




# DESIGN & RESTORATION PROPOSAL FOR THE GALIANO CONSERVANCY ASSOCIATION

DL 57 LEARNING CENTRE AND CAMPGROUND  
MULTI-USE SITE


Jane Healey  
Ang  atzburg  
John Kirbyson

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## I. EXECUTIVE SUMMARY

This proposal gives recommendations on restorative actions and design options for the multi-use campground and learning centre site within District Lot 57. Guided by some members of the Galiano Conservancy Association (GCA), an overview of the constraints and possibilities within the site were determined. As part of this report we have extensively reviewed the Galiano Conservancy Association's mission, vision, and management philosophy to ensure these are reflected in the overall design and goals of this proposal. The IUCN best practices  are also recognized throughout to ensure the sustainable and long-term use of the site. The report includes an overview of the current and historical states, the proposed design, and site-specific restoration prescriptions. Campground areas, the learning centre building, and restored ecological areas are combined to create a fluid space for living, learning, and growing.

## II. CONTRIBUTIONS

John Kirbyson wrote the introduction, background, review of best practises, the design process and the description of the site ecology. Angela Ratzburg wrote the site history and site analysis sections as well as created the proposal map. The opportunities and constraints of the site were the topic of many group discussions and the overall campground design was the  result of a joint effort between all group members. Jane Healey focused on the restoration prescriptions. Angela and Jane also wrote the executive summary, conclusion, and prepared the final document. John edited and constructively commented on each part throughout the writing process. While we each wrote our respective sections, we all contributed to every aspect, sharing research, documents, and ideas.

### III. INTRODUCTION

In their publication, *Ecological Restoration for Protected Areas*, the IUCN advocates three underlying principles and fourteen supporting guidelines for successful ecological restoration; it should be effective, efficient and it should be engaging. Effective restoration re-establishes the natural and cultural values of an area. Efficient restoration maximizes beneficial outcomes while minimizing costs. Engaging restoration occurs through the collaboration and participation of partners, stakeholders, communities and indigenous people, who participate in planning, implementation and reciprocal learning that can build a sense of ownership, and reconnect participants with nature. (Keenleyside et al. 2012. p.16). The Galiano Conservancy Association (GCA) is a model of effective and efficient restoration being achieved through engaging efforts and approach. For 25 years, the grass-roots community - based organization has dedicated itself to local conservation and restoration efforts and creation of sustainable community life. Its primary purpose is... "To preserve, protect and enhance the quality of the human and natural environment" on Galiano Island. (GCA website). With strong community support, the GCA has many notable accomplishments, including implementation of National award winning, large-scale ecosystem restoration projects. One of its strengths is its land assembly. The association holds covenants over 217 hectares of land and owns an additional 185.6 hectares in order to protect habitat for wildlife, maintain ecosystems and provide access to nature for education purposes (Ibid.). Protected lands have created the Mid- Galiano Island Protected Area Network, helping to achieve connectivity between habitats while providing educational and recreational opportunities.

Their most recent land acquisition is DL 57, a 76.1-hectare site referred to as The Galiano Learning Centre. The purpose of this centre is to provide opportunities for education and research into ecosystem- based conservation, and to demonstrate sustainable living with the natural environment, under their philosophy that healthy interactions with the land will help increase respect, appreciation and protection.

To date, the GCA has accomplished the following four key actions for this site:

- Developed a management plan for the property and is in the early stages of implementation.
- An old portable sawmill site has been restored with the engagement of local experts and 101 community volunteers who contributed over 1200 hours of time to the effort; again demonstrating that the power of people with vision and values can engage a community to restore ecological integrity while demonstrating the transformative power of participation in restoration activities. (...ver).
- A building donated by the Silva Forest Foundation, is in the process of being erected and will serve as the classroom and kitchen. (K. Millard. pers. com. 2014)
- Obtained a Temporary Use Permit from the Islands Trust for environmental education programming and overnight camping until expiry in June 2017, or a successful rezoning of the site (K. Millard. pers. com. 2014). (At present, the planned uses of the property are contrary to the uses permitted for the current zones established within Galiano Island's OCP).

Two additional actions identified as priorities within the plan to be achieved within the first two years, form the focus of this report;

- Ecological restoration plan
- Conceptual plan for the development of facilities and infrastructure

Specifically, the purpose of this report is to develop a conceptual plan and restoration prescriptions for the learning centre/campground site following the vision and mission of the Galiano Conservancy Association.

## IV. BACKGROUND

### a. Galiano Conservancy Learning Centre (GLC) Management Plan

In 2013, the Galiano Conservancy Association undertook a comprehensive planning process for District Lot 57 which followed closely the International Union for the Conservation of Nature (IUCN) recommended seven step process for restoration of protected areas (Keenleyside et al. 2012. P.51). Some of the key stages included:

- Extensive public consultation was sought through a series of open house meetings, input from neighbouring residents and governing bodies including Islands Trust and Capital Regional District
- The ecological significance and condition of the land and adjacent marine environment were assessed through consultation with a variety of local and provincial experts in various fields including ecosystem analysis and ecosystem-based planning, restoration, sustainable forestry and agriculture and food production
- The cultural history and significance was assessed including First Nations and early Europeans
- A management philosophy with Vision Goals and Objectives was developed including consideration of climate change
- Land zones with guidelines and actions were developed according to the ecological sensitivity
- An implementation strategy and monitoring program was outlined. An adaptive management strategy with ongoing monitoring and evaluation will help ensure effective, efficient and engaging ecological restoration as outlined by Keenleyside et al. 2012. p.53.

A review of their Vision, Mission, Management Philosophy, Management Principles, Goals and Objectives are essential in developing any design and restoration prescriptions (GCA 2013):

Vision:

The Learning Centre will focus our learning about the remarkable coasts, islands and waters of Galiano and the Salish Sea. We aspire to learn the life lessons and history of this particular place, and look clearly and imaginatively into the future. This experience with the Land will reinforce the lesson that as we restore a place we also restore our communities and ourselves.


Mission:

Steward the Land in a manner that restores and maintains healthy, resilient ecosystems and then models innovative approaches to sustainable living.

Management Philosophy:

What is best for the ecosystems of the land should figure highly in any decisions. The land should be regarded as a community to which we belong that both sustains us and is sustained by us; to be loved and respected. Activities on the land should bring us closer to natural processes, to ourselves and to one another.

Management Principles:

1. Focus on what to protect,  on what to use.
2. Recognize the hierarchical relationship between ecosystems, cultures, and economies – that economies are part of human cultures, which are part of ecosystems. Therefore, maintaining the integrity of ecosystems provides the basis for sustainable cultures, including their economies.
3. Apply the precautionary principle to all plans and activities.

4. Protect, maintain, and, where necessary, restore ecological connectivity, and the full range of composition, structure, and function of enduring features, natural plant communities, and animal habitats and ranges.
5. Facilitate the protection and/or restoration of Indigenous land use.
6. Ensure that planning is inclusive of the range of values and interests.
7. Contribute to diverse, ecologically sustainable, local economy.
8. Practice adaptive management

#### Goals and Objectives:

- practicing ecological stewardship
- creating opportunities and providing facilities for learning, research and innovation
- contributing to local food security
- contributing to local economic development
- providing public access
- creating opportunities for recreation (GCA 2013)

Their plan establishes clear intentions within a strong ecosystem-based approach that provides a framework from which more detailed site specific planning can occur. It looks first at the most important areas for ecological protection and then at the suitability of remaining sites for desired higher intensity uses, activities and infrastructure.

#### **b. Review of Best Practices**

The IUCN (Keenleyside et al. 2012) has published a section on Best Practises in ecological restoration. They offer twelve key messages with an emphasis on ensuring a participatory process involving all relevant stakeholders and partners in planning and implementation. Higgs (2003, p. 242) refers to this as conducting Focal Restoration – “practises that creates strong relationships between people and natural processes”. Ultimately environmental problems are rooted in human ideals, values and beliefs.



Participation in restoration work helps people connect with each other and with nature, creating a stronger desire to conserve and protect. Further, when restoration considers past history and culture, it creates within people, a sense of continuity and helps create a sense of place so that the site takes on more significance. The process and the product of restoration are both beneficial.

Most neighbouring Gulf Islands including Mayne, Pender, Salt Spring and Gabriola islands, have similar community- based conservancy associations with similar mandates to be stewards of the island ecosystems, build social capacity through education and engage the community in active restoration. A few of the differing approaches are noted:

- Salt Spring Island group has assembled a list of federally and provincially listed species- at- risk, which is their focus for conservation/restoration and may enable them to seek more government funding. There may be greater opportunities for the GCA to assemble a similar list for DL57 and include recovery plans within the site. Some possible species may include the sharp-tailed snake, purple martin, western bluebird and painted turtle.
- Pender Island Conservancy Association helped establish conservation covenants on private land ( not held by the association) for which land owners receive reduced tax incentives
- A similar NGO – the Garry Oak Ecosystem Recovery Team partners with local municipal and regional parks departments and gains the benefits of funding support.
- While other associations have education programs, GCA appears to be the leader in developing a restorative learning centre. This centre will certainly help the association achieve its mandate to preserve, protect and enhance the quality of the human and natural environment on Galiano Island.

If not already done, it may be prudent for CGA to network, through the Islands Trust, with the other island conservancies to share collective knowledge and together expand their sphere of influence in protecting the islands ecosystems and culture. Like ecosystems themselves, the associations can become self-organizing systems, increasing in diversity and complexity and increasing energy flow into the system. Entropy increases. (Volpe 2014).

## V. DESIGN PROCESS

The GCA has set the stage for implementation of successful restoration projects, including the design and restoration of the multi-use site. They have assembled critical ecological information, gathered historical and cultural information, engaged the community in a dialogue reflecting communal philosophy, values, principles and adopted an attitude of adaptive management and ongoing monitoring and research to the guide intervention into the natural system.

Their work follows closely that of Higgs (2003) and Higgs and Hobbs (2014). They have proposed a process of “Wild Design” as a framework to guide intervention into natural systems. Wild Design involves the integration of scientific knowledge from many disciplines with active participation from a community to define its social, cultural values in order to establish appropriate goals and objectives for the project. It is an engagement with natural processes that involves both a strong commitment to restore both the ecosystem and the social culture of the community.

Higgs and Hobbs (2014. p. 238) outline three steps in the process of Wild Design; (1) gain an ecological understanding of the problem, (2) incorporate community values and principles and (3) public participation in goal setting, engagement with stakeholders, attentiveness to local characteristics and project implementation. As well they define seven principles to guide the process; “Clarity, Fidelity, Resilience, Restraint, Respect, Responsibility, Engagement.” Plans for the design and restoration of the multi-use site follow the Wild Design process, integrating the ecological, historical and cultural information with the communities expressed philosophy and vision for the site.

## VI. SITE DESCRIPTION

### a. History

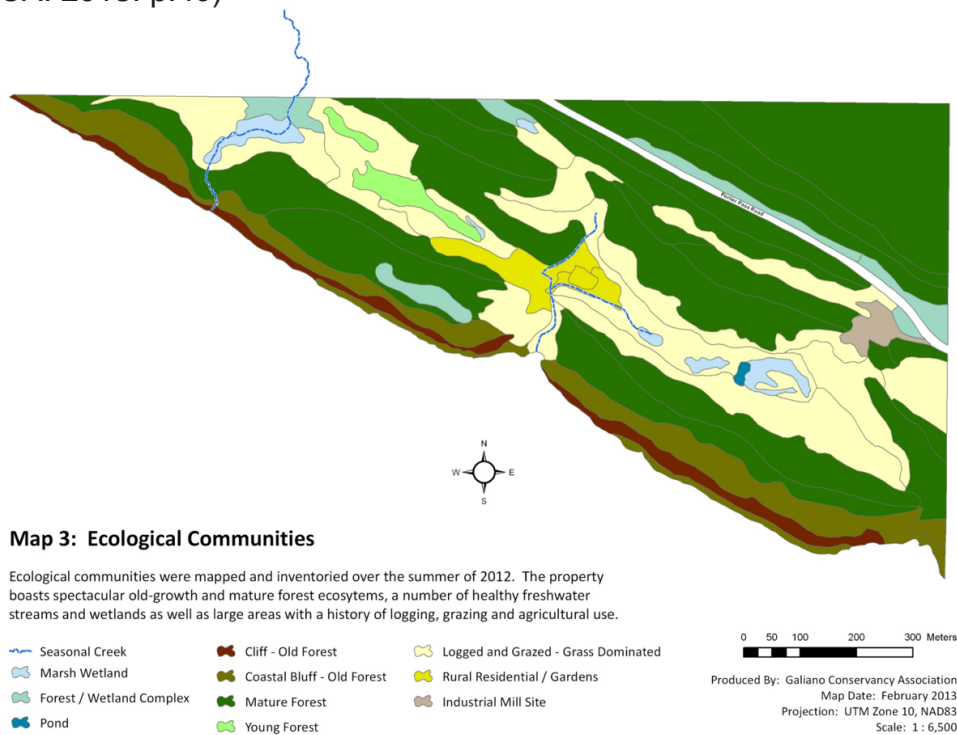
DL57 has a very diverse history of ownership. Community member Gary Moore has researched the history of the island and presented us with a brief history of the use associated with each known owner. The first known holder of this land was the Scholefield family who ran a homestead and farm in the 1920s. This meant there were many agricultural uses for the land as well as the construction of a house near the middle of the property. In the 1930's the farm was then sold to the Communist Party of Canada and the use of the property is somewhat unknown. Finally, Bill Campbell took possession of this property in the 1950s. Logging on the property was his main objective however, he allowed people to stay on the property and build small houses/structures when he wasn't on site. Later in his life Bill Campbell returned and began to log the property more extensively leaving large areas of disturbed land and numerous roads throughout the property. This provides discontinuity in the landscape and ecosystems, habitat for invasive species, and general declines in the health of the land. At one time in the history of the property and specifically the multi-use site Ken Millard informed us that there was a road that lead down (through the now campground) to Sturdies bay. Finally, in 2014 the Galiano Conservancy purchased the property in hopes of achieving the goals and objectives previously described.

### b. Ecology and Human Use

Galiano Island lies within the Coastal Douglas-fir Biogeoclimatic Zone; a unique set of associated ecosystems that occurs on a narrow strip of south-east Vancouver Island, Gulf Islands, and the Sunshine Coast regions of British Columbia (BC. 1999). “The Coastal Douglas-fir Zone is the rarest biogeoclimatic zone in British Columbia and is of great conservation concern.” (Biodiversity BC website). There is an open field area with emerging invasive grasses and thistle, as well as some native plants. The rocky bluffs on the north end of the bluff contain a variety of tree species including Douglas-fir and arbutus.

The plan identified five Management Areas representing land-use zones from low- intensity use to high- intensity use corresponding to zones of increasing environmental sensitivity and levels of environmental protection. The campground and learning centre activities and uses have been designated within a low sensitivity Multi-use zone (Figure 1).

The primary purpose of the Multi-use Facility Areas is to accommodate the buildings, systems and infrastructure required to support day and residential learning, research and retreat use of the property. Multi-use Facility Areas are generally located on previously logged and highly disturbed sites. They are accessible by existing maintained roads. (GCA. 2013. p.40)




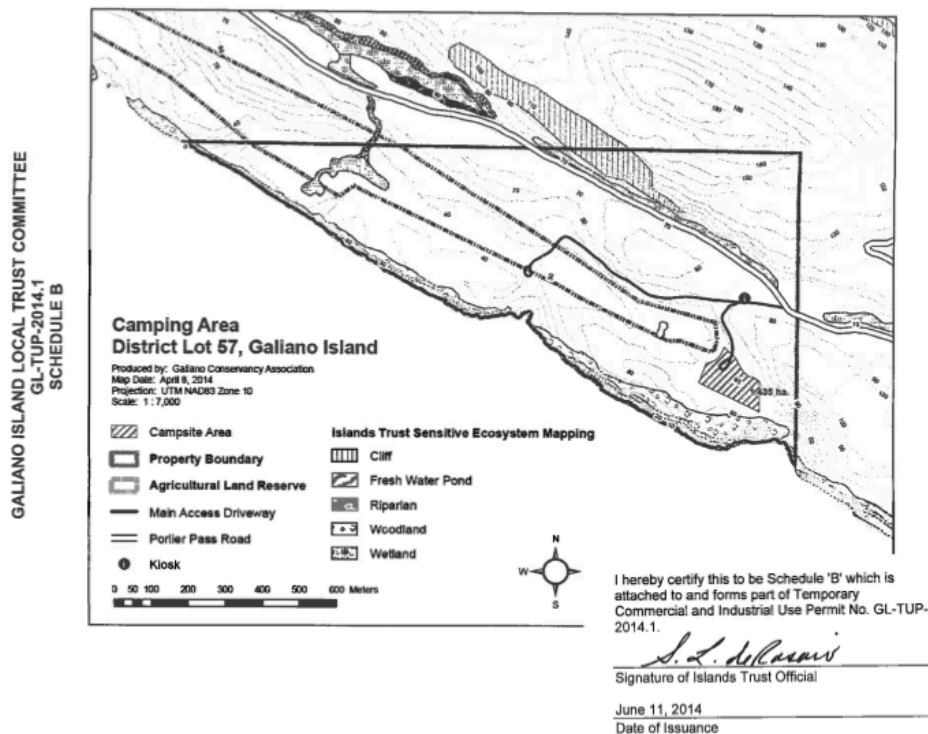
**Figure 1. Map of Ecological Communities from Galliano Learning Centre Management Plan**

The plan also provides Guidelines and Actions in a number of areas including; Ecological Restoration, Facilities and Infrastructure Management and Recreation

Management to ensure that activities meet the overall Philosophy. These were also critical to consider in the design and restoration plans for the campground and learning centre multi-use site.

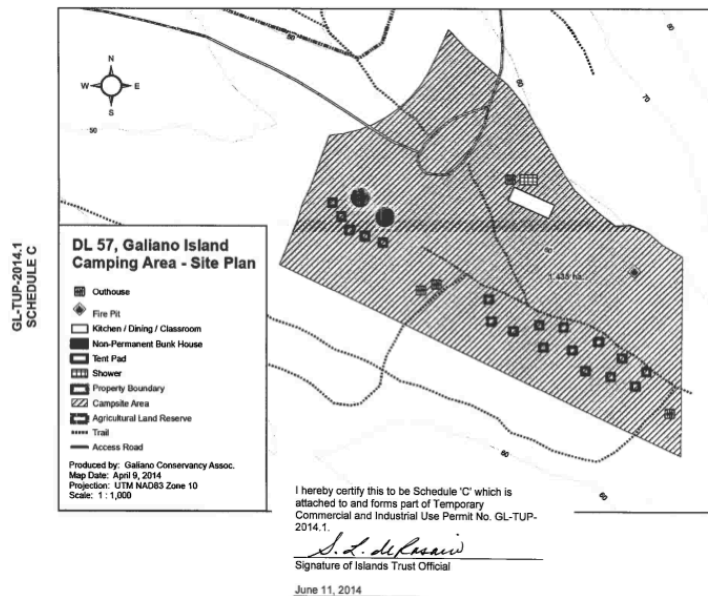
## VII. SITE ANALYSIS

With the Temporary Use Permit acquired by the Conservancy through the Galiano Island Local Trust for the  camping area certain limitations exist. As an overview the campground is currently limited to 1.44 hectare area outlined in the below map.



**Figure 2. Camping area map from Galiano Conservancy Association**

The disturbed areas within this site set limits on possible design, but the conservancy drew up the basic design layout seen below.



**Figure 3. Camping area site plan from Galliano Conservancy Association**

This section will look at the opportunities and constraints observed while onsite as well as in the above Temporary Use Permit design. It will make suggestions on improvements, recommended areas for restoration, and future expansion of the multi-use camping and learning centre site.

### a. Constraints

Some of the main concerns brought up in discussions with community members, key stakeholders, and our own analysis were regarding safety on site, the need for more facilities, and the need for better-defined pathways for access to and from the sites various features. Some examples are listed here.

- The roadway down to the roundabout and the camping area are shared by both vehicle and pedestrian traffic.
- The site is lacking clear pedestrian paths and routes to the tent pads, learning centre, parking near the mill site, fire pit, shower facilities, and outhouses.
- Due to historical logging and intensive use of this site there are many stumps, obstacles, and invasive weed species throughout the site and

around the perimeter likely disrupting ecological processes and connections

- The site lacks aesthetic appeal needed to support a learning centre/campground
- There is no indication of informational or educational signage in key historical or natural feature areas of the site.

## **b. Opportunities**

Many of the constraints listed above only lead to opportunity. Although, in the original campground plan, these are all limiting factors there are many opportunities for improvement and development as restorative action takes place. In defining restoration, "the process of assisting the recovery of ecosystems that have been damaged, degraded, or destroyed," the key words are ecosystem and restoration (Society for Ecological Restoration International Science and Policy Working Group, 2004, p.4). For this multi-use site to exceed all expectations of a learning centre, or camping area, it needs to be restored to its own self-sustained, growing, thriving ecosystem that incorporates human interaction at every step. This includes concentrating facility development within this site to preserve more native ecosystems that will have less human use elsewhere in DL57. This is the design approach utilised to create the following map.

Observing the IUCN principles, guidelines and best practices for successful restoration of protected areas, the opportunities for the campground are outlined below as well as a detailed description of the features within the map. These principles also coincide with the management principles, and goals and objectives of the Galiano Conservancy Association.

Effective:

In order to 'do no harm' key areas on site were identified as first priority restoration sites. These areas have prescribed restoration actions described below.

They are key in redefining the landscape, restoring structural integrity, and reintroducing native species to the landscape.

Restoring connectivity between the multi-use site and the rest of the property is also very important for the site's ecosystem, as well as re-establishing traditional cultural values and practices that contribute to sustainability.

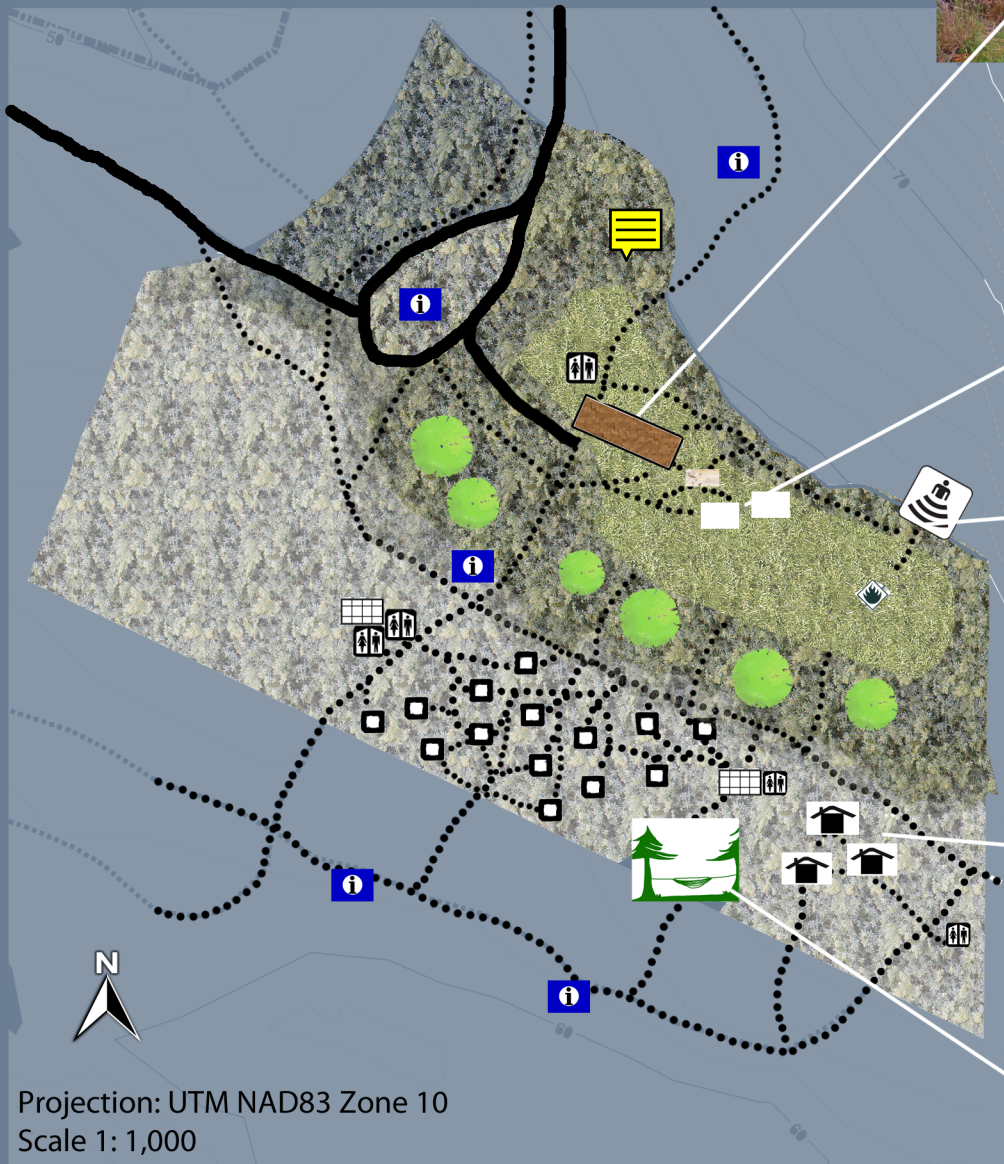
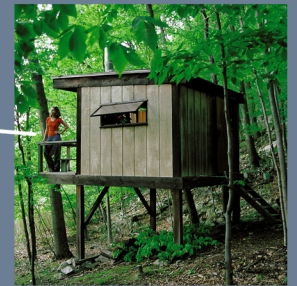
Design Features: fruit/nut trees, first priority restoration areas, high traffic future restoration area, intensive use activity field,

Recommendation:


1. By planting fruit or nut trees and creating a novel ecosystem component between the campsite and the learning centre building it is possible to maximize the restoration contribution by benefiting both from the added structural component to the landscape and from the sustainable food resource available outside the kitchen. Collaboration with other projects on site, such as the proposed food forest, would help in choosing trees that would extend pollination corridors and again enhance connectivity throughout the property.
2. Restore first priority restoration areas to ensure regions of lower human interaction can be properly restored closer to a historical state.
3. High traffic future restoration areas are suggested for use for pathways and development of the camping area and once sufficient facilities are in place to sustain human activity at the Learning Centre then these areas can be set aside for future restoration projects.
4. The intensive use activity field was included in the original plans and is meant as open space for games and activities for kids to run and as an open area for gathering.



# DL 57, Galiano Island Multi-Use Camping Area and Learning Centre - Design and Restoration Map



Projection: UTM NAD83 Zone 10  
Scale 1: 1,000

- |  |                            |   |                                      |
|--|----------------------------|---|--------------------------------------|
|  | kitchen/dining/classroom   |  | fruit/nut tree                       |
|  | non-permanent buildings    |  | first priority restoration area      |
|  | natural amphitheatre       |  | high traffic future restoration area |
|  | firepit                    |  | intensive use field for activities   |
|  | tree houses or bunk houses |  | foot path/trail                      |
|  | Hennessy Hammock hostel    |  | road/vehicle access                  |
|  | shower facilities          |   |                                      |
|  | composting toilet/outhouse |   |                                      |
|  | tent pad                   |   |                                      |
|  | educational signage        |   |                                      |

Efficient:

A goal of this design was to create an ecosystem that incorporates every aspect including human interactions. Implementing a low impact trail network within the site and to the surrounding ridges will ensure the long-term capacity and support for maintenance.

Design Feature: Pathways, composting toilets, shower facilities, road/vehicle access

Recommendation:

1. To make sure plans for the camping area are effective and efficient we suggest implementing pathways in the proposed areas to effectively manage the movement throughout the site and minimize damage to areas of concern. That is expand the woodchip-covered paths around the site - a cost effective solution that will minimize maintenance costs of surrounding areas in the future.
2. Composting toilets are suggested instead of outhouses as a more efficient and sustainable waste management system. However, because this is contrary to the building code, composting toilets cannot be achieved a larger number of outhouses on site are required for the site to be functional.
3. Create simple shower and wash facilities with potable water for the campsite area. Two are proposed in the design; however, one would be sufficient in close proximity to the tenting and housing area. Wastewater from these facilities could be used for irrigation of the fruit/nut trees and other restoration areas.

4. Road access is a safety concern on the site. Implement a pathway or staircase up the slope behind the building to the parking lot to create safer access for pedestrians and vehicles. Also implementing pathways up to the southern ridges of the property and to and from all the site features is recommended to reduce human impact on site and increase efficient movement throughout the site.

#### Engaging:

Finally in order to create rich experiential opportunities to connect people to place the entire design is meant to engage people with their environment whether it be from picking their own food from the fruit trees, or listening to a presentation in the amphitheatre with pocket views of the ocean, or while sleeping in a hammock, tent, or tree house in the forest. Everyone who visits the site should feel like they are a part of the ecosystem. This will also be achieved through engaging volunteers in building, operating, and monitoring the site. Engaging companies, such as Hennessy Hammock to donate time, labour, or equipment will encourage public recognition of the site. Connecting people to this site will be the indefinite way to maintain the site over time.

Design Feature: Tent pads, Tree houses, and a Hennessy Hammock Hostel, educational signage, natural amphitheatre, fire pit, non-permanent event buildings, outdoor eating/classroom

#### Recommendation:

1. Relocate some tent pads further back into the forest so they are not in the open path and make it easy to gather as a group in the tenting area. Also add tent pads to have the maximum 14 allowable tent pads.
2. Create a Hennessy Hammock Hostel area in the trees below the tenting area. Designate appropriate trees for hammocks to be hung and have this as a camping option. Not only are these hammocks an easy camping

solution, but also they physically connect the camper to trees and they were designed on the Island connecting the local business community to the site.

3. Have tree houses, or a form of bunkhouse for the less rustic camper or for someone staying for a longer period of time. The image shown of a possible hut is of a simple design that would cause little impact on the forest floor or on any trees, but would provide the opportunity to be within the forest.

4. Educational signage is a must. The Learning Centre will provide a beautiful location for experiential learning, but historical features should be noted, as well as restoration efforts and culturally significant stories. Identified are possible placements of signs including one at the start of what used to be the road on the island that connected the property to Sturdies Bay.

5. On the Northern slope above the fire pit a natural amphitheatre could be created with the use of the stumps and logs found throughout the property. Not only will this provide a stage with pocket views of the ocean, it will provide a natural outdoor theatre for engaging with the surroundings and people of all ages.

6. The fire pit is included in the original plans and provides yet another gathering place for story telling.

7. An area is identified for non-permanent event buildings or tents for larger groups or external classroom use.

8. An outdoor eating area or platform that can also be used as an outdoor classroom would provide a more experiential setting for group meals or talks.

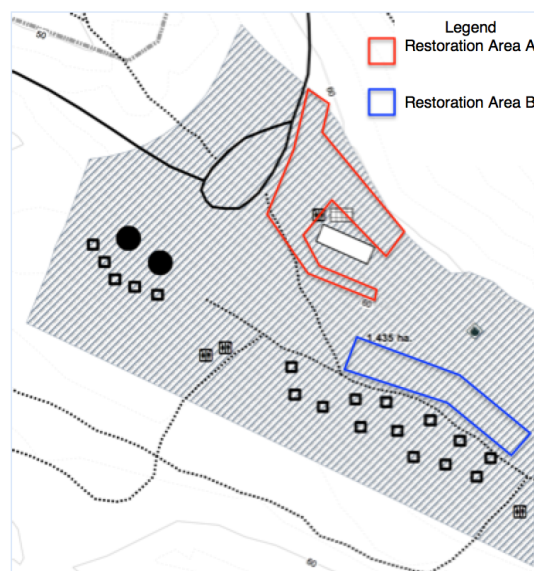
9. Engage community members like Jane Wolverton who expressed concern about food availability for the Galiano community as a whole in an effort to connect people and projects in the community to support a sustainable future for the entire island.

In order for this ecosystem to be restored to incorporate and function with humans it will take time and effort from the entire community. However, these suggestions should help keep the restoration efforts effective, efficient, and engaging.

## RESTORATION PRESCRIPTIONS

### a. Restoration Areas

The first priority restoration area (Figure 4) is what this prescription plan will address. This is surrounding the Learning Centre building (in construction and the flat field area adjacent to the learning centre building. This includes from the current road down to the site to beside the building and the south side of the building (Area A), and the small sloping area between the flat field area and the current campsite area (Area B) (Figure 4).



**Figure 4. First priority camping areas adapted from GCA Management Plan**

## **b. Current State**

As mentioned above, it is known that the restoration and campsite area were logged up until 2009 and there are several cedar and Douglas-fir stumps and logs remaining from that logging practice. The area is covered by a number of invasive species, particularly thistle, bull thistle, common velvet-grass and a variety of other grasses. Some native species including mahonia and salal are present at the site as well. The learning centre building is also currently under construction, adding to disturbance and compaction at the restoration site. Two comparative sites on the property are used to influence restoration prescription ideas.

## **c. Blending the Learning Centre Building**

One objective from the restoration of the area surrounding the learning centre is to “blend” the appearance of the building from view and to have the building incorporated into the flow of the landscape. The main view of the building (once complete) will be from the road that leads down to it. Screening and blending the building into the surroundings will be best achieved by planting trees between the building and the road (north corner of Area A). Figure 5 shows the area between the building and the road that is to be used to blend the building into the surroundings.

One potential solution to speed up the screening process would be to extend the rocky bluff area with a hill of soil coming down from beside the road to near the north corner of the building. This would create a wall, with trees and other plants in order to shield the view of the building. However, there are drawbacks to adding material to the hillside. Finding the appropriate soil and the cost involved in obtaining and moving such a large amount of earth are concerns. There is also a concern of potential washing events from the soil when it is first added. Because it will be loose, with few roots to stabilize it, the hillside may give way, especially after a large precipitation event. The material could fall towards the building or overtop of the road, blocking access and creating more setbacks. Proper compaction and grading of the slope would be required

to alleviate some of the potential for wasting. Overall, this idea could be used and would be a good way to increase screening of the learning centre building, but further research, including geotechnical advising, and support would be needed to pursue this route.

The blending effect desired to hide the learning centre building will take a number of years, as the trees will need to be quite tall in order to effectively block out the building. Some grand fir, Douglas-fir, Arbutus, red alder, or Western red cedar trees may be used in Area A beside the road, in specific areas suited to each species. Potential understory plants could include mahonia, salal, Nootka rose and ocean spray. However, more analysis on the specific species that would be suitable for this site is required.



**Figure 5. Between road and building – area for blending with trees (Jane Healey)**

#### **d. Invasive Species**

The biggest challenge with this restoration project will likely be the management of invasive species in the area. The majority of DL 57 has substantial amounts of various invasive species. The campsite area is struggling particularly with thistle and

grasses. The thistle has come in to the disturbed site area and covered a great portion of the two key restoration areas. In order to begin replanting new species, the current layer of invasive thistles and grasses would need to be removed, creating a disturbance and a new perfect spot for these invasives to grow back.

Persistent management of these invasive species will be essential for the success of restoring these areas. However, because the invasion is widespread throughout the property and nearby properties on Galiano Island, a more widespread invasive species management plan would work best to keep any invasive plants from growing back in the campsite area, as well as the whole of DL 57. Managing these species over the whole property would better ensure that they would not return to the campsite restoration areas A and B. However, this is a gargantuan task that will take many years as well as a lot of funding and people power.

Once replanting with native species has begun, frequent monitoring and adaptation for the return of invasives is imperative. As soon as invasive species are detected returning to the site, action must be taken to remove them again. This includes removing them by hand and ensuring existing non-invasive plants have the chance to establish in the area by reducing disturbance as much as possible once planted.

Canada thistle is a particularly nasty invasive species that has taken hold in the restoration spots at the campsite area. It grows best when there are no other competing plants and because of extensive root system, it is difficult to control (Government of Saskatchewan, n.d.). Removal of thistle as completely as possible from the restoration sites, with refraining from using herbicides, followed by planting of appropriate native non-invasive species is important. Over time, the thistle will become less of a problem in Area A as it is a shade-intolerant species. As trees and shrubs begin to take over this area, thistle will be outcompeted. In area B, if fruit and/or nut trees are planted, this will help reduce the presence of thistle over time as well. Shading of thistle is the main control practice in Canada excluding the use of herbicides (Ross, M., n.d.). The GCA has indicated that they would like to avoid the use of herbicides. The key to controlling thistle is persistence. Continually causing stress to the plants will deplete nutrient stores and they will eventually die out. Managing for the control of Canada thistle will take



several years and should be planned for as such. This restoration prescription does not provide further detail on controlling thistle, as that is another huge project for the GCA to undertake. However, controlling thistle is an important part of this prescription.

There are also invasive grasses in the restoration area, throughout the campsite area, as well as across the DL57 property. Species include but are not limited to common velvet-grass, yellow-flag iris, foxtail fescue, colonial bentgrass, sweet vernal grass, spike bentgrass, silver hairgrass, and crested-wheat grass. The details of this restoration prescription do not include control of each of these species.

Controlling invasive thistle and grasses is important, and part of this is giving newly planted native species a chance to thrive. Thorough planning ahead of time is necessary to ensure the greatest chance of success for native species (United States National Park Service, 2014). Not allowing invasive species to out-compete native species is a big challenge and must be handled aggressively. Very thorough and frequent monitoring is important. Observing the restoration areas and identifying when an invasive species is moving in, and then removing those plants is a good way to ensure the native species can establish. However, this can take up a lot of time and energy. Removing invasive plants once they show up will also cause minor disturbances around the site, further promoting the spread of many invasive grasses and thistle.

Another key strategy for ensuring native plant success is to time the planting of them. Each species has an optimal time of year to be planted to ensure greater success and establishment. For the first while after planting, appropriate watering and weeding is also important to help the native plants.

Part of ensuring native plants will establish and out-compete invasive species is to find the correct species to plant in an area. Two reference sites are used for this restoration project to help determine what appropriate species would be to plant at these locations. But also researching more about potential species, including the optimal soil, aspect, slope, shading, watering etc is important to determine exactly where on the restoration areas to plant each plant. Finding species that can grow well together is important as well.

As this project moves forth, it may be found that completely eliminating and keeping invasive species at bay could be too much of a challenge to take on. Through adaptive management, it could be decided that some invasive species may just become part of a novel ecosystem in this area. The GCA has preferred that this project attempt to eliminate invasive species, but recognizes this is a long-term task and may prove to be impractical or impossible within their means.

### **e. Restoration Steps**

The restoration process for the campsite area is broken up into two spots, Area A and Area B. They are both similar sites ecologically and are close together, however the goals of function are quite different. Area A is intended to help blend the learning centre building in with its surroundings, whereas Area B has several potential options for function in its setting. One main option for Area B is for fruit trees to be planted and act as a small extension of the potential food forest adjacent to the campground site. The restoration process is the same for each area unless specified. This is a general idea of the process and can be adapted as needed. Because the restoration sites lie in a high use area, the goal is not necessarily to bring the space back to a real natural state. The idea is to reduce or eliminate invasive species and to create a more natural space than exists currently.

Area B: This area has the opportunity for different types of restoration. It could be an extension of Area A and include exclusively native species. It could just have smaller shrubs and low trees to maintain an open flow between the learning centre building and the campground area, or it could have taller trees to screen the two areas. It could have fruit and nut trees as an extension of the food forest. This space could also be left alone and have no restoration, or a completely different idea may emerge that would be best suited for the present and future needs of the GCA.

1. Identify and adjust goals and objectives. Some goals already identified by the GCA are to blend the learning centre in with the landscape, and to use this

restoration project as an experiment and learning/teaching tool. Ongoing discussion amongst conservancy members and the public should continue to reach a decision on the final goals and objectives of this project. A rough timeline for the project can also be discussed.

2. Identify space to restore. Figure 4 shows a general idea of the desired restoration spaces. However, as construction continues with the learning centre and related infrastructure (septic system, washrooms and showers) and goals for the conservancy change with further discussion, the final boundaries for restoration will change and be fine-tuned.

3. Further research into biotic and abiotic conditions. Two reference sites have already been established and have data available. As well, climatic data is also available for the area. Further research on soil characteristics including compaction, current invasive species, and other conditions is needed.

4. Finding appropriate species. The reference sites and general knowledge of the area is known, including some of what species would be appropriate to plant in the restoration areas. Research into specific species for Area A, specifically what type of trees would be best is needed. While general ideas for the area are known, identifying microsites and picking the best-suited plants for each smaller area is a larger task. Identifying smaller sites and choosing particular plants will increase the chances of success for the native plants and lower the chance of success of competing invasive species.

5. Creating a thorough plan and timeline. This includes setting out the individual steps required to carry out the restoration plan, as well as a timeline for each part of the project. Steps may include removing current invasive species, preparing the soil, preparing the native plants for plantation, care for plants, determining which plants will go in what location, etc.

6. Carrying out the plan. Actually getting a shovel in the ground, and going forth with the steps in the plan. There will likely be bumps in this step, which is where adaptive management and monitoring come in.

7. Monitor progress and adapt to changing circumstances. Having photo-monitoring spots and designated people to record findings before, during, and after the actual physical restoration is an essential tool for the learning process of this restoration experiment. There will be unforeseen changes and hiccups which will change the rest of the plan. Working with these changes is part of adaptive management.

#### **f. Adaptive Management and Monitoring**

Adaptive management in a restoration setting means to change the prescription plan as unforeseen things happen with the project. This project is an experiment. Things will happen that nobody saw coming, and the ideals in the beginning of the project could have to change as the project progresses. There are “unknown unknowns”, and ecosystems are more complex than we can know. Changing prescription plans as these unknown things come up is important. Realizing that the original prescription plan and vision for the project may change very drastically over time as this experiment unfolds.


#### **g. Education**

This entire restoration and design project is considered to be an experiment and there are opportunities to learn at every step along the way. The GCA staff and volunteers will have learning opportunities as the restoration project unfolds, and will be able to use the project as a teaching tool as part of their programming. The educational signage and restoration project will allow for programming to include learning about ecological restoration, novel ecosystems, as well as the real-life challenges that come with this type of project – trial and error, adaptive management, changing goals etc.

Hands on experience for program participants can also be incorporated into the project (monitoring, weeding, etc).

## CONCLUSION

Best practices from the IUCN as well as the vision, goals and principles established by the GCA were employed throughout the design and restoration plans. Combining the design of the multiuse site with specific restoration prescriptions is an ideal way to move forward in restoring ecosystems to include human interaction. Constraints of the site in its current state only lead to opportunity as the Learning centre grows. The goals of blending the Learning Centre building with its surroundings and creating a well-functioning native ecosystem are manifested within the restoration prescriptions. By using this and future restoration projects as learning and teaching tools it allows the GCA to improve its community outreach and programming, therefore ensuring the indefinite maintenance of this site by creating connections to place.

Ultimately, the CGA will need to seek a rezoning of the property and final approval of the development plan. Since such processes are political and subject to public opinion (Curran 2013.p.29), it mmended that the GCA undertake further public consultation to demonstrate the social, environmental and economic value and benefits of the plan.

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