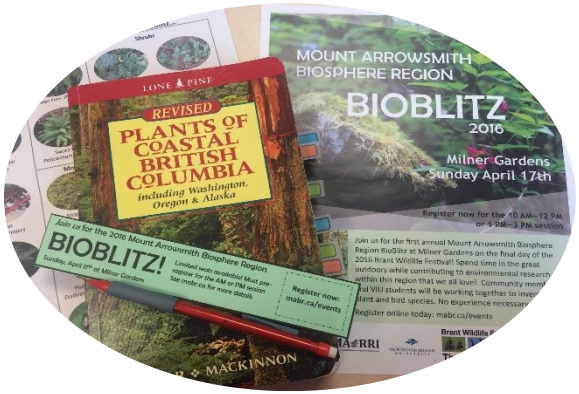
Mount Arrowsmith Biosphere Region BioBlitz 2016: Summary Report



United Nations Educational, Scientific and Cultural Organization

Mount Arrowsmith Biosphere Region

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Mount Arrowsmith Biosphere Region Research Institute

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The contributions and efforts of the following members made the 2016 Mount Arrowsmith Biosphere Region BioBlitz a successful and informative event.

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Table of Contents

Figures & Tables

Appendices

Executive Summary

Vancouver Island consists of both private and public lands that hold significant value in connecting and protecting critical habitat, including species that are considered at risk. There are multiple methods that are helpful in monitoring and enhancing our current knowledge and inventory of both flora and fauna located within the region. One particular method that will help us increase our knowledge is a BioBlitz, which usually is a 24-hour event that connects local community members, students, faculty and scientists together to promptly identify as many flora and fauna species as possible (National Geographic, 2015). Conducting such events not only helps determine the biodiversity within the region, but also increases our knowledge of possible declines of certain species over a long period of time, thus helping us manage our sensitive lands.

The results of the participant data collected at the first annual Mount Arrowsmith Biosphere Region (MABR) BioBlitz include a number of different species, which include twelve tree species, seventeen shrub species (one species which is an invasive), thirty-one herb species (with three invasive species), seven fern species, twenty-six moss species, eight lichen species, seven odd ball flora species, and a total of thirty-seven different bird species. The data collected from conducting biogeographic flora and fauna surveys is important for gaining sound baseline knowledge of existing biodiversity in the area. Annual biological monitoring will show trends and changes over time that can indicate the fluctuations in red and blue listed species, invasive species, and overall species richness of a region (Margules & Austin, 1991). Changes in habitat health from long-term climate trends as well as local weather patterns can have a significant impacts on the state of the environment, and these changes can be detected over time with community monitoring initiatives (Margules & Austin, 1991).

Continuation of environmental monitoring with events such as the MABR BioBlitz have the capability to expand local knowledge and appreciation of biodiversity as well as wildlife, adding to a transparent, useful data set that will be valuable for future generations to come. This research ultimately aims to promote the health and resilience of our local natural systems and all the species that are interconnected within them. With future BioBlitz events, the aim is to expand the boundaries to cover several different microclimates and provide opportunity to monitor a greater geographic inventory of species diversity on Vancouver Island as well as increase the amount of student research, and citizen-science based participation in future BioBlitz events to come.

Introduction

The 2016 Mount Arrowsmith Biosphere Region BioBlitz was developed by student researchers at Vancouver Island University's Mount Arrowsmith Biosphere Region Research Institute (MABRRI). Students collaborated with the Brant Wildlife Festival, the Nature Trust of BC, and Milner Gardens and Woodlands to promote citizen science while celebrating wildlife and biodiversity within the Mount Arrowsmith Biosphere Region (MABR). The MABR is a UNESCO designated reserve that geographically spans 1,200 km^2 where people live and work together in hopes of creating a sustainable future and where they can live in harmony with nature (History, 2015; Geography, 2015).

A BioBlitz is an event where citizens, students, and scientists from all walks of life team up with the purpose of identifying as many plant and animal species as possible during a specified time period (BioBlitz, 2016). The 2016 MABR BioBlitz was a pilot project designed to connect people with nature while developing sound biological surveying methods for future BioBlitz events in the MABR. The intention was to increase public appreciation for biodiversity as well as local knowledge of species in the area.

In future years, MABRRI plans to expand the parameters of the MABR BioBlitz to include several different locations within the MABR. This expansion will allow for the biological survey to include different microclimates and species diversity while allowing for many more citizens, student researchers, and experts to participate in meaningful and rewarding environmental monitoring. Local knowledge of biodiversity is useful in analyzing trends and changes in our natural systems and how they are influenced by human systems.

Milner Gardens

Milner Gardens and Woodlands is located in Qualicum Beach, roughly 40 minutes north of Nanaimo, and consists of 60 acres of coastal and upland forests and 10 acres of developed gardens. In 1996, VIU obtained the land from Ray and Veronica Milner and labeled the gardens as "The Milner Gardens" with a purpose to preserve the garden for education and communal value (About Milner Gardens, n.d.).

The Milner Woodlands comprises of Coastal Douglas-Fir old-growth forests with an understory of Western Red-Cedar, Grand Fir as well as Red Alder and is perceived as a relatively productive ecosystem. Due to the geographic location of the Milner Woodlands, it is considered to be a "rainshadow" forest, which consists of warm, dry summers and mild, wet winters (MacKinnon, 2003). This relatively rare, yet extremely productive ecosystem accounts for 0.2% of the province and contains the lowest volume of old growth, which raises concern for conservation of these forests (About Milner Gardens, n.d.). Furthermore, the Milner Woodlands is dedicated to preserving species and ecosystems at risk.

Milner Gardens consists of meadow lawns and many varieties of rhododendrons as well as trees and shrubs brought home from Ray and Veronica Milner's travels from around the world (About Milner Gardens, n.d.). Exotic species include the Red Japanese Maple (*Acer palmatum*), Spanish Chestnut (*Castanea saliva*), a Golden Chain tree (*Laburnum x watereri `Vossii*), Chinese dogwood (*Corpus kousavar. Chinensis*) and a Dove tree (*Davidia involucrate*) (About Milner Gardens, n.d.). In addition, due to Milner Gardens consisting of such rare species from around the globe, it is deemed as a place with important educational resources for research and public education.

Why a BioBlitz in Milner Gardens?

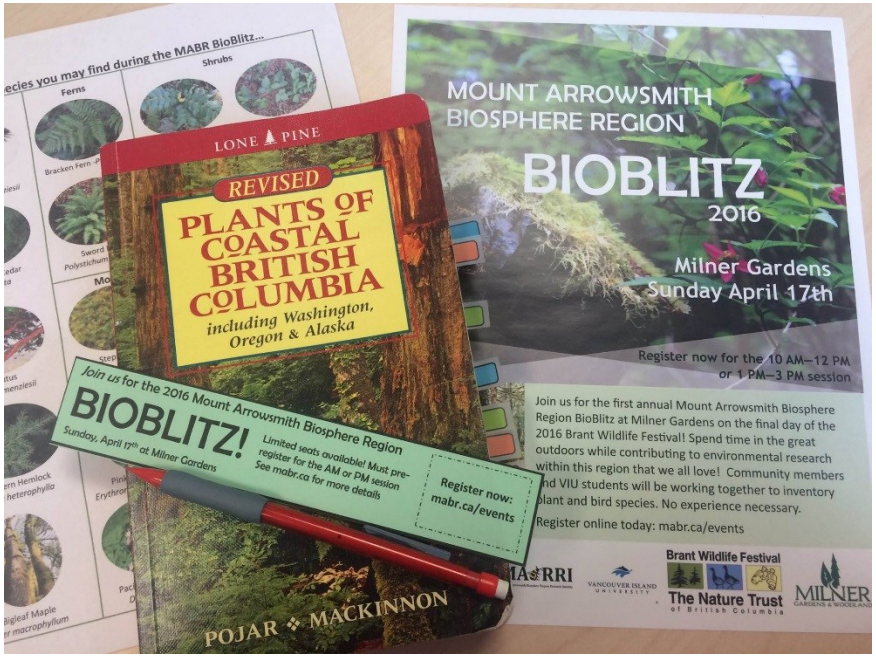
There were many benefits to hosting the first MABR BioBlitz at Milner Gardens and Woodlands. Their staff members were very helpful and accommodating with the organization and logistics of this event. The site offered an onsite first-aid attendant, washroom facilities, parking, refreshments, and tents, tables, and chairs for registration and display. Accessibility, parking, and other facilities that Milner Gardens and Woodlands were able to provide made the location an ideal choice for community members to learn how to identify flora and fauna species in a safe and comfortable environment. Due to Milner Gardens and Woodlands being a part of VIU, there were also less liability concerns associated with hosting the event. For future MABR BioBlitz events, Milner Gardens and Woodlands will be designated the official training site for new and inexperienced BioBlitz participants where they can improve their species identification skills in a low-risk environment that will increase participant's knowledge of species identification beyond Milner Gardens.

Goals and Objectives

Key deliverables and objectives for conducting the BioBlitz within Milner Gardens and Woodlands:

1. Have MABRRI students organize and host a BioBlitz event during the Brant Wildlife Festival in 2016
2. Promote VIU student research through outreach in the local community
3. Contribute to long-term monitoring of flora and fauna in the Mount Arrowsmith Biosphere Region (MABR)
4. Provide participants with a finalized flora and fauna collection form for species identified during the event

The overall objective for conducting this BioBlitz was to engage VIU students with the community and enhance their research skills by bringing the students together with VIU faculty, local experts, citizen scientists, and local participants to collaborate on a regional research project. In addition, conducting this research offers VIU students a chance to not only gain extensive research experience but it will allow them to engage with their community. The BioBlitz also connected VIU with the Nature Trust of BC and the Brant Wildlife Festival, which is held within the Regional District of Nanaimo. With the successful completion of the BioBlitz, it is anticipated that the event will be fully funded from external sources by 2017, allowing VIU student researchers and community partners to facilitate the BioBlitz annually.



Methods, Tools and Equipment Used

Local participants were self-selected by signing up for this event on the BioBlitz Eventbrite page. Experts were contacted prior to the event by the MABRRI team based on area of expertise (flora or fauna). On the day of the event, experts and participants arrived at Milner Gardens for either the morning or afternoon Blitz sessions.

Participants were assigned to a group with a designated expert and team leader and were sent off to selected sites (Appendix 1) to gather as much information as possible on flora or fauna, which included trees, shrubs, sedges/grasses, mosses/lichen as well as shore birds and others. In addition, the experts and team leaders helped the participants with identification based on their own knowledge and expertise.

To gather information on species detected, experts and participants were given various tools and equipment to carry out the task. This included clipboards with several forms such as a plant and bird collection form as well as a page containing images of common species (Appendix 2), Pojar and Mackinnon plant identification books, bird identification books, and binoculars.

Findings

Baseline information collected by a range of participants including VIU students not only helps increase the value and meaning of a BioBlitz, it also allows participants to learn and collaborate with flora and fauna identification experts. Collecting the following data allows Milner Gardens and Woodlands to update their current species inventory and contributes to long-term monitoring of flora and fauna within the MABR, which is one of the projects main objectives. Table 1 is a complete list of flora and fauna identified within each site throughout the Milner Gardens and Woodlands.

Table 1. Compiled Findings of Plant and Bird Species April 17th, 2016 (Both morning and afternoon sessions)

Trees	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Big-Leaf Maple	*Acer macrophyllum*		X	X	X	X
	Douglas-Fir	*Psuedotsuga menziesii*	X	X	X	X	X
	Grand-Fir	*Abies grandis*		X	X	X	X
	Lodgepole Pine	*Pinus contorta*				X	
	Red Alder	*Alnus rubra*	X	X	X	X	X
	Western Hemlock	*Tsuga heterphylla*	X	X	X	X	
	Western Red Cedar	*Thuja plicata*	X	X	X	X	X
	Pacific Dogwood	*Cornus nuttallii*	X		X	X	
	Pacific Crab Apple	*Malus fusca*					X
	Bitter Cherry	*Prunus emarginata*	X				X
	Sitka Willow	*Salix sitchensis*	X				
	Pacific Willow	*Salix lasiandra*	X				
Shrubs	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Baldhip Rose	*Rosa gymnocarpa*	X	X	X	X	X
	Devils Club	*Oplopanax horridus*				X	
	Dull-Oredon Grape	*Mahonia nervosa*	X	X	X	X	X
	Red Elderberry	*Sambucus racemosa*	X		X	X	X

	Ocean Spray	*Holodiscus discolor*	X		X	X	
	Red Huckleberry	*Rubus parviflorium*	X	X	X	X	X
	Salal	*Gaultheria shallon*	X	X	X	X	X
	Salmonberry	*Rubus spectabilis*		X	X	X	X
	Trailing Blackberry	*Rubus ursinus*	X	X	X	X	X
	Thimbleberry	*Rubus*		X	X	X	X
	Himalayan Blackberry	*Rubus*		X			
	Evergreen Huckleberry	*Vaccinum ovatum*		X			
	Holly	*Ilex aquifolium*	X	X	X	X	X
	Hardhack	*Spirea douglasii*		X			X
	Nootka Rose	*Rosa nutkana*		X			
	Red Osier Dogwood	*Cornus Sericea*			X	X	X
	Cascara	*Rhamnus Purshiana*				X	X
Herbs	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Pacific Bleeding Heart	*Dicentra formosa*		X			
	Pacific Trillium	*Trillium ovatum*	X	X	X	X	X
	Skunk Cabbage	*Lysichiton americanus*	X	X	X	X	X
	Snow Berry	*Symphoricarpos albus*					
	Sweet-Scented Bedstraw	*Galium triflorum*		X	X	X	
	Three-Leafed Foamflower	*Tiarella trifoliata*				X	
	Vanilla Leaf	*Achyls triphylla*		X	X	X	X
	Wall Lettuce	*Lactuca muralis*	X		X		
	Cardamine	*Cardamine oligosperma*	X				X
	Western Starflower	*Trientalis latifoeia*	X	X	X	X	
	English Daisy	*Bellis perennis*		X			
	Pacific Coralroot	*Corallorhiza maculate sp. Mertensiana*		X			
	One-Sided Wintergreen	*Orthilia Secunda*		X			
	Creeping Buttercup	*Ranunculus repens*	X		X		
	Miner's Lettuce	*Claytonia perfoliata*			X		
	Stinging Nettle	*Urtica dioica*	X				X
	English Ivy	*Hedera helix*	X				X
	Robert's Geranium	*Geranium robertianum*	X				X

	Cleavers	*Gallium aperine*	X		X		X
	Slough Sedge	*Carex obnupta*	X		X	X	X
	Columbine	*Aquilegia Formosa*					X
	Forget-me-not	*Myosotis*	X				X
	Water parsley	*Oenanthe sarmentosa*	X				
	Horsetail	*Equisetum arvense*	X				
	Creeping Bellflower	*Campanula rapunculoides*	X				
	Anise		X				
	Western Dock	*Rumax*	X				
	Sweet Vernal Grass	*Lanthoxanthum odoratum*	X				
	Aphanes	*Aphanes*	X				
	Bitter Grass	*Calea ternifolia*	X				
	Reed Canary Grass	*Phalaris arundinacea*	X				
Ferns	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Bracken Fern	*Pteridium aquilinum*	X	X	X		X
	Deer Fern	*Blechnum splicant*				X	
	Lady Fern	*Athyrium felix-femina*		X		X	X
	Oak Fern	*Gymnocarpium dryopteris*				X	
	Sword Fern	*Polystichum minitum*	X	X	X	X	X
	Spiny Wood Fern	*Dryopteris expansa*	X		X	X	
	Licorice Fern	*Polypodium glycyrrhiza*			X		
Mosses	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Coastal Leafy Moss	*Plagiomnium insigne*			X	X	X
	Electrified Cats-Tail Moss	*Rhytidiadelphus triquetrus*	X	X	X	X	X
	Lanky Moss	*Rhytidiadelphus loreus*	X		X	X	X
	Oregon-Beaked Moss	*Kinderbergia oregana*	X	X	X	X	X
	Palm Tree Moss	*Leucolepis acanthoneuron*	X		X	X	X
	Step Moss	*Hylocomium splendens*	X	X	X	X	X
	Flat Moss	*Pseudotaxiphyllum elegans (buckiella)*	X			X	X
	Fan Moss	*Rhizomnium glabrescens*	X	X	X	X	X
	Moss	*Dicranum sp.*	X		X		X

	Nocktooth Leafy Moss		X				
	Magnificent Moss	*Plagiomnium venustum*		X			
	Lovers Moss	*Aulacomnium androgynum*		X			
	Cat tail Moss	*Isothecium myosuroides*	X	X	X		X
	Common Witch's Hair	*Alectona sarmentosa*		X			X
	Wavy-Leafed Cotton Moss	*Plagiothecium undulatum*		X		X	X
	Plume Moss	*Dendroalsia Abientina*		X			
	Menzies Moss	*Metaneckera menziesii*	X		X		
	Broom Moss	*Dicranum scoparium*		X	X		
	Bent-Leaf Moss	*Rhytidiadelphus squarrosus*			X		
	Slender Beaked Moss	*Eurhynanium Praelongum / Kindbergia praelonga*			X		
	Tangled Moss	*Heterocladium procurrens*			X	X	
	Dusky-Fork Moss	*Dicranum fuscescens*	X			X	
	Douglas' Neckera Moss	*Neckera douglasii*				X	X
	Tree Moss	*Climacium dendroides*					X
	Curly Thatch Moss	*Dicranoweisia cirrata*					X
	Badge Moss	*Plagiomnium insigne*	X				
Lichens	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Tattered Rag	*Platismatia herrei*	X		X		
	Lichen	*Cladina genus*		X	X	X	
	Dust Lichen	*Lepraria sp.*		X			X
	Lungwort	*Lobaria pulmonaria*		X			
	Lichen	*Usnea sp.*	X	X	X		X
	Ragbag	*Platismatia glauca*		X			X
	Frog Pelt	*Peltigera neopolydactyla*					X
	Antlered Perfume	*Evernia prunastri*	X				
	Lichen	*Cladonia genus*	X				
Additional (Oddballs)	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station A**	**Observed in Station B**	**Observed in Station C**	**Observed in Station D**	**Observed in Station E**
	Pinedrops	*Pterospora andromdea*	X				

	Panther Cap Mushroom	*Amanita pantherina*					X
	Tree-Ruffle Liverwort	*Porella navicularis*					X
	Snake Liverwort	*Conocepalum conicum*					X
	Yellow Ladle Liverwort	*Scapania bolanderi*	X				
	Crisp Sandwort	*Stellaria Crispa*	X				
	Pinesap	*Hypopitys manotropa*	X				
Shore Birds	**Species Name (Common/ Indicator Species)**	**Species Name (Scientific)**	**Observed in Station F**	**Observed in Station G**	**Observed in Station Other**		
	Bald Eagle	*Haliaeetus leucocephalu*	X	X	X		
	Belted Kingfisher	*Ardea herodias*	X	X			
	Bonapartes Gull	*Haematopus bachmani*	X	X			
	Glacous-Winged Gull	*Histrionicus histrionicus*		X			
	Red-Breasted Merganser	*Brachyramphus marmoratus*	X	X			
	Surf Scoter	*Larus occidentalis*	X	X			
	Western Grebe	*Chroicocephalus Philadelphia*		X			
	Common Raven	*Corvus corax*	X				
	Northwestern Crow	*Corvus caurinus*	X				
	Rufous Hummingbird	*Selasphorus rufus*		X			
	Rufous-Sided Towhee	*Pipilo erythrophthalmus*			X		
	Winter Wren	*Troglodytes hiemalis*			X		
	Spotted Towhee	*Pipilo maculatus*			X		
	Pacific Wren	*Troglodytes pacificus*	X	X	X		
	American Robin	*Turdus migratorius*	X		X		
	Nuthatch	*Sittidae*			X		
	Black-Bellied Plover	*Pluvialis squatarola*	X	X			
	Black Turnstone	*Arenaria melanocephala*	X	X			
	Pidgeon Guillemot	*Cepphus columba*	X	X			
	Horned Grebe	*Podiceps auritus*	X	X			
	Pacific Loon	*Gavia pacifica*	X	X			
	Red Necked Grebe	*Podiceps grisegena*	X	X			
	Hutton's Vireo	*Vireo huttoni*		X			
	Anna's Hummingbird	*Calypte anna*		X			
	Dark-eyed Junco	*Junco hyemalis*		X			

	Black-throated Grey Warbler	*Setophaga nigrescens*		X			
	Northern Flicker	*Colaptes auratus*	X	X			
	Common Merganser	*Mergus merganser*	X	X			
	Dunlin	*Calidris alpina*	X	X			
	Greater Yellow Legs	*Tringa melanoleuca*		X			
	Common Loon	*Gavia immer*	X	X			
	California Gull	*Larus californicus*		X			
	Downy Woodpecker	*Picoides pubescens*	X				
	Black-Capped Chickadee	*Poecile atricapillus*	X				
	Mew Gull	*Larus canus*	X				
	Mallard	*Anas platyrhynchos*	X				

*Exotic Species Listed in RED

Participant Feedback and Recommendations

Without the assistance and participation of VIU students, local experts, citizen scientists and the general public, the Mount Arrowsmith Biosphere Region BioBlitz 2016 would not have been successful. Through participant feedback and recommendations we will be able to enhance future BioBlitzes as well as carry out additional future BioBlitzes as a large-scale public event.

Most participants expressed satisfaction with their experience with the MABR's BioBlitz and the most common themes included:

- Meeting local nature enthusiasts and experts
- A great refresher for identifying both plant and bird species
- Knowledge of leaders and experts with plant identification
- Being surrounded by nature at a beautiful location as well as learning new species

In addition to the positive feedback listed by participants, there were a number of constructive suggestions for the team that were voiced by the participants. With this feedback, we are able to improve the planning of future BioBlitzes to ensure the success of the event for VIU students as well as the public. The following includes the main feedback outlined by participants:

- It would have been great to include a brief 'how-to' in regards to plant identification for those new to the study before the event took place to increase the productivity
- Decrease the size of the stations and increase the number of available leaders so there is more one on one communication between participants and leaders
- Provide snacks and beverages for those participating in the event
- Allow for more identification time as well as possibly an earlier start

- More additional resources for those who are new to plant and bird identification

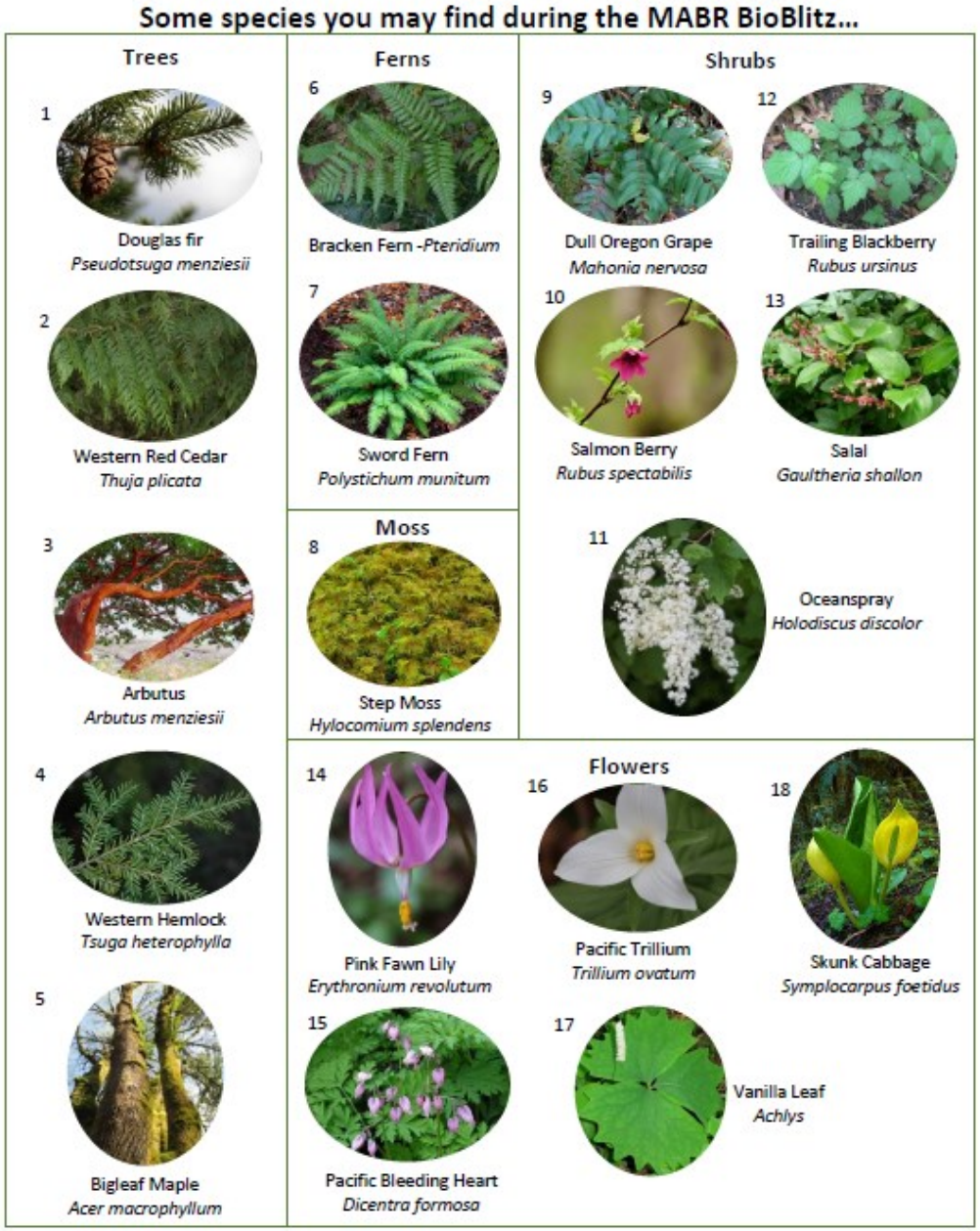
Future Blitzing

In the future, the MABR BioBlitz should consist of two separate components. Firstly, the Milner Gardens Blitz, which will cater specifically to beginning blitzers as well as local experts who will be able to teach interested individuals how to blitz. This beginner BioBlitz will be very similar to the 2016 BioBlitz that we have reported in this document. A second component of future BioBlitzes should be for field experts, biologists, naturalist and the more experienced blitzers of the region, who will be able to expand the data collection to multiple sites across the MABR. Core areas including Wildlife Management Areas, Provincial, Regional and Municipal parks should be the preferred sites as they have some levels of protection, and likely will be able to be blitzed for many years to come.

Adding a blitzing component to the marine areas is another goal for future years. Local residents have expressed an interest to either scuba dive, or snorkel to collected data on inter-tidal and marine species that live in these unique, and often less monitored habitats within the MABR. Lastly moving up in elevation is another goal in years to come. The incredible vertical range of the MABR extends over 2100 meters from deep within the Salish Sea to the top of Mount Arrowsmith. This extensive elevational range consists of four terrestrial biogeoclimatic zones alone which all provide a different type of habitat for the flora and fauna living within the MABR. With the goal of expanding the BioBlitz among multiple locations and increasing citizen participation during the annual event we are hopeful that the BioBlitz will become an annual event that community members will look forward to being a part of each and every year.

Appendix 1. Map of BioBlitz Sites for the Milner Gardens BioBlitz

Appendix 2. Common Species – BioBlitz Species Handout



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