally sensitive habitat and sites of cultural and spiritual importance to Coast Salish tribes and First Nations on both sides of the border. (Georgia Strait Alliance, 2004). The Orca Pass and NMCA initiatives are working collaboratively with the shared goals of establishing marine protected areas in the region that have both conservation merit and public support. (Canadian Parks and Wilderness Society, 2002)

Along with water based marine conservation, Galiano Island has protected approximately 20% of its shoreline through terrestrial initiatives. This includes 5.6 hectares of beach, mudflat, coastal cliff, and coastal herbaceous habitat, approximately 20% of the 29 hectares identified.



Low tide at Montague Harbour

STATUS OF TERRESTRIAL / MARINE INTERFACE ON GALIANO ISLAND



Coastal cliffs: cliffs with a marine interaction. Generally near vertical bedrock with accumulation of soil limited to fissures and ledges.

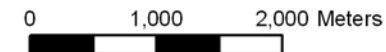
Coastal herbaceous: rocky shoreline, influenced by the marine environment and characterized by grasses, forbs, mosses and lichens.

Beach: area that expresses sorted sediments, reworked by wave action in recent times.

Mudflat: flat, plain-like areas dominated by fine-textured sediments and exposed at low tide; includes estuaries.

Developed/occupied Foreshore: Dock, marina or foreshore / near shore lease (shellfish, log dump etc.).

- Coastal Cliff
- Coastal Herbaceous
- Beach
- Mudflat
- Developed Foreshore (docks)
- Other Ecosystems
- Protected Area
- Marine Protected Area (Proposed)



Produced by: Galiano Conservancy Association
 Map Date: June, 2004
 Scale: 1 : 60,000
 Projection: UTM Zone 10 NAD83
 Rotation: 15 deg. counterclockwise

Marine Values

Resource Use

Surrounded by water, the residents, visitors and property owners of Galiano Island see the ocean as a great source of human utility. This utility can be divided along the following lines:

- 1. Personal use:** For most island residents and property owners the ocean is a source of food. People on Galiano enjoy fish, scallops, oysters, clams, mussels, seaweeds & algae, and crabs. It is important to them that they be able to harvest and consume these foods without getting sick, therefore environmental health of the ocean is vital. However, people on Galiano also value access to the ocean including access via personal residences, public and private docks, and public beach accesses. Building near the ocean is common. Construction often includes the building of septic systems to service homes as well as breakwaters and retaining walls to prevent erosion of shorelines.
- 2. Income generation:** Income from the marine environment on Galiano Island is gained through harvest of ocean resources and tourism activities. Fishing, harvesting of shellfish, and commercial diving for scallops are common. Residents of Galiano are also involved with the marine tourism industry, especially throughout the summer months. Tourist amenities include whale watching tours, kayaking, a marina, boat rentals and tours and fishing tours. All of the income generation activities are valued for their ability to support the island way of life.
- 3. Transportation:** One of the most important uses of the ocean for island residents, property owners and visitors is as a method of transportation. Most people arrive at Galiano via ferry. Island residents use the ferry to access many services including health care and government services and many of the goods available on Galiano arrive by ferry. Adequate ferry services were a valued use of the marine/foreshore area.



Log dump at low tide in Whaler Bay mudflat *Brian Mitchell*

Ecology

The diversity of marine life on Galiano was of great value to workshop participants. In particular, the accessibility of marine invertebrates and other creatures at low tides, the numerous shore birds and the ever-present marine mammals (seals, whales, river otters), and shoreline wildflowers were highlights of seashore visits. To maintain the quality of the marine and foreshore environment, workshop participants felt that a healthy relationship between land and water was of importance. They enjoyed observing the relationship between the shore and the ocean as seen, for example, in the weathering of rocks and the records of geological processes at the interface. On a larger scale the ocean was deemed important for creating the temperate climate that is enjoyed on the West Coast of British Columbia and for creating dynamic change. Because of the value placed on marine ecology, concerns were expressed over the lack of protected areas in the marine environment.

Aesthetic / Spiritual

Workshop participants emphasized the importance of the ocean and the foreshore as spiritual and aesthetically pleasing places. The light, open nature of the seashore was felt to be uplifting, freeing and invigorating. The dynamic, ever changing characteristic of the ocean was an inspiration for artistic endeavours including painting, photography, and the writing and playing

of music. The salt smell of the water, the regular sounds of the waves, the textures of the seawater and the beach contributed to people's sensual experience of the marine ecosystem. Additionally, the influence of the moon on the tides and the obvious connection between the tides and the intertidal life emphasized a feeling of connection between all things in the natural world. This sense of connection was very important to workshop participants. It was also important that residents, visitors and property owners be allowed to experience the ocean and the foreshore through access to marine areas. Public ownership of the foreshore in Canada was highly valued for providing this access.

Education

Accessibility of the foreshore and marine environments was also of high value for educational opportunities for young people and adults. Marine life was perceived as ideal for the study of life processes among invertebrates and marine plants and algae. The foreshore/marine environment was also seen as a good teaching resource for principles of connectivity and nutrient cycles, especially through studies of interactions between land and ocean, and of geological processes. Learning about nature and connections within nature was considered valuable amongst workshop participants.

Another highly valued aspect of marine education was the passing on of historical knowledge to the present about uses of the ocean environments. For example, how to harvest foods from the ocean, the use of seaweeds for fertilizer, and how to safely use the ocean as a transportation highway.

Recreation

Important recreational activities on Galiano are tied to the valuation of health and fitness, relaxation, and exploration. Physical activities that are important to residents and property owners on Galiano Island include swimming, kayaking, sailing, boating, walking, dog walking, fishing, scuba diving and snorkeling, water sports (eg. water skiing), and cliff jumping. Those supporting mental health and relaxation include reading, sunbathing, daydreaming, building sandcastles and collecting shells and pebbles. The foreshore and

marine areas are also places to explore and find mystery. Residents, visitors and property owners enjoy stargazing, bird watching, whale watching (although this is somewhat controversial), botanizing, and intertidal exploration. All of these activities are tied intimately to the accessibility of shorelines and areas that are compatible with desired shoreline uses.

Historical / Cultural

Culturally beaches and shorelines on Galiano Island are used today as places to congregate for picnics and social events. Historically they have been used as temporary village sites, as ceremonial sites, and as food gathering sites by local First Nations peoples. Workshop participants indicated that they felt that beaches and shorelines were valued as current gathering places. They also emphasized that they felt First Nations sites should be preserved.



Exploring tide pools between Cable Bay and Pebble Beach

Freshwater



Laughlin Lake

Odin Scholz

Streams and wetlands are limited in their size and occurrence on an island with such small watersheds and so dry a climate. Yet they are abundant in life or biodiversity, with birds, mammals, amphibians, insects and lush plant growth all focussed in and around these wet areas. Riparian ecosystems, located on the margins of streams and wetlands, provide ideal habitat for wildlife with their forest cover, food, and proximity to water.

Wetlands

Wetlands on Galiano include lakes, shallow water, swamps, marshes, wet meadows, a fen, and a bog. These ecosystems are defined as follows: Lakes are permanently flooded bodies of water greater than two meters in depth. Bogs and fens develop on continuously wet peaty soils. Bogs are generally acidic and low in nutrients, supporting shrubs such as Labrador tea, and various species of sphagnum moss. Fens are fed by water enriched with minerals from upslope drainage, and support a higher diversity of plants, including hardhack, a variety of sedges, rushes and reedgrasses. Marshes are inundated with water daily, seasonally or permanently, and are characterized by a variety of sedges, rushes grasses and reeds. Shallow water wetlands feature submerged and floating plants such as yellow pond-lily. Swamps include flood-tolerant trees such as western redcedar, and willow as well as salmonberry, horsetail and skunk cabbage. Wet meadows are rare, with a grassy

appearance provided by flood-tolerant grasses, low sedges and rushes. (McPhee et al., 2000)

Many wetlands are a mix of these different wetland types. Laughlin Lake provides an excellent example of a complex wetland. Although relatively shallow, its deeper sections are considered a lake as they exceed two meters in depth. Shallower areas, around the edges and near the western end are shallow water wetlands dominated by floating-leaved pondweed. Along the margins of the shallow portions, seasonal fluctuations in the water table create an environment ideal for the various sedges, rushes, grasses and other water dependent plants of a marsh.

Riparian Ecosystems

Riparian ecosystems have moist soils that support plant communities that are distinct from those in the surrounding upland areas (SEI Riparian Pamphlet). Riparian ecosystems can vary in width from just a few meters next to a small stream with steep banks to more than 50 meters either side of a large stream with flat banks. These areas are often comprised of trees such as red alder, willow and western redcedar that can tolerate periodic flooding. Floods, stream channel shifts and shallow rooting zones cause frequent natural disturbances such as blowdown, creating a high degree of structural diversity in the riparian ecosystem and in the associated stream or wetland (SEI Riparian Pamphlet). Riparian ecosystems also provide shade for streams and wetlands, keeping water temperatures low and minimizing evaporation during long summer dry spells.



Complex wetland (Shaw's Bog) bog – marsh - lake *Chris Kissingner*

Streams

Streams support a wide variety of organisms on Galiano ranging from beaver to three-spine sticklebacks to damselflies. There are two major types of stream on Galiano: year round and seasonal. The majority of the island's creeks are seasonal and do not flow during the summer and early fall. This is a result of the size of their watersheds and our warm dry climate. Watersheds tend to mirror the long, thin shape of the island, resulting in relatively small interior areas for the collection of precipitation. Located at Galiano's wider south-end and originating from the peaks of Mount Galiano and Mount Sutil, the Murchison Creek watershed is the largest on the island totaling about 550 hectares. Murchison almost doubles the size of its closest rivals, Putter Brook watershed (285 ha.), originating from the old dump and flowing through the golf course, and Jack Creek (290 ha.) watershed originates from Shaws Bog flowing alongside Cook road. In contrast, the Goldstream River watershed on Vancouver Island, just north of Victoria, is 4,850 hectares in size.



Jack Creek (North Galiano)

Keith Erickson

Unlike Goldstream River, Galiano's creeks do not support large populations of salmon. In fact, there are no sea run salmon or trout populations currently spawning in the island's streams. There are however, resident cutthroat trout and stickleback populations that have persisted in a number of our creeks. These fish are no longer able to make it to the ocean because of barriers such as waterfalls, ditched agricultural fields and dams. Sea run populations of Coho, chum and cutthroat would likely have existed in a few of Galiano's larger creeks prior to damage from agriculture, logging and development. Efforts to

re-establish Coho and Chum populations in Greig Creek are currently taking place, mainly through stream bank restoration and stocking. Habitat for a resident cutthroat trout population in Murchison creek has been improved through the creation of off-channel ponds and the placement of large woody debris within the channel.

Threats

Since the pioneering settlers first began to work Galiano's landscape in the late 1800's, streams, wetlands and riparian areas have been focal points for development and resource extraction. Riparian areas often produce the largest, most valuable trees. Wetlands, when drained, provide by far the most fertile soils. Streams were most valued for their fresh water, which was diverted for use in homesteads. Stream channels were also used as transportation corridors for moving cut logs from upland areas to the ocean. Extensive forestry has limited the ability of upland areas to clean and regulate the flow of water to streams and wetlands. After logging, uplands and especially riparian areas lose their ability to stabilize soil, resulting in erosion and sedimentation of water bodies and creeks. Roads also have a significant impact on streams and wetlands. These impermeable, linear features alter hydrology by channeling natural surface flows along their edges, usually in ditches. Instead of a broadly dispersed flow across the land, water accumulates, passing under the road obstruction through a culvert. This unnaturally large or concentrated flow then scours streambeds down to bedrock, resulting in waterfalls and erosion of banks, blocking the passage of fish and other wildlife. Often a meandering stream with a diversity of pools and riffles (essential habitat for rearing salmon) is straightened or channelized by increased flows during storm events. The fast moving water creates long riffles with no pools. The diversion of water also impacts wetlands by altering the water table during both the wet and dry seasons.

Pollution also impacts our freshwater ecosystems. Toxic materials such as oil, bleach or pesticides that are spread or spilled on the ground inevitably end up in the water system, accumulating in streams and wetland areas.

Healthy wetlands, lakes and streams are havens for wildlife mainly because they provide fresh water. But they also offer a diverse assemblage of plant life, bacteria and insects that form the foundation of many food chains. In addition, the enhanced growth and forest structure found in riparian areas provides necessary cover for wildlife.

Wetlands play a vital role in recharging our vulnerable groundwater supplies in summer drought periods. Although these ecosystems are considered areas of water discharge for most of the year, low water tables in the driest times of year draw the stored water down through the fine silt and clay wetland bottoms.

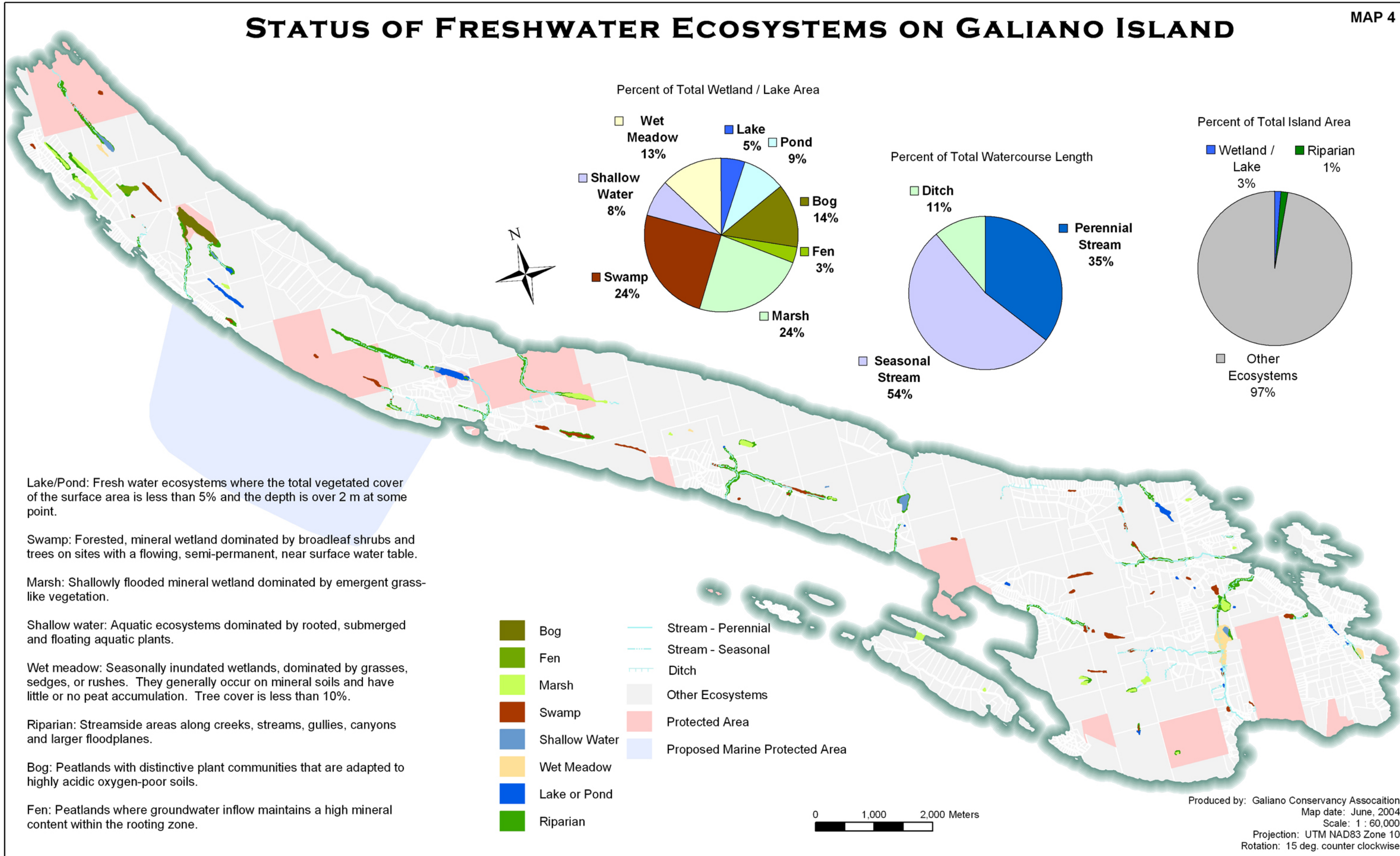
Current Status

In recognition of their being essential to life and of their history of disturbance, wetlands have been a primary focus of protection efforts on Galiano. Wetlands account for only 1.3% or 78 hectares of the Island's landscape of which 24% have been protected. 17 seasonal and 7 year round streams have been identified and mapped on Galiano. These mapped watercourses have a combined length of 33 kilometres, 4 kilometres of which have been protected. Streams and wetlands have also received some protection through the establishment of setbacks in local bylaws. No buildings may be located within 15 meters of any fresh water ecosystem, and septic fields must be set back at least 30 meters. In addition, landowners sometimes make wetlands, streams, or riparian areas the subject of voluntary conservation covenants in recognition of their critical importance.



Wading through a marsh (Ecological Reserve 128, North Galiano)
Chris Kissinger

STATUS OF FRESHWATER ECOSYSTEMS ON GALIANO ISLAND



Lake/Pond: Fresh water ecosystems where the total vegetated cover of the surface area is less than 5% and the depth is over 2 m at some point.

Swamp: Forested, mineral wetland dominated by broadleaf shrubs and trees on sites with a flowing, semi-permanent, near surface water table.

Marsh: Shallowly flooded mineral wetland dominated by emergent grass-like vegetation.

Shallow water: Aquatic ecosystems dominated by rooted, submerged and floating aquatic plants.

Wet meadow: Seasonally inundated wetlands, dominated by grasses, sedges, or rushes. They generally occur on mineral soils and have little or no peat accumulation. Tree cover is less than 10%.

Riparian: Streamside areas along creeks, streams, gullies, canyons and larger floodplains.

Bog: Peatlands with distinctive plant communities that are adapted to highly acidic oxygen-poor soils.

Fen: Peatlands where groundwater inflow maintains a high mineral content within the rooting zone.

Freshwater Values

Resource Use

The most emphasized value for freshwater ecosystems was their importance in maintaining water quality and water storage capacity for island households businesses and gardens. Storage capacity is enhanced by encouraging areas of standing water while water quality is maintained by preventing waterborne pollutants from entering watercourses and groundwater. Maintaining this value is often at odds with other valued uses of wet areas, such as agriculture and housing development, which often require ditching and draining of wetlands and the creation of roads. Many agricultural areas on the island have been wetlands and a few are returning to this state. Wet areas are often rich in nutrients for increased plant growth. Building of houses and development of infrastructure (such as roads) in wetland areas is also common. Workshop participants agreed that water quality and quantity was of the utmost importance, but many also saw agricultural sites in



Wetland area drained for agricultural field by ditches

wet areas and the right to build on a wet site as important values held by some islanders.

Other uses of freshwater sites included the gathering of pondweeds and plants for garden fertilizer and for transplanting in household ponds. Many people also valued wetlands, creeks and ponds as sources of water for direct use on gardens and for gathering food plants like salmonberry and Labrador tea.

Ecology

Most workshop participants felt that all natural freshwater ecosystems on Galiano Island, because of their rarity and due to the general scarcity of water on the island, were valuable and should be respected. Ecologically, areas of standing water were considered valuable as watering holes for birds, frogs, and other animals. Freshwater ecosystems, such as inland lakes and wetlands, were observed to be refuge areas for birds during times of nesting and mating as well as during ocean storms. They were also important for their use in the lifecycle of many insects, including dragonflies. Concerns were raised about wetlands being rearing grounds for mosquitoes and mosquito transmitted diseases, but it was generally felt that a balanced wetland ecosystem would contain predators to control populations. Therefore, healthy freshwater ecosystems were considered important. To maintain water levels in freshwater ecosystems, workshop participants felt that a healthy beaver population was very important, although many complained of beaver logging in their yards or neighbourhoods.

Aesthetic / Spiritual

Areas of freshwater on Galiano Island were felt to be “alive” by workshop participants. Valuable attributes of freshwater areas included the sounds of birds, frogs, wind and moving water and the wildness, inaccessibility and mystery associated with wet areas. Most workshop participants found the presence of water in natural areas to be inspiring artistically. Places with surface water were considered good areas for reflection and meditation. Many felt a strong sense of place when around water, which included feelings of calm and peace. Wet areas were also seen as

examples of the cycles of change and impermanence of living areas. One workshop group identified wetland areas as places where nature was at its best.

Education

Freshwater areas were viewed as excellent and important outdoor classrooms. Programs with Galiano's Community School which included salmon egg hatch and release projects were seen as integral to the curriculum of island students. Freshwater ecosystems were viewed as particularly important for science curricula including insect, frog, fish, water quality and bird topics. Observation of these creatures and processes in a natural setting was viewed as an important part of any child's education.

Recreation

Recreational values associated with freshwater areas on Galiano Island were more limited than for other natural areas. Workshop participants valued access to wetland areas for canoeing and kayaking. They also enjoyed hikes and walks that included some access to freshwater areas for birdwatching and the observation of wildlife. Some mentioned that they also enjoyed the occasional swim in a pond or lake. There was a strong feeling that access to freshwater areas should not adversely effect their ecology.

Historical / Cultural

Very little was mentioned about the historical/cultural values associated with wetlands. Workshop participants were aware that many wetlands on Galiano Island had been drained for agriculture. There was some curiosity as to the potential of using wetland areas for agriculture without damaging ecosystems. Raft agriculture, where plants floated on raft-like beds to take advantage of wetland nutrients and water, was suggested as were small, intensively cultivated, raised beds in wetland areas.

Landscape Connections



Looking from the interior ridge on DL44 across Galiano to Mayne Island.
Keith Erickson

We have discussed the current status of the four major ecosystem types on Galiano Island, including the general ecology and existing (or potential) threats to these systems. But these have so far been discussed as independent, isolated entities. Thinking about our island in this way does not do justice to its unique ecology. The connections and interactions between ecosystems as well as their shapes and patterns across the entire island landscape must also be considered. Ignoring this would be akin to studying the respiratory system, circulatory system, nervous system and digestive system of the human body without considering how they work together or the value of the person that they constitute.

Galiano ecosystems depend on ecosystems from other islands and the mainland

Species richness and diversity on Islands is governed in part by a number of principles known

collectively as the theory of island biogeography. Two of the most important principles are:

1. There is a positive relationship between the total size of an island and the number of species that it can support. Therefore, the larger the area, the greater the number of species; and,
2. There is a negative relationship between an island's remoteness (distance from the mainland) and the number of species that it can support. Therefore, the more remote an island, the fewer the species it can support.

These theories are based on observed rates of species extinction compared to rates of species colonization on islands throughout the world.

The ocean surrounding Galiano makes colonization by land based organisms very difficult. However, colonization by plants and animals still occurs. For example: pollen from trees on neighbouring islands is blown here by the wind; a wide variety of seeds and spores are brought over by birds; animals will swim over and; once in a while, log rafts full of seeds, spores, insects, plants and animals are expelled from large rivers like the Fraser and drift to Galiano's shore. Humans are also responsible for the colonization of all sorts of plants and animals including exotic species from ecosystems on the other side of the world.

Because Galiano is relatively large (6000 hectares) and located in a tightly knit archipelago of islands, it is able to support healthy populations of many species. Galiano's size however, does limit its ability to support populations of some species such as the cougar, whose male individuals require a minimum home range of over 16,000 hectares (Maser, 1998). Size also imposes limitations on the long-term viability of some of Galiano's plant and animal populations. In the event of a large-scale disturbance such as an intense wildfire or the rapid deforestation from clearcut logging, species may be lost. Such catastrophic disturbance events can destroy habitat faster than populations are able to adapt or move into the few remaining areas of refuge. Some species are more susceptible to these situations than others and are often rarer,

more limited in their distribution and have a lower probability of re-colonization.

Galiano ecosystems depend on each other

Galiano's ecosystems are connected in many ways:

Water flows from one ecosystem to another over the surface in streams or through the soil. This link provides for the dispersal of all types of organisms, nutrients, seeds, spores, minerals and other vital components of life. The hydrology of ecosystems is also connected. If the flow of water is altered in an upland forest, it will change the moisture levels of the wetland area at the bottom of the hill.

Wildlife often requires a number of different habitats to support the various stages of their life cycle. For instance, amphibians such as the rough skinned newt require wetlands for breeding and rearing but migrate to forests as adults where they live in or under damp, rotting logs. Many bird species nest in one type of ecosystem while hunting or foraging in another. For example, the Great Blue heron requires mature forest to establish a breeding colony, yet feeds along the ocean shoreline, on lakes, and in wetlands. Thus, in the case of the heron, different habitats support different life requirements. In the case of the sharp-shinned hawk, different habitats support different seasonal requirements. In spring and summer months, the hawk breeds and nests in the forest, usually near a wetland or stream, and hunts in open Garry oak meadows or bluffs where updrafts aid movement. In the winter, the hawk can be found in almost any type of habitat. (Campbell, 1990)

The examples above suggest that a mosaic of different ecosystems across the landscape must exist in order to satisfy the habitat requirements of many species of wildlife. This is further complicated when considering entire populations or a number of populations of these wildlife species. In this case, a group of habitats, say a grouping of wetland, forest, and Garry oak meadow, needs to be connected to other similar combinations. This ensures that if wildlife populations in one habitat group are drastically

reduced by some disturbance such as an outbreak of disease, individuals from nearby habitats will be able to colonize and rebuild the affected populations.

Effects of proximity or adjacency of habitats will vary depending on species. For example, a raccoon that can travel many kilometers in a day through all sorts of ecosystem types may not require habitat patches that are close to each other. On the other hand, a vole that can move only a couple of dozen meters in a day and requires cover to avoid predators may require continuous habitat to ensure survival.

Fragmentation turns ecosystems into islands

Habitat fragmentation is considered by many biologists to be the single greatest threat to biological diversity (Noss, 1991). Loss of habitat due to logging, development or agriculture has led to the isolation of natural areas. The remaining intact ecosystem patches resemble a scattering of "islands" across the landscape. The principles of island biogeography mentioned above also have



Porlier Pass Road is a major source of fragmentation Keith Erickson

relevance to patches or “islands” of natural habitat. The bigger the patch the more species it can support. The closer it is to other patches, the easier it is for species to colonize. Like islands, patches of habitat are vulnerable to species loss or extinction.

Fragmentation makes it difficult for many species to move between habitats. It inhibits their ability to adapt or seek refuge from a disturbance or recolonize an area after it has been disturbed. It impacts the abilities of plants and animals to disperse and alters patterns of migration. It may prevent wildlife from being able to locate habitats that provide for a necessary component of their life cycles.

Not all fragmentation creates an absolute barrier to species migration, as a brick wall or a large city might. On Galiano, fragmentation is caused by roads, residential, commercial and industrial areas, clearcut logging, agricultural fields, power lines and other uses of the land. Each type of fragmentation will have its own unique impacts depending on the sensitivity of the wildlife in the area. For example, a series of clearcuts that separate two isolated patches of mature forest act more as a filter than a barrier, allowing the movement of some species while inhibiting the movement of others (Soutier 1979, Noss 1991). A species of fungi that is associated with old-growth Douglas-fir will be isolated by the clearcuts, while members of the local black-tailed deer population are able to move through the logged areas with ease. Some types of fragmentation such as agricultural fields can benefit certain species. Many birds depend on open fields adjacent to forest edges and will thrive as a result of this type of disturbance. On Galiano, fragmentation is most detrimental to species that have trouble moving across disturbed terrain, or species that are sensitive to noise and human activity, or species that can only move short distances at a time.

Corridors connect islands

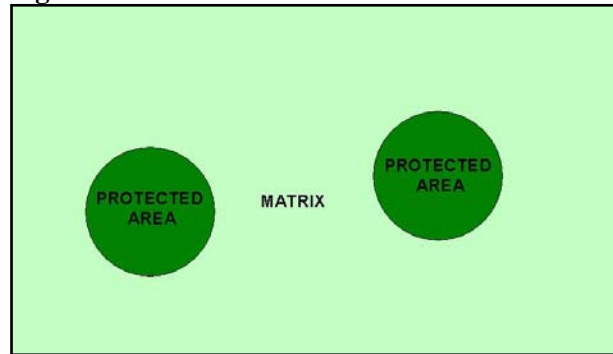
One strategy offered to counter the fragmentation problem is that of landscape linkages, usually understood as linear corridors of habitat that physically connect larger habitat patches in a landscape mosaic (Noss, 1991). Any area of

habitat through which an animal or plant propagule³ has a high probability of moving may be considered a corridor or linkage. (Noss 1991) This being true, not all corridors will satisfy the movement requirements of all species. Some of the most effective corridors include streams and riparian habitat as these ecosystems are linear in nature and rich in species.

When talking about fragmentation of ecosystems and connecting isolated natural habitats with corridors we must inevitably address the issue of land protection and land use. A useful way of looking at these topics involves dividing the landscape into two categories:

1. Protected Areas (islands or patches of habitat where a legally binding agreement exists to ensure that ecological integrity takes precedence over human use of the land)
2. The Matrix⁴ (everything surrounding or in between protected areas, where human use of the land can take precedence over ecological integrity)

Figure 2. Matrix vs. Protected Areas



As discussed, isolated habitats do not ensure the long-term viability of the species that live in them. The same principle applies to protected areas. Although there has been a conscious effort to link

³ Dunster and Dunster (1996) define Propagule as: In conservation biology, the smallest number of individuals of a species that can successfully colonize an island with a suitable habitat.

⁴ Dunster and Dunster (1996) define Matrix as: The most extensive and most connected landscape element type occurring in a location; plays the dominant role in landscape functioning. It is also a landscape element surrounding a patch.

protected areas, especially in the mid-island region, most of Galiano’s parks and reserves are isolated. As a result, long-term viability of the species that these areas aim to protect must rely on corridors and connections to natural habitats that still exist within the matrix. Opportunities for enhancing protected areas and avoiding species loss due to isolation hinge on connectivity within the matrix. Effective connections include natural ecosystems that are left alone and areas where land use respects the integrity of natural ecosystems. Priority should be given to ecosystems that border on protected areas and patches with large interior areas (big, and round, not small, long and skinny with lots of edge). Due to the history of land use on Galiano, connections between protected areas will not be entirely comprised of natural ecosystems, but will have to include modified areas within the matrix. This being said, even modified ecosystems such as plantations or agricultural fields can play a role, since they provide limited habitat that can support the movement of some plant and animal species. Maintaining connections between protected areas and among patches of natural habitat is particularly critical in times of climate change,



Small patch of Old Growth Forest (mid-island) *Keith Erickson*

when organisms must move with shifting habitat conditions if they are to survive.

Current Status

Galiano land protected by acquisition totals 818 hectares or 14% of the entire landscape. This includes 521 hectares or 27% of the remaining 1921 hectares of natural⁵ ecosystems on the island. The following chart breaks these natural ecosystems down into more specific habitat units:

Table 2. Habitat Types by Total Remaining Area, Area Protected and Percent Protected

Habitat Type	Total Area Remaining (ha.)	Total Area Protected (ha)	% Protected
Coastal Cliff	7.74	2.607	33.68
Inland Cliff	30.64	3.708	12.10
Coastal Herbaceous	6.07	1.562	25.73
Herbaceous	6.05	1.159	19.16
Lake / Pond	12.73	4.63	36.37
Beach / Mudflat	15.18	1.484	9.78
Mature Forest	1551.22	427.490	27.56
Old Growth Forest	3.96	2.305	58.21
Riparian	70.14	11.035	15.73
Woodland	139.39	41.530	29.79
Wetland	77.99	18.439	23.64
Streams (km)	33	3.936	11.93

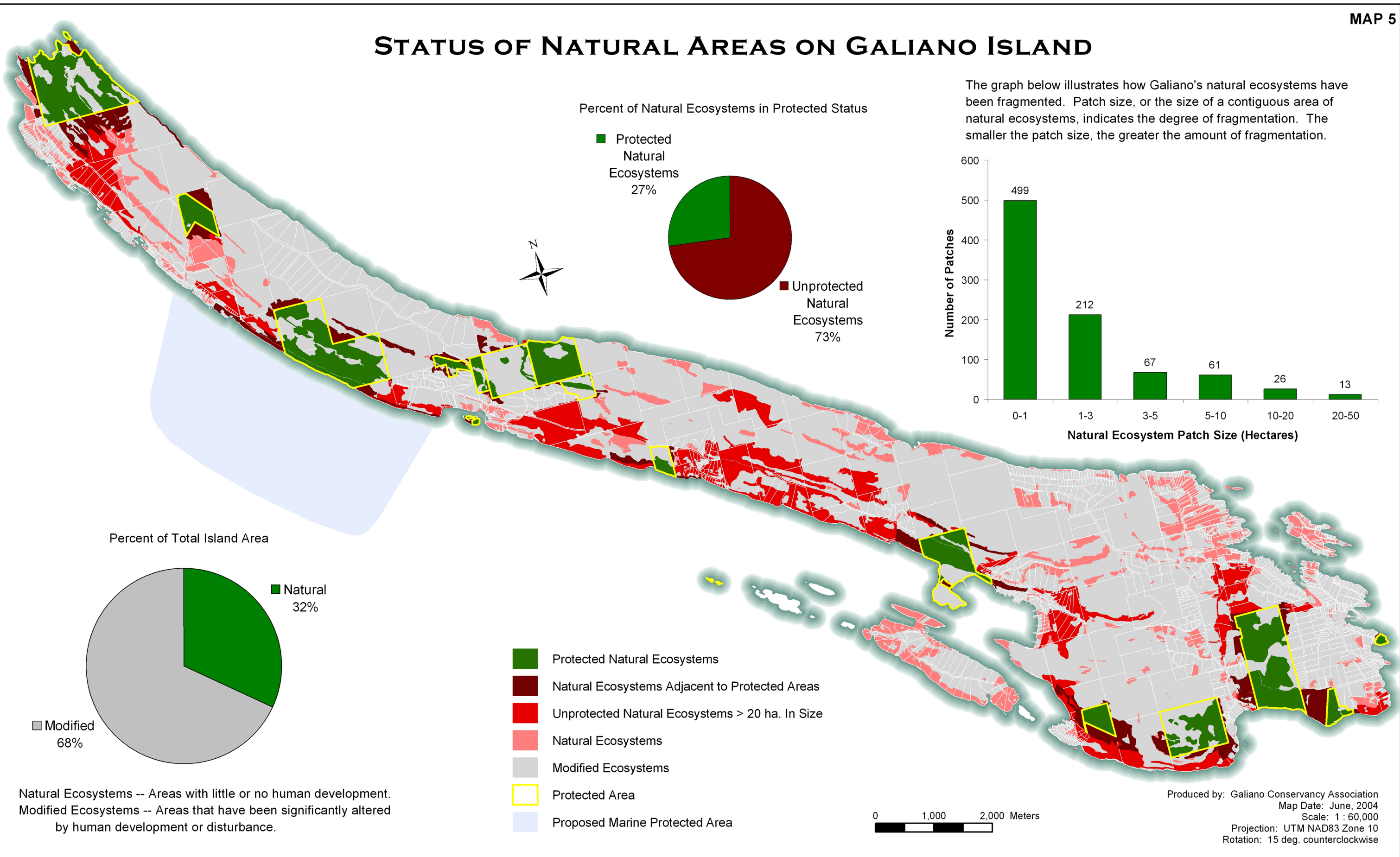
Although many of Galiano’s ecosystems have been protected, their integrity is compromised by a high degree of fragmentation. Over 57% of all natural ecosystem patches⁶ are less than 1 hectare in size, 81% are smaller than 3 hectares. Only 18% of the total area of all natural ecosystems exist in patches greater than 20 hectares.

Given the importance of patch size and connectivity to the persistence of habitat and wildlife, attention must be focused on enhancing ecological integrity within the matrix. Sustainability of Galiano Island’s ecology, including organisms we have yet to discover and relationships we are yet to comprehend, depends on a coordinated stewardship effort inclusive of all members of our community.

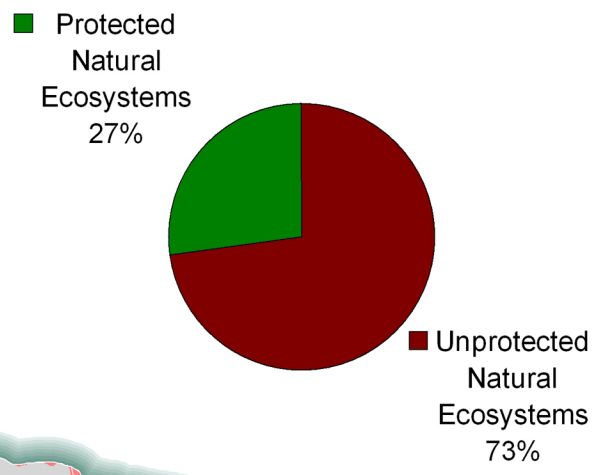
⁵ “Natural” refers to an area or ecosystem with little or no human development or related impact.

⁶ Natural ecosystem patches may include several different habitat types as long as they are contiguous.

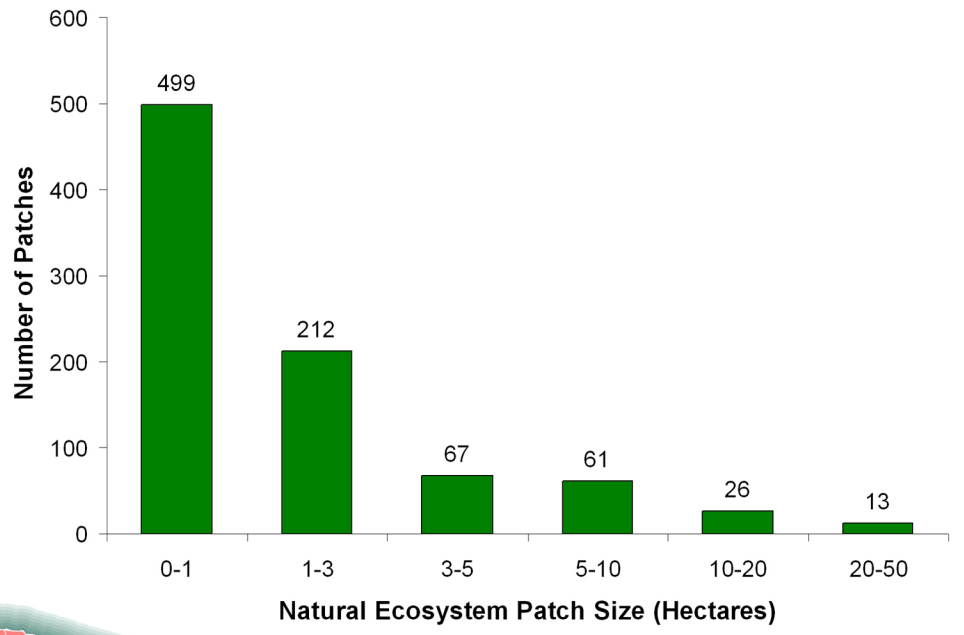
STATUS OF NATURAL AREAS ON GALIANO ISLAND



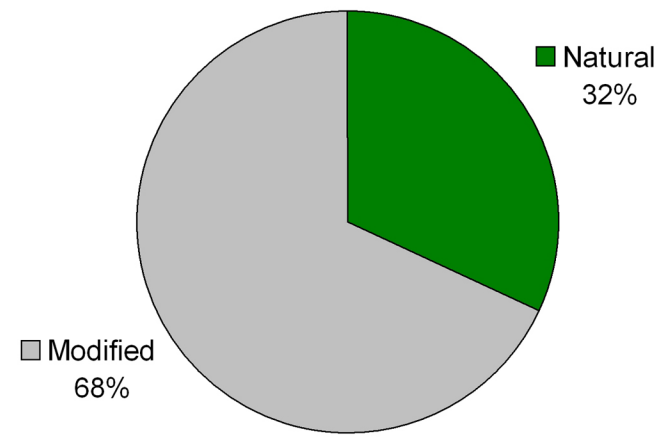
Percent of Natural Ecosystems in Protected Status



The graph below illustrates how Galiano's natural ecosystems have been fragmented. Patch size, or the size of a contiguous area of natural ecosystems, indicates the degree of fragmentation. The smaller the patch size, the greater the amount of fragmentation.



Percent of Total Island Area



- Protected Natural Ecosystems
- Natural Ecosystems Adjacent to Protected Areas
- Unprotected Natural Ecosystems > 20 ha. In Size
- Natural Ecosystems
- Modified Ecosystems
- Protected Area
- Proposed Marine Protected Area

Natural Ecosystems -- Areas with little or no human development.
 Modified Ecosystems -- Areas that have been significantly altered by human development or disturbance.

Produced by: Galiano Conservancy Association
 Map Date: June, 2004
 Scale: 1 : 60,000
 Projection: UTM NAD83 Zone 10
 Rotation: 15 deg. counterclockwise

Landscape Connection Values

The first four UP-CLOSE Workshops were about specific landscapes: forests, Garry oak meadows, aquatic / freshwater, and marine / foreshore. Throughout these workshops, however, there was a general feeling that isolating these landscapes, as if they had no connection to one another, provided an incomplete perspective of Galiano Island's landscape as a whole. Therefore, the subject of landscape connections was broached and discussed at each workshop. It became the topic of the last UP-CLOSE session.

Workshop participants felt that all of Galiano's ecosystems were linked either by something that traveled through several landscapes or by contact at their edges. These connections were felt to be important to the Galiano landscape. Examples of connections highlighted at the UP-CLOSE Workshops included:

Water: Water connects terrestrial, freshwater and marine landscapes because of its presence and flow throughout all ecosystems. Water carries components of one ecosystem to another. For example, nutrients from the forest are carried in rainwater over top of and through forest soils to streams and wetlands. This delivery system quality of water can be both a benefit and a cost to ecosystems. For example, according to some workshop participants, the flow of water connecting the land to the ocean can be problematic when water passes through faulty septic systems picking up and concentrating unwanted nutrients which are deposited in marine ecosystems. This nutrient deposition can result in unusual algae blooms which can cause problems for other organisms.

Climate: Different island landscapes were believed to affect one another by way of climate effects. The most dramatic example of this cited during the workshop series was the effect of the ocean on the land. Many coastal forests, woodlands and aquatic ecosystems owe their moderate climates to the presence of the marine environment, which helps keep summers relatively

cool and winters mild. Other climate connections mentioned in workshop discussions include the cooling of streams and water bodies by the shading action of forests and the effects of trees as windbreaks calming inland waters. Shaded and calm bodies of inland water offer refuges for many animal species from sun and storms.

Non-human Animals: Workshop participants were quick to note that animals, having the capacity of movement, were important connectors of island landscapes. Not only do they feed, drink, sleep, bear young and breed throughout the various island ecosystems, but they also move nutrients and seeds throughout the landscape. Animal feces are important to moving nutrients from one place to another as is the death and decay of animals. Birds and mammals also move plant seeds from one place to another in their feces and on their bodies. Having diverse habitats to support these animals was felt to be important by workshop participants.

Human Beings: Human beings were also viewed as connectors of landscapes. In this capacity, however, humans were seen as having largely a negative effect on ecosystems. Many highly invasive species, such as Scotch Broom and English Ivy were brought to Galiano Island by human beings. Human beings have also disturbed some of the important landscape connections through the development of land that connects different ecosystems as well as through the introduction of unnatural items to local ecosystems. For example, clearcut logging of steep slopes adjacent to wetlands or bodies of water often results in deposition of unnatural levels of sediment in these waterways. Despite observing these negative connections, however, most workshop participants felt that the human relationship to the landscape had the capacity to become a more positive experience for both people and the places in which they live and work.

The idea of "Landscape Connections" not only has the connotation of connections between landscapes, but also stresses the connections between people and nature. Throughout the workshop series, discussions about the value of natural areas to residents and property owners of Galiano Island yielded information on the links

between human beings and the land. Because of a desire to encourage these links, workshop participants often discussed the balance between overlapping values. Issues that were frequently discussed included:

- 1. Use vs. Overuse of Natural Resources:** For many workshop participants, emotional connection to the landscape was enhanced with the use of natural resources. Valued usage of natural resources included both personal/household uses and economic uses. However, workshop participants felt that the boundary between use and overuse of natural resources needed to be evaluated periodically. For many, the distinction between use and overuse of a resource required both personal reflection and collaborative community agreement.
- 2. Access vs. Restricted Access to Natural Areas:** Like the issue of usage of natural resources, access to natural areas was believed to enhance feelings of connection to Galiano's natural environment. However, workshop participants generally felt that there were natural areas that should not be made easily accessible. These areas might be sensitive ecosystems containing rare species or dangerous landscapes. The feeling of the workshop group was that access to natural areas should be encouraged and facilitated, but that the negative effects of providing access to a natural area should be properly assessed and, in some cases, minimized. Assessment of potential negative effects might result in a decision not to provide access to a particular area.
- 3. Value of Mystery and Emotional Connection to the Land vs. Scientific Knowledge:** A frequent discussion during the UP CLOSE Workshops centered on the value of mystery and wonder in people's emotional connection to the land. Most workshop participants felt that a sense of mystery and wonder was as important as having academic or scientific knowledge about a natural landscape. Nevertheless, available education about natural landscapes, their components and how

they work, was felt to be important for both young and old.

- 4. Desire to be a Part of Nature vs. Desire to Live Outside of Nature:** The desire to live more closely with nature was evident in the wishes of workshop participants. However, the convenience and comfort associated with modern households was also valued. Most workshop participants felt that the effect of the modern household on Galiano's ecosystems needed to be considered and, where possible, the negative impacts of modern lifestyles needed to be mitigated. A general desire for education about how to create homes and lifestyles that fit better with Galiano's ecosystems was expressed.



Preventing root damage to trees by "re-surfacing" trail with wood chips in the Pebble Beach Reserve

Recommendations

The UP-CLOSE Workshop Series concluded by asking participants what recommendations they would make for the conservation of Galiano Island's natural landscapes and the maintenance of the human values connected with them. Workshop group suggestions were organized into recommendations for education, stewardship, responsible resource use and land use planning. Recommendations are described below.

Education

Every workshop participant agreed that education about Galiano's local ecosystems would contribute to conservation. Most workshop participants felt that as people learn about nature, they are able to emotionally and intellectually connect with it. Education about the outdoors, most agreed, was best when done outdoors. Therefore, *access* to natural areas on Galiano Island was important for nature education.

Suggested methods of education included:

- Signage at trailheads and at the ferry terminal to give background about Galiano Island's natural landscape. Signage might also provide suggestions for respecting local ecosystems as well as trail map information and numbers to call for more information.
- Brochures about the natural ecology of Galiano Island that could be distributed at the Chamber of Commerce Tourist Information Booth and other locations. It is possible that brochures might be sold and proceeds used for local education initiatives.
- Workshops for the community about ways of living sustainably and minimizing our ecological footprint. Create links between human actions and the natural landscape.
- Outdoor walks with local and off-island experts. Topics might include the island's ecology, local flora and fauna, the natural processes, island geology and how other generations have historically interacted with nature on Galiano (eg. First Nations, Japanese, and pioneer families).

- Articles in local publications about local animal and plant species. For example, a "Species of the Month" article.
- Children's education programs in local schools and for visiting youth.
- A staffed Nature House in Montague Harbour Provincial Marine Park including advertised programming for all ages.

Stewardship: Caring for the Land

Stewardship is "caring for the land and associated ecosystems so that healthy ecosystems can be passed on to future generations" (Dunster & Dunster, 1996). Both individuals and organized groups can do it. UP-CLOSE workshop participants suggested encouraging island stewardship in the following ways:

- Outreach to local landowners providing information about natural ecology of the island and ways of supporting it through responsible use of household and yard products
- Creation of a brochure that identifies local venues where local organic foods, native plants, eco-friendly cleaners, eco-friendly wood products, local lumber milling, recycling facilities and used clothing can be found.
- Creation of an online database or notice board where local residents, property owners and visitors can share information about local flora and fauna.
- Provide information about private conservation covenants. Profile local residents who have created conservation covenants for their land and ask them to share their impressions of the process.
- Plan trails that provide access to nature, but minimize negative impacts on sensitive ecosystems.
- Encourage landowners to practice restoration on their lands and provide them with the training to do so. Eg. Removal of invasive plants and reestablishment of native vegetation.
- Create local employment opportunities in restoration of natural systems.

Responsible Resource Use

Workshop participants believed that use of local resources was a means of connecting to the natural ecosystems of Galiano Island. Use of local natural resources was also a means of maintaining a healthy local economy and supporting local households. Workshop participants felt strongly that sustainable resource use should be a part of plans for Galiano so that future generations would have the opportunity to use the products of the land and water in the same ways as we do today. Suggestions for encouraging responsible resource use included:

- Promotion of local organic food production through provision at local stores of organic fertilizers and natural pest controls.
- Creation of sustainable agriculture guidelines for Galiano Island.
- Work to improve the quality of regenerating forests on Galiano Island through forest restoration.
- Provide hands-on training and information sessions about sustainable forestry.
- Encourage use of Galiano Island Forestry Guidelines.
- Encourage on-island value added industry using local wood.

Land Use Planning and Legislation

Workshop participants identified land use planning and enforced environmental legislation as a means of maintaining the quality of local ecosystems. They felt that these items were particularly important to preventing uncontrolled development of the island and destructive land use practices. Suggestions for land use planning and legislation included:

- Incorporating conservation of sensitive ecosystems into requirements for building and development permits.
- Suggesting and supporting legislation that protects sensitive and rare ecosystems.
- Development of a conservation plan for Galiano Island. Include public process.
- Provide education to landowners about how their property fits into the landscape as a

whole as well as what plans there are for land use in their area.

Additional Recommendations

The UP-CLOSE Workshops brought up many recommendations from participants, however, there was not enough time to cover all topics comprehensively. The following are some recommendations that were hinted at by workshop participants or that stem from information from the Galiano Island Landscape Classification.

- Create a landowner contact initiative to provide information to private landowners about the natural importance of their land.
- Seek out stewardship agreements from willing landowners.
- Continue and encourage land acquisition projects within the community for conservation purposes, especially those that build connections with existing protected areas and those protecting rare or sensitive habitats.
- Continue and encourage habitat restoration in ecologically damaged areas, especially those linking natural habitats (eg. plantation forest area located between two mature forest patches).

Key Points

UP-CLOSE Workshop Series

- access to nature (for recreation, spiritual renewal, education, etc.).
- education about nature and how to treat it.
- ability to use natural resources in a responsible manner for economical purposes and personal use.
- regulations and planning processes that support functioning ecosystems that result in clean air, water, animals, plants that can be enjoyed by all.

What Activities are Currently Taking Place on Galiano Island?

Land Acquisition and Management

Galiano Island residents and organizations, along with local, regional, provincial and federal governments, have protected approximately 13.6% of Galiano Island's land base through the creation of parks and reserves. Over a third of these lands have been acquired by local organizations such as the Galiano Club and the Galiano Conservancy Association. Figure 5 below indicates the owners of protected land on Galiano Island, MAP 6 indicates size and ownership of individual protected areas.

All lands in protected areas require some level of care. In most cases this care is provided by the land owners and includes such things as:

- Trail building, maintenance and repair
- Public education about care and respect of the protected area
- Emergency planning for such things as forest fires, drought, evacuation of area users
- Habitat restoration in disturbed areas
- Ecosystem monitoring to determine if the area is changing and what the causes of change might be
- Management planning for permitted uses of the area and future maintenance requirements

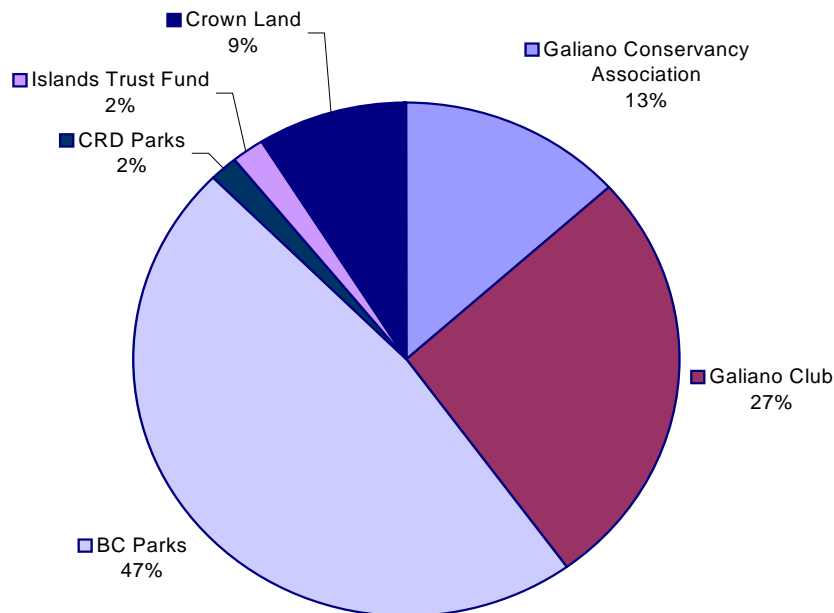
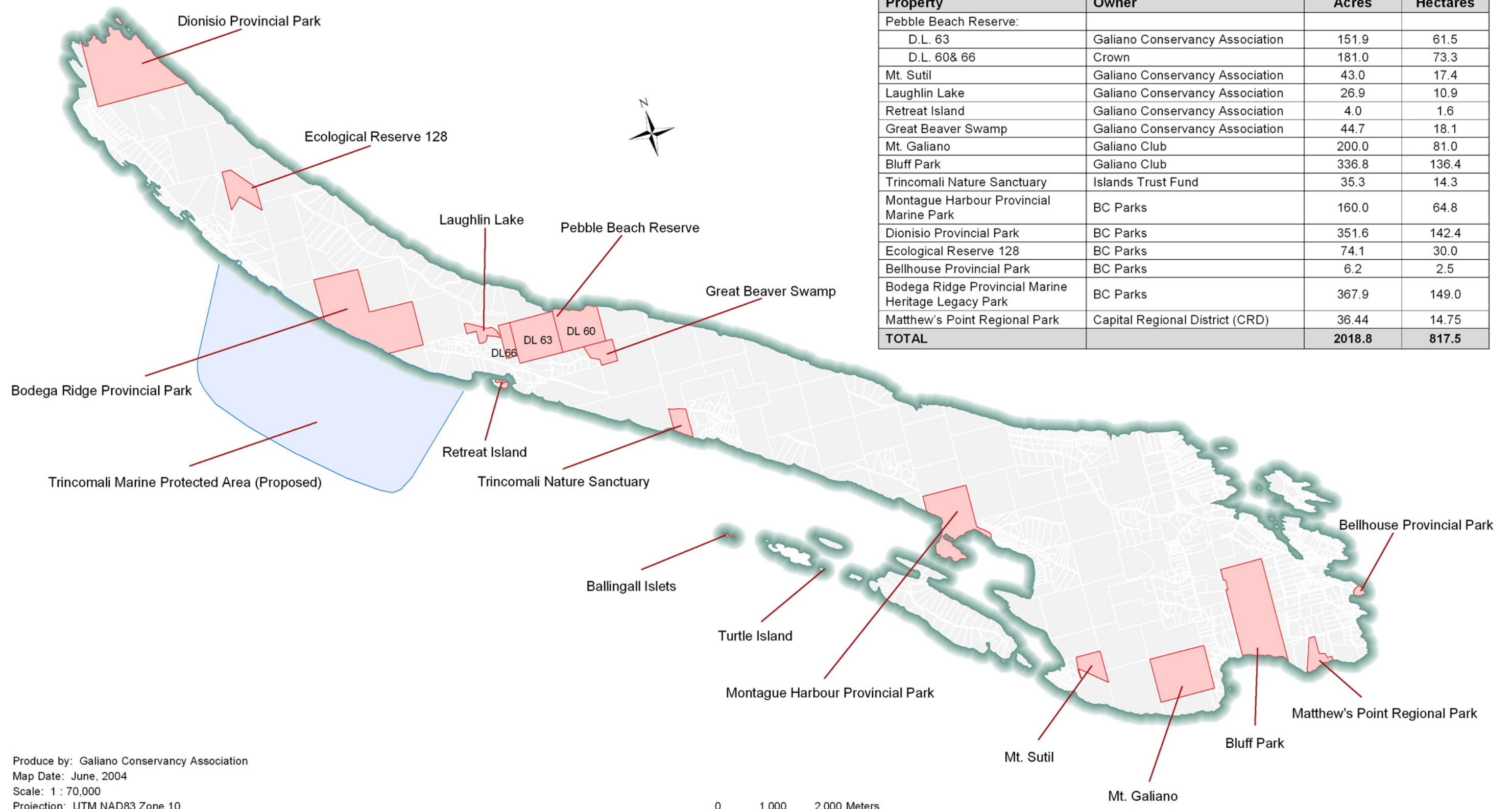
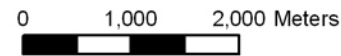


Figure 3. Percent of Protected Areas According to Owner (%)

PROTECTED AREAS: GALIANO ISLAND



Produce by: Galiano Conservancy Association
 Map Date: June, 2004
 Scale: 1 : 70,000
 Projection: UTM NAD83 Zone 10
 Rotation: 15 deg. counterclockwise



Stewardship

Currently, there are many organizations that undertake some form of stewardship on Galiano Island. Their activities include land management for recreation, education initiatives, land protection and management for conservation purposes and marine protected area initiatives. Organizations involved in stewardship are listed in table the below. As with land acquisition, organizations engaged in stewardship activities exist at the local, regional, provincial, and national levels.

Table 3. Stewardship Organizations and Activities

ORGANIZATION	ACTIVITIES
Local	
Galiano Club	Land ownership and management, future Heritage Forest owner
Galiano Island Forest Association	Education, Forest Practices Guidelines for Galiano
Galiano Island Parks and Recreation Commission	Trail construction, beach access, support of local education initiatives
Galiano Activity Centre Society	Education and recreation
Galiano Island Local Trust Committee	Marine stewardship program, land use planning
Galiano Conservancy Association	Land ownership and management, marine stewardship program, local covenant holder, local and regional education initiatives, local stream, wetland, forest and Garry oak meadow restoration initiatives, mapping and conservation planning
Regional	
Capital Regional District Parks	Land ownership and management
Garry Oak Meadow Preservation Society	Local covenant holder
Orca Pass Initiative	Coalition of organization for marine protection in Active Pass
Habitat Acquisition Trust	Local covenant holder and partner in local land acquisition
Gulf Islands Centre for Ecological Education	Ecological education initiative
SeaChange Marine Conservation Society	Marine education
Island Stream and Salmon Enhancement Society	Restoration and stewardship initiatives
Goldstream Salmon Hatchery	Donation of salmon eggs for local streams
Watership Society	Salmonids in the classroom project with local school
Provincial	
B.C. Parks	Land ownership and management
TLC, The Land Conservancy of B.C.	Local covenant holder, land acquisition partner
Silva Forest Foundation	Proposed Heritage Forest covenant holder, local forest restoration work
Provincial / National	
Pacific Marine Heritage Legacy	Provincial / Federal partnership for land acquisition
National	
Parks Canada	National Marine Conservation Area feasibility study for the Gulf Islands area
Nature Conservancy of Canada	Partnerships for land acquisition
Department of Fisheries and Oceans Canada	Stream restoration and Rockfish protection initiatives

Project Outcomes

The original goals of the Galiano Island Habitat Conservation Project were to protect wildlife habitat through:

1. Landscape mapping and analysis of wildlife habitat that incorporates local community input.
2. Creation of local conservation objectives.

With the completion of the Galiano Island Landscape Classification, the UP-CLOSE Open Houses and the UP-CLOSE Workshop Series the project has achieved goal number one and has come a long way towards meeting goal number two.

The outcomes and future plans for the project are broken down into three categories: the Galiano Island Landscape Classification, community process/action, and local conservation objectives.

Galiano Island Landscape Classification

The Galiano Island Landscape Classification has come about via a thorough public process involving over 127 island residents, property owners and visitors and has been made available to local government (Islands Trust), the general public, and Galiano Island organizations. It is now also available online through the Islands Trust website at www.islandstrust.bc.ca by following links to Islands Trust Ecosystem Maps, Galiano Island.

Now that the Landscape Classification is complete, plans are underway to encourage implementation of the mapping in land use and conservation planning. Galiano Island organizations have been notified of its availability and are encouraged to make use of it. Several local and regional organizations have already employed the Landscape Classification for their purposes. It is anticipated that other organizations will follow. Users include:

- The North Galiano Emergency Response Committee
- The Galiano Club
- Affordable Housing Committee
- Several owners of private property on Galiano Island
- The Islands Trust Fund
- The Capital Regional District (Natural Areas Atlas)
- Canadian Parks and Wilderness Society

The Galiano Conservancy Association has made the Landscape Classification available to the Galiano Island Local Trust Committee and will continue to provide the results of any subsequent analysis.

To keep the Galiano Island Landscape Classification current, the mapping will need to be revisited and updated every five years. Ideally, this will include flying aerial photography, satellite imagery and some ground-truthing to verify questionable sites.

Community Process and Action

Throughout the creation of the Galiano Island Landscape Classification the Galiano community has been invited to provide information and participate in the identification of natural and modified areas on the island. This assistance has helped a great deal in refining the Landscape Classification and has raised public awareness about sensitive habitats on Galiano Island. Inspired by guest speakers and discussion with fellow community members at the UP-CLOSE Workshops, a number of local residents have decided to take action through the formation of a group called the Galiano Naturalists.

The Galiano Naturalists have a goal to “engage in projects that foster increased awareness, appreciation, respect and understanding of natural areas and thereby lead to their protection” (Galiano Naturalists, 2004). With this goal in mind, and with the recommendations arising from the workshops, they have initiated a “Species of the Month” article in the local magazine, *The Active Page*, and have begun work on a brochure identifying local natural

areas of interest. The brochure will provide ecological information on natural areas of interest and sensitive ecosystems on Galiano Island and will give examples of places to visit. The Naturalists have agreed not to advertise sensitive areas as places to visit. The group also plans to engage in local stewardship initiatives and several members are registered for a Shorekeepers marine foreshore monitoring workshop through the Department of Fisheries and Oceans Canada (DFO). They will learn shoreline monitoring protocols and choose and monitor a Galiano beach two times per year, sending their results to DFO.

Because promoting care of Galiano's habitats is much too large a job for one organization or group, the Galiano Conservancy Association will be increasing its efforts to encourage neighbourhood stewardship groups focussed around protected areas. Stewardship group tasks might include:

- Removal of invasive exotic plant species
- Restoration, establishment of native plants
- Habitat monitoring activities
- Voluntary habitat protection on private land
- Agreements to not use herbicides and pesticides or to pollute private land

By motivating more island residents to care for local ecosystems, the Galiano Conservancy Association hopes to enhance current protected areas by improving connections across the matrix.

Local Conservation Objectives

The UP-CLOSE workshops were successful because they launched a set of recommendations, which, along with analysis of the Galiano Island Landscape Classification, have the potential to form the basis of local conservation objectives. Groups such as the Galiano Naturalists and the Galiano Conservancy Association have initiated projects that will begin to satisfy several recommendations and many local and regional groups are working towards similar goals. Information found in this report will be provided to relevant government agencies, such as the

Galiano Island Local Trust Committee, as well as regional and local community organizations. With continued public process and increased support it is possible to achieve the goal of a conservation plan supported the Galiano community.

A local conservation plan would be founded in analysis of the Galiano Island Landscape Classification and would incorporate the human values detailed in earlier sections of this report. Conservation priorities for the island would be weighed against types of human use and wherever possible, plans to meet both conservation goals and human needs would be developed. Public involvement during the development of a conservation plan should be encouraged so that feelings of community ownership of the plan can be established.

Finally, it is apparent that conservation planning on Galiano Island will include the work of many organizations, government agencies, and individuals. Already, many initiatives are working towards habitat conservation, responsible resource use, and alternative ways of living lightly on the land. With the clear direction of a community-based conservation plan, the energies of organizations such as the Galiano Conservancy Association, will be strategically directed towards activities that conserve the natural environment while supporting the needs and values of local residents.

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Appendix I
UP-CLOSE Workshop Series Flyer with Speaker
Biographies

UP-CLOSE

Galiano Landscapes: What Do You Value? February 6 - March 21, 2004

Galiano Island residents and property owners know their island environments as well as anyone. If you take pleasure in learning about your island and would like to share with others the things that you love, then the UP-CLOSE Workshop series needs you!

Up-Coming Workshops

For dates and details on workshops, please see following page. All workshops take place at the South Galiano Community Hall with the exception of the evening lectures on Friday, February 20 and Friday, March 19, which will take place at the Lions Hall.

Typical Workshop Schedule

Friday Evening, 7:30 pm:	Guest speaker and reception
Saturday Morning, time varies:	Field trip to the ecosystem
Saturday Afternoon, 1pm - 4pm:	Facilitated discussion "What Do You Value?"

Childcare

Childcare available upon request. 5 days prior notice please. Call Kate Emmings at the Galiano Conservancy Office, (250) 539-2424.






Register Now !

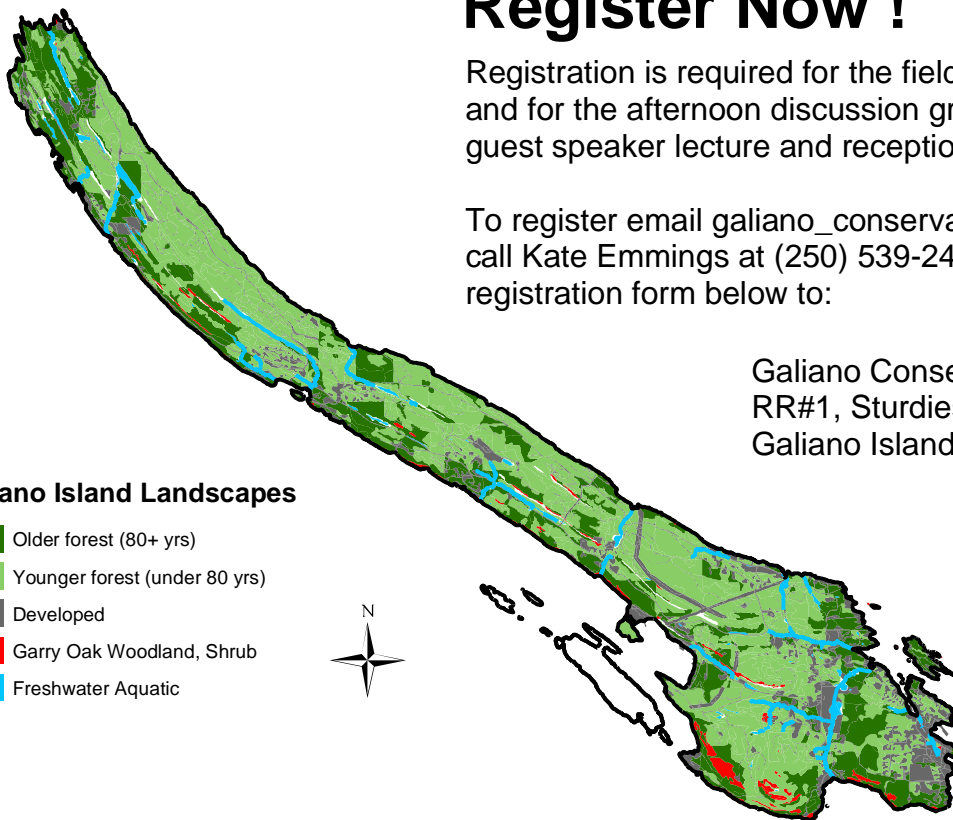
Registration is required for the field trip component and for the afternoon discussion group. Friday evening guest speaker lecture and reception open to the public.

To register email galiano_conservancy@gulfislands.com, call Kate Emmings at (250) 539-2424, or send the registration form below to:

Galiano Conservancy Association
RR#1, Sturdies Bay Road
Galiano Island, B.C. V0N 1P0

Galiano Island Landscapes

-  Older forest (80+ yrs)
-  Younger forest (under 80 yrs)
-  Developed
-  Garry Oak Woodland, Shrub
-  Freshwater Aquatic



Registration Form

Name (s): _____

Address: _____

Phone #: _____

Email: _____

Number Attending: _____

Workshops (please indicate on the back which workshops you would like to attend):

UP-CLOSE Workshop Speakers February 6 to March 20, 2004

HERB HAMMOND, Forest Ecosystems, February 6-7, 2004



HERB HAMMOND is a forest ecologist and Registered Professional Forester with 30 years experience in research, industry, teaching and consulting. He works extensively with rural and First Nations communities throughout Canada and around the world. Herb heads Silva Ecosystem Consultants Ltd., and is a founding director of the Silva Forest Foundation, a non-profit organization devoted to research and education in ecosystem-based conservation planning and management. Herb holds a Bachelor of Science in forest management from Oregon State University and a Masters of Forestry from the University of Washington. He is the author of *Seeing the Forest Among the Trees: The Case for Wholistic Forest Use* and is finishing a handbook on ecosystem-based planning in the boreal forest. Herb is the 2003 recipient of the Gold Canadian Environment Award for sustainable living.

EMILY GONZALES, Garry oak Ecosystems, February 13-14, 2004

EMILY GONZALES is an "introduced species" whose preferred habitat is the Gulf Islands. Born in Los Angeles, she was naturalised in Victoria and Vancouver and became a student of island ecology. Emily's M.Sc. was about the spread of the Eastern grey squirrel in B.C. and her current Ph.D. focuses on the contribution of herbivores, exotic grasses and landscape fragmentation to the decline of Garry oak ecosystems. She works out of the Centre for Applied Conservation Research at UBC where her interests include island biogeography, community ecology, restoration, introduced species and conservation ecology. Outside of academia Emily has worked as the Director of Science ALIVE, a science education organization at Simon Fraser University, and in Environmental Education through the Stanley Park Ecology Society at Stanley Park. She is an avid fitness enthusiast racing triathlons and teaching fitness in her spare time. Emily has recently bought property on Galiano and is looking forward to her time on the island.



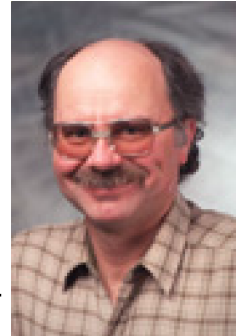
DOUG BIFFARD, Marine and Foreshore Ecosystems, February 20-21, 2004



Whether working, spending time with his family, or enjoying pursuits such as diving and kayaking, the theme of DOUG BIFFARD's life has been water. Doug began his working life as a commercial fisherman and diver. Deciding that he needed to know more about the marine environment, he enrolled at Malaspina College (Nanaimo) in the Fisheries and Aquaculture Program. After completing a 3-year diploma, Doug and his family moved to Desolation Sound where they farmed oysters and salmon. When the shine left the salmon aquaculture industry, Doug took employment with the Provincial Government in Smithers, B.C. Since then he has been actively involved with coastal environments and their people. Doug has experience with marine and aquatic issues including log dumping and storage, riparian protection, and management of floating camps and lodges. Doug now works for BC Parks where he is involved in the conservation of aquatic and marine environments.

RICHARD HEBDA, Freshwater Aquatic Ecosystems, March 5-6, 2004

RICHARD HEBDA is the Curator of Botany and Earth History at the Royal British Columbia Museum. He holds a Ph.D. in Botany from the University of British Columbia where he studied the paleoecology of bogs. One of Richard's big curiosities is how landscapes came to be and the clues that can tell us about their histories. He likes to time travel, through the study of paleoecology or what he calls "ecology on a big time scale." In addition to his work with the Royal British Columbia Museum, Richard teaches at the University of Victoria in the Departments of Biology and Earth and Ocean Sciences and in the Restoration of Natural Systems Program. He is a prolific writer and enjoys translating scholarly literature into the public realm. His research interests include the long-term history of British Columbia's ecosystems and their relationship to climate change. Wetland and lake ecosystems, because of their sediment records, have been the focus of many of his studies.



GEOFFREY SCUDDER, Landscape Connections, March 19-20, 2004



GEOFFREY SCUDDER is a Professor Emeritus at the University of British Columbia, having served as Head of the Department of Zoology (1976-1991) and Interim Director of the Centre for Biodiversity Research (1993-1995). He has special interests in entomology, biodiversity and conservation biology. From 1968-1999 he had a seasonal residence at Spanish Hills on Galiano Island. While here, he discovered several rare insect species in the Bodega Ridge area including a previously unrecorded species of seed bug on the Manzanita shrubs. This species was recently described in the *Journal of the New York Entomological Society* and is now called *Tupiocoris killamae*. Geoffrey is now involved in conservation area design and the identification of landscape connections in the southern interior of B.C. He serves on the Board of Directors of the Nature Trust of British Columbia and is on advisory committees for Environment Canada and the B.C. Ministry of Water, Land and Air Protection.

Registration Form (Cont.)

Please indicate which workshops you would like to register for and return form by mail to:

Galiano Conservancy Association
RR#1, Sturdies Bay Road
Galiano Island, B.C. V0N 1P0

or, drop the registration form by our office which is located on Sturdies Bay Road in the house behind the bakery.

- Forest Ecosystems (Feb. 6-7)
- Garry oak Ecosystems (Feb 13-14)
- Marine and Foreshore Ecosystems (Feb 20-21)
- Freshwater Ecosystems (March 5-6)
- Landscape Connections (March 19-20)

Appendix II
UP-CLOSE Workshop Series: Notes from
Facilitated Discussions

The following is a summary of the results of the facilitated discussions that took place following the UP-CLOSE Workshop Series held on Galiano Island between February 6 and March 20, 2004. Discussion participants were asked to determine what was most valuable to them about Galiano Island's natural habitats. The habitats highlighted by the workshop series were forests, Garry-oak meadows, marine/foreshore areas and freshwater/aquatic areas. The final workshop was about landscape connections. Workshop participants identified six main areas of human values associated with local natural areas: resource use, ecological, aesthetic/spiritual, educational, recreational and historical/cultural. Details of what was important to island residents and property owners for each habitat are described below.

Forests

Resource Use

Forests on Galiano Island have been providers of food, medicines, building materials, firewood, clean air and water, jobs and monetary profits. Each of these items has been highly valued by Galiano residents and property owners. Use of the forest to meet human needs ranked as one of the top three values for most workshop participants.

Human uses of the forest, as determined by a workshop group, could be divided into 3 categories:

- 1. *Personal/Household:*** Personal/household uses included such things as trees for building materials and firewood, mushrooms/berries/herbs for consumption and medicinal purposes, shrubs for flower arrangements and wood for carving.
- 2. *Economic:*** Economic uses include any uses of forest products for sale in exchange for money. Typically on Galiano Island these have been timber sales, either of whole logs or milled lumber. They also include herbal tinctures, salal branches for florists, firewood sales, artistic wood carvings and the sale of wood furniture and functional items (eg. cutting boards). Employment of individuals throughout these industries is also an economic benefit to Galiano residents and property owners.
- 3. *Nature Services:*** The term "nature services" refers to the ways in which nature benefits human beings without being manipulated. Nature services on Galiano Island include such things as water purification, air purification, and shade for temperature and glare reduction. These services are not usually measured economically or used directly. Nevertheless, they are seen as huge benefits by people on Galiano.

Ecology

Residents and property owners on Galiano Island rated ecological health as one of their top 3 values for the island's forest ecosystems. They saw healthy forest ecology as a benefit to more than creatures and plants. There was a personal significance. Of importance were:

- 1. *Forests as Habitats for Animals and Plants:*** Homes for animals and a variety of plants were important components of forests for workshop participants. The perception of being a part of the ecosystem and of forests being part of a human habitat was also important for islanders.
- 2. *Age of Forests:*** Because of their rarity and great age, the old forests on Galiano Island were of great importance to workshop participants. There were also feelings of awe and respect for the life expectancy and life cycle of trees on Galiano. Workshop participants were particularly captivated by the notion of a tree's lifecycle extending beyond its standing life to its existence as a piece of woody debris on the forest floor for a period equal to its living life.

3. **Quantity and Diversity of Life:** The idea of being surrounded by life was also very important. Participants felt that a variety of species in reasonable numbers were also essential.
4. **Forest Cycles:** Forest cycles were discussed by workshop participants. They saw life cycles and element cycles (oxygen and water) as symbols of the connections between all life. In particular, these cycles highlighted the connection of humans to forest ecosystems and served as a reminder that people are a part of natural systems.

Aesthetic / Spiritual

Along with ecology and human uses, aesthetics and spiritual services were seen as a part of the top three values associated with forest ecosystems on Galiano Island. These values were defined as follows:

1. **Aesthetic:** For workshop participants, aesthetic values were about more than appearance. They included melodic sounds, fragrant smells, brilliant and soft colours, and a variety of shapes and textures. No single forest aesthetic was described as beautiful. However, the major examples of a valuable forest aesthetic included: bird songs, dappled light (ie. through tree boughs), the smell of damp earth and soil, old trees, lush, green vegetation, and soft mosses and forest floors.
2. **Spiritual:** Forest ecosystems, like many of the other ecosystems in this report, were spiritual places for most workshop participants. Spiritual places were perceived as a necessity for mental health and were seen as contributing to building/maintaining good interpersonal relationships and healthy working habits among local residents and property owners. Forest qualities that fostered spiritual health included quiet, peacefulness, stillness, privacy, space, and perception of mystery and of being a part of nature and the greater whole. Workshop participants also felt that time spent in forests established in them a sense of belonging, place and connection.

Education

Galiano residents and property owners saw forest ecosystems as an effective outdoor classroom for young and old. In particular, forests were appreciated as indicators of the source of many products that humans use, as teachers of how the natural world works, and as trainers of young people for future careers. The theme of education was isolated as important in itself, but was also seen as an important part of other values. For example, a forest ecosystem might be used to teach young people about ecosystem values or it might be used to teach about places to collect wood for carving or roots for medical tinctures.

Recreation

Forests on Galiano Island offer recreational opportunities that are valued by local residents and property owners. Recreation is seen as important for physical fitness, fun, and maintaining a peaceful and balanced lifestyle. Recreational activities of particular importance were walking, running, bird watching, camping, trailmaking, bicycling and play, among others.

Historical / Cultural

Historically the forests of Galiano Island have been used to support First Nations tribes and many of the early pioneer families. The historical and cultural patterns of using the forest were particularly strong for many workshop participants. Many people felt that encouraging the use of the forest, while protecting ecological values, was important for both individuals and the community of Galiano Island.

Garry Oak Meadows

Resource Use

Workshop participants considered Garry oak ecosystems providers of high quality “space”. Due to the openness of Garry oak meadows and their frequent southern exposure they were determined to be ideal house sites by some workshop participants. The herbaceous/meadow quality of Garry oak sites was also appealing as a place to graze livestock such as sheep and goats.

Ecology

A healthy Garry oak ecology was of high importance for most workshop participants who saw the rarity of Garry oak meadows and associated animal species as a compelling reason to value and protect them. Galiano residents and property owners participating in the workshop series found the preservation of wildflowers, rare butterflies and rare insects as particularly important. To preserve native plant and animal varieties, removal of invasive species was deemed important. Work to remove invasives was also considered as a source of potential employment for island residents.

Aesthetic / Spiritual

Garry oak meadows were considered particularly appealing due to their sunny, open qualities and their access to ocean views. In the spring, the colours of the wildflowers were described as aesthetically pleasing as were the gnarled shapes of the trees themselves. Several workshop participants commented on the value of Garry oak meadows for artistic inspiration especially for painting, drawing and photography. Spiritually, the sunny qualities of the meadows were equated with hope and optimism, while the Garry oak trees were suggestive of tenacity and perseverance. Workshop participants found spiritual value in being able to link positive human qualities with the natural aspects of Garry oak meadows. Garry oak meadows were also considered good places to meditate.

Education

Garry oak meadows were seen as important sites for education of young and old due to their rarity. Workshop participants felt that education about what makes Garry oak ecosystems important in this area was essential for their protection. Not only the rarity of Garry oak ecosystems, but also their uniqueness in Canada, makes them perfect topics for landowner outreach and education programs. Workshop participants felt that it was important to raise awareness about Garry oak ecosystems, especially among those with Garry oak on their properties.

Recreation

Workshop participants enjoyed Garry oak areas as camping sites and sunny picnic spots. They engaged in a variety of recreational endeavours including horseback riding, walking, hiking, stargazing, birdwatching, and photography. To enable these activities to take place, trail building was considered another potential activity. Garry oak areas were considered attractive recreational areas due to their openness of space, their sunny nature and their unique flora and fauna.

Historical / Cultural

Garry oak meadows were historically used by First Nations for food collection and cultivation. The bulb of *Camassia quamash* (Camas) was a known food source in this area. Whether Galiano’s Garry oak meadows were used for this purpose or not is unknown. However, the idea that ancient peoples may have used Garry oak sites on Galiano for food gathering and cultivation made Garry oak meadows important sites in the eyes of workshop participants.

Marine / Foreshore

Resource Use

Surrounded by water, the residents, visitors and property owners of Galiano Island see the ocean as a great source of human utility. This utility can be divided along the following lines:

1. **Personal use:** For most island residents and property owners the ocean is a source of food. People on Galiano enjoy fish, scallops, oysters, clams, mussels, seaweeds & algae, and crabs. It is important to them that they be able to harvest and consume these foods without getting sick, therefore environmental health of the ocean is vital. However, people on Galiano also value access to the ocean including access via personal residences, public and private docks, and public beach accesses. Building near the ocean is common. Construction often includes the building of septic systems to service homes as well as breakwaters and retaining walls to prevent erosion of shorelines.
2. **Income generation:** Income from the marine environment on Galiano Island is gained through harvest of ocean resources and tourism activities. Fishing, harvesting of shell fish, and commercial diving for scallops are common. Residents of Galiano are also involved with the marine tourism industry, especially throughout the summer months. Tourist amenities include whale watching tours, kayaking, a marina, boat rentals and tours and fishing tours. All of the income generation activities are valued for their ability to support the island way of life.
3. **Transportation:** One of the most important uses of the ocean for island residents, property owners and visitors is as a method of transportation. Most people arrive at Galiano via ferry. Island residents use the ferry to access many services including health care and government services and many of the goods available on Galiano arrive by ferry. Adequate ferry services were a valued use of the marine/foreshore area.

Ecology

The diversity of marine life on Galiano was of great value to workshop participants. In particular, the accessibility of marine invertebrates and other creatures at low tides, the numerous shore birds and the ever-present marine mammals (seals, whales, river otters), and shoreline wildflowers were highlights of a visit to the seashore. To maintain the quality of the marine and foreshore environment, workshop participants felt that a healthy relationship between land and water was of importance. They also enjoyed observing the relationship between the shore and the ocean, for example the weathering of rocks and the record of geological processes at the interface. On a larger scale the ocean was deemed important for creating the temperate climate that is enjoyed on the West Coast of British Columbia and for creating dynamic change. Because of the value placed on marine ecology, concerns were expressed over the lack of protected areas in the marine environment.

Aesthetic / Spiritual

Workshop participants emphasized the importance of the ocean and the foreshore as spiritual and aesthetically pleasing places. The light, open nature of the seashore was felt to be uplifting, freeing and invigorating. The dynamic, ever changing characteristic of the ocean was an inspiration for artistic endeavours including painting, photography, and the writing and playing of music. The salt smell of the water, the regular sounds of the waves, the textures of the seawater and the beach contributed to people's sensual experience of the marine ecosystem. Additionally, the influence of the moon on the tides and the obvious connection between the tides and the intertidal life emphasized a feeling of connection between all things in the natural world. This sense of connection was very important to workshop participants. It was also important that residents, visitors and property owners be allowed to experience the ocean and the foreshore through access to marine areas. The public ownership of the foreshore in Canada was highly valued for providing this access.

Education

Accessibility of the foreshore and marine environments was also of high value for educational opportunities for young people and adults. Marine life was perceived as ideal for the study of life processes among invertebrates and marine plants and algae. The foreshore/marine environment was also seen as a good teacher of principles of connectivity and nutrient cycles, especially through studies of interactions between land and ocean, and of geological processes. Learning about nature and connections within nature was considered valuable amongst workshop participants.

Another highly valued aspect of marine education was the passing on of historical knowledge to the present about uses of the ocean environments. For example, how to harvest foods from the ocean, the use of algae for fertilizer, and how to safely use the ocean as a transportation highway.

Recreation

Important recreational activities on Galiano are tied to the valuation of health and fitness, relaxation, and exploration. Physical activities that are important to residents and property owners on Galiano Island include swimming, kayaking, sailing, boating, walking, dog walking, fishing, scuba diving and snorkeling, water sports (eg. water skiing), and cliff jumping. Those supporting mental health and relaxation include reading, sunbathing, daydreaming, building sandcastles and collecting shells and pebbles. The foreshore and marine areas are also places to explore and find mystery. Residents, visitors and property owners enjoy stargazing, bird watching, whale watching (although this is somewhat controversial), botanizing, and intertidal exploration. All of these activities are tied very intimately to the accessibility of shorelines and areas that are compatible with desired shoreline uses.

Historical / Cultural

Culturally beaches and shorelines on Galiano Island are used today as places to congregate for picnics and social events. Historically they have been used as temporary village sites, as ceremonial sites, and as food gathering sites by local First Nations peoples. Workshop participants indicated that they felt that beaches and shorelines were valued as current gathering places. They also emphasized that they felt First Nations sites should be preserved.

Freshwater / Aquatic

Resource Use

The most emphasized value for freshwater ecosystems was their importance in maintaining water quality and water storage capacity for island households businesses and gardens. Storage capacity is enhanced by encouraging areas of standing water while water quality is maintained by preventing waterborne pollutants from entering watercourses and groundwater. Maintaining this value is often at odds with other valued uses of wet areas, such as agriculture and housing development, which often require ditching and draining of wetlands. Many agricultural areas on the island have at one point been wetlands and a few are returning to this state. Wet areas provide moisture and are often rich in nutrients for increased plant growth. The building of houses and the development of infrastructure such as roads in wetland areas is also common as many properties and requires the in-filling or draining of wet areas. Workshop participants agreed that water quality and quantity was of the utmost importance, but many also saw agricultural sites in wet areas and the right to build on a wet site as important values held by some islanders.

Other uses of freshwater sites included the gathering of pond weeds and plants for garden fertilizer and for transplanting in household ponds. Many people also valued wetlands, creeks and ponds as sources of water for direct use on gardens and for gathering food plants like salmonberry and Labrador tea.

Ecology

Most workshop participants felt that all natural freshwater ecosystems on Galiano Island, because of their rarity and due to the scarcity of water in the summer months, were very valuable and should be respected. Ecologically, areas of standing water were considered valuable as watering holes for birds, frogs, and other animals. Freshwater ecosystems, such as inland lakes and wetlands, were observed to be refuge areas for birds during times of nesting and mating as well as during ocean storms. They were also important for their use in the lifecycle of many insects, including dragonflies. Concerns were raised about wetlands being rearing grounds for mosquitoes and mosquito transmitted diseases, but it was generally felt that a balanced wetland ecosystem would contain predators to control populations. Therefore, healthy freshwater ecosystems were considered important. To maintain water levels in freshwater ecosystems, workshop participants felt that a healthy beaver population was very important, although many complained of beaver logging in their yards or neighbourhoods.

Aesthetic / Spiritual

Areas of freshwater on Galiano Island were felt to be alive by workshop participants. Valuable attributes of freshwater areas included the sounds of birds, frogs, wind and moving water and the wildness, inaccessibility and mystery associated with wet areas. Most workshop participants found the presence of water in natural areas to be inspiring artistically. Places with surface water were considered good areas for reflection and meditation. Many felt a strong sense of place when around water, which included feelings of calm and peace. Wet areas were also seen as examples of the cycles of change and impermanence of living areas. One workshop group identified wetland areas as places where nature was at its best.

Education

Freshwater areas were viewed as excellent and important outdoor classrooms. Programs with Galiano's Community School which included salmon egg hatch and release projects were seen as very integral to the curriculum of island students. Freshwater ecosystems were viewed as particularly important for science curricula including insect, frog, fish, water quality and bird topics. Observation of these creatures and processes in a natural setting was viewed as an important part of any child's education.

Recreation

Recreational values associated with freshwater areas on Galiano Island were more limited than for other natural areas. Workshop participants valued access to wetland areas for canoeing and kayaking. They also enjoyed hikes and walks that included some access to freshwater areas for birdwatching and the observation of wildlife. Some mentioned that they also enjoyed the occasional swim in a pond or lake. There was a strong feeling that access to freshwater areas should not adversely effect their ecology.

Historical / Cultural

Very little was mentioned about the historical/cultural values associated with wetlands. Workshop participants were aware that many wetlands on Galiano Island had been drained for agriculture. There was some curiosity as to the potential of using wetland areas for agriculture without damaging ecosystems. Raft agriculture, where plants floated on raft-like beds to take advantage of wetland nutrients and water, was mentioned as were small, intensively cultivated, raised beds in wetland areas.

Landscape Connections

The first four UP-CLOSE Workshops were about specific landscapes: forests, Garry oak meadows, aquatic / freshwater, and marine / foreshore. Throughout these workshops, however, there was a general feeling that isolating these landscapes, as if they had no connection to one another, provided an incomplete perspective of Galiano Island's landscape as a whole. Therefore, landscape connections were broached and discussed at each workshop becoming the topic of the last UP-CLOSE session.

Workshop participants felt that all of Galiano's ecosystems were linked either by something that traveled through several landscapes or by contact at their edges. These connections were felt to be important to the Galiano landscape. Examples of connections highlighted at the UP-CLOSE Workshops included:

Water: Water connects terrestrial, freshwater and marine landscapes because of its presence and flow throughout all ecosystems. Water carries components of one ecosystem to another. For example, nutrients from the forest are carried in rainwater over top of and through forest soils to streams and wetlands. This messenger-like quality of water can be both a benefit and a cost to ecosystems at the end of its path. For example, according to some workshop participants, the flow of water connecting the land to the ocean can be problematic when water passes through faulty septic systems picking up and concentrating nutrients which are deposited in marine ecosystems. This nutrient deposition can result in unusual algae blooms which can cause problems for other organisms.

Climate: Different island landscapes were believed to affect one another by way of climate effects. The most dramatic example of this cited during the workshop series was the effect of the ocean on the land. Many coastal forests, woodlands and aquatic ecosystems owe their moderate climates to the presence of the marine environment which helps keep summers relatively cool and winters mild. Other climate connections mentioned in workshop discussions include the cooling of streams and water bodies by the shading action of forests and the effects of trees as windbreaks calming inland waters. Shaded and calm bodies of inland water offer refuges from sun and storms for many animal species.

Non-human Animals: Workshop participants were quick to note that animals, having the capacity of movement, were important connectors of island landscapes. Not only do they feed, drink, sleep, bear young and breed throughout the various island ecosystems, but they also move nutrients and seeds throughout the landscape. Animal feces are important to moving nutrients from one place to another as is the death and decay of an animal. Birds and mammals also move plant seeds from one place to another in their feces and on their bodies. Having diverse habitats to support these animals was felt to be important by workshop participants.

Human Beings: Human beings were also viewed as connectors of landscapes. In this capacity, however, humans were seen as having largely a negative effect on ecosystems. Many highly invasive species, such as Scotch Broom and English Ivy were brought to Galiano Island by human beings or via human actions. Human beings have also disturbed some of the important landscape connections through the development of land that connects different ecosystems as well as through the introduction of unnatural items to local ecosystems. For example, clearcut logging of steep slopes adjacent to wetlands or bodies of water, often results in deposition of unnatural levels of sediment in these waterways. Despite observing these negative connections, however, most workshop participants felt that the human relationship to the landscape had the capacity to become a more positive experience for both people and the places in which they live and work.

The idea of "Landscape Connections" not only has the connotation of connections between landscapes, but also stresses the connection between people and nature. Throughout the workshop series, discussions

about the value of natural areas to residents and property owners of Galiano Island yielded information on the links between human beings and the land. Because of a desire to encourage these links, workshop participants often discussed the balance between overlapping values. Issues that were frequently discussed included:

1. ***Use vs. Overuse of Natural Resources:*** For many workshop participants, emotional connection to the landscape was enhanced with the use of natural resources. Valued usage of natural resources included both personal/household uses and economic uses. However, workshop participants felt that the boundary between use and overuse of natural resources needed to be evaluated and reevaluated periodically. For many, the distinction between use and overuse of a resource required both personal reflection and collaborative community agreement.
2. ***Access vs. Restricted Access to Natural Areas:*** Like the issue of usage of natural resources, access to natural areas was believed to enhance feelings of connection to Galiano's natural environment. However, workshop participants generally felt that there were natural areas that should not be made accessible to people. These areas might be sensitive ecosystems containing rare species or dangerous landscapes. The feeling of the workshop group was that access to natural areas should be encouraged and facilitated, but that the negative effects of providing access to a natural area should be properly assessed and minimized. Assessment of potential negative effects might result in a decision not to provide access to a particular area.
3. ***Value of Mystery and Emotional Connection to the Land vs. Scientific Knowledge:*** A frequent discussion during the UP CLOSE Workshops centered on the value of mystery and wonder in people's emotional connection to the land. Most workshop participants felt that a sense of mystery and wonder was as important as having an academic or scientific knowledge of a natural landscape. Nevertheless, available education about natural landscapes, their components and how they work was felt to be important for both young and old.
4. ***Desire to be a Part of Nature vs. Desire to Live Outside of Nature:*** The desire to live more closely with nature was evident in the wishes of workshop participants. However, the convenience and comfort associated with modern households was also valued. Most workshop participants felt that the effect of the modern household on Galiano's ecosystems needed to be considered and, where possible, the negative ramifications of modern lifestyles needed to be mitigated. A general desire for education on how to create homes and lifestyles that meshed and fit in with Galiano's ecosystems was expressed.

Appendix III
Information Articles from the Local Galiano
Island Magazine “*The Active Page*”

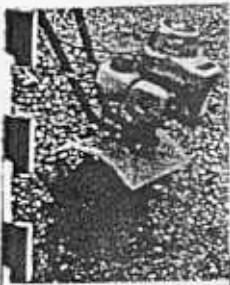
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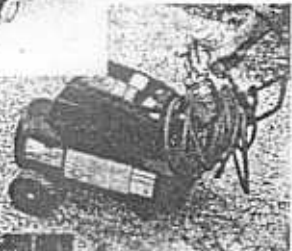
Cement
Mixer



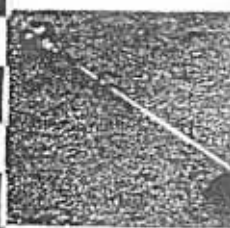
Wet & Dry
Vacuum with
Blower



Power
Mowers



Power
Compressor



Weed Wacker



Steam
Carpet
Cleaner
Vacuum



Rapid Load Weed Wacker



Chain Saw & Hedge
Cutter Attachments



RAPID
LOAD



22" Weed Wacker

Up-Close Coffee/Teahouses by Kate Emmings

Are you an expert on your own backyard? Do you know your favourite walk or stream like the back of your hand? If so, the Galiano Conservancy Association needs your help.

Since 1999 we've been working on a map of Galiano Island that identifies the island's different habitats. Habitats are spaces that wildlife use for shelter, food, water, living space, etc. An example might be a Garry oak meadow where deer graze or a lake or pond where birds bathe.

Island habitat boundaries have been developed using aerial photographs of Galiano. Many of the habitats were then verified through local knowledge and on-the-ground observations. However, some areas were mapped using only aerial photography and will include error. To reduce this error margin, your help and your expertise is needed.

Come and take a look at the habitat map and let us know what you think. What is it missing? What would you change? What is it you'd really like to see shown? While you're there have a cup of tea or coffee and a goodie and:

- Look at the place you live in 3-D using aerial photos and a stereoscope
- Find your favourite spot on the island on our computer mapping system
- See what other islanders know and like about Galiano by viewing some of the art pieces and community made maps from the Salish Seas Mapping Exhibit
- Take an Up-Close look at your own backyard in a warm and friendly place!

South End Hall - November 8, 2003

Times by Neighbourhood:

10:00 am - 11:15 am	Sturdies Bay
11:15 am - 12:30 pm	Sticks Allison
12:30 pm - 1:45 pm	Montague Harbour
1:45 pm - 3:00 pm	Murchison Creek /Georgeson Creek

Creek

North End Hall - November 15, 2003

Times by Neighbourhood:

10:00 am - 11:40 am	North End
11:40 am - 1:20 pm	Retreat Cove
1:20 pm - 3:00 pm	Ganner Creek

Galiano Activity Centre - November 22, 2003

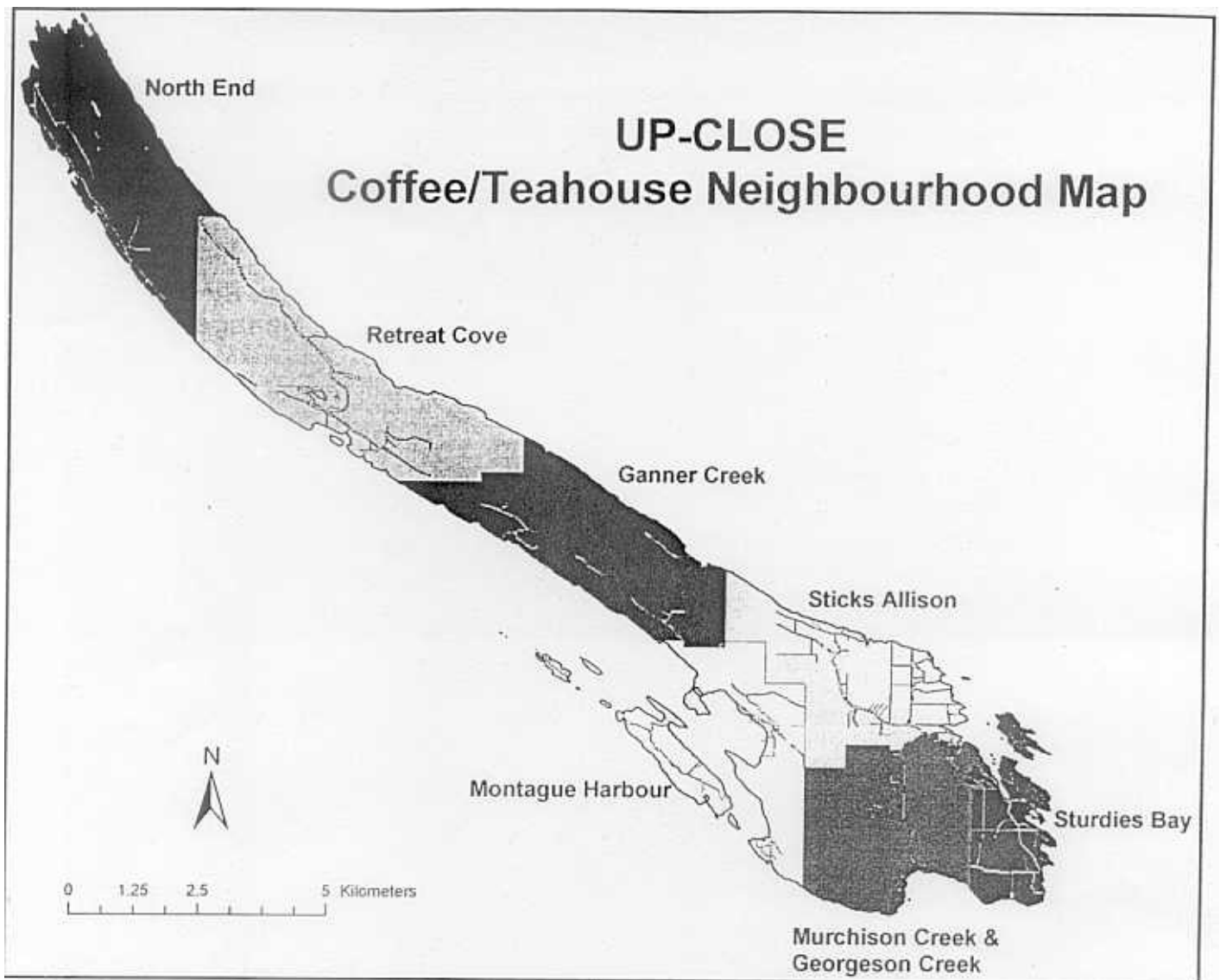
10:00am - 3:00pm	Island-wide
------------------	-------------

Please find your neighbourhood on the map next to this article. Neighbourhood times are only a suggestion for coffee/teahouse visits. If you cannot make your neighbourhood time, but would like to take a look at the habitat map, please come to any of the coffee/teahouses at any time.

For more information please call Kate Emmings at (250) 539-2424.

New Books in the Conservancy Library by Linda Millard

Brody, Hugh. **The Other Side of Eden: Hunters, Farmers, and the Shaping of the World**, North Point Press, New York, 2000. "A terrific read. In part a fascinating memoir of Hugh Brody's decades of living with and working on behalf of native hunting and gathering peoples; it is more importantly an examination of the ways in which freedom and intimacy with both family and location intersect in those cultures. Thus it offers us a model we ought to consider very seriously when setting out



to rethink our own acquisitive, confrontational, divisive, warlike, and destructive ways." —William Kittredge

"Penetrating meditations on traditional societies caught in the avalanche of modern times, and on the gentle infusion of the holistic vision, not only in regard to life and death, but in such quotidian concerns as good manners and the care of children. Wonderful!" —Peter Matthiessen

Ehrlich, Gretel. *Islands, The Universe, Home*, Penguin Books, 1991. Gretel Ehrlich's world is one of isolation and wonder, of pain and grace, and these elements ignite her vivid imagination. She writes of ravens and elk and prairie dogs, and eagles falling out of the sky. She tells of a voyage of discovery in northern Japan, where she finds her "bridge to heaven." She captures a "light moving down a mountain slope." One evening there is a contrapuntal dance of death: a calf she has tried to save, and a friend and mentor both die. Through these explorations, in prose that is supple and muscular and evocative, Ehrlich begins to understand her own longings, her own nature, and the relatedness of her life to the universe.

"Her essays, delicately combining interior and exterior exploration, are as spare and beautiful as the landscape from which they've grown....Each one is a pilgrimage into the secrets of the heart." —Andrea Barrett, *The Cleveland Plain Dealer*

Halpern, Sue. *Four Wings and A Prayer: Caught in the Mystery of the Monarch Butterfly*, Weidenfeld & Nicolson, London, 2001. The Rosario butterfly reserve in Mexico is filled with the murmur of fluttering butterfly wings; branches of the trees bowed to the ground with tens of millions of them; visitors become perches themselves and trample wings underfoot as if they were autumn leaves. This is one of only a dozen mountainsides high in Mexico's Transvolcanic Range, where nearly all the North American monarch butterflies east of the Rockies spend the winter after their remarkable 3000-mile, transcontinental journey. This book tells of the quest to trace the journey of the Monarch, the only creature to migrate in the way birds do. It flies north to south, from New York State to Mexico, at altitudes of up to 3,000 feet, dodging aeroplanes and predators. But unlike birds, the Monarch never makes the full loop; its destination is never where it began. Despite this, every butterfly has an innate sense of its route. For years scientists have been tracking this enigmatic creature and its journey, for whilst the monarch is familiar and common, it is also elusive. Its wintering site in Mexico was only discovered twenty years ago, after a 23 year search. In this elegantly written book Halpern weaves together the stories of people who have devoted their lives to the Monarch. It is also an exploration of the science of this fragile

Continued on page 20

**St. Margaret of Scotland Thrift Shop by Ena
looley. Publicity.**

The annual Lions Fiesta continues to be a bonanza for the Thrift Shop with a steady stream of satisfied customers coming and going. Volunteers manned the shop and outside venues all day.

The Thrift Shop has come a long way since its conception in the late 70's where a few ladies, members of St. Margaret's Altar Guild, sold a few clothes from a special room in the old store on Burrill Road. All proceeds at that time were given to the Church.

Now we have about 30 members, three of who work from 10am until 12noon each Friday and the same on Saturday. The stock handlers work over 30 hours per week.

At the end of the year the committee allocates all monies to various charities, in particular, funds are dispensed to Island charities. Last year the whole amount was given to the Galiano Health Centre enabling them to purchase a much-needed defibrillator. A fixed percentage is given to St. Margaret's.

The President thanks all donors for their continued support donations of good clean clothing, bedding and laundered children's clothing.

When donating china and glassware, please wash them beforehand, as we do not have washing facilities at the shop.

Thrift Shop hours are 10am until 12 noon, Friday and Saturday.

**Galiano Under a Microscope: Sharing Local
Knowledge by Kate Emmings.**

Maybe you've peered at a bug or a leaf under a microscope before, but what about a close up look at a whole island? How

would Galiano appear to your expert eye? What would be its defining features?

Each resident, property owner and visitor to this island will have a proficiency in a different locale or landscape of Galiano Island. Come and lend the community your knowledge and expertise in:

UP-CLOSE

Galiano Landscapes: What Do You Value? November 2003 - March 2004

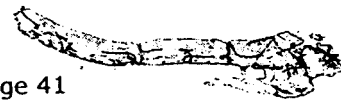
November will begin the UP-CLOSE look at our island landscapes. A new map of the entire island one and a half elephants long will bring every detail of the island's landscapes into sharp focus - that's an 18-foot-long map for those who are not familiar with the lengths of elephants. (See a reduced map sample adjacent to this article.)

Visit and comment on the map, by neighbourhood, in a coffee/teahouse setting at the North End and South End Community Halls during the month of November.

Dates for November coffee/teahouses will appear in November's Active Page and at notice boards all over the island during late October.

UP-CLOSE events will continue through the months of January - March with a series of workshops on Galiano Landscapes.

For more information about UP-CLOSE, check next month's Active Page or call/visit the Galiano Conservancy Association. We are located in the office behind the bakery and can be reached at 539-2424.



See Map on Page 41

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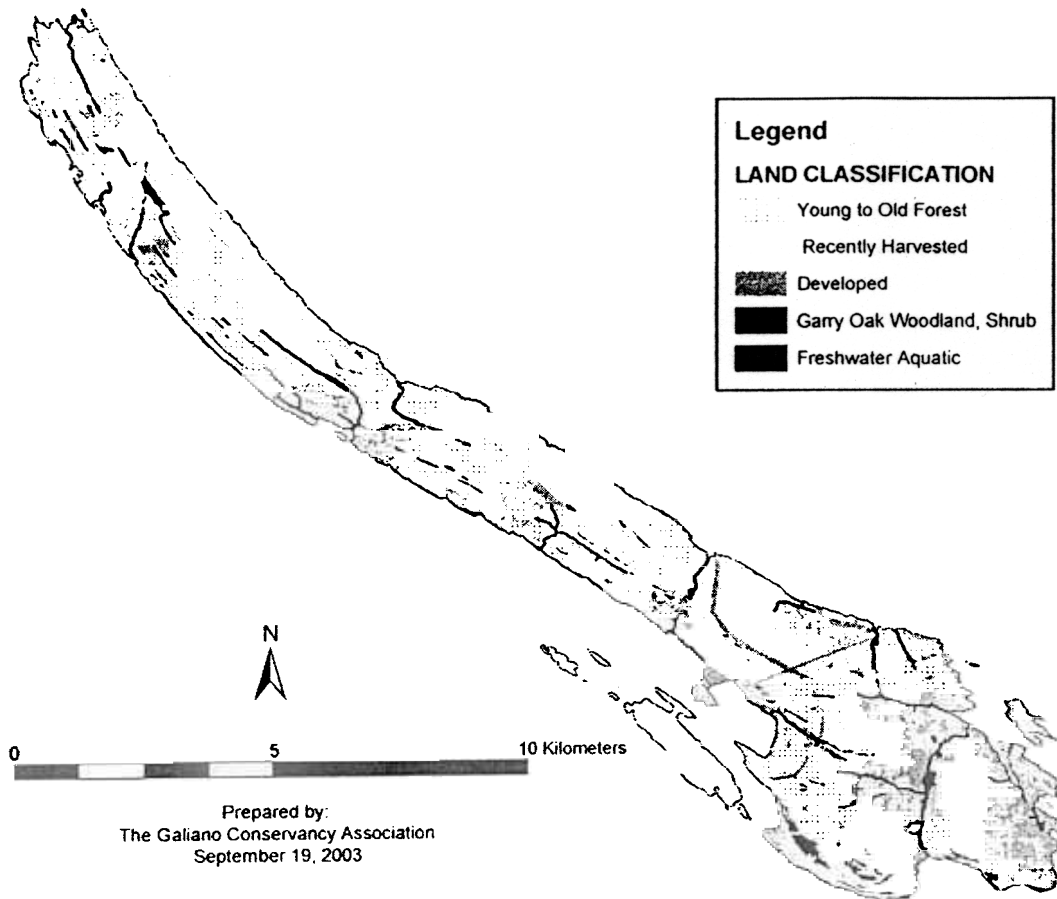
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180g Canned Albacore Tuna		
(Ingredients: Albacore Tuna Loin, Water)		\$4 p/can (\$90 per case of 24)

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A Simplified Galiano Island Habitat Map



As Christmas drew nearer
and evenings grew colder
Our stocks were so bare
that indecent exposure
did threaten to claim
our proprietresses -
Summer's guests stripped us
down past our dresses
But now we're replenished
with gifts, arts and crafts,
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and spare us from draughts.

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Up-Close Workshop Series Itinerary by Kate Emmings

From February 6 - March 21, 2004, five workshops will take place that highlight Galiano Island's many ecosystems.

The workshops will be structured as follows:

- Friday Evening: Guest speaker & hors-d'oeuvres
- Saturday Morning: Field trip to the ecosystem of interest with the guest speaker
- Saturday Afternoon: Lunch followed by a facilitated discussion about the values we associate with Galiano's habitats
- Food will be provided and childcare will be available free of charge upon request. Call 539-2424 for more information or to register.

February 6-7 - Herb Hammond, Galiano Forests

Herb Hammond is a forest ecologist and Registered Professional Forester with thirty years of experience in research, industry, teaching and consulting. He works extensively with rural and First Nations communities throughout Canada and around the world. Herb heads Silva Ecosystem Consultants Ltd., and is a founding director of the Silva Forest Foundation, a non-profit organization devoted to research and education in ecosystem-based conservation planning and management. Herb holds a Bachelor of Science in forest management from Oregon State University and a Master of Forestry from the University of Washington. He is the author of *Seeing the Forest Among the Trees: The Case for Wholistic Forest Use*.

February 13-14 - Emily Gonzales, Garry Oak Woodlands

Emily Gonzales is a PhD student at the University of British Columbia. She is studying how herbivores, exotic grasses and landscape fragmentation have led to the decline of Garry oak ecosystems. Emily first explored the Gulf Islands by bike with her mom when she was fifteen years old. After tackling its many hills, she and her mother decided on Galiano as their favourite island and recently purchased a home on Sticks Allison Road.

February 20-21 - Doug Biffard, Marine and Foreshore Ecosystems

Doug Biffard is a Protected Areas Ecologist working for the British Columbia Ministry of Water, Land and Air Protection. He has been actively involved in Marine Protected Areas planning. He has seen Galiano many times from boats and is looking forward to his visit to the landward side of the island.

March 6-7 - Richard Hebda, Freshwater Ecosystems

Richard Hebda is currently the Curator of Botany and Earth History at the Royal B.C. Museum and is an Adjunct Professor in the Department of Biology and School of Earth and Ocean Sciences at the University of Victoria. His interests include vegetation and climate history in B.C. and Lowland Mexico. He completed his Ph.D. in Botany at the University of British Columbia on a study of the vegetation and paleoecology of Burns Bog.

March 20-21 - Geoffrey Scudder, Landscape Connections

Geoffrey Scudder has a BSc in Zoology and a PhD in Entomology and has taught at the University of British Columbia in the zoology department since 1958. His personal and research interests include insect morphology and physiology, insect relationships with forests and the preservation of biodiversity.

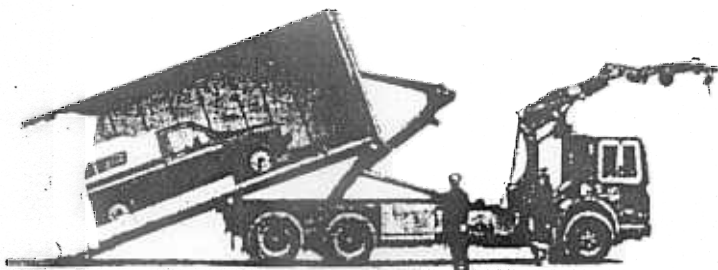


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Up-Close Workshops, February 2004 by Kate Emmings

February is supposed to be the month of love. So why not come out and share with your community why you love Galiano's ecosystems? Join us for a diverse set of workshops including guest speakers, field trips and a facilitated discussion. Clear your calendar February 6-7, 13-14, and 20-21 for the workshops listed below. Don't forget to come out on Valentine's Day for a row around Retreat Island and a walk through the Garry oak with Emily Gonzales!

February 6-7 – Herb Hammond, Galiano Forests, South Galiano Community Hall

Herb Hammond is a forest ecologist and Registered Professional Forester with 30 years of experience in research, industry, teaching and consulting. He is a leader in the development and application of ecosystem-based conservation planning and forest use, which he defines as the protection and ecologically responsible use of the forest through all scales of time and space. He works extensively with rural and First Nations communities throughout Canada and around the world. Herb heads Silva Ecosystem Consultants Ltd., and is a founding director of the Silva Forest Foundation, a non-profit organisation devoted to research and education in ecosystem-based conservation planning and management. Herb holds a Bachelor of Science in forest management from Oregon State University and a Masters of Forestry from the University of Washington. He is the author of *Seeing the Forest Among the Trees: The Case for Wholistic Forest Use* (Polestar Press), winner of the Roderick-Haig Brown B.C. Book Prize in 1992. He is currently finishing a handbook on ecosystem-based planning in the boreal forest. Herb is the 2003 recipient of the Gold Canadian Environment Award for sustainable living.

February 13-14 – Emily Gonzales, Garry Oak Ecosystems, South Galiano Community Hall

Emily Gonzales is an "introduced species" whose preferred habitat is the Gulf Islands. Born in Los Angeles, she was naturalised in Victoria and Vancouver and became a student of island ecology. Emily's M.Sc. was about the spread of the Eastern grey squirrel in B.C. and her current Ph.D. focuses on the contribution of herbivores, exotic grasses and landscape fragmentation to the decline of Garry oak ecosystems. She works out of the Centre for Applied Conservation Research at UBC where her interests include island biogeography, community ecology, restoration, introduced species and conservation ecology. Outside of academia Emily has worked as the Director of Science AL!VE, a science education organisation at Simon Fraser University, and in Environmental Education through the Stanley Park Ecology Society at Stanley Park. She is an avid fitness enthusiast and has been known to race triathlons and teach fitness in her spare time. Emily has recently bought property on Galiano Island and is looking forward to becoming involved in the Galiano community.

February 20-21 – Doug Biffard, Marine Ecosystems, Lions Hall (Friday evening), South Galiano Community Hall (Saturday afternoon)

Doug Biffard has almost always lived by the water. Whether working, spending time with his family, or enjoying pursuits such as diving and kayaking, water has always been the main theme for his life. Doug began his working life as a commercial fisherman and diver. Deciding that he needed to know more about the marine environment, he enrolled at Malaspina College (Nanaimo) in the Fisheries and Aquaculture Program. After

completing a three-year diploma, Doug and his family moved to Desolation Sound where they farmed oysters and salmon. When the shine left the salmon aquaculture industry, Doug took employment with the Provincial Government in Smithers, B.C. Since then he has been actively involved with coastal environments and their people. Doug has experience with marine and aquatic issues including log dumping and storage, riparian protection, and management of floating camps and lodges. Doug now works for BC Parks where he is involved in the conservation of aquatic and marine environments.

Times & Places

Lectures take place on Friday evenings at 7:30pm; we will try to wait for those coming off of the Vancouver evening ferry. Field trips will start at 9:30 except for the marine field trip, which will be scheduled, as much as possible, for the tides. Lunch will be between 12:30pm and 1:00pm and discussion groups will begin at 1 pm. Childcare is available upon request (5 days notice please).

Registration

Speaker lectures are open to the public. Field trips and facilitated discussions require registration.

To register call Kate at (250) 539-2424 or email galiano_conservancy@gulfislands.com

New Books in the Conservancy Library by Linda Millard

Ackerman, Diane. **The Rarest of the Rare: Vanishing Animals, Timeless Worlds**, Vintage Books, New York, 1995. "With the insatiable curiosity and lavish powers of description that have made her our foremost naturalist-poet, Diane Ackerman journeys in search of monarch butterflies and short-tailed albatrosses, monk seals and golden lion tamarin monkeys: the world's rarest creatures and their vanishing habitats. She delivers a rapturous celebration of other species that is also a warning to our own. Traveling from the Amazon rain forest to a forbidding island off the coast of Japan, enduring everything from broken ribs to a beating by an irate seal, Ackerman reveals her subjects in all their splendid particularity. She shows us how they feed, mate, and migrate. She eavesdrops on their calls and courtship dances. She pays tribute to the men and women who have devoted their lives to saving them. And on every page of **The Rarest of the Rare**, Ackerman conveys her passion to her readers, turning scientific reportage into an act of seduction." - From the back cover

BC Treaty Commission. **What's the Deal with Treaties? A Lay Person's Guide to Treaty Making in British Columbia** [Booklet and Video], BC Treaty Commission, Vancouver, 2002. The current BC treaty process began in 1990 when Canada, British Columbia and First Nations established the BC Claims Task Force to make recommendations on the scope of treaty negotiations, the organization and processes to be used, interim measures and public education. In its report the task force made 19 recommendations, which were all accepted by the three parties. Subsequently, First Nations, Canada and British Columbia signed an agreement in September 1992 to establish the BC Treaty Commission. The BC Treaty Commission Agreement is supported by federal and provincial legislation and by a resolution of the First Nations Summit. In 1993 the Treaty Commission began receiving Statements of Intent from First Nations wanting to negotiate a treaty with Canada and British Columbia. The issues being addressed in treaty negotiations are complex and sometimes contentious. The Treaty Commission has tried, in

UP-CLOSE Workshops: What Does Galiano Value? by Kate Emmings

What do people on Galiano value about the island's natural landscapes? In early February, 26 individuals answered this question for Forest and Garry oak ecosystems. This is a sampling of what they had to say.....

Forest Values (February 7):

- Peace & quiet
- Economic diversity: tree products and employment
- Beauty and aesthetic characteristics
- Education possibilities
- Health (ecosystem services): clean air, clean water, water retention, foods
- Spiritual places
- Recreation: trails and forest access

Garry Oak Values (February 14):

- Beauty: light, open, flowers
- Rare ecosystems
- Habitat for animals, insects, plants
- Rich history: cultural (First Nations uses)
- Viewscapes
- Spiritual places: light, etc. = optimistic/hopeful/inspiring
- Recreation: picnics, viewscapes

These values were distilled in the forest workshop into core values such as:

Core Values of Workshop Participants:

- Human Health (physical): Human health is important as it allows for the pursuit of other important life goals.
- Human Health (spiritual): Spiritual health is important because it fosters good relationships with self, other individuals and community.
- Ecosystem Health: Ecosystem health is important because it helps to sustain other core values and because it is seen as a form of life in itself.
- Connection/Belonging (use of natural areas for sustenance): Use of natural surroundings for shelter/food/other uses is important because it provides employment and implies a connection to surrounding systems, i.e. a sense of belonging to them.

Workshops were well attended and enjoyed by participants not only as ways of learning about natural areas from guest speakers, but also as means of meeting and conversing with island residents. The next few workshops will look not only at what we value, but also at how we can continue to support and encourage what is important about the natural landscape on the island. A marine workshop will be held at the end of February and two workshops in March will conclude the workshop series.

March Workshops:

- Richard Hebda, Aquatic Ecosystems
- March 5, 7:30 pm at South End Hall (evening lecture, open to the public)
- March 6, 9:30 am at Laughlin Lake (please register)
- March 19-20: Geoffrey Scudder, Landscape Connections
- March 19, 7:30pm at Lions Hall (evening lecture, open to the public)
- March 20, 9:30 am at Bodega Ridge trail head (please register)

Information gathered from these workshops will be compiled in a report that will accompany the Galiano Island Landscape Classification. It will be made available to all residents, property owners and organizations on Galiano Island.

Everyone is encouraged to attend lectures, field trips and workshop sessions. All viewpoints are welcome! To register or for more information call Kate Emmings at 539-2424.



Appendix IV
Galiano Island Landscape Classification
Metadata: Definitions of Mapping Terms

Meta Data Set Name: Landscape Classification – Galiano Island, BC

1. Identification Information

Files: Land Class april04.shp
Land Class april04.shx
Land Class april04.dbf
Stream.shp
Stream.shx
Stream.dbf
Canal.shp
Canal.shx
Canal.dbf

1.2 Description

1.2.1 Abstract

Core components of the project include the creation of a 1:5,000 scale Landscape Classification of Galiano Island, an ecological analysis of the geographic data, and a community-based process for building consensus on conservation values and priorities. The Landscape Classification is an interpretation of the current ecological state of Galiano Island. All forested, aquatic, natural non-forested and developed areas have been mapped forming a contiguous cover of Galiano's entire 6000 hectare landscape. The Landscape Classification is interpreted from, or includes, the following sources of data:

- May 20th, 1998 colour aerial photography, (flown at 1:15,000 scale)
- May 20th, 1998 georeferenced and orthorectified colour aerial photography (1m pixel resolution)
- 2002 black and white orthophoto (0.5m pixel resolution) (Islands Trust Fund /Capitol Regional District)
- 1997 black and white aerial photography (flown at 1:10,000 scale)
- July 30th, 2000 Landsat 7 ETM+ satellite imagery
- Forest Cover and Road maps – 1:20,000 scale (MacMillan Bloedel, 1987)
- Forest Management Plan for LOT 8, Galiano Island (H.A. Forest Management LTD, 1992)
- Forest Management Plan for LOT 51, Galiano Island (H.A. Forest Management LTD, 1992)
- Galiano Stream and Wetland Project (Galiano Conservancy Association, 1999-2001)
- Galiano Forest Restoration Project (Galiano Conservancy Association, 2001)
- Laughlin Lake Management Plan (Galiano Conservancy Association, 2002)
- Pebble Beach Reserve Management Plan (Galiano Conservancy Association, 1998)
- Base Line Inventory, District Lot 44 (Galiano Conservancy Association, 2002)
- Sensitive Ecosystems Inventory (Environment Canada/BC Conservation Data Centre, 1992-97)
- Terrain Resource Information Management Program (TRIM) road and contour data (Province of British Columbia, Ministry of Environment Lands and Parks, Geographic Data BC, 1997)

All mapped polygons are greater than or equal to 0.01 hectares in area. Overall the map is accurate to a 1:5,000 scale, although specific areas of the island have been classified at a larger scale with greater detail and adapted according to the classification scheme used for this project.

The vast majority of data was interpreted directly from the 1998 air photography and orthophoto. Interpretation was aided by the extensive ground-based local knowledge of the mapper. In addition, approximately 25% of the total mapped area was verified through project specific ground-truthing. Polygon types and boundaries were adjusted according to Global Positioning System surveys and on the ground revisions to field maps. Data describing dominant vegetation and site characteristics was collected for over 25% of all groundtruthed polygons, the rest were simple visual inspections. Groundtruthing data was completed specifically for this map and also includes data from several recent inventory initiatives.

The landscape classification was made available to local residents and property owners through a series of three open houses on Galiano Island. A total of 135 people attended the open houses, verifying the accuracy of the landscape classification and identifying incorrect data.

The landscape classification will undergo analysis to identify areas of high conservation value based on ecological and geographic attributes. The analysis will contribute to a public process that will combine science based information with community based values to determine priority areas for conservation.

Documentation of the project will provide government agencies, non-government organizations, and individuals with the means to achieve the conservation goals of the Galiano Community.

1.2.2 Purpose

- To provide reliable science based geographic information and a clear and effective communication of community-held environmental values and priorities.

1.3 Time period of content: 1998 - 2003

1.4 Status

1.4.1 Progress

- Complete

1.4.2 Maintenance and Update Frequency

- Data updates are intended to occur at five-year intervals.

1.5 Geographic Extent

1.5.1 Description of Geographic Extent: Galiano Island, Gossip Island

1.5.2 Bounding Rectangle Coordinates

1.5.2.1 West Bounding Coordinate: -123.60

1.5.2.2 East Bounding Coordinate: -123.30

1.5.2.3 North Bounding Coordinate: 49.03

1.5.2.4 South Bounding Coordinate: 48.84

1.6 Keywords

1.6.1.1 Theme Keyword Thesaurus: none

1.6.1.2 Theme Keyword: Landscape Classification

1.6.1.3 Theme Keyword: Terrestrial Ecosystems

1.6.1.4 Theme Keyword: Aquatic Ecosystems

1.6.2.1 Place Keyword: Galiano Island

1.6.2.2 Place Keyword: Southern Gulf Islands

1.6.2.3 Place Keyword: Georgia Basin

1.7 Access Constraints: None

1.8 Use Constraints: Any party using or manipulating the 1:5000 scale Landscape Classification of Galiano Island (Galiano Conservancy Association, 2003) must notify the Galiano Conservancy Association of its intended use and acknowledge the Galiano Conservancy Association in any display or presentation of the data.

1.9 Point of Contact

1.9.2 Contact Person Primary: Keith Erickson

1.9.2.1 Contact Person: Ken Millard

1.9.2.2 Contact Organization: Galiano Conservancy Association

1.9.3 Contact Address: Keith Erickson

1.9.3.1 Address Type: Mailing

1.9.3.2 Address: RR#1 Sturdies Bay Road

1.9.3.3 City: Galiano Island

1.9.3.4 State or Province: BC

1.9.3.5 Postal Code: V0N 1P0

1.9.3.6 Country: Canada

1.10 Native Data Set Environment: Arc View GIS

2 Data Quality Information

2.1 Attribute Accuracy

2.1.1 Attribute Accuracy Report: 1 : 5,000 scale

2.2 Completeness Report: The dataset is complete for Galiano Island, Parker Island, Gossip Island

2.3 Positional Accuracy:

2.3.1 Horizontal Positional Accuracy

- 2.3.1.1 Horizontal Positional Accuracy Report: Streams and Wetlands (GPS) – (+ or - 10m)
- 2.3.1.2 Vertical Positional Accuracy: N/A
- 3 Spatial Data Organization Information
- 3.1 Direct Spatial Reference Method: Vector
- 4 Spatial Reference Information
- 4.1 Horizontal Coordinate System Definition:
 - 4.1.1 Map Projection Name: Geographic
 - 4.1.2 Grid Coordinate System Name: Decimal Degrees
 - 4.1.2.1 Datum: WGS 80
 - 4.1.2.2 UTM Zone Number: N/A
- 5 Entity and Attribute Information
- 5.1 Overview Description: Landscape Classification
 - 5.1.1 Entity and Attribute Overview: See complete classification table in Appendix I of this document
 - 5.1.2 Entity and Attribute Detail Citation: See complete classification table in Appendix I of this document
- 6 Distribution Information
- 6.1 Distributor - digital Arc View files / Paper Maps
 - 6.1.1 Contact Organization: Galiano Conservancy Association
 - 6.1.2 Contact Person: Ken Millard
 - 6.1.3 Contact Address: RR#1 Sturdies Bay Road
 - 6.1.4 City: Galiano Island
 - 6.1.5 State or Province: British Columbia
 - 6.1.6 Postal Code: V0N 1P0
 - 6.1.7 Country: Canada

APPENDIX I: Classification Scheme

NATURAL ECOSYSTEMS - Landscape units with little or no human development. In the Trust Area these are usually rare and/or fragile ecosystems

CLASS	SUBCLASS
OF – Old Growth Forest Large patches of forest that have not been subject to recent human disturbance (in the last 150 years). Areas display a wide variety of tree sizes, spacing and age. Old veteran trees comprise a major component of the site. Characterized by large dead standing and dead fallen trees of varying states of decay, canopy gaps, understory patchiness high organic matter accumulations, and multiple canopy layers. Average tree age of the dominant canopy is 250 years or more.	co – Conifer: > 75% of tree cover is coniferous
	mx – Mixed: mixed with broadleaf component > 25%.
MF – Mature Forest Large patches of forest where old-growth characteristics are beginning to develop. Usually with multi-storied canopies, well developed understories, and diverse structural features such as large dead standing and dead fallen trees. Average tree age is 80 - 250 years.	co – Conifer: > 75% of tree cover is coniferous
	mx – Mixed: mixed with broadleaf component > 25%.

<p>WD – Woodland Dry, open stands of deciduous forest, generally with between 10 and 25% tree cover. Woodlands may include non-forested openings, often with shallow soils and bedrock outcroppings.</p>	<p>mx – Mixed: mixed with conifer component > 15%.</p>
<p>HB – Herbaceous Non-forested ecosystems with less than 10% tree cover. Most have shallow soils and bedrock outcrops.</p>	<p>bd – Broadleaf: Dominant broadleaf.</p> <p>mx – Mixed: a mix of grasses and forbs as well as mosses and lichens.</p> <p>cs – Coastal herbaceous: rocky shoreline, influenced by the marine environment and characterized by grasses, forbs, mosses and lichens.</p> <p>sp – Spit: sand and gravel deposits with low to moderate cover of grasses and herbs.</p> <p>du – Dunes: sand dunes with a low cover of grasses</p> <p>sh – Shrub: shrubs account for more than 20% of the vegetation.</p>
<p>RI – Riparian Streamside areas along creeks, streams, gullies, canyons and larger floodplains.</p>	<p>fl – Low bench: areas flooded at least once every two years for part of the growing season; plants are adapted to extensive flooding and abrasion.</p> <p>fm – Medium bench: areas flooded every one-six years for short periods (10-25 days); usually deciduous or mixed forests with trees tolerant of flooding and sedimentation.</p> <p>fh – High bench: areas periodically and briefly inundated by high waters; typically conifer-dominated floodplains of larger coastal rivers.</p> <p>ff – Fringe: narrow, linear areas along open water bodies (rivers, lakes, and ponds).</p> <p>gu – Gully: where the watercourse is in a steep V-shaped gully.</p>
<p>ST – Stream Watercourse formed when water flows between continuous, definable banks.</p>	<p>fp – Perennial: creek or stream that flows continuously throughout the year.</p> <p>fs – Seasonal: stream that flows only at certain times of the year, (eg. when the groundwater table is high and/or when it receives water from springs).</p>
<p>WN – Wetland Areas characterized by daily, seasonal or year-round water at or above the surface.</p>	<p>bg – Bog: shrubby or treed, nutrient-poor peatlands with distinctive communities of plant species adapted to highly acid and oxygen-poor soil conditions.</p> <p>ff – Fen: peatlands where groundwater inflow maintains a high mineral content within the rooting zone.</p> <p>ms – Marsh: shallowly flooded mineral wetland dominated by emergent grass-like vegetation.</p> <p>sp – Swamp: forested, mineral wetland dominated by broadleaf shrubs and trees on sites with a flowing, semi-permanent, near surface of water table.</p>

	<p>sw –Shallow Water: aquatic ecosystems dominated by rooted, submerged and floating aquatic plants.</p> <p>wm – Wet Meadow: seasonally inundated wetlands, dominated by grasses, sedges, or rushes. They generally occur on mineral soils and have little or no peat accumulation. Tree cover is less than 10%.</p>
<p>CL – Cliffs</p> <p>Steep, vertical, or overhanging rock faces-sparse vegetation may occur in crevices or on ledges.</p>	<p>cc – Coastal cliffs: cliffs with a marine interaction. Generally near vertical bedrock with accumulation of soil limited to fissures and ledges.</p> <p>ic – Inland cliffs: typically formed as a result of erosion, catastrophic failures or mass wastage. Generally characterized by rapid drainage and the accumulation of soil that is limited to bedrock fissures and ledges.</p>
<p>LC – Lacustrine</p> <p>Lacustrine ecosystems are fresh water ecosystems where total vegetated cover of the surface area is less than 5%.</p>	<p>la – Lake: a naturally occurring static body of water, greater than 2m deep in some portion.</p> <p>pd – Pond: a small body of water greater than 2m deep, but not large enough to be classified as a lake.</p>
<p>LT – Littoral</p> <p>Ecosystems are marine influenced where total vegetated cover of the surface area is less than 5%.</p>	<p>mu – Mudflat: flat, plain-like areas dominated by fine-textured sediments and exposed at low tide; includes estuaries.</p> <p>be – Beach: area that expresses sorted sediments, reworked by wave action in recent times.</p>

MODIFIED - Landscape units with human development or disturbance

CLASS	SUBCLASS
<p>YF – Young Forest</p> <p>Self-thinning has become evident and the forest canopy has begun to differentiate into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole sapling stage; begins as early as age 30 and as late extends to 50-80 years.</p>	<p>co – Conifer: > 75% of tree cover is coniferous</p>
	<p>mx – Mixed: neither coniferous or broadleaf account for > 75% of tree cover</p>
	<p>bd – Broadleaf: > 75% of tree cover is broadleaf</p>
<p>PS – Pole Sapling</p> <p>Dense regeneration of clearcut area between 15 and 30 years old, but can range upwards of 50 years if growing under poor conditions. Trees are greater than 10m tall and have overtopped shrubby and herbaceous vegetation.</p>	<p>co – Conifer: > 75% of tree cover is coniferous</p>
	<p>mx – Mixed: neither coniferous or broadleaf account for > 75% of tree cover</p>
	<p>bd – Broadleaf: > 75% of tree cover is broadleaf</p>

<p>RH – Recently Harvested</p> <p>Stands less than 15 years of age that are undergoing the initial stages of regeneration (usually dominated by shrubby and herbaceous vegetation, tree species less than 10m tall) in areas where timber has been removed.</p>	<p>cc – Clearcut: Clear-cuts and heavily logged areas, mostly or all stripped of native vegetation, may be replanted or naturally regenerating. Naturally regenerating sites are dominated by seedlings, shrubs and herbaceous species (usually with a large component of exotic species). Replanted sites will vary in composition depending on silvicultural applications. Includes human caused serious erosion areas.</p>
	<p>st – seed tree retention: clear-cuts where individual trees or groups of trees have been retained for regeneration or aesthetic purposes.</p>
	<p>gs- group selection: areas where timber harvest has occurred using group or individual tree selection methods including commercially thinned forest.</p>
<p>RW – Rural</p> <p>Area in which human developments are interspersed with forest range, farmland, and native vegetation or cultivated crops.</p>	<p>se- Settlement – residential, commercial or other structures are interspersed with native vegetation, farmland or cultivated crops</p>
	<p>gc – Golf course: Grass-covered fairways and open areas for the playing of golf.</p>
	<p>pk – Park: groomed areas including parks, playgrounds, aesthetic areas, and cemeteries.</p>
<p>AG – Agricultural</p> <p>Area where dominant use is for agricultural purposes.</p>	<p>cf – Cultivated Field: flat or gently rolling, non-forested open area subject to human agricultural practices.</p>
	<p>co – Cultivated Orchard: an agricultural area composed of single or multiple tree species planted in rows.</p>
	<p>cv – Cultivated Vineyard: Vineyard.</p>
<p>DP – Developed</p> <p>Area where human features or disturbance is dominant.</p>	<p>ca – Canal: Artificial watercourse created for transport, drainage, and/or irrigation purposes.</p>
	<p>sz – Developed/occupied Foreshore: Dock, marina or shellfish lease.</p>
	<p>rz – Road Surface: Area cleared and compacted for vehicle transport.</p>
	<p>gp – Gravel Pit: Area exposed for the removal of sand and gravel.</p>
	<p>ur – Urban/suburban: Area in which residences and other human developments form an almost continuous covering of the landscape.</p>
	<p>uc – Utility Corridor: Area permanently altered to allow for the passage of a public or private utility.</p>
	<p>es – Exposed Soil: area of exposed soil; not included in any of the other definitions.</p>

	<p>lq – Unrestored Landfills and quarries: includes large-scale soil, rock and debris dumping, gravel/rock quarries, major ditching disturbances.</p>
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Definitions of Attributes in Other Database Fields:

Groundtruth – indicates which polygons were verified through groundtruthing

- Y – Groundtruthed (using information from previous or other concurrent projects)
- V – Groundtruthed (visually or with GPS)
- D – Groundtruthed (visual or with GPS) and ecological data collected

Source – indicates the relevant data sources for each polygon

- pi - May 20th, 1998 colour aerial photography, (flown at 1:15,000 scale)
- May 20th, 1998 georeferenced and orthorectified colour aerial photography (1m pixel resolution)
- 1997 black and white aerial photography (flown at 1:10,000 scale)
- 2002 ortho - 2002 black and white orthophoto
- lk - Local Knowledge – photo interpreter or contact has direct knowledge of the place or polygon
- L7 - July 30th, 2000 Landsat 7 ETM+ satellite imagery
- mbfi - Forest Cover maps – 1:20,000 scale (MacMillan Bloedel, 1987)
- mb - Road maps – 1:20,000 scale (MacMillan Bloedel, 1987)
- MP Lot 8 - Forest Management Plan for LOT 8, Galiano Island (H.A. Forest Management LTD, 1992)
- MP DL51 - Forest Management Plan for LOT 51, Galiano Island (H.A. Forest Management LTD, 1992)
- GPS - Galiano Stream and Wetland Project (Galiano Conservancy Association, 1999-2001)
- TERP - Galiano Forest Restoration Project (Galiano Conservancy Association, 2001)
- LLMP - Laughlin Lake Management Plan (Galiano Conservancy Association, 2002)
- pbmp - Pebble Beach Reserve Management Plan (Galiano Conservancy Association, 1998)
- dl44 cov - Base Line Inventory, District Lot 44 (Galiano Conservancy Association, 2002)
- sei - Sensitive Ecosystems Inventory (Environment Canada/BC Conservation Data Centre, 1992-97)
- trim - Terrain Resource Information Management Program (TRIM) road and contour data (Province of British Columbia, Ministry of Environment Lands and Parks, Geographic Data BC, 1997)

Confidence – indicates the relative degree of confidence in the accuracy of each interpreted polygon

- h – high
- m-medium
- l – low

Appendix V
UP-CLOSE Workshops Speaker Summaries

UP-CLOSE Speaker Summaries

Herb Hammond – Galiano Forests

Galiano Island lies in a rare piece of Canada, one of the smallest ecological areas, the dry coastal Douglas-fir biogeoclimatic zone. This special place is also one of the most threatened – sandwiched between places that have a huge impact on modifying the ecosystem, Vancouver and Victoria. There are astonishing pressures on the Galiano landscape. This presents a large challenge to forest ecological restoration. It also makes Galiano an important place to lead the way in restoration.

Forest ecology restoration is a unique project on Galiano, and it will have applicability to the island's backyards as well. We're asking new questions. We don't know what we've lost in an intact ecosystem; we don't know what came before. It is challenging to try to imagine, to compensate for the knowledge that we have lost. Successive generations inherit successively degraded ecosystems, thinking what they have is normal. Restoration tries to deal with that issue.

Islands as terrestrial landscapes are contained and have hard limits at the shoreline. This landscape is made up of clusters of ecosystems that are interdependent in space and in time. There are a myriad of interconnections on a landscape level. At the stand level, we find our most comfortable scale. Without even any extensive patch of original forest on the island, so we are really in the realm of conjecture in describing the restoration target of a fully functioning intact forest stand.

With conifers, photosynthesis occurs through the winter, so it is a lack of water that is the limiting factor. Drought shuts down growth. Water is held in swamps and other water bodies. These areas encompass a spectrum of habitats, very small parts of habitats that are often marginalized. However, during drought these are important reserves for the ecosystem and for many species.

Every Galiano watershed is also influenced by marine ecosystems. The Garry oak ecosystem on the shoreline connects directly with the marine minerals, with calcium and magnesium coming from the spray. In turn, the fallen trees from the forest that lie on the beach impact the marine ecosystem.

The ecosystem is described by its composition (plants, animals, soil, climate) and by its structures (the way these parts are arranged, live-dead-wet-dry). Composition plus the structures explains the function of the ecosystem. If you lose elements of composition or structure, you lose ecosystem function.

At the stand level, analysis shows that dead trees are essential. They hold water and mycorrhizal fungus, which are so dense that in one handful you can hold 3-4 km of their structure. We are only beginning to understand the relationships that show that the forest is really one organism. The forest relies and derives its diversity from decayed wood. While there is no truly fireproof landscape, the most fireproof were the old growth forests. They exhibit large canopy gaps, green limbs are far from the ground, the bark of old trees is thick and fire resistant.

Although fire was the agent of change, the most common disturbance was the death of individual trees. On the east side of Galiano, we've seen a second cut of timber in 100 years. A time scale more like 500-1000 years is a normal lifetime of a Douglas-fir, up to 1200 years for a Western Red cedar. Considerations of "merchantable" and "rotation age" are assumptions of convenience, not function. These are at the very young end of the time spectrum. The forestry industry depends on the biological legacy of the past generations of trees over thousands of years. We borrow on that legacy by harvesting as we do. Now we are stressing those ecosystems even more with climate change. We need to recognize time frames from milliseconds to thousands of years.

For an ecosystem-based restoration plan, we need to establish a picture to determine what we have to do. We need a benchmark for the natural system, but with no large natural landscapes, this becomes a

forensic task. We need to do some reconstructive work to determine how the system functions. We also need to identify impacts on the ecosystem, particularly industrial forestry. Once we define ecological integrity, we will have to evaluate alternative plans and activities. That will help us focus on a target for sustainability.

The character and the condition of the forest ecosystem will define the restoration needs. With progressive logging patterns, we see progressive degradation of natural systems. Many soil organisms are simply not there anymore, and we have to rebuild those relationships and complexity. If we examine homogeneity vs. diversity, we see in a more intact forest, examples of openings and age diversity that reflect a great habitat diversity.

For example, we know now that salmon are a product of the forests as well as marine ecosystems, with the contribution of big fallen trees that are necessary for fish habitat in streams. Large pieces of decaying wood help aquatic ecosystems over a long time; a big cedar will still be visible up to 900 years after it has fallen. If we rob the ecosystem of this input then we incur a big debt. A tree that is prematurely removed must be grown again to great age before it can then die and contribute the decomposition that is missed. Instead we see decaying stumps.

It is important to respect the precautionary principle. With such uncertainty, we need to act gradually, perhaps doing only 20% of what we will eventually do. We may also decide to do nothing now. The burden of proof for not doing harm is on the proponent of an action.

What is old growth forest? It is nutrient storage and building. It holds spiritual values. The challenge of restoration is not to repeat the mistakes of the past. However, how can we restore what we don't understand. What we can do is try to create old growth structures. We also need to address community functioning as a place of diversity and responsibility; we must restore local economies, too. It will be for future generations to see the outcome.

Emily Gonzales – Garry oak Woodlands

My presentation has the theme of interactions. The Garry oak and its community exhibit great complexity; it can be found in grasslands, on coastal bluffs, in deep soil vernal pools (more on Vancouver Island) and on rock outcrops with shallow soils. It can also be a transitional stage at the edge of a Douglas-fir forest. Early settlers left a striking historic picture of the Garry oak ecosystem. We know now that the stands of single large Garry oak are not the best. Scrubby Garry oak is indicative of healthy Garry oak ecosystems, as they are characteristic of the more typical vegetative reproduction (not acorns) and vigour.

Oaks grown from acorns do better in soil from oak sites than they do in regular potting soil without the native bacteria, fungi and microorganisms. Some 800 species of invertebrates are associated with Garry oak, and we know that this is an area not well studied. Better known are the subgroup of butterflies; in fact there are butterflies that are an indicator species for the ecosystem. When the ecosystem degrades, there is a decline in the other plants that make up the ecosystem; it's not just the Garry oaks. Butterflies may also be an indicator for climate change. We know that many birds are typical of the Garry oak ecosystem, but we have seen many species disappear as nesting species. Reptile species are also in decline. There are fully 59 species of plants at risk in the Garry oak ecosystem. Have these declining species always been rare, or are there changes happening now? Research is ongoing and not conclusive.

During the ice age, the land was below present sea level under two kilometres of ice. Through Richard Hebda's pollen studies, we know that Garry oak peaked in population 6000 years ago. 4,000 years ago, the climate cooled allowing Douglas-fir and shrubs to encroach on Garry oak. Although the range for Garry oak is from California to Comox, with some isolated islands on Savary Island and in Sumas, the ecosystem is very spotty within the range.

First Nations people controlled vegetation through fire to maintain the Garry oak ecosystem. They depended on Camas bulbs as a key starch in their diet and weeded out the poisonous Death Camas. With European settlement, agriculture had a negative effect on the ecosystem, but also the settlers also admired the beauty of the spring Garry oak meadows. Development encroachment from the 1800's (10,443 ha.) to 1997 (512 ha.), a 95% decline, with less than 1% remaining as an intact ecosystem. Now we are seeing some protection put into place.

Why should we see the Garry oak ecosystem decline so much in settled areas? There is a hypothesis that the culprits are introduced and native herbivores that graze before plants can reseed. Exotic grasses are taller and shade out native species. With fragmentation of the ecosystem now surrounded by exotic species, there is a limited opportunity for adjacent seed stocks to re-introduce native plants. This illustrates the importance of connectivity and buffers to ecosystem protection.

Over 4,000 species of exotic plant species have been successfully introduced over the past 400 years to the continental US and Canada, making up 20% of vascular plant species. Not one native species has been made extinct on the continent by these exotic introductions. Nor have any native species been extirpated within a state. Native and non-native species can co-exist because of competition and heterogeneity. In the Garry oak ecosystem, 150 species have been "absorbed" with only four native plants completely "displaced". One of the most important introduced species is Scotch broom that adds nitrogen to the naturally low Garry oak ecosystem. It is thought that this encourages the invasion of exotic grasses, but research is ongoing.

Have herbivores impacted the native plants? On an experimental site, 95% of the plants were introduced grasses. Preliminary results indicate that grazing matters, but competition may not impact the presence of native species. Is a fire regime necessary to maintain Garry oak ecosystems? Is fire a useful tool in ecosystem restoration? Exotic species like burned sites, but this may be because of the surrounding seed sources. When native seeds are brought in, then the native species outstrip the exotic ones. There is still much to research and learn. Meanwhile, it is important to be strategic in protecting the most intact remnants of the Garry oak ecosystem because we have such a limited ability to act.

Doug Biffard – Marine and Foreshore Ecosystems

My topic is the interface between terrestrial and marine environments. In the 1960's environmental concern began to arise about single species management from the emerging specialty of conservation biology. Now we talk of ecosystem management, that I have heard defined somewhere as managing the people who interact with the ecosystem. It's about home, and we learn by looking at another's home for perspective on ours.

What makes coastal BC a place like no other? There are several distinguishing aspects of coastal topography. The shore is very crenulated, unlike anywhere except perhaps Norway. We have a vast inland sea in the Georgia Strait where there is no exposure to open water. There is a broad continental shelf kilometres wide, tapering to the north. The shorelines are heavily influenced by the fresh water precipitation runoff and rivers.

Next is the seasonally variable ocean circulation. At this latitude, the broad and weak sub-arctic current splits with part going north and part south. The current patterns are always changing. The sub-arctic boundary is formed between the saltier and warmer southern waters and the less salty cooler northern waters. To the south with warmer temperatures, evaporation exceeds rainfall making the sea saltier, and to the north the reverse is true: rainfall exceeds evaporation and the sea is less salty.

Salmon like the northerly less salty and colder water, especially near the continent. Also, the fresher water on the surface of the ocean draws nutrients from lower saltier depths. This also varies with the extent of the continental shelf. In 2000, we had a summer pattern where near and off-shore currents ran

opposite directions. This created high productivity, and also high variability with lots of diversity. The winter pattern is more stable, with the current moving up the coast to Alaska.

Then there is tide: we have lots of it, up to five metres, creating lots of intertidal biodiversity. In tropical coral reef ecosystems, there is very little measurable tidal change. Also strong tides make strong tidal currents, that mix waters, also creating varying conditions.

Rainfall runoff and continental drainage exhibit alternating patterns. Flows from the interior snow pack peaks in June in the Fraser River. On the coast, winter flows have a major influence in the fall and winter. These freshwater flows bring terrestrial nutrients to the marine environment, keeping our marine productivity high nearly continuously. We also uniquely have the kelp forest as a major ecosystem feature.

All of these factors support biodiversity in plants and animals. We have some 42 species of rockfish, and think of all the salmon species. We also have the largest species in the world of barnacle, chiton, nudibranch, urchin, octopus, scallop and intertidal clam.

With all this complexity, how do we classify our shorelines? There are four characteristics: substrate, slope, exposure to wave activity and shape. Organisms may also create habitat, for example plants like rockweed (fucus), eelgrass, the kelp forest, sea lettuce (ulva), and animals like goose barnacles, mussels and clams. Each of these presents habitats in which specialized organisms thrive.

We also describe intertidal zonation by the characteristic organisms that inhabit those conditions. The tide creates some conditions, but so do the ranges of predators, for example the uppermost starfish ranges limit the lower range of mussels. When starfish die out as they have from periodic disease, the mussels recolonize to greater depth. As well, some organisms need many habitats through their lifecycle, with salmon as a dramatic and obvious example.

What about the impact of human activities on shorelines? Residential use, commercial and public activities, agriculture, forestry especially in upland areas, can all cause major impacts at large and small scales. Some of these can be changes in sediments; hydrology; nutrients (forest fire retardants are fertilizers and their runoff can be serious); structures directly shading marine habitats (log rafts, for example); turbidity (as from busy pleasure boat anchorages); beach armouring; docks, piers and decks (may offer new opportunities for predators); disturbance (dogs chasing sandpipers, for example); pollutants (like slight oil leaks from motor boats). These changes can eliminate former habitat. These changes then work all the way through the food chain. The impacts are all tradeoffs for the human initiative, presumably a benefit, so we need to examine the results and be aware.

The classic illustration is the sea otter story. Herring is a rich food source, less so Pollock. Sea lions prefer herring, and the killer whales eat sea lions. When the sea lions are not so plentiful, the killer whales turn to sea otter. The otters rely on sea urchins that feed on kelp. If there are no otters then the kelp forest is destroyed, and the habitat collapses to a subtidal barrens. The absence of this barrier affords the shore less protection from surf damage. So what happens when we overfish the herring?

Richard Hebda – Freshwater Ecosystems

We need to examine the values of ecosystems, because this determines their future. Wetlands are water storage, which we all need. So we must be stewards to these sites of recharge in a practical sense not just for ecological protection.

Water has three characteristics that serve to define different kinds of wetland ecosystems. One is the amount of water, along with its position relative to the water table and whether this fluctuates. Next is the rate of movement of water through the wetland; if it is fast, then there may be more nutrients passing by the roots of plants in the wetland. And last is the chemistry of the water, including its nutrients.

Most wetlands are not just one type of ecosystem, but a complex of types. Wetlands are found in basins which are located on Galiano between rocky ridges (this is not typical). They are also found along water courses, along streams and creeks. Wetlands may also occur between the shoreline and dry land, and between lakes. Finally, wetlands may form where there is a break in the slope of the land, where groundwater gets close to the surface as seepage or a spring.

Bogs are acidic where the water table is near the surface, the feature is open with few woody species, and dominated by sphagnum moss. This is a transformative plant that changes the hydrology and chemistry of its surroundings. It creates conditions that are favourable for a bog, and not favourable for trees and shrubs. Characteristic bog plants are in the heath and heather family. The accumulation of peat (decomposing sphagnum moss) can be as much as 30 metres.

Burns Bog is the largest raised bog in the Americas. It once covered twice its current area and nearby areas were also peat-bearing bogs. The peat accumulates in a low dome like a sponge rising above the ground level. Sphagnum is an “ecosystem engineer” that continues to grow in these favourable conditions.

More usually a bog occurs along the margin of a pond. That’s the case with Shaw’s Bog on Galiano, a basin-marginal bog. This is a special place because it is almost the driest possible climate where a bog is possible. On the west coast where there is high rainfall, bogs are even possible on a slope because of poor drainage.

A **Fen** is a wetland dominated by sedges. The jingles help: “sedges have edges” (often triangular), “and rushes are round” ; “grasses are round and hollow” (mostly). Sedges need more nutrients than bogs offer, and sedges tolerate less acid. The water level of a fen may vary, or water may move more quickly through a fen. Fens often look grassy.

A **Marsh** is characterized by herbaceous, not woody species. Usually the water level fluctuates and the marsh is rich in nutrients. The pH is neutral or basic. This is a high productivity ecosystem. Typical are cattails, bulrushes, and grasses. At Laughlin Lake, there is a little marsh wetland.

A Salt Marsh is a special case, a marsh influenced by brackish or salt water. These exist at some scale wherever a stream enters the sea. Salicornia is typical. Coastal meadows are a kind of salt marsh where they are only wet at the highest tides. These occur at Boundary Bay where gum weed is typical. In the BC Interior, marshes can be very alkaline. These have been found to have occurred 10,000 years ago on Vancouver Island evidenced by lime deposits. Very definitely, wetlands DO change.

Swamps are wetlands dominated by trees and shrubs. Cedar, sword fern, skunk cabbage, salmonberry, hardhack are all characteristic of swamps on Galiano. Willows, black spruce and larch are typical in the Interior.

Ponds are shallow open water ecosystems. Plants often have floating leaves like the yellow pond lily, pond weed and water smartweed.

Galiano is very fortunate to have all of these kinds of wetland ecosystems: bog, fen, marsh, swamp, and pond. Next to wetlands are the **Riparian Ecosystems** which are influenced by water, and can be distinguished from the upland ecosystem. Deciduous species like willows and alders shade the banks. Insects drop off the overhanging trees into the water to feed aquatic species. The canopy provides shade to keep the water cool and cover from predators. If streams and creeks are the arteries of hydrology on Galiano, then wetlands are the organs of hydrology. Both total less than 2% of the Galiano land area, but they are critical. We want to see great complexity in the plant communities on the edges of streams, not dugouts or riprap.

What good are wetlands?

Water for us. And water for wild creatures. Wetlands act to regulate the movement of water on a landscape.

Detention storage. Wetlands interrupts and collect water from rainfall before it enters the sea. Wetlands help to average out the flow of water, lessening erosion and floods. Wetlands allow strams a gradual flow between precipitation events.

Special plants. Biodiversity increases with plants like sundews that get nitrogen from insects they catch. Bog laurel and the most southerly range of the northerly cloudberry occurs in Burns Bog.

Habitat for wildlife. In the Interior, the screech owl favours riparian areas, as do otters.

Food for us. And for wildlife.

Technological materials. Rushes and willows were used by First Nations, and globally, for basket-making.

Materials that shape ecosystems. Coarse woody debris rots and provides nutrients that shape the landscape.

Agriculture. Crop-producing fields have frequently been located on islands in wetlands.

History. The layers laid down in wetlands tell us our history; they are the libraries of environmental eras, containing pollen records of past ecosystems. Wetlands can also preserve the artefacts of our past: the remains of mastodons and woven materials that would otherwise have decomposed.

What's the threat to wetlands? Our European traditions give us negative attitudes about wetlands. Now we know better but conventional habits remain.

Alteration. If it is wet, drain it; or fill it in, or dig it out, or straighten it, seems to be our impulse.

Pollution. We introduce damaging substances of all kinds, commonly nutrients from agriculture, lawns and sewage.

Beautification. We plant grass to the water's edge and introduce exotic species.

Finally I would like to mention Climate Change. In 4,000-year-old wood taken from Heale Lake on Vancouver Island, we know that very rapid change is possible. Predictions indicate that we will get way less water in the summer with much warmer temperatures, and maybe more water in winter. We will rely on storage in wetlands; they are our rain barrels and must healthy and working well. Trees needing moisture will be stressed and die, except where wetlands provide a refuge. Already upland cedars are not so healthy from too dry summers. The wetlands themselves will change in their depth of water and flow patterns. Wetlands may shrink. Plants have adapted to specific conditions. We may see bogs turn to swamps or marshes.

Galiano is fortunate to have such a diversity of wetlands. Take care of them. Conserve every one. They are your future.

Geoff Scudder – Landscape Connections

The goal of this talk is to link the pieces together from other talks in the series. The focus is biodiversity conservation and the context is islands and island problems. For Galiano, most important will be addressing fragmentation and creating a comprehensive plan for this place.

Big organisms are minor components of biodiversity. Arthropods dominate. Biodiversity is more than just species though; it is the communities and the ecosystems. Biodiversity is the whole lot, and it operation is what we are trying to protect.

We know the many benefits: social values, medical and scientific benefits, economic benefits, ecosystem services (like clean water and air), and ecosystem function. This last is the most important. With all the interconnections that make up an ecosystem, it is clear that the ecosystems must be dynamic (ever-changing) or the ecosystem will die out.

Galiano's small piece is important in the province. There are some 5,222 species recorded in BC and their locales have been recorded, too. Using this information we find that Galiano is a rarity hotspot for all kinds of species at

risk, as well as all rare taxa plotted together. In total richness (the total count of species found), Galiano is a hot spot for many groups of organisms. This means that Galiano can be a major player for conserving biodiversity in the province.

Galiano is also an island. Twelve thousand years ago there was nothing here; Galiano was under an ice sheet. Everything that is here now came from somewhere else to repopulate the land as it gradually emerged from the ice. Brooks Peninsula was not glaciated and may have served as a repopulation source. Other species arrived from the south. Since Vancouver Island was relatively early out from under the ice, it may have acted as a colonizing force to Galiano. Georgia Strait was a large barrier to species movement then as it is now.

Birds, bats and insects would have used flight to arrive on Galiano. Research shows that there is an aerial plankton of insects that drop out of the sky after sunset at a rate of billions of insects per km² per day to affect colonizing patterns. Bird droppings undoubtedly were responsible for the arrival on Galiano of vascular plants. After washouts from floods, species rafting out of the Fraser River would have arrived on Galiano to colonize.

The size of islands makes a difference in biodiversity. The biodynamics of protected areas are the same as for island dynamics, if we do not pay attention to the land in between the protected areas. The standard formula is that the number of species equals a balance point of immigration less extinction. Island biodiversity dynamics show that there are more species, for example, on Salt Spring Island simply because it is bigger than on Galiano. Or on a patch of protected Galiano.

So does isolation affect colonization? No matter how big, we lose species all the time. Even in the 14,000 km² Serengeti Plains in Africa, species have died out. There is no source for recolonization for the Serengeti. If we reduce the area to a threshold of 60% of the original, we can then see a steep drop off in species. We need to save around 40-50% of an ecosystem if we want to save it.

Extinction happens for many reasons: sudden drought, disease, genetic drift. There must be a minimum viable population, but that number is difficult to work out. Over 100-500 years, we have seen extinction of less than 5%. There must be between 500 and 1000 individuals to continue. But how many is that in a patch, or on an island? We can ask some of those questions on Galiano. Certainly, there are more than 500 deer and racoons, but certainly not bears. Butterflies may be a big issue. All of the patches may not be surviving at one time. It may be okay to have more than 500 individual butterflies among all the patches because there can be recolonization between patches to reestablish populations that die out for some reason.

The matrix between the protected areas must be permeable for organisms to get from one place to another. In studies on isolated places like the Galapagos we see patterns that apply everywhere, certainly in patches on Galiano: steady populations interrupted by drastic crash and rebuilding.

Experiments in Brasil are testing population dynamics in areas of 1 km², 10 km², 100 km², 1000 km², and even 10,000 km². To this are added better corridors to see their effect. This reinforces the theory that larger patches are better but that still species loss will happen. To double the number of species in a patch, one must increase the area by 1000.

In BC the most species are found in new generation forest, with fewer species in the old growth. However these are different species and are not interchangeable; species are specialists. We need the mosaic of habitats. We are finding that there is not enough old growth core to keep other species out; there is edge effect everywhere that changes the microclimate and allows alien species invasions. Without enough core, then the patch is all edge.

Galiano has been subject to a sensitive ecosystems analysis that looked at Vancouver Island and the Gulf Islands. The seven types of sensitive ecosystems are all found on Galiano, although non under 1ha were mapped even if they exist (like estuaries). Luckily some sensitive ecosystems are in the protected areas that we have.

In these sensitive ecosystems we have species of rarity and uniqueness, for example the new species found on manzanita on Bodega Ridge that has now after ten years of investigation has been declared a new species. Another is a rare bug at Lover's Leap found only once before in Victoria in 1903. Our records of nesting bluebirds disappeared in the 1990's. There has been no identification of a sharp-tailed snake since 1981. A water bug found at a wetland at the north end is one of three specimens found in the province.

These sensitive habitats are shrinking too. Between 1990 and 2002 there has been a loss of 11% of the sensitive areas. Only 60% of the sensitive ecosystems in the province are held in protected areas. The problem is competition with people who like to live and to play in these same places.

So what are the recommendations? Create vegetated buffers, restrict access, control invasive species, prevent breeding disturbance, and allow for natural disturbances on the landscape. We cannot afford to lose any more of these areas; they are irreplaceable.

So one of the things they [Sensitive Ecosystems study] point out is that if you look at these systems, how endangered they are, the one thing you've got to do is make sure you don't lose any more. They've got to the stage now when one can't afford to let any more go because they're small already. And if they go then the habitat for all these rare species goes. So these are the ones that are irreplaceable. They've got to be 100 per cent conserved. So they're the top priority. You need to save them, but you can't save them unless you do this sort of thing [gesturing at create vegetated buffer, restrict access, control invasive species, prevent breeding disturbance]. Stop them being isolated. Keep them connected in some way with what surrounds them, by what we call buffer zones."

Protected areas are being degraded everywhere. We have been following the wrong strategy in saving islands of sensitive ecosystems. We need to protect the whole ecosystem with landscape scale initiatives. Conservation biology is teaching us about the need for connectivity in Conservation Area Design, not a piecemeal approach but a holistic approach.

"About two months ago we had a CAD [Conservation Area Design] meeting at UBC. Michael Soulé, one of the "gods" in Protected Areas, came. And when he was asked "How much is enough?" He said, "That's easy. 100 per cent. Because 100% has got to be operating in some way with a conservation aspect to it. It doesn't mean it has to be protected areas. In fact its better if it's not protected areas because people thin it's okay... Everyone in the matrix has to cooperate."

It seems that the big logging companies are now ahead of government in their approach. They are deciding to leave everything in certain ecosystems and then logging 50% in buffer areas. It is important for everyone in the matrix to cooperate with protection. Also Galiano is an alien species hotspot, with Scotch broom and the seven-spot ladybird as examples that are displacing native species. Ferries and people bring in new species too.

The concept is to have protection for the core + connections + buffers + the matrix. All have to function for biodiversity as well as economic and social uses. There must be joint agreements with everybody. Encourage stewardship and conservation covenants. Remember that you need 100%. Use corridors to connect protected areas only when you have no alternative and are forced into this strategy.

This approach can have a dramatic impact because our protected areas might turn out to be in the wrong places. With a 3° C. increase in average temperatures as some predict, the effect is moving 200 km north or 500 m up in altitude. That means on Galiano that we must maintain height connectivity. The landscape plan must be everywhere.