Shore Access #17 Ecological Restoration Project (2023 to 2024)

Georgeson Bay, Galiano Island, BC

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ER390: Environmental Restoration Project

August 15, 2024

Contents

Epigraph

"Our very idea of productivity is premised on the idea of producing something new, whereas we do not tend to see maintenance and care as productive in the same way."

— Jenny Odell, "How to Do Nothing: Resisting the Attention Economy"

Executive Summary

This report documents work done on the ecological restoration project Shore Access 17 at Georgeson Bay on Galiano Island between June 2023 and August 2024, building off work from prior involved parties from 2020 to 2023. The goal of my project is to ensure the continuation and progression of ecological restoration on the site through removal of invasive species and planting of native species. Activities conducted during this period include 174 person-hours of invasive species management (primarily during three volunteer work parties), native species monitoring in Zone 1 of the site to assess species abundance and survival rates, native plant species selection for future planting and administrative tasks. Six of eight total recommendations from the 2023 management plan were progressed during my involvement in the project. Recommendations for moving forward include site wide recommendations for invasive species management, adaptive management measures and suggested next steps for the project.

Introduction

Biodiversity decline caused by human activities is a pressing concern both worldwide and within British Columbia. Ecosystems that have been modified by humans often see declines in populations of native species, and ecological restoration efforts aim to restore function in damaged ecosystems which in turn slows biodiversity loss (Gann *et al*., 2019). This technical report describes work completed from April 2023 through September 2024 for the Shore Access #17 (Zuker) ecological restoration project on Galiano Island. Shore Access #17 is public land managed by the Galiano Island Park and Recreation Commission (GIPRC). The restoration project was originally initiated by Andrew Simon in 2020, acting in his role as Commissioner of GIPRC. The goal of the Shore Access #17 restoration project has been to restore and enhance terrestrial habitat, primarily through removal of invasive plant species and planting a diversity of native plant species targeted at supporting local pollinators.

This is the third Restoration of Natural Systems (RNS) student project that has been completed for Shore Access 17. Briefly, the first two student projects assessed site conditions, planned appropriate native plantings, managed invasive plant species, held monitoring activities and hosted volunteer events. The goals of this project were to continue to manage invasive plant species, to monitor prior native plantings, to update the restoration prescription for the site and to continue the project's momentum.

Site Description and Ecological Context

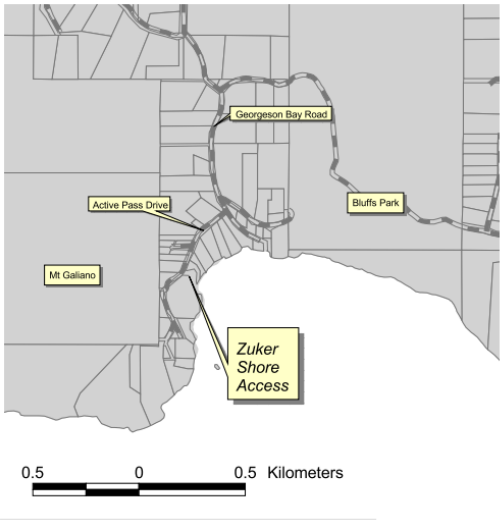

Figure 1. Shore Access #17 map (modified from GIPRC, 2009)

Shore Access 17 (also named 'Zuker'), leads down to Georgeson Bay, on the south side of Galiano Island and to the east of Mount Galiano (Figure 1). The address is 287 Active Pass Dr (48.8660, -123.3509).

Galiano Island is within the traditional territories of the Penelakut, Hwlitsum, and Tsawwassen First Nations, and of other Hul'qumi'num-speaking peoples, who have occupied and stewarded their lands since time immemorial. Prior to colonization, Shore Access 17 and the surrounding area likely were managed by cultural burning practices (Jeannine Georgeson, personal communication, May 10, 2024), which are a traditional land management practice using controlled fire for ecosystem health and for ceremonial purposes. After colonization began in BC, cultural burning practices were banned throughout the province by the Bush Fire Act of 1874. The land use of the surrounding parcels shifted to agriculture and invasive plant species began to move into this site. GIPRC began managing shore access trails on Galiano Island, including Shore Access 17, in 2006.

The restoration site is in the semi-arid Coastal Douglas Fir biogeoclimatic zone (CDFmm) which occurs on parts of south-east Vancouver Island, the Lower Mainland of B.C., and the Gulf Islands within the rain shadow of the Vancouver Island and the Olympic peninsula mountains (Nuszdorfer, Klinka and Demarchi, 1991). Vegetation of the CDF ecosystem includes 50 rare species, many at the northern end of their distribution. (Nuszdorfer, Klinka and Demarchi, 1991). Galiano Island has a warm-summer Mediterranean climate (Csb) under the Köppen climate classification system, with a cool and wet winter (Climate Data, 2024).

Figure 2. Location of Shore Access 17 restoration site on Galiano Island, with management zones delineated in inset map.

The site has been split into three management zones (Figure 1) with differing characteristics: Zone 1 (open meadow), Zone 2 (steep, bedrock slope with thin soils), and Zone 3 (shaded, more moist forested ecosystem). See Claeys (2023) for a detailed description of each zone and subzone.

High-level restoration focuses to date for each zone follow:

- Zone 1: Fully fenced with intensive native plantings of primarily forb and shrub species. Removal of numerous invasive plant species. Area with the highest level of effort and number of native plantings.
- Zone 2: Shrub plantings with caging to protect from deer browsing. Invasive plant management.
- Zone 3: Invasive plant management, with lower effort of seeding and planting than the other two zones.

Terrestrial ecosystem mapping (TEM) was done in 2021 for each zone, with the following results:

Table 1. ***Terrestrial ecosystem mapping per zone.***

Zone	**Site Series**	**Structural Stage**	**Additional Modifier**
Zone 1	CwBg - Foamflower (RF)	Young forest	Broadleaf canopy (5B),
Zone 2	CwBg - Foamflower (RF)	Graminoid-dominated (2b)	Very shallow soils and a warm aspect (vw).
Zone 3	CwFd - Kindbergia (RK)	Young forest	Single-storied, broadleaf canopy (5sB).

See Boyd (2022) for a detailed description of the terrestrial ecosystem mapping methodology.

Timeline of Work to Date

2017

- GIPRC put significant efforts into controlling spurge laurel (*Daphne laureola)* in this area. This was ultimately unsuccessful, as the species vigorously regenerated in following years.

2019

- This site was identified as having high restoration potential in a survey of several sites maintained by GIPRC. A formal restoration project was proposed, in part as a solution to the invasive species management challenges.

2020

- A management plan was produced by Andrew Simon and Michael Carrothers (2020). Students in the University of Victoria's Restoration of Natural Systems diploma program were recruited to support the project.

2021 to 2022

- Student #1 (Brittany Boyd) involvement:
  - Surveyed and mapped Zones 1, 2 and 3 using TEM methods.
  - Managed invasive species across all three zones.
  - Native plant selection, deer fence installation, planting and seeding took place in Zone 1.
  - Planting took place in Zones 2 and 3
  - Volunteer events were hosted on site.
- The final report produced by Brittany Boyd is titled "Restoration of Habitat for Native Plants & Pollinators on Southern Galiano Island, B.C." (2022).

2022 to 2023

- Student #2: (Brittany Claeys) involvement:
  - Planted additional native plants in Zone 1 (forbs and seeds).
  - Created a prescription for additional plantings in Zones 2 and 3, and planted them.
  - Conducted monitoring in spring 2023 for Zone 1, 2 and 3.
- The final report produced by Brittany Claeys is titled "Georgeson Bay (Shore Access 17) Pollinator Restoration and Management Plan 2023" (2023).

Project Goal

The goal of this project is to ensure the continuation and progression of the work started by GIPRC and previous UVic RNS students maintaining Shore Access #17 as an ecological restoration site through removal of invasive species and planting of native species.

Objectives

Table 2. *Restoration project objectives*

#	Objective
#1	Continued removal of invasive species, including: • Hand removal of invasive species on site, primarily in Zone 2 and regenerating individuals in Zone 1. • Removal of orchard grass (*Dactylis glomerata)* in Zone 1 through pulling, cutting and selective burlap smothering • Removal of spurge laurel on private property to the southwest to limit spread to site • Mechanical removal of large invasive individuals i.e. English hawthorn (*Crataegus monogyna)* by maintenance contractor in Zone 3, A related objective is to reduce the costs of managing invasive species over time.
#2	Monitoring and maintenance of previously treated zones, including monitoring existing planted areas to ensure the establishment of native vegetation (building on spring 2023 monitoring) in Zones 1, 2 and 3.
#3	To evaluate the success of prior restoration efforts and to suggest adaptive management options by updating the restoration prescription for the site.

Methods and Materials

Invasive Species Management

After habitat loss, invasive species are the second most significant threat to biodiversity (Environment and Climate Change Canada, 2017). Invasive species management is one of the highest priorities for Shore Access #17. Invasive plant species of primary concern on the site (species with the highest qualitatively observed abundance at Shore Access 17, with vigorous regeneration year over year) are listed below, as well as management techniques used at this site for each species.

Table 3. ***Invasive species management techniques per plant***

Plant	Management Technique	Reference
Spurge-laurel	Hand removal by pulling for small individuals (<15cm) and cutting beneath root collar for large individuals. Gloves were used as the sap is toxic. It also cannot be burned for safety reasons.	Metro Vancouver (2022).
Himalayan blackberry (*Rubus armeniacus)*	Mowing can be effective but was not utilized this year due to density of native plantings. For this site, we hand pulled small individuals, and dig out the roots of mature individuals. Note that sturdy gloves are preferable to avoid thorns.	Invasive Species Council of BC (2019)
Scotch broom (*Cytisus scoparius)*	Managed before the seeds mature to prevent spread. For small individuals, hand pulled. For large individuals (>5cm diameter stems), cut the base at or below ground level to reduce re-sprouting.	Metro Vancouver (2021)
English hawthorn	Hand pulled small individuals. For mature trees, they were cut down close to the base with a chainsaw. Most stumps cut in previous years resprouted, so stump grinding was done this year.	Garry Oak Ecosystems Recovery Team (2002)
Canada thistle (*Cirsium arvense)*	For this site, we hand pulled small individuals. Note that sturdy gloves are preferable to avoid spiny leaves.	USDA (2006)
Orchard-grass	This year, orchard grass was managed through hand pulling as its abundance has decreased through prior years of management (smothering with burlap).	Garry Oak Ecosystems Recovery Team (2007)

Three volunteer events were held between June 2023 and June 2024 (see additional details in results section). In addition to volunteer labour, the maintenance contractor for GIPRC, Michael Carrothers, had 20 hours allotted to maintaining the Shore Access 17 site in the 2023/2024 fiscal year. I provided advice on what he should focus on, which included the following in order of importance:

- Management of resprouting English hawthorn stumps in Zone 1, either by burning of stump or stump grinding during winter
- Removal of five English hawthorn in Zone 2 and Zone 3 to prevent future dispersal. Trees were flagged with orange flagging tape.
- Removal of mature English Holly (*Ilex aquifolium)* in Zone 3,
- Debris management by burning the debris pile,
- If time beyond above, invasive species removal.

The work that was accomplished within the 20 hours allocated were cutting all the mature English hawthorn trees (12 in total) and pulling smaller individuals recruited from seed surrounding the large ones. He also removed some, but not all of the hawthorn stumps through stump grinding. He burned the debris from prior work parties and piled additional hawthorn debris down beside the large holly tree, to burn when tree is removed in future fiscal years.

Monitoring

In September 2023, I conducted a plant survey of species abundance to monitor survival of prior year's native plantings for Zone 1 only. This was done to supplement incomplete monitoring for Zone 1 conducted in April 2023 (at that time, only 132 of 411 total plants had been observed due to time constraints), and to assess the survival of plantings after the dry summer months.

As monitoring was intended to inform replacement plantings (both quantity and species selection) a count of species abundance was chosen. The goal was to systematically observe all planted seedlings in Zone 1, whose locations were marked by survey flags at the time of planting. To do so, a rope was laid across the site along a set of flags and walked by the observer. Native plant species along the line were identified using a reliable field guide for native plants (Pojar and McKinnon, 1994) by one observer and verbally called out to a notetaker with a condition assessment (alive or dead), who took down the data in a field notebook. Plants that had senesced but had clear success over the prior months (obvious and plentiful seed heads) were included in the count. Once the traverse of the line was finished, the rope was lifted and placed along the next series of flagged plantings to continue identification. As this was not random sampling and the rope was primarily used to avoid duplicate counting or missing a flagged individual, the lines were placed quite close together. This was repeated across all of Zone 1. After the field visit, the observations were transcribed to a spreadsheet. The data were compared to the number of individual native seedlings planted (Boyd, 2022 and Claeys, 2023) to assess survival rate per plant species.

Native Plant Selection

The monitoring informed adaptive management through a plant selection exercise to generate a list of recommended plants for future planting. The original plan was to order and plant native species in spring 2024, but through dialogue with GIPRC commissioner Simon, native plantings in the spring were postponed in preference for future plantings to be conducted in the fall, due to drought conditions in

summer reducing survival. See results section for results of plant selection exercise and suggested future plantings.

In November 2023, I spread small quantities of native seeds, sourced from Coast Salish Native Plants in North Vancouver:

- Miner's lettuce (*Claytonia perfoliate*): 10g seeds, below the eroding slope in Zone 2
- Farewell to Spring (*Clarkia amoena):* 10g seeds, below the eroding slope in Zone 2
- Pearly everlasting (*Anaphalis maraitacea*): 10g seeds, north end of site, to the east of Zone 1.

Administration

Eight volunteer Commissioners make up GIPRC. The commissioners are appointed by the CRD for a two-year terms, beginning in the month of January. As Commissioner Simon's role is reaching a term limit, a new commissioner, Keith Erickson, was identified as a new primary contact for this restoration site due to his restoration ecology expertise. In spring 2024, I wrote a project summary of work to date to assist with the transition, then met with him in May 2024 to walk through the site together and discuss the project history and goals.

Results and Interpretation

Invasive Species Management

I held three work parties (June 2023, November 2023, and June 2024), primarily focused on invasive species management.

Table 4. ***Invasive species management activities in 2023/2024***

Date	Details	Person-hours
June 10, 2023: **Make A Difference Week event**	5 volunteers attended this event, which was focused on hand-pulling orchard grass and thistle in Zone 1.	10
November 19, 2023: **UVic Ecological Restoration Club event**	27 volunteers attended this event, which was focused on invasive species management. The majority of the effort was put into in Zones 2 and 3, with volunteers pulling small and medium individuals of spurge laurel on the site and cutting large individuals on adjacent private property to limit spread of seeds and recruitment of new seedlings within the site Five volunteers with plant identification skills worked inside Zone 1 and managed Canada thistle, Himalayan blackberry, and spurge laurel.	132
June 6, 2024 **Make A Difference Week event**	5 volunteers attended this event, which was focused on invasive species removal. Species managed include Canada thistle, Himalayan blackberry, scotch broom and spurge laurel.	12

	Volunteers also laid burlap to A) Re-establish a maintenance trail in Zone 1 and, B) To prepare two locations for future accessible benches and path to them.	
TOTAL VOLUNTEER PERSON-HOURS		**154**

In addition to the above, 20 hours of invasive species management was done by a maintenance contractor (see methods section for details). The total people-hours spent on this site by volunteers and paid staff conducting invasive species management was 174 hours over the course of my involvement in the restoration project.

Figure 3. Volunteers during November 2023 invasive plant removal event. UVic ERC volunteers hard at work (left). Debris pile of removed spurge laurel with volunteer (right).

Monitoring

Table 5. *Monitoring counts per plant species*				
Plants	**Total Planted**	**April 2023 Count**	**Sept 2023 Count**	**Survival Rate (Sept)**
Alaska oniongrass (*Melica subulata*)	3			0%
baldhip rose (*Rosa gymnocarpa*)	10		2	20%
black hawthorn (*Crataegus douglasii*)	5		6	120%
blackcap raspberry (*Rubus leucodermis*)	10	3	1	10%
blue wildrye (*Elymus glaucus*)	18			0%
blue-eyed grass (*Sisyrinchium idahoense*)	10	5	4	40%
California brome (*Bromus carinatus*)	18	1	1	6%
California oatgrass (*Danthonia californica*)	18			0%
Columbia brome (*Bromus vulgaris*)	10			0%
dull Oregon-grape (*Berberis nervosa*)	9	1	1	11%
false lily-of-the-valley (*Maianthemum dilatatum*)	10	8	3	30%
great camas (*Camassia leichtlinii*)	10	7		0%
Junegrass (*Koeleria macrantha*)	6	1	3	50%
Lemmon's needlegrass (Achnatherum lemmonii)	5			0%
long-stoloned sedge (*Carex inops*)	5	3	2	40%
mock orange (*Philadelphus lewisii*)	16	15	12	75%
mountain sweet cicely (*Osmorhiza berteroi*)	5			0%
oceanspray (*Holodiscus discolor*)	20	17	15	75%
Oregon gumweed (*Grindelia stricta*)	3		3	100%
osoberry (*Oemleria cerasiformis*)	5	1	1	20%
pacific crabapple (*Malus fusca*)	6			0%
pacific woodrush (*Luzula comosa var. laxa*)	4			0%
prairie woodrush (*Luzula subsessilis*)	4			0%
pretty shooting star (*Primula pauciflora*)	10		3	30%
red columbine (*Aquilegia formosa*)	20	14	13	65%
red flowering currant (*Ribes sanguineum*)	8	5	1	13%
red-osier dogwood (*Cornus sericea*)	10			0%
salal (*Gaultheria shallon*)	18			0%
sea blush (*Plectritis congesta*)	9		3	33%
self-heal (*Prunella vulgaris*)	3	3	2	67%
Siberian miner's lettuce (*Claytonia sibirica*)	6			0%
slender-foot sedge (*Carex leptopoda*)	4			0%
Small-flowered alumroot (*Heuchera micrantha)*	15		9	60%
snowberry (*Symphoricarpos albus*)	18	12	10	56%
spring gold (*Lomatium utriculatum*)	10	10		0%
sword fern (*Polystichum munitum*)	6	1	1	17%
tall Oregon-grape (*Berberis aquifolium*)	16	3	3	19%
thimbleberry (*Rubus p*arviflorus)	10			0%
trailing blackberry (*Rubus ursinus*)	28	10	16	57%
western fescue (*Festuca occidentalis*)	6			0%
western trumpet honeysuckle (*Lonicera ciliosa*)	5	4	4	80%
woodland strawberry (*Fragaria vesca*)	10	8	2	20%
woolly sunflower (*Eriophyllum lanatum*)	18		9	50%
yerba buena (*Clinopodium douglasii*)	5			0%

TOTAL PLANTS	**445**	**132**	**130**	

Table 6 outlines which species were observed to have a high survival rate in Zone 1. This analysis is based on 2023 monitoring (both spring and fall) of Zone 1. The full table (including lower survival rates) is included in Appendix B.

Table 6. ***Plant success ratings per species.***

Category	Species
Successful plants (where >50% of the planted specimens were observed to survive) include:	• mock orange (*Philadelphus lewisii*) • western trumpet honeysuckle (*Lonicera ciliosa*) • black hawthorn (*Crataegus douglasii*) • snowberry (*Symphoricarpos albus*) • trailing blackberry (*Rubus ursinus*) • oceanspray (*Holodiscus discolor*) • self-heal (*Prunella vulgaris*) • woolly sunflower (*Eriophyllum lanatum*) • small-flowered alumroot (*Heuchera micrantha*) • Oregon gumweed (*Grindelia stricta*) • great camas
Mid-level successful plants (20% to 50% survival) included:	• osoberry (*Oemleria cerasiformis*) • baldhip rose (*Rosa gymnocarpa*) • red columbine (*Aquilegia formosa*) • long-stoloned sedge (*Carex inop*s) • Junegrass (*Koeleria macrantha*) • sea blush (*Plectritis congesta*) • woodland strawberry (*Fragaria vesca*) • false lily-of-the-valley (*Maianthemum dilatatum*) • blue-eyed grass (*Sisyrinchium idahoense*) • woolly sunflower (*Eriophyllum lanatum*) • pretty shootingstar (*Primula pulchellum*)

To supplement quantitative observations, below I have included qualitative observations of interest:

- Spurge laurel continues to vigorously regenerate throughout all zones. Other invasive species on the site that may become management concerns include mullein (*Verbascum sp.*), foxglove (*Digitalis purpurea*), English holly, common vetch (*Vicia sativa*), Dovefoot crane's-bill (*Geranium molle*), wall lettuce (*Mycelis muralis*) and feverfew (*Tanacetum parthenium*).
- Orchard grass abundance appears to be decreasing in Zone 1.
- Canada thistle abundance appears to be increasing in Zone 1.

September 2023 monitoring found that the most successful species in Zone 1 (>50% survival) were generally drought tolerant shrub and herbaceous species (Table 6). Spring and fall monitoring results were similar in the total number of observed species (132 and 130 respectively), however, species richness was higher in the September results; a wider variety of native species were present. For species

observed in both the spring and fall, species abundance was generally lower, with the exception of trailing blackberry (*Rubus ursinus*), where more individuals were counted in the fall.

There are limitations to the collected monitoring data. The methodologies used in April 2023 and September 2023 were different: April 2023 monitoring was done for all three zones using the mapping application Avenza to create geospatial point data at each seedling, including a health score for each plant, while the September 2023 monitoring was a simpler presence/absence census of Zone 1. The time of year when monitoring activities were conducted is also relevant when analyzing these data – certain early-flowering plants (i.e. great camas) would have senesced by the September monitoring. Other species would not yet have germinated during the April monitoring (Figure 4). Plants for this site were specifically chosen to have a wide variety of flowering times, so there isn't one time of the year where monitoring would catch all plant species. This means that the data should be looked at as a suite to create a more complete picture of the success of native plantings at the site.

Figure 4. Southern end of Zone 1 through the seasons. April 2023 (top left), June 2023 (top right), November 2023 (bottom middle).

Native Plants and Seeding

September 2023 monitoring found that 2023 spring seeding was successful, as standing seed heads were abundant in flagged seeded areas. Conversely, monitoring in spring 2024 at each site of seeding indicated that seeding done in the prior November did not germinate.

Progress on 2023 Recommendations

Recommendations below (Table 7) are copied from the 2023 Management Plan (Claeys, 2023) and outlines what progress has been made towards each.

Table 7. ***Progress to date on 2023 recommendations***

No.	Recommendation	Progress in 2023/2024
1	Prioritize monitoring of plantings to determine health and general success of species, specifically in all Zone 1 subzones (2023); add flags to all species to aid in monitoring,	Zone 1 was monitored in Sept 2023. Flagging was replaced when visibly deteriorating and newly seeded areas were flagged, but additional flagging beyond that was not done.
2	Planting of shrubs, forbs, and graminoid species in dense patches of high erosion areas of Zones 2 and 3 since potentially too much soil movement for germination of seeds to occur [2023/2024],	Planting was not done in 2023/2024 at the request of the GIPRC.
3	Seeding of various species across site for a potential cost-effective solution to providing native species cover [2023/2024]; especially in previously restored areas,	Limited seeding was done at the toe of in Zone 2.
4	Removal of exotic species prioritizing those in restored zones or those which would threaten the survival of plantings over removal in new areas (spurge-laurel, Scotch broom, Himalayan blackberry, English hawthorn trees and stump resprouting, orchard-grass, as well as rhizomatous exotic grasses [2023 to ongoing])	Significant efforts towards invasive species removal, for all species listed, was advanced in 2023/2024 in all zones.
5	Additional invasive species removal and native planting/seeding for areas of Zone 2 which have had minimal activity to date (2024),	Significant efforts towards invasive species removal was advanced in Zone 2 in 2023/2024. Native species were not planted in 2023/2024.
6	Debris management including burn pile in Zone 2 (burn winter 2023/2023),	The debris pile was burned in November 2024.
7	Restoration prescription development for Zone 4 (2024), and	I decided to not to move forward with this in detail, however, see Appendix C for preliminary work on a Zone 4 restoration prescription.

8	Ongoing monitoring of all planted species and seeded areas (2023-2028).	N/A – all zones monitored in April 2023, supplemented by additional Zone 1 monitoring as per recommendation #1.

Discussion

The section below discusses and interprets the results within the context of the project goals: managing invasive plant species, monitoring prior native plantings and continuing the project's momentum.

As invasive species management activities have been sustained at this site for a period of three years, varied results can be expected given the varied seed persistence per species. Table 8 outlines the seed persistence of each invasive species of management concern on site.

Table 8. ***Seed persistence per invasive species of management concern***

Plant	Seed Persistence	Reference
Spurge-laurel	Only a small proportion of sown spurge laurel seeds germinate in the first year with far more appearing in the second year after seeding. Trials on Vancouver Island following removal of mature plants showed a large germination event in year one and two, and greatly reduced numbers of seedlings in the third year.	Strelau, Clements, Webb, and Prasad (2018)
Himalayan blackberry	Seeds can remain viable in the soil for "several years" however regeneration from seeds are less of a concern as regeneration is primarily from vegetative growth from rhizomes once the plants become established.	Gaire, Astley, Upadhyaya and Bargen (2015)
Scotch broom	Very long-lived seed bank. Seeds can remain viable in the soil for more than 30 years.	Prasad (2000)
English hawthorn	No persistent seed bank in nature has been reported. Decreased seed viability has been noted after storage for 2 years.	Fichtner and Wissemann (2021).
Canada thistle	Seeds are moderately persistent, with the estimated half life of seed at 15cm depth varies between 5 to 10 years. However vegetative spread through its root system is its primary form of dispersal.	Heimann and Cussans (1996)
Orchard-grass	Orchard grass does not usually build up significant seed banks.	Garry Oak Ecosystems Recovery Team (n.d.)

Qualitative observations of reduced occurrence of orchard grass are likely attributable to management efforts and a lack of viable seed bank in the soil. Despite significant regeneration over the course of the project, spurge laurel may germinate less in the future as the seed bank decreases in viability. Unpublished data from other local restoration sites showed a reduction in abundance after three years of management – observations in spring 2025 may confirm whether this site follows the same trend. This

may also explain why 2017 efforts to manage spurge laurel were unsuccessful, as it was a single year of concerted effort.

To date, the number of people-hours spent on invasive species maintenance has not decreased (Table 9) – however, qualitative observations about changes in relative invasive species abundance show that management efforts are having an impact on the ecology of the site. Finally, it is likely that while the species of primary concern may change over time but invasive plant species as a category will persist; invasive species management activities will need to continue on this site into the future.

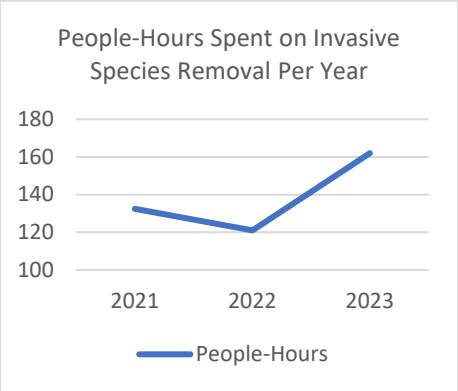

Table 9. ***Total Hours Spent on Invasive Species Removal Per Year of Project***

Year	**People-Hours**
2021	132.5
2022	121
2023	162
2024 (as of July)	12 (to date)
TOTAL (all years)	427.5

The bulk of my efforts were devoted to invasive species management, and limited additional effort was put into new native plantings. Autumn planting was voiced as a preference by GIPRC to increase the survival rate by allowing them to become established over the winter; this was not possible this year due to the timing of my involvement (September 2023 to July 2024). However, seeding was done in both April 2023 and November 2023 with differing results – monitoring the following autumn found evidence of success from spring seeding (high densities of seed heads in seeded areas), while informal monitoring in June 2024 did not find evidence of success from November's seeding. This could be due to a number of factors, including:

- Higher seeded volumes and more dense seeding in the first round of seeding,
- Plant selections that were better suited to locations of seeding in first round of seeding,
- Selection of plant species that did not require cold stratification in the first round of seeding, allowing for spring timing,
- High rates of soil movement in Zone 2 impeding germination in second round of seeding, and
- Different seed suppliers.

The success of seeding done in spring 2023 shows that seeding can be an effective strategy on this site. I suggest GIPRC take lessons learned above into consideration while planning for future seeding efforts.

The table below (Table 10) outlines a few plants that have had better survivability at this site, but similar phenology to the plants found to have lower success, and are suitable to the site conditions (dry/mesic, sun/part shade). This list of native plants can be used during future plant selection, to ensure that the flowering times of plant species on site covers as much of the year as possible for pollinators.

Table 10. ***Suggested species for Zone 1 to supplement phenology of species with low-survival rates.***

Phenology	**Suggested Species**

Early season (February/March) flowering species	• Tall Oregon-grape (*Berberis aquifolim*) • Western buttercup (*Ranunculus occidentalis*) • Red-flowering current (*Ribes sanguineum*)
Later season (August) flowering species	• Oregon gumweed (*Grindelia stricta*) • Red columbine (*Ribes sanguineum*) • woolly sunflower (*Eriophyllum lanatum*)

Otherwise, see Table 6 for additional plants that have had success at the site, regardless of phenology.

A future goal for this site includes installation of infrastructure to honour and make visible the Indigenous cultural history, occupation and usage of Georgeson Bay. In 2023, the GIPRC received a proposal for the development of a cultural services plan for the site from Jeannine Georgeson (GIPRC, 2023) As of the writing of this report, future infrastructure may include an accessible bench overlooking the ocean and signage (*Jeannine Georgeson, personal communication, May 10, 2024).* Work that was done during 2024 to support future infrastructure was to prepare the site by laying burlap on the two areas identified as suitable for benches in May 2024 (east of Zone 1, adjacent to the gravel path, and immediately south of Zone 1, at the previous site of the burn pile). Future planning should avoid expanding restoration activities to these two areas, to avoid conflicting with the future infrastructure project.

Governance and Goalposts

GIPRC is a committee of the Capital Regional District (CRD) whose mandate is to manage community parks trails and recreation programs on Galiano Island. The philosophy of shore access management is outlined on the CRD website as follows:

> "*Shore accesses often represent remnants of undeveloped land that retains environmental, cultural, and archaeological values. Although the primary purpose of shore accesses is to provide the public with a route to the shoreline, the Commission recognizes the importance of protecting these other values. Before improving an access, the Commission inventories these features and considers ways to minimize impact on these assets,"* (CRD, n.d.)

From the above, the GIPRC's primary responsibility is access, and other considerations, including environmental values are secondary. Ecological restoration has been an emerging priority for GIPRC over recent years, however, the level of effort and continued investment into projects such as these is a political decision and should be explicitly discussed. As there is personnel turnover (i.e. new commissioners, student involvement and volunteers), there can be challenges with continuing the momentum of a project. Commissioner Simon has identified Commissioner Erickson to pass the torch to after his term ends. After three years of active maintenance and with a shift in GIPRC personnel, it is a good time to take stock of success to date and to reassess whether GIPRC wants to continue working towards the goals as originally envisioned, or to adopt an adaptive management strategy.

Success is measured against the goals that are stated for a project. I have copied excerpts of stated goals (with an ecological focus) from previous documents for this restoration project below (Table 11), including the original management plans and two students before me:

Table 11. ***Project goals from prior reference documents for this project.***

Reference Document	Goal
Management Plan (2021)	Zone 1: "Remove invasive species and restore a diverse native perennial shrub and herbaceous community". Does not state a goal for Zones 2 and 3.
Boyd (2022)	"The overarching goal of this restoration project is to enhance the ecological integrity of the site, with a particular focus on providing habitat for native pollinators. Ecological integrity refers to the degree to which native components and processes of an ecosystem are intact, and native pollinators are supported by natural habitat diversity, with sustained floral resources throughout the year."
Claeys (2023)	"This Project was developed as a comprehensive approach to addressing the challenges of invasive species management and to restore the ecological integrity of the Project [...]".

Is the goal to remove invasive species, enhance ecological integrity, provide habitat for pollinators (in Zone 1), or to reduce maintenance over time (not stated above, but verbally communicated to me over the course of my involvement in this project)?

Determining the goal posts is the responsibility of GIPRC to set clear direction and priorities as a governing organization with knowledge of their responsibilities to their constituents and community. It is possible to have multiple goals, but the order of priority is relevant to ensure decisions are made with the proper weighing of trade-offs. My understanding of the order of importance in of listed goals in previous documents would place them in the following order:

1. Remove invasive species
2. Enhance ecological integrity
3. Provide habitat for pollinators
4. Reduce maintenance effort over time.

My understanding from conversations with Commissioners is that #4, reducing maintenance effort over time, is increasing in importance after three years of maintenance efforts on this project. If that is the case, my suggestion is to transition Zone 1 from a primarily herbaceous community and establish a shade canopy through moving towards a shrub-tree community direction. Maintaining an herbaceous community in perpetuity is a high maintenance endeavor, unless burning practices are reintroduced to the landscape. Deciding upon a future direction for this site is something that the GIPRC board should determine, and is outside of the scope of this report.

Recommendations

The section below outlines nine final recommendations for this report (in bold), and specific detailed future work as sub-bullets below each recommendation.

1. The GIPRC master plan is up for renewal in 2025-2029, and the Master Planning Committee intends to address invasive plant species in the Master Plan (GIPRC, 2024). I suggest that the Commission **establish a level-of-effort / level of service in the master plan** to outline the future goals for ecological restoration on Commission-managed lands in a way that is documented and stated clearly.
2. **Continue to manage emergent invasive species populations in all Zones.**

a. In Zone 3, the majority of plants selected and planted were successful. I suggest continuing with managing invasive species, in particular spurge laurel, to ensure survival of previous plantings to maturity, but a lower level of effort is needed as there is a lower density of invasive species. One specific suggestion is to remove the large English holly tree, and after doing so, to manage the debris pile that has been placed underneath with a winter burn.

b. If Canada thistle continues to be an emergent species of concern, hand pulling is not very effective. Prescribed burns, herbicides or establishing plant populations with species that emerge early in the growing season are alternative management strategies that are more effective (USDA, 2006).

3. **Decide upon the ecological goal for Zone 1** (continue with an herbaceous community or move towards a shrub-tree community direction)
    a. Continuing with the current herbaceous direction for Zone 1 would mean a continued level of effort in maintenance, with an expectation of similar hours of volunteer time needed annually (perhaps decreasing slightly over time depending on seed persistence, as discussed in Table 8), as well as the purchase of additional native plants/seeds. This would continue to advance the pollinator-focused restoration goal, which was one of the original priorities of this project.
    b. Moving towards a shrub-tree end state may result in less intensive maintenance needs into the future, as invasive species such as Himalayan blackberry and Canada thistle are shade intolerant. This strategy will still require invasive species removal: for example, the northern end of Zone 1 is already partially shaded by mature bigleaf maple trees (*Acer macrophyllum*) and has a similar amount of invasive species as other areas on the site. Furthermore, trees take time to become established and to produce significant canopy cover, therefore significant hours spent on maintenance will still be required in the medium-term. This also means that the existing planted herbaceous community, that prefers full sun, may become shaded out as trees mature. This option would also require purchase of additional plants and seeds.
4. **Rehabilitate caged plantings in Zone 2**

Figure 5. Sword fern (Polystichum munitum) planting with burlap (above). Caged native planting with Himalayan blackberry inside cage (below).

There are 36 native plantings in Zone 2 that are surrounded by individual cages to protect them from deer browsing. All of the plantings need maintenance through invasive species removal as the cages protect invasive species from deer browsing as well, and the plantings are becoming crowded. Initial monitoring shows that 27 of the plantings need replacement plantings, which is a 25% survival rate; however, the native plantings may continue to survive while being covered and crowded by invasive species. I suggest that first, invasive removal is done by a knowledgeable labourer, then second, the number of replacement plantings needed is confirmed. When those are put into the ground, I suggest to replant with burlap surrounding them (Figure 5) to avoid competition from invasive species.

5. **Consider erosion management measures for the steep slope in Zone 3**
    a. The steep slope in Zone 3 was seeded unsuccessfully during my tenure on the project and remains unvegetated. The GIPRC could consider bioengineering techniques such as placement of coconut coir or willow wattle fencing. This area is subject to archaeological considerations and a registered professional may need to be involved to ensure management efforts are in line with regulations under the *Heritage Conservation Act*; this may be true whether or not future actions are taken to mitigate erosion.
6. **Remove flags for plantings that did not survive**
7. **Replace flags that are breaking down, to avoid introducing microplastics into the environment.**
8. **Support future Indigenous cultural infrastructure work.**
9. **Please continue to reference the 2023 Management Plan (Claeys, 2023) for additional detailed recommendations.**

Conclusion

The GIPRC, as a land manager on Galiano Island, is well positioned to contribute to ecological restoration efforts on Galiano Island. The Galiano Conservancy over the last 35 years has already put significant efforts into ecological restoration locally; a regional, collaborative approach aids in habitat connectivity, reduction in invasive species transfer and increased knowledge and capacity building across organizations. Globally, we are nearly midway through the United Nations Decade on Ecosystem Restoration (2021-2030) and efforts to restore ecosystems at the local scale are contributing to a movement towards positive ecological impacts at the global scale.

Successful restoration projects require ongoing maintenance and monitoring, and will continue to be required to ensure that Shore Access 17 continues its transition back to the form and function of a native ecosystem.

Acknowledgements

This project is located on the unceded, traditional territories of the Hul'qumi'num-speaking Coast Salish peoples. The project report was written on the unceded, traditional territories of the xʷməθkʷəy̓əm (Musqueam Indian Band), Sḵwx̱wú7mesh Úxwumixw (Squamish Nation), and səlilwətaɬ (Tsleil-Waututh Nation).

Thank you to Andrew Simon, Keith Erickson, Charlene Dishaw and the rest of the Galiano Island Parks and Recreation Commission, Nancy Shackleford and the Restoration of Natural Systems program, Jeannine Georgeson, Galiano Island community volunteers, University of Victoria Restoration Club volunteers, Adam Huggins and the Galiano Conservancy Association, prior RNS students dedicated to this project Brittany Boyd and Brittany Claeys, maintenance contractor Michael Carothers, and Jim Hodgson.

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Appendix A – Photographs

Results of June 2023 Make a Difference Week invasive removal efforts

November 2024 - UVic Ecological Restoration Club work party

June 2024 Make a Difference Week – volunteers, burlap laid on area for future bench, burlap maintenance trail.

Appendix B – Full Plant Survival Analysis

Category	Species
Successful plants (where >50% of the planted specimens were observed to be alive) include:	• mock orange (*Philadelphus lewisii*) • western trumpet honeysuckle (*Lonicera ciliosa*) • black hawthorn (*Crataegus douglasii*) • snowberry (*Symphoricarpos albus*) • trailing blackberry (*Rubus ursinus*) • oceanspray (*Holodiscus discolor*) • self-heal (*Prunella vulgaris*) • woolly sunflower (*Eriophyllum lanatum*) • small-flowered alumroot (*Heuchera micrantha*) • Oregon gumweed (*Grindelia stricta*)
Mid-level successful plants (20% to 50% observed to be alive) included:	• osoberry (*Oemleria cerasiformis*) • baldhip rose (*Rosa gymnocarpa*) • red columbine (*Aquilegia formosa*) • long-stoloned sedge (*Carex inop*s) • Junegrass (*Koeleria macrantha*) • sea blush (*Plectritis congesta*) • woodland strawberry (*Fragaria vesca*) • false lily-of-the-valley (*Maianthemum dilatatum*) • blue-eyed grass (*Sisyrinchium idahoense*) • woolly sunflower (*Eriophyllum lanatum*) • pretty shootingstar (*Primula pulchellum*)
Unsuccessful plants (<20% survival):	• tall Oregon-grape (*Berberis aquifolium)* • red flowering currant (*Ribes sanguineum*) • red-osier dogwood (*Cornus sericea*) • thimbleberry (*Rubus parviflorus*) • dull Oregon-grape (*Berberis nervosa*) • salal (*Gaultheria shallon*) • blackcap raspberry (*Rubus leucodermis*) • pacific crabapple (*Malus fusca*) • miner's lettuce (*Claytonia sibirica*) • pacific woodrush (*Luzula comosa var. laxa*) • prairie woodrush (*Luzula subsessilis*) • mountain sweet cicely (*Osmorhiza berteroi*) • yerba buena (*Clinopodium douglasii*) • sword fern (*Polystichum munitum*) • farewell-to-spring (*Clarkia amoena*)
Unknown success	• spring gold (*Lomatium utriculatum*) • great camas (*Camassia leichtlinii*) • white fawn lily (*Erythronium oregonum*) • chocolate lily (*Fritillaria affinis*)

Appendix C – Zone 4 Preliminary Prescription

In my original proposal for my ER390 project, I had indicated my intent to develop a restoration prescription for the eastern side of the gravel path, along a drainage ditch abutting private property. As I have worked on the site, I have become more realistic about the ability to implement that idea. The neighbours on that side maintain concerns about privacy if the mature shrubs are removed. Constraints as described in the discussion section around the level of effort moving forward also apply to expanding the footprint of the restoration site; doing so would run counter to my other suggestions. Therefore, I have included high level suggestions for this area, but have not fully developed a restoration prescription.

First, invasive species removal would have to take place. The primary invasive species of concern is Himalayan blackberry. See Table 3 for best management practices for this species. Second, a planting plant would need to be produced. Table 12 contains a preliminary plant list for Zone 4. The initial criteria were:

- Can tolerate a dry site
- Shrub that will grow tall, for privacy
- Has edible berries

Table 12 *Preliminary plant selection for Zone 4.*

Species	**Qualities**
Saskatoon-berry *(Amelanchier alnifolia)*	Tall, edible and choice
mock orange (*Philadelphus lewisii*)	Tall, but not edible
trailing blackberry (*Rubus ursinus*)	Not tall, but edible
osoberry (*Oemleria cerasiformis*)	Tall, edible but not choice
oceanspray (*Holodiscus discolor*)	Tall but not edible
baldhip rose (*Rosa gymnocarpa*)	Tall, edible but not choice
Tall Oregon-grape (*Berberis aquifoluim*)	Tall, edible but not choice
Hairy Manzanita (*Arctostaphylos columbiana*)	Tall, edible but not choice
Pacific Nine-bark (Physocar*pus capitatus*)	Very tall