GOERT 2015

11th Research Colloquium

Blank Slate Restoration

Proceedings

November 20, 2015

University of Victoria

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Edited by

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Acknowledgements

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Speakers for the Colloquium were primarily recommended by the Garry Oak Ecosystem Recovery Team (GOERT). Descriptions of the presentations provided in the Proceedings were based on notes taken by Lindsay Kathrens and Julia Jennings of Environmental Studies at the University of Victoria. Additional notes were provided by Mike Meagher. Brenda Costanzo offered further edits on the final manuscript. PowerPoint slides in the Proceedings were taken from the presenters' talks.

Julie Williams of the GOERT Society Board handled the registration desk on the day of the Colloquium. Early registration was done by Craig Elder and Adam Connor of GOERT.

Val Schaefer, GOERT Society Chair and Academic Administrator for the RNS Program, was the Coordinator of the Colloquium and was responsible for developing the program, corresponding with presenters, working with the event volunteers and overseeing the production of the Proceedings.

All of the presenters volunteered their own time and paid their own transportation costs to participate in the Colloquium, a major contribution for which we are thankful and without which the Colloquium would not have been possible.

The cover photo of a Garry Oak in Victoria's Summit Park in 2014 was taken by Anny Schaefer.

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Background Information
Blank Slate Restoration and Garry Oak Ecosystems

The Garry Oak Ecosystem Recovery Team (GOERT) partnered with the Restoration of Natural Systems Program at the University of Victoria for its colloquium on Friday, November 20th, at the university. The theme was "Blank Slate Restoration" to present some of the latest research and projects on establishing Garry Oak meadow species on sites with lawns or bare ground, and re-establishing extirpated GOE populations. The theme is topical on two fronts. The District of Saanich recently applied its Environmental Development Permit Area bylaw to private property with Garry Oak Trees, even if the property only has a lawn and no current evidence of meadow wildflowers. The intent of the bylaw is to acknowledge that the property has the potential to be restored to a Garry Oak meadow even though none currently exists – hence the "blank slate." This presents scientific and social challenges for action planning in restoration and is why we chose this theme.

For the Colloquium we have also expanded the concept of blank slate restoration from restoring a "blank slate" landscape to include restoring extirpated populations where recovery occurs without any existing population on from which to build on. Translocations and plantings are required to restore extirpated populations. Restoration efforts for the recovery of endangered wildflowers in Garry Oak Ecosystems often involve plantings from seeds or plants collected from other sites. This raises concerns about provenance and diluting the genetic integrity of an at risk population. It also may involve major international efforts as is the case with GOERT translocating pairs of Western Bluebirds from the Willamette Valley in Washington State to the Garry Oak Nature Preserve by Duncan to re-establish the extirpated population on Vancouver Island.

About the Garry Oak Ecosystem Recovery Team (GOERT)

Based in Victoria, BC, we coordinate efforts to protect and restore Garry Oak and associated ecosystems and the species at risk that inhabit them.

In the rainshadow of the Vancouver Island Ranges, one of Canada's richest ecosystems is also one of its most endangered. Less than 5% of Garry Oak ecosystems remain in a near-natural condition. More than 100 species of plants, mammals, reptiles, birds, butterflies and other insects are currently officially listed as "at risk of extinction" in Garry Oak and associated ecosystems. Several species have already been eliminated.

The Garry Oak Ecosystems Recovery Team (GOERT) is working to save these endangered species and the habitats they need for survival. Your help is needed. You can play a valuable part in a comprehensive recovery program to protect this rare habitat and save the plant and animal species at risk of local or global extinction.

A National Treasure Garry Oak ecosystems are a unique national treasure. Thousands of plant and animal species inhabit Garry Oak ecosystems. They are the richest land-based ecosystems in coastal BC, they are a defining landscape characteristic of this region, and they are an integral part of the culture of this area. First Nations have harvested foods and medicines from Garry Oak ecosystems for hundreds of years, and in some areas, Garry Oak meadows were tended and deliberately burned to enhance the production of camas and other food sources.

Garry Oak Distribution In Canada, Garry Oak ecosystems are found on southeast Vancouver Island, the Gulf Islands, and in two locations in the Fraser Valley. They are also found in Washington, Oregon, and California (where the trees are often known as Oregon White Oaks). They exist nowhere else in the world.

Our Story - What We Do

GOERT was formed in 1999 to coordinate efforts to protect and restore endangered Garry Oak and associated ecosystems and the species at risk that inhabit them.

Our Recovery Implementation Groups (RIGs) are working to complete the science-based information necessary for ecosystem and species recovery, minimize ongoing site and species losses, and motivate public and private protection and stewardship activities.

Only a concerted, long-term effort to conserve what is left of Garry Oak and associated ecosystems in Canada can halt the ever-increasing threat to their species at risk.

GOERT's recovery planning approach considers ecosystems as well as individual species at risk. Recovery planning in Canada has historically taken a species-by-species approach, but national initiatives now recognize the importance of incorporating a wider

scope in some circumstances. The ecosystem-based approach makes sense in this case, as so many species at risk occur in the same geographical area in Garry Oak and associated ecosystems.

Our Programs How We Do It

Bring Back the Bluebirds — the Western Bluebird Re-introduction Project. We are beginning year 3 of an ambitious 5-year project to re-introduce extirpated (locally extinct) bluebirds to Vancouver Island and the Gulf Islands.

Species at Risk Outreach — contacting private and public landholders who have species at risk on their land and helping them protect and restore the species at risk populations.

Local Government and First Nations Outreach — working with local governments and First Nations to provide resources needed for protection and recovery of species at risk in Garry Oak habitat.

Resources for protection and restoration of Garry Oak ecosystems — our popular *Garry Oak Gardener's Handbook*, comprehensive restoration manual, species at risk and invasive species field manuals, and much more.

What You Can Do

Through grants and donations the Garry Oak Ecosystems Recovery Team can continue to reach out to local governments and others who manage the remaining fragments of Garry Oak habitat in this region, the only place they exist in the world. Protection and restoration of habitat is needed to halt the decline of more than 100 species at risk. We are truly humbled by the dedication and hard work of so many partners working to save rare plants and animals and their habitat. With your support, we can continue this momentum.

Restoration Programs at the University of Victoria Descriptions

Restoration of Natural Systems Diploma and Certificate

The Restoration of Natural Systems (RNS) program is an accredited program created to disseminate information about the emerging field of environmental restoration and to provide practical background knowledge, training, and skill development for those working in areas related to the restoration of natural systems. The program is offered by the School of Environmental Studies and the Division of Continuing Studies, and is guided by an advisory committee. This interdisciplinary program provides the theory and practice needed to conduct restoration activities. It takes a holistic approach that recognizes the importance of both the social and biophysical dimensions of environmental restoration. The courses have been designed to meet the needs of professionals and to suit the busy schedules of people who work full time. Courses are offered in either an on-campus five-day immersion format or semester-long distance format. The program is offered at the 3rd and 4th year undergraduate level and often attracts students who are concurrently working on an undergraduate degree.

The courses in the program are expected to contribute in varying degrees to the student's knowledge and skill areas in:

- Designing restoration projects that consider a broad range of subject areas and include consideration of human factors;
- Evaluating projects on an on-going basis and making adjustments;
- Using scientifically rigorous approaches to restoration projects;
- Reading and analyzing technical reports and scientific publications;
- Introducing students to the decision makers and policies governing restoration work;
- Dispute resolution, conducting consultative processes, and consensus building;
- Presenting ideas clearly electronically, orally and in writing;
- Recognizing personal values that affect individual's decisions;
- Use of current mapping and sampling technologies;
- Solving problems encountered in implementing restoration projects;
- Working in partnership with other professionals and stakeholders;
- Developing competency in the types of equipment and procedures used to sample the natural environment;
- Developing awareness of national and international restoration issues;
- Understanding human impacts;
- Including traditional ecological knowledge in restoration planning;
- Incorporating social and scientific knowledge in restoration planning.

Diploma students must be admitted into the program and accepted to the University of Victoria for credit study. Students must complete 12 courses (6 required courses and 6

electives) to obtain their diploma. A one- or two-term co-op placement option is available for diploma students.
Certificate students must also meet the admission requirements of the program but do not have to accepted for credit study at UVic. Students must complete 8 courses (6 required courses and 2 electives) to obtain their certificate.

The RNS Program has received both the Award of Excellence from the Canadian Association for University Continuing Education (2001) and the Ecostar Award for Environmental Education from the Capital Regional District (2005).

Ecological Restoration Professional Specialization Certificate

This non-credit certificate has been designed for professionals working in the field of ecological restoration, environmental practice, biology, landscape architecture, landscape design and management, forestry and agrology. The certificate builds on the success of the Restoration of Natural Systems program to offer more advanced training for working professionals. Courses in the certificate are offered in a distance format, appealing to professionals from across North America as a means to meet their annual professional development requirements or to update their skills and understanding.

This program is intended for people who already hold a degree or diploma. The certificate is designed for practitioners working in restoration and related fields who see "problems" with current practices and want to investigate alternative and innovative solutions. This program develops critical thinking skills and asks challenging questions that require students to deal with the uncertainty that is present with problems in ecological restoration.

Upon completion of this program, students will be able to conduct detailed site assessments and restoration projects that pay special attention to the unique conditions and challenges presented by built and otherwise highly altered environments. The program focuses on the following areas:

- re-establishing natural processes;
- balancing social and economic constraints with ecosystem functioning;
- exploring new approaches to creating functional landscapes; and
- challenging our current understanding of ecological restoration as it is applied to a wide range of conditions.

The program features four courses, which are only available online:

- ER501: Design Principles for Natural Processes
- ER502: Ecosystem Design through Propagation of Native Plants
- ER503: Natural Processes: Restoration Ecology
- ER504: Invasive Species and Novel Ecosystems.

Two courses are offered each year, one in the spring (January to April) and one in the fall (September to December). Students can complete the program in as little as two years.

The program has five foundational areas of emphasis:

1. Using a systems approach to restoration that focuses on ecosystem function as well as structure. For example, the program focuses on the use of symbiotic relations such as mutualism, competition and predation as they can shape plant and animal communities, or using ecosystem engineers such as beavers to create wetlands, or taking advantage of natural succession to restore disturbed areas.

2. Restoration as a means to re-establishing natural processes. Whereas the re-establishment of species associations requires knowledge of species habitat, re-establishing processes requires all of this knowledge as well as in-depth knowledge of systems, of interdependencies and of ecological processes, For example, it involves understanding the mycrorrhizae and invertebrates which form the basis of soil ecosystems.

3. Site analysis on the micro and macro level that examines ecosystems at all scales, from ions in soil and water through unicellular organisms to the larger plants and animals that dominate nature's ecosystems. The site analysis also identifies social, political, legal and other non-biological factors that need to be considered and incorporated into a restoration project.

4. Using the latest theoretical constructs in formulating restoration plans. These include concepts such as adaptive cycles, panarchy, novel ecosystems and assembly rules.

5. Restoration in severely disturbed environments that provide their own unique challenges. Frequently all natural processes have been altered and systems have been removed. Restoration, therefore, involves re-establishing a natural system from scratch. Furthermore, a restoration biologist often only has a small patch of land to work with. And there are many on-going disturbances to the site such as noise and impervious surfaces.

Colloquium Schedule

Morning

8:30 A.M. **Registration.**

9:00 A.M. **Welcome.**
Val Schaefer, Chair, GOERT Society

9:15 A.M. **Presentations 1.**
Moderator: Val Schaefer, Chair, GOERT Society

Lawns to Lilies and Rare Plant Translocations: Recapping 6 years of GOE Restoration and SAR Recovery at Fort Rodd Hill and GINPR
Aimée Pelletier, Nathan Fisk and Nicole Kroeker, Parks Canada

What I learned while Playing in the Park
Colleen O'Brien, Steward with Saanich Parks "Pulling Together Volunteer Program

Meadow Reconstruction at Haliburton Farm
James and Kristen Miskelly, Saanich Native Plants

10:15 A.M. **Break.**

10:30 A.M. **Presentations 2.**

Taylor's Checkerspot Recovery Actions
Jenny Heron, Invertebrate Conservation Specialist, BC Ministry of Environment, Vancouver

Restoration for Vancouver Island Beggarticks at Jinglepot Marsh, Nanaimo
Trudy Chatwin, Species at Risk Biologist Ministry of Forests, Lands and Natural Resource Operations and Rob Lawrance, Environmental Planner, City of Nanaimo

Rain Gardens
Val Schaefer, RNS Program, University of Victoria

Municipal Tools to Protect and Restore Ecosystems
Adriane Pollard, District of *Saanich*

Noon

Lunch Break.

Afternoon

1:15 P.M. **Presentations 3.**

The Bluebird Project
Kathryn Martell, Garry Oak Ecosystem Research Team

Restoration of Bowker Creek through Oak Bay High School
Jody Watson, Harbours and Watersheds Coordinator, Parks and Environmental Services, Capital Regional District

Garry Oak restoration in the Comox Valley
Loys Maingon, Courtenay Naturalists

2:15 P.M. **Break.**

2:45 P.M. **Presentations 4.**

Focusing on Results: Strategic ecological restoration with the Open Standards for the Practice of Conservation
Emily Gonzales, Ecological Restoration Specialist, Parks Canada

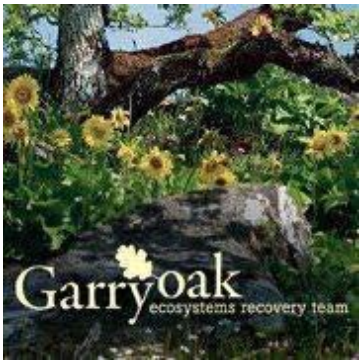
Species at Risk: The 3-year recovery document posting plan, Priority activities, action planning, funding
Blair Hammond, Manager, Ecosystem Conservation, and Kate Shapiro, Aboriginal Liaison Biologist, Canadian Wildlife Service, Environment Canada

Looking Back and Moving Forward: The role of herbaria in restoration
Erica Wheeler, Royal BC Museum Herbarium

Somenos
Dave Polster, Dave Polster Environmental Services Ltd.

4:00 P.M. **Wrap-Up.**

5:00 P.M. **GOERT Society AGM.**



University of Victoria

Presentations

1. Lawns to Lilies and Rare Plant Translocations: Recapping 6 years of GOE Restoration and SAR Recovery at Fort Rodd Hill and GINPR (Aimée Pelletier, Nathan Fisk and Nicole Kroeker, Parks Canada)

Introduction

The Parks Canada staff from the Coastal BC field unit have a number of special projects geared towards the maintenance and recovery of Species at Risk on the coast of British Columbia. Spearheaded by Aimee Pelletier and Nathan Fisk, Fort Rodd Hill and Fisgard Lighthouse National Historic Site has initiated a series of restoration efforts to research the propagating success of several species at risk on site.

Garry Oak Learning Meadow Restoration

The blank slate restoration project began in 2013 and continued into 2015. It has now had many successes, such as being active raptor habitat and providing breeding habitat for songbirds. There have been 14 butterfly and 12 bee species identified. There are over 100 species and 100,000 plant species alone in the Garry Oak Learning meadow located in the heart of the Fort.

Collaboration

The staff at Fort Rodd Hill work with the Esquimalt and Songhees First Nations, collaborating with indigenous interpreters to better tell the stories and traditional

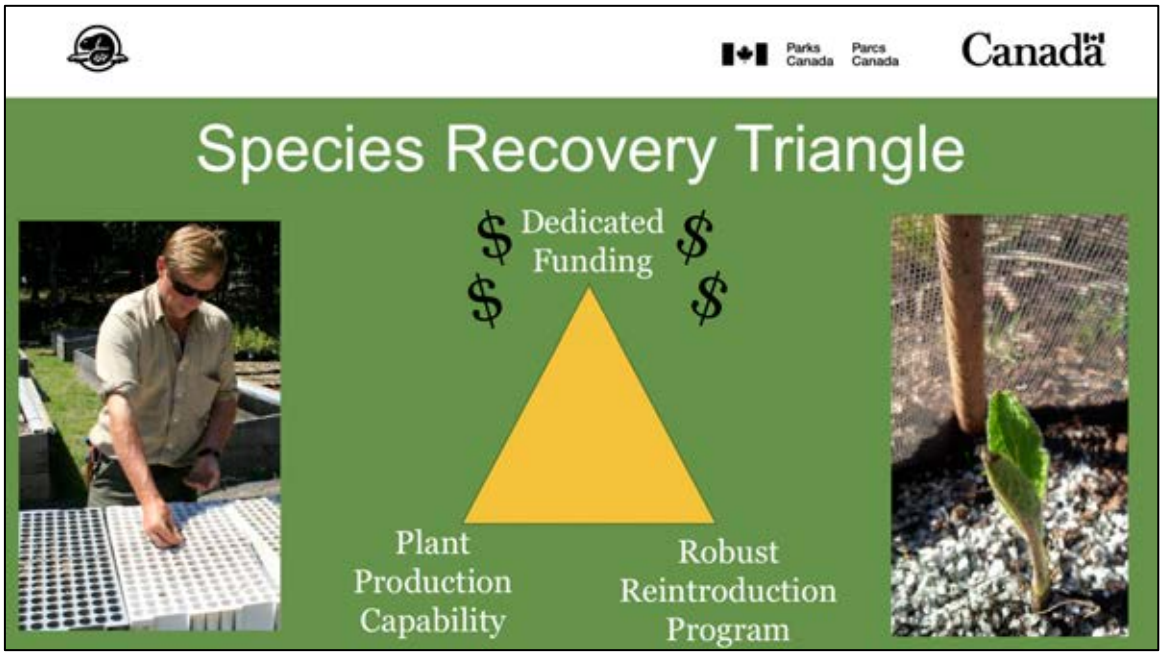
knowledge of the groups that inhabited this land for time immemorial. Fort Rodd Hill has also been extremely successful in volunteer recruitment. In 2015 alone, over 2000 volunteer hours have been logged.

The Species At Risk Team has also had a number of Co-op students that have enhanced restoration initiatives. Students gain valuable work experience while contributing to species removal efforts, such as special interest projects to collect data about various species groups on site.

Native Plant Restoration and Propagation

“Plant reintroductions are challenging,” says nursery supervisor Nathan Fisk. It is essential to have multiple sites, dedicated funding and continuous monitoring and plant additions for at least 4 years.

In order for a restoration project to remain robust and successful, there is a need for three pillars to make a resilient support triangle in a long term and robust restoration project such as this one. The first is the need for long term dedicated funding, extending at least three years. The second is to build up a plant production capacity, in a nursery environment in order to be able to self-source transplants and trouble shoot propagation struggles. And the final pillar of the successful restoration triangle is to have a robust reintroduction plan. Though transplants may not show immediate success, it is important to give the project long-term attention and dedication, drawing from outside sources for genetics, and not discounting plants that may appear less healthy in the nursery.



Genetic Variation

High genetic variation is essential for the survival of the plant population. Increasing genetic variation within the propagation project increases the resilience of the plant population. Genetic variation can be increased by collecting early, late and mid-season to represent various phenotypic expressions throughout the growing year. Diversifying microsites also ensures that there is variation in the genes of the plants. Fort Rodd Hill collected from various microsites for Deltoid Balsamroot pollination, such as Thetis Lake Regional Park and Summit Park. Though this risks losing locally adapted genotypes, outside genetics can also provide benefits to propagating challenges.

Plant translocation

When translocating plants, it is vital to create a genetic melting pot that will minimize the impact of the translocator as a potential selective force and give less biased results. Doing this creates a genetic melting pot, minimizing the impact of the selector as a potentially biased force – this involves collecting propagules at different times of year, from a variety of microsites and a variety of phenotypes; one never knows what is going to best suit the site.

Another key point from the Fort Rodd Hill presentation was the importance of keeping all plant phenotypes until outplanting. Though certain individuals may appear to be unhealthy in a nursery setting, the change in environments that occurs after outplanting could prove them to be the more successful individuals of a population. Growing all plant phenotypes avoids genetic bottlenecking and ensures there is a wide range of genotypes that can adapt to different out plant sites.

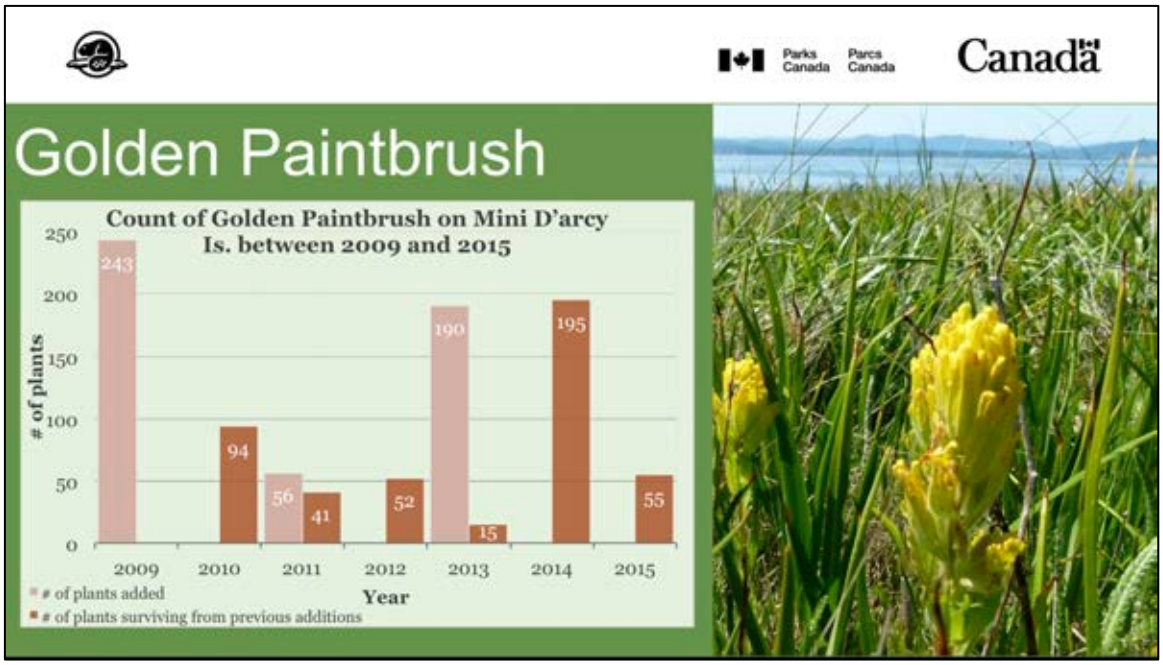
The use of mycorrhizae to assist growth after germination can also be beneficial, especially if the plant and fungal species are mutually symbiotic. Using associate species planting methods can also combat environmental factors.

When outplanting, transect methods showed more success than grouping methods. This also allows for better monitoring of individual species in the outplant area. After outplanting it is important to partake in provenance and performance tracking to continually monitor the success of methods used during the project. Recording and monitoring of each method is important.

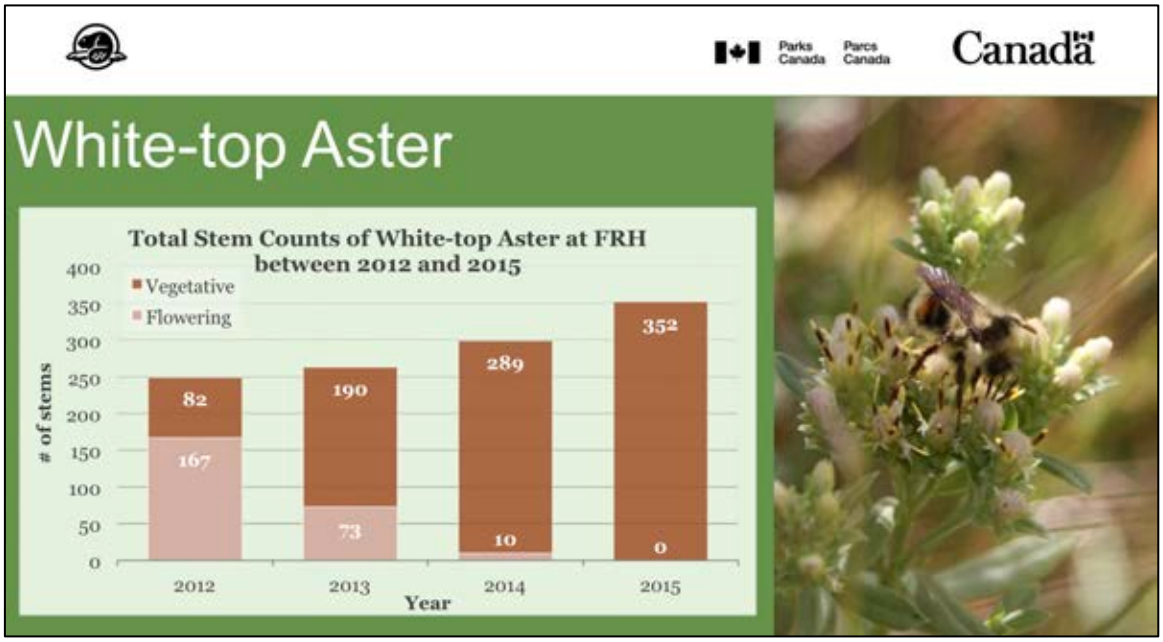
Species at Risk

There are several unique Species at Risk located at Fort Rodd Hill that the SAR team aims to recover. A population of Deltoid Balsamroot *Balsamorhiza deltoidea* was discovered by Nancy Turner and Hans Roemer at the site. Assisted pollination from populations in Oregon and Washington helped to propagate seedlings in the Garry Oak Learning Meadow Nursery. Deltoid Balsamroot was planted in cohorts each year with low initial success, but continual additions to the population may increase success.

Continuous addition of out plants to the Golden Paintbrush has occurred over the past few years at Fort Rodd Hill. Monitoring has shown that only plants well suited to the local environment survive.



A previously red listed SARA species, White Topped Aster *Sericocarpus rigidus* is now only a species of special concern.



Garry Oak Ecosystems have been found to require ongoing maintenance due to the effects of habitat loss and invasive species. Continual disturbance management is necessary for this species to thrive according to the SAR team at FRH.

There are many factors to be considered when looking at out plant success. Weather, health of individuals, hydrology and disturbance can all contribute.

2. What I learned while Playing in the Park (Colleen O'Brien)

Project Background and Site Characteristics

Colleen O'Brien, Lead Steward, with Saanich Parks "Pulling Together Volunteer Program" has been actively engaged with restoration efforts in Playfair Park since the beginning of 2010. In total, Playfair Park is about 3.7 ha with a Garry Oak meadow restoration area accounting for approximately 0.8 ha. The meadow is a deep-soil site with rocky outcrops and a low ridge between east and west slopes. The meadow has been heavily invaded by agronomic grasses, and once the grasses are removed it becomes apparent that there is a large and persistent weedy seed bank.

There are 37 native vascular plant species on the meadow plant species list, three of which have been added in the past 18 months. Yellow Montane Violet (*Viola praemorsa* ssp. *praemorsa*), is a red-listed (imperiled) species in BC and has been known, since 1997, to occur in Playfair Park. One of the recent additions to the species list is Foothill Sedge (*Carex tumulicola*), also red-listed, which had gone undetected until 2014 as it was suppressed by non-native grasses. The plant list includes very few native annuals, whose occurrences are very localized, which has proven to be beneficial with a removal technique outlined below.

Grass Removal Techniques

Tufted perennial grasses: Orchard Grass (*Dactylis glomerata*), dominated much of the meadow and, to a lesser extent, Sweet Vernalgrass (*Anthoxanthum odoratum*), and Tall Oat Grass (*Arrhenatherum elatius*) also occurred. All are being pulled by hand, tiller by tiller, rather than cut out with a carpet knife which would put dormant, shallow-crowned Yellow Montane Violet at risk. This technique is very labour intensive, but effective and minimizes soil disturbance.

Figure 1: Method to control fall-germinating seedlings.

Annual grasses: Soft Brome (*Bromus hordeaceus*) and Barren Brome (*Bromus sterilis*), both with minimal seed banking capabilities, are being effectively controlled by smothering fall-germinating seedlings once the rains return. Areas are covered with black plastic (either solid or breathable fabric) (Figure 1), cardboard or leaves and left in place for 5 – 8 weeks depending on the material used and the weather conditions. This is another labour-intensive technique, but less so than trying to either pull seedlings, or cut seeds off of mature plants in a meadow that hasn't yet finished flowering. CAUTION: Short-term mulching also kills seedlings of native annuals and perennials that emerge in the fall. However, most mature fall-emergent perennial plants survived the short blackouts and produced seeds the following spring.

Perennial rhizomatous grasses: Kentucky Bluegrass (*Poa pratensis*), Bentgrass (*Agrostis* spp.), Perennial Ryegrass (*Lolium perenne*) are being controlled with the use of the grass-specific herbicide sethoxydim (Poast®Ultra) which does not affect fescues or sedges. Initially, in October 2014 Poast®Ultra was used only where rhizomatous lawn grasses remained after all other grasses had been removed using labour-intensive methods. In October 2015, accredited Saanich Parks staff began to treat areas where these grasses were included in the grass matrix. Hand-pulling and short-term mulching continues to be used in areas where there are no rhizomatous grasses.

Controlling Weedy Herbaceous Species

Although weedy herbs are apparent before grasses are removed, they explode onto the scene after one summer of exposure to light. In Playfair Park, the seed bank includes persistent species like White Clover (*Trifolium repens*), Subterranean Clover (*Trifolium subterraneum*), Dovefoot Geranium (*Geranium molle*), Purple Dead-nettle *(Lamium purpureum),* three species of non-native Chickweed (*Cerastium* spp.), and Common Vetch (*Vicia sativa*) all of which germinate in the fall. This presents the opportunity to deplete the seed bank using short-term mulching (Figure 2) with plastic, leaves and cardboard. There are some areas in Playfair Park that have now been mulched for short periods during the autumn for three years in a row: once for annual grasses and twice for seed bank seedlings. In other areas, mulching once or twice has proven to be sufficient. Once an area is relatively clear, weed control becomes a matter of hand-pulling whatever pops up in subsequent years.

Figure 2: Short-term mulching in action (November 2015)

Summary

The restoration in Playfair Parks' Garry oak meadow has been very focused and methodical. Grass and weed removal efforts began in the areas with highest conservation values (where Yellow Montane Violet occurred), and has continued in these areas as well as expanding into new sites. Efforts have also been focused on containing invasive species and to minimize soil disturbance.

Although the population of mature Yellow Montane Violet declined by 4.5% in 2015 from the previous year, it is expected to rebound during the next year's count. Most of the decline has been attributed to 'age regression' due to habitat degradation. The entire decline occurred in areas with dense rhizomatous grasses and/or dense Pacific Sanicle (*Sanicula crassicaulis*). Since then, significant progress has been made to improve the habitat for Yellow Montane Violet to promote both mature plants and to recruit offspring.

***Viola praemorsa* counts of mature plants**

year	surveyor	count	difference
1997	Roemer	unknown	1st found
2000	Douglas/Hartwell	282	1st count
2006	Fairbarns	297 (+/- 15)	+ 15 after 6 years
2009	Fairbarns	748 (+/- 20)	+ 451 after 3 years
2010	Fairbarns	783	+ 35 after 1 year
2011	Fairbarns	552	- 231 after 1 year
2012	Kohler/Martell	935	+ 383 after 1 year
2013	Kohler/Martell	1041	+ 106 after 1 year
2014	O'Brien, *et al*	1330	+ 289 after 1 year
2015	O'Brien	1272	- 58 after 1 year

Some things learned while playing in the park

1. Pay close attention to timing to ensure best removal and replanting dates based on species phenology;

2. Follow best restoration practices as guidelines and not laws, allowing for some flexibility and creativity to discover what works best for your project; and

3. Accept that collateral damage may occur. Though it is important to attempt to keep it to a minimum, sometimes it is necessary for progress.

3. Meadow Reconstruction at Haliburton Farm (James and Kristen Miskelly)

The Haliburton Biodiversity project aims to restore native ecosystems, focusing on wet Garry Oak associated ecosystems. Biodiversity at Haliburton Farm has been improved through projects like the installation of bird boxes, and the planting of hedgerows to improve bird habitat.

Communities Partners and Project Support

Community support has been vital to this project. Several sponsors and grants include Mountain Equipment Co-Op, The District of Saanich, TD Friends of the Environment, The Habitat Conservation Trust Foundation, Public Conservation Assistance Fund, and Haliburton Community Organic Farm. In other parts of the world, farm related restoration has happened on a huge scale such as in Coyote prairie, Eugene, Oregon, with the restoration of a 300 ac (121 ha) plot of old agricultural land.

One of the restoration focuses at Halliburton is that of the wet Garry Oak associated ecosystems. The restoration area is comprised of a wetland area and a slightly larger meadow area. When discussing Garry Oak ecosystems it is easy to forget the associated

ecosystems, some of which are wet, seasonally wet, or vernal pools. These ecosystems host great biodiversity and are home to many endangered species.

There are several wetland restoration guidelines that directed this project. These guidelines grew from wetland restoration in the Willamette Valley, Oregon. The guidelines includes:

1. Having a background and purpose
2. Restoring to wetland prairies of the Willamette Valley ecoregion
3. A wetland prairie management overview
4. A site preparation phase
5. A plant establishment phase
6. A long term management phase

Following these guidelines was a web resource and workshop series.

Restoration Strategies

To combat the invasive species, mulching and solarization techniques were used. Using heat to kill seedlings and seed bank of some weedy species allows the native species to grow and reproduce more effectively. After smothering nonnative grasses, tilling methods can be helpful to remove the individuals that successfully grew despite the solarization.

Lessons Learned

Several lessons were learned by James and Kristen Miskelly during the first stages of this project.

1. The first was to avoid underestimating the persistence of the non-native seed bank. The potential recurrence of invasive and exotic species is not just what you see sprouting. Keep the original soil in the dark, covered with cardboard and mulch and plant new native species over top. This stage may be longer than you expect, although planting is an exciting step. It is essential to make sure the weed seed bank is kept at bay prior to introducing native species.

2. The second was to be careful when planting competitive native grasses (i.e. Blue Wildrye and Columbia Brome); with these you may not see the diversity you would likely see in nature.

3. Finally, James Miskelly urges to avoid beginning a project until you have a plant materials plan. If you remove and have an empty site with no replacement material to go in, the effectiveness of your project will be severely limited.

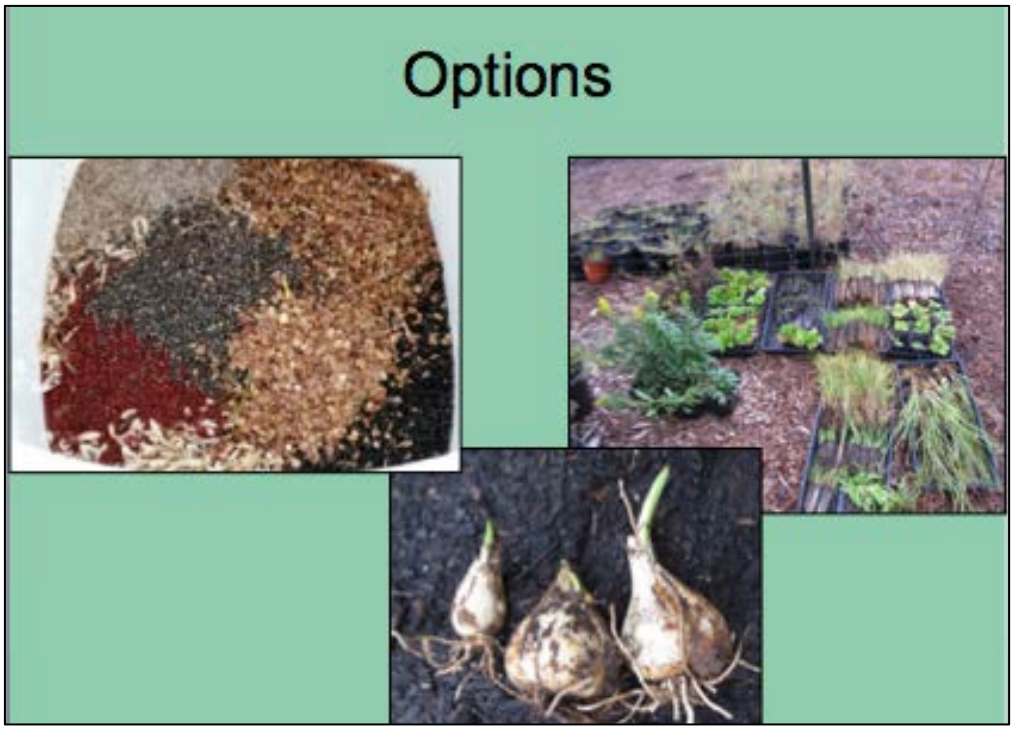
Planting options

Various planting techniques were used after the seedbank was reduced at the site. If the soil is prepared enough, direct seeding was found to be cost effective and allows for a lot of diversity. If planting through sheet mulch, plugs were found to be the most effective planting method.

Results

Many endangered and listed species were discovered at the site, some propagating naturally without being planted. Wildlife has also responded to the increased biodiversity in the area brought on by the project.

There are countless local areas that could benefit immensely from this type of blank slate restoration. Agricultural land that is not currently in use has a particular potential if funding and time is available. In terms of land regeneration and protection, we have more opportunities than we may think, says James Miskelly.


Options


Results

4. Taylor's Checkerspot Recovery Actions (Jenny Heron)

Headed-up by Jennifer Heron, this restoration project takes place in Helliwell Provincial Park on Hornby Island. Historic air photos helped to provide background for the trajectory of this project and to kick-start the recovery actions for 2015. These air photos show a significant amount of conifer ingrowth into previous open and meadow areas within the park. Habitat enhancement work began in March 2015. Fundingfor this project came from various sources, predominantly from the Environment Canada Habitat Stewardship Program and BC Ministry of Environment and BC Parks. Collaborative work from many agencies and organizations including Parks Canada, BC Parks and Ministry of Environment, GOERT, Hornby Island Conservancy, Denman Conservancy Association, Wildlife Preservation Canada, The Greater Vancouver Zoo and the Ministry of Forest Lands and Natural Resource Operations.

<u>Life History of the Taylor's Checkerspot</u>

The Taylor's Checkerspot was once found in open meadows from Courtenay to Victoria BC, and was thought to be an extirpated species until it was recorded from within a recent clearcut on Denman Island. The decline in the species is thought to be due to

habitat loss and the encroachment of non-native and invasive plants. This brightly patterned butterfly is a resource specialist – its original habitats are meadow ecosystems. However, the individual on Denman Island was found in a clear cut, and the species is also often found in heavily disturbed damp areas. This could be an adaption of the species due to loss of habitat. The Taylor's Checkerspot is now a provincially red-listed species and nationally listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). It is suspected that population losses are due to habitat loss and the degradation of Garry Oak ecosystems. Information is lacking about the life history of this butterfly, particularly what it feeds on, however, some larval host plants and nectar plants, are known. An array of plant species-at-risk are associated with this butterfly species and will also benefit from habitat restoration. In Helliwell Park on Hornby Island, 14 species that are provincially red or blue-listed have been found. Other butterfly species are also present in the area, such as the Western Pine Elfin, the Grey Hairstreak, the Propertius Duskywing, and the Silvery Blue

Increasing success by reflecting and considering all elements of a project

The impacts of a restoration project on other species must be considered in the planning process and should also be reflected on throughout the project. Decreasing ongoing threats to the ecosystem such as invasive species can be helpful to all species. Taking an adaptive management approach to manage further and potential risks also increases the resilience of a project such as this. Community involvement can bring opportunities for funding and volunteering as well as support and input from local frequenters to the site.

Restoration guidelines pertaining to the Taylor's Checkerspot

A question that must be asked when embarking on a restoration project is that of the goals of the project and the historical timeline which the project is restoring to. Ecosystems undergo significant change constantly, and the further effects of stressors such as habitat loss can shift the trajectory of an ecosystem to an unexpected outcome. Habitat changes in the ecosystem of the Taylor's Checkerspot include increased cover of Douglas-fir and shore pine with a subsequent decrease in meadow habitat. Many other factors also contribute to changes in habitat as other insect and plant species also alter the ecosystem. There are many influences to consider with habitat enhancement work. It is important to include both larval host plants and adult nectar plants when enhancing habitat for this species.

The Taylor's Checkerspot butterfly project in Helliwell Park started with small conifer removal to open up the space for a meadow habitat. After the conifers in the area were reduced, new native plants suitable to the projected butterfly habitat were planted. Keeping deer browsing of seedlings was a challenge.

This pilot project faced both support and opposition. Support from the community and involved individuals was robust. However some opposition came from the removal of the conifer trees, which in this context are technically invasive native species. After conducting various surveys only a small percentage of community members opposed the project. Actions the project will take to support this species were met with an equal support for all proposed methodology.

Timeline of the Project and Future Trajectories

Recovery actions on Denman Island were undertaken in 2015. In January trees were removed from a 2.63 ha area. Only trees below 17 years old or less than 5 m in height were cut, and all trees were left on the site. Improving habitat and increasing native plants are in the future trajectory of the project on Denman, similar goals to Helliwell Provincial Park project.

The future goals of the project are to reduce the threats to the species that occur in and around sites on Denman Island, and to establish a self-sustaining Taylor's checkerspot population in both Denman Island Provincial Park and Protected Area and within Helliwell Park on Hornby Island. The size of meadow habitat will be increased by removing encroaching native invasive plant species. After this, the abundance of desirable native plants will be increased through planting and seeding of the site within seven treatment areas

Many lessons were learned in the first stages of this restoration design. The volumes of removed trees were much larger than expected, and removal capacity could be increased. Invasive plant maintenance and weeding of the site must occur in order to keep invasive plants in check. Public engagement is also an area that requires constant attention. Signage, web and media updates as well as advertising, engaging with public events and maintaining correspondence all strengthen this project. Projects are a multi-partner and multi-agency endeavors.

In terms of monitoring, it is important to keep all documents in working form to allow for updates and adaptive management of the project.

A captive breeding project was initiated in 2013 by Peter Karsten and supported by Wildlife Preservation Canada and many volunteers, under a Memorandum of Understanding with the BC Ministry of Environment. The breeding facility is to be moved to the Greater Vancouver Zoo in Abbotsford in March 2016.

5. Restoration for Vancouver Island Beggarticks at Jinglepot Marsh, Nanaimo (Trudy Chatwin and Rob Lawrance)

Site Introduction

The Vancouver Island Beggarticks (*Biddens amplissima*) restoration project at Jinglepot Marsh in Nanaimo is an example of from the ground up restoration. Trudy Chatwin and Rob Lawrance updated a Provincial management plan for the species and re-surveyed the plants at the site, located at Jinglepot Marsh. In 2012, provincial funding was used by Kurtis Bjork to update records in the Vancouver area, and by Marion McCoy in Victoria. Finally in 2014 Land Based Investment Strategy funding was received to implement recommendations of the management plan. Jinglepot Marsh is situated near Nanaimo, BC and is the first site for the project. Jinglepot Marsh is the first site for the project and is a municipal park within the City of Nanaimo. The site was previously agricultural land, and is now severely disturbed and facing edge effects from the surrounding urban area. Jinglepot Marsh is an extirpated location for the species, but restoration efforts hope to restore the habitat and a population of Vancouver Island Beggarticks. The City of Nanaimo contributed to the restoration and propagation efforts of this project, as well as species-at-risk interns, various naturalists and the Ministry of Forests, Lands and Natural Resource Operations. Propagation in a nursery setting allowed for a more robust plant introduction and subsequent monitoring for this project. Six potential restoration sites have been proposed for the Vancouver Island Beggarticks in Jinglepot Marsh.

Life History of the Vancouver Island Beggarticks

The annual Vancouver Island Beggarticks is nationally designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a species of Special Concern and is a provincially blue listed annual species in British Columbia, and a species of Special Concern in Canada. This plant is native to Garry Oak marsh and estuary ecosystems, a habitat that is at risk, as well as in agricultural fields and wetland margins. Vancouver Island Beggarticks bright yellow flowers bloom in late August through to October.

Challenges and threats to the restoration project

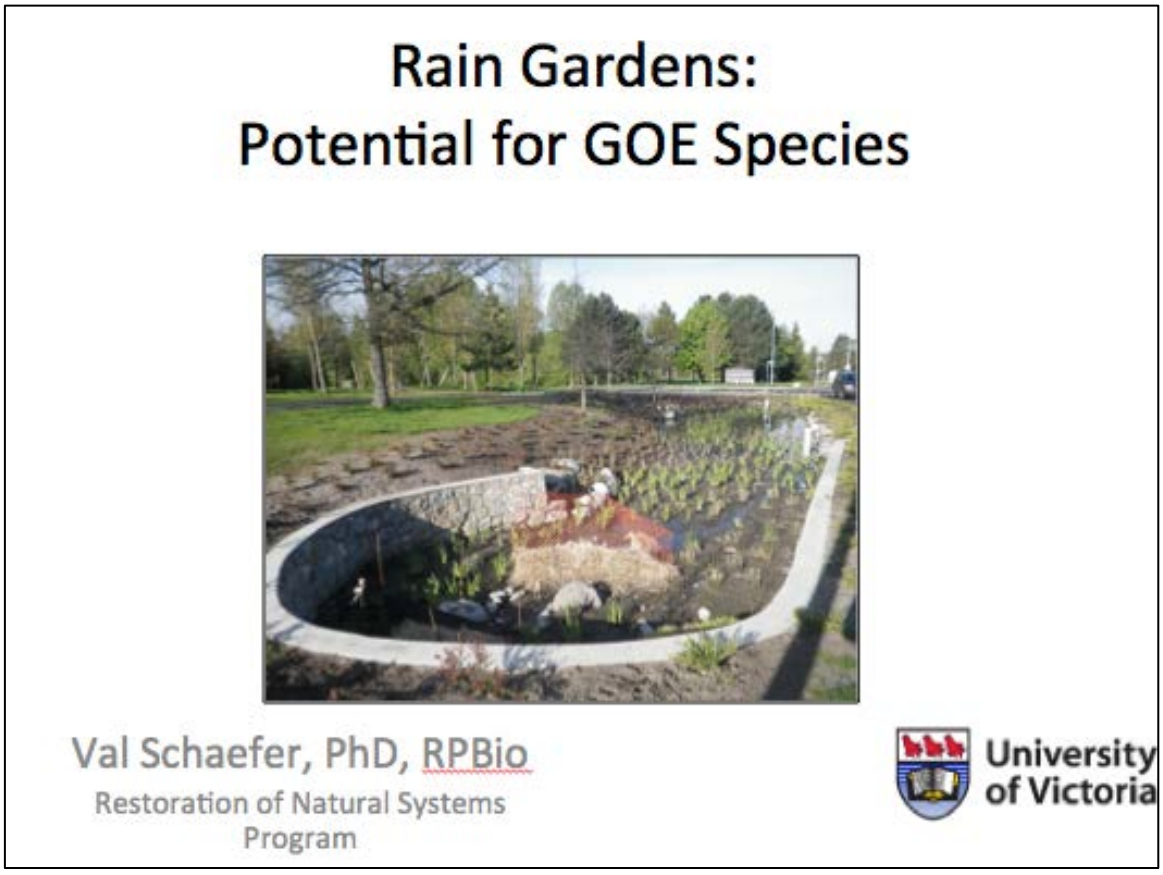
The largest threat faced by this restoration was Reed Canary Grass (*Phalaris arundinacea*). The new management plan objectives are based on the removal and monitoring of this species. The management plan implemented adaptive management and experimentation within the site, having different areas that received tilling treatment, pond liner treatment or both. Kuboto excavating equipment was to remove the Reed Canary grass rhizomes as well as English Hawthorn (*Crataegus monogyna*) trees, leaving the native bulrushes. The Kuboto was operated by the city of Nanaimo Trails and Recreation Crew. Tilling was done in approximately 40 m long increments and was completed on August 10th, 2015. Following tilling, experimental grass removal occurred

by digging and smothering the plants. Additionally, the use of pond liner over the grasses was found to be more efficient than digging, but this lead to increased water levels in areas and was also more expensive.

Results and Future Goals

Results were seen in November 2015, when some of the water returned from under the pond liner, with Reed Canary Grass not showing up in areas that were treated. However. It was found that Reed Canary Grass that only had the stems cut without removing the rhizome returned to the site. This management plan is not to be completed in a short-term, timeframe, and it also faces many challenges such as finding appropriate and genetically diverse seed sources, as well as getting volunteers to aid in the effort. The next steps of this project are to replant with Vancouver Island Beggarticks seeds, monitor seedlings that sprout in 2016, and observe the invasive species seed bank at the site.

6. Rain Gardens (Val Schaefer)



By definition, a rain garden is a depression or hole that has been planted to allow rainwater runoff absorption, particularly from impervious urban substrates such as pavement, compacted lawn and roofs. Rain Gardens in cityscape can increase urban biodiversity significantly. They also provide benefits such as storm water management and are openly endorsed by the city of Victoria.

Rain gardens vary in their habitat types and biodiversity. Though severely fragmented in an urban environment, they essentially create a mini ecosystem that provides connectivity for species. Structures and systems are context specific, and fall along a spectrum of absorptions and diversities. This form of ecological restoration can be considered blank slate because this is a newly created habitat. Rain garden designs with high infiltration absorb approximately 95% of water, but a storm drain connection will also be implemented for additional stormwater.

Types of Rain Gardens

1. Large scale, unconfined space rain gardens

Large scale unconfined rain gardens allow for larger plants, and greater plant diversity. An underdrain and an overflow drain allow for large catchment areas to be drained. This results in a high storage capacity and higher water quality than some of the other rain gardens.

2. Medium scale, unconfined space rain gardens

Medium scale rain gardens can also host large biodiversity and plants, however slightly less than that of a large scale unconfined rain garden. Depending on the design of the underdrain, medium scale rain gardens typically have moderate infiltration capacity.

3. Bioswales

Bioswales occur along Tattersall Road in Victoria. In a bioswale, runoff flows through a swale that has been planted with a diversity of plant species. Scarified subsoil aids in infiltration, resulting in bioswales having a high infiltration capacity. Overflow drains may be installed at low points of the swale, but typically there are low storm drain connections. They have medium biodiversity and medium storage capacity.

4. Roadside rain gardens

This type of rain garden occurs along Trent Street near Hillside mall. Located near a road or within a median, roadside rain gardens can be large or small depending on space availability. Medium biodiversity, storage capacity and infiltration are achieved through these rain gardens.

5. Confined urban space rain gardens

Confined rain gardens must be specially designed to fit a very confined space such as next to the Atrium Building on Blanshard Street. Impermeable surfaces, such as ones over a parking garage or if there are concerns about underground services such as fiber optic cables that can be damaged by tree roots are best suited for this design. They provide medium biodiversity and storage capacity. However, this type of rain garden is closed to surrounding soils and provides no infiltration benefits.

6. Grass swales

Grass swales occur along Shelbourne Street and San Juan Avenue in Gordon Head. Shallow growing plants that can be mown are most commonly used. A sand or rock base increases infiltration, as well as an overflow drain or a catch basin. They provide low biodiversity and storage capacity but can achieve medium infiltration.

Natural Analogues

Rain gardens can function as a vernal pool ecosystem. They allow for native species characteristic of some vernal pools to be planted as amongst various rain gardens. There are opportunities to bring the native species in the genera we see in natural analogues to these gardens; we can used Garry oak species when looking through this framework.

Schaefer suggests that some Garry Oak Ecosystem associated plants fit well within these systems.

Within a large scale rain garden the bottom of the slope functions as a wetland as it receives the most drainage, and consists primarily of rushes. The community then works its way up to mesic soil, and hosts more shrub species. The top slope typically has xeric soil and hosts tree species and ground cover species such as strawberries. This top layer is closest in proximity to the road or urban setting.

Some Garry Oak Species that can function well in a rain garden setting include:

•Blue Wildrye *Elymus glaucus*

•Common Camas *Camassia leichtlinii*

•Menzies Larkspur *Delphinium menziesii*

•Yarrow *Achillea millefollium*

•Red Columbine *Aquilegia canadensis*

•Fireweed *Chamerion angustifolium*

•Western Buttercup *Ranunculus occidentalis*

•Long-stoloned Sedge *Carex inops*

•Miner's Lettuce *Claytonia perfoliata*

•Lance-leaved Stonecrop *Sedum lanceolatum*

•Broad-leaved Stonecrop *Sedum spathulifolium*

•California Oat Grass *Danthonia californica*

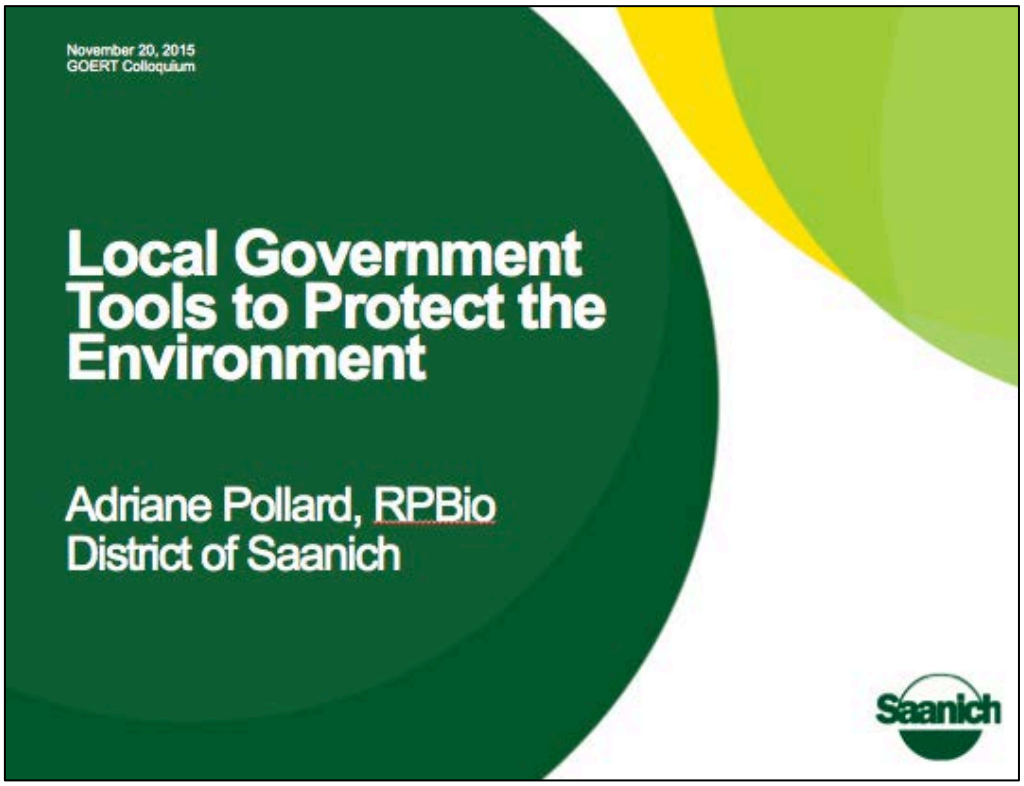
•Roemer's Fescue *Festuca roemeri*

One barrier to rain garden implementation is the expense of implementing rain gardens. Collaborating with municipalities and volunteer groups may help to alleviate this barrier.

Common Camas

Blue Wildrye

7. Municipal Tools to Protect and Restore Ecosystems (Adriane Pollard)



There are many tools municipalities can use to aid ecological restoration and the protection of endangered habitats such as Garry Oak and associated ecosystems. The District of Saanich is home to a range of ecosystems- urban, agricultural land, wetland and riparian zones to name a few. Saanich is the only municipality with environmental planning of ecology on private land.

Ecological Features: The District of Saanich

Saanich is located in the Coastal Douglas Fir Biogeoclimatic Zone, with a moist maritime climate (CDFmm). Locally several unique ecosystems are present such as Garry Oak and associated ecosystems, second growth coniferous forest, riparian and wetland zones are marine coastline. The population of Saanich is 115,000 and it includes 103 km^2 of land.

Putting a Policy Lens on Environmental Protection

Factors affecting land use and Environmental protection are not only subject to public will. Enabling legislation to allow for more robust protection is also reliant on staff funds, expertise and resources.

Tools that the municipality holds rest largely in legislation. Having restoration and conservation objectives can help municipalities work more efficiently with environmental groups, however economic and financial stressors can limit the success of this work. Pooling resources between regional governments can help to alleviate some of this challenge. Buy in from stakeholders and governments are essential for the best results.

Proactive versus Reactive Approaches

A proactive approach fares far better than a reactive approach when dealing with social systems. Bylaws, such as zoning, can help enforce certain rules. Protection through covenants and involvement through outreach, education volunteering, restoration and research are ways citizens and the city can work together to show our interest in the protection of sensitive ecosystems. A combination of education and regulation strengthens the push for conservation objectives. Though zoning and bylaws pertain mostly to private land, it is important to consider the public lens on this matter as well.

Zoning is not a guaranteed protection for Garry Oak trees and other components of this sensitive ecosystem. Legislation covers many key areas, such as limits to impervious surfaces within the district, development setbacks from streams and lot coverage. Policies and acquisition of land are large drivers determining the fate of these sites.

A brief timeline of significant years which helped shape the landscape shows the development of the District of Saanich's Environmental Protection.

1967 Began acquiring major floodplains and lands along the Colquitz River

1968 Created the Urban Containment Boundary

1991 Environmental & Social Review Process

1993 Deposit of Fill Bylaw

1994 First Environmental Planner on the island

1995 Natural State & Tree Covenants

1997 Tree Protection Bylaw

1998 First Environmentally Significant Areas Atlas

2000-2010 Garry Oak Restoration Project

2001 First Watershed Development Permit Area Council adopts Naturescape BC Principles

2002 Council Endorses Garry Oak Recovery Strategy

2006 Streamside DPA

2011 Environmental GIS Layers

2012 Marine & Terrestrial DPA

2012-2015 ESA Mapping Initiative

As partnerships with other community groups such as the University of Victoria and various nonprofits began to grow, the opportunity to shift focus to outreach and education about Saanich's natural areas arose.

The importance of municipal environmental protection can be seen In the case study of the Colquitz river and floodplains, urban containment boundaries were established early and had a huge impact. An environmental and social review of impact assessment and an atlas with a significant areas key tool contributed to the stewardship conversation in the city.

Seasonal Employees inventory streams and partner with the Department of Fisheries and Oceans (DFO). In 1998, the first atlas was published. Brochures and educational videos brought awareness to the mapping and inventory projects underway in Saanich and continue to be an effective way of reaching the public. A similar model was used for watershed and riparian zone protection, plans and restoration in Saanich. A similar approach of data collection, followed by distribution and outreach is used for Garry Oak Ecosystem protection in Saanich.

The official community plan policy is "*To Protect and Restore Garry Oak Ecosystems"* Several Projects, Covenants and bylaws surround this statement.

- Garry Oak Restoration Project
- Training and education programs
- Garry Oak Ecosystems Recovery Team
- Urban Forest Strategy
- Parks management
- Natural State covenants
- Tree Covenants
- Environmental & Social Review Process (Zoning and Subdivision)
- Inventory and Mapping
- Tree Protection Bylaw
- Naturescape

There is still a lack of awareness among many residents regarding Garry Oak trees and their associated habitat. As Adrianne stated, "Some people think it's illegal to cut down a Garry Oak tree, some do not even know what one is ." Being mindful of this variance in perspectives brings in new ideas for how GOE outreach in Saanich could be more successful.

There are several exceptions that allow landowners to disregard to protection of a Garry Oak on their property. If the tree is small, dead or diseased, a fire hazard, near a building foundation, in an inappropriate location, on ALR land, on a driveway or a building permit, the tree can be removed. Rural Saanich property is also allowed to removal of one Garry Oak tree per year. A tree must be 2 m or more and at least 4 cm in diameter to be considered.

Development Permit Areas

Development Permit Areas (DPAs) help to increase the protection of Oak trees on private land. Unlike other policies, DPAs allow for the protection of the entire ecosystem. Though some use is allowed, restoration and recovery can be set as a greater focus. DPAs also have more flexibility than typical bylaws and use buffers to permit some sensitive development. This works hand in hand with the Tree Bylaw, and also communicates more effectively to developers about the requirements on the land.

Restoration Objectives and Tools: Environmental Development Permit Areas

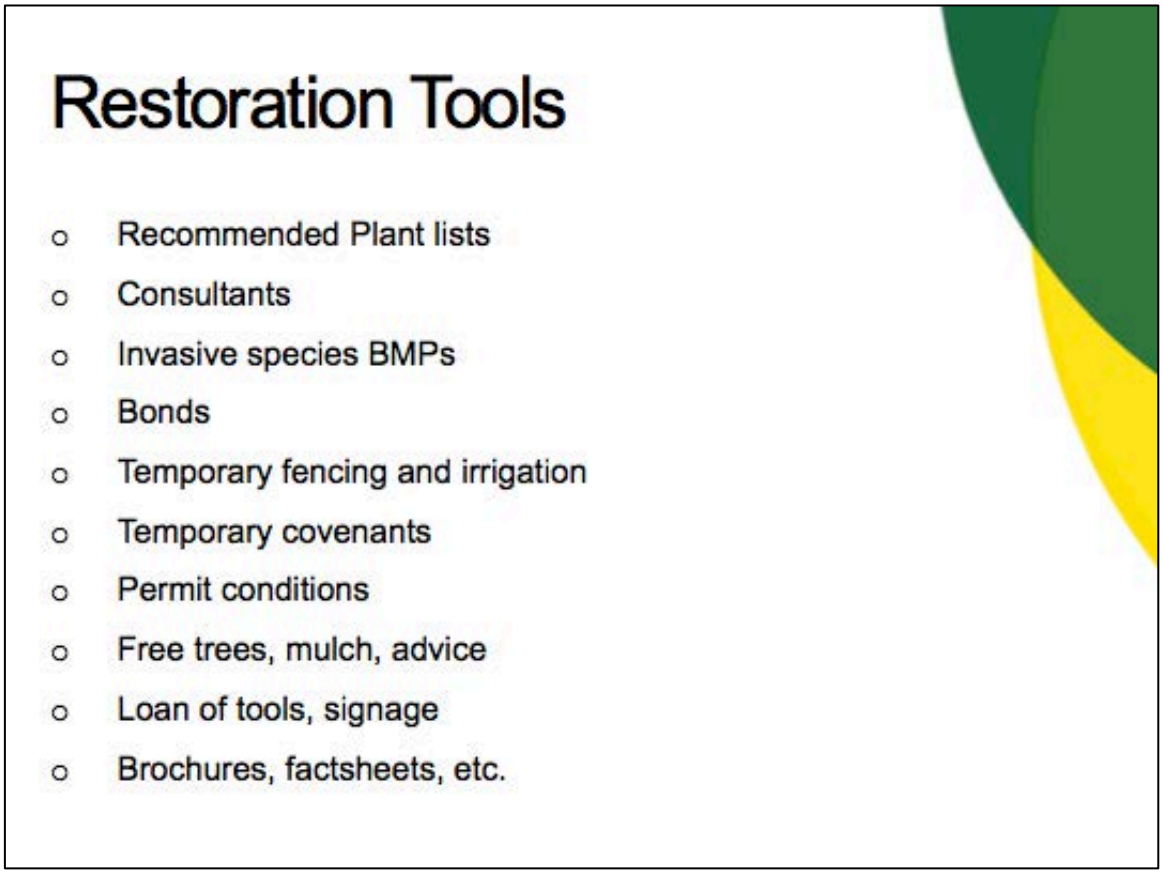
Garry Oaks are part of the Official Community Plan (OCP) in the greater Victoria area. A variety of bylaws, policies, education programs, partnerships and mapping efforts occur both on public and private land. However, there is still a lack of awareness and stewardship towards Garry Oak and associated Ecosystems. The local bylaw does not protect all trees and there are several loopholes which allow for the removal of Garry Oak trees. There is still a lot of pressure from environmental and stewardship groups to protect these trees.

Difficulty often arises when attempting to work with landowners, as conservation objectives can be imposing to land use ideas. Editing your discourse and remaining professional is needed to form and keep good relations with local landowners. Situations differ from person to person, and considering the location, limits of authority, and outcomes of restoration goals is essential when working with the community. Providing resources for information and financing for property owners is something the municipality can do to alleviate tensions.

The restoration objectives in a given Environmental Development Permit Area (EDPA) are determined by a variety of factors. The scale and condition of the land, the availability of biologist and staff assistance, and the aspirations of the landowner regarding the property must collaborate well for any project to be a success. Restoration is an objective of the city, but must take a more egalitarian approach versus a scientific one is private land ownership cases. Information to landowners could be increased by providing more municipality based guidance documents or establishing restoration objectives. DPAs have environmental guidelines, which can be a labor intensive local government tool. By gaining protection of the Garry Oak and associated ecosystems will allow for the protection of all trees, not only Garry Oaks. Permit areas vary in scale, and can stretch far beyond an individual tree, even including parts of one or more properties

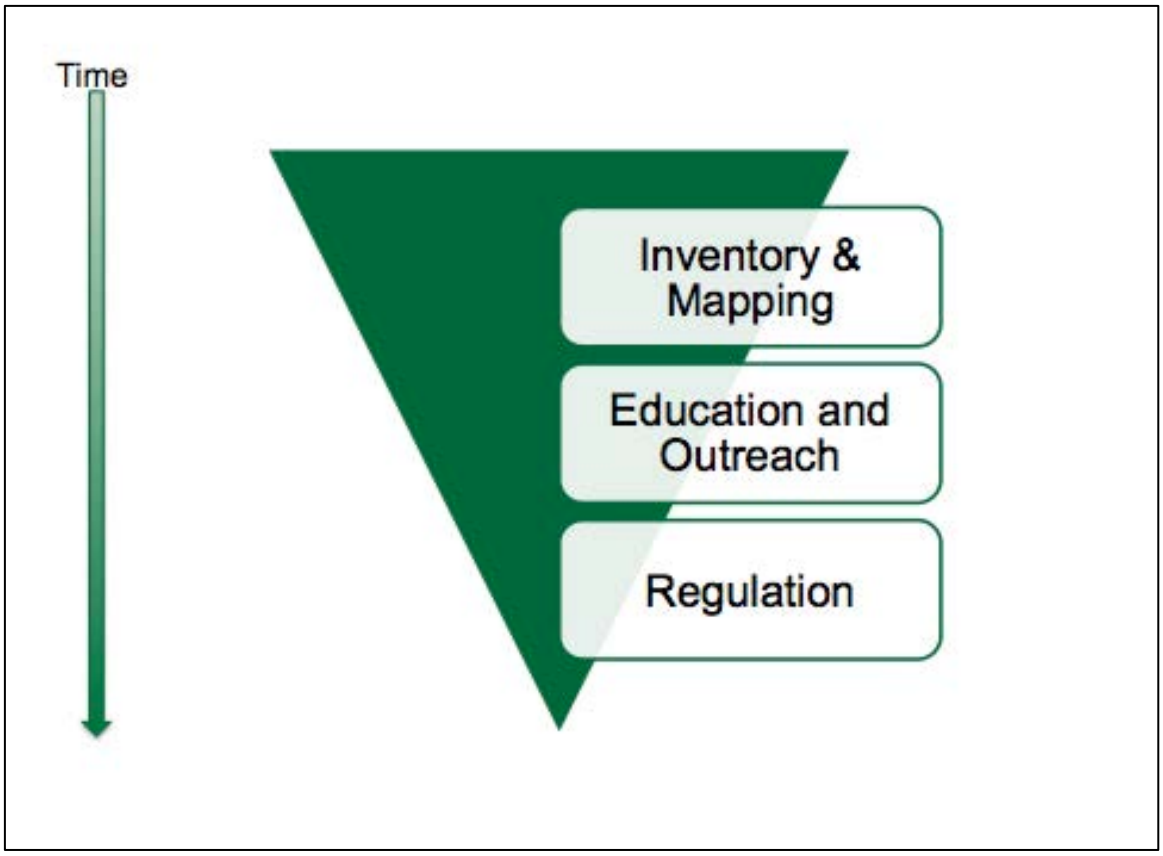
When restoration objectives have been set, it is common for the district to hire a biologist. This allows for consultation and plant list recommendations, as well as documented monitoring of the restoration that occurs on the site. The most common type of restoration involves invasive species removal and replanting. When translocation of rare plants occurs, it is necessary to have an experienced biologist available. The District of Saanich can provide several tools to reach these objectives. Assistance with tools, signage, trees and mulch, as well as political measures such as bonds and temporary covenants are

all available to landowners restoring the sensitive ecosystems on their properties.

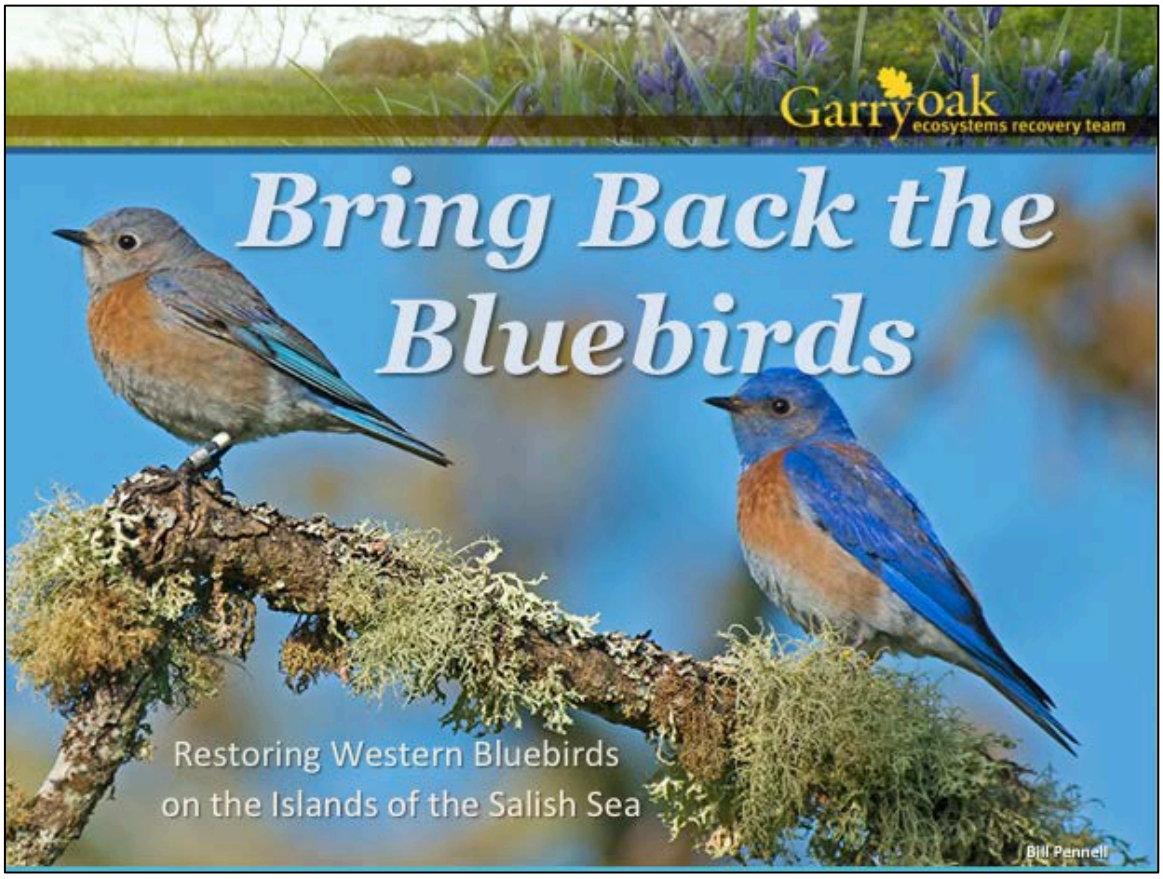


Environmentally Significant Area Mapping

In recent years, mapping has allowed increased connectivity between the locations of Garry Oak trees and the properties they exist on. The Environmentally Significant Areas (ESA) mapping initiative in Saanich is exploring mapping more important areas that can aid the restoration and conservation of sensitive ecosystems. Significant amounts of funding have been invested in inventory and mapping, as well as outreach and regulation of bylaws if needed. Restoration is a key element of conservation, if these remnants are to be healthy and viable in the future. The map allows for viewing of where links between sensitive ecosystems occur, and where assets and efforts at the municipal level can be best focused for the most impact. Covenants, stream and shore side setbacks can be used as tools that fit together in the landscape.


Time
Inventory & Mapping
Education and Outreach
Regulation

8. The Bluebird Project (Kathryn Martell)



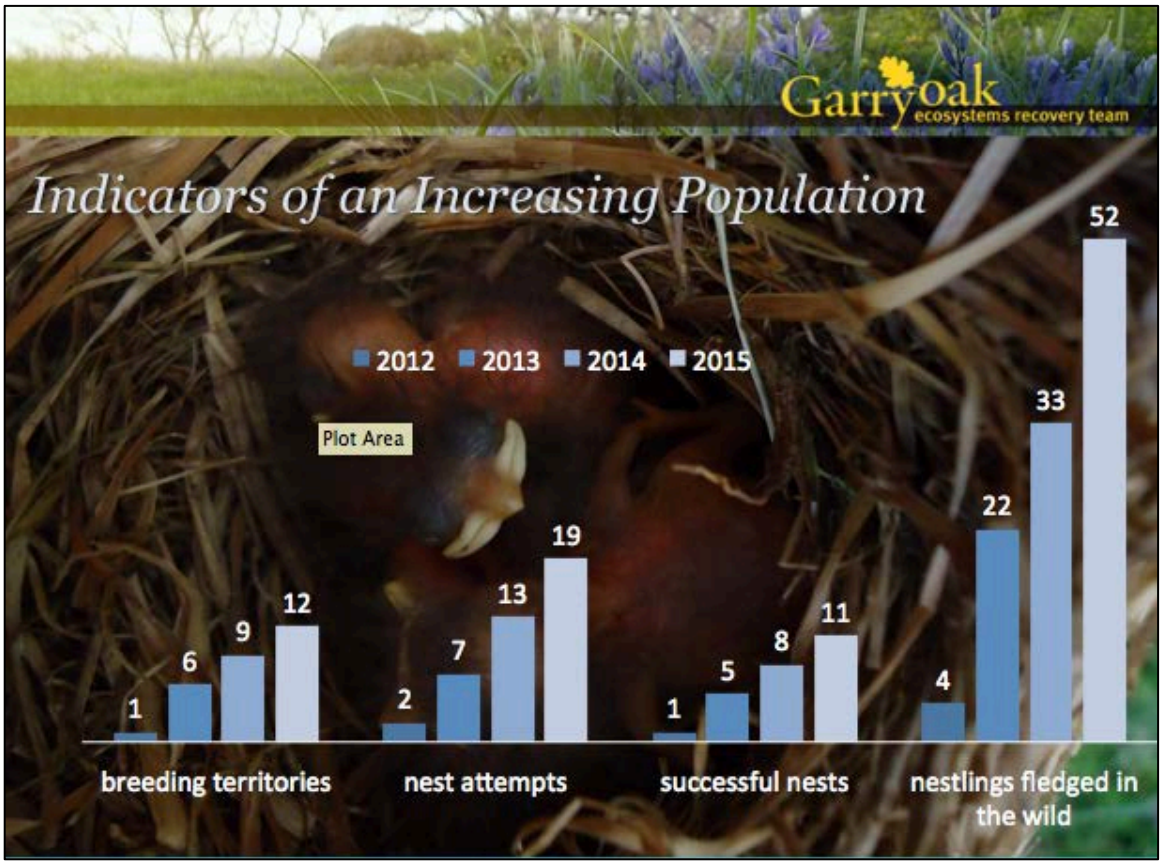
Kathryn Martell of the Garry Oak Ecosystem Recovery Team presented an overview of Western Bluebird population decline in the Georgia Basin, and of GOERT's "Bring Back the Bluebirds" restoration project in the Cowichan Valley. The Western Bluebird is a short-range migratory bird species, whose historical range is strongly associated with that of Garry Oak ecosystems. Garry Oak meadows provide ideal habitat for the Western Bluebird, as this species is a secondary cavity nester, and requires low spreading branches on which it can perch, from which it can swoop down to open ground to feed on ground-dwelling insects.

While common in Garry Oak savannahs of the Georgia Depression before the 1950s, populations of the species began to decline due to the cumulative effects of habitat loss, fragmentation, and degradation, the decline of nesting cavity excavators (for example, Lewis' Woodpecker), the loss of traditional wildfire management practices, declines in prey, and the increased prevalence of aggressive invasive birds (i.e. the House Sparrow and the European Starling). As a result, the Western Bluebird became extirpated on Vancouver Island by the 1990s, and is now a Red-Listed species in British Columbia. While populations remain in parts of Washington and Oregon, natural dispersal of the species is hindered by the fragmentation of its original habitat.

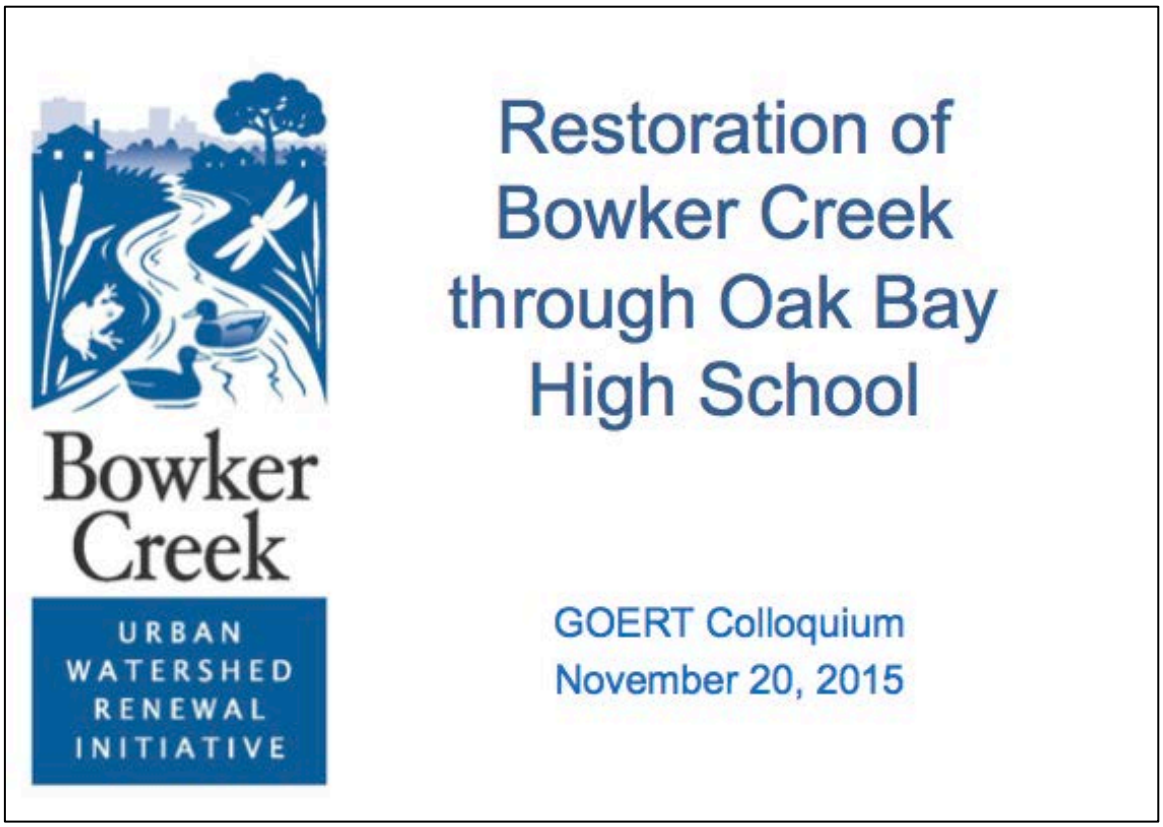
GOERT has taken an approach to restoring Western Bluebird populations on Vancouver Island, which builds on the species' strength as a habitat generalist. The Western Bluebird requires structure rather than composition, so it is easily adaptable to novel perching or nesting structures. GOERT's 'Bring Back the Bluebirds' project was implemented in the Cowichan Garry Oak Preserve, beginning in 2012, with the aim of building "a viable breeding population of Western Bluebirds in the Salish Sea, and build community connections with Garry Oak ecosystems". This site provides an open meadow with scattered large trees, and contains low spreading branches, fencing, and low growing shrubs to accommodate the bluebird's perching needs.

This partnership based project began with the establishment of the nestbox stewardship program in 2005/06 , and has expanded to include efforts at translocation from a healthy population in Fort Lewis, Washington, to the preserve. Translocations began in 2012 with 4 adult pairs and 9 juvenile birds; this year saw the establishment of one breeding territory and one successful nest (defined as fledging one young). Subsequent years saw the continued translocation of bluebirds, as well as the return of several juveniles, and the arrival of a small number of bluebirds by way of natural dispersal from the San Juan Islands.

In 2015, 23 returns and 11 successful nests were observed, 12 breeding territories were established, and 52 nestlings were successfully fledged in the Cowichan Garry Oak Preserve. Although predation has posed a significant challenge and places a strain on project resources – particularly with House Sparrow and small mammal attacks on bluebird nests – the team has continually adapted its techniques for ensuring the successful establishment of the Western Bluebird population on the island. Translocations will continue in 2016 and possibly into 2017, potentially with efforts at balancing male and female populations, and GOERT is looking at mentoring community volunteers who will act as stewards for this population in the future.

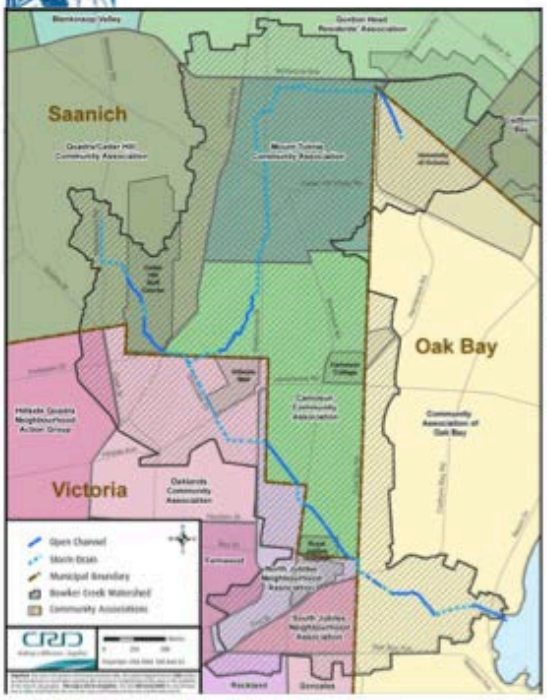

Garryoak
ecosystems recovery team
Indicators of an Increasing Population
2012
2013
2014
2015
Plot Area
1
6
9
12
2
7
13
19
1
5
8
11
4
22
33
52
breeding territories
nest attempts
successful nests
nestlings fledged in the wild

9. Restoration of Bowker Creek through Oak Bay High School (Jody Watson)



Jody Watson of the Bowker Creek Initiative discussed a recent restoration initiative at Oak Bay High School involving Garry Oak ecosystem components. Her presentation began with a general overview of the Bowker Creek Watershed Renewal Initiative, a multi-stakeholder steering committee incorporating several municipalities, the CRD, the University of Victoria, and several community associations. The Initiative operates with an aim of coordinating across these stakeholder groups in implementing the Bowker Creek Watershed Plan. The initiative seeks to take responsibility within the watershed for the management of water flow, the improvement of natural areas and biodiversity, and to achieve acceptable water quality. Additionally, the initiative is working toward the provision of a community greenway throughout the watershed. The implementation of this vision is guided by a 100-year action plan called the Bowker Creek Blueprint. The Blueprint identifies several key opportunities for taking action toward achieving the goals of the plan. The Oak Bay High School site has an open portion of the creek running through the grounds which was identified as one such priority area. As 60% of the watershed is impervious, actions to mitigate high levels of downstream flooding are of importance..

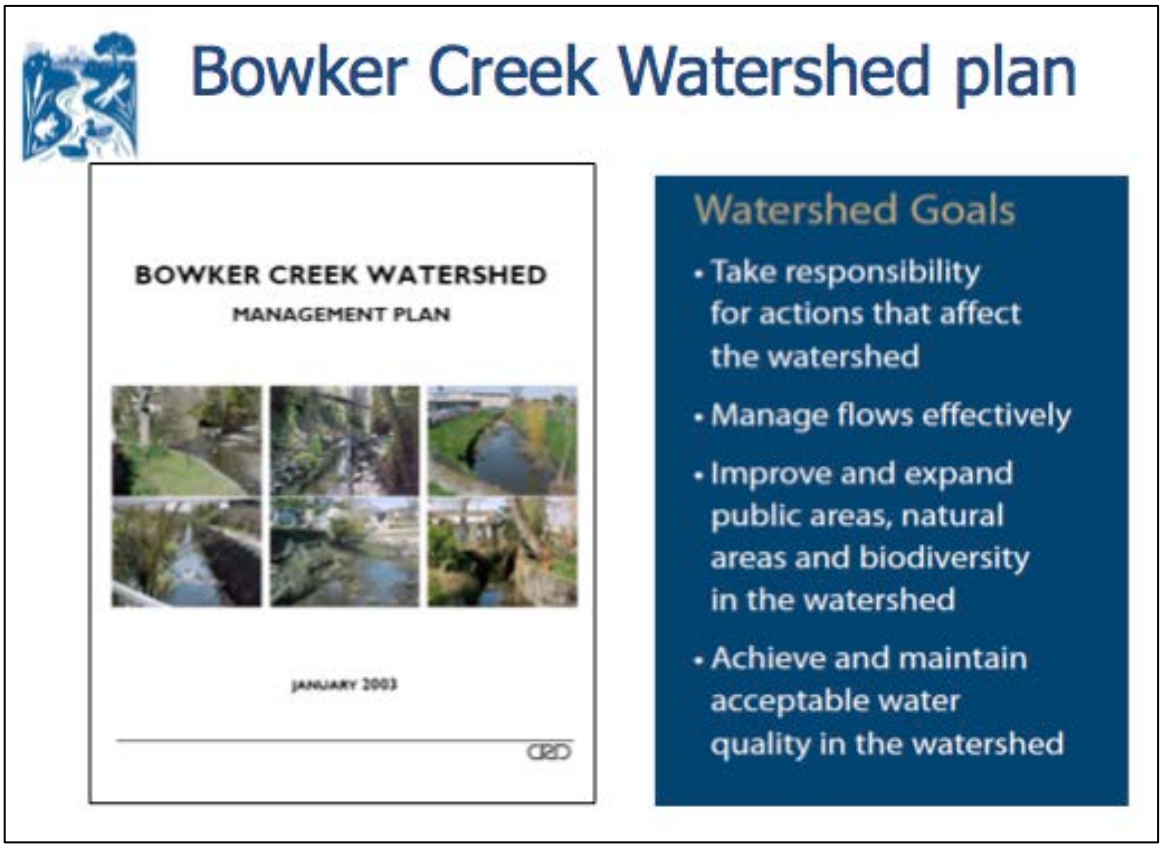
Who is the BCI?



Multi-stakeholder steering committee

- Saanich
- Victoria
- Oak Bay
- CRD
- University of Victoria
- Urban Development Institute
- Community Associations
  - Friends of Bowker Creek Society
  - Camosun CA
  - Quadra-Cedar Hill CA
  - North Jubilee CA
  - Community Association of Oak Bay

Bowker Creek
URBAN WATERSHED RENEWAL INITIATIVE

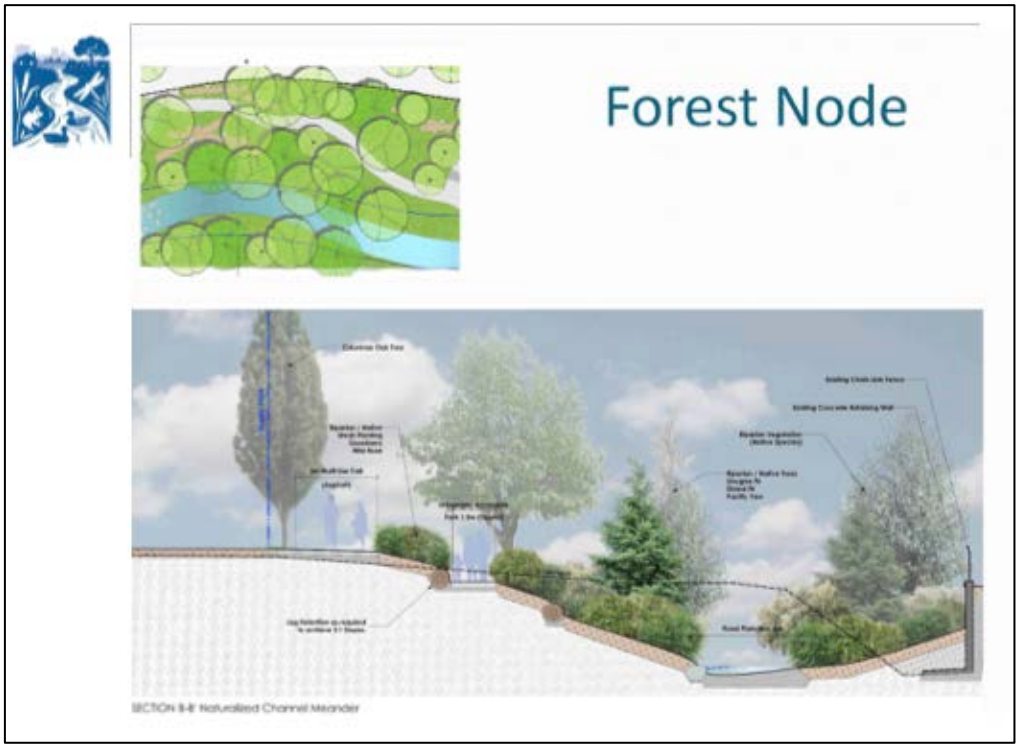


The opportunity to implement this particular action arose in 2010 with the proposal to renovate Oak Bay High School buildings and to re-design the school grounds. The school gifted 20m of the grounds for stream restoration to the Bowker Creek Watershed Initiative, and objectives developed and the design process commenced. It was the aim of the project to improve flood flow conveyance, and aquatic and riparian habitat, while providing an outdoor learning space and public access, all in a manner that would minimize cost and ongoing maintenance.

The school has been directly involved from the outset of the project's implementation. The Initiative began by working with Oak Bay High in incorporating the creek and the project into the school curriculum (*i.e.,* with career training), and involving students both in workshops and a design charrette. Restoration plans were created based on the outcomes of such engagement activities, from which it was found that students and staff wanted a community space, an outdoor classroom, universally accessible multi-use trails, and a lawn area.

In particular, the lawn area presented an opportunity for Garry Oak ecosystem restoration, and became the site of a Garry Oak meadow. This is of particular importance as the Bowker Creek watershed was once a Garry Oak ecosystem. Watson walked the audience through the labour intensive implementation process, which involved stream diversion, erosion control efforts, the creation of meanders to mimic salmon habitat, the construction of a classroom space, and a great deal of student involvement in vegetation establishment. This project, completed in the fall of 2015, saw the transformation of a

once highly impervious, invasive species-dominated portion of Bowker Creek to an open, inviting and interactive public space in the Oak Bay High School field.

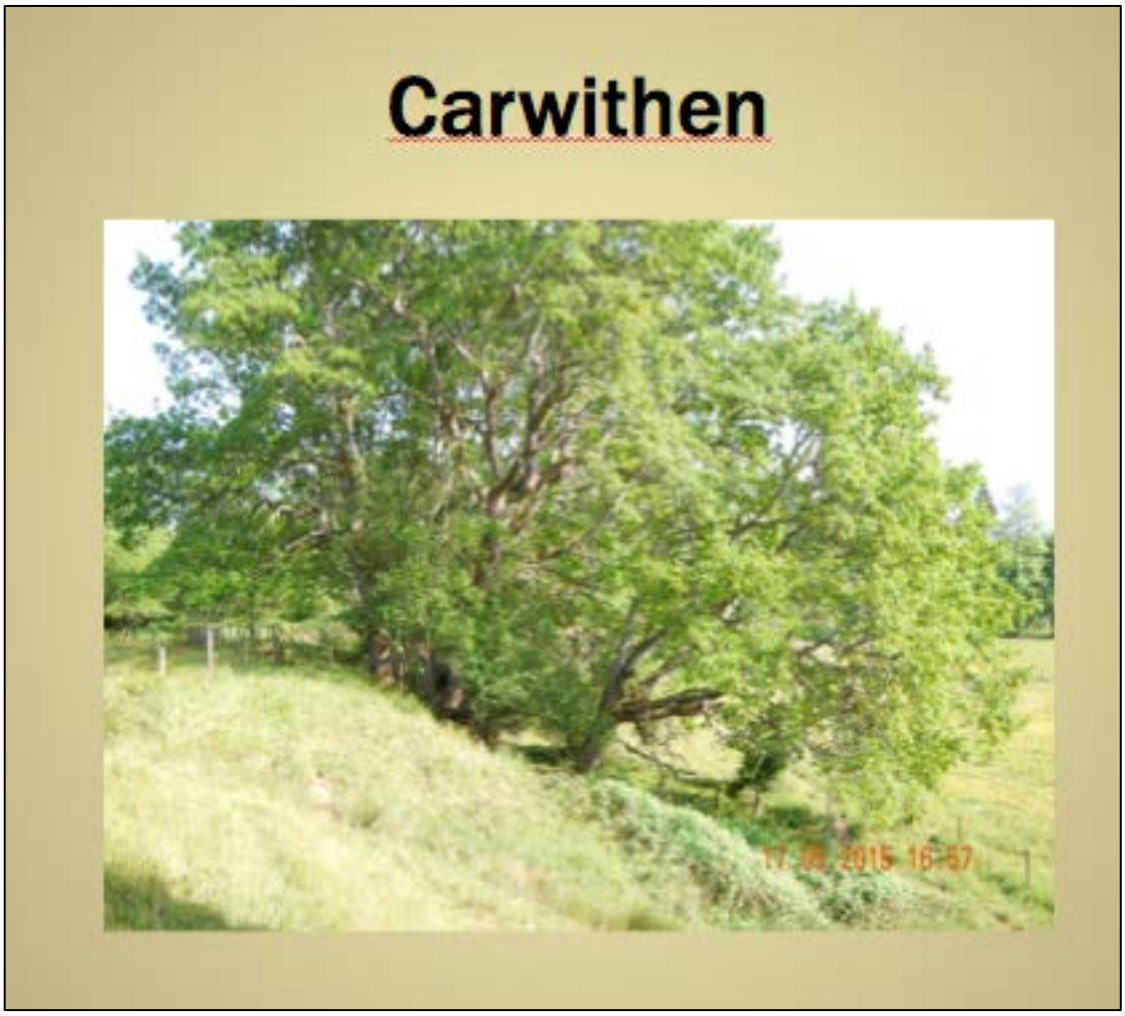


10. Garry oak Restoration in the Comox Valley (Loys Maingon)

In his presentation on Garry Oak trees and restoration in the Comox Valley, Loys Maingon outlined the decline in Garry Oak meadow distribution in the valley, and the efforts being taken to reintroduce young oak trees to the canopy in a series of three case studies. A brief overview of the area and its natural history demonstrated that in much of the Comox Valley, Garry Oaks historically existed with a strong association to wet conditions – particularly in the Tsolum River area – and play an important role in coastal dune habitat. Unsurprisingly, the Comox Valley has seen a significant decline in the extent of Garry Oak meadows since 1856, due to factors including habitat loss and land use conversion, alterations in sediment and water flows, and coastal erosion. Few oaks remain from 1865 (e.g., on the Carwithen property), and those remaining are beginning to core out as they reach maturity. Thus, the area is in need of a rebound in Garry Oak populations.

In response to this, Maingon operates a Garry Oak tree nursery in the area, which yields a high number of trees (over 3500 in 2012). These young trees are now being planted in public areas such as the Tsolum River. Barriers to this restoration process include: the decline in traditional management of Garry Oak ecosystems by local First Nations; development attitudes; and landscaping choices (which favour fast growing non-native

species over slow-growing Garry Oaks despite their lack of suitability to local environmental conditions). In spite of this, Maingon cites changes to city bylaws as a key tool by which the use of Garry Oak trees in public landscaping is being encouraged.



Maingon discussed three cases in which Garry Oak restoration is or will take place. Point Holmes Park is a coastal site in which Garry Oaks are present and invasive species removal has taken place. Maingon emphasized the importance of the seed bank, which in this case remained despite the invasion of non-native species. While the City of Comox has proposed the reinforcement of coastal dunes with human-constructed walls, Maingon argues that the protection of dune habitat can and should be achieved through the restoration of coastal Garry Oak ecosystems. Also discussed was an expansion of the Vanier Garry Oaks Park, and the potential for a meadow restoration project to take place in conjunction with the North Island Hospital Project.

Garry Oak Nursery (2012)
3500+ trees

11. Focusing on Results: Strategic ecological restoration with the Open Standards for the Practice of Conservation (Emily Gonzales)

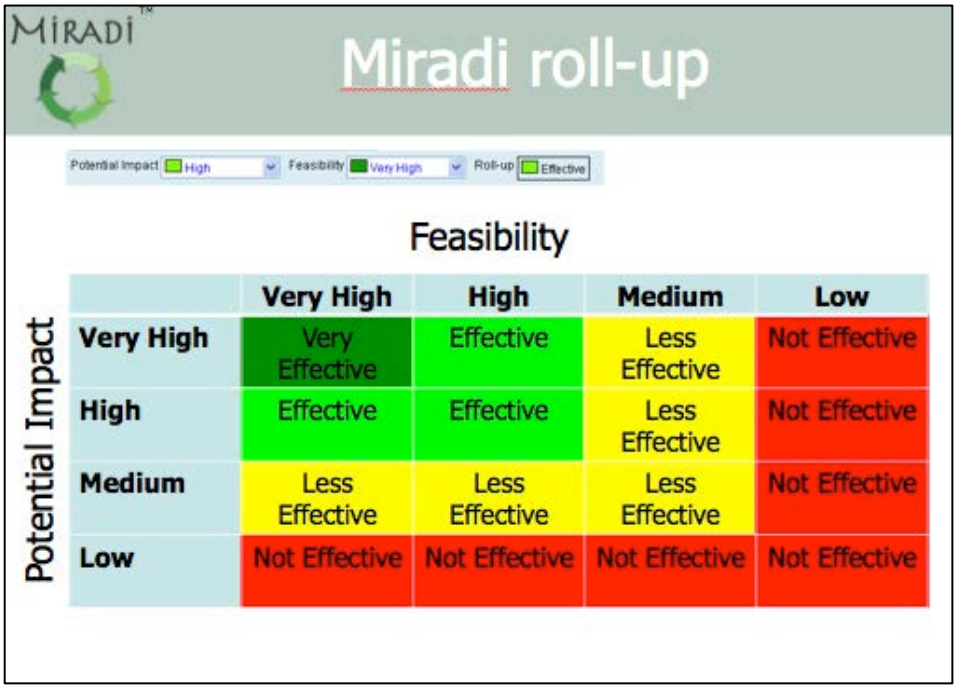
Emily Gonzales of the University of Victoria and Parks Canada Agency began her presentation with a brief summary of the key learnings she had so far identified in previous presentations during this year's GOERT Colloquium. She pointed out that folks are developing more techniques to do more, faster, and better, taking note of the importance of partnerships, and the idea that our scope with ecological restoration as it relates to Garry Oak ecosystems needs to be broadened.

Gonzales has travelled across Canada to facilitate workshops in which Open Standards have been applied to restoration projects in National Parks, and is also working to incorporate the Open Standards into the courses she instructs at UVic, in order to equip students with a more valuable skill set in preparation for the fields of conservation and restoration. As Gonzales explained, her team began developing the Open Standards for use in National Parks by asking key questions as to whether the biggest threats to conservation are being mitigated, using the most effective and feasible strategies, and whether the expected results are being reached in dealing with the key conservation problem identified in a number of project proposals. Her conclusions from this process were that our time, funding, and resources are so often limited in restoration, and so we

must be ensuring that our approach to restoration is both effective and efficient. The Open Standards are response to this: they are a means of communicating, organizing, and implementing conservation projects, through an open source format. They were developed in a partnership between leading environmental organizations in Canada and in the world, have been improved through an adaptive management approach, and have now been applied in over 170 countries through growing partnerships.

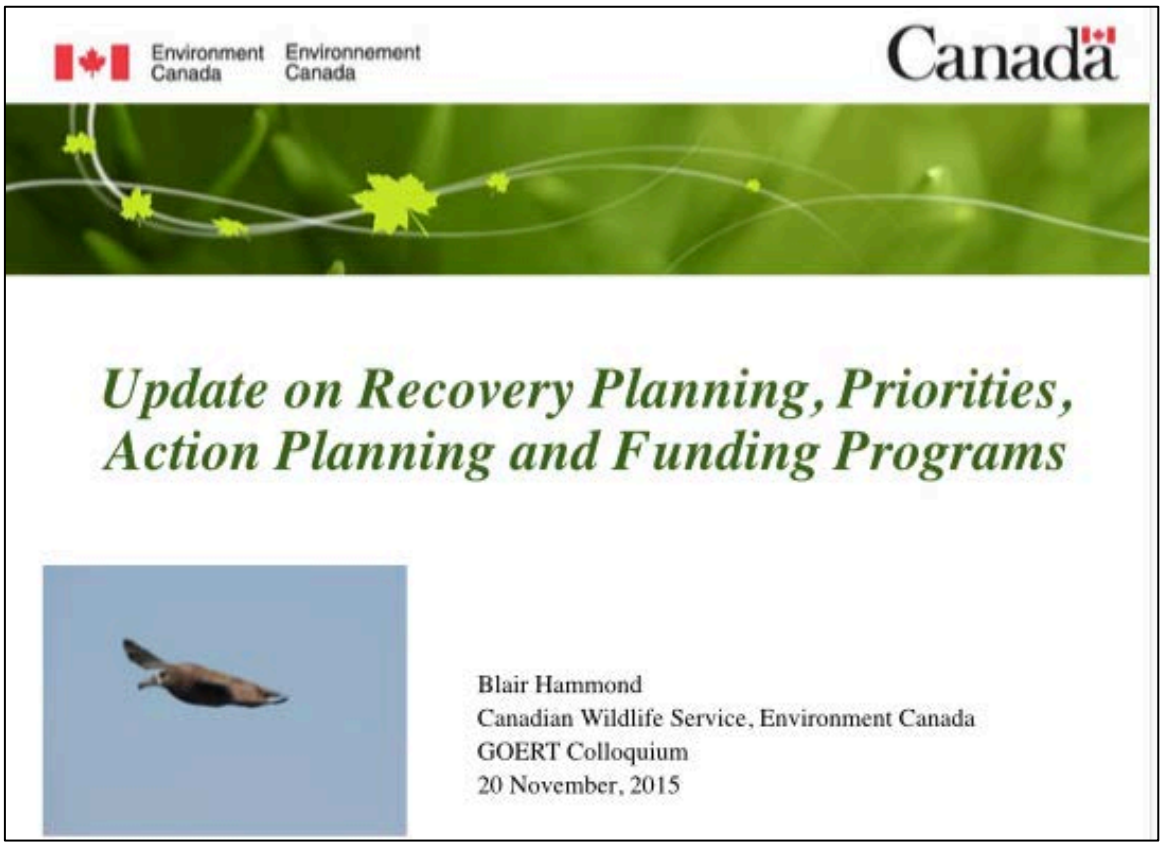
Projects that can be planned and implemented using the Open Standards vary greatly in their form. As Gonzales explained, Open Standards for the Practice of Conservation are used in a step-by-step process, which operationalizes an adaptive management approach to conservation and restoration. Gonzales walked the audience through this process using Miradi software. While the Open Standards do not necessarily need to be used in conjunction with this software, Gonzales emphasized that it can be a helpful tool for doing so in a step-by-step manner. The process begins with a broad lens that looks toward the end, rather than the beginning of a project. First, the scope of the project is identified, followed by an identification of what is being conserved (i.e. species and species at risk, ecosystems), so as to initially identify the problem before the approach is considered. Following this, the threats to the system in question are considered and classified, and then ranked in terms of importance. Upon ranking these threats, their drivers (or indirect threats) are then identified. Strategies for dealing with these threats are then identified and ranked based on their potential impact or potential for leading to desired outcomes, and their feasibility in consideration of factors such as time, finances, resources, ethics, or

other constraints. Based on feasibility and impact scores, the effectiveness of different strategies can be calculated (Miradi, Gonzales explained, will do these calculations for you). Following this, assumptions regarding our strategies and their potential results are laid out and tested. Where key assumptions lie is where monitoring, based on certain objectives and indicators, will later come in.



Thus, the Open Standards are geared toward making strategic decisions and systematic choices in conservation and restoration, especially given limited available resources. This format cannot only be applied to individual projects, but is also useful in considering multiple projects and how they fit together on a larger landscape or regional scale.

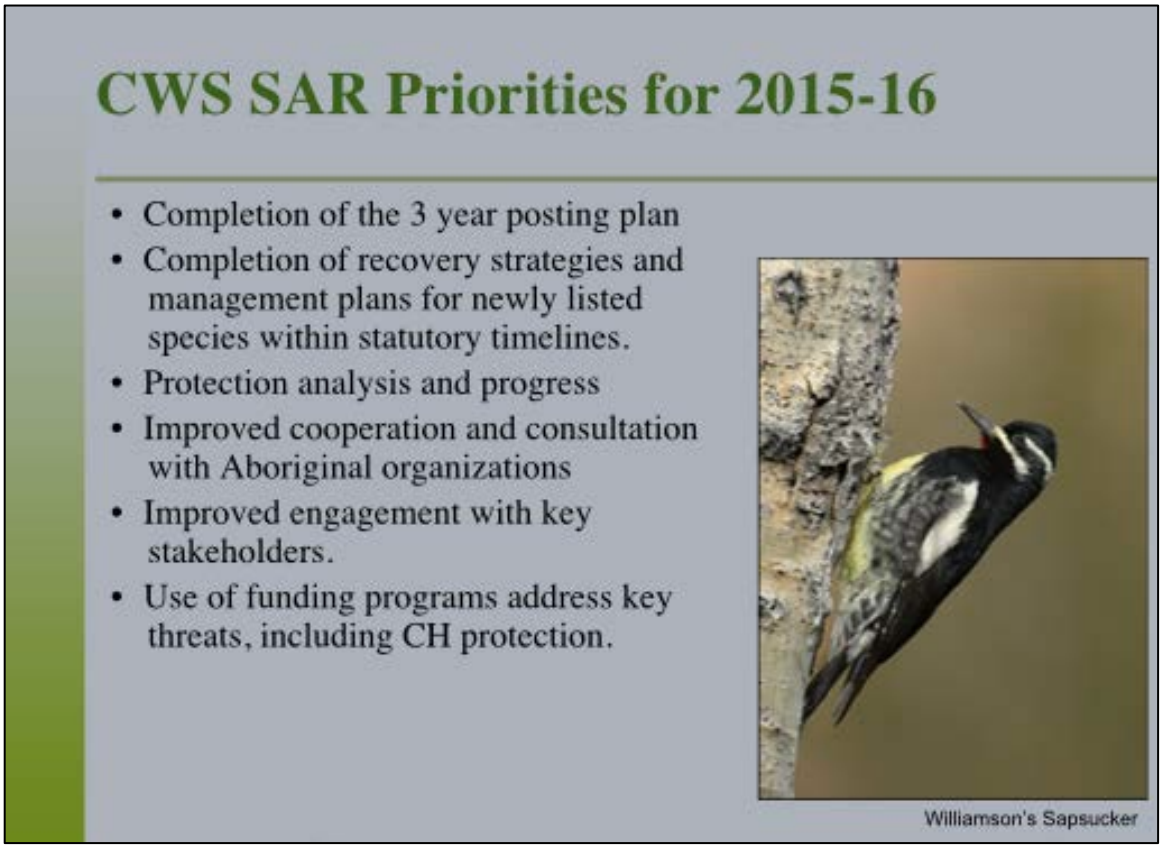
12. Update on Recovery Planning, Priorities, Action Planning and Funding Programs (Blair Hammond of the Canadian Wildlife Service, Environment Canada)



Blair Hammond's update on Environment Canada's strategies for implementing the Species At Risk Act (SARA) began with a brief overview of the act, its process, and the government bodies overseeing it. Environment Canada is responsible for overseeing the administration portion of the act, as well as enacting SARA as it relates to all species, with the exception of aquatic species (which are overseen by the Department of Fisheries and Oceans) and those situated in National Parks (these are the responsibility of Parks Canada Agency). Hammond discussed one aspect of the SARA process in particular, recovery planning for threatened, extirpated, and recoverable species. Recovery planning involves the development of Recovery Strategies and Action Plans for 'Threatened', 'Endangered', and 'Extirpated' species. For 'Threatened' and 'Endangered' species, critical habitat is identified based on species distribution, and the biophysical attributes and activities likely to result in destruction of such habitat. The identification of critical habitat is one aspect of action planning, which also includes the identification specific projects and activities to take place, timelines, and socio-economic evaluation. As well, Management Plans are developed for species of 'Special Concern'.

Hammond provided an update on the Species At Risk priorities for 2015 and 2016, which include the completion of a 3-year posting plan, the completion of recovery and

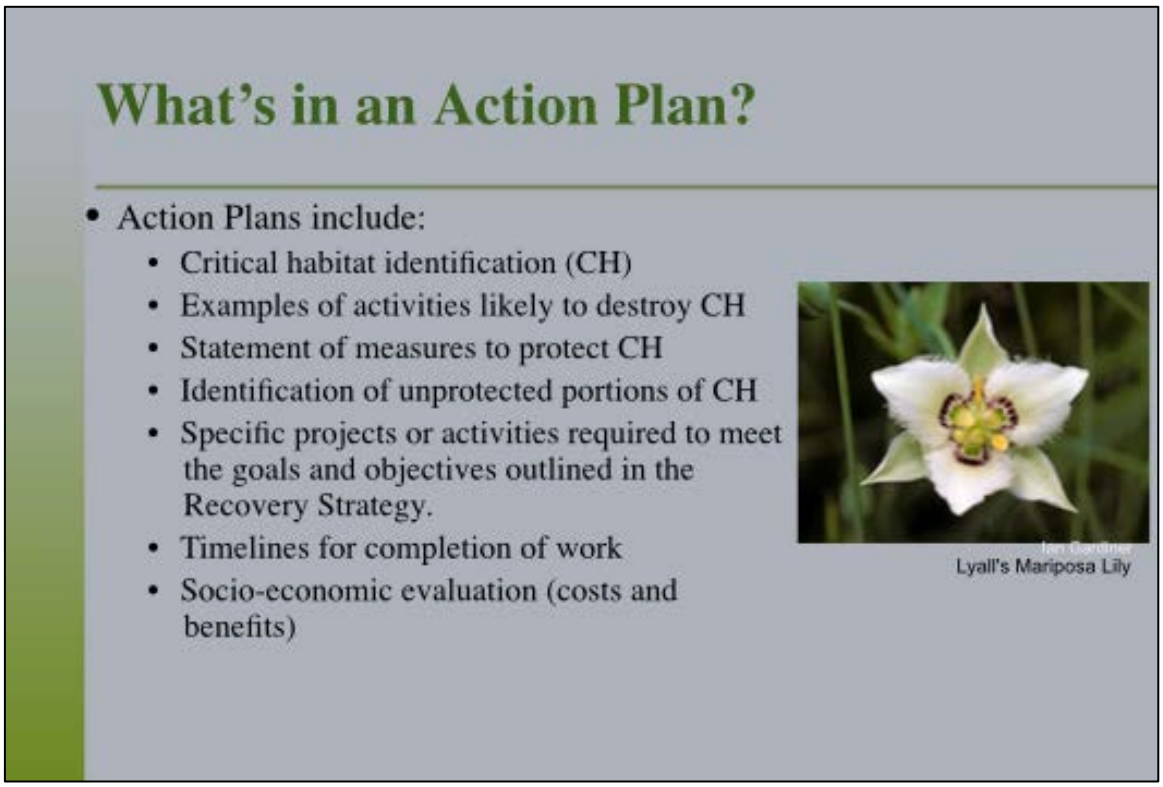
management strategies for newly listed species, protection analysis, improved cooperation with Aboriginal organizations, improved stakeholder engagement, and the use of funding programs to address key identified threats. The 3-year posting plan was created to accelerate the rate at which recovery documents for listed species overseen by Environment Canada (334 out of 521 Schedule 1 SARA species in Canada) are posted. Additional species remain to be added to Schedule 1 of SARA, and 192 documents remain to be posted. A large portion of these species – 200 SARA species in total and 155 of the terrestrial species overseen by Environment Canada – can be found in British Columbia. These completed listings and plans are to be expected within the next 12-18 months.



Following this, action planning is to take place upon the availability of capacity to do so, which will attempt to focus on "multi-species, habitat, or landscape based" plans, taking into account different successional stages, with a high level of cooperation.

With regard to stewardship and funding programs, Hammond outlined government financial tools for achieving the act; these include directed grants, funding programs, and tax incentives. As of 2014, funding programs have been provided with more resources. These include the Aboriginal Fund for Species at Risk, which supports aboriginal involvement with SAR protection, particularly with regard to culturally important species on Aboriginal lands; the Habitat Stewardship Program, which funds stewardship activities for SARA-listed species on private, Crown, or Aboriginal lands, or in aquatic marine areas; the National Wetlands Conservation Fund, which takes a focus on non-

federal lands in which wetland restoration is taking place; and the Interdepartmental Recovery Fund, which allocates funding for federal departments and departmental corporations for activities which take place on lands under federal jurisdiction. Hammond explained applications for funding have been delayed until January 2016 due to this year's federal election. He recommends new applicants for funding to consider submitting multi-year projects.



Action Planning: Approach

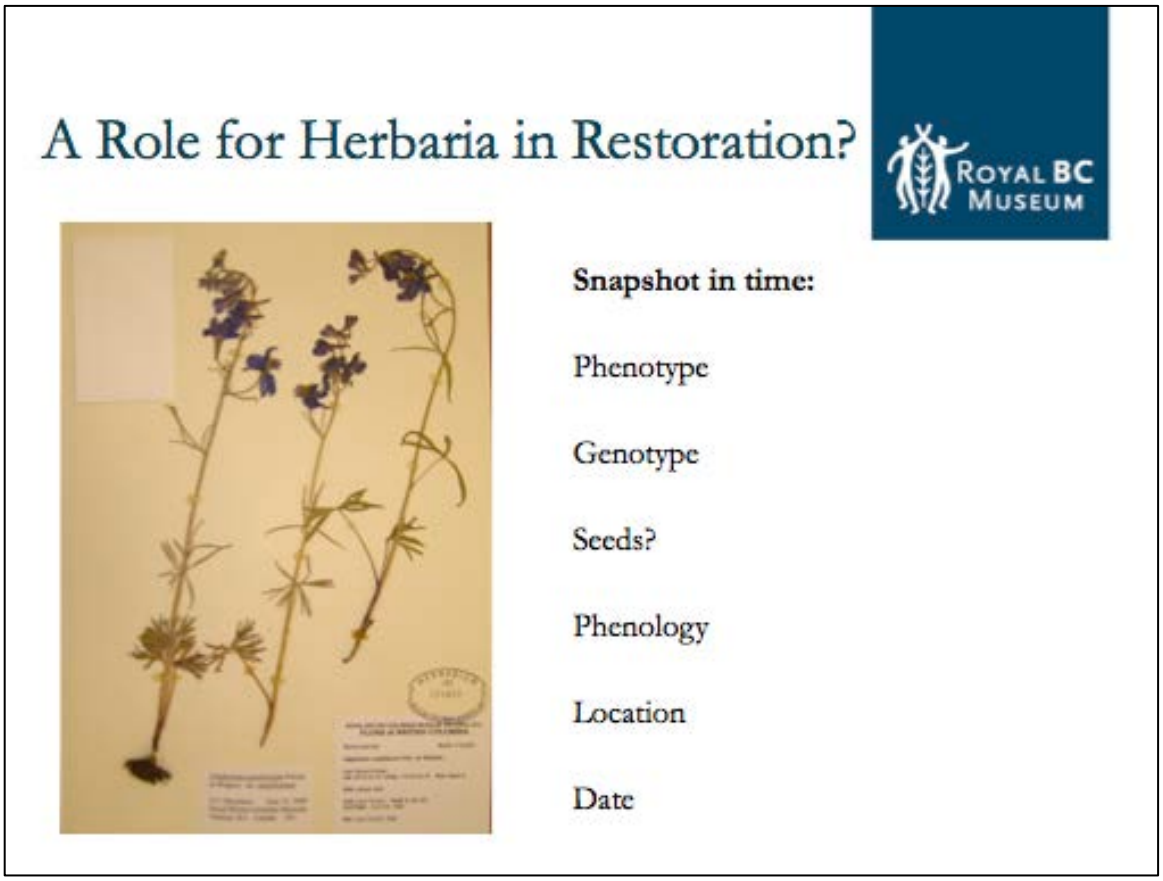
- Wherever possible, CWS's intent is to pursue multi-species, habitat or landscape-based action plans.
- Like recovery strategies and management plans, Action Plans require cooperation and consultation with various parties, including the province and aboriginal organizations.

Coastal Scouler's Catchfly

13. Looking Back and Moving Forward: The role of herbaria in restoration (Erica Wheeler)

As Erica Wheeler of the Royal BC Museum explains, it is important for those engaging in ecological restoration and conservation work to realize that their efforts and achievements will one day become history. Wheeler's presentation aimed at discussing the role herbaria can play in moving into the future, and considering what comes next with regard to restoration. A herbarium is a collection of pressed and dried plants, used for reference material, which record the location, ecology, and phenology of a specimen. This material can be used for morphological, anatomical, and genetic studies. While herbaria are distributed worldwide, the majority are located in Western Europe, with the oldest herbaria located at the Università di Bologna, Italy, and Naturkundemuseum in Ottoneum, Germany (both founded in 1569). Today, the largest herbaria are located in Paris, France, and the Bronx in New York City, USA.

British Columbia is also home to several herbaria, of which the Royal BC Museum is one. Since their origin, herbaria have shifted in their role; they were initially used to identify and keep track of local medicinal plants. During the age of exploration, herbaria were the sites in which collections of foreign plant specimens were stored. During the majority of the 20th century, specimens were continually collected for biologists' use in understanding biodiversity and natural processes.

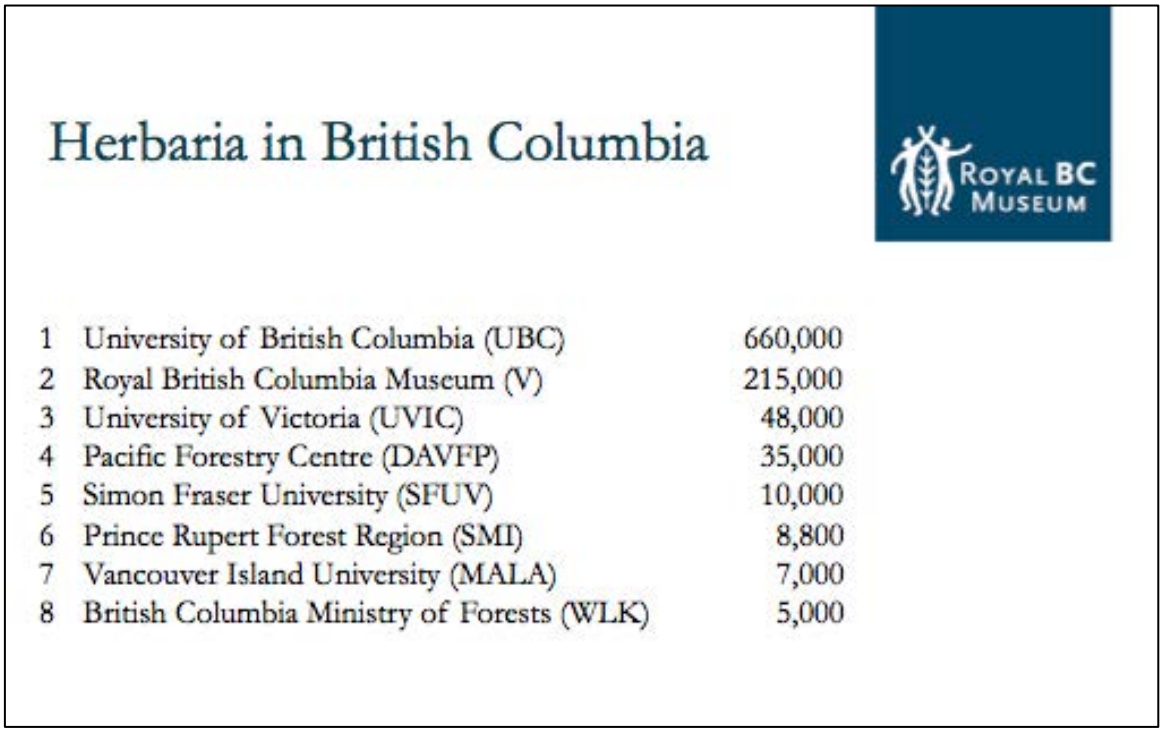


Wheeler asked the audience to consider: with anthropogenic climate change, the increased presence of novel ecosystems, and increasingly changing natures, how can herbaria be of use to us? As she explained, herbarium-based research can involve species descriptions, can provide evidence of the location in which a species has occurred at a specific point in time, and can be increasingly used for molecular systematics, which involves looking at DNA sequencing in the determination of taxa variation and relation.

Using the information afforded to us by herbaria, we can identify changes in taxa distribution over time. This can include looking at the spread of invasive species or the decline of native species in a geographical area. Such information may be crucial as we experience the effects of climate change, as it will contribute to our understanding of changes in species distribution with changes in environmental and climatic conditions. Additionally, with relation to climate change, herbaria can provide evidence of environmental changes in history. For example, with changes in atmospheric CO_2 levels, the number of stomata in plant species shifts. For conservation purposes, the presence of rare or threatened species can be recorded and referred to. We can also track changes in species' DNA over time and across populations, which can have a variety of uses in future research of ecological and biological change.

Currently, then, herbaria can increasingly be used for restoration purposes. Herbaria provide information on three axes: time, space, and taxonomy. Herbaria provide information, in a snapshot in time, on phenotypes, genotypes, seeds, phenology, and

geographical locations. This information can be of use in addition to existing information used in restoration projects. For example, in identifying the phenotypes we are looking to in restoring populations of certain species. Although herbaria do not traditionally document intentionally planted specimens, they could increasingly play a role in tracking the outcomes of restoration initiatives. As an example, Wheeler pointed to restoration in the Haliburton Biodiversity Project at Haliburton Community Farm; in setting up for the observation of long term changes in the project, over 80 specimens were collected from the site in the 2015 season, which noted their origin (whether these species were translocated, originated on-site, or were new arrivals), and their location on the site, specific to the restoration project's grid.



In conclusion, Wheeler emphasized that we need to think in the long term (in considering future generations of researchers), with a broad scope, using carefully detailed documentation, in the collection and preservation of specimens today.

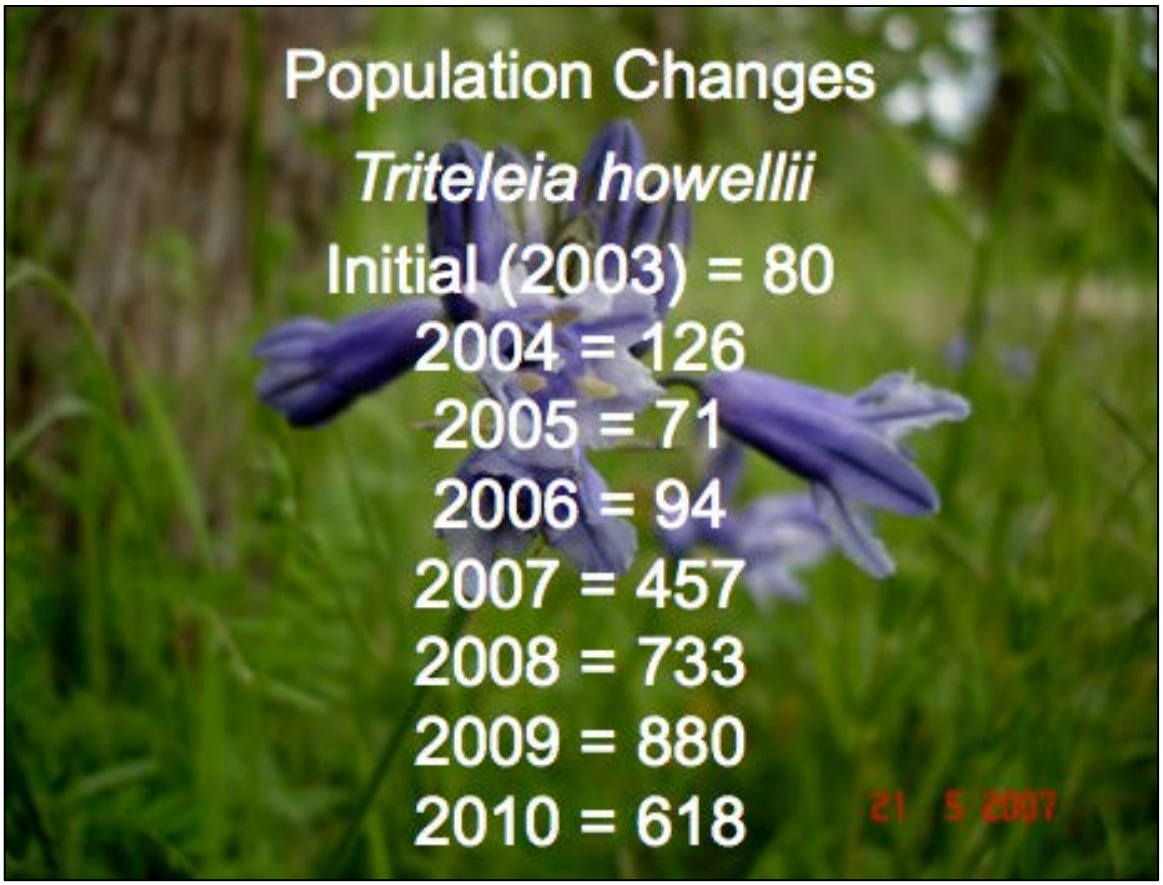
14. Somenos (Dave Polster)

Dave Polster, of Polster Environmental Services Ltd., discussed his experience with Garry Oak ecosystem restoration on the Somenos site. Polster has been engaged with this project on an on-going basis for approximately 15 years. During that time, the area achieved designation as a protected parkland despite the threat of housing development, with subsequent restoration efforts taking place until today. This area is a deep soil, wet Garry Oak ecosystem, which demonstrates archaeological evidence of cultural modification dating back at least 4000 years. Like other Garry Oak ecosystems, this involved intensive fire management and the harvest of camas.

Not unlike other systems of its type, this ecosystem faces continual pressure from urban development, lack of intensive traditional management, and the encroachment of invasive species. At the time of its recent protection, the site supported a great deal of woody invasive shrubs, including Scotch Broom (*Cytisus scoparius*), and Common Hawthorn (*Crataegus monogyna*). The first few years of this project involved the removal of woody invasive species. Following this, in 2003, the site was divided into 4 treatment blocks of irregular shape, to mimic natural edges that would be created given traditional fire management practices. In these four plots, different methods of restoration and management were to be employed, with one plot serving as a control in which only invasive species removal has taken place. Although it was initially intended that the three remaining plots would incorporate varying levels of fire management intensity, 2003 was a year of heavy forest fires across British Columbia so fires were not employed. Thus,

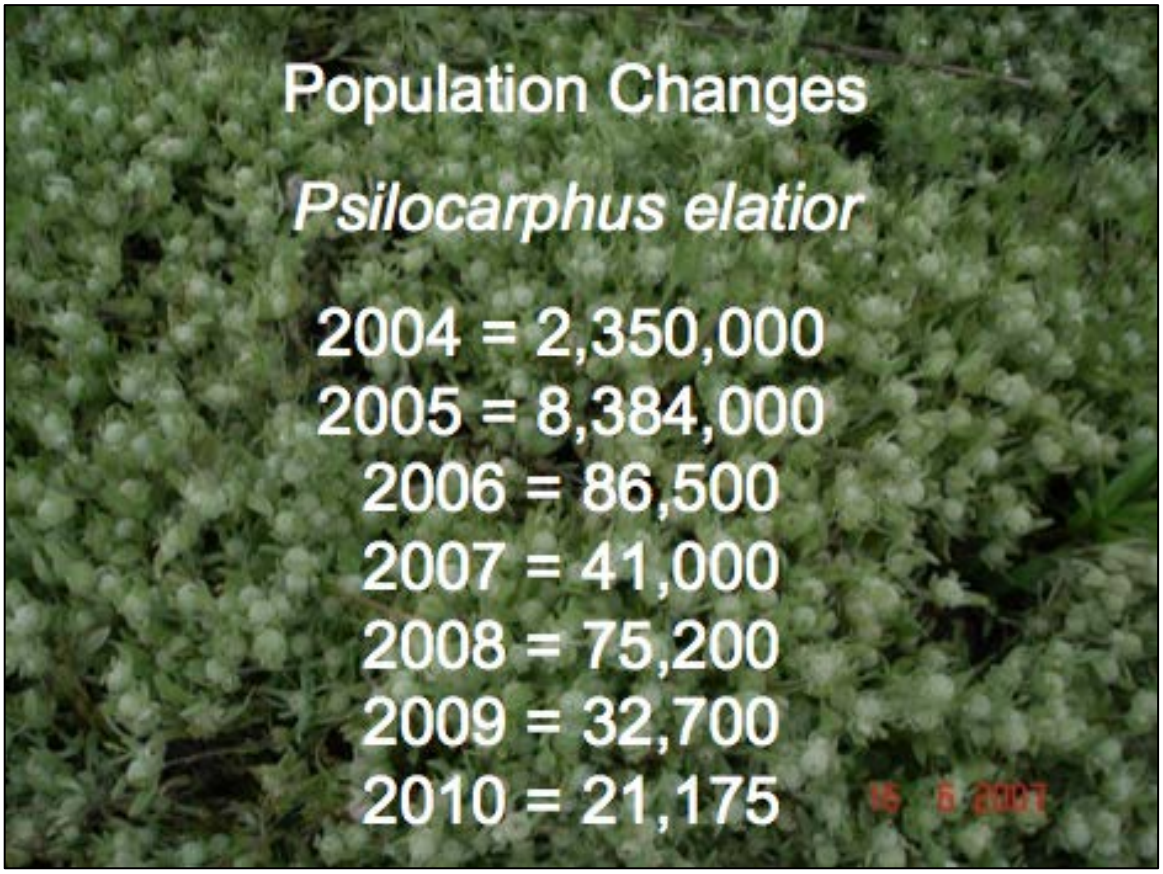
mowing is now used as a surrogate for burning, with no difference in mowing treatment across the 3 experimental blocks.

Planting and monitoring of native species continually takes place on the site. This site contains up to 8 species at risk. A great deal of energy has been put into detailed vegetation studies and counting rare species populations. These include the largest known population of Yellow Montane Violet (*Viola praemorsa*) in Canada, Howell's Triteleia (*Triteleia howellii)* Howell's violet, *Viola howellii*, Deltoid Balsamroot (*Balsamorhiza deltoidea*), and Tall Woolly-Heads (*Psilocarphus elatior*). Restoration has been undertaken on the site under the assumption that the re-establishment of historical conditions will enable populations of important native species to thrive, although traditional fire management techniques have not yet been employed. The result of restoration activities have so far been mixed. The *Viola praemorsa* population on the site has fluctuated significantly throughout the years, suggesting a need for a greater understanding of the species and its ecology. *Triteleia howellii* has grown in numbers since 2003, while *Viola howellii* has declined in numbers significantly, from 55 individuals in 2003, to 1 in 2007.



Tall Wooly-Heads numbers declined a great deal between 2003 and 2010. However, recent re-establishment of flooding regimes has allowed for additional restoration of this species' habitat, allowing its numbers to begin bouncing back. In 2004, creek dredging led to the creation of a berm that prevented seasonal flooding from occurring on the site,

reducing Tall-Wooly Heads habitat and allowing for the encroachment of stands of willow and Reed Canary Grass. The berm was excavated, breached, and opened in certain spots in 2013 to allow water to re-enter the site in the winter months. Additionally, repeated mowing has taken place to continually suppress stands of invasive species, particularly at the time of year when these species' energy reserves were at their lowest. Throughout this, Tall Wooly-Heads numbers have been closely monitored, and have been rebounding.



As more information is gathered on this ecosystem, it becomes more apparent how little is known about these complex systems. The activities that take place on this site are a continuous experiment, the long-term outcome of which remains uncertain. The site will continue to face threats from urban expansion, and will have to be engaged with and researched a great deal more in the future. Polster emphasized the human element of this project, and the value of such projects in raising awareness and knowledge in communities, restoring for the inherent value of rare and threatened species, and encouraging both stewardship and spirit of place. While project funding was cut in 2015, preventing mowing from taking place on site, Polster hopes restoration can and will continue into the future at Somenos.

Presenters

Aimee Pelletier and **Nathan Fisk**, Parks Canada aimee.pelletier@pc.gc.ca, nathan.fisk@pc.gc.ca

Aimee works for Parks Canada's species at risk team as the project manager for Garry oak ecosystem restoration and species at risk recovery at Fort Rodd Hill National Historic Site. Restoration efforts at Fort Rodd Hill focus on species at risk and invasive species research and management and propagation of native species for planting in our restoration sites. Much of the work is accomplished through the hard work of co-op students and dedicated volunteers. Two new projects underway are the development of a native plant demonstration garden, and the restoration of a 1 acre area of the historic site to a Garry oak woodland, rocky outcrop and meadow mosaic. Aimee is greatly enjoying the challenge of learning how to propagate native species in the small native plant nursery at Fort Rodd Hill and in her garden at home.

Colleen O'Brien, Steward with Saanich Parks "Pulling Together Volunteer Program cob@shaw.ca

Colleen received the Saanich award for Individual Environmental Achievement in 2015 for her work to restore Garry Oak ecosystems in Playfair Park. She is currently the lead Volunteer Steward for Pulling Together in Playfair and has donated more than 4000 hours of volunteer work on restoration and related activities in the Park since the beginning of 2010. She is currently focusing on restoration techniques to remove invasive species and the replanting of rare, native species. Colleen's nomination was supported by over 120 members of the public - a ringing endorsement.

James and Kristen Miskelly, Saanich Native Plants, jmiskelly@telus.net, Kristen kristen.miskelly@gmail.com

James and Kristen are biologists with a long-standing interest in the conservation, appreciation, and propagation of the unique flora of southern Vancouver Island. We have experience in inventory of natural areas, species at risk management, restoration, and native plant gardening. If you have a native plant project in mind we are happy to help with any stage of development

Jenny Heron, Invertebrate Conservation Specialist, BC Ministry of Environment, Vancouver, Heron, Jennifer.Heron@gov.bc.ca

Currently, Jennifer is working on a long-term butterfly monitoring program in the southern Gulf Islands, Vancouver Island and the Lower Mainland, along with habitat restoration for Taylor's Checkerspot butterflies in Helliwell Provincial Park, Hornby Island. Jennifer's interests include invertebrate public education, music, jogging, and hiking.

Trudy Chatwin, Species at Risk Biologist Ministry of Forests, Lands and Natural Resource Operations, Trudy.Chatwin@gov.bc.ca

Trudy Chatwin is currently the Rare and Endangered Species Biologist for the Ministry of Environment in Nanaimo, B.C. As chair of our Vertebrates at Risk RIG, she is a key player in the Bring Back the Bluebirds project. Her personal interest in protection of Garry oak ecosystems perhaps stems from being born and raised in a Garry oak woodland, alive with camas, shooting stars, fawn lilies, oaks, birds and snakes. She studied Wildland Recreation and Resource Management at Selkirk College in Castlegar and later completed a degree in Biology at the University of Victoria. Trudy is enthusiastic about learning about and protecting most aspects of our natural world.

Val Schaefer, Academic Administrator, Restoration Programs, University of Victoria, schaefer@uvic.ca

Val is an educator, urban ecologist and a Registered Professional Biologist. He has implemented numerous urban community projects on environmental education and ecological restoration. He has consulted for government and community groups on biodiversity conservation, natural areas management and urban design. Val has spoken about urban biodiversity extensively at conferences and professional meetings locally and internationally. He is currently at the University of Victoria where he is the Restoration of Natural Systems Program's Academic Administrator and the Coordinator of the Restoration Institute. He previously taught on faculty in Biology at Douglas College, New Westminster, where he was also a co-founder and the Executive Director of the Institute of Urban Ecology. He was active in the Vancouver Natural History Society for over 10 years and served as the President of the Society and the Chair of the Conservation Committee. His website is urbanecology.ca. Val has served on the GOERT Board for one year.

Adriane Pollard, Manager of Environmental Services, District of Saanich, Adriane.Pollard@saanich.ca

Adriane Pollard has been the Manager of Environmental Services at the District of Saanich for more than 10 years. Prior to that, she was a consulting ecologist for another 10 years, which she augmented with many seasonal jobs with the provincial government. Her focus as a consultant was mitigating the impacts of development and protecting ecologically sensitive areas. She is both a registered professional biologist and a member of the Planning Institute. She recently completed a Masters in Environmental Management. Adriane has been a member of GOERT since about the time of its inception, with a few gaps while out of the country, etc. She also served as chair of the Conservation Planning & Site Protection RIG for a very active few years. Adriane served on the GOERT Board for the last two years, as co-vice chair and as co-secretary.

Kathryn Martell, Bluebird Project Coordinator, GOERT, Kathryn Martell katemartell@gmail.com

She coordinates the Bring Back the Bluebirds project and provides both technical and field assistance on GOERT's species recovery and restoration projects. An ecologist with a M.Sc. in disturbance dynamics and resource management, Kathryn comes to GOERT

after several years of community stewardship and habitat restoration projects throughout the province. Kathryn has conducted field surveys for a variety of species at risk and particularly enjoys discovering pockets of beauty in urban settings. When away from GOERT, Kathryn loves long rambles, hearing and telling stories, digging her hands in the garden as often as possible, and adventures of all kinds. She is also trying to learn the banjo and is teaching her mother's puppy to waltz.

Jody Watson, Harbours and Watersheds Coordinator, Parks and Environmental Services, Capital Regional District, jwatson@crd.bc.ca

Biography not available.

Loys Maingon, Courtenay Naturalists, aardscanltd@gmail.com

Loys Maingon is the President of the Comox Valley Naturalists Society. He is a limnologist principally interested in surface freshwater processes. He is chair of the Canadian Technical Committee on Water Quality Sampling Methods (ISO/CAC TC147/S6), and member of various international ISO working groups writing sampling protocols. Over the last couple of years Aardscan had partnered with Zero Waste consultants in the impact assessment, design and siting of recycling and solid waste facilities.

Emily Gonzales, Ecological Restoration Specialist, Parks Canada, Emily.Gonzales@pc.gc.ca

Emily Gonzales studies the effects of herbivores on Garry oak ecosystems and invasion by exotic plant species. She is a member of the Centre for Applied Conservation Research, Friends of Ecological Reserves (Scientific Committee), and the Galiano Conservancy Association (Board of Directors). Her interests include herbivores, invasive species (including eastern grey squirrels), plant community ecology, and spatial analysis (GIS). For her Ph.D., she studied herbivore (deer) feedback dynamics and the facilitation of invasive species (non-native grasses) dominance.

Blair Hammond, Manager, Ecosystem Conservation, and Kate Shapiro, Aboriginal Liaison Biologist, Canadian Wildlife Service, Environment Canada, Blair.Hammond@ec.gc.ca

Biography not available.

Erica Wheeler, Royal BC Museum Herbarium, ericaw@uvic.ca

Erica is the Botany Collections Manager at the Royal British Columbia Museum where her work focuses on the maintenance and development of the botany collection in the herbarium. The RBCM herbarium (V) houses close to 210,000 vascular plant specimens collected largely in BC and in adjacent provinces and states. Herbarium specimens are available for study by researchers in BC and around the world. Before joining the RBCM in the spring of 2012, Erica earned BSc and MSc degrees at the University Victoria and a PhD at the University of Missouri. Her interests include the systematics of the genus

Allium in North America, conservation genetics, biodiversity informatics, and herbarium curation.

Dave Polster, Polster Environmental Services Ltd., d.polster@telus.net

Dave Polster serves on all three committees of the Restoration RIG: He is on the Native Plant Propagation and the Fire & Stand Dynamics Sub-committees, and co-chairs the Invasive Species Sub-committee. He has an amazing ability to be in several places at once, working to restore Garry oak habitat at Somenos Garry Oak Preserve and Mt. Tzuhalem Ecological Reserve near Duncan, while simultaneously directing mine reclamation in far-flung places and dropping by to give advice on small-scale restoration projects. His interests are invasive species, restoration, soil bioengineering and natural history. Dave was given an Acorn Award in 2009 in recognition of his outstanding contributions to Garry oak ecosystems recovery.

Attendees

Individuals (Alphabetical by First Name)
Adam Miller
Adrian Small
Adriane Pollard
Aimee Pelletier
Alexander Campbell
Alf Birch
Andrea Schiller
Andrew Burger
Ann Murphy
Ann Tiplady
Beth Burwash
Blair Hammond
Brenda Costanzo
Carly Palmer
Carol Davies (EC Davies)
Carol Milo
Carole Rossell
Carrina Maslovat
Chris Junck
Colleen O'Brien
Daniel Theriault
Dave Polster
Deanna Matheson
Don Eastman
Donna Wong
Emily Gonzales
Erica Wheeler
Eugene Lee
Frank Hovenden
Genevieve Singleton
Hal Gibbard
Ian Browning
James Miskelly
Janine Saunder
Jemma Green
Jenifer Penny
Jenny Clark
Jenny Eastman
Jenny Heron
Jeremy Gye
Jo-Anne Stacey
Jody Watson

John Hopewell
John McMullen
Judith Spearing
Julia Jennings
Julian Anderson
Julie Williams
Karen Yearsly
Kathleen Matthews
Kathryn Martell
Kella Sadler
Ken Walker
Kevin Moore
Kristen Miskelly
Laura Gretzinger
Laura Mathias
Lea Gelling
Lindsay Kathrens
Louise Goulet
Loys Maingon
Maleea Acker
Margaret Ferguson
Mattie Sawasky
Meaghan McCarty
Michelle York
Mike Meagher
Monica Whitney-Brown
Morgan Davies
Murray Goode
Nathan Fisk
Nicole Kroeker
Paige Erickson-McGee
Peter Fielder
Peter Pinfold
Pippi Lawn
Raj Prasad
Rina Odaka
Rob Lawrance
Roger Hird
Rosemary Balfour
Shannon Craig
Sibylla Helms
Stephanie Hurst
Stuart Prescott
Sue Askew
Susan Myerscough
Sylvia Samborski

Teresa Lawson
Tim Thielmann
Todd Golumbia
Tory Stevens
Tristan Zaborniak
Trudy Chatwin
Val Schaefer
Wendy Anthony
Wendy Tyrell
Wendy Tyrell
Wylie Thomas

Organization Registrations
GOMPS (Garry Oak Meadow Preservation Society)
HAT (Habitat Acquisition Trust)
SSI Conservancy (Salt Spring Island Conservancy)