

Olympic National Forest Bumblebee Surveys 2017-2018

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Introduction

Many bumblebee species have declined in recent decades in Europe and North America (Colla and Packer 2008, Cameron et al. 2011, Kosior et al. 2007). The western bumble bee (*Bombus occidentalis*) was once common and widespread in the western North America; however, since the 1990s, populations from southern British Columbia to central California have nearly disappeared, possibly due to disease (Rao and Stephen 2007, Cameron et al. 2011, Colla and Ratti 2010). Rhoades et al. (2016) confirmed that a western bumblebee population persists on the Olympic Peninsula; but the current distribution, conservation status, and habitat associations of *B. occidentalis* are not fully known on the Olympic Peninsula.

In 2015, the western bumblebee was placed on the Forest Service Region 6 Sensitive Species List. In 2017-2018, the Olympic National Forest received funding from the Region 6 Interagency Special Status Sensitive Species Program to conduct bumblebee surveys on the Forest. This document is the final project report of this two-year survey effort.

Project Objectives

The primary objectives of the 2017-2018 Olympic National Forest bumblebee survey effort was to

- (1) determine presence of western bumblebee (*Bombus occidentalis*) on Olympic National Forest;
- (2) expand our knowledge of bumblebee species and distribution on the Olympic Peninsula;
- (3) better understand bumblebee habitats, host plants, potential threats, and management opportunities or needs on the Forest;
- (4) expand our knowledge of the presence of butterflies and other pollinators on the Forest.

Methods

We compiled bumblebee records on the Olympic Peninsula from prior studies and observations. We then identified survey areas based on historic records and on knowledge of locations presently containing an abundance of floral resources.

Survey areas included open areas containing flowering plants distributed throughout Olympic National Forest, on both Hood Canal and Pacific Ranger Districts (Figure 1). The survey sites included roadsides, meadows, balds, and other open habitats, ranging from low elevation to alpine. Each survey area was approximately one hectare in size. In some cases, the survey area was a linear area along a trail or roadside.

Surveys were carried out by walking slowly through survey areas, searching for and capturing bumblebees with insect nets, focusing on areas with flowering plants. In most cases, surveys were conducted for 90 person-minutes; two surveyors searched for 45 minutes, three surveyors searched for 30 minutes, and so on. During the surveys, captured bumblebees were placed in coolers containing ice packs. This allowed the bumblebees to slow down for easier identification. At the end of the 90 person-minute search, the chilled bumblebees were identified on-site, if possible, and photographed. The sex (worker,

male or queen) of each bee was noted, if possible. After photographing and viewing the chilled bees, they slowly became active again and they were released. A few bumblebees were collected to establish a specimen reference library (WDFW scientific collection permit # 17-163). Bees were identified using the guides Koch et al. (2012) and Williams et al. (2014). Photos of unidentified bees were examined later for identification, and many were sent to The Xerces Society or uploaded to their Bumblebee Watch website (bumblebeewatch.org) for identification confirmation. Rich Hatfield, Xerces Society, helped us develop our survey methods.

In most cases we also noted the plant species on which each captured bee was found; we did this especially in the second year (2018). This first year (2017) we noted the plants that bees visited in the survey area, but not necessarily the host plant of each captured bee. In addition, other pollinators (other bees, butterflies and hummingbirds) were noted during the surveys.

Results

We created a spreadsheet and GIS shapefile of historic western bumblebee records on the Olympic Peninsula, which is on file at Olympic National Forest, Washington. This data came from the Xerces Society, who had compiled bumblebee records as of 2013, and from James Strange (USDA Research Entomologist) who had conducted surveys on the peninsula more recently. There were 54 records of western bumblebee on the peninsula, ranging from 1919 to 2015. See Figure one for the locations of the historic detections.

The project staff conducted 30 surveys at twenty-six sites distributed throughout the Forest in nine watersheds (Table 1; Figure 1). Note that some sites were close together. For example, we surveyed three different locations at Sitkum and two locations at Mt. Townsend. Although close together, the habitats and locales were distinct and were considered separate sites. Some sites were surveyed twice, including Dennie Ahl Seed Orchard, Mint Meadow, Tubal Cain, Green Hill FS Road 2620.032, and Mt. Muller.

The sites with the highest number of bumblebees were the Skokomish roadside sites, Dennie Ahl Orchard, Mint Meadow, Sitkum, and the Three Peaks Botanical Area.

Eleven species of bumblebees were identified (Table 2). In some cases, we could not verify species or could not determine between *caliginosus* and *vosnesenskii* (Table 2). The most widely distributed species were *Bombus flavifrons* and *Bombus vosnesenskii*. *B. flavifrons* (Figure 2) was detected in 90% of the surveys. Ten bumblebees were collected for a reference library. The pinned specimens are stored at Olympic National Forest office in Quilcene, Wash.

The rare *Bombus occidentalis* was detected at one site, the Mount Townsend Trail. *B. occidentalis* was observed at this site in both 2017 and in 2018 on cow parsnip (*Heracleum lanatum*) flowers in subalpine habitat, 5050 feet elevation (Figures 3 and 4).

We noted the presence of several other pollinators at the sites (Table 1). Pollinators, including hummingbirds, butterflies, flies, native bees, and non-native European honeybees (*Apis mellifera*), were widely distributed. European honeybees were detected at eight sites, ranging from low to high elevation (Table 1). Leafcutter bees (*Megachile* sp.) were noted at Skokomish Borrow Pit, Walter Creek Bridge, and Quinalt Ridge. Rufous hummingbirds (*Selaphorus rufus*) were detected at nine survey sites. Butterflies were noted at 22 sites; seventeen species of butterflies were identified (Table 3).

Bumblebees were observed on the flowers of 27 different plant species. Host plants were primarily herbaceous plants, but some were woody shrubs (Table 4). The plants included non-native as well as native species.

Discussion

The summers of 2017 and 2018 were relatively dry. Most plants were done flowering by August at some locations, particularly lower elevations. Ideally, survey efforts would include numerous survey visits at each site distributed throughout the season. The late-season Deer Ridge survey, for example, revealed few

bees; most of its plants were done flowering. Earlier visits may show a more accurate picture of the *Bombus* community. However, staff and time are often limited. The intent of this survey effort was to survey a broad array of sites throughout the Forest. Future efforts might entail surveying a reduced number of select sites, such as Mt Townsend, focusing on the apparent peak season.

This survey effort showed that bumblebees and other pollinators are diverse and widely distributed on the Olympic National Forest and are found in a variety of habitats and elevations. Even roadsides and other disturbed areas can provide good habitats; the key is the presence of flowering plants and likely the availability of suitable nesting sites. We observed bumblebees visiting a diversity of plant species, both woody and herbaceous, annual and perennial. Our results indicate the importance of providing a variety of plants for pollinators. Some habitats may be limited from a lack of floral resources and could be impacted by climate change causing drier summers. Information from these surveys will be used for planning and implementing habitat improvement activities for bumblebees and other pollinators on the Forest. Many areas in Olympic National Forest, particularly disturbed areas, such as decommissioned roads would likely benefit from native plantings.

Prior to this survey effort, recent detections of *Bombus occidentalis* on the Olympic National Forest included only Mt. Townsend in 2009 and Dungeness in 2013. Our results indicate that *Bombus occidentalis* continues to be rare on the Olympic National Forest. We detected this species at virtually the same location as 2009. We recommend continuing to monitor Mt. Townsend to confirm continued occupancy of *B. occidentalis* at this site, and to continue surveys at other sites as well to determine presence of this species. Because of the scarcity of the species, it could take several seasons to detect other occupied sites.

It should be noted that two surveys' results were likely affected from poor weather or short survey effort. The Mt. Walker survey, with only three bumblebees detected, had poor weather conditions which likely affected the survey results. Big Quilcene survey was a short (45 minute) survey visit.

Bumblebee surveys can a good way to involve youth in nature and biology survey work, since they involve following a scientific protocol, observing and identifying animals and plants in a relatively short time period. Our surveys on the Olympic National Forest successfully involved college- and high school-aged youth. In 2018 a Girl Scouts high school-aged group helped survey the Nicklund Creek Skokomish site, and they seemed very interested and engaged. Student Conservation Association Interns (college students) did many of the surveys in both 2017 and 2018. Also, a local high school student helped survey Green Hill site in 2017.

Acknowledgments

Rich Hatfield of the Xerces Society presented a bumblebee ID field training at Olympic National Forest in 2017. We learned a lot, and this project would not be so successful without him. The Xerces Society confirmed identification of many of the captured photographed bumblebees.

Region 6 Interagency Special Status Sensitive Species Program provided funding for this project. Student Conservation Association (SCA) recruited intern applicants and provided partial funding for interns.

This project would not have been possible without Susan Piper, Terrestrial Program Manager, who always encouraged applying for funding, and Cheryl Bartlett, Forest Botanist, who helped with surveying and identifying survey sites; and the following people who conducted many surveys: Halle Lambeau, Karen Guzman, Conor Cubit, Wildlife Interns, and Allison Trudgeon, Forestry Technician. We also thank Anita McMillan, Washington Department of Fish and Wildlife, for joining us at the training session and partnering with us to find bumblebees on the Olympic Peninsula. In addition, we thank Wildlife Biologist Betsy Howell, Environmental Planner Kim Crider, Forestry Technician Susette Huett, and Volunteer Entomologist Elizabeth Sussky for attending the training and searching for bumblebees.

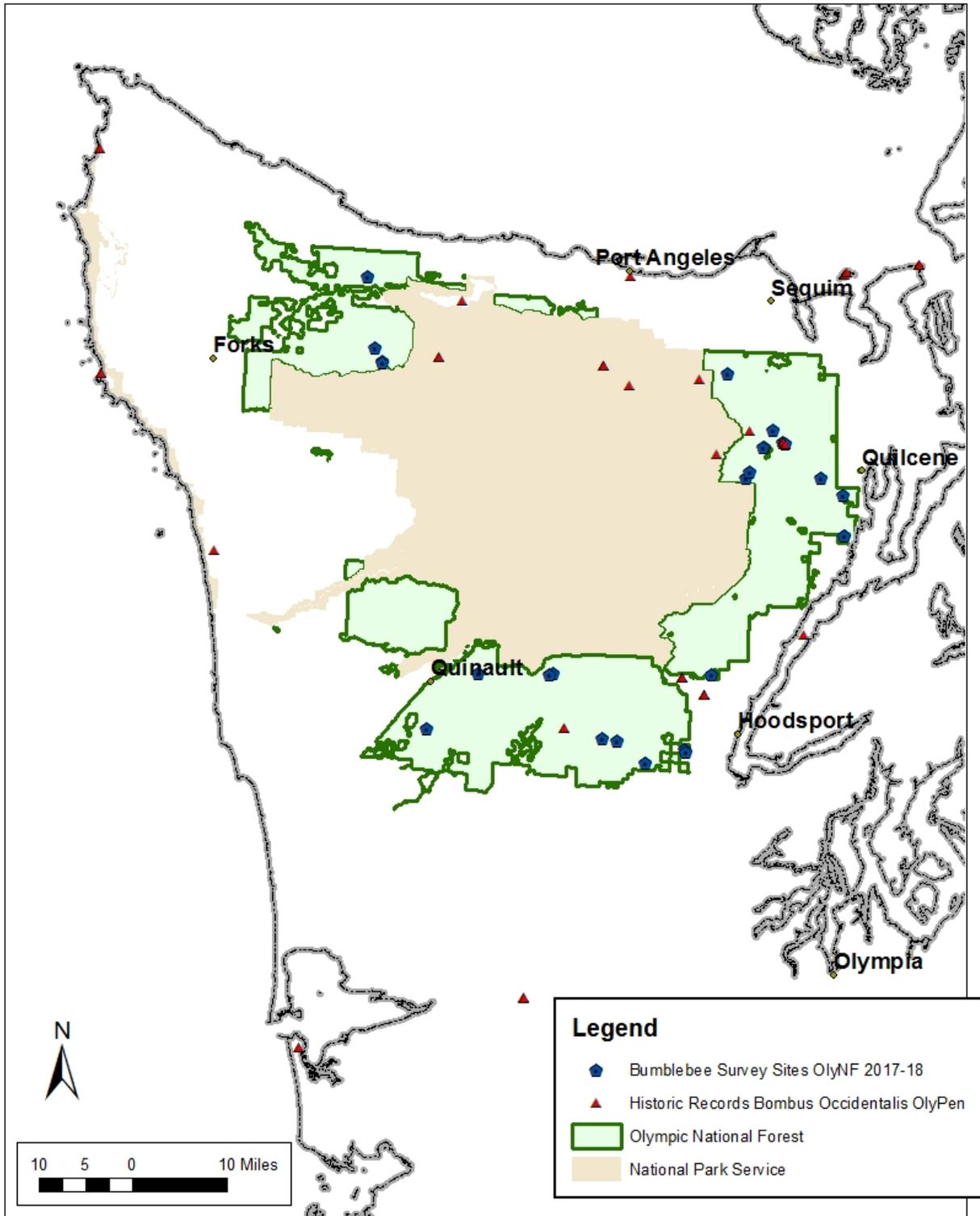


Figure 1. Map of Bumblebee Surveys Sites on the Olympic National Forest, 2017-2018.



Figure 2. *Bombus flavifrons* was the most abundant species detected on the Olympic National Forest during surveys in 2017 and 2018. Pictured here is a male (left) and female (right).



Figure 3. A western bumblebee (*Bombus occidentalis*) observed at Mt Townsend, Olympic National Forest, in 2017.



Figure 4. *Bombus occidentalis* habitat, Mt. Townsend Trail, Olympic National Forest, 2017 and 2018.

Table 1. Bumblebee survey information, including sites, species, numbers, plants, and survey notes, on the Olympic National Forest, 2017 and 2018.

Survey Site, Watershed Lat. Long., Elevation (ft.) Survey Date	<i>Bombus</i> Species Detected	Number				# Species #Individuals <i>Bombus</i>	Floral Resources	Notes Other pollinators noted
		Female*	Male	Unk. sex	Total			
Dennie Ahl Seed Orchard 1 S Fork Skokomish River 47.3803, -123.2572 600' 12 July 2017	caliginosus flavifrons mixtus rufocinctus vosnesenskii	3 3 5 1 2	7 2		3 3 12 3 2	5 species 23 bees	Spirea, salal, rose	Honeybees noted. Part of Training session with R. Hatfield
Dennie Ahl Seed Orchard 1 5 June 2018	caliginosus flavifrons mixtus vosnesenskii	1 15 4	2	1 1 1	1 1 18 5	4 species 25 bees	Spirea, Blue- eyed Mary, lupine, oxeye daisy, cat's ear	Other native bees, 3 species butterflies**
Dennie Ahl Seed Orchard 2 S Fork Skokomish River 47.3764, -123.2562 600' 12 July 2017	caliginosus flavifrons mixtus rufocinctus. vosnesenskii	13 1 5 16 2	2		13 1 5 18 2	5 species 39 bees	Spirea, salal, rose	mimic flies noted. Part of training session with R. Hatfield
Mint Meadow, Lilliwaup Creek-Frontal Hood Canal 47.4979, -123.2029 910' 13 July 2017	caliginosus flavifrons mixtus	1 7* 20	10		1 7 30	3 species 38 bees	Spirea, salal, rose, snowberry	One of the bumblebees was a queen Part of training session with R. Hatfield
Mint Meadow 20 June 2018	flavidus flavifrons mixtus unknown sp.	1 3 15 1	1 1	2 2	1 4 18 3	3-4 species 26 bees	Pennycress, Spirea, snowberry	Hummingbird*** 2 species butterflies
Walter's Creek Bridge S Fork Skokomish River 47.3910, -123.04484 1100' 13 July 2017	flavifrons melanopygus mixtus vosnesenskii	18 1 29 2		1	18 1 30 2	4 species 51 bees	cat's ear, plantain, fireweed	Leafcutter bees; 3 species butterflies. Part of training session with R. Hatfield.

Table 1 (continued)

Survey Site, Watershed Lat. Long., Elevation (ft.) Survey Date	<i>Bombus</i> Species Detected	Number				# Species #Individuals <i>Bombus</i>	Floral Resources	Notes Other pollinators noted
		Female*	Male	Unk. sex	Total			
Borrow Pit FS Rd 2350 S Fork Skokomish 47.3879, -123.4129 1350' 13 July 2017	caliginosus flavifrons mixtus melanopygus vosnesenskii	1 13 17 2 7		1	1 13 18 2 7	5 species 41 bees	catsear, plantain, fireweed	Honeybees; leafcutter bees; mimic flies. Part of training session with R. Hatfield.
Nicklund Creek S Fork Skokomish River 47.3552, -123.3460 900' 3 August 2018	caliginosus flavifrons sitkensis vosnesenskii vosnsenskii/ caliginosus	2	15 2 1 2 2		15 4 1 4 2	4 species 26 bees	Fireweed, goldenrod	Hummingbird noted. Survey with 8 high school- age Girl Scouts
Green Hill FS Road 2620.032 Dosewallips River 47.7199 -122.9118 2300' 14 July 2017	flavidus flavifrons melanopygus mixtus vosnesenskii	5 11 1	1 1	1	5 11 1 2 1	5 species 20 bees	fireweed, oxeye daisy, lupine	Hummingbird
Green Hill FS Road 2620.032 1 June 2018	flavifrons mixtus vosnesenskii	2 2 2			2 2 2	3 species 6 bees	Spring gold; lupine	Mimic flies noted. Marginal weather conditions. High school student shadowed.
Green Hill Meadow Dosewallips River 47.1859 -122.9130 2200' 14 July 2017	flavifrons		2		2	1 species; 2 bees	salal	None observed
Sitkum Road 2952 Calawah River 47.9590 -123.9931 3400' 18 July 2017	flavifrons	50			50	1 species 50 bees	Lupine, oxeye daisy	Honeybees; 2 species butterflies

Table 1 (continued)

Survey Site, Watershed Lat. Long., Elevation (ft.) Survey Date	<i>Bombus</i> Species Detected	Number				# Species #Individuals <i>Bombus</i>	Floral Resources	Notes Other pollinators noted
		Female*	Male	Unk. sex	Total			
Sitkum FS Road 2920 Calawah River 47.9806, -124.0128 3080' 25 July 2017	flavidus flavifrons sitkensis unknown sp.	1 1	5	1 6	6 1 1 6	3-4 species; 14 bees	catsear, fireweed, birdsfoot trefoil	None noted.
Sitkum FS Road 2918 Calawah River 47.9601, -123.9932 3450' 18 July 2018	flavidus sitkensis	5		9 2	9 7	2 species 16 bees	Lupine, oxeye daisy, birdsfoot trefoil, fireweed, Oregon sunshine	Honeybees, mimic flies, hummingbird, 3 species butterflies
Colonel Bob Trail Upper Quinault River 47.4832 -123.7371 3450' 1 August 2017	flavifrons	3		7	10	1 species 10 bees	bluebell, yarrow, Spirea	Honeybees; 2 species butterflies
Tubal Cain Trail Higher Dungeness River 47.8531 -123.1051 5200' 7 August 2017	flavifrons	9	7		16	1 species 16 bees	fireweed	Honeybees; 3 species butterflies
Tubal Cain Trail Lower Dungeness River 47.8529 -123.1038 4700' 11 July 2018	vosnesenskii unknown sp.			3 1	3 1	2 species 4 bees	vetch	Bald-faced hornets, bees, hummingbird, 5 species butterflies, all noted on walk up.
Upper Dungeness 47.88070, -123.08312 2550' 7 August 2017	flavifrons melanopygus	1	7 4	2	10 4	2 species 14 bees	fireweed	Mimic flies, 1 butterfly
Marmot Pass Dungeness River 47.8146, -123.1342 6200' 8 August 2017	flavifrons melanopygus vosnesenskii	14	1 1	3	15 3 1	3 species 19 bees	lupine, bluebell	2 species butterflies

Table 1 (continued)

Survey Site, Watershed Lat. Long., Elevation (ft.) Survey Date	<i>Bombus</i> Species Detected	Number				# Species #Individuals <i>Bombus</i>	Floral Resources	Notes Other pollinators noted
		Female*	Male	Unk. sex	Total			
Boulder Shelter Dungeness River 47.8146, -123.1342 6200' 16 July 2018	flavidus flavifrons insularis		1 1 1		1 1 1	3 species 3 bees	Edible thistle, Valerian	Hummingbird, 3 species butterflies
Big Quilcene FS Rd 27 Big Quilcene River 47.8087, -122.9709 2120' 8 August 2017	caliginosus flavifrons mixtus vosnesenskii/ caliginosus	4 1 3	3	1 1	1 7 2 3	3-4 species, 13 bees	invasive pea vine	Other bees; shortened survey 45 min.
Mt. Townsend Trail Big Quilcene River 47.8598, -123.0552 5050' 11 August 2017	flavifrons melanopygus occidentalis vosnesenskii	4 2 1	5 10 1		9 12 1 1	4 species 23 bees	fireweed, cow parsnip	Honeybees; 3 species butterflies noted on way.
Mt. Townsend Upper Trail Big Quilcene River 47.9611 -123.0612 5900' 10 August 2018	bifarius flavifrons melanopygus mixtus	2 2 2		3 3	5 2 3 2	4 species 12 bees	Vetch, Campanula, pearly everlasting	Honeybees, hummingbird, 5 sp. butterflies noted. 1 <i>B. occidentalis</i> on cow parsnip observed outside of survey on way back.
Mt Muller Trail Sol Duc River 48.091361 -124.0361 3350' 14 August 2017	flavifrons vosnesenskii	3	1	4	4 4	2 species 8 bees	salal, fireweed	1 species butterfly
Mt Muller Trail 21 June 2018	flavidus flavifrons melanopygus sitkensis		1 2	1 6	1 1 2 6	4 species 10 bees	Vetch, fireweed, kinnikinnick	Hummingbird, 5 butterfly species

Table 1 (continued)

Survey Site, Watershed Lat. Long., Elevation (ft.) Survey Date	<i>Bombus</i> Species Detected	Number				# Species #Individuals <i>Bombus</i>	Floral Resources	Notes Other pollinators noted
		Female*	Male	Unk. sex	Total			
Three Peaks Botanical Area 1 Wynoochee River 47.48940, -123.56561 3000' 18 August 2017	flavifrons melanopygus vosnesenskii	25 3 3			25 3 3	3 species 31 bees	elephant's head, <i>Delphinium</i> <i>glaucum</i> , Sitka burnet	None noted.
Three Peaks Botanical Area 2 Wynoochee River 47.48705, -123.57539 3600' 18 August 2017	flavidus flavifrons melanopygus vosnesenskii	12 1 10	4 6 1		4 18 2 10	4 species 34 bees	fireweed, lupine, willow, cow parsnip	None noted.
Mt. Walker Big Quilcene River 47.7839, -122.9178 2800' 31 July 2018	vosnesenskii sitkensis	1	2		1 2	2 species 3 bees	Spirea	None noted. Bad weather conditions
Quinault Ridge Road Upper Quinault River 47.3950, -123.8498 1800' August 2018	flavifrons insularis mixtus vosnesenskii	1 1 1 2	2 1		3 1 2 2	4 species 8 bees	Fireweed, birdsfoot trefoil	Leafcutter bee, mimic flies, 2 sp. butterflies, Hummingbird
Deer Ridge Trailhead Dungeness River 49.96513, -123.1930 2480' 29 August 2018	flavifrons melanopygus sitkensis	2 1	1	1	3 1 1	3 species 5 bees	Salal, Oxeye daisy	Tachinid fly, 2 species butterflies

*All females were workers, except one queen observed at Mint Meadow.

**See Table 3 for butterfly species.

*** Rufous hummingbird (*Selasphorus rufus*).

Table 2. Bumblebee (*Bombus*) species found in Olympic National Forest, the number detected, and the number of surveys each species was detected, 2017-2018.

Scientific Name	Common Name	# Bees (n = 594)	# Surveys (n = 30)
<i>Bombus flavifrons</i>	Yellow head bumblebee	266	27 (90%)
<i>B. vosnesenskii</i>	Yellow-faced bumblebee	51	16
<i>B. mixtus</i>	Fuzzy-horned bumblebee	141	12
<i>B. melanopygus</i>	Black-tailed bumblebee	34	11
<i>B. caliginosus</i>	Obscure bumblebee	35	7
<i>B. flavidus</i>	Fernald cuckoo bumblebee	27	7
<i>B. sitkensis</i>	Sitka bumblebee	18	6
<i>B. sp.</i>	Unknown species	10	3
<i>B. rufocinctus</i>	Red-belted bumblebee	21	2
<i>B. insularis</i>	Indiscriminate cuckoo bumblebee	2	2
<i>B. vosnesenskii/ caliginosus</i>	Yellow-faced Group	5	2
<i>B. bifarius</i>	Two form bumblebee	5	1
<i>B. occidentalis</i>	Western bumblebee	1	1

Table 3. Butterfly species detected during bumblebee surveys, Olympic National Forest, 2017 and 2018.

Common Name	Scientific Name	Sites
Woodland Skipper	<i>Ochloides sylvanoides</i>	Quinault Ridge, Deer Ridge, Townsend
Silver-spotted skipper	<i>Epargyreus clarus</i>	Dennie Ahl Orchard
Clodius Parnassian	<i>Parnassius clodius</i>	Walter Cr., Sitkum, Colonel Bob, Townsend
W. Tiger Swallowtail	<i>Papilio rutulus</i>	Dennie Ahl, Mint Meadow, Tubal Cain, Muller
Pale Swallowtail	<i>Papilio eurymedon</i>	Tubal Cain, Muller
Swallowtail unidentified	<i>Papilio sp.</i>	Walter Cr., Boulder Shelter
Pine White	<i>Neophsia menapia</i>	Deer Ridge
Sara orangetip	<i>Anthocharis sara</i>	Tubal Cain, Boulder Shelter, Muller
White unidentified	<i>Pieris sp.</i>	Muller
Lilac-bordered Copper	<i>Lycaena nivalis</i>	Townsend
Silvery Blue	<i>Glaucopsyche lygdamus</i>	Sitkum
Spring Azure	<i>Celastrina argiolus</i>	Muller
Unidentified blue	<i>Lycaenidae</i>	Sitkum, Tubal Cain
Great Spangled Fritillary	<i>Speyeria cybele</i>	Tubal Cain, Marmot Pass, Col. Bob, Townsend
Hydaspe Fritillary	<i>Speyeria hydaspe</i>	Upper Dungeness, Townsend, Sitkum, Colonel Bob, Boulder Shelter, Quinault Ridge
W. Meadow Fritillary	<i>Boloria epithore</i>	Townsend, Walter Cr.
Edith's checkerspot	<i>Euphydryas editha</i>	Tubal Cain
Snowberry Checkerspot	<i>Euphydryas colon</i>	Marmot Pass, Tubal Cain, Boulder Shelter, Townsend
Checkerspot species	<i>Euphydryas sp.</i>	Muller
California Tortoiseshell	<i>Nymphalis californica</i>	Tubal Cain
Lorquin's Admiral	<i>Limenitis lorquini</i>	Dennie Ahl Orchard, Mint Meadow
unidentified species	<i>Lepidoptera</i>	Muller

Table 4. Plant host species of bumblebees (*Bombus*) observed during surveys, Olympic National Forest, 2017 and 2018.

Common Name	Scientific Name	<i>Bombus</i> species, if known
Lupine	<i>Lupinus. sp</i>	<i>unk. sp., sitkensis, flavifrons, mixtus</i>
Catsear	<i>Hypochaeris sp.</i>	<i>unk. sp., sitkensis, flavidus, mixtus</i>
Birdsfoot Trefoil	<i>Acmispon/ Lotus denticulatus</i>	<i>sitkensis, flavidus, vosnesenskii</i>
Spirea	<i>Spirea sp.</i>	<i>unk. sp., flavifrons, mixtus</i>
Fireweed*	<i>Chamerion angustifolium</i>	<i>unk. sp.; flavidus; vosnesenskii, flavifrons, melanopygus, sitkensis, caliginosus, mixtus</i>
Yarrow	<i>Achillea millefolium</i>	<i>flavifrons</i>
Oxeye daisy*	<i>Leucanthemum vulgare</i>	<i>unk. sp., flavidus; flavifrons, mixtus</i>
Salal	<i>Gaultheria shallon</i>	<i>unk. sp., vosnesenskii, flavifrons, melanopygus, sitkensis</i>
Sitka barnet	<i>Sanguisorba canadensis</i>	<i>vosnesenskii</i>
Elephant's head	<i>Pedicularis groenlandica</i>	<i>melanopygus</i>
Tall Larkspur	<i>Delphinium glaucum</i>	<i>flavifrons</i>
Willow	<i>Salix sp.</i>	<i>vosnesenskii</i>
Spring gold	<i>Lomatium utriculatum</i>	<i>mixtus</i>
Oregon sunshine	<i>Eriophyllum lanatum</i>	<i>sitkensis</i>
Pea vine*	<i>Lathyrus latifolius</i>	<i>flavifrons, caliginosus, mixtus</i>
Vetch*	<i>Vicia sp.</i>	<i>sitkensis</i>
Rose	<i>Rosa sp.</i>	<i>unk. sp.</i>
Blue-eyed Mary	<i>Collinsia parviflora</i>	<i>mixtus</i>
Snowberry	<i>Symphoricarpos albus</i>	<i>unk. sp., mixtus</i>
Pennycress*	<i>Thlaspi arvense</i>	<i>mixtus, flavifrons, flavidus</i>
Edible thistle	<i>Cirsium edule</i>	<i>flavidus</i>
Valerian	<i>Valeriana sitchensis</i>	<i>insularis, flavifrons</i>
Common Harebell	<i>Campanula rotundifolia</i>	<i>mixtus, bifarius</i>
Pearly everlasting	<i>Anaphalis margaritacea</i>	<i>bifarius</i>
Cow parsnip	<i>Heracleum lanatum</i>	<i>occidentalis, flavifrons, melanopygus, flavidus</i>
Kinnikinick	<i>Arctostaphylos uva-ursi</i>	<i>melanopygus</i>
Goldenrod	<i>Solidago canadensis</i>	<i>caliginosus/ vosnesenskii;</i>

*non-native species

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