

Mount Arrowsmith Biosphere Region BioBlitz 2017: Summary Report



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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. The Mount Arrowsmith Biosphere Region (MABR) encompasses an ecologically diverse range of habitats and ecosystems within its watershed boundaries all of which hold special importance to the region culturally, environmentally, and economically. Our team at the Mount Arrowsmith Biosphere Region Research Institute (MABRRI) strives to embrace and celebrate these diverse values through research, education, community outreach, and the promotion of environmental conservation and awareness of this beautiful and extraordinary place that we all live and share.

While there are multiple methods to monitor the local environment and increase our current knowledge of flora and fauna species of the region, one method that is gaining rapid popularity at a local, regional, and even national scale, in some cases, is a BioBlitz. A BioBlitz is usually a 12-to-72-hour long event that connects local community members, students, faculty, local knowledge holders, naturalists, and scientists together to identify as many flora and fauna species as possible within the allocated time frame. Conducting such an event provides us with a better understanding of biodiversity and species richness within the region; the event also increases our knowledge

of possible species declines and changes in invasive species counts over time. All the valuable data collected helps us manage our sensitive habitats and ecosystems within the region.

The results of the participant data collected at the second annual MABR BioBlitz at Milner Gardens & Woodland in Qualicum Beach include numerous different flora species observed, including ten different tree species, seventeen shrub species, thirty-five herb species, six fern species, three sedge species, one grass species, forty moss species, eleven liverwort species, twenty-four lichen species, twenty-two fungi species, one slime mold species and one oddball species. Participants observed five different invasive flora species at Milner Gardens. Notably, there were three species at risk found at Milner Gardens, including one endangered flora species, one threatened fauna species and one fauna species that was listed of special concern. Furthermore, fauna species that were observed at Milner Gardens included three birds of prey, four different shore birds, twenty waterfowl species, thirty-three different forest bird species, and two other fauna species.

Participants collecting data at the Oak Leaf Drive Park BioBlitz site in Nanoose Bay observed flora and fauna species in both the terrestrial, as well as the marine environment. These terrestrial flora species included three tree species, four shrub species, thirty-seven herb species, one fern and one sedge species, two different rush species, five different grass species, three mosses, two lichens, and three fungi species. Additionally, participants observed one shorebird species, two waterfowl species, twelve different forest bird species, and one other fauna species in the terrestrial environment. On land, two invasive species were observed at Oak Leaf Drive Park. In the marine environment five kelp species were identified, as well as three sponge species, three tube worm species, four tunicates, eleven different cnidarians, seven gastropod species, three bi-valve species, one barnacle species, one limpet, one chiton, seven different crustaceans, seventeen echinoderms, 9 fish species, one cephalopod species and one mammal species. Notably, participants observed two species at risk, one endangered fauna species and one threatened fauna species at Oak Leaf Drive Park in the marine environment.

The data collected from conducting biogeographic flora and fauna surveys is important for gaining sound baseline knowledge of existing biodiversity in the region. Annual biological monitoring will allow us to observe 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 (MABRRI, 2016). Changes in habitat health from long-term climate trends and local weather patterns can have a significant impact on the state of the environment, and these changes can be detected over time with community monitoring initiatives (MABRRI, 2016). The data collected at the first annual MABR BioBlitz at Milner Gardens on April 17, 2016, has been compared to the data collected at Milner Gardens at the second annual MABR BioBlitz on April 22, 2017, to observe changes and number of different flora and fauna species that were identified (Table 1).

Events such as the MABR BioBlitz have the capability to expand local knowledge of biodiversity and wildlife habitat within the region while contributing to a publicly available and transparent data set that will be valuable and useful for future generations and long-term species trend analysis. This research aims to promote the health and resilience of our natural systems and all the intricate and unique characteristics and relationships within these ecosystems (MABRRI, 2016). We wish to promote knowledge sharing, environmental stewardship, and critical thinking in communities beyond the academic environment to promote the longevity and relationships between people and nature. With future BioBlitz events, the aim is to expand its boundaries of the event year after year to include a greater variety of ecosystems, habitats and microclimates that will provide an opportunity to observe and monitor trends in species inventory over a greater geographic range on Vancouver Island, additionally the MABR BioBlitz wishes to increase student research and participation in the event coordination and grow the citizen-science based participation each year (MABRRI, 2016).

Introduction

The 2017 Mount Arrowsmith Biosphere Region BioBlitz was developed entirely by student researchers at Vancouver Island University's Mount Arrowsmith Biosphere Region Research Institute (MABRRI). The 2017 MABR BioBlitz is the second annual event held in



collaboration with the Brant Wildlife Festival, the Nature's Trust of BC, and Milner Gardens & Woodland that aimed to promote citizen science-based research while celebrating wildlife and biodiversity within the Mount Arrowsmith Biosphere Region (MABR). The MABR is a UNESCO designated biosphere reserve on the eastern mid Vancouver Island; it spans 1,200 km² geographically and is known as a place where people live and work together in hopes of creating a sustainable future where they can live in harmony with nature (MABRRI, 2016). Last year's MABR BioBlitz was a pilot event that was designed to connect people with nature while developing sound biological surveying methods for future BioBlitz events in the MABR. The 2016 MABR BioBlitz was successful in accomplishing these goals as well as increased public appreciation for biodiversity

and the sharing of local species knowledge within the community. The 2016 pilot BioBlitz broke ground for the event and made it possible for continued growth and enthusiasm for this type of event.

The 2017 MABR BioBlitz was successful in expanding the parameters of the BioBlitz to include another location in a different ecosystem than that of the previous year. The geographic expansion of the project allowed for diversity of species identification in different microclimates within the region. The new location at Oak Leaf Drive Park in Nanoose Bay allowed an avenue for expert biologists, botanists, ornithologists, naturalists, and experienced Bio-Blitzers to come participate in a terrestrial biological survey of



flora and fauna species as well as a marine survey for experienced scuba divers. The Milner Gardens & Woodland BioBlitz site was intended to promote and encourage members of the community that were new to species identification and desired some guidance of a trained expert in the field of species identification. These changes observed through citizen science-based research provide us with local knowledge of biodiversity that is useful in analyzing trends and changes in our natural environment and human influences over time.

Milner Gardens & Woodland

Milner Gardens and Woodland is located in Qualicum Beach, BC, and consists of 60 acres of coastal and upland forests, as well as 10 acres of developed gardens. In 1996, Vancouver Island University obtained the lands from Ray and Veronica Milner and thus named the gardens “The Milner Gardens” with a purpose to preserve the garden for education and communal value (About Milner Gardens, n.d.).

The Milner Woodlands is comprised of Coastal Douglas-fir old-growth forests with an understory of Western red-cedar and Grand Fir as well as Red alder and is perceived to be a relatively productive ecosystem (MABRRI, 2016). Due to the geographic location of the

Milner Woodlands, it is a “rain shadow” forest, which consists of warm, dry summers and mild, wet winters (MacKinnon, 2013). This relatively rare, yet extremely productive ecosystem accounts for 0.2 % of the province of British Columbia and contains the lowest volume of old growth trees, which raises considerable concern for conservation of these forests (About Milner Gardens, n.d.). Milner Gardens & Woodland staff and volunteers are dedicated to preserving these ecosystems and the species at risk that are found within them (MABRRI, 2016).

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*), and a Golden chain tree (*Laburnum x watereri ‘Vossii*), Chinese dogwood (*Corpus kousavar. Chinensis*) and a Dove tree (*Davidia involucrate*) (About Milner Gardens, n.d.; MABRRI, 2016). Additionally, due to Milner Gardens consisting of such rare species from around the globe, it is a place with important educational resources for research opportunities and public education and enjoyment.

Why a BioBlitz at Milner Gardens?

Milner Gardens & Woodland has proven to be an excellent venue for the MABR BioBlitz. Our first annual MABR BioBlitz on April 17, 2016, was a great success, as was our second MABR BioBlitz on April 22, 2017, Earth Day. There are many benefits to hosting the event at Milner Gardens & Woodland. The staff and volunteers at Milner Gardens have been very helpful and accommodating with assisting in the organization and logistics of the event. The 2016 MABR BioBlitz was our first ever BioBlitz and pilot event. This year we determined that Milner Gardens would be the perfect location for our team of research assistants, experts, and volunteers to train community members how to identify species and collect flora and fauna data for those with little or no experience in doing so. Accessibility, parking, washrooms, and other facilities that Milner Gardens can provide make the location an ideal choice for community members to learn how to identify species in a guided, safe, and comfortable environment. Milner Gardens is a Vancouver Island University entity and has a strong and connected relationship with the Mount Arrowsmith Biosphere Region and MABRRI through various collaborative student research projects. Milner Gardens will continue to be the designated beginner-level training site for future MABR BioBlitz events. Members of the community that are new to Bio-Blitzing and would like some guidance can be trained by our helpful staff, experts, and volunteers at this event in a low-risk environment.

Oak Leaf Drive Park

Oak Leaf Drive Park, also known as Oak Leaf Community Park, is situated in Nanoose Bay in a newly developing region along the coast line. The Park boasts both lush terrestrial ecosystems and a productive coastal marine environment for many aquatic species. The community park property is owned and managed by the Regional District of Nanaimo (RDN) as a new addition to their community parks in the region. The Park was donated to RDN Parks through the subdivision of property on Oak Leaf Drive (Regional District of Nanaimo, 2015). The RDN has recently, in 2016, undergone a thorough biological inventory and assessment of the park to determine and establish development strategies to protect the sensitive plant ecosystems (Regional District of Nanaimo, 2016).



Why a BioBlitz at Oak Leaf Drive Park?

Oak Leaf Drive Park was chosen as our second MABR BioBlitz site for several reasons. The Park hosts a productive marine environment for participants with scuba diving experience to participate in marine species data collection. A marine survey was a component that had not been a part of the previous MABR BioBlitz and that we would like to continue in future years. The site also boasts a stunning Garry Oak (*Quercus garryana*) woodland with an open canopy and a dominant understory of grasses and herbs. This type of Garry Oak woodland ecosystem is commonly found in areas such as Oak Leaf Drive Park in Nanoose Bay, that have gentle slopes and shallow level soils resting on bedrock (Fairbarns, 2017). Species commonly found in Garry Oak ecosystems such as this that were discovered at the BioBlitz include pink honeysuckle (*Lonicera hispidula*) and grasses such as *Festuca idahoensis*. This coastal bluff Garry Oak

ecosystem is also home to Douglas fir (*Pseudotsuga menziesii*) and Arbutus (*Arbutus menziesii*) trees, which are commonly found on coastal bluff regions of eastern Vancouver Island (Fairbarns, 2017).



This biologically rich site was an excellent choice for a second BioBlitz location for its natural characteristics and features; however, it also proved to be ideal because the Park has access to an on-site washroom with an accessible parking lot and trails. The RDN showed a definite interest in the BioBlitz event being held at Oak Leaf Drive Park so that baseline data can be collected on species in the park, which would provide a snapshot of biodiversity that can be compared with data collected in future years at Oak Leaf Drive Park.

Goals and Objectives

There were several key deliverables and objectives associated with the 2017 MABR BioBlitz, which built on the success of last year's first annual MABR BioBlitz

event. The goal is for MABRRI to continue to grow the event year after year and extend the geographic boundaries within the MABR but outside of Milner Gardens, as well. Successfully, MABRRI secured a second site at Oak Leaf Drive Park to host the second site for experienced Bio-Blitzers. The goals and objectives of the 2017 MABR BioBlitz are as follows:

1. Have MABRRI student researchers plan and host a BioBlitz at both Milner Gardens and Woodland and a secondary site within the MABR.
2. Promote Vancouver Island University student research through outreach in the local community and spark interest in environmental stewardship in the region, as well as, increase knowledge and understanding of the MABR and our connection between people and nature.
3. Contribute to long-term monitoring of flora and fauna in the MABR while expanding the event from the previous year.

4. Maintain Milner Gardens & Woodland as a training site for beginner Bio-Blitzers and introduce a second site for more experienced and/or advanced Bio-Blitzers that require little or no guidance to identify flora and fauna species.
5. Provide participants and the public with a finalized flora and fauna collection form, in report form, for species identified during the event.

The overall objective for conducting a BioBlitz was to engage Vancouver Island University (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. While VIU students benefit from learning through teaching and engaging with the members of the community and local knowledge holders, there is a positive benefit to all participants in connecting with each other and the environment to learn and contribute to the research through teamwork. Additionally, those participants that conducted an individual biological survey can contribute to the research and be part of a regional community initiative to achieve long-term species data for the region.

Methods, Tools, and Equipment Used



Local participants were self-selected by signing up for this event on the online BioBlitz Eventbrite registration page for either of the two BioBlitz sites. Expert team leaders were contacted prior to the event by the MABRRI team based on their area of expertise (flora and fauna). On the day of the event participants joined the MABRRI team of volunteers at either Milner Gardens & Woodland or Oak Leaf Drive Park to participate in the event. At Milner Gardens the day's events were separated into two sessions, one in the morning and one in the afternoon. All participants were provided with clipboards and field forms for data collection of both plant and bird species. The groups at Milner Gardens were separated into groups that were interested in birding or plant identification. The birding groups were provided use of spotting scopes and data collection forms for which to identify

bird species. Those that were participating in the plant surveys were provided with *Plants of Coastal British Columbia* by Jim Pojar and Andy MacKinnon along with microscopes and data collection forms. BioBlitz participants were initially sent to separate stations throughout Milner Gardens for the morning session and were encouraged to branch out and navigate throughout these stations to identify a greater variety of species than one station could provide. This method appeared to work well as participants were able to Blitz in several different ecosystems within the property an increase the number of species identified on site.

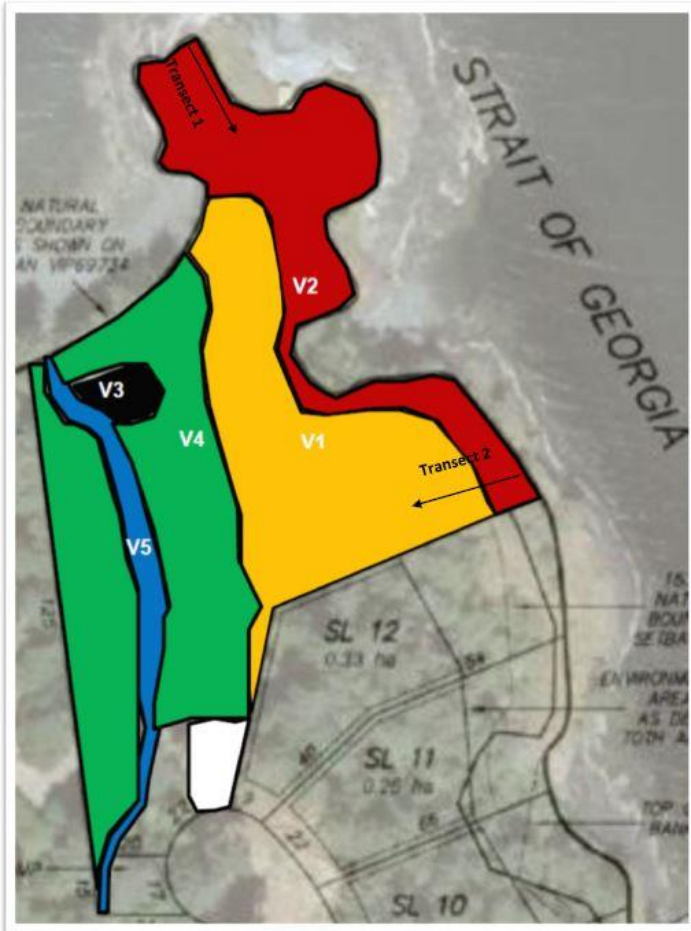


Figure 1. Map of Vegetation Transect Locations. **Source:** Law, P. (2017)

BioBlitz participants at Oak Leaf Drive Park were provided with species identification books and data collection forms for the terrestrial flora and fauna survey of the park and were encouraged to use whichever method they found best for species identification based on their background of expertise and field experience. Those that participated in the underwater marine survey were provided with slates and field forms to tally species under water when identified. The scuba divers were admitted for a dive after signing a waiver and were asked to sign in and out on entering and leaving the water. Marine species guides and various other reference materials were provided to Bio-Blitzers at this site as well, for those that needed them.

Findings

The species data collected at the 2017 MABR BioBlitz contributes to baseline data for Milner Gardens & Woodland that can be compared with data from the previous MABR BioBlitz in 2016, as will data that was collected at Oak Leaf Drive Park in the consecutive years to come. The MABR BioBlitz event allows participants to gain hands on experience and knowledge in the field of species identification with the idea of encouraging these participants to continue to be environmental stewards in their own lives.

Comparison of Data between 2016 and 2017 Milner Gardens Bio-Blitzes

The collection of the following data allows Milner Gardens to update their current species inventory and contributes to long-term monitoring for the flora and fauna within the MABR, which is one of the projects main objectives. Table 1 is a complete list of flora identified within Milner Gardens & Woodland on April 17, 2016, and April 22, 2017, during the MABR BioBlitz. The data was compiled into one table for ease of comparison between the two years. NOTE: exotic species are highlighted in **RED** and Species at Risk are highlighted in **BLUE**. The flora Species at Risk that was identified during the 2017 MABR BioBlitz was the endangered Small-Flowered Lipocarpha (*Lipocarpha micrantha*). Invasive flora species that were identified during the 2017 MABR BioBlitz were English Holly (*Ilex aquifolium*), English Daisy (*Bellis perennis*), Himalayan Blackberry (*Rubus armeniacus*), Ox-Eye Daisy (*Leucanthemum vulgare*), and Yellow Flag Iris (*Iris pseudacorus*).

Table 1. Compiled Findings from 2016 and 2017 MABR BioBlitz Flora Species (both morning and afternoon sessions) at Milner Gardens & Woodland.

Trees			
Species Common Name	Species Scientific Name	2016	2017
Arbutus	<i>Arbutus menziesii</i>		X
Big-Leaf Maple	<i>Acer macrophyllum</i>	X	X
Bitter Cherry	<i>Prunus emarginata</i>	X	
Douglas-fir	<i>Psuedotsuga menziesii</i>	X	X
Grand Fir	<i>Abies grandis</i>	X	X
Holly, English	<i>Ilex aquifolium</i>	X	X
Lodgepole Pine	<i>Pinus contorta</i>	X	
Mountain Ash	<i>Sorbus aucuparia</i>		X
Pacific Crab Apple	<i>Malus fusca</i>	X	

Pacific Dogwood	<i>Cornus nuttallii</i>	X	
Pacific Willow	<i>Salix lasiandra</i>	X	
Red Alder	<i>Alnus rubra</i>	X	X
Sitka Willow	<i>Salix sitchensis</i>	X	
Western Hemlock	<i>Tsuga heterophylla</i>	X	X
Western Red Cedar	<i>Thuja pilicata</i>	X	X
Western Yew	<i>Taxus brevifolia</i>		X
Total Number of Species		13	10
Shrubs			
Species Common Name	Species Scientific Name	2016	2017
Baldhip Rose	<i>Rosa gymnocarpa</i>	X	X
Cascara	<i>Rhamnus purshiana</i>	X	X
Devils Club	<i>Oplopanax horridus</i>	X	
Dull-Oregon Grape	<i>Mahonia nervosa</i>	X	X
Evergreen Huckleberry	<i>Vaccinium ovatum</i>	X	
Falsebox	<i>Pachistima myrsinites</i>		X
Hardhack	<i>Spiraea douglasii ssp. douglasii</i>	X	X
Himalayan Blackberry	<i>Rubus armeniacus</i>	X	X
Nootka Rose	<i>Rosa nutkana</i>	X	
Ocean Spray	<i>Holodiscus discolor</i>	X	X
Red Elderberry	<i>Sambucus racemose</i>	X	X
Red Huckleberry	<i>Rubus parviflorum</i>	X	X
Red-Osier Dogwood	<i>Cornus stolonifera</i>	X	X
Salal	<i>Gaultheria shallon</i>	X	X
Salmonberry	<i>Rubus spectabilis</i>	X	X
Scoulers Willow	<i>Salix scouleriana</i>		X
Tall Oregon Grape	<i>Mahonia aquifolium</i>		X
Thimbleberry	<i>Rubus parviflorus</i>	X	X
Trailing Blackberry	<i>Rubus ursunus</i>	X	X
Western Trumpet Honeysuckle	<i>Lonicera ciliosa</i>		X
Total Number of Species		16	17
Herbs			
Species Common Name	Species Scientific Name	2016	2017
Aniseed	<i>Apiaceae spp.</i>	X	
Arrow-Leaved Groundsel	<i>Senecio triangularis</i>		X

Bittercress	<i>Cardamine spp.</i>	X	X
Broad-Leaf Shooting Star	<i>Dodecatheon hendersonii</i>		X
Buttercups	<i>Ranunculus spp.</i>		X
Canadian Bunchberry	<i>Cornus Canadensis</i>		X
Chickweed	<i>Stellaria spp.</i>		X
Cleavers	<i>Gallium aperine</i>	X	X
Columbine	<i>Aquilegia Formosa</i>	X	
Creeping Buttercup	<i>Ranunculus repens</i>	X	X
Crisp Sandwort	<i>Stellaria crispa</i>	X	
Daffodil	<i>Narcissus spp.</i>		X
Duckweed	<i>Lemnoideae spp.</i>		X
English Daisy	<i>Bellis perennis</i>	X	X
English Ivy	<i>Hedera helix</i>	X	
Forget-Me-Not	<i>Myosotis spp.</i>	X	
Foxglove, Common	<i>Digitalis purpurea</i>		X
Geranium	<i>Geranium spp.</i>		X
Herb Robert	<i>Geranium robertianum</i>	X	X
Horsetail, Common	<i>Equisetum arvense</i>		X
Miner's Lettuce	<i>Claytonia perfoliata</i>	X	X
One-Sided Wintergreen	<i>Orthilia Secunda</i>	X	
Ox-Eye Daisy	<i>Leucanthemum vulgare</i>		X
Pacific Bleeding Heart	<i>Dicentra formosa</i>	X	X
Pacific Coralroot	<i>Corallorhiza maculate sp. Mertensiana</i>	X	
Pacific Trillium	<i>Trillium ovatum</i>	X	X
Pinesap	<i>Monotropa hypopitys</i>	X	
Pink Fawn Lily	<i>Erythronium revolutum</i>		X
Prunella	<i>Lamiaceae spp.</i>		X
Purple Dead Nettle	<i>Lamium purpureum</i>		X
Purple Death Bell	<i>Digitalis spp.</i>	X	
Roses	<i>Aphanes spp.</i>	X	X
Skunk Cabbage	<i>Lysichiton americanus</i>	X	X
Snow Berry	<i>Symphoricarpos albus</i>	X	
Starflower	<i>Trientalis spp.</i>		X
Stinging Nettle	<i>Urtica dioica</i>	X	X
Sweet-Scented Bedstraw	<i>Galium triflorum</i>	X	X

Three-Leafed Foamflower	<i>Tiarella trifoliata</i>	X	
Trailing Yellow Violet	<i>Viola sempervirens</i>		X
Twin Flower	<i>Linnaea borealis</i>		X
Vanilla Leaf	<i>Achyls triphylla</i>	X	X
Wall Lettuce	<i>Lactuca muralis</i>	X	X
Water Parsley	<i>Oenanthe sarmentosa</i>	X	X
Western Coralroot	<i>Corallorhiza maculate ssp. Mertensiana</i>		X
Western Dock	<i>Rumax spp.</i>	X	
Western Starflower	<i>Trientalis latifolia</i>	X	
Wood Sorrel	<i>Oxalis spp.</i>		X
Yellow Flag Iris	<i>Iris pseudacorus</i>		X
Total Number of Species		28	35
Ferns			
Species Common Name	Species Scientific Name	2016	2017
Bracken Fern	<i>Pteridium aquilinum</i>	X	X
Deer Fern	<i>Blechnum splicant</i>	X	X
Green Spleenwort	<i>Asplenium viride</i>		X
Lady Fern	<i>Athyrium felix-femina</i>	X	X
Licorice Fern	<i>Polypodium glycyrrhiza</i>	X	
Oak Fern	<i>Gymnocarpium dryopteris</i>	X	
Spiny Wood Fern	<i>Dryopteris expansa</i>	X	X
Sword Fern	<i>Polystichum minitum</i>	X	X
Total Number of Species		7	6
Sedges			
Species Common Name	Species Scientific Name	2016	2017
Sedges	<i>Cyperaceae spp.</i>		X
Slough Sedge	<i>Carex obnupta</i>	X	X
Small-Flowered Sedge	<i>Lipocarpa micrantha</i>		X
Total Number of Species		1	3
Grasses			
Species Common Name	Species Scientific Name	2016	2017
Bitter Grass	<i>Calea ternifolia</i>	X	
Reed Canary Grass	<i>Phalaris arundinacea</i>	X	X
Sweet Vernal Grass	<i>Lanthoxanthum odoratum</i>	X	
Total Number of Species		3	1

Mosses			
Species Common Name	Species Scientific Name	2016	2017
Badge Moss	<i>Plagiomnium insigne</i>	X	X
Bent Leaf Moss	<i>Rhytidiadelphus squarrosus</i>	X	X
Broom Moss	<i>Dicranum scoparium</i>	X	X
Capillary Thread-Moss	<i>Bryum capillare</i>		X
Cat Tail Moss	<i>Isoetecium myosuroides</i>	X	X
Coastal Leafy Moss	<i>Plagiomnium insigne</i>	X	X
Coiled Leaf Moss	<i>Hypnum circinale</i>		X
Common Witch's Hair	<i>Alectona sarmentosa</i>	X	
Cord Moss	<i>Leptobryum pyriforme</i>		X
Crane's Bill Moss	<i>Atrichum selwynii</i>		X
Curly Thatch Moss	<i>Dicranoweisia cirrata</i>	X	
Cylindric Beard-Moss	<i>Didymodon insulanus</i>		X
Douglas' Neckera Moss	<i>Neckera douglasii</i>	X	
Dusky Fork-Moss	<i>Dicranum fuscescens</i>	X	X
Electrified Cats-Tail Moss	<i>Rhytidiadelphus triquetrus</i>	X	X
Fan Moss	<i>Rhizomnium glabrescens</i>	X	X
Flat Moss	<i>Pseudotaxiphyllum elegans (buckiella)</i>	X	
Fragile Fork Moss	<i>Dicranum tauricum</i>		X
Green/Herzog's Pocket Moss	<i>Fissidens viridulus/limbatus</i>		X
Hairy Screw Moss	<i>Tortula ruralis</i>		X
Hanging Moss	<i>Antitrichia curtipendula</i>		X
Juniper Haircap Moss	<i>Polytrichum juniperinum</i>		X
Lanky Moss	<i>Rhytidiadelphus loreus</i>	X	X
Lovers Moss	<i>Aulacomnium androgynum</i>	X	
Lyell's Bristle Moss	<i>Orthotrichum lyellii</i>		X
Magnificent Moss	<i>Plagiomnium venustum</i>	X	
Menzies' Tree Moss	<i>Leucolepis acanthoneuron</i>	X	X
Moss	<i>Dicranum spp.</i>	X	
Nocktooth Leafy Moss		X	
Nuttall's Homalothecium Moss	<i>Homalothecium nuttallii</i>		X
Oregon Beaked Moss	<i>Kindbergia oregana</i>	X	X
Pale-Fruited Thread Moss	<i>Pohlia annotina</i>		X
Palm Tree Moss	<i>Leucolepis acanthoneuron</i>	X	X

Park Moss	<i>Zygodon rupestris</i>		X
Pipe Cleaner Moss	<i>Rhytidiopsis robusta</i>		X
Plume Moss	<i>Dendroalsia Abientina</i>	X	
Red Mouthed Mnium	<i>Mnium spinulosum</i>		X
Red Roof Moss	<i>Ceratodon purpureus</i>		X
Rough Moss	<i>Claopodium crispifolium</i>		X
Shaggy Moss	<i>Rhytidiadelphus triquetrus</i>		X
Silky Forklet-Moss	<i>Dicranella heteromalla</i>		X
Slender Beaked Moss	<i>Kindbergia praelonga</i>	X	X
Small Leaf Moss	<i>Pseudotaxiphyllum elegans</i>		X
Soft-Tufted Beard-Moss	<i>Didymodon vinealis</i>		X
Spear Moss	<i>Calliergonella custpidata</i>		X
Step Moss	<i>Hylocomium splendens</i>	X	X
Tangled Moss	<i>Heterocladium procurrans</i>	X	
Tree Moss	<i>Climacium dendroides</i>	X	
Wavy Leaved Cotton Moss	<i>Plagiothecium undulatum</i>	X	X
Wet Rock Moss	<i>Dichodontium pellucidum</i>		X
Yellow Moss	<i>Homalothecium fulgescens</i>		X
Total Number of Species		26	40
Liverworts			
Species Common Name	Species Scientific Name	2016	2017
Blue Pouchwort	<i>Calypogeia azurea</i>		X
Crescent-Cup Liverwort	<i>Lunularia cruciate</i>		X
Hanging Millipede Liverwort	<i>Frullania nisquallensis</i>		X
Hard Scale Liverwort	<i>Mylia taylorii</i>		X
Ladle Liverwort	<i>Scapania bolanderi</i>		X
Lesser Featherwort	<i>Plagiochila porelloides</i>		X
Little Hands Liverwort	<i>Lepidozia reptans</i>		X
Lophocolea cuspidate	<i>Lophocolea cuspidate</i>		X
Snake Liverwort	<i>Conocephalum conicum</i>	X	
Tree Ruffle Liverwort	<i>Porella navicularis</i>	X	X
Two-Horned Pincerwort	<i>Cephalozia bicuspidate</i>		X
Yellow-Ladle Liverwort	<i>Scapania bolanderi</i>	X	X
Total Number of Species		3	11
Lichens			

Species Common Name	Species Scientific Name	2016	2017
Antlered Perfume	<i>Evernia prunastri</i>	X	X
Bark Barnacle Lichen	<i>Thelotrema lepadinum</i>		X
Bitter Wart Lichen	<i>Pertusaria amara</i>		X
Camouflage Lichen	<i>Melanelia spp.</i>		X
Cumberland Rock-Shield	<i>Xanthoparmelia cumberlandia</i>		X
Dotted Bush Lichen	<i>Ramalina farinacea</i>		X
Dust Lichens	<i>Lepraria spp.</i>	X	X
Frog Pelt	<i>Peltigera neopolydactyla</i>	X	
Gold Dust Lichens	<i>Chrysothrix spp.</i>		X
Herringbone Beard	<i>Usnea filipendula</i>		X
Lichen	<i>Cladina spp.</i>	X	
Lichen	<i>Cladonia spp.</i>	X	
Lichen	<i>Usnea spp.</i>	X	
Lipstick pixie	<i>Cladonia macilenta</i>		X
Lungwort Lichen	<i>Lobaria pulmonaria</i>	X	X
Membranous Dog Lichen	<i>Peltigera membranacea</i>		X
Nit Beard	<i>Usnea subfloridana</i>		X
Oak Moss Lichen	<i>Evernia prunastri</i>		X
Rag Bag Lichen	<i>Platismatia glauca</i>	X	X
Rose-Bud Pert	<i>Pertusaria subambigens</i>		X
Sarea resinae	<i>Sarea resinae</i>		X
Saucer Lichen	<i>Ochrolechia laevigata</i>		X
Shield Lichen	<i>Parmelia sulcate</i>		X
Script Lichen	<i>Graphis scripta</i>		X
Tattered Rag Lichen	<i>Platismatia herrei</i>	X	X
Tree Lungwort	<i>Lobaria pulmonaria</i>		X
Tree Pelt	<i>Peltigera collina</i>		X
Trumpet Lichen	<i>Cladonia fimbriata</i>		X
Total Number of Species		9	24
Fungi			
Species Common Name	Species Scientific Name	2016	2017
Artist Conk	<i>Ganoderma applanatum</i>		X
Bird's Nest Fungus	<i>Nidulariaceae spp.</i>		X
Bitter Iodine Polypore	<i>Albatrellus hirtus</i>		X

Cedar Needle Blight	<i>Didymascella thujina</i>		X
Coccomyces dentatus	<i>Coccomyces dentatus</i>		X
Dasyscyphus bicolor	<i>Dasyscyphus bicolor</i>		X
Deer Mushroom	<i>Pluteus cervinus s.l.</i>		X
Dye Polypore	<i>Phaeolus schweinitzii</i>		X
Heterotextus luteus	<i>Heterotextus luteus</i>		X
Jelly fungus	<i>Dacrymyces spp.</i>		X
Leaf Fungus	<i>Stereum spp.</i>		X
Lichen Agaric	<i>Lichenomphalia umbellifera</i>		X
Needle Rust	<i>Pucciniastrum goeppertianum</i>		X
Ochre Spreading Tooth	<i>Steccherinum ochraceum</i>		X
Panther Cap Mushroom	<i>Amanita pantherina</i>	X	
Red Belt Conk	<i>Fomitopsis pinicola</i>		X
Red Edge Bonnet	<i>Mycena rubromarginata</i>		X
Ringed Conocybe	<i>Conocybe filaris</i>		X
Saprotrophic Mushrooms	<i>Mycena spp.</i>		X
Turkey Tail	<i>Trametes versicolor</i>		X
Western Varnished Conk	<i>Ganoderma oregonense</i>		X
White Green-Algae Coral	<i>Multiclavula mucida</i>		X
White Marasmius	<i>Marasmiellus candidus</i>		X
Total Number of Species		1	22
Slime Molds			
Species Common Name	Species Scientific Name	2016	2017
Scrambled Egg Slime Mold	<i>Fuligo septica</i>		X
Total Number of Species		0	1
Oddball			
Species Common Name	Species Scientific Name	2016	2017
Pinedrops	<i>Pterospora andromdea</i>	X	
Vancouver Groundcone	<i>Boschniakia hookeri</i>		X
Total Number of Species		1	1
Total Number of Flora Species at Milner Gardens		108	171

Table 2 is a complete list of fauna identified within Milner Gardens & Woodland on April 17, 2016, and April 22, 2017, during the MABR BioBlitz. The data was compiled into one table for ease of comparison between the two years. NOTE: exotic species are

highlighted in **RED** and Species at Risk are highlighted in **BLUE**. Fauna Species at Risk that were identified during the 2017 MABR BioBlitz include the threatened Marbled Murrelet (*Brachyramphus marmoratus*) and three species that are considered to be of special concern, which include the Band-Tailed Pigeon (*Patagioenas fasciata*), Horned Grebe (*Podiceps auritus*), and Western Grebe (*Aechmophorus occidentalis*). No invasive fauna species were identified during the 2017 MABR BioBlitz.

Table 2. Compiled Findings from 2016 and 2017 MABR BioBlitz Fauna Species (both morning and afternoon sessions) at Milner Gardens & Woodland.

Birds of Prey			
Species Common Name	Species Scientific Name	2016	2017
Bald Eagle	<i>Haliaeetus leucocephalus</i>	X	X
Barred Owl	<i>Strix varia</i>		X
Sharp-Shinned Hawk	<i>Accipiter striatus</i>		X
Total Number of Species		1	3
Shore Birds			
Species Common Name	Species Scientific Name	2016	2017
Belted Kingfisher	<i>Megaceryle alcyon</i>	X	X
Black-Bellied Plover	<i>Pluvialis squatarola</i>	X	X
Black Turnstone	<i>Arenaria melanocephala</i>	X	X
Dunlin	<i>Calidris alpina</i>	X	X
Greater Yellow Legs	<i>Tringa melanoleuca</i>	X	
Total Number of Species		5	4
Waterfowl			
Species Common Name	Species Scientific Name	2016	2017
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	X	X
Brant	<i>Branta bernicla</i>		X
California Gull	<i>Larus californicus</i>	X	
Common Loon	<i>Gavia immer</i>	X	X
Common Merganser	<i>Mergus merganser</i>	X	X
Common Murre	<i>Uria aaige</i>		X
Glaucous-Winged Gull	<i>Larus glaucescens</i>	X	X
Greater Scaup	<i>Aythya marila</i>		X
Horned Grebe	<i>Podiceps auritus</i>	X	X
Mallard	<i>Anas platyrhynchos</i>		X
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	X	X

Mew Gull	<i>Larus canus</i>	X	X
Pacific Loon	<i>Gavia pacifica</i>	X	X
Pelagic Cormorant	<i>Phalacrocorax pelagicus</i>		X
Pidgeon Guillemot	<i>Cephus columba</i>	X	X
Red-Breasted Merganser	<i>Mergus serrator</i>	X	X
Red-Necked Grebe	<i>Podiceps grisegena</i>	X	X
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>		X
Surf Scoter	<i>Melanitta perspicillata</i>	X	X
Western Grebe	<i>Aechmophorus occidentalis</i>	X	X
White-Winged Scoter	<i>Melanitta fusca</i>		X
Total Number of Species		14	20
Forest Birds			
Species Common Name	Species Scientific Name	2016	2017
American Robin	<i>Turdus migratorius</i>	X	X
Anna's Hummingbird	<i>Calypte anna</i>	X	X
Band-Tailed Pigeon	<i>Patagioenas fasciata</i>		X
Black-Capped Chickadee	<i>Poecile atricapillus</i>	X	
Black-Throated Blue Warbler	<i>Setophaga caeruleascens</i>		X
Black-Throated Gray Warbler	<i>Setophaga nigrescens</i>	X	X
Brown Creeper	<i>Certhia americana</i>		X
Bushtit	<i>Psaltriparus minimus</i>		X
Chestnut-Backed Chickadee	<i>Poecile rufescens</i>		X
Common Raven	<i>Corvus corax</i>	X	X
Dark-Eyed Junco	<i>Junco hyemalis</i>	X	X
Downy Woodpecker	<i>Picoides pubescens</i>	X	
European Starling	<i>Sturnus vulgaris</i>		X
Golden-Crowned Kinglet	<i>Regulus satrapa</i>		X
Golden-Crowned Sparrow	<i>Zonotrichia atricapilla</i>		X
Hammond's Flycatcher	<i>Empidonax hammondii</i>		X
Hutton's Vireo	<i>Vireo huttoni</i>	X	X
Northern Flicker	<i>Colaptes auratus</i>	X	X
Northwestern Crow	<i>Corvus caurinus</i>	X	X
Nuthatch	<i>Sittidae spp.</i>	X	
Orange-Crowned Kinglet	<i>Regulus satrapa</i>		X
Orange-Crowned Warbler	<i>Oreothlypis celata</i>		X

Pacific-Slope Flycatcher	<i>Empidonax difficilis</i>		X
Pacific Wren	<i>Troglodytes pacificus</i>	X	X
Pileated Woodpecker	<i>Dryocopus pileatus</i>		X
Pine Siskin	<i>Spinus pinus</i>		X
Purple Finch	<i>Haemorhous purpureus</i>		X
Red-Breasted Nuthatch	<i>Sitta Canadensis</i>		X
Red-Breasted Sapsucker	<i>Sphyrapicus ruber</i>		X
Rufous Hummingbird	<i>Selasphorus rufus</i>	X	X
Rufous-Sided Towhee	<i>Pipilo erythrophthalmus</i>	X	X
Song Sparrow	<i>Melospiza melodia</i>		X
Spotted Towhee	<i>Pipilo maculatus</i>	X	
Townsend's Warbler	<i>Setophaga townsendi</i>		X
Western Tanager	<i>Piranga ludoviciana</i>		X
Winter Wren	<i>Troglodytes hiemalis</i>	X	
Yellow Warbler	<i>Setophaga petechial</i>		X
Yellow Rumped Warbler	<i>Setophaga coronata</i>		X
Total Number of Species		16	33
Other Species			
Species Common Name	Species Scientific Name	2016	2017
Banana Slug	<i>Ariolimax spp.</i>		X
Red-Backed Salamander	<i>Plethodon cinereus</i>		X
Total Number of Species		0	2
Total Number of Fauna Species at Milner Gardens		36	62

2017 MABR BioBlitz Data for Oak Leaf Drive Park

The collection of species data from both the terrestrial and marine ecosystems has been compiled into the following tables from the findings of Oak Leaf Drive Park. The data collected at this site is baseline data that will contribute to biological species inventory for the MABR that meets the main objectives of the project. The data will be used for comparison for future BioBlitzes at this site and provide the Regional District of Nanaimo with a baseline inventory of species within the park to add to their existing knowledge of the area. NOTE: exotic species are highlighted in **RED** and Species at Risk are highlighted in **BLUE**. No flora Species at Risk were identified at this site during the terrestrial surveys; although, there were two invasive flora species identified, which are the Canada thistle (*Cirsium arvense*) and Hairy Cat's Ear (*Hypochaeris radicata*) as is shown in Table 3.

Table 3. Compiled Findings from 2017 MABR BioBlitz of Terrestrial Flora Species (both morning and afternoon sessions) at Oak Leaf drive Park on April 22, 2017

Trees		
Species Common Name	Species Scientific Name	Observed
Arbutus	<i>Arbutus menziesii</i>	X
Douglas Fir	<i>Pseudotsuga menziesii</i>	X
Garry Oak	<i>Quercus garryana</i>	X
Total Number of Species		3
Shrubs		
Species Common Name	Species Scientific Name	Observed
Salal	<i>Gaultheria shallon</i>	X
Saskatoon Berry	<i>Amelanchier alnifolia</i>	X
Snowberry	<i>Symphoricarpos albus</i>	X
Trailing Blackberry	<i>Rubus ursinus</i>	X
Total Number of Species		4
Ferns		
Species Common Name	Species Scientific Name	Observed
Sword Fern	<i>Polystichum minitum</i>	X
Total Number of Species		1
Herbs		
Species Common Name	Species Scientific Name	Observed
Beach Pea	<i>Lathyrus japonicus var. maritimus</i>	X
Bedstraw	<i>Galium spp.</i>	X
Blue Eyed Mary	<i>Omphalodes verna</i>	X
Broad-Leaved Stonecrop	<i>Sedum spathulifolium</i>	X
Canada Thistle	<i>Cirsium arvense</i>	X
Chickweed	<i>Stellaria spp.</i>	X
Chickweed Monkey-Flower	<i>Mimulus Alsinoides</i>	X
Chocolate Lily	<i>Fritillaria affinis</i>	X
Clover	<i>Trifolium spp.</i>	X
Common Camas	<i>Camassia quamash</i>	X
Common Daisy	<i>Bellis perennis</i>	X
Dandelion	<i>Taraxacum officinale</i>	X
Field Chickweed	<i>Cerastium arvense</i>	X

Geranium	<i>Geranium spp.</i>	X
Hairy Cat's Ear	<i>Hypochaeris radicata</i>	X
Pink Honeysuckle	<i>Lonicera hispidula</i>	X
Kinnikinnick	<i>Arctostaphylos uva-ursa</i>	X
Miner's Lettuce	<i>Claytonia perfoliata</i>	X
Miniature Lupine	<i>Lupinus bicolor</i>	X
Mountain Forget-Me-Not	<i>Myosotis asiatica</i>	X
Oregon Grape	<i>Mahonia spp.</i>	X
Pacific Hemlock-Parsley	<i>Conioselinum gmelinii</i>	X
Pink Fawn Lily	<i>Erythronium revolutum</i>	X
Rockfoils	<i>Saxifraga spp.</i>	X
Sanicle	<i>Sanicula europaea</i>	X
Seashore Lupine	<i>Lupinus littoralis</i>	X
Sheep Sorrel	<i>Rumex acetosella</i>	X
Shepherd's Purse	<i>Capsella bursa-pastoris</i>	X
Shortspur Seablush	<i>Plectritis congesta</i>	X
Skunk Cabbage	<i>Symplocarpus foetidus</i>	X
Small-Flowered Alumroot	<i>Heuchera micrantha</i>	X
Small-Flowered Woodland Star	<i>Lithophragma parviflorum</i>	X
Spring Gold	<i>Lomatium utriculatum</i>	X
Strawberry, Coastal	<i>Fragaria chiloensis</i>	X
Wall Speedwell	<i>Veronica arvensis</i>	X
Western Buttercup	<i>Ranunculus occidentalis</i>	X
White Triteleia	<i>Triteleia hyacinthina</i>	X
Yarrow	<i>Achillea millefolium</i>	X
Total Number of Species		38
Mosses		
Species Common Name	Species Scientific Name	Observed
Spikemosses	<i>Selaginella spp.</i>	X
Starmoss	<i>Tortula ruralis</i>	X
Twisted Pincushion	<i>Ulota obtusiuscula</i>	X
Total Number of Species		3
Lichens		
Species Common Name	Species Scientific Name	Observed
Lipstick Pixie	<i>Cladonia macilenta</i>	X

Reindeer Lichen	<i>Cladonia rangiferina</i>	X
Total Number of Species		2
Liverworts		
Species Common Name	Species Scientific Name	Observed
Flat-Leaved Scalewort	<i>Radula complanata</i>	X
Hanging Millipede Liverwort	<i>Frullania nisquallensis</i>	X
White Earwort	<i>Diplophyllum albicans</i>	X
Total Number of Species		3
Sedges		
Species Common Name	Species Scientific Name	Observed
Bent Sedge	<i>Carex deflexa</i>	X
Total Number of Species		1
Rushes		
Species Common Name	Species Scientific Name	Observed
Common Rush	<i>Juncus effusus</i>	X
Common Spike-Rush	<i>Eleocharis palustris</i>	X
Total Number of Species		2
Grasses		
Species Common Name	Species Scientific Name	Observed
Kentucky Bluegrass	<i>Poa pratensis</i>	X
Poaceae	<i>Festuca idahoensis</i>	X
Roemer's Fescue	<i>Festuca roemeri</i>	X
Sweet Vernalgrass	<i>Anthoxanthum odoratum</i>	X
Timber Oatgrass	<i>Danthonia intermedia</i>	X
Total Number of Species		5
Fungi		
Species Common Name	Species Scientific Name	Observed
Artist's Conk	<i>Ganoderma applanatum</i>	X
Lichen Agaric	<i>Lichenomphalia umbellifera</i>	X
Mushrooms	<i>Mycena spp.</i>	X
Total Number of Species		3
Total Number of Terrestrial Flora Species at Oak Leaf Drive Park		65

Table 4 shows a complete list of all terrestrial fauna species that were identified during the biological survey at Oak Leaf Drive Park on April 22, 2017. NOTE: exotic species are highlighted in RED and Species at Risk are highlighted in BLUE. No invasive fauna species or Species at Risk were identified during the terrestrial biological survey at this site.

Table 4. Compiled Findings from 2017 MABR BioBlitz of Terrestrial Fauna Species (both morning and afternoon sessions) at Oak Leaf drive Park on April 22, 2017

Shore Birds		
Species Common Name	Species Scientific Name	Observed
Black Oystercatcher	<i>Haematopus bachmani</i>	X
Total Number of Species		1
Waterfowl		
Species Common Name	Species Scientific Name	Observed
Common Merganser	<i>Mergus merganser</i>	X
Glaucous-Winged Gull	<i>Larus glaucescens</i>	X
Total Number of Species		2
Forest Birds		
Species Common Name	Species Scientific Name	Observed
Bushtit	<i>Psaltriparus minimus</i>	X
Chestnut-Backed Chickadee	<i>Poecile rufescens</i>	X
Common Raven	<i>Corvus corax</i>	X
Dark-Eyed Junco	<i>Junco hyemalis</i>	X
House Finch	<i>Haemorhous mexicanus</i>	X
Orange-Crowned Warbler	<i>Vermivora celata</i>	X
Pacific Wren	<i>Troglodytes pacificus</i>	X
Pine Siskin	<i>Spinus pinus</i>	X
Red-Breasted Nuthatch	<i>Sitta canadensis</i>	X
Red Crossbill	<i>Loxia curvirostra</i>	X
Song Sparrow	<i>Melospiza melodia</i>	X
Spotted Towhee	<i>Pipilo maculatus</i>	X
Total Number of Species		12
Other Species		
Species Common Name	Species Scientific Name	Observed
Banana Slug	<i>Ariolimax spp.</i>	X
Total Number of Species		1

Total Number of Terrestrial Fauna Species at Oak Leaf Drive Park	16
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Table 5 shows a complete list of flora species that were identified during the marine survey at Oak Leaf Drive Park on April 22, 2017. NOTE: exotic species are highlighted in RED and Species at Risk are highlighted in BLUE. There were no invasive flora species or Species at Risk identified during this biological marine survey of flora species.

Table 5. Compiled Findings from 2017 MABR BioBlitz of Marine Flora Species (both morning and afternoon sessions) at Oak Leaf drive Park on April 22, 2017

Kelp		
Species Common Name	Species Scientific Name	Observed
Mazzella	<i>Mazzella spp.</i>	X
Rockweed	<i>Fucus vesiculosus</i>	X
Sargassum	<i>Sargassum spp.</i>	X
Sea Lettuce	<i>Ulva spp.</i>	X
Turkish Towel	<i>Chondracanthus exasperates</i>	X
Total Number of Species		5
Total Number of Marine Flora Species at Oak Leaf Drive Park		5

Table 6 shows a complete list of fauna species that were identified during the marine survey at Oak Leaf Drive Park on April 22, 2017. NOTE: exotic species are highlighted in RED and Species at Risk are highlighted in BLUE. There were two species of marine fauna that were identified as Species at Risk, which include the endangered Northern Abalone (*Haliotis kamtschatkana*) and the threatened Quillback Rockfish (*Sebastes maliger*). There were no invasive marine fauna that were identified during this biological marine survey.

Table 6. Compiled Findings from 2017 MABR BioBlitz of Marine Fauna Species (both morning and afternoon sessions) at Oak Leaf drive Park on April 22, 2017

Sponges		
Species Common Name	Species Scientific Name	Observed
Orange Ball Sponge	<i>Tethya californiana</i>	X
Smooth Scallop Sponge	<i>Mycale adhaerens</i>	X
Yellow Boring Sponge	<i>Cliona celata</i>	X
Total Number of Species		3
Tube Worms		

Species Common Name	Species Scientific Name	Observed
Calcareous Tube Worm	<i>Serpula vermicularis</i>	X
Ruffles Scaleworm	<i>Arctonoe fragilis</i>	X
Spaghetti Tube Worm	<i>Thelepus crispus</i>	X
Total Number of Species		3
Tunicates		
Species Common Name	Species Scientific Name	Observed
Mushroom Tunicates	<i>Distaplia occidentalis</i>	X
Orange Social Ascidiars	<i>Metandrocarpa taylori</i>	X
Shiny Orange Sea Squirt	<i>Cnemidocarpa finmarkiensis</i>	X
Transparent Sea Squirt	<i>Corella willmeriana</i>	X
Total Number of Species		4
Cnidarians		
Species Common Name	Species Scientific Name	Observed
Buried Green Anemone	<i>Anthopleura Artemisia</i>	X
Comb Jelly	<i>Ctenophora spp.</i>	X
Cross Jelly	<i>Mitrocoma cellularia</i>	X
Orange Cup Coral	<i>Tubastraea coccinea</i>	X
Orange Sea Pen	<i>Ptilosarcus gurneyi</i>	X
Orange Zoanthids	<i>Epizoanthus scotinus</i>	X
Ostrich Plume Hydroids	<i>Aglaophenia struthionides</i>	X
Painted Anemone	<i>Urticina grebelnyi</i>	X
Pink Mouth Hydroids	<i>Ectopleura crocea</i>	X
Plumose Anemone	<i>Metridium farcimen</i>	X
Tube Dwelling Anemone	<i>Pachycerianthus fimbriatus</i>	X
Total Number of Species		11
Gastropoda		
Species Common Name	Species Scientific Name	Observed
Giant Dendronotus	<i>Dendronotus iris</i>	X
Lewis's Moonshell	<i>Neverita lewisii</i>	X
Red Flabellina	<i>Flabellina triophina</i>	X
Sea Lemon	<i>Anisodoris nobilis</i>	X
Topsnail	<i>Trochidae spp.</i>	X
White Lined Dirona	<i>Dirona albolineata</i>	X
Yellow Margin Dorid	<i>Cadlina luteomarginata</i>	X

Total Number of Species		7
Bi-Valves		
Species Common Name	Species Scientific Name	Observed
Northern Abalone	<i>Haliotis kamtschatkana</i>	X
Pacific Pink Scallop	<i>Chlamys rubida</i>	X
Rock Scallop	<i>Crassadoma gigantean</i>	X
Total Number of Species		3
Barnacles		
Species Common Name	Species Scientific Name	Observed
Acorn Barnacles	<i>Balanus grandula</i>	X
Total Number of Species		1
Limpets		
Species Common Name	Species Scientific Name	Observed
Keyhole Limpet	<i>Fissurellidae spp.</i>	X
Total Number of Species		1
Chitons		
Species Common Name	Species Scientific Name	Observed
Chiton	<i>Polyplacophora spp.</i>	X
Total Number of Species		1
Malacostraca (Crustaceans)		
Species Common Name	Species Scientific Name	Observed
Golf-Ball Crab	<i>Rhinolithodes wosnessenskii</i>	X
Hermit Crabs	<i>Paguroidea spp.</i>	X
Northern Kelp Crab	<i>Pugettia producta</i>	X
Puget Sound King Crab	<i>Lopholithodes mandtii</i>	X
Red Rock Crab	<i>Cancer productus</i>	X
Spiny Lithode Crab	<i>Acantholithodes hispidus</i>	X
Umbrella Crab	<i>Crypolithodes sitchensis</i>	X
Total Number of Species		7
Echinoderms		
Species Common Name	Species Scientific Name	Observed
Blood Star	<i>Henricia leviuscula</i>	X
Californian Sea Cucumber	<i>Parastichopus californicus</i>	X
Daisy Brittle Star	<i>Ophiopholis aculeate</i>	X
Feather Star	<i>Florometra serratissima</i>	X

Green Sea Urchin	<i>Strongylocentrotus droebachiensis</i>	X
Grey Brittle Star	<i>Ophiura lutkeni</i>	X
Leather Star	<i>Dermasterias imbricata</i>	X
Ochre Star	<i>Pisaster ocraceus</i>	X
Orange Sea Cucumber	<i>Cucumaria miniata</i>	X
Painted Star	<i>Orthasterius koehleri</i>	X
Pale Sea Cucumber	<i>Cucumaria pallida</i>	X
Purple Sea Urchin	<i>Strongylocentrotus purpuratus</i>	X
Red Sea Urchin	<i>Strongylocentrotus franciscanus</i>	X
Rose Star	<i>Crossaster papposus</i>	X
Spiny Red Star	<i>Hippasteria spinosa</i>	X
Sunflower Star	<i>Pycnopodia helianthoides</i>	X
Vermillion Star	<i>Mediaster aequalis</i>	X
Total Number of Species		17
Fish		
Species Common Name	Species Scientific Name	Observed
Blackeye Goby	<i>Rhinogobiops nicholsii</i>	X
Cabezon	<i>Scorpaenichthys marmoratus</i>	X
Copper Rockfish	<i>Sebastes caurinus</i>	X
Kelp Greenling	<i>Hexagrammos decagrammus</i>	X
Lingcod	<i>Ophiodon elongates</i>	X
Painted Greenling	<i>Oxylebius pictus</i>	X
Quillback Rockfish	<i>Sebastes maliger</i>	X
Sailfin Sculpin	<i>Nautichthys oculofasciatus</i>	X
Scalyhead Sculpin	<i>Artedius harringtoni</i>	X
Total Number of Species		9
Cephalopod		
Species Common Name	Species Scientific Name	Observed
Giant Pacific Octopus	<i>Enteroctopus dofleini</i>	X
Total Number of Species		1
Mammals		
Species Common Name	Species Scientific Name	Observed
California Sea Lion	<i>Zalophus californianus</i>	X
Total Number of Species		1
Total Number of Marine Fauna Species at Oak Leaf Drive Park		69

Participant Feedback and Recommendations

Without the assistance, participation, and support of VIU students, local experts, citizen scientists and community members, the Mount Arrowsmith Biosphere Region BioBlitz would not have been such a great success. Through participant feedback and recommendations from both 2016 and 2017 events we will be able to continue to improve and enhance future BioBlitz events year after year to expand the geographic boundaries of the event and encourage and support an increase in public participation and knowledge sharing. While we did not collect formal written feedback from participants this year, common expression from participants to our volunteers was positive and enthusiastic for this type of event and the opportunity for individuals from all walks of life to work together as a team to learn about local species identification in an outdoor environment. While many participants did have some existing knowledge of species in the area it proved to be a fun and engaging exercise to refresh and even increase the knowledge of participants in the region. This event is worthwhile because it was clear to see that participants were engaged and enjoying themselves.

In addition to the positive feedback that was received there was some constructive suggestions that were made for future BioBlitz events that included some changes to the layout and formatting of the data collection forms, as well as an improvement for future years in the advertising of the event in the months leading up to event. It was expressed that advertising could have improved and future years will include advertisements on local radio stations and newspapers which had been underutilized for the 2017 MABR BioBlitz. It was also suggested to have an expert biologist or naturalist onsite at the advanced BioBlitz site for extra assistance and guidance if needed.

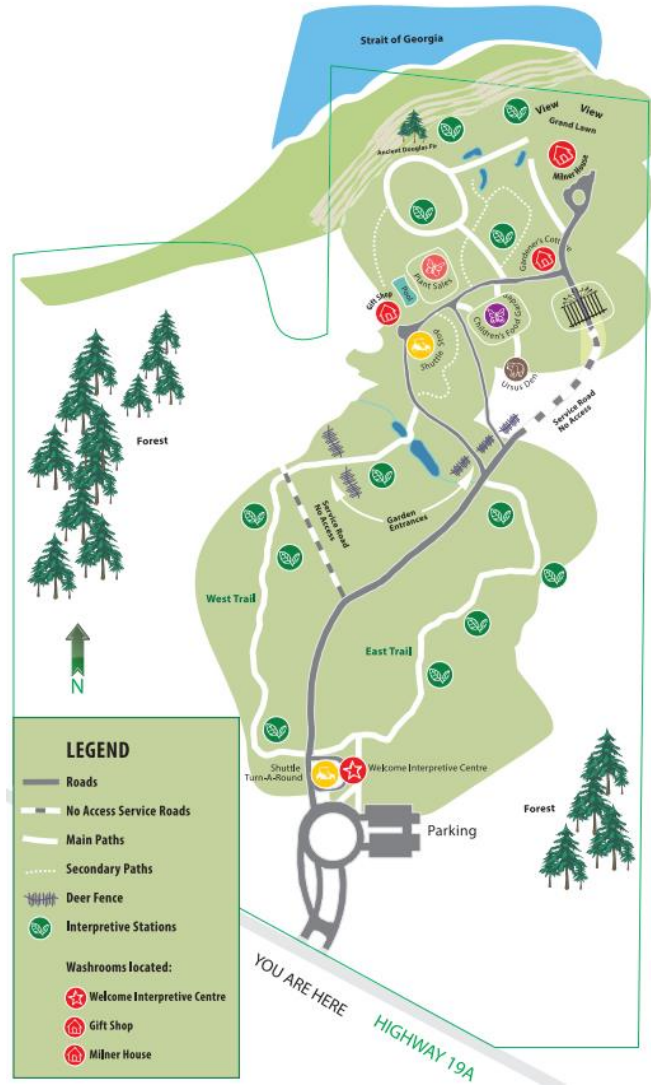


Future Blitzing

The 2017 MABR BioBlitz achieved its goals in expanding to another site at Oak Leaf Drive Park, in addition to Milner Gardens, while maintaining Milner Gardens & Woodland as a training site for beginner BioBlitzers to learn about species identification from local experts and citizen scientists in the region. Our future goals inspire us to expand the MABR BioBlitz further across the MABR to include core areas such as Wildlife Management Areas, Provincial, Regional and Municipal parks; these areas maintain some level of protection and may be able to be consistently surveyed year after year to allow for a proper comparison between species data. This year's marine survey proved to be well received and we wish to continue to offer this option for participants in future MABR BioBlitz events and potentially add another marine survey site for interested scuba divers and snorkelers.










The Mount Arrowsmith Biosphere Region is a stunningly beautiful and diverse region with countless species to discover and steward. The incredible vertical range of the MABR allows for 2100 meters of discovery from the highest peak of Mount Arrowsmith to the depths of the Salish Sea, and our team at the Mount Arrowsmith Biosphere Region Research Institute is inspired and eager to explore, engage, and educate one another and each other about these important ecosystems and habitats that we all live in and share. The MABR BioBlitz has proven to be a well-received success within the community and our team at MABRRI looks forward to expanding the event throughout the MABR for future years to come.

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



Appendix 2. Common Species-BioBlitz Handout

Some species you may find during the MABR BioBlitz...

Trees		Ferns		Shrubs					
1	 Douglas fir <i>Pseudotsuga menziesii</i>	6	 Bracken Fern - <i>Pteridium</i>	9	 Dull Oregon Grape <i>Mahonia nervosa</i>	12	 Trailing Blackberry <i>Rubus ursinus</i>		
2	 Western Red Cedar <i>Thuja plicata</i>	7	 Sword Fern <i>Polystichum munitum</i>	10	 Salmon Berry <i>Rubus spectabilis</i>	13	 Salal <i>Gaultheria shallon</i>		
3	 Arbutus <i>Arbutus menziesii</i>	8 Moss  Step Moss <i>Hylocomium splendens</i>		11	 Oceanspray <i>Holodiscus discolor</i>				
4	 Western Hemlock <i>Tsuga heterophylla</i>	14	 Pink Fawn Lily <i>Erythronium revolutum</i>	Flowers		16	 Pacific Trillium <i>Trillium ovatum</i>	18	 Skunk Cabbage <i>Symplocarpus foetidus</i>
5	 Bigleaf Maple <i>Acer macrophyllum</i>	15	 Pacific Bleeding Heart <i>Dicentra formosa</i>	17	 Vanilla Leaf <i>Achlys</i>				

Appendix 3. Birds You May Expect to Find at Milner Gardens



Most Likely Birds Seen and Heard at Milner Gardens and Woodland

by Sandra Gray

Listed below are predominantly forest dwelling birds that can be seen or heard during your visit to Milner Gardens and Woodland throughout the seasons. In addition, many species of ducks, shorebirds, and gulls visit the shoreline of MGW during migration or may winter over along the East Coast of Vancouver Island. With binoculars or spotting scope you may be able to add quite a few to 'your list' while on site. Over 250 species of birds have been recorded in the Parksville Qualicum Beach Checklist Area.

S Usually a seasonal visitor; may be seen during migration; may nest locally or on site.

C Common visitor or resident; can be seen most of the year but may be migratory; may nest locally or on site.



The following list is in the scientific order used by most field guides.

- | | | | |
|---|---|---|---|
| <input type="checkbox"/> Mallard | S | <input type="checkbox"/> Rufous Hummingbird | S |
| <input type="checkbox"/> California Quail | C | <input type="checkbox"/> Belted Kingfisher | C |
| <input type="checkbox"/> Great Blue Heron | C | <input type="checkbox"/> Red-breasted Sapsucker | C |
| <input type="checkbox"/> Turkey Vulture | S | <input type="checkbox"/> Downy Woodpecker | C |
| <input type="checkbox"/> Bald Eagle | C | <input type="checkbox"/> Hairy Woodpecker | C |
| <input type="checkbox"/> Sharp-shinned Hawk | C | <input type="checkbox"/> Northern Flicker | C |
| <input type="checkbox"/> Cooper's Hawk | C | <input type="checkbox"/> Pileated Woodpecker | C |
| <input type="checkbox"/> Red-tailed Hawk | S | <input type="checkbox"/> Pacific-slope Flycatcher | S |
| <input type="checkbox"/> Merlin | C | <input type="checkbox"/> Hutton's Vireo | C |
| <input type="checkbox"/> Peregrine Falcon | S | <input type="checkbox"/> Warbling Vireo | S |
| <input type="checkbox"/> Killdeer | C | <input type="checkbox"/> Steller's Jay | C |
| <input type="checkbox"/> Band-tailed Pigeon | C | <input type="checkbox"/> Northwestern Crow | C |
| <input type="checkbox"/> Great Horned Owl | C | <input type="checkbox"/> Common Raven | C |
| <input type="checkbox"/> Barred Owl | C | <input type="checkbox"/> Tree Swallow | S |



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For more information call 250-752-6153 or email milnergardens@shaw.ca.



Most Likely Birds Seen and Heard at Milner Gardens and Woodland

by Sandra Gray

S Usually a seasonal visitor; may be seen during migration; may nest locally or on site.

C Common visitor or resident; can be seen most of the year but may be migratory; may nest locally or on site.

The following list is in the scientific order used by most field guides.

- | | | | |
|--|---|--|---|
| <input type="checkbox"/> Violet-green Swallow | S | <input type="checkbox"/> Black-throated Gray Warbler | S |
| <input type="checkbox"/> Northern Rough-winged Swallow | S | <input type="checkbox"/> Townsend's Warbler | S |
| <input type="checkbox"/> Chestnut-backed Chickadee | C | <input type="checkbox"/> Western Tanager | S |
| <input type="checkbox"/> Bushtit | C | <input type="checkbox"/> Spotted Towhee | C |
| <input type="checkbox"/> Red-breasted Nuthatch | C | <input type="checkbox"/> Chipping Sparrow | S |
| <input type="checkbox"/> Brown Creeper | C | <input type="checkbox"/> Fox Sparrow | C |
| <input type="checkbox"/> Bewick's Wren | C | <input type="checkbox"/> Song Sparrow | C |
| <input type="checkbox"/> Pacific (Winter) Wren | C | <input type="checkbox"/> White-crowned Sparrow | C |
| <input type="checkbox"/> Golden-crowned Kinglet | C | <input type="checkbox"/> Dark-eyed Junco | C |
| <input type="checkbox"/> Ruby-crowned Kinglet | C | <input type="checkbox"/> Black-headed Grosbeak | S |
| <input type="checkbox"/> Swainson's Thrush | S | <input type="checkbox"/> Red-winged Blackbird | C |
| <input type="checkbox"/> Hermit Thrush | C | <input type="checkbox"/> Brown-headed Cowbird | S |
| <input type="checkbox"/> American Robin | C | <input type="checkbox"/> Purple Finch | C |
| <input type="checkbox"/> Varied Thrush | C | <input type="checkbox"/> House Finch | C |
| <input type="checkbox"/> European Starling | C | <input type="checkbox"/> Red Crossbill | S |
| <input type="checkbox"/> Cedar Waxwing | S | <input type="checkbox"/> Pine Siskin | S |
| <input type="checkbox"/> Orange-crowned Warbler | S | <input type="checkbox"/> American Goldfinch | S |
| <input type="checkbox"/> Yellow-rumped Warbler | S | | |



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