

# Mossom Creek 2023 Bioblitz Report

Mossom Creek Hatchery & Education Centre



Prepared for:

**Burrard Inlet Marine  
Enhancement Society**

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***Date: November 10, 2023***

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## Mossom Creek 2023 Bioblitz Report November 2023

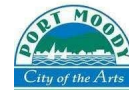
### Prepared for:

The Burrard Inlet Marine Enhancement Society (BIMES) / Mossom Creek Hatchery & Education Centre. Formed as a society in 1991, BIMES was preceded by volunteer stewardship activities on Mossom Creek dating back to 1976. The society manages the Mossom Creek Hatchery & Education Centre located in Port Moody, B.C. which releases hundreds of thousands of salmon each year into the local ecosystem. Their initiatives focus on salmon enhancement activities, environmental stewardship, and marine education within the Port Moody Arm of the Burrard Inlet. For more information see the Mossom Creek Hatchery website at <http://www.mossomcreek.org/>

### Prepared by:

Robyn Ingram, Environmental Scientist, Alex Legere, Environmental Scientist, and Kamil Szlachta, Environmental Manager at Bailey Environmental Consulting (Bailey). Founded in 2010, Bailey has been a leader in front-end assessment and permitting services as well as construction monitoring and management for a range of projects across the Pacific Northwest providing valuable knowledge and expertise in the promotion of sound environmental stewardship.

Funding for this project has been graciously provided by:



## Acknowledgements

On behalf of the Burrard Inlet Marine Enhancement Society (BIMES) I want to extend my sincere gratitude to our sponsors and supporters, with a special acknowledgment to the Telus Foundation. Their support has been integral to the success of this initiative, and we are deeply appreciative of their commitment to environmental stewardship. In addition, we are grateful for the continued support of Vancity and the City of Port Moody for this ongoing project.

Projects like these are important to help us understand the health of our watershed. Pressure from development can have a negative impact on our natural systems and environment. This foundational information will add to the previous research we have collected about the area and provide important information for municipalities, regulatory bodies, and stewardship groups to make informed decisions about how best to protect these natural assets.

I would also like to thank Bailey Environmental for their work on this event, as well as our many volunteers who were so eager to assist in any way possible to make this event a great success. We could not have done this without your help.

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Finally, I would like to recognize and thank everyone who provided their time, expertise, and commitment to the environment, making the 2023 Mossom Bioblitz a resounding success. The project wouldn't have been possible without the help of the following participants: BIMES and their wonderful volunteers, Beaty Museum specialists and staff, all participating undergrad students from BCIT, SFU, and UBC, Matthew Mitchell, Aaron Aguirre, John Reynolds, Olivia Lee, Steve Joya, Karen Needham, Christopher Stinson, Wendy Frankel, Daniel Lee, Sung Wook Jo, Bruce Clark, Terry McIntosh, Pamela Zevit, Rod MacVicar, Isabelle Cote, Erik Kukulowicz, Sunny Tseng, Zach Sherker, Diane Watson, Serena Moore, Colin Bailey, and Michelle Bailey.

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## Executive Summary

Ecosystems throughout Metro Vancouver provide essential services for all life. Green spaces provide opportunities to enhance human physical and mental health, increase community resilience, and safeguard biodiversity. Adaptive management of these areas is crucial in assessing the efficacy of environmental policy and if conservation goals are being met. However, assessing these areas can prove challenging as a large dataset must be collected often within a limited budget and under time constraints.

Bioblitzes have become an increasingly valuable tool to meet this challenge. A Bioblitz is a period of intense survey in which experts, naturalists, and citizen scientists come together to collect as much data as possible on the flora and fauna of an area in a short amount of time. Part recreation and education, the Bioblitz is an effective and fun means of cataloguing the biodiversity within a particular watershed with the added benefits of fostering collaboration and raising awareness about local biodiversity.

The 2023 Mossom Creek Bioblitz is the second such biodiversity inventory of the Mossom Creek watershed, serving as a follow up to the 2017 Mossom Creek Bioblitz, providing an update on inventory data. A total of 63 participants came together to record over 1,585 observations, cataloging 420 different species of flora and fauna, including three provincially blue listed species of special concern. The results of the Bioblitz will inform local strategic decision-making regarding green spaces by the City of Port Moody and the Village of Anmore, as well as support the work of BIMES and their conservation efforts in the region.

## Introduction

The Burrard Inlet Marine Enhancement Society (BIMES) is a charitable organization championing environmental education and stewardship activities in the Burrard Inlet area. The organization manages the Mossom Creek Hatchery & Education Centre located in Port Moody, B.C. which releases over one hundred thousand salmon each year into the local ecosystem. Their initiatives focus on salmon enhancement activities, environmental stewardship, and marine education within the Port Moody Arm of the Burrard Inlet.

These events have become an increasingly popular means to collect a large dataset of the flora and fauna of an area in a short amount of time, providing valuable snapshots of biodiversity. The 2023 Mossom Creek Bioblitz is the second such biodiversity inventory of the watershed, following the first Bioblitz in 2017. A blend of education and recreation the Bioblitz brought industry experts, emerging biologists, and citizen scientists together for a comprehensive survey

**MOSSOM CREEK BIOBLITZ**  
**PORT MOODY, B.C.**

Join us in celebrating local biodiversity through a 24-hour "marathon" where the volunteers, scientists and local stewards come together to identify and record local plants and wildlife in our watershed.

**Help experts find new and exciting creatures!**

**VOLUNTEER OPPORTUNITIES**  
Do you have an interest in nature and ecology?

**Friday, June 2nd, 2023**  
Bat Walk 7:00 pm - 10:00 pm

**Saturday, June 3rd, 2023**  
Birding 7:00 - 10:00 am  
Forest Seine 10:00 am - 1:30 pm  
Beach Seine 12:30 pm - 3:00 pm

**Registration is required.**  
Visit [mossomcreek.org](http://mossomcreek.org) for details.

**WHAT'S A BIOBLITZ?**

**find it:** Spot local species like bugs, plants and birds.

**identify:** Learn from experts about species identification.

**log it:** Upload your photos to [iNaturalist.org](http://iNaturalist.org) and contribute to the Bioblitz.

TO LEARN ABOUT VOLUNTEER OPPORTUNITIES VISIT [MOSSOMCREEK.ORG](http://MOSSOMCREEK.ORG)  
FIND US ON SOCIAL: [@MOSSOMCREEK](https://twitter.com/MOSSOMCREEK)

THANK YOU TO OUR SPONSORS AND SUPPORTERS:

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of species found around Mossom Creek. Over a 24-hour period from the night of June 2 to the evening of June 3, 2023, field teams surveyed all manner of taxa with the objective of updating an ongoing inventory of flora and fauna within the lower Mossom Creek Watershed in Port Moody, B.C.

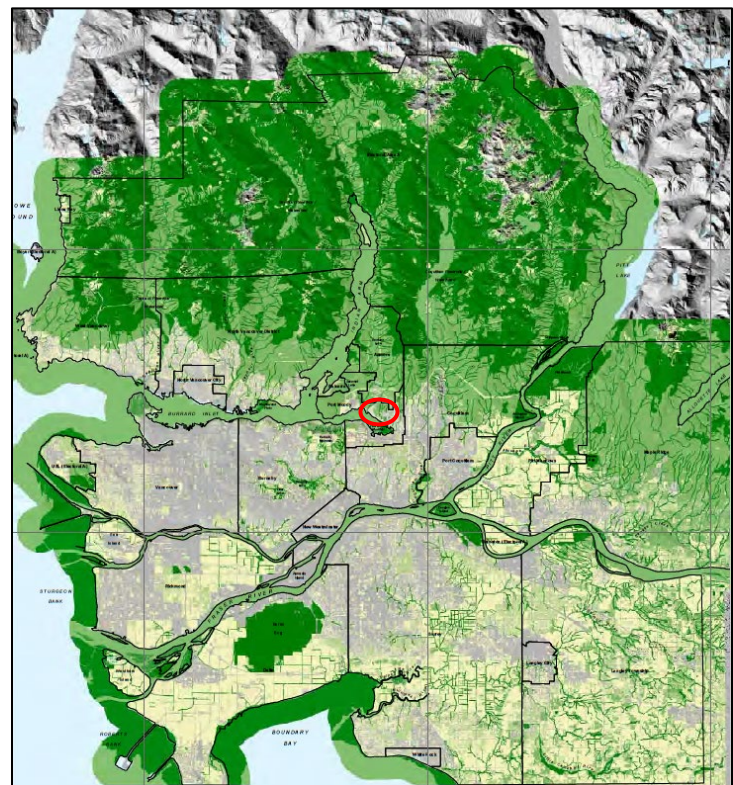
The 2023 blitz was an opportunity to examine trends and document changes of biodiversity within the Mossom Creek Watershed within the last five years. These records will aid in the long-term conservation and monitoring of one of Port Moody's last remaining salmon bearing streams, and the greater local ecosystem. Although considerable effort was made to maintain the consistency of participating experts, a few participants from the 2017 BioBlitz were unable to attend in 2023, and thus may have influenced the taxa surveyed in 2023.

**Why Conduct a Bioblitz?**

Biodiversity is key in creating resilient ecosystems because it helps the ecosystem recover from disturbances like floods, droughts, or fires. Resilient ecosystems are those that contain a diverse range of species that help each other. If there are multiple species to fill a niche in an ecosystem, that ecosystem is less likely to collapse when one species is suffering because the other species can act as a buffer or a series of backups.

Continued development across our region contributes to loss of biodiversity and as a result the balance of the natural order suffers. Within the rural landscape, ecosystems face numerous threats, including habitat loss, habitat fragmentation and degradation, and invasion from non-native species (Zevit 2017). These threats combined with ongoing natural disturbances are making it very difficult for ecosystems to recover and adapt.

Relative Biodiversity Summary			
Map Legend Colour	Biodiversity Index	Area (ha)	% of Total Study Area
Very High	To	50,859	13.8%
		60,175	16.3%
Moderate		107,475	29.1%
		16,243	4.4%
		67,390	18.2%
			81.8%



**Figure 1: Relative Biodiversity in the Greater Vancouver Region.** Mossom Creek Watershed outlined in red. Axys Consultants, Biodiversity Conservation Strategy for Metro Vancouver (2006).

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Bioblitzes help us understand how resilient our ecosystems are while allowing us to determine trends in species presence so that we can prioritize protecting and conserving environments that need our help.

### **Bioblitz 2023 Goals**

1. Collect species data for future species richness calculations in the Lower Mossom Creek Watershed in Port Moody, B.C.
2. Evaluate the results from the 2017 and 2023 Bioblitz events to understand the changing conditions of the Watershed.
3. Make recommendations for developers to follow when planning for upcoming residential building development in Anmore South.

### **Bioblitz 2023 Objectives**

- Identify the taxons present in the Lower Mossom Creek Watershed.
- Add to the existing species inventory of Mossom Creek Watershed.
- Compare results to Provincial Species at Risk Inventory to determine if listed species are present in the Watershed.
- Assess trends in the data to determine which species require habitat enhancement efforts.

### **Metro Vancouver Region**

Mossom Creek is located within the Metro Vancouver Regional District towards the east end of Burrard Inlet in Port Moody, B.C. Metro Vancouver contains a wide variety of habitat types that support a growing number of species of conservation concern including the Fraser River Estuary which is home to more than 102 provincially listed species at risk (Fraser Estuary, n.d.). Estuarine habitats are known to be the most productive environments in the world for not only wildlife but people as well. Connecting the rivers to the ocean, estuaries maintain a land base that supports agriculture, shipping routes, fresh water, and flat land for development.

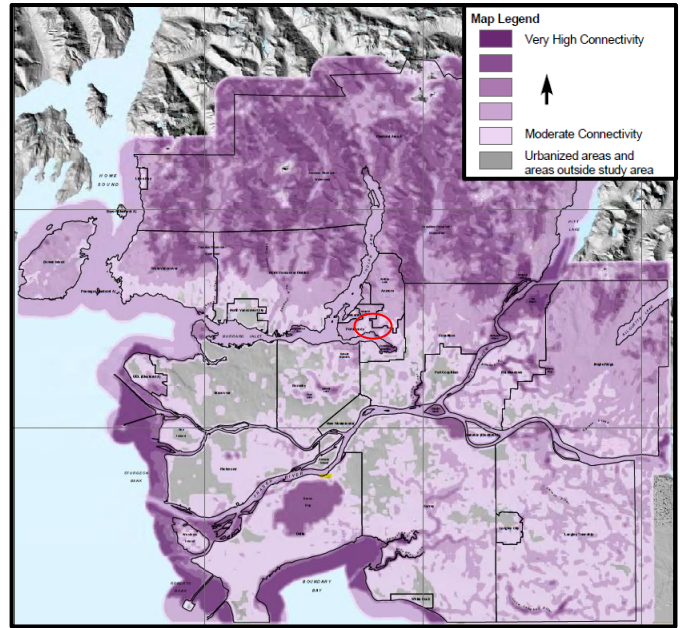
As such, the Metro Vancouver Regional District has been a hot spot for development, resulting in habitat fragmentation and destruction throughout the region. Many studies have been conducted to determine the extent of remaining natural areas and the connectivity between



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them, a characteristic that is vital to the survival of wildlife populations. Using newly developed technology, spatial analysis studies have provided us with a better understanding of areas within the Lower Mainland that may contain high and low levels of biodiversity while also mapping areas of high and low habitat connectivity (Figure 2) (Axys Consultants 2006). When this information is confirmed by on-the-ground studies, we can pinpoint areas of conservation concern and move forward with management strategies to protect these vital environments.



**Figure 2: Habitat Connectivity in the Greater Vancouver Region.** Mossom Creek Watershed outlined in red. Axys Consultants, *Biodiversity Conservation Strategy for Metro Vancouver (2006)*.

## The Mossom Creek Watershed – Past and Present

Prior to European contact, the Coast Salish First Nations communities lived along the area of what is today collectively known as Port Moody (CPM, 2023). The ideal climate and ample resources of the area allowed numerous First Nations groups to live in the area, including the Sanetch, Cowichan, Nanaimo, Homalco, Sechelt, Squamish, Muskwiam, and the Tsawwassen. Archaeological studies by Simon Fraser University and the Tseil Waututh have identified significant traditional use of the inlet for shellfish and red elderberry harvesting going back thousands of years (Zevit, 2017).

Post colonization, the Port Moody Arm, like much of Burrard Inlet, has a long history of shoreline industry. The area has been dominated by extractive industries such as forestry and oil refining. There was extensive logging of the area within the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. The first recorded lumber mill opened on the north shore of Burrard Inlet in 1883. Timber harvesting continued until the mid-90s when 12% of the watershed above East Road was logged (BIMES, 2015).

Burrard Inlet has undergone notable industrial growth since timber harvesting ceased in the mid-90s. Current industries operating in the area include a chemical treatment plant, hydroelectric thermal plant, oil refinery, sulfur and potash shipping facilities, and sawmills (Cormier, 2023). The Mouth of Port Moody Arm has also experienced increased industrial activity, with a major expansion of the Westridge Terminal set to significantly boost ship traffic in the region. This industrialization has coincided with rising urbanization and densification, evident in the numerous oceanfront residential developments planned in Port Moody. Developments such as the proposed Flavelle Oceanfront Development are expected to introduce 3,400 units of residential housing to the south bank of Burrard Inlet.

## Watershed Features

Mossom Creek is contained within a steep ravine and flows for approximately 12.8 km (Zevit, 2017), with its headwaters beginning at an elevation of 820 m on Eagle Mountain, flowing southwest until it enters the Burrard Inlet at Dockrill Point. An area of approximately 3.4 km<sup>2</sup> drains into Mossom Creek. Soils within the basin are mostly classified as moderately well drained and with the majority of the landscape surface being comprised of glacial till, colluvium over bedrock, and glaciomarine deposits (Shepherd, 2000). Port Moody Arm is the easternmost section of the Burrard Inlet, into which Mossom Creek drains. The marine environment is characterized by 10 m deep shallow waters, low circulation, and minimal freshwater input (BIEAP, 2011; Kerr Wood Leidal, 2017).

The Mossom Creek watershed is within the coastal western hemlock dry maritime biogeoclimatic zone (CWHdm) which has mild temperatures and heavy rainfall during the winter, and relatively cool, dry summers (Pojar, 1991). The Port Moody Arm in general has important ecological value due to the low levels of altered shoreline, intact riparian areas, and high-value tidal flats in the eastern end (Kerr Wood Leidal, 2017). Several habitat types exist within the lower portion of the watershed including the old field habitat of Ioco townsite, mature forest, old meadows within the old gun range, riparian habitats of three major streams (Mossom Creek, Schoolhouse Creek, Village Creek) and two small estuaries (Figure 3).



**Figure 3:** Habitat types and creeks in relation to the Lower Mossom Creek Watershed, outlined in white.

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The Mossom Creek watershed represents one of these few remaining intact natural patches in the area. In fact, the entire Mossom watershed has been designated as highly environmentally sensitive by the City of Port Moody (CPM, 2014). Environmentally sensitive areas in Port Moody include critical habitat for fish, birds, amphibians, wildlife, and plant species (Figure 4).

This watershed is significant, containing one of two major salmon bearing streams in the Port Moody Arm. Once extirpated in the region, spawning chum salmon now utilize the lower watershed with its minimal gradient and complex habitat features. Adult coho salmon journey further inland to steeper reaches to spawn (BIMES, 2015). Each year the Mossom Creek hatchery releases 100,000 chum fry into the area and between 5,000 and 10,000 coho smolts. In 2016, the hatchery began releasing pink salmon into the creek.

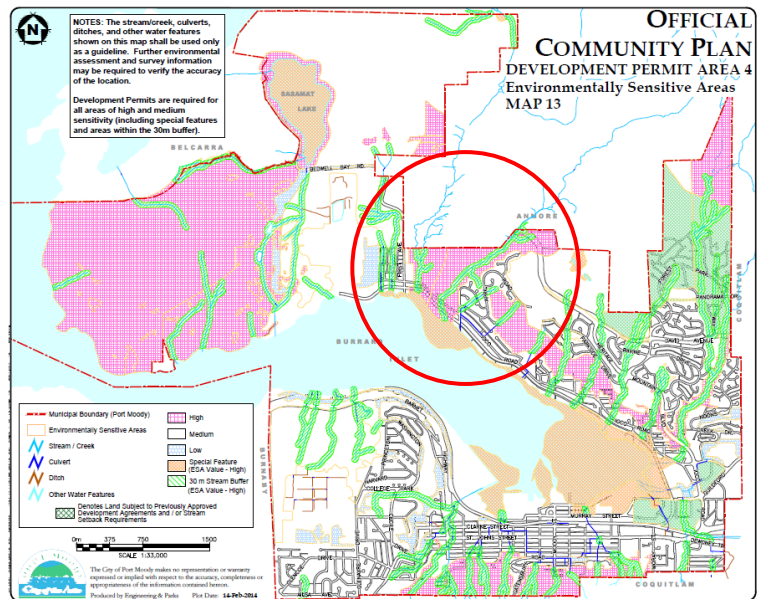


Figure 4: Environmentally sensitive areas in the City of Port Moody, B.C. (OCP, 2014). Lower Mossom Creek outlined with red circle.

## The 2023 Mossom Bioblitz

The 2023 Mossom Creek Bioblitz spanned the course of two days, beginning the evening of Friday June 2<sup>nd</sup> and ending in the later afternoon on Saturday June 3<sup>rd</sup>. The event was hosted by the members and volunteers of Mossom Creek Hatchery with support from the team at Bailey. Invitations were sent out to local universities and colleges that offered Environmental Sciences programs including the University of British Columbia (UBC), Simon Fraser University (SFU), and British Columbia Institute of Technology (BCIT) with the goal of engaging undergrad students in a hands-on learning experience led by a variety of biology experts. The event was packed full of numerous surveys each focusing on a different form of biota. Presentations were given by two PhD students and a member of the Invasive Species Council of B.C. who shared the details of their studies and ongoing research. This year, several fisheries biologists, entomologists, bryologists, and marine and terrestrial ecologists guided groups of volunteers and undergrads in locating and identifying a wide variety of species throughout the watershed.

As the Bioblitz is an educational event intended to be accessible to participants of all ages and skills, the majority of surveys were conducted in easy to access areas, in clearings or along roads. Participants were organized into groups based on the taxon they were interested in and walked through different habitat types selected by their guiding expert. Some experts chose to conduct independent surveys, allowing for a slightly more diverse sample area. Most participants

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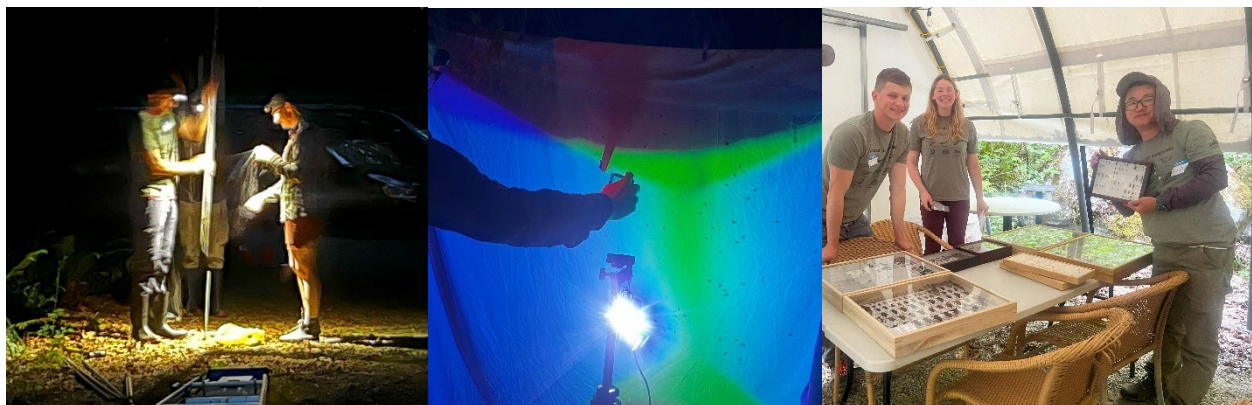
collected data on their phones, using the app *iNaturalist* to log photos and the location (latitude, longitude) of their observations, while others collected data in notebooks which were later digitized for analysis.

The Bioblitz kicked off with a bat survey led by a collection of bat experts and their student assistants on Friday June 2<sup>nd</sup>. The survey was timed around sunset (21:11 on June 2<sup>nd</sup>, 2023), as bats are most active around dawn and dusk. Three mist nets were deployed between 21:30 and 00:30. One net was set up approximately 50 m south of the hatchery, and two approximately 50 m north of the hatchery. Once bats were observed in the net, they were retrieved by hand and placed in a bat bag until relaxed. One at a time, each bat was carefully removed from the bat bag, identified, sexed, and measured. Each wing length, total body length, foot length, and ear length were recorded. Swab samples were taken for lab analysis to later test for white nose syndrome. The loco townsite was not surveyed for bats.



*Figure 5: Mist net set up (left), Bat capture (middle), Long-eared myotis (right).*

While the bat survey was running, entomologist Sung Wook Jo set up a hanging sheet to capture nighttime flying insects. A blacklight or UV light was used to attract insects to a hanging sheet where they were captured and placed into jars filled with rubbing alcohol. These individuals were later identified and added to Sung's personal insect collection.



*Figure 6: Evening Insect Capture on June 2, 2023. Setting up hanging sheet (left), using a blacklight to attract insects (middle), Sung's insect collection (right).*

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The schedule on Saturday began with a large group of enthusiastic birders led by two experts. The group walked the length of Mossom Creek Drive, along loco Road to 1<sup>st</sup> Avenue, and throughout loco field. Participants silently conducted songbird surveys using meander transects, looking and listening for signs of bird activity. Every five to ten minutes, the group would stop and wait for one minute in silence to allow for bird activity to resume before beginning to record species presence. The experts helped participants identify species by song, supported by the Merlin app on their phones.



Figure 7: Terry McIntosh, bryologist

Following the bird survey, participants were separated into four groups based on the taxon they were surveying for. As plants were a very popular choice, two groups set off to survey for plants. One group was led by a bryologist and focused more on bryophytes like mosses and liverworts, while the other conducted a general plant survey in the forest surrounding the hatchery. The third group focused on identifying gastropods. Participants were led to zones containing habitat characteristics representational of moist areas, such as those containing plant species like bigleaf maple (*Acer macrophyllum*), sword fern (*Polystichum munitum*), and salmonberry (*Rubus spectabilis*). The expert established several transects covering a small sample area for each participant to survey. Walking carefully, or crawling on the ground, group members traversed their transects, turning over leaves and looking

under moist logs in search of gastropods. Species were identified and recorded on the iNaturalist app.

The fourth group was focused on surveying for insects. Pitfall traps were installed in the forest near Mossom Creek Drive 24-hours prior to retrieval. Sites near the base of trees or next to decomposing logs were selected for trap placement. Holes were dug and plastic cups were placed inside so that they were flush with the ground. Small sponges soaked with a mixture of red wine and rubbing alcohol were placed inside the cups to attract and kill any insects that fell into the traps overnight. The group retrieved 30 cups and brought them back to the hatchery where they picked the insects out of the debris and placed them into a container. Any live insects were placed into a vial with rubbing alcohol and transferred to the container once dead.



Figure 8: Insect retrieval from pitfall traps.

With the morning surveys complete, it was time for the most popular event of the day, the beach seine. To help manage the number of people at the beach, participants were separated

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into two groups. While one group ate lunch at the hatchery, the other walked down to the waterfront where experts had lined up buckets, nets, and fish viewers. Participants with waders helped experts use the seine net to gather various species for identification in buckets. Other species were retrieved from the mud and collected by aquarium net for identification. Intertidal molluscs were captured by digging, sifting through sediment, or identifying shell remains. All captured species were identified, photographed, and logged prior to release back into the water.



*Figure 9: Beach Seine on the afternoon of June 3rd, 2023, in Mossom Creek Estuary.*

The final taxon for survey was freshwater fish. Minnow traps were set up during the morning surveys, filled with fish roe for bait and floating pieces of wood to act as a support for any water shrews that may get caught inside. Traps were placed in Mossom Creek along a reach of approximately 500 m, in deep pools. The traps sat for 7-8 hours before collection. Species were retrieved from the traps and placed into buckets with bubblers. Participants used fish viewers to identify the fish species and returned captured individuals to the creek once logged.

After everyone returned from their surveys, participants gathered in the hatchery for presentations. PhD student Zach Sherker started things off with his presentation on "Fish and Floods: Managing Floodgates to Improve Salmon Access to Critical Floodplain Habitat." Zach shared the details of his ongoing research project that assessed the various approaches for juvenile salmon passage through the floodgates of the Coquitlam River. His presentation sparked an in-depth discussion with hatchery members



*Figure 10: Zach Sherker's presentation on Managing floodgates and improving salmon passage.*

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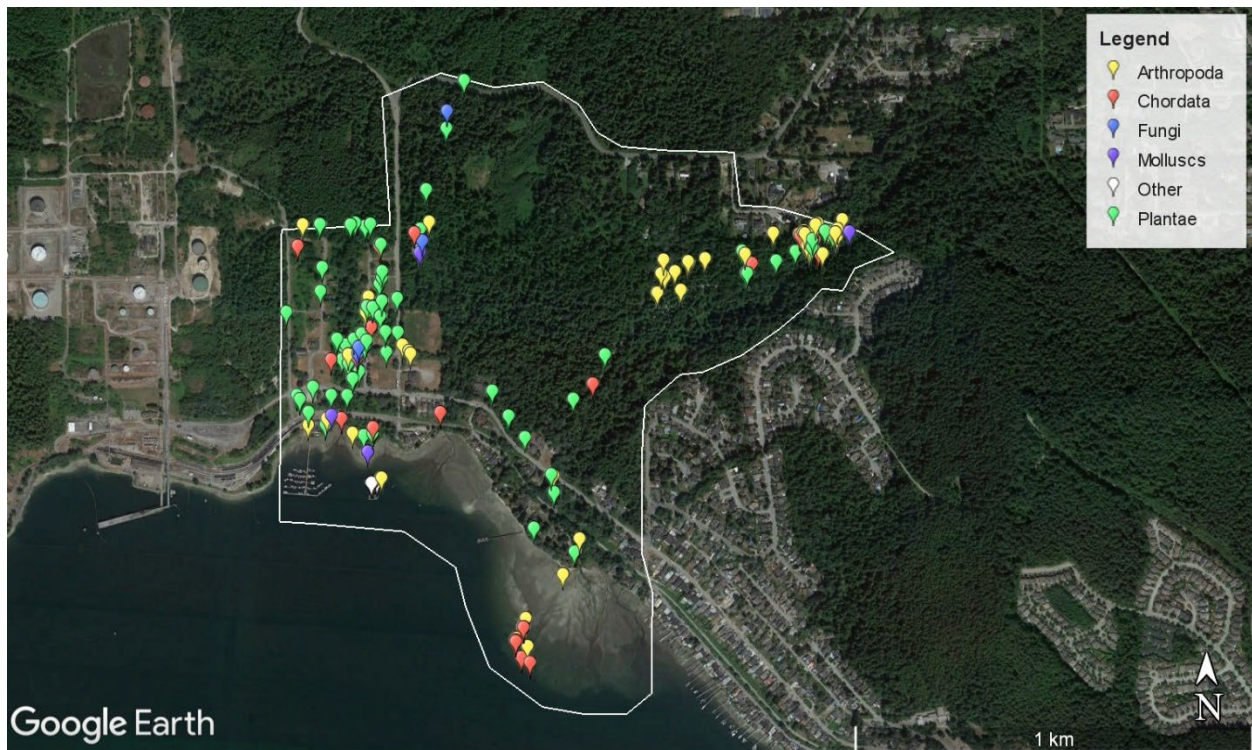
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about his creative method for tracking tagged juvenile salmon. Following Zach, Diane Watson from the Invasive Species Council of BC presented on common invasive species found within the lower mainland and their effects on local ecosystems. The presentation included informative photographs and techniques used to identify and capture various invasive species in B.C. Lastly, Sunny Tseng, a PhD candidate of UNBC, shared her presentation on "Passive Acoustics as a Tool to Monitor Individual Barred Owls". Sunny's work suggests that individual barred owls can be identified based on the owls' different tones, which can be tracked through certain software. It was a great learning experience!

The event wrapped up with a BBQ dinner and a review of the results of the 2017 Mossom Creek Bioblitz. Pamela Zevitt, who helped organize and lead the 2017 BioBlitz, reminded everyone how important the results of the day's surveys were and shared how the data would be used in combination with the results from 2017.

## Results

The 2023 Mossom Creek Bioblitz was a valuable opportunity to add to the ongoing inventory of flora and fauna within the lower Mossom Creek Watershed. A total of 1,581 observations were recorded of an identified 413 different species, highlighting the area's diversity (Figure 11).

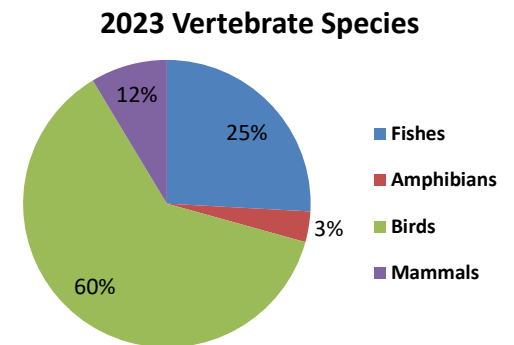
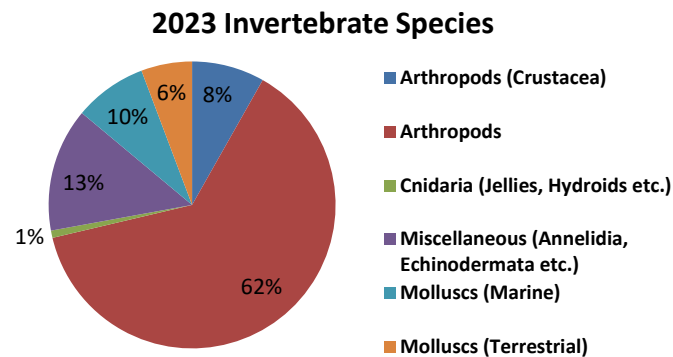
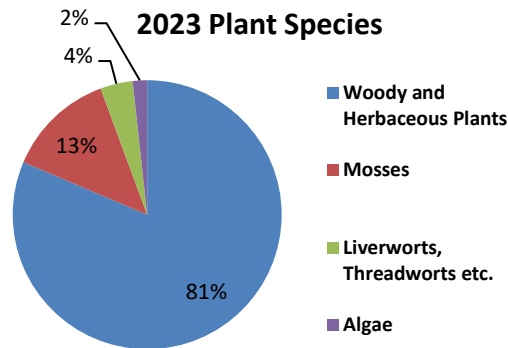


**Figure 11:** Location of confirmed observations tracked on iNaturalist throughout the 2023 Bioblitz. Multiple species observations are not shown on this map. Species are categorized by their orders.

Observations include three provincially blue listed species of special concern, the double crested cormorant (*Phalacrocorax auratus*), northern red-legged frog (*Rana aurora*), and yuma myotis bat (*Myotis yumanensis*). Plants were the largest group of observed organisms with 233 species recorded (vascular = 189, non-vascular = 44), followed by invertebrates with 125 observations, the majority of which belong to arthropods, with 88 species recorded. Lastly, birds made up the majority of the vertebrate observations and included 37 species. The total number of species is likely to increase with time as more species identified are confirmed via iNaturalist.

**Table 1: Taxonomic classifications recorded from the Mossom Creek 2023 Bioblitz**

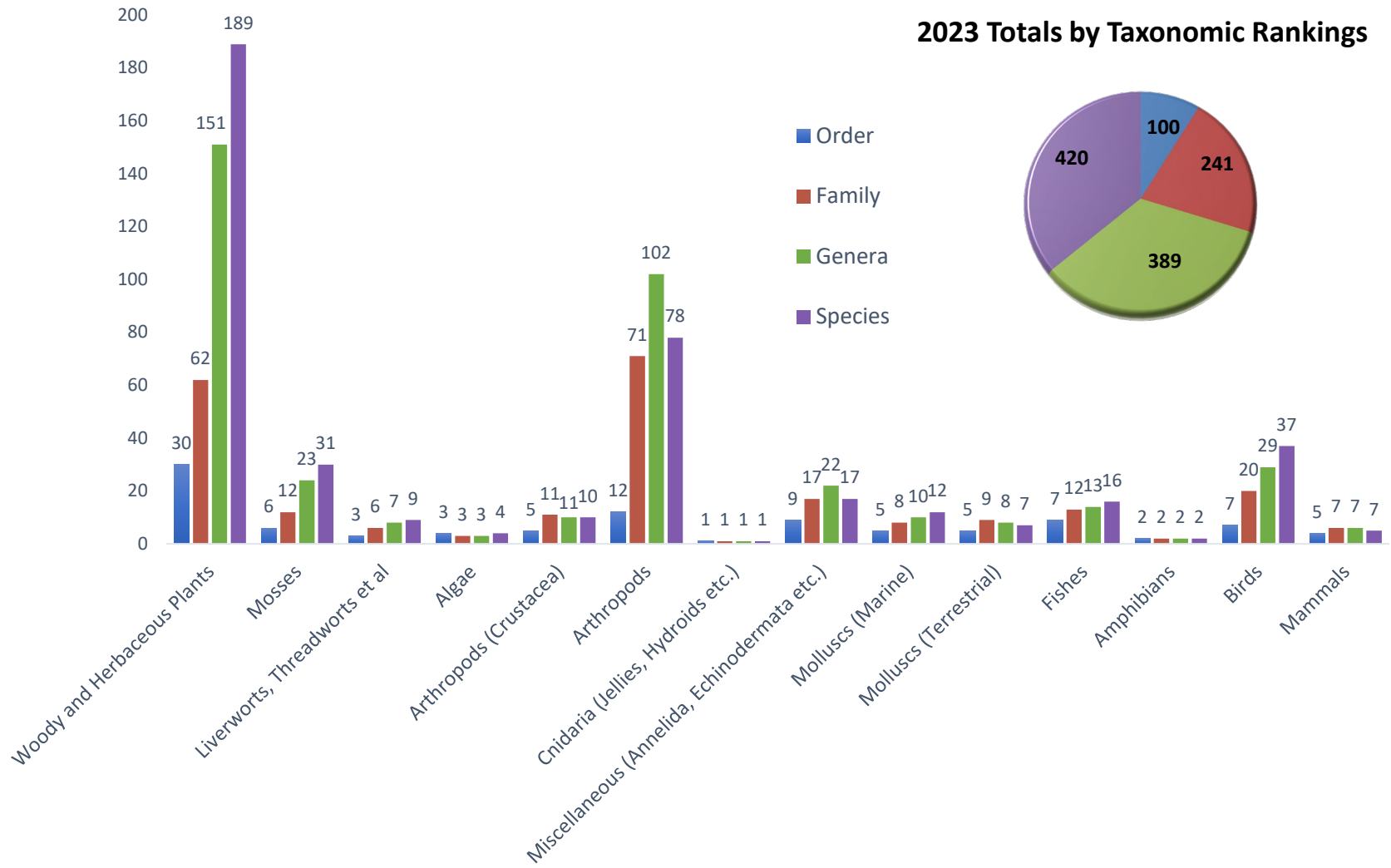
Taxonomic Groupings	Order	Family	Genera	Species
Woody and Herbaceous Plants	30	62	151	189
Mosses	6	12	23	31
Liverworts, Threadworts etc.	3	6	7	9
Algae	3	3	3	4
Arthropods (Crustacea)	5	11	11	10
Arthropods	12	71	102	78
Cnidaria (Jellies, Hydroids etc.)	1	1	1	1
Miscellaneous (Annelida, Echinodermata etc.)	9	17	22	17
Molluscs (Marine)	5	8	10	12
Molluscs (Terrestrial)	5	9	8	7
Fishes	7	12	13	16
Amphibians	2	2	2	2
Birds	7	20	29	37
Mammals	5	7	7	7
<b>Totals<sup>1</sup></b>	<b>100</b>	<b>241</b>	<b>389</b>	<b>420</b>



<sup>1</sup> If viewing the event page on iNaturalist, these numbers may slowly continue to increase as observations are identified by other users. Many observations in the data set could only be confirmed to a certain taxon level as further identification requires lab analysis.



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## Bioblitz 2017 and 2023 Comparison

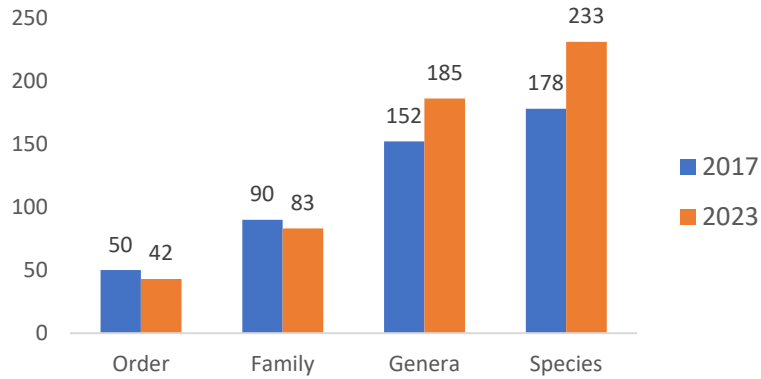
*Table 2: Comparison of 2017 to 2023 Bioblitz results*

Taxonomic Groupings	Order 2023	Order 2017	Family 2023	Family 2017	Genus 2023	Genus 2017	Species 2023	Species 2017
Algae	3	3	3	4	3	5	4	5
Amphibians	2	1	2	1	2	1	2	1
Arthropods	12	12	71	52	102	71	78	80
Arthropods (Crustacea)	5	3	11	8	11	8	10	9
Birds	7	12	20	29	29	39	37	47
Cnidaria (Jellies, Hydroids etc.)	1	6	1	7	1	7	1	7
Fishes	7	5	12	7	13	9	16	11
Liverworts, Threadworts etc.	3	4	6	15	7	19	9	23
Mammals	5	4	7	6	7	9	7	13
Miscellaneous (Fungi, Echinodermata, etc.)	9	10	17	8	22	10	17	11
Molluscs (Bivalves)	5	9	8	9	10	9	12	13
Molluscs (Gastropods)	5	1	9	5	8	6	7	7
Mosses	6	13	12	19	23	39	31	51
Woody and Herbaceous Plants	30	30	62	52	151	89	189	99
<b>Totals</b>	<b>100</b>	<b>113</b>	<b>241</b>	<b>222</b>	<b>389</b>	<b>321</b>	<b>420</b>	<b>377</b>
<i>Difference between 2023 and 2017</i>	<b>-13</b>		<b>19</b>		<b>68</b>		<b>43</b>	

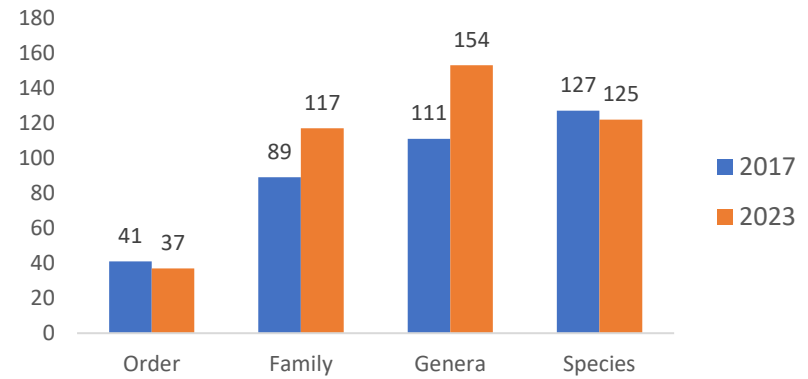
Results from the 2023 Bioblitz event yielded a greater number of family (+19), genus (+68), and species (+43), observations. There were fewer observations in the order category in general, on average there were fewer orders of birds, Cnidaria, liverworts and threadworts, bivalve molluscs, mosses and miscellaneous taxonomic groupings observed in 2023. Across all taxonomic classifications, fewer birds, cnidaria, mosses, liverworts and threadworts were observed in 2023. Amphibians, arthropods (Crustacea), fishes, woody and herbaceous plants, and molluscs (Gastropods) saw an increase in 2023 across all taxonomic groups. The number of woody and herbaceous plant species observations almost doubled in 2023.

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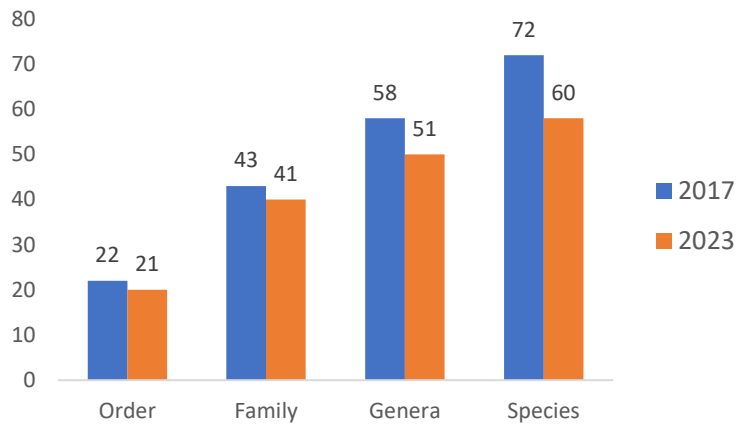
Comparison: Plants



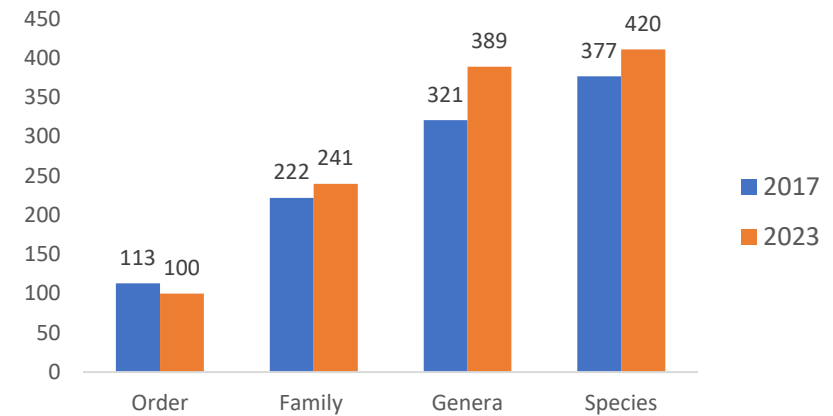
Comparison: Invertebrates



Comparison: Vertebrates

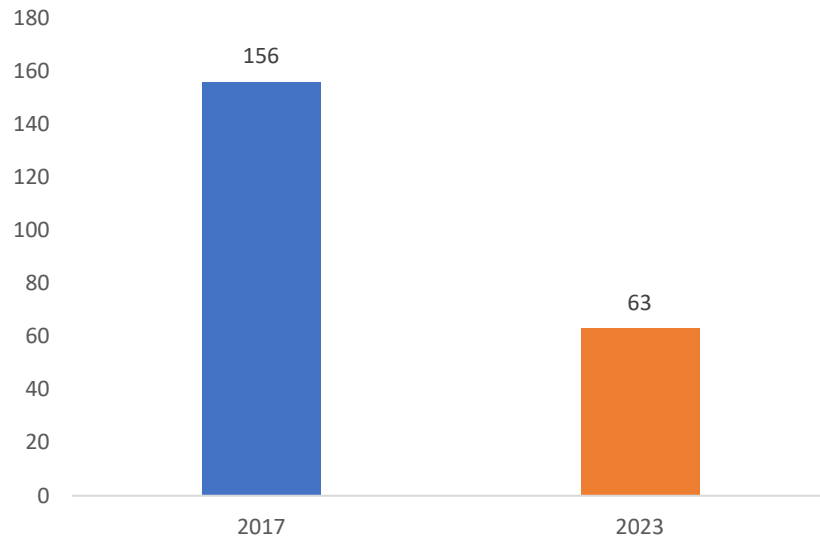


Comparison: All Species

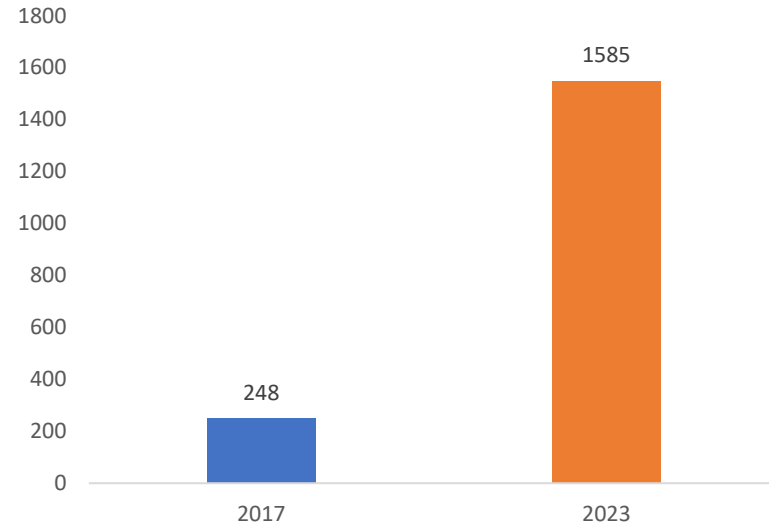


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Comparison: Number of Participants



Comparison: Number of Observations



## Discussion

With any Bioblitz event, results may vary depending on many contributing factors. Certain species may be more active or noticeable during different seasons of the year, and abiotic factors like temperature, elevation, or water availability will vary depending on the location or timing of the survey. As this is a citizen science event involving the iNaturalist app, the number of observations and successfully identified species depends on the quality of photos taken and the details the participants provide. The quality of iNaturalists submissions can fluctuate each year depending on the experience of the observer, which can affect how many species are correctly identified (Family, Genus, or Species level). As we learn from each Bioblitz event, we hope that we can account for each factor that may influence the results and improve the overall number of confirmed species over time.

One major difference between the 2017 and 2023 Bioblitz events was timing. In 2017, the event was held in mid-August, during a period of drought. The average temperature in Port Moody of August 2017 was 20.4°C, with a maximum temperature of 31°C and a minimum temperature of 12.0°C. Leading up to the event, precipitation was minimal. In 2017, the average rainfall over the three months leading up to the event was 37.4mm, which is considerably less than the standard 89.6mm, measured between 1999 and 2019 (Climate-data.org).

Drought conditions have a cascading impact on ecosystems and the species present throughout. Within freshwater ecosystems, reduced rainfall results in changes in streamflow, stream connectivity, water quality, including increased temperatures and decreased dissolved oxygen content, and habitat availability (U.S Geological Survey). These changes may influence species interactions, abundance, and presence of native and introduced species. Although it may take years for these effects to make a significant change in species presence, over a shorter time scale, increased temperatures and less water availability may mean plants die off sooner, birds are less active, as there are fewer insects available for food, and amphibians and gastropods are harder to find because suitable moist habitat is reduced/unavailable. As such, conducting a survey in August, during a drought, may have impacted surveyors' ability to locate certain species.

The most recent Bioblitz event was held in the beginning of June 2023 in hopes that the climate in June would allow for better survey conditions. Although the survey did occur earlier than August (Bioblitz 2017), the spring months leading up to the event were much drier than usual. In Port Moody, spring precipitation in 2023 averaged 18.3mm, which is very low considering the average rainfall for April to June in Port Moody is 208mm. The average temperature in June 2023 was 15.6°C, with a maximum temperature of 30.5°C, and a minimum temperature of 7.0°C.

As we continue to see the affects of climate change, and the region experiences earlier, longer summers, and less precipitation, attempting to time future Bioblitzes to avoid times of drought may become increasingly difficult. Within just five years, we have observed climate change impacts on a local level. Despite being held three months earlier after what should have been a

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season of heavy rainfall, the environmental conditions during the 2023 Bioblitz were quite similar to those of August 2017. In June 2023 we saw a maximum temperature difference of only -0.5°C and 19.1mm less average precipitation leading up to the event.

The second difference between the two events was the number of participants involved. This year, we had 63 participants, including volunteers, students, and experts. Of those 63 people, 22 submitted their observations to iNaturalist, resulting in a grand total of 1,585 observations. The event was organized differently in 2017, resulting in a different group of participants. The event was open to the public and 102 people participated in three events (bat/owl walk, beach seine, and forest walk). Additionally, 41 scientists, researchers and citizen scientists combined with 13 event volunteers resulted in a grand total of 156 participants in 2017. iNaturalist was not utilized in 2017 as effectively as it was in 2023. Of these 156 people, only 8 recorded their observations online. This may be a contributing factor as to why there was a difference of 1335 observations between the two events. Although it may also be attributed to the ambitious John Reynolds who single handedly submitted a staggering 1,253 observations, which accounts for 79% of the total number of iNaturalist observations in 2023. In addition to John's enthusiasm, 330 observations were recorded by other participants, which represents an increase of 82 observations from the 2017 event.

It is the hope of BIMES that Bioblitz events can occur every five years to inventory and monitor the species present within the Lower Mossom Creek Watershed. With only two events so far it is difficult to compare the success of each event, because organizers, participants, budget, and resources change between years. As this is only the second Mossom Creek Bioblitz event, it is not possible to explain why the 2023 event may have yielded more woody and herbaceous plant species but fewer bird species, or why in 2017 more moss species were observed, but fewer fish species. As future events take place and survey methods are replicated, survey areas are expanded, and more people participate, we may eventually be able to develop a dataset that will allow for the determination of trends in species presence over time.

## **Recommendations**

BIMES has identified site conditions in the Lower Mossom Creek Watershed that are vital in maintaining the health and integrity of these ecosystems. Developers and stewardship groups are discussing the importance of protecting certain site conditions when planning and designing projects in the area. The results of the 2023 and 2017 Bioblitz events will not only provide evidence to support these protection plans but may also act as a benchmark dataset to monitor the success of the measures implemented. By identifying new species, introduced species, and species of conservation concern in the area, we can monitor how development in the Lower Mossom Creek Watershed may impact these ecosystems, and where conservation or enhancement priorities lie.

## **Recommendations for Developers working in Anmore South and Lower Mossom Creek Watershed**

Large-scale development within the Lower Mossom Creek Watershed has the potential to negatively impact the health of the watershed by impacting the water quality, removing trees, introducing non-native species, and disrupting sensitive wildlife habitat. Since 1999, Mossom Creek has provided target watershed indicator values such as aquatic diversity, stream channel complexity, riparian forest integrity, and percent of total impervious area used by the Metro Vancouver Regional District (GVSD) to monitor watershed health. Retaining the health and integrity of Mossom Creek has been the goal of BIMES and Mossom Creek Hatchery for years, and the stream has maintained its classification as the only Class A (Excellent) stream in the GVSD (Zevit, 2017). The following measures are recommended for developers when designing and planning upcoming projects within the watershed:

### **Pre-Development**

- **Install water quality monitoring equipment in Mossom Creek up and downstream of proposed development prior to the start of construction works.** Utilize real-time water quality monitoring instruments to gather pre- and post- construction water quality data. Developing a baseline dataset will allow for accurate monitoring of potential impacts to water quality resulting from development. If negative results are observed, real-time monitoring will make it possible to address the issue before it causes substantial negative impacts.

### **Design**

- **Retain native plantings and wildlife corridors.** The Mossom Creek Watershed has maintained its condition for so long because disturbance has been limited. As more development is planned, the forested landscape will be replaced with housing communities, fragmenting valuable wildlife corridors that allow for the movement of large mammals including mule deer, bobcat, and American black bear. When planning development, designers should look at the landscape in a broad scale and involve appropriate Qualified Environmental Professionals to identify and map important wildlife corridors that need to be maintained. Where this is not possible, tree cover should be maintained and native species planted to preserve the characteristics of the existing natural environment and provide food and habitat for native species.
- **Design natural stormwater management strategies like rain gardens, narrow roads, impervious paving materials and vegetated swales.** As development changes the hydrology of the landscape, aquatic systems are overloaded with excess rainwater, resulting in high flow events and stream bank erosion. Maintaining as much vegetation as possible in developments will allow for the rainwater to be absorbed into the ground, alleviating the pressure put on river systems during extreme rain events. Maintaining or

planting large trees will not only provide shade in the summer months, but also provide added protection from soil erosion as less rain falls on bare ground.

- **Employ dark sky principles when designing the lighting of structures and walkways.** Bright lights can disturb sensitive species like bats and birds as they travel at night. Artificial light can cause these species to get lost or confused as they use the night sky for navigation. Avoiding the use of unnecessary lights at night, using low level light sources, and lights of warmer colours are some of the methods that can be used to prevent light pollution and protect wildlife (Dark Sky International, n.d.).
- **Bird friendly glass should be used throughout the property.** Unobstructed glass reflects the image of the surrounding environment, resulting in nearly one billion bird deaths per year as birds accidentally collide into buildings and other structures (Guardian Glass, n.d.). Using alternative types of glass may allow for birds to see the glass or building and aid in avoiding death by collision. Many options are available that are barely noticeable to the human eye including fritted glass, etched glass, or UV-coated glass (Guardian Glass, n.d.).

### **Construction**

- **Limit disturbance to riparian habitat.** The Provincial Riparian Areas Protection Regulation protects the natural area within 30 m of the top of stream banks, but BIMES recommends extending that buffer so there is less potential for negative impacts to the aquatic environment.
- **Retain or create wildlife trees.** Cutting down large areas of forest will introduce the issue of danger trees on the forest edge, as trees are exposed to wind and roots are damaged during excavation. Partially decomposed trees, standing snags, and trees with broken crowns provide valuable habitat to a great number of species. Unfortunately, these trees are also hazardous as they can fall over at any time and injure people or damage property. Where possible, wildlife trees should be maintained, or new wildlife trees created to provide additional habitat for wildlife.

### **Enhancement and Education**

- **Recreational trails should avoid sensitive ecosystem areas like near stream banks or within wet depressions.** Fencing should be installed to keep trail users outside of natural areas so that erosion and disturbance are limited to maintained trails.
- **Dogs should be kept from entering the stream.** Streams contain invertebrates that live under the rocky substrates. Any disturbance within the stream will stir up sediment and harm sensitive invertebrates that provide valuable food for salmon and other aquatic life. Seeds from invasive plants may get caught on the people's clothing or fur of animals, creating the potential for invasion in these sensitive areas. Vegetation may also be trampled and destroyed which exposes bare soil, and results in erosion and added sediment to the stream.



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- **Signage should be posted in highly sensitive areas to teach the public about the species present and the need to protect natural areas within the Watershed.** By spreading knowledge, we hope to encourage more members of the public to become stewards of the land and protect these areas for generations to come.
- **Habitat enhancement through installation of bat and bird boxes in the surrounding natural area is recommended to balance the habitat loss that will result from development.**

Finally, to make future Bioblitz events more successful in collecting data representative of the lower Mossom Creek Watershed, the following methods are recommended for the 2028 and future Bioblitz events:

### Bioblitz 2028 Recommendations

- **Conduct surveys during different seasons.** As seasons change, different species may be more noticeable than others because of the lifecycle of different flora and fauna. Establishing different survey timing throughout the year might help observers capture a wider range of species. This would require substantial planning and may not be realistic to the scale of previous Bioblitzes, but even on a smaller scale, smaller groups may be able to gather data focused on one particular area or taxon when convenient for the organizers. Holding these smaller events may also allow undergraduate classes to attend and contribute to the ongoing dataset while learning about the area and the ongoing work at the hatchery.
- **Employing elements of both systematic and random survey methods would capture a wider range of species that may not be observable from the road or trails.** Systematic sampling (e.g. transects) is beneficial as this technique allows for extensive coverage of a sampling area, while random sampling (e.g. random predetermined survey points along a transect) reduces sampling bias. Combining these survey methods would allow for a less biased dataset that will more effectively capture the species present within the watershed. As random/systematic survey methods are challenging with different age groups and less mobile people, this might be a good method to employ when involving undergraduates who can also learn about experimental design and the benefits of systematic, random sampling.
- **Repeat survey and sample methodology year after year.** Using a consistent sampling method across years will allow BIMES to determine trends in species presence over time and control for repeated variables across years.
- **Where possible, repeat the same surveys year after year to capture taxon presence.** Every effort should be made to standardize both sampling and capture effort across years, which will allow for equivalent capture effort for all relevant taxon. In 2017, small mammal trapping, owl surveys, and bat detectors to ID bats were used; however, due to time constraints and scheduling difficulties with some experts, these surveys were not possible in the 2023 event. Allowing for more time to plan and schedule may help avoid

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this inconsistency in future events. Holding events at different times throughout the year may also help resolve this issue.

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## Appendix 1: Species observed during the 2023 Bioblitz

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**Table 3:** Vascular Plants - Woody and Herbaceous

Species Common Name	Scientific Name	Family	Order
Vine maple	<i>Acer circinatum</i>	Sapindaceae	Sapindales
Big leaf maple	<i>Acer macrophyllum</i>	Sapindaceae	Sapindales
Box-elder maple	<i>Acer negundo</i>	Sapindaceae	Sapindales
Norway maple	<i>Acer platanoides</i>	Sapindaceae	Sapindales
Sycamore maple	<i>Acer pseudoplatanus</i>	Sapindaceae	Sapindales
	<i>Acer</i> spp.	Rubiaceae	Gentianales
Common yarrow	<i>Achillea millefolium</i>	Asteraceae	Asterales
Ground elder	<i>Aegopodium podagraria</i>	Apiaceae	Apiales
Common horsechestnut	<i>Aesculus hippocastanum</i>	Sapindaceae	Sapindales
Red alder	<i>Alnus rubra</i>	Betulaceae	Fagales
Western pearly everlasting	<i>Anaphalis margaritacea</i>	Asteraceae	Asterales
Sweet vernal grass	<i>Anthoxanthum odoratum</i>	Poaceae	Poales
Bur chervil	<i>Anthriscus caucalis</i>	Apiaceae	Apiales
European crowfoot	<i>Aquilegia vulgaris</i>	Ranunculaceae	Ranunculales
	<i>Arctium</i> spp.	Asteraceae	Asterales
Pacific silverweed	<i>Argentina pacifica</i>	Rosaceae	Rosales
Goat's beard	<i>Aruncus dioicus</i>	Rosaceae	Rosales
Lady fern	<i>Athyrium filix-femina</i>	Athyriaceae	Polypodiales
Hastate orache	<i>Atriplex prostrata</i>	Amaranthaceae	Caryophyllales
English daisy	<i>Bellis perennis</i>	Asteraceae	Asterales
Dwarf Oregon grape	<i>Berberis nervosa</i>	Berberidaceae	Ranunculales
common beggarticks	<i>Bidens frondosa</i>	Asteraceae	Asterales
Soft brome	<i>Bromus hordeaceus</i>	Poaceae	Poales
Giant bindweed	<i>Calystegia silvatica</i>	Convolvulaceae	Solanales
	<i>Calystegia</i> spp.	Caryophyllaceae	Caryophyllales
Fairy bellflower	<i>Campanula persicifolia</i>	Campanulaceae	Asterales
Wood bittercress	<i>Cardamine flexuosa</i>	Brassicaceae	Brassicales
Little western bittercress	<i>Cardamine oligosperma</i>	Brassicaceae	Brassicales

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Species Common Name	Scientific Name	Family	Order
	<i>Cardamine</i> spp.	Betulaceae	Fagales
Slender-footed sedge	<i>Carex leptopoda</i>	Cyperaceae	Poales
Lyngbye's sedge	<i>Carex lyngbyei</i>	Cyperaceae	Poales
Mountain cornflower	<i>Centaurea montana</i>	Asteraceae	Asterales
Common chickweed	<i>Cerastium fontanum</i>	Caryophyllaceae	Caryophyllales
	<i>Cerastium</i> spp.	Cannabaceae	Rosales
Fireweed	<i>Chamaenerion angustifolium</i>	Onagraceae	Myrtales
Common lambsquarters	<i>Chenopodium album</i>	Amaranthaceae	Caryophyllales
Alpine enchanters nightshade	<i>Circaea alpina</i>	Onagraceae	Myrtales
Canada thistle	<i>Cirsium arvense</i>	Asteraceae	Asterales
Pink purslane	<i>Claytonia sibirica</i>	Montiaceae	Caryophyllales
Lily of the valley	<i>Convallaria majalis</i>	Asparagaceae	Asparagales
Pacific dogwood	<i>Cornus nuttallii</i>	Cornaceae	Cornales
Bunchberry	<i>Cornus unalaschensis</i>	Cornaceae	Cornales
European filbert	<i>Corylus avellana</i>	Betulaceae	Fagales
Beaked hazelnut	<i>Corylus cornuta</i>	Betulaceae	Fagales
	<i>Corylus</i> spp.	Asteraceae	Asterales
Rockspray cotoneaster	<i>Cotoneaster horizontalis</i>	Rosaceae	Rosales
Swedish cotoneaster	<i>Cotoneaster scandiavicus</i>	Rosaceae	Rosales
Swedish cotoneaster	<i>Cotoneaster suecicus</i>	Rosaceae	Rosales
Common hawthorn	<i>Crataegus monogyna</i>	Rosaceae	Rosales
Smooth hawksbeard	<i>Crepis capillaris</i>	Asteraceae	Asterales
Kenilworth ivy	<i>Cymbalaria muralis</i>	Plantaginaceae	Lamiales
Scotch broom	<i>Cytisus scoparius</i>	Fabaceae	Fabales
Cocksfoot	<i>Dactylis glomerata</i>	Poaceae	Poales
Spurge laurel	<i>Daphne laureola</i>	Thymelaeaceae	Malvales
Western bleedig heart	<i>Dicentra formosa</i>	Papaveraceae	Ranunculales
Common foxglove	<i>Digitalis purpurea</i>	Plantaginaceae	Lamiales
Northern wood fern	<i>Dryopteris expansa</i>	Dryopteridaceae	Polypodiales
Fringed willowherb	<i>Epilobium ciliatum</i>	Onagraceae	Myrtales

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Species Common Name	Scientific Name	Family	Order
Broad-leaved helleborine	<i>Epipactis helleborine</i>	Orchidaceae	Asparagales
Common horsetail	<i>Equisetum arvense</i>	Equisetaceae	Equisetales
Giant horsetail	<i>Equisetum telmateia</i>	Equisetaceae	Equisetales
Fennel	<i>Foeniculum vulgare</i>	Apiaceae	Apiales
Virginia strawberry	<i>Fragaria virginiana</i>	Rosaceae	Rosales
Cascara	<i>Frangula purshiana</i>	Rhamnaceae	Rosales
Hemp nettle	<i>Galeopsis tetrahit</i>	Lamiaceae	Lamiales
Cleavers	<i>Galium aparine</i>	Rubiaceae	Gentianales
	<i>Galium spp.</i>	Rosaceae	Rosales
Cudweed	<i>Galium triflorum</i>	Rubiaceae	Gentianales
Salal	<i>Gaultheria shallon</i>	Ericaceae	Ericales
Herb Robert	<i>Geranium robertianum</i>	Geraniaceae	Geraniales
Large leaved avens	<i>Geum macrophyllum</i>	Rosaceae	Rosales
American mannagrass	<i>Glyceria grandis</i>	Poaceae	Poales
	<i>Grindelia spp.</i>	Asteraceae	Asterales
Oregon gumweed	<i>Grindelia stricta</i>	Asteraceae	Asterales
English ivy	<i>Hedera helix</i>	Araliaceae	Apiales
Dame's rocket	<i>Hesperis matronalis</i>	Brassicaceae	Brassicales
	<i>Hieracium spp.</i>	Asteraceae	Asterales
Spotted hawkweed	<i>Hieracium maculatum</i>	Asteraceae	Asterales
Yorkshire fog	<i>Holcus lanatus</i>	Poaceae	Poales
Ocean spray	<i>Holodiscus discolor</i>	Rosaceae	Rosales
Common hop	<i>Humulus lupulus</i>	Cannabaceae	Rosales
	<i>Humulus spp.</i>	Brassicaceae	Brassicales
	<i>Hyacinthoides</i>	Apiaceae	Apiales
Creeping St. John's wort	<i>Hypericum calycinum</i>	Hypericaceae	Malpighiales
St John's wort	<i>Hypericum perforatum</i>	Hypericaceae	Malpighiales
Catsear	<i>Hypochaeris radicata</i>	Asteraceae	Asterales
English holly	<i>Ilex aquifolium</i>	Aquifoliaceae	Aquifoliales
Jewelweed	<i>Impatiens capensis</i>	Balsaminaceae	Ericales

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Species Common Name	Scientific Name	Family	Order
Small-flowered jewelweed	<i>Impatiens parviflora</i>	Balsaminaceae	Ericales
Baltic rush	<i>Juncus balticus</i>	Juncaceae	Poales
Common rush	<i>Juncus effusus</i>	Juncaceae	Poales
Blackgrass	<i>Juncus gerardi</i>	Juncaceae	Poales
	<i>Juncus spp.</i>	Fabaceae	Fabales
Yellow archangel	<i>Lamium galeobdolon</i>	Lamiaceae	Lamiales
Nipplewort	<i>Lapsana communis</i>	Asteraceae	Asterales
Everlasting pea	<i>Lathyrus latifolius</i>	Fabaceae	Fabales
Ox-eye daisy	<i>Leucanthemum vulgare</i>	Asteraceae	Asterales
American dune grass	<i>Leymus mollis</i>	Poaceae	Poales
common privet	<i>Ligustrum vulgare</i>	Oleaceae	Lamiales
Perennial ryegrass	<i>Lolium perenne</i>	Poaceae	Poales
Orange Honeysuckle	<i>Lonicera ciliosa</i>	Caprifoliaceae	Dipsacales
Twinberry	<i>Lonicera involucrata</i>	Caprifoliaceae	Dipsacales
Common Honeysuckle	<i>Lonicera periclymenum</i>	Caprifoliaceae	Dipsacales
Bird's foot trefoil	<i>Lotus corniculatus</i>	Fabaceae	Fabales
Greater birdsfoot trefoil	<i>Lotus pedunculatus</i>	Fabaceae	Fabales
	<i>Lotus spp.</i>	Cornaceae	Cornales
Pacific woodrush	<i>Luzula comosa</i>	Juncaceae	Poales
Common wood-rush	<i>Luzula multiflora</i>	Juncaceae	Poales
Small-flowered woodrush	<i>Luzula parviflora</i>	Juncaceae	Poales
Skunk cabbage	<i>Lysichiton americanus</i>	Araceae	Alismatales
Broad-leaved starflower	<i>Lysimachia latifolia</i>	Primulaceae	Ericales
Sea milkwort	<i>Lysimachia maritima</i>	Primulaceae	Ericales
Creeping jenny	<i>Lysimachia nummularia</i>	Primulaceae	Ericales
Large yellow loosestrife	<i>Lysimachia punctata</i>	Primulaceae	Ericales
False lily-of-the valley	<i>Maianthemum dilatatum</i>	Asparagaceae	Asparagales
Western Crabapple	<i>Malus fusca</i>	Rosaceae	Rosales
Disc mayweed	<i>Matricaria discoidea</i>	Asteraceae	Asterales
Black medick	<i>Medicago lupulina</i>	Fabaceae	Fabales



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Species Common Name	Scientific Name	Family	Order
	<i>Melilotus</i> spp.	Fabaceae	Fabales
Lemon balm	<i>Melissa officinalis</i>	Lamiaceae	Lamiales
Bog bean	<i>Menyanthes trifoliata</i>	Menyanthaceae	Asterales
Wall Lettuce	<i>Mycelis muralis</i>	Asteraceae	Asterales
Field forget-me-not	<i>Myosotis arvensis</i>	Boraginaceae	Boraginales
Indian plum	<i>Oemleria cerasiformis</i>	Rosaceae	Rosales
Water parsley	<i>Oenanthe sarmentosa</i>	Apiaceae	Apiales
Evening primrose	<i>Oenothera biennis</i>	Onagraceae	Myrtales
Devil's club	<i>Oplopanax horridus</i>	Araliaceae	Apiales
Oregano	<i>Origanum vulgare</i>	Lamiaceae	Lamiales
Mountain sweet cicely	<i>Osmorhiza berteroi</i>	Apiaceae	Apiales
Welsh poppy	<i>Papaver cambricum</i>	Papaveraceae	Ranunculales
Virginia creeper	<i>Parthenocissus inserta</i>	Vitaceae	Vitales
Redshank	<i>Persicaria maculosa</i>	Polygonaceae	Caryophyllales
Sweet coltsfoot	<i>Petasites frigidus</i>	Asteraceae	Asterales
Stonecrop	<i>Petrosedum forsterianum</i>	Crassulaceae	Saxifragales
Reed canarygrass	<i>Phalaris arundinacea</i>	Poaceae	Poales
Pacific ninebark	<i>Physocarpus capitatus</i>	Rosaceae	Rosales
Sitka spruce	<i>Picea sitchensis</i>	Pinaceae	Pinales
Orange hawkweed	<i>Pilosella aurantiaca</i>	Asteraceae	Asterales
Ribwort plantain	<i>Plantago lanceolata</i>	Plantaginaceae	Lamiales
broadleaf plantain	<i>Plantago major</i>	Plantaginaceae	Lamiales
Rough meadow grass	<i>Poa trivialis</i>	Poaceae	Poales
Licorice fern	<i>Polypodium glycyrrhiza</i>	Polypodiaceae	Polypodiales
Swordfern	<i>Polystichum munitum</i>	Dryopteridaceae	Polypodiales
Black poplar	<i>Populus nigra</i>	Salicaceae	Malpighiales
The black cottonwood	<i>Populus trichocarpa</i>	Salicaceae	Malpighiales
carpenter's herb	<i>Prunella vulgaris</i>	Lamiaceae	Lamiales
Sweet cherry	<i>Prunus avium</i>	Rosaceae	Rosales
Cherry laurel	<i>Prunus laurocerasus</i>	Rosaceae	Rosales

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Species Common Name	Scientific Name	Family	Order
	<i>Prunus</i> spp.	Poaceae	Poales
Douglas-fir	<i>Pseudotsuga menziesii</i>	Pinaceae	Pinales
Bracken	<i>Pteridium aquilinum</i>	Dennstaedtiaceae	Polypodiales
Tall buttercup	<i>Ranunculus acris</i>	Ranunculaceae	Ranunculales
Creeping buttercup	<i>Ranunculus repens</i>	Ranunculaceae	Ranunculales
Japanese knotweed	<i>Reynoutria japonica</i>	Polygonaceae	Caryophyllales
Rusty menziesia	<i>Rhododendron menziesii</i>	Ericaceae	Ericales
Stink currant	<i>Ribes bracteosum</i>	Grossulariaceae	Saxifragales
Black locust	<i>Robinia pseudoacacia</i>	Fabaceae	Fabales
Dwarf rose	<i>Rosa gymnocarpa</i>	Rosaceae	Rosales
Nootka rose	<i>Rosa nutkana</i>	Rosaceae	Rosales
Himalayan blackberry	<i>Rubus bifrons</i>	Rosaceae	Rosales
Oregon cut-leaf blackberry	<i>Rubus laciniatus</i>	Rosaceae	Rosales
Thimbleberry	<i>Rubus parviflorus</i>	Rosaceae	Rosales
Salmonberry	<i>Rubus spectabilis</i>	Rosaceae	Rosales
Trailing blackberry	<i>Rubus ursinus</i>	Rosaceae	Rosales
Sheeps sorrel	<i>Rumex acetosella</i>	Polygonaceae	Caryophyllales
Curled dock	<i>Rumex crispus</i>	Polygonaceae	Caryophyllales
Bitter dock	<i>Rumex obtusifolius</i>	Polygonaceae	Caryophyllales
Pacific pickleweed	<i>Salicornia pacifica</i>	Amaranthaceae	Caryophyllales
Scouler's willow	<i>Salix scouleriana</i>	Salicaceae	Malpighiales
Sitka willow	<i>Salix sitchensis</i>	Salicaceae	Malpighiales
Red elderberry	<i>Sambucus racemosa</i>	Viburnaceae	Dipsacales
Panicled bulrush	<i>Scirpus microcarpus</i>	Cyperaceae	Poales
White stonecrop	<i>Sedum album</i>	Crassulaceae	Saxifragales
Bitter nightshade	<i>Solanum dulcamara</i>	Solanaceae	Solanales
	<i>Solidago</i> spp.	Asteraceae	Asterales
Perennial sowthistle	<i>Sonchus arvensis</i>	Asteraceae	Asterales
European mountain ash	<i>Sorbus aucuparia</i>	Rosaceae	Rosales
Rose spirea	<i>Spiraea douglasii</i>	Rosaceae	Rosales

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Species Common Name	Scientific Name	Family	Order
Curled starwort	<i>Stellaria crispa</i>	Caryophyllaceae	Caryophyllales
lesser stitchwort	<i>Stellaria graminea</i>	Caryophyllaceae	Caryophyllales
Common chickweed	<i>Stellaria media</i>	Caryophyllaceae	Caryophyllales
white twisted stalk	<i>Streptopus amplexifolius</i>	Liliaceae	Liliales
Deer fern	<i>Struthiopteris spicant</i>	Blechnaceae	Polypodiales
Common snowberry	<i>Symphoricarpos albus</i>	Caprifoliaceae	Dipsacales
Common tansy	<i>Tanacetum vulgare</i>	Asteraceae	Asterales
	<i>Taraxacum</i> spp.	Asparagaceae	Asparagales
English yew	<i>Taxus baccata</i>	Taxaceae	Pinales
Fringecup	<i>Tellima grandiflora</i>	Saxifragaceae	Saxifragales
Western red cedar	<i>Thuja plicata</i>	Cupressaceae	Pinales
Three-leaf foamflower	<i>Tiarella trifoliata</i>	Saxifragaceae	Saxifragales
Piggyback plant	<i>Tolmiea menziesii</i>	Saxifragaceae	Saxifragales
Suckling clover	<i>Trifolium dubium</i>	Fabaceae	Fabales
Red clover	<i>Trifolium pratense</i>	Fabaceae	Fabales
White clover	<i>Trifolium repens</i>	Fabaceae	Fabales
Western trillium	<i>Trillium ovatum</i>	Melanthiaceae	Liliales
Nodding trisetum	<i>Trisetum cernuum</i>	Poaceae	Poales
Western hemlock	<i>Tsuga heterophylla</i>	Pinaceae	Pinales
	<i>Tsuga</i> spp.	Amaranthaceae	Caryophyllales
	Unknown	Convolvulaceae	Solanales
	Unknown	Juncaceae	Poales
	Unknown	Poaceae	Poales
	Unknown	Sapindaceae	Sapindales
	Unknown	Unknown	Unknown
	Unknown	Urticaceae	Rosales
Stinging nettle	<i>Urtica gracilis</i>	Urticaceae	Rosales
oval-leaf blueberry	<i>Vaccinium ovalifolium</i>	Ericaceae	Ericales
Red huckleberry	<i>Vaccinium parvifolium</i>	Ericaceae	Ericales
American brooklime	<i>Veronica americana</i>	Plantaginaceae	Lamiales

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Species Common Name	Scientific Name	Family	Order
Common gypsyweed	<i>Veronica officinalis</i>	Plantaginaceae	Lamiales
Thymeleaf speedwell	<i>Veronica serpyllifolia</i>	Plantaginaceae	Lamiales
Hairy vetch	<i>Vicia hirsuta</i>	Fabaceae	Fabales
Creeping myrtle	<i>Vinca minor</i>	Apocynaceae	Gentianales
Stream violet	<i>Viola glabella</i>	Violaceae	Malpighiales

**Woody and Herbaceous Plants Summary:**

Species	Genera	Family	Order
189	151	62	30

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**Table 4: Non-Vascular Plants - Mosses**

Species Common Name	Scientific Name	Family	Order
Catherine's moss	<i>Atrichum undulatum</i>	Polytrichaceae	Polytrichales
Crispleaf roughmoss	<i>Claopodium crispifolium</i>	Brachytheciaceae	Hypnales
Dusky fork-moss	<i>Dicranum fuscescens</i>	Dicranaceae	Dicranales
Broom moss	<i>Dicranum scoparium</i>	Dicranaceae	Dicranales
Grey-cushioned grimmia	<i>Grimmia pulvinata</i>	Grimmiaceae	Grimmiales
Tree mat moss	<i>Homalothecium fulgescens</i>	Brachytheciaceae	Hypnales
	<i>Homalothecium spp</i>	Brachytheciaceae	Hypnales
Big shaggy-moss	<i>Hylocomiadelphus triquetrus</i>	Hylocomiaceae	Hypnales
Splendid feathermoss	<i>Hylocomium splendens</i>	Hylocomiaceae	Hypnales
	<i>Hypnum circinale</i>	Hypnaceae	Hypnales
Oregon beaked moss	<i>Kindbergia oregana</i>	Brachytheciaceae	Hypnales
Common feather-moss	<i>Kindbergia praelonga</i>	Brachytheciaceae	Hypnales
Palm tree moss	<i>Leucolepis acanthoneura</i>	Mniaceae	Bryales
Douglas neckera moss	<i>Neckera douglasii</i>	Neckeraceae	Hypnales
Coastal leafy moss	<i>Plagiomnium insigne</i>	Mniaceae	Bryales
Wavy-leaved cotton moss	<i>Plagiothecium undulatum</i>	Plagiotheciaceae	Hypnales
Contorted pogonatum moss	<i>Pogonatum contortum</i>	Polytrichaceae	Polytrichales
Alpine Haircap	<i>Polytrichastrum alpinum</i>	Polytrichaceae	Polytrichales
cat's tail moss	<i>Pseudisothecium stoloniferum</i>	Lembophyllaceae	Hypnales
Elegant pseudotaxiphyllum moss	<i>Pseudotaxiphyllum elegans</i>	Plagiotheciaceae	Hypnales
	<i>Pulviger a papillosa</i>	Orthotrichaceae	Orthotrichales
	<i>Pulviger a spp.</i>	Orthotrichaceae	Orthotrichales
Yellow fringe-moss	<i>Racomitrium aciculare</i>	Grimmiaceae	Grimmiales
Elongate moss	<i>Racomitrium elongatum</i>	Grimmiaceae	Grimmiales
Bristly fringe-moss	<i>Racomitrium heterostichum</i>	Grimmiaceae	Grimmiales
Rhizomnium moss	<i>Rhizomnium glabrescens</i>	Mniaceae	Bryales
Lanky moss	<i>Rhytidiadelphus loreus</i>	Hylocomiaceae	Hypnales
Square goose neck moss	<i>Rhytidiadelphus squarrosus</i>	Hylocomiaceae	Hypnales

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Species Common Name	Scientific Name	Family	Order
Obtuseleaf scleropodium moss	<i>Scleropodium obtusifolium</i>	Brachytheciaceae	Hypnales
	<i>Stereodon subimponens</i>	Stereodontaceae	Hypnales
	Unknown	Grimmiaceae	Grimmiales
Park yoke-moss	<i>Zygodon rupestris</i>	Orthotrichaceae	Orthotrichales

**Mosses Summary:**

Species	Genera	Family	Order
31	23	12	6

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**Table 5: Non-Vascular Plants - Liverworts etc.**

Species Common Name	Scientific Name	Family	Order
Bazzania liverwort	<i>Bazzania denudata</i>	Lepidoziaceae	Jungermanniales
St Winifrid's moss liverwort	<i>Chiloscyphus polyanthos</i>	Lophocoleaceae	Jungermanniales
Little hands liverwort	<i>Lepidozia reptans</i>	Lepidoziaceae	Jungermanniales
ring peltia	<i>Pellia neesiana</i>	Pelliaceae	Pelliales
tree ruffle liverwort	<i>Porella navicularis</i>	Porellaceae	Porellales
Flat-leaved scalewort	<i>Radula complanata</i>	Radulaceae	Porellales
American earwort	<i>Scapania americana</i>	Scapaniaceae	Jungermanniales
yellow-ladle liverwort	<i>Scapania bolanderi</i>	Scapaniaceae	Jungermanniales
Water Earwort	<i>Scapania undulata</i>	Scapaniaceae	Jungermanniales

**Liverworts Summary:**

Species	Genera	Family	Order
9	7	6	3

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**Table 6: Marine Algae**

Species Common Name	Scientific Name	Family	Order
Rock weed	<i>Fucus distichus</i>	Fucaceae	Fucales
Sugar kelp	<i>Saccharina latissima</i>	Laminariaceae	Laminariales
Gut weed	<i>Ulva intestinalis</i>	Ulvaceae	Ulvales
Sea lettuce	<i>Ulva lactuca</i>	Ulvaceae	Ulvales

**Algae Summary:**

Species	Genera	Family	Order
4	3	3	3



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**Table 7: Arthropods (Crustacea)**

Species Common Name	Scientific Name	Family	Order
Common pill bug	<i>Armadillidium vulgare</i>	Armadillidiidae	Isopoda
North American acorn barnacle	<i>Balanus glandula</i>	Balanidae	Balanomorpha
Japanese skeleton shrimp	<i>Caprella mutica</i>	Caprellidae	Amphipoda
little brown barnacle	<i>Chthamalus dalli</i>	Chthamalidae	Balanomorpha
Unknown	<i>Crangon spp.</i>	Crangonidae	Decapoda
Yellow shore crab	<i>Hemigrapsus oregonensis</i>	Varunidae	Decapoda
Graceful rock crab	<i>Metacarcinus gracilis</i>	Cancriidae	Decapoda
Dungeness crab	<i>Metacarcinus magister</i>	Cancriidae	Decapoda
Common shiny woodlouse	<i>Oniscus asellus</i>	Oniscidae	Isopoda
Hairy hermit crab	<i>Pagurus hirsutiusculus</i>	Paguridae	Decapoda
Dock shrimp	<i>Pandalus danae</i>	Pandalidae	Decapoda
	Unknown	Mysidae	Mysida
	Unknown	Unknown	Decapoda

**Arthropods (Crustacea) Summary:**

Species	Genera	Family	Order
10	11	11	5

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**Table 8: Arthropods**

Species Common Name	Scientific Name	Family	Order
Smoky carpet	<i>Aethalura intertexta</i>	Geometridae	Lepidoptera
	<i>Agabus</i> spp.	Dytiscidae	Coleoptera
	<i>Alloperla</i> spp.	Chloroperlidae	Plecoptera
	<i>Amara</i> spp.	Carabidae	Coleoptera
	<i>Anaspis</i> spp.	Scraptiidae	Coleoptera
	<i>Anobium</i> spp.	Ptinidae	Coleoptera
	<i>Anthaxia</i> spp.	Buprestidae	Coleoptera
Cowpea aphid	<i>Aphis craccivora</i>	Aphididae	Hemiptera
Common water strider	<i>Aquarius remigis</i>	Gerridae	Hemiptera
Sand bear spider	<i>Arctosa perita</i>	Lycosidae	Araneae
	<i>Arctosa</i> spp.	Lycosidae	Araneae
	<i>Atomaria</i> spp.	Cryptophagidae	Coleoptera
	<i>Aulagomyza</i> spp.	Agromyzidae	Diptera
	<i>Baetis</i> spp.	Baetidae	Ephemeroptera
Hairy spider weevil	<i>Barypeithes pellucidus</i>	Curculionidae	Coleoptera
Yellow head bumble bee	<i>Bombus flavifrons</i>	Apidae	Hymenoptera
Sitka bumble bee	<i>Bombus sitkensis</i>	Apidae	Hymenoptera
	<i>Bombus</i> spp.	Apidae	Hymenoptera
Raspberry fruitworm	<i>Byturus unicolor</i>	Byturidae	Coleoptera
Pink-striped willow spanworm	<i>Cabera variolaria</i>	Geometridae	Lepidoptera
Western stone	<i>Calineuria californica</i>	Perlidae	Plecoptera
hacklemesh weaver	<i>Callobius pictus</i>	Amaurobiidae	Araneae
	<i>Cameraria gaultheriella</i>	Gracillariidae	Lepidoptera
	<i>Camponotus</i> spp.	Formicidae	Hymenoptera
Granulated carabid	<i>Carabus granulatus</i>	Carabidae	Coleoptera
Bronze carabid	<i>Carabus nemoralis</i>	Carabidae	Coleoptera
Leaf-footed bug	<i>Ceraleptus pacificus</i>	Coreidae	Hemiptera
	<i>Cheumatopsyche</i> spp.	Hydropsychidae	Trichoptera

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Species Common Name	Scientific Name	Family	Order
Riffle beetle	<i>Cleptelmis addenda</i>	Elmidae	Coleoptera
	<i>Corticarina</i> spp.	Latridiidae	Coleoptera
Red flat bark beetle	<i>Cucujus clavipes</i>	Cucujidae	Coleoptera
Sweetfern geometer moth	<i>Cyclophora pendulinaria</i>	Geometridae	Lepidoptera
	<i>Cytilus</i> spp.	Byrrhidae	Coleoptera
Common footman	<i>Dasytes plumbeus</i>	Melyridae	Coleoptera
	<i>Deinopteroloma subcostatum</i>	Staphylinidae	Coleoptera
fire-coloured beetles	<i>Dendroides ephemeroides</i>	Pyrochroidae	Coleoptera
	<i>Dichelotarsus</i> spp.	Cantharidae	Coleoptera
	<i>Dinothenarus pleuralis</i>	Staphylinidae	Coleoptera
	<i>Ditylus</i> spp.	Oedemeridae	Coleoptera
	<i>Doroneuria</i> spp.	Perlidae	Plecoptera
Red-cross shield bug	<i>Elasmotherus cruciatus</i>	Acanthosomatidae	Hemiptera
Winter firefly	<i>Ellychnia corrusca</i>	Lampyridae	Coleoptera
Luciole de Hatch	<i>Ellychnia hatchi</i>	Lampyridae	Coleoptera
	<i>Ellychnia</i> spp.	Lampyridae	Coleoptera
	<i>Empoasca</i> spp.	Cicadellidae	Hemiptera
Quill gordon	<i>Epeorus pleuralis</i>	Heptageniidae	Ephemeroptera
Bird hover fly	<i>Eupeodes volucris</i>	Syrphidae	Diptera
	<i>Eusphalerum</i> spp.	Staphylinidae	Coleoptera
	<i>Euura</i> spp.	Tenthredinidae	Hymenoptera
northern caddisfly	<i>Glyphopsyche irrorata</i>	Limnephilidae	Trichoptera
Multicolored Asian lady beetle	<i>Harmonia axyridis</i>	Coccinellidae	Coleoptera
Clown millipede	<i>Harpaphe haydeniana</i>	Xystodesmidae	Polydesmida
Fall webworm	<i>Hyphantria cunea</i>	Erebidae	Lepidoptera
mayfly	<i>Ironodes flavipennis</i>	Heptageniidae	Ephemeroptera
	<i>Leistus ferruginosus</i>	Carabidae	Coleoptera
water strider	<i>Limnoporus notabilis</i>	Gerridae	Hemiptera
Common green bottle fly	<i>Lucilia sericata</i>	Calliphoridae	Diptera
	<i>Lucilia</i> spp.	Calliphoridae	Diptera

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Species Common Name	Scientific Name	Family	Order
Forest Tent Caterpillar	<i>Malacosoma disstria</i>	Lasiocampidae	Lepidoptera
	<i>Medetera</i> spp.	Dolichopodidae	Diptera
	<i>Metacolpodes buchanani</i>	Carabidae	Coleoptera
Golden rod crab spider	<i>Misumena vatia</i>	Thomisidae	Araneae
Common heart shield	<i>Nebria brevicollis</i>	Carabidae	Coleoptera
	<i>Nematus</i> spp.	Tenthredinidae	Hymenoptera
Carrion beetle	<i>Nicrophorus defodiens</i>	Silphidae	Coleoptera
Greater night-stalking tiger beetle	<i>Omus dejeanii</i>	Carabidae	Coleoptera
Rusty tussock moth	<i>Orgyia antiqua</i>	Erebidae	Lepidoptera
Apple weevil	<i>Otiorhynchus cribricollis</i>	Curculionidae	Coleoptera
	<i>Otiorhynchus singularis</i>	Curculionidae	Coleoptera
	<i>Otiorhynchus</i> spp.	Curculionidae	Coleoptera
Pale swallowtail	<i>Papilio eurymedon</i>	Papilionidae	Lepidoptera
Western tiger swallowtail	<i>Papilio rutulus</i>	Papilionidae	Lepidoptera
	<i>Parasyrphus</i> spp.	Syrphidae	Diptera
	<i>Pegomya bicolor</i>	Anthomyiidae	Diptera
	<i>Pegomya</i> spp.	Anthomyiidae	Diptera
	<i>Philaenus</i> spp.	Aphrophoridae	Hemiptera
Meadow froghopper	<i>Philaenus spumarius</i>	Aphrophoridae	Hemiptera
	<i>Phormia</i> spp.	Calliphoridae	Diptera
Crane fly	<i>Phoroctenia vittata</i>	Tipulidae	Diptera
	<i>Phyllocnistis</i> spp.	Gracillariidae	Lepidoptera
Holly leaf miner	<i>Phytomyza ilicis</i>	Agromyzidae	Diptera
	<i>Phytomyza</i> spp.	Agromyzidae	Diptera
Leaf mine	<i>Phytomyza tiarella</i>	Agromyzidae	Diptera
Longicorne scripté	<i>Pidonia scripta</i>	Cerambycidae	Coleoptera
Cabbage white	<i>Pieris rapae</i>	Pieridae	Lepidoptera
Stag beetle	<i>Platycerus oregonensis</i>	Lucanidae	Coleoptera
Vagabund cluster fly	<i>Pollenia vagabunda</i>	Polleniidae	Diptera
The virgin, virgin moth	<i>Protitame virginalis</i>	Geometridae	Lepidoptera

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Species Common Name	Scientific Name	Family	Order
Twenty-spotted lady beetle	<i>Psyllobora vigintimaculata</i>	Coccinellidae	Coleoptera
Ebony salmonfly	<i>Pteronarcys princeps</i>	Pteronarcyidae	Plecoptera
	<i>Pteronarcys</i> spp.	Pteronarcyidae	Plecoptera
Woodland ground beetle	<i>Pterostichus algidus</i>	Carabidae	Coleoptera
	<i>Pterostichus amethystinus</i>	Carabidae	Coleoptera
Harpale d'hercule	<i>Pterostichus herculeanus</i>	Carabidae	Coleoptera
Giant woodland ground beetle	<i>Pterostichus lama</i>	Carabidae	Coleoptera
Brother yellowmarked caterpillar	<i>Raphia frater</i>	Noctuidae	Lepidoptera
	<i>Rhizophagus</i> spp.	Monotomidae	Coleoptera
	<i>Rhyacophila</i> spp.	Rhyacophilidae	Trichoptera
Rough-skinned lugworm	<i>Rhyparochromus vulgaris</i>	Rhyparochromidae	Hemiptera
	<i>Salpingus viridiaeneus</i>	Salpingidae	Coleoptera
Ground beetle	<i>Scaphinotus angulatus</i>	Carabidae	Coleoptera
Narrow-collared snail-eating beetle	<i>Scaphinotus angusticollis</i>	Carabidae	Coleoptera
Ground Beetle	<i>Scaphinotus marginatus</i>	Carabidae	Coleoptera
	<i>Scolopocryptops</i> spp.	Scolopocryptopidae	Scolopendromorpha
Festive click beetle	<i>Selatosomus festivus</i>	Elateridae	Coleoptera
Rugose stag beetle	<i>Sinodendron rugosum</i>	Lucanidae	Coleoptera
	<i>Sphenophorus</i> spp.	Curculionidae	Coleoptera
	<i>Sphindus</i> spp.	Sphindidae	Coleoptera
Virginian tiger moth	<i>Spilosoma virginica</i>	Erebidae	Lepidoptera
	<i>Stenus</i> spp.	Staphylinidae	Coleoptera
Nut leaf weevil	<i>Strophosoma melanogrammum</i>	Curculionidae	Coleoptera
	<i>Thaumatomyia</i> spp.	Chloropidae	Diptera
Tissue moth	<i>Triphosa haesitata</i>	Geometridae	Lepidoptera
	<i>Trixagus</i> spp.	Throscidae	Coleoptera
European hardwood ambrosia beetle	<i>Trypodendron domesticum</i>	Curculionidae	Coleoptera
Washington udea moth	<i>Udea washingtonalis</i>	Crambidae	Lepidoptera
	Unknown	Agromyzidae	Diptera
	Unknown	Calliphoridae	Diptera

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Species Common Name	Scientific Name	Family	Order
	Unknown	Cicadellidae	Hemiptera
	Unknown	Culicidae	Diptera
	Unknown	Curculionidae	Coleoptera
	Unknown	Geometridae	Lepidoptera
	Unknown	Ichneumonidae	Hymenoptera
	Unknown	Julidae	Julida
	Unknown	Limoniidae	Diptera
	Unknown	Perlidae	Plecoptera
	Unknown	Staphylinidae	Coleoptera
	Unknown	Staphylinidae	Coleoptera
	Unknown	Unknown	Diptera
	Unknown	Unknown	Hymenoptera
	Unknown	Unknown	Lepidoptera
	Unknown	Unknown	Lepidoptera
	Unknown	Unknown	Trichoptera
The Welsh wave	<i>Venusia cambrica</i>	Geometridae	Lepidoptera
	<i>Venusia</i> spp.	Geometridae	Lepidoptera
Western red twin-spot	<i>Xanthorhoe defensaria</i>	Geometridae	Lepidoptera
	<i>Xyleborinus</i> spp.	Curculionidae	Coleoptera
	<i>Xylosandrus</i> spp.	Curculionidae	Coleoptera
	<i>Xylota</i> spp.	Syrphidae	Diptera
Mahogany similar-wing moth	<i>Zale minerea</i>	Erebidae	Lepidoptera

**Arthropods Summary**

Species	Genera	Family	Order
78	102	71	12

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**Table 9: Miscellaneous**

Species Common Name	Scientific Name	Family	Order
Golden star tunicate	<i>Botryllus schlosseri</i>	Styelidae	Stolidobranchia
	<i>Chlorociboria</i> spp.	Chlorociboriaceae	Helotiales
	<i>Cladonia</i> spp.	Cladoniaceae	Lecanorales
	<i>Evasterias</i> spp.	Asteriidae	Forcipulatida
Mottled star	<i>Evasterias troschelii</i>	Asteriidae	Forcipulatida
Oakmoss	<i>Evernia prunastri</i>	Parmeliaceae	Lecanorales
Northern red-belted conk	<i>Fomitopsis mounceae</i>	Fomitopsidaceae	Polyporales
	<i>Fomitopsis</i> spp.	Fomitopsidaceae	Polyporales
Common script lichen	<i>Graphis scripta</i>	Graphidaceae	Ostropales
	<i>Lecanora</i> spp.	Lecanoraceae	Lecanorales
	<i>Lepraria</i> spp.	Stereocaulaceae	Lecanorales
Netted specklebelly	<i>Lobaria anomala</i>	Peltigeraceae	Peltigerales
Lungwort	<i>Lobaria pulmonaria</i>	Peltigeraceae	Peltigerales
	<i>Menegazzia subsimilis</i>	Parmeliaceae	Lecanorales
Peltigera laevigata	<i>Nephroma laevigatum</i>	Nephromataceae	Peltigerales
	<i>Nephtys</i> spp.	Nephtyidae	Phyllodocida
	<i>Parmelia</i> spp.	Parmeliaceae	Lecanorales
Hammered shield lichen	<i>Parmelia sulcata</i>	Parmeliaceae	Lecanorales
The dog lichen	<i>Peltigera collina</i>	Peltigeraceae	Peltigerales
Black-footed polypore	<i>Picipes badius</i>	Polyporaceae	Polyporales
Purple starfish	<i>Pisaster ochraceus</i>	Asteriidae	Forcipulatida
Rag lichens	<i>Platismatia glauca</i>	Parmeliaceae	Lecanorales
	<i>Ramalina farinacea</i>	Ramalinaceae	Lecanorales
	<i>Taphrina</i> spp.	Taphrinaceae	Taphrinales
Turkey tail	<i>Trametes versicolor</i>	Polyporaceae	Polyporales
Variable wrinkle-lichen	<i>Tuckermanopsis orbata</i>	Parmeliaceae	Lecanorales
	Unknown	Nereididae	Phyllodocida
	Unknown	Parmeliaceae	Lecanorales

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**Miscellaneous Summary**

Species	Genera	Family	Order
17	22	17	9



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**Table 10:** *Cnidaria*

Species Common Name	Scientific Name	Family	Order
Penicillate jellyfish	<i>Polyorchis penicillatus</i>	Corynidae	Anthoathecata

**Cnidaria Summary**

Species	Genera	Family	Order
1	1	1	1

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**Table 11:** Marine Molluscs (Bivalves)

Species Common Name	Scientific Name	Family	Order
Nuttall's cockle	<i>Clinocardium nuttallii</i>	Cardiidae	Cardiida
Baltic clam	<i>Macoma balthica</i>	Tellinidae	Cardiida
Bent-nose clam	<i>Macoma nasuta</i>	Tellinidae	Cardiida
Pacific oyster	<i>Magallana gigas</i>	Ostreidae	Ostreida
Horse mussel	<i>Modiolus modiolus</i>	Mytilidae	Mytilida
Soft shell clam	<i>Mya arenaria</i>	Myidae	Myida
Blue mussel	<i>Mytilus edulis</i>	Mytilidae	Mytilida
Northern bay mussel	<i>Mytilus trossulus</i>	Mytilidae	Mytilida
Purple mahogany-clam	<i>Nuttallia obscurata</i>	Psammobiidae	Cardiida
Manila clam	<i>Ruditapes philippinarum</i>	Veneridae	Venerida
Butter clam	<i>Saxidomus gigantea</i>	Veneridae	Venerida
Pacific gaper	<i>Tresus nuttallii</i>	Mactridae	Venerida
	<i>Tresus</i> spp.	Mactridae	Venerida

**Marine Molluscs Summary**

Species	Genera	Family	Order
12	10	8	5

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**Table 12: Terrestrial Molluscs (Gastropods)**

Species Common Name	Scientific Name	Family	Order
Banana slug	<i>Ariolimax columbianus</i>	Ariolimacidae	Stylommatophora
	<i>Arion</i> spp.	Arionidae	Stylommatophora
White bubble shell	<i>Haminoea vesicula</i>	Haminoeidae	Cephalaspidea
Checkered periwinkle	<i>Littorina scutulata</i>	Littorinidae	Littorinimorpha
Mask limpet	<i>Lottia persona</i>	Lottiidae	Unknown
Lean western nassa	<i>Nassarius mendicus</i>	Nassariidae	Neogastropoda
Rough-mantled doris	<i>Onchidoris bilamellata</i>	Onchidorididae	Nudibranchia
	Unknown	Physidae	Unknown
Northwest hesperian	<i>Vespericola columbianus</i>	Polygyridae	Stylommatophora

**Terrestrial Molluscs Summary**

Species	Genera	Family	Order
7	8	9	5

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**Table 13: Amphibians**

Species Common Name	Scientific Name	Family	Order
Northwestern salamander	<i>Ambystoma gracile</i>	Ambystomatidae	Caudata
Northern red-legged frog	<i>Rana aurora</i>	Ranidae	Anura

**Amphibians Summary**

Species	Genera	Family	Order
2	2	2	2

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**Table 14: Fishes**

Species Common Name	Scientific Name	Family	Order
High cockscomb	<i>Anoplarchus purpureus</i>	Stichaeidae	Perciformes
Penpoint gunnel	<i>Apodichthys flavidus</i>	Pholidae	Perciformes
speckled sanddab	<i>Citharichthys stigmaeus</i>	Paralichthyidae	Pleuronectiformes
Arrow goby	<i>Clevelandia ios</i>	Gobiidae	Gobiiformes
Sharpnose sculpin	<i>Clinocottus acuticeps</i>	Psychrolutidae	Perciformes
Shiner perch	<i>Cymatogaster aggregata</i>	Embiotocidae	Cichliformes
Buffalo sculpin	<i>Enophrys bison</i>	Psychrolutidae	Perciformes
Three-spined stickleback	<i>Gasterosteus aculeatus</i>	Gasterosteidae	Perciformes
Pacific staghorn sculpin	<i>Leptocottus armatus</i>	Cottidae	Perciformes
Cutthroat trout	<i>Oncorhynchus clarkii</i>	Salmonidae	Salmoniformes
Coho salmon	<i>Oncorhynchus kisutch</i>	Salmonidae	Salmoniformes
Crescent gunnel	<i>Pholis laeta</i>	Pholidae	Perciformes
Saddleback gunnel	<i>Pholis ornata</i>	Pholidae	Perciformes
Starry flounder	<i>Platichthys stellatus</i>	Pleuronectidae	Carangiformes
Plainfin midshipman	<i>Porichthys notatus</i>	Batrachoididae	Batrachoidiformes
Kelp pipefish	<i>Syngnathus californiensis</i>	Syngnathidae	Syngnathiformes
	Unknown	Cottidae	Perciformes
	Unknown	Pholidae	Perciformes
	Unknown	Pholidae	Perciformes
	Unknown	Pholidae	Perciformes
	Unknown	Salmonidae	Salmoniformes
	Unknown	Unknown	Carangiformes

**Fishes Summary**

Species	Genera	Family	Order
16	13	12	7

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**Table 15:** *Birds*

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Species Common Name	Scientific Name	Family	Order
Cedar waxwing	<i>Bombycilla cedrorum</i>	Bombycillidae	Passeriformes
Canada goose	<i>Branta canadensis</i>	Anatidae	Anseriformes
Anna's hummingbird	<i>Calypte anna</i>	Trochilidae	Caprimulgiformes
Wilson's warbler	<i>Cardellina pusilla</i>	Parulidae	Passeriformes
Turkey vulture	<i>Cathartes aura</i>	Cathartidae	Cathartiformes
Swainson's thrush	<i>Catharus ustulatus</i>	Turdidae	Passeriformes
Brown creeper	<i>Certhia americana</i>	Certhiidae	Passeriformes
American crow	<i>Corvus brachyrhynchos</i>	Corvidae	Passeriformes
Common raven	<i>Corvus corax</i>	Corvidae	Passeriformes
Western flycatcher	<i>Empidonax difficilis</i>	Tyrannidae	Passeriformes
Hammond's flycatcher	<i>Empidonax hammondii</i>	Tyrannidae	Passeriformes
Willow flycatcher	<i>Empidonax traillii</i>	Tyrannidae	Passeriformes
House finch	<i>Haemorhous mexicanus</i>	Fringillidae	Passeriformes
Purple finch	<i>Haemorhous purpureus</i>	Fringillidae	Passeriformes
Bald eagle	<i>Haliaeetus leucocephalus</i>	Accipitridae	Accipitriformes
Dark-eyed junco	<i>Junco hyemalis</i>	Passerellidae	Passeriformes
Olympic gull	<i>Larus occidentalis x glaucescens</i>	Laridae	Charadriiformes
Orange-crowned warbler	<i>Leiothlypis celata</i>	Parulidae	Passeriformes
Song sparrow	<i>Melospiza melodia</i>	Passerellidae	Passeriformes
Double-crested cormorant	<i>Nannopterum auritum</i>	Phalacrocoracidae	Suliformes
Spotted towhee	<i>Pipilo maculatus</i>	Passerellidae	Passeriformes
Western tanager	<i>Piranga ludoviciana</i>	Cardinalidae	Passeriformes
Black-capped chickadee	<i>Poecile atricapillus</i>	Paridae	Passeriformes
Chestnut-backed chickadee	<i>Poecile rufescens</i>	Paridae	Passeriformes
Bushtit	<i>Psaltriparus minimus</i>	Aegithalidae	Passeriformes
Rufous hummingbird	<i>Selasphorus rufus</i>	Trochilidae	Caprimulgiformes
Yellow rumped warbler	<i>Setophaga coronata</i>	Parulidae	Passeriformes
Black-throated gray warbler	<i>Setophaga nigrescens</i>	Parulidae	Passeriformes
Yellow warbler	<i>Setophaga petechia</i>	Parulidae	Passeriformes
Townsend's warbler	<i>Setophaga townsendi</i>	Parulidae	Passeriformes

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Red-breasted nuthatch	<i>Sitta canadensis</i>	Sittidae	Passeriformes
American goldfinch	<i>Spinus tristis</i>	Fringillidae	Passeriformes
Pacific wren	<i>Troglodytes pacificus</i>	Troglodytidae	Passeriformes
American robin	<i>Turdus migratorius</i>	Turdidae	Passeriformes
	Unknown	Laridae	Charadriiformes
	Unknown	Laridae	Charadriiformes
	Unknown	Trochilidae	Caprimulgiformes
Pelagic cormorant	<i>Urile pelagicus</i>	Phalacrocoracidae	Suliformes
Warbling vireo	<i>Vireo gilvus</i>	Vireonidae	Passeriformes
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Passerellidae	Passeriformes

**Summary Birds**

Species	Genera	Family	Order
37	29	20	7

**Table 16: Mammals**

Species Common Name	Scientific Name	Family	Order
Coyote	<i>Canis latrans</i>	Canidae	Carnivora
North American river otter	<i>Lontra canadensis</i>	Mustelidae	Carnivora
Long-eared myotis	<i>Myotis evotis</i>	Vespertilionidae	Chiroptera
Yuma myotis	<i>Myotis yumanensis</i>	Vespertilionidae	Chiroptera
Mule deer	<i>Odocoileus hemionus</i>	Cervidae	Artiodactyla
Harbour seal	<i>Phoca vitulina</i>	Phocidae	Carnivora
Gray squirrel	<i>Sciurus carolinensis</i>	Sciuridae	Rodentia
Unknown	Unknown	Soricidae	Eulipotyphla

**Mammals Summary**



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Species	Genera	Family	Order
7	7	7	5

## Appendix 2: Historic Wildlife Sightings<sup>2</sup>

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<sup>2</sup> Based on sightings by trail cam and volunteer recordings provided by the Mossom Creek Hatchery and Education Centre from 2014-2023.

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**Table 17:** *Historic Wildlife Sightings from the Mossom Creek Hatchery Watershed*

\*Highlighted rows represent species also observed during the 2023 Bioblitz

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Species Common Name	Scientific Name	Family	Order	Comments
Cooper's Hawk	<i>Accipiter cooperii</i>	Accipitridae	Accipitriformes	hatchery parking lot; 2015
Northwestern Salamander	<i>Ambystoma gracile</i>	Ambystinatidae	Caudata	near hatchery, egg mass from Noons Creek pond placed in Mossom pond; yrs: 2014, 2016
Great Blue Heron <i>faninni ssp.</i>	<i>Ardea herodias faninni</i>	Ardeidae	Pelecaniformes	near hatchery, trail cam at pond by viewing platform; yrs: 2015, 2016, 2023 (SARA special concern)
Coastal Tailed Frog	<i>Ascaphus truei</i>	Leiopelmatidae	Anura	#8 Mossom Creek Drive, several near hatchery, an adult by pond, tadpole above intake; yrs: 2014, 2016, 2017 (SARA special concern)
Cedar Waxwing	<i>Bombcilla cedrorum</i>	Bombcyllidae	Passeriformes	Merlin app; 2023
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Accipitridae	Accipitriformes	at hatchery intake; 2014
Coyote	<i>Canis latrans</i>	Canidae	Carnivora	#8 Mossom Creek Drive, Mossom at loco Rd, on hatchery cam system, lower end of gravel road; yrs: 2014, 2015
Turkey Vulture	<i>Cathartes aura</i>			On river otter carcass in estuary; 2023
Swainson's Thrush	<i>Catharus ustulatus</i>	Turdidae	Passiformes	intake trail (heard), way up gravel road, Merlin app; yrs: 2014, 2017, 2023
American Dipper	<i>Cinclus mexicanus</i>	Cinclidae	Passiformes	Mossom Creek, base of stairs near hatchery, at pond beside hatchery; yrs: 2015, 2017
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Picidae	Piciformes	seen from trail to intake above hatchery; 2017
Northern Alligator Lizard	<i>Elgaria coerule</i>	Anguidae	Squamata	#8 Mossom Creek Drive; 2014
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	Tyrannidae	Passiformes	heard near hatchery, half way up gravel road, Merlin app; yrs: 2014, 2017, 2023
Ensatina Salamander	<i>Ensatina eschscholtzii</i>	Plethontidae	Caudata	near hatchery; 2014

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Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Sciuridae	Rodentia	flying squirrel nesting box check, East Rd residence on Mossom Cr (got into house, killed by cat); yrs: 2015, 2016 (possibly newly identified Humboldt's flying squirrel ( <i>Glaucomys oregonensis</i> ))
Wolverine	<i>Gulo gulo</i>	Mustelidae	Carnivora	trail cam; 2023
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Accipitridae	Accipitriformes	beside hatchery pond, in tree near hatchery, high in large Douglas firs near bottom of gate, start of gravel road, estuary; yrs: 2015, 2017
Varied Thrush	<i>Ixoreus naevius</i>	Turdidae	Passiformes	#8 Mossom Creek Drive, viewed in hatchery area; yrs: 2014, 2023
Dark-eyed Junco	<i>Junco hyemalis</i>	Emberizidae	Passiformes	halfway up gravel road, viewed in hatchery area; yrs: 2017, 2023
Snowshoe Hare	<i>Lepus americanus</i>	Leporidae	Lagomorpha	20 m north of entry gate on west side of gravel road, just below entry gate; yrs: 2015, 2016
North American River Otter	<i>Lontra canadensis</i>	Mustelidae	Carnivora	base of stairs near hatchery, pool, hatchery cam system; yrs: 2015, 2023
Bobcat	<i>Lynx rufus</i>	Felidae	Carnivora	Heritage Mt Blvd, upper Mossom, Coutts/Hackinen yard, beside hatchery, road to hatchery, Sunnyside Properties, below loco Rd, beside Mossom Creek, a yearling at construction trailer, hatchery site, #8 Mossom Creek Drive; 2015
Belted Kingfisher	<i>Megasceryle alcyon</i>	Alcedinidae	Coraciiformes	hatchery area; 2023
Striped Skunk	<i>Mephitis mephitis</i>	Mephitidae	Carnivora	dead on loco Rd near Mossom Creek culvert; 2017
Pacific Sideband	<i>Monadenia fidelis</i>	Monadeniidae	Stylommatophora	seen previously and often; 2015
American Mink	<i>Neovison vison</i>	Mustelidae	Carnivora	hatchery intake, pond; yrs: 2014, 2016, 2017, 2023

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Mule Deer	<i>Odocoileus hemionus</i>	Cervidae	Artiodactyla	Mossom Rd near loco Rd, upper pull-out two deer, adult and two fawns at hatchery, on cam system, by welcome sign, mom and 3 yearlings, lower pull-out young buck; yrs: 2014, 2015, 2016, 2017
Chum Salmon	<i>Oncorhynchus keta</i>	Salmonidae	Salmoniformes	between estuary and hatchery (approx. 200); 2016
Osprey	<i>Pandion haliaetus</i>	Pandionidae	Accipitriformes	flying low over Mossom gravel rd; 2015
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Columbidae	Columbiformes	trail cam; 2023
Spotted Towhee	<i>Pipilo maculatus</i>	Emberizidae	Passiformes	#8 Mossom Creek Drive, on fence, hatchery site; 2014
Western Tanager	<i>Piranga ludoviciana</i>	Thraupidae	Passiformes	halfway up gravel road, Merlin app; yrs: 2017, 2023
Chestnut-backed Chickadee	<i>Poecile rufescens</i>	Paridae	Passiformes	intake trail (heard), halfway up gravel road, between estuary and hatchery; yrs: 2014, 2015, 2017
Raccoon	<i>Procyon lotor</i>	Procyonidae	Carnivora	trail to intake, on cam system; yrs: 2014, 2015
Cougar	<i>Puma concolor</i>	Felidae	Carnivora	path beside hatchery building, nature cam on trail, cam system, Mel's backyard, Mossom forest (repeatedly over a week); yrs: 2014, 2015, 2017
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Regulidae	Passiformes	by ear near hatchery; 2015
Rufous Hummingbird	<i>Selasphorus rufus</i>	Trochilidae	Passiformes	on fence, hatchery site, near ampitheatre, beside hatchery, seen bathing in pond waterfall; yrs: 2014, 2015
Townsend's Warbler	<i>Setophaga townsendi</i>	Parulidae	Passiformes	Merlin app; 2023
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	Picidae	Piciformes	near hatchery; 2015
Barred Owl	<i>Strix varia</i>	Strigidae	Strigiformes	near hatchery, a quarter of the way up the gravel road, at pond, dead beside loco rd near Mossom Creek culvert; yrs: 2014, 2015, 2016, 2017

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Douglas Squirrel	<i>Tamiasciurus douglasii</i>	Sciuridae	Rodentia	near hatchery, small parking lot, amphitheatre beside hatchery; yrs: 2014, 2015
Rough-skinned Newt	<i>Taricha granulosa</i>	Salamandridae	Caudata	between hatchery and parking lot on road, cold and slow moving; 2016
Pacific Wren	<i>Troglodytes pacificus</i>	Troglodytidae	Passiformes	intake trail, nest with chicks screeching, near hatchery; yrs: 2014, 2015
American Robin	<i>Turdus migratorius</i>	Turdidae	Passiformes	Merlin app; 2023
Black Bear	<i>Ursus americanus</i>	Ursidae	Carnivora	on cam system, on gravel road, on pathway beside hatchery, #8 Mossom Creek Drive, lower gate at base of gravel road (2), adult and two cubs, on gravel road near bottom, eating unripe salmonberries, adult and cub near loco at Mossom Cr Drive, hatchery parking lot, spawning pools, two cubs at hatchery; yrs: 2014, 2015, 2016, 2017, 2023
Warbling Vireo	<i>Vireo gilvus</i>	Vireonidae	Passiformes	intake trail (heard), halfway up gravel road, Merlin app; yrs: 2014, 2017, 2023
Red Fox	<i>Vulpes vulpes</i>	Canidae	Carnivora	Lancaster Court, Anmore, Mossom watershed - ate a domestic duck; 2015
Wilson's Warbler	<i>Wilsonia pusilla</i>	Parulidae	Passiformes	intake trail (heard); 2014
Giant Stonefly	<i>Pteronarcys sp.</i>	Pteronarcyidae	Plecoptera	adults near hatchery, exoskeletons on cedar tree beside creek, adult on the wing; yrs: 2015, 2016

**Historic Wildlife Summary**

Species	Genera	Family	Order
49	48	35	17