An Annotated Checklist of Lichens of the Opal Creek Wilderness and Adjacent Areas: a Pre-Fire Baseline

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ABSTRACT
In 2020 the Beachie Creek Fire burned a large area of forest in the northern Oregon Cascade Range including public and private land and much of the Opal Creek Wilderness. We compiled a baseline data set from various sources of the lichens known to occur before the fire within this area. These data are presented as an annotated species checklist documenting two hundred and eighty species. *Euopsis pulvinata*, *Lepraria elobata*, *Miriquidica instrata*, *Plectocarpon nephromeum*, *Porpidia flavicunda,* and *Rhizocarpon distinctum* are reported as new for Oregon based on an online search of herbarium records. In the proximity of the wilderness area where populations of listed rare species are known, their occurrences are mapped against a fire intensity gradient. Drone-generated images of selected locations before and after the fire are included to help gauge the fire effects on lichen communities. Increased fire activity in the area is potentially causing landscape-level changes in biodiversity, and the data we present represent a historical baseline for future analysis of the effects of the Beachie Creek fire on lichen diversity.

Keywords: fire intensity, Willamette National Forest, megafire, disturbance, climate change, species inventory

INTRODUCTION
Wildfires are increasing in frequency and severity in the Pacific Northwest (Halofsky 2020) affecting lichen communities that occur in this region. Most lichens are not adapted to survive high intensity wildfire as individuals, but instead rely on recolonization to occupy areas where they have been eliminated by fire (Longán et al. 1999). In forests, many lichens can survive low-severity fire, but in areas of high-severity fire virtually all lichens may be eliminated across vast areas of the landscape (Miller et al. 2018). Proximity to living trees that can disperse propagules of epiphytic lichens is thought to be important in reestablishing lichen communities after wildfire (Romagni & Gries 2000, Berryman & McCune 2006).

Loss of lichen communities due to increased wildfire occurrences and intensity can have cascading trophic effects on other species that rely on lichens for their life history (Palm et al.

2022). At shorter time scales post-fire colonization of lichens can favor early successional lichen species that inhabit dead wood and charcoal while reducing rare species (Johansson et al. 2006). Even in fast-growing shrub-dominated plant communities, reestablishment of certain functional groups such as cyanolichens can take decades after wildfire (Miller et al. 2020). Research on the long-term effects of climate change on lichen communities has focused on shifting climate envelopes (Ellis et al. 2007, Ellis 2019, Smith et al. 2020) and microclimate refugia (Di Nuzzo et al. 2022) but short-term effects of today's larger and more severe fires are in need of further study.

The northern Oregon Cascade Range contains diverse and abundant lichen communities with rare and endangered species concentrated in specific habitats such as old-growth forests, riparian areas, rock outcrops, and hardwood gaps (McCune et al. 2002, Peterson & McCune 2003). Within this region, the Opal Creek Wilderness was the largest contiguous mature old-growth forest until it burned in the Beachie Creek Fire in September, 2020. The burned area previously supported a diverse lichen community, including a number of rare species. Their fate is unknown, and here we compile a baseline list of lichens that occurred within the fire perimeter to aid in determining the effects of this fire on regionally important lichen populations. Management of forest resources and biodiversity can rely on baseline information to determine goals for desired future conditions and to provide benchmarks for comparison with future biodiversity. The Beachie Creek Fire will be of particular interest for future study because it includes large areas of older forest and wilderness in an area that has been relatively heavily explored by lichenologists over the last several decades.

STUDY AREA

The study area encompasses the Beachie Creek Fire footprint in the land of the Kalapuya, Santiam and Molalla peoples in the Northern Cascade mountains of Oregon (Figure 1). This fire was started on August 16, 2020 by a lightning strike in the Opal Creek Wilderness. The wildfire started out small, only growing slightly in the first days of the fire and reaching about 200 hectares (approx. 500 acres) by September 6th. On September 7th critical fire weather resulting from high temperatures, low humidity and extremely high winds caused the fire to rapidly spread down slope. In one night, the fire burned approximately 52,600 hectares (approx. 130,000 acres) and heavily damaged or completely destroyed the communities of Jawbone Flats, Elkhorn, Gates, Mill City, Mehama, Lyons and parts of Detroit Lake. This fire burned approximately 94% of the Little North Santiam River watershed (FEMA 2020).

There were five other fires in Oregon that burned over one hundred thousand acres each during this time, collectively called the Labor Day Fires of 2020. These fires destroyed thousands of homes and charred over a million acres, making 2020 one of the costliest fire seasons in the history of Oregon.

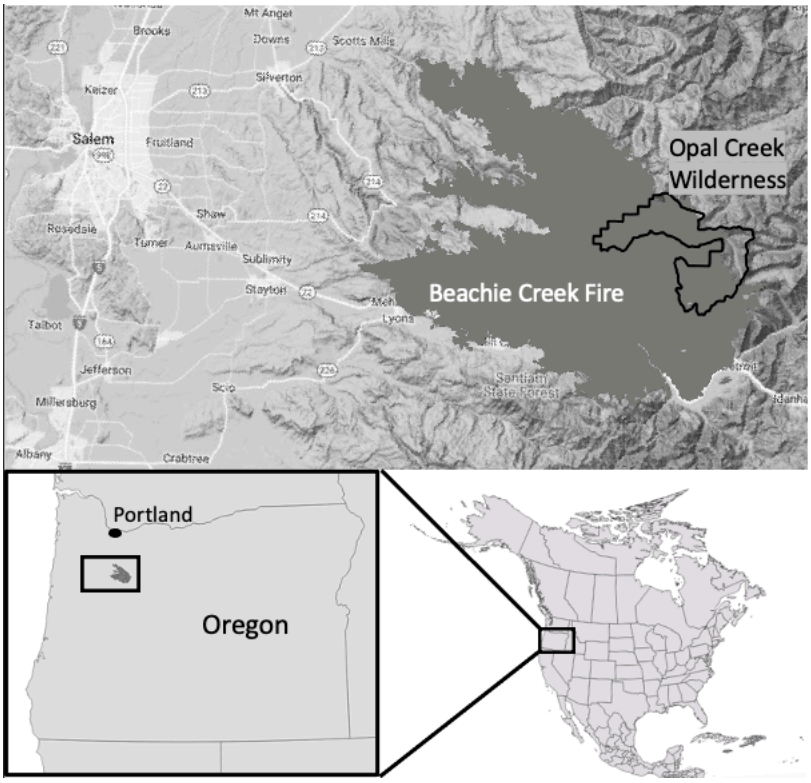

Figure 1. Location of the study area within North America and Oregon. The Opal Creek Wilderness Area is outlined in black and the Beachie Creek Fire is in gray.

Climate- The climate is Mediterranean with most precipitation falling from fall through spring with a pronounced annual drought in the summer. Average annual precipitation values for the Beachie Creek Fire range from the drier lower elevations with an average of 152 cm to 290 cm in the wetter upper elevations in the eastern portion of the fire (FEMA 2020). Elevation ranges from 265 Meters (870 ft.) at the Santiam River to 1,460 Meters (4,790 ft.) at the top of Whetstone Mountain. Lichen samples were collected from throughout the elevation range.

Geology- The study area is composed of igneous rock types from the Western Cascades and the High Cascades geological provinces. Volcanic parent material in this area is composed of basalt, andesite, rhyolite and dacite. Along the foothill toe slopes near the Santiam River valley bottom at the western edge of the fire there are areas underlain with unconsolidated fluvial glacial till as well as debris flow and terrace deposits (FEMA 2020).

Vegetation- The study area is predominately mountainous forested slopes dominated by a mix of conifer species. In the lower to mid-elevations the predominant evergreen species include Douglas-fir (*Pseudotsuga menziesii*), Western hemlock (*Tsuga heterophylla*), Western red cedar (*Thuja plicata*), and Western yew (*Taxus brevifolia*). In streamside and seepy areas some deciduous trees become dominant including Black cottonwood (*Populus trichocarpa*), Oregon Ash (*Fraxinus latifolia*) Red alder (*Alnus rubra*), Vine maple (*Acer circinatum*) and Big-leaf

maple (*Acer macrophyllum*). Upper elevation forests are dominated by Pacific silver fir (*Abies amabilis*) with some Mountain hemlock (*Tsuga mertensiana*), Alaska yellow cedar (*Callitropsis nootkatensis*) and Engelmann spruce (*Picea engelmannii*).

Understory species are dominated by Oregon grape (*Berberis nervosa*), Rhododendron (*Rhododendron macrophyllum*), Western sword fern (*Polystichum munitum*), Salal (*Gaultheria shallon*), and Red huckleberry (*Vaccinium parvifolium*) with beargrass (*Xerophyllum tenax*) becoming more prominent at upper elevations.

MATERIALS AND METHODS

Annotated Checklist- We compiled a list of all known lichens and lichenicolous fungi occurring in the Opal Creek Wilderness and other areas within the perimeter of the 78,336-hectare (193,573 ac.) Beachie Creek Fire (Figure 1). Data were compiled from six separate sources detailed below. The data drawn from each source are referenced after the letters in the checklist. At least one collection number is provided from every data source where a collection occurs. For the sake of brevity, species with many collections are represented by only a short list of representative collection numbers. Nomenclature follows Esslinger (2021) except where noted.

Data Sources

A. **NW Lichenologists-** In 2007 a several-day foray was conducted in the Opal Creek area by the Northwest Lichenologist and hosted by the Opal Creek Ancient Forest Center. After the foray, records provided by attendees were compiled. Specimens were deposited in several herbaria and most individual records can be found in the Consortium of North American Lichen Herbaria (CNALH). Species that were observed and photographed or noted during the foray but not collected are denoted as “obs s.n.”.

B. **Bruce McCune’s herbarium-** A geographically constrained search of BMs specimen database was conducted and all species identified with a high degree of confidence are included. All numbers in the checklist are Bruce McCune’s unless otherwise noted and most specimens are housed at the Oregon State University herbarium (OSC). This source includes visual observations based on surveys conducted in Fisherman’s Bend Campground by Sherri Pittam, Bruce McCune and Terry Fennell (Pittam et al. 2019). Visual observations without collection numbers are indicated in the checklist by s.n.

C. **FIA lichen plots-** A database search of publicly available data was conducted in the National Air Quality and Lichens database (https://gis.nacse.org/lichenair) for all lichen plots occurring within the study area.

D. **The Evergreen State College field trip collections-** Field trips to the Opal Creek area were conducted by The Evergreen State College (TESC) led by Lalita Calabria between 2013 and 2018. Representative specimens cited here are deposited in the The Evergreen State College herbarium (EVE) and can be found on CNALH.

E. **Jawbone Flats calicioid lichens study-** An ecological study of the calicioid lichens and fungi occurring on the buildings at Jawbone Flats on the campus of the Opal Creek Ancient Forest Center was conducted by TESC and Portland State University (see Petersen et al. 2017). All specimens are deposited in (EVE).

Conservation Status

The conservation status of the lichen taxa compiled in this list was determined using the Oregon Biodiversity Information Center (ORBIC) 2019 rankings (Oregon Biodiversity Information Center, 2019). These rankings are developed according to NatureServe's guidelines on conservation ranks. Global ranks begin with a "G" and state ranks begin with a "S". Both use the following ranking system: 1 = critically imperiled; 2 = imperiled; 3 = rare, uncommon, or threatened; 4 = not rare and apparently secure, and 5 = demonstrably widespread. Due to the high rates of species endemism in California and Oregon, ORBIC evaluates and further treats NatureServe rankings for state application using Lists 1 - 4.

RESULTS and DISCUSSION

The compiled species list contains 280 taxa including 232 (83%) chlorolichens, 59 (20%) cyanolichens, and including 16 (5%) species that are tripartite lichens. Nineteen (7%) species are calicioids and 5 (2%) species are non-lichenized or lichenicolous species that are traditionally treated with lichen. The numbers for functional groups are as follows: 110 (40%) microlichen, 106 (38%) foliose, and 64 (23%) fruticose. One hundred and sixty-two (58%) are only recorded from one data source, and 12 (4%) are listed as rare species with ORBIC.

From the compiled list of specimens sixteen locations of occurrences of ORBIC listed rare species were documented from within or in close proximity of the Opal Creek Wilderness (figure 2). Twelve (75%) of these locations are located in areas that were characterized as high burn severity, and two (12.5%) occurrences are in moderate burn severity and two (12.5%) are in low burn severity areas. The fate of these populations is currently unknown. Three locations of ORBIC listed rare species were known from Fisherman's Bend Campground, all three of these locations (100%) are in high burn severity locations and all were apparently extirpated in the fire (Stone pers. com. 2022).

ORBIC Listed Species occurring in the study area

G3G4, S3, List 4 ***Hypotrachyna afrorevoluta*** (Krog & Swinscow) Krog & Swinscow - Corticolous on hardwoods and conifers in coastal forests and forested riparian zones, and saxicolous on rock or soil in forest habitats (Exeter *et al* 2016). *Hypotrachyna afrorevoluta* is known from Eurasia, Africa, South and North America. The western North American range of the species includes British Columbia, Washington, Oregon, California, and Arizona. In Oregon, *H. afrorevoluta* can be found at low elevations in coastal wetlands and on headlands and ridges in coastal dunes and marine estuaries; it has also been observed in the Willamette Valley, in the Cascade-Siskiyou National Monument, and more rarely in the west Cascades (Exeter et al. 2016, Glavich et al. 2005, Villella et al. 2018).

G1, S1, List 1 ***Hypotrachyna riparia*** McCune - Corticolous on shrubs and hardwoods in ash swamps and riparian forests. *H. riparia* is endemic to northwestern North America, and found only at low elevations in the west Cascades and Willamette Valley of Oregon (Exeter et al. 2016, McCune 2008). This species is threatened by habitat loss due to development and wildfires and from the potential future loss of Oregon ash habitat due to the recent arrival of the invasive Emerald ash borer (Stone et al. 2022).

G4, S3, List 2 ***Nephroma occultum*** Wetmore - Corticolous, primarily in the mid- to upper-canopy of conifers in old growth forests and occasionally in mid- to lower-canopy of second growth/seral conifer stands (Exeter et al. 2016, Goward 1995, Rosso et al. 2000). In British Columbia, *N. occultum* has also been observed in the lower canopy of old growth forests (Goward 1995). The species is a rare endemic to northwestern North America from Alaska to Oregon. *N. occultum* is most abundant west of the Cascade Range between approx. 300 to 1,000 M in elevation with disjunct, interior populations observed in British Columbia (Exeter et al. 2016, Goward 1995, Rosso et al. 2000). The species is threatened by habitat loss and microclimate alteration caused by logging, development, and climate change (Exeter et al. 2016).

G2 (Proposed) ***Pannaria oregonensis*** McCune & M.Schultz - Corticolous on twigs and small branches of trees, including *Salix hookeriana, Fraxinus latifolia, Picea sitchensis, Pseudotsuga menziesii,* and shrubs, including *Cytisus scoparius, Rubus spectabilis,* and *Physocarpus* species. Formerly thought to be two species, *Pannaria rubiginella* P.M. Jørg. & Sipman and *Pannaria rubiginosa* (Thunb.) Delise, recent phylogenetic analyses revealed that *P. oregonesis* is a discrete species endemic to northwestern North America (McCune et al. 2022). The species is considered rare with a discontinuous range extending from southern Alaska to northern California. *P. oregonensis* is known from forests, dunes, and woodlands along the Pacific Coast, and occasionally riparian forests of the lower west slope of the Cascade Range. The largest known population of the species was from Fisherman's Bend, a recreation site near Mill City, Oregon occuring on Oregon Ash (*Fraxinus latifolia*) in a riparian swamp. This population was likely extirpated by the Beachie Creek Fire. McCune et al. (2022) proposed that this species receive a global conservation status ranking of G2, Imperiled.

G3G4, S2, List 2 ***Pilophorus nigricaulis*** M. Satô - Saxicolous on volcanic rock talus, boulders, and outcrops in exposed and forested sites at elevations ranging from 130 to 4,700 ft. *Pilophorus nigricaulus* is known only from Japan and west of the Cascade crest from Alaska to Oregon in the Pacific Northwest, and it is rare in the southern part of its range. In Oregon and Washington, *P. nigricaulis* populations are threatened by habitat loss due to anthropogenic activities that impact the substrate and alter microclimatic conditions (Exeter et al 2016, Glavich 2013).

G4, S3, List 4 ***Pseudocyphellaria hawaiiensis*** H. Magn. **-** Corticolous on conifers, hardwoods, and ericaceous shrubs. *P. hawaiiensis* is known from Papua New Guinea, Hawaii, and northwestern North America from Alaska south to northern California (Villella 2021). *P. hawaiiensis* is most abundant on the coast and in the Coast Range in Oregon. The species is less common in the foothills of the west Cascades in Oregon and the western Olympic Peninsula in Washington. *P. hawaiiensis* is threatened by habitat loss and microclimate alteration caused by logging, development, and climate change (Exeter et al. 2016).

G4, S3, List 2 ***Pseudocyphellaria mallota*** (Tuck.) H. Magn. - Corticolous on conifers, hardwoods, and shrubs. Known from mid- to low elevations in northwestern North American and western South America. *P. mallota* is uncommon throughout its range in northwestern North America. The species is threatened by habitat loss and microclimate alteration caused by logging, development, and climate change (Exeter et al. 2016).

G3G4, S3, List 4 ***Pseudocyphellaria rainierensis*** Imshaug - Corticolous or growing over moss on the boles and branches of conifers and hardwoods in riparian old growth forests. This rare species is endemic to northwestern North America occurring from Alaska to Oregon. *P. rainierensis* is most abundant in the west Cascades of Oregon and Washington, and on the Olympic Peninsula in Washington and Vancouver Island, British Columbia from 300 to 1,200 ft. in elevation. This species is threatened by habitat loss and microclimate alteration caused by logging, development, and climate change (Exeter et al. 2016, Glavich 2013).

G3/G4, S2, List 3 ***Scytinium platynum*** (Tuck.) Otálora, P. M. Jørg. & Wedin - A rarely reported rock and soil dwelling species that occurs in mountainous settings along the west coast of North America from British Columbia to Northern Mexico. It is threatened by logging other forms of habitat alteration.

G4/G5, S2, 3 ***Tuckermannopsis subalpina*** (Imshaug) Kärnefelt – This species is widespread and common in the higher elevations of the northern Oregon Cascades where it occurs at the southern edge of its range in coastal North America.

Other Noteworthy Species

The species listed below are noteworthy because they are rarely or previously not reported in the Pacific Northwest according to McCune and Geiser (2009) and McCune (2017). A search of online herbarium records was conducted in CNALH and species with no documented records for Oregon are noted.

Cladonia dahliana Kristinsson- This lichen is treated by some authors as the psoromic acid chemotype of *C. symphycarpa,* but with either status this is only the second report from Oregon.

Cladonia portentosa subsp. ***pacifica*** (Ahti) Ahti- This species is somewhat common along the Pacific coast but this is apparently the first record of this lichen from the Cascades in Oregon.

Euopsis pulvinata (Schaerer) Nyl- This species is widespread but inconspicuous and seldom collected in the Pacific Northwest, apparently new for Oregon.

Lepraria elobata Tønsberg- This species is widespread but infrequent, growing on a wide variety of substrates, apparently new for Oregon.

Miriquidica instrata (Nyl.) Hertel & Rambold- Apparently uncommon found at both high and low elevations, this is apparently the first collection from Oregon.

Plectocarpon nephromeum (Norman) Sant. – Previously reported from Washington, British Columbia and Alaska (Haldeman & Yang 2021) this is apparently the first record from Oregon.

Rhizocarpon distinctum Th. Fr.**-** Within the Pacific Northwest this species has an uncertain abundance and distribution, this is apparently the first record from Oregon.

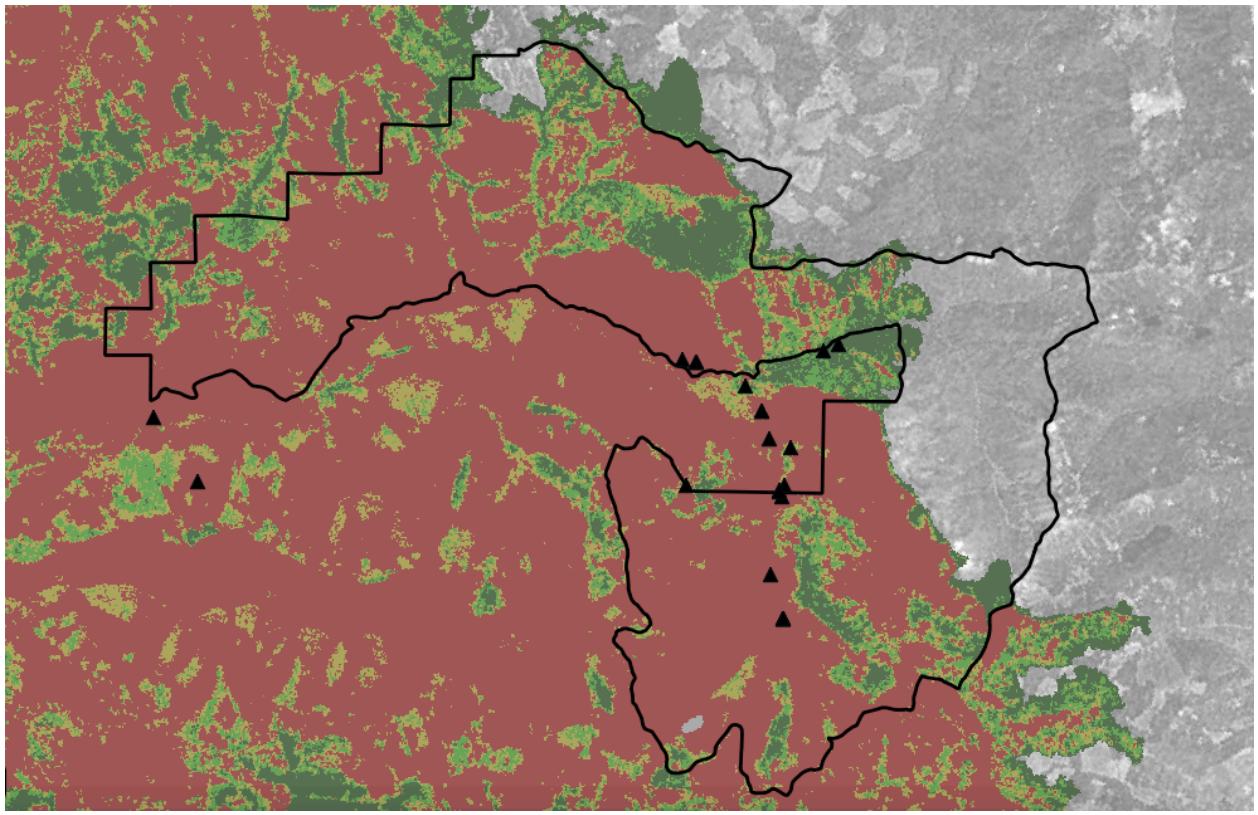

Figure 2. Documented ORBIC listed rare lichen occurrences and fire intensity in the proximity of the Opal Creek Wilderness in eastern area of the Beachie Creek fire. Fire intensity scale is as follows- red: high, yellow: moderate, green: low. The Opal Creek Wilderness is outlined in black and rare lichen occurrences are indicated by black triangles. Areas of gray are outside of the fire perimeter.

Table 1. Annotated Checklist of Lichens and Associated Fungi of the Opal Creek Wilderness and Adjacent Areas

Acolium inquinans (Sm.) A. Massal.- Corticolous on bark of conifers and on wooden buildings. B: Pittam, Fennel & McCune s.n.; E: D12E, G8

Ahtiana pallidula (Tuck. ex Riddle) Goward & Thell - Uncommon epiphyte of conifer crowns. A: J. Villella obs s.n.

Alectoria imshaugii Brodo & D. Hawksw. -Uncommon epiphyte of conifers. B: 29572; C: A. Mikulin 1122140

Alectoria sarmentosa (Ach.) Ach. - Common epiphyte of conifers. B: 28577, Pittam, Fennel & McCune s.n.; C: R. Ulrich 1120144, L. Lasselle 1120140; D: T. Linja TL-10.27.15-44, R. Sullivan RS-10.27.15-91

Alectoria vancouverensis (Gyelnik) Gyelnik ex Brodo & D. Hawksw. - Common epiphyte of conifers in lower elevation areas. B: Pittam, Fennel & McCune s.n.

Amandinea punctata (Hoffm.) Coppins & Scheid. - On bridge timbers over a creek. B: 28376

Arthonia arthonioides (Ach.) A. L. Sm. - On twigs of *Abies* on the edge of an area of mining disturbance. B: 22436
Arthonia ilicina Taylor - On bark of streamside *Thuja plicata.* A: N. Hillyard 1311
Aspicilia aquatica Körber - Saxicolous on rock in creek. A: R. Robertson 9618
Bacidia arceutina (Ach.) Arnold - On fiberglass rail in *Pseudotsuga menziesii* forest. B: 29903
Bacidia circumspecta (Nyl. ex Vainio) Malme - On pressure-treated wood of a boardwalk in a mixed hardwood-conifer floodplain forest. B: 38060
Bacidina inundata (Fr.) Vězda - On creekside rocks in mixed conifer-deciduous riparian forest. B: 28416
Baeomyces rufus (Hudson) Rebent.- On wooden structure in Jawbone Flats and on a shaded boulder in an area of historic mining disturbance. A: J. Villella obs. s.n.; B: 37655
Bellemerea sanguinea (Kremp.) Hafellner & Cl. Roux - On siliceous rocks. B: L. H. Pike 2138
Blastenia ferruginea (Hudson) Th. Fr. - On the bark and twigs of *Acer macrophyllum* in an open area on top of large outcrops. B: 28433
Bryoria fuscescens (Gyelnik) Brodo & D. Hawksw. - Uncommon epiphyte of conifers. C: A. Mikulin 1120140 D: T. Linja 10.27.15-48, S. Pierce SP-10.27.15-58 (as *Bryoria capillaris*)
Bryoria glabra (Motyka) Brodo & D. Hawksw.- Common epiphyte of conifers. B: 22066, Pittam, Fennel & McCune s.n.; C: D. Glavich 1122140
Bryoria pseudofuscescens (Gyelnik) Brodo & D. Hawksw.- Common epiphyte of conifers. A: R. Robertson 9589; C: A. Ingersoll 1120140; D. T. Linja TL 10.27.15-47, S. Pierce SP-10.27.15-57
Bryoria trichodes subsp. ***trichodes*** (Michaux) Brodo & D. Hawksw.- Uncommon epiphyte of conifers. D: Group A #20
Calicium glaucellum Ach. - Uncommon on bark of older trees and on wooden buildings. A: N. Hillyard 1312; E: F1, G1
Calicium lenticulare Ach. - Rare on wooden buildings and bark of conifers. B: E. B. Peterson 2955
Calicium viride Pers.- Common on the bark of older conifer trees and on wooden buildings. E: D11E-b, D1N
Candelaria pacifica M. Westb. & Arup- Common epiphyte of deciduous and conifer trees. B: Pittam, Fennel & McCune s.n.
Candelariella vitellina (Hoffm.) Müll. Arg.- Uncommon on large rock outcrops in forest openings. A: Villella obs. s.n.
Carbonicola myrmecina (Ach.) Bendiksby & Timdal - On charred standing snag in southwest slopes and seepy draws with mixed-age *Pseudotsuga menziesii* forest and plentiful understory of *Acer circinatum* and *Acer macrophyllum.* B: 22001; C: D. Glavich s.n.
Cetrelia cetrarioides (Duby) W. L. Culb. & C. F. Culb. - Rare on hardwoods near streams. B: 37561; Pittam, Fennel & McCune s.n.
Chaenotheca brunneola (Ach.) Müll. Arg. - Uncommon on conifer bark and snags and on wooden buildings. A: J. Robertson 9562; B: 22435; E: A19W, A32W-b

Chaenotheca chlorella (Ach.) Müll. Arg.- Uncommon on wooden buildings. E: A24W-b, B2N
Chaenotheca chrysocephala (Ach.) Th. Fr. - Uncommon on conifer bark and on wooden buildings. B: Pittam, Fennel & McCune s.n.; E: D18E, H2
Chaenotheca ferruginea (Turner ex Sm.) Mig. - Uncommon on bark of *Thuja plicata* and other conifer and on wooden buildings. E: D11E, A7N
Chaenotheca furfuracea (L.) Tibell. - Uncommon on soil in crevices on the downslope side of tree bases and in shaded areas under wooden buildings. D: C. Crossley CDC.10.26.16.02; E: B1N, A1N; G: K. Carpenter 41
Chaenotheca hispidula (Ach.) Zahlbr. - Uncommon on wooden buildings. E: D10E-a, D29W
Chaenotheca laevigata Nádv. - Uncommon on wooden buildings. E: D5N, D22E
Chaenotheca hygrophila Tibell - Uncommon on conifer bark. A: N. Hillyard 1312b
Chaenotheca phaeocephala (Turner) Th. Fr. - Uncommon on wooden buildings. E: E18W, D13E
Chaenotheca subroscida (Eitner) Zahlbr. - Rare on wooden buildings. E: D20E
Chaenotheca trichialis (Ach.) Th. Fr. - Uncommon on wooden buildings. E: A12S-a, A13S-a
Chaenothecopsis nana Tibell - Rare on wooden buildings. E: B4S-b
Chaenothecopsis pusiola (Ach.) Vainio - Uncommon on wooden buildings. E: A31W-b, D10E-b
Chrysothrix candelaris (L.) J. R. Laundon- A: Uncommon on trees in moist settings at lower elevations. A: Villella obs s.n.
Cladonia arbuscula subsp. ***mitis*** (Sandst.) Ruoss- Uncommon in areas of thin soil over rock associated with *Xerophyllum tenax*. A: R. Robertson 9583; B: 37790
Cladonia bellidiflora (Ach.) Schaerer- Common on rocks, logs and tree bases. A: R. Robertson 9616; J. Villella 102404-7; B: 22060, 27374; D: H. Stewart-Ahn 10.25.17 L5a, J. Dumsha JDL 10.
Cladonia borealis S. Stenroos - On *Pseudotsuga menziesii* stump in old-growth *P. menziesii-Tsuga heterophylla* forest. D: L. Calabria 09.2012, A. Arnold 9
Cladonia cariosa (Ach.) Sprengel- On decaying wood and stumps in old growth *Pseudotsuga menziesii-Taxus brevifolia* forest. D: L. Calabria 25
Cladonia carneola (Fr.) Fr.- Uncommon, found in the understory growing on bryophytes and woody debris in forests dominated by *Tsuga heterophylla*. A: J. Villella 102304-s.n.; B: Pittam, Fennel & McCune s.n. D: A.O. 10.25.17.06;
Cladonia chlorophaea s. lat. (Flörke ex Sommerf.) Sprengel **-** Common on soil, woody debris and bark in lower reaches of the forest and on the forest floor. D: J. Roman JR-10.27.15-07
Cladonia coniocraea (Flörke) Sprengel - On rotten logs. C: D. Glavich s. n.; D: I. L. Calabria LC.10.27.15-05
Cladonia cornuta subsp. ***cornuta*** (L.) Hoffm. - On wood in old growth along Battle Ax Creek trail. D: R. Sullivan RS-10.27.15-55, J. Roman 10.27.15-12
Cladonia dahliana Kristinsson- Rare on exposed rock in a steep sloped boulder field behind Jawbone Flats. D: RS-10.28.15-63

Cladonia ecmocyna subsp. ***ecmocyna*** Leighton - Uncommon, found on mossy rock in exposed, sloping, boulder fields at the base of a cliff. A: J. Villella 102404-9; B: 22061; D: L. Boizot LB-10.27.15-66, R. Sullivan RS-10.27.15-52

Cladonia fimbriata (L.) Fr. - Common on a variety of substrates including trees and downed woody debris. B: Pittam, Fennel & McCune s.n. C: A. Mikulin 1122140; D: J. Roman JR-10.28.15-08, Group A 23

Cladonia furcata (Hudson) Schrader - Common on soil and wood. A: R. Robertson 9606; B: 27376, Pittam, Fennel & McCune s.n.; D: R. Sullivan RS-10.27.15-42, RS-2015-47

Cladonia gracilis subsp. ***gracilis*** (L.) Willd.- B: 27375

Cladonia macilenta Hoffm. - D. S. Curtis**-** B: Pittam, Fennel & McCune s.n.

Cladonia norvegica Tønsberg & Holien. - Rare on conifer stumps in old-growth forest. D: R. Sullivan RS-10.26.2015-49

Cladonia ochrochlora Flörke - Common on soil and a wide variety of woody substrates. C: L. Lasselle 1120140, R. Ulrich 1120144; D: G. Jackmond 27, I. Matsouka 19

Cladonia phyllophora Hoffm. - Rare on rock, in open rocky slopes along forest edges. D: J. Roman JR-10.28.15-14

Cladonia portentosa subsp. ***pacifica*** (Ahti) Ahti - Rare on rock and occasionally on late-stage woody debris in volcanic outcrops on north slopes. B: 27373

Cladonia pyxidata (L.) Hoffm. - Common on a variety of woody and non-woody substrates. B: Pittam, Fennel & McCune s.n; D: R. Sullivan RS-10.27.15-45, J. Roman JR-10.27.15-09

Cladonia rangiferina (L.) F. H. Wigg.- Uncommon in thin soil areas amongst *Xerophyllum tenax* dominated plant communities in openings in mixed conifer old-growth forests. A: R. Robertson 9584, J. Villella 102504-38; B: 22059, 27371; D: A. Landers 10252016.3, Æ. Wiklund Æ.W.24-10-2018-4

Cladonia squamosa (Scop.) Hoffm.- Common on various woody and non-woody substrates in the lower forest strata. A: J. Villella 102404-5; B**.** Pittam, Fennel & McCune s.n.; D: R. Sullivan RS-10.28.15-64; J. Roman JR-10.28.15-05**,** Hutten & Villella 5

Cladonia subulata (L.) F. H. Wigg - On moss over rock or mossy exposed roots of *Tsuga heterophylla* along north-facing side of trail in old-growth conifer forest. D; L. Calabria LC10.26.16-05, H. Ahn-Stewart. H.A.S.10.24.17. L2.a

Cladonia transcendens (Vainio) Vainio - Common on various woody substrates. A: J. Villella 102403-33; B: Pittam, Fennel & McCune s.n.; D: R. Sullivan RS-10.27.15-43, Hutten & Villella 33

Cladonia umbricola Tønsberg & Ahti- Uncommon on the boles of *Pseudotsuga menziesii*. C: D. Glavich 1122140; D: Hutten & Villella 30

Cladonia verruculosa (Vainio) Ahti**-** On rock and moss in a small talus slope. B: 22062**,** Pittam, Fennel & McCune s.n.; D: J. Roman JR-10.27.15-13

Cliostomum flavidulum Hafellner & Kalb **-** On the bark of *Abies* sp. on the edge of an area disturbed by past mining. B: 28407

Coenogonium pineti (Ach.) Lücking & Lumbsch - On large woody debris and stumps in old-growth mixed conifer forest. A: J. Villella obs. s.n.
Cyclohymenia epilithica McCune & M. J. Curtis - On rock in old-growth *Pseudotsuga* - *Tsuga heterophylla* forest near creek. B: 22436
Dermatocarpon meiophyllizum Vainio - Rare in scour sheltered areas of rocks in and on the edge of perennial streams. A: J. Villella obs. s.n.
Ephebe lanata (L.) Vainio - On rock outcrops and semi-submerged rocks and near waterfalls in a perennial stream flowing through an old-growth mixed conifer hardwood forest. B: 27366; D: L. Calabria LC10.25.16-04
Epilichen scabrosus (Ach.) Clem. - On *Beomyces rufus* on a shaded boulder in an area of historic mining disturbance. B: 37655
Esslingeriana idahoensis (Essl.) Hale & M. J. Lai- Uncommon on *Pseudotsuga menziesii* boles. C: A. Mikulin 1122140
Euopsis pulvinata (Schaerer) Nyl. - On an iron rich boulder in an area of historic mining disturbance. B: 28389
Evernia prunastri (L.) Ach. - Common epiphyte especially on hardwoods such as *Acer* species and *Alnus rubra*. C: A. Ingersoll 1120140; B: Pittam, Fennel & McCune s.n.
Fellhanera bouteillei (Desm.) Vězda - Rare on rain sheltered conifer needles along creeks, especially *Thuja plicata*. A: J. Villella obs. s.n.
Fuscopannaria aurita P. M. Jørg. - Rare on rocks in forest openings. B: L. H. Pike 2138
Fuscopannaria cyanolepra (Tuck.) P. M. Jørg. - Uncommon on soil and moss especially along roadcuts. B: 22440
Fuscopannaria leucostictoides (Ohlsson) P. M. Jørg.- Uncommon epiphyte on trees and shrubs, especially near streams. B: 28402, 27370, Pittam, Fennel & McCune s.n.; C: A. Mikulin 1122140, R. Ulrich 1120144
Fuscopannaria pacifica P. M. Jørg.- Common epiphytic species, especially on conifers. A: J. Robertson 9554, 9560; B: 37652**,** Pittam, Fennel & McCune s.n.; C: D. Glavich 1122140; D: D. Wamser DW-L.10.24.18.1, E. Greer EG-10.24.17-15
Graphis scripta (L.) Ach. - Uncommon epiphyte on branches and boles of *Acer circinatum* and *Alnus rubra*. B: 22072
Hertelidea botryosa (Fr.) Printzen & Kantvilas - On wood of a conifer snag in an area of historic mining disturbance. B: 28409
Hypocenomyce scalaris (Ach. ex Lilj.) M. Choisy- Common on charred wood. C: J. Riley s.n.
Hypogymnia apinnata Goward & McCune - Common epiphyte on conifer trees and wood. A: R. Robertson 9577; B: 28430, 28429; C: L. Lasselle 1120140, R. Ulrich 1120144; D: Josh Gurel JG-10.27.15-31, R. Pigman RP-10.28.15-01
Hypogymnia canadensis Goward & McCune - Uncommon epiphyte on *Tsuga heterophylla* twigs at the edge of an area of historic mining disturbance. B: 22008; D: Sarah Coutts

Hypogymnia enteromorpha (Ach.) Nyl. - Common epiphyte of conifers. A: R. Robertson 9607, 9615; B: 28431, Pittam, Fennel & McCune s.n.; C: A. Ingersoll 1120140, R. Ulrich 1120144; D: R. North RN25, T. Buntain 8

Hypogymnia hultenii (Degel.) Krog - Common on bark, fine twigs and wood of conifers. A: J. Villella 102504-8; B: 28399; C: D. Glavich 1122140, R. Ulrich 1120144; D: N. Nelson NILS-10.27.15, J. Gurel JG-10.27.15-23

Hypogymnia imshaugii Krog -Common epiphyte on conifer branches and snags. B: Pittam, Fennel & McCune s.n.; C: A. Ingersoll 1120140; D: J. Gurel JG-2015-29, R. Pigman RP-10.27.15-04

Hypogymnia inactiva (Krog) Ohlsson - Rare to abundant epiphyte found on the branches and twigs of conifers and deciduous trees, and on *Chrysolepis chrysophylla* snags. A: J. Villella 102504-19; B: 28398, Pittam, Fennel & McCune s.n.; C: A. Ingersoll 1120140, R. Ulrich 1120144; D: A. Cherwa ADC51, K. Baldwin BAC007

Hypogymnia occidentalis L. Pike- Uncommon conifer epiphyte. C: D. Glavich s.n.

Hypogymnia oceanica Goward - Uncommon on conifers and *Alnus rubra*. B: 28400; 22439; C: R. Ulrich 1120144; D: E. Daugherty ED-10.25.17-06

Hypogymnia physodes (L.) Nyl. - Common on trees. A: J. Villella 102504-24; B: 28428; 28937 B: Pittam, Fennel & McCune s.n.; C: L. Lasselle 1120140, R. Ulrich 1120144; D: R. Pigman RP-10.27.15-01, J. Gurel JG-10.28.15.33

Hypogymnia rugosa (G. Merr.) L. Pike - Common epiphyte on *Abies amabilis* snags. C: A. Ingersoll 1120140, A. Hardman s.n.

Hypogymnia tubulosa (Schaerer) Hav. - Uncommon to common epiphyte on conifer boles, snags, and twigs. A. J. Villella 102404-7; B. Pittam, Fennel & McCune s.n.; C: A. Mikulin 1122140; D. J. Gurel JG-10.27.15-21

Hypogymnia wilfiana Goward, T. Sprib. B. McCune & Ahti - C: Uncommon on *Pseudotsuga menziesii* boles, A. Hardman s.n.

G3/G4, S3, 4 ***Hypotrachyna afrorevoluta*** (Krog & Swinscow) Krog & Swinscow- Epiphyte on the bark of *Amelanchier alnifolia* in open, mixed hardwood forest and forested shore of a river. B: 37563, Kofranek 2541, Pittam, Fennel & McCune s.n.

G1, S1, 1 ***Hypotrachyna riparia*** McCune - Epiphyte on the bark of *Fraxinus* in open mixed hardwood forest. B: 37562, Pittam, Fennel & McCune s.n.

Hypotrachyna sinuosa (Sm.) Hale- Uncommon epiphyte on hardwood. B: Pittam, Fennel & McCune s.n.

Icmadophila ericetorum (L.) Zahlbr. - Common crust on decaying wood and moss near or along trails in old growth. A: J. Robertson 9565, N. Hillyard 1296; B: Pittam, Fennel & McCune s.n.; D: C. Kuzis CK-10.26.15-48, L. Vadopalas LV-10.28.15-109

Ionaspis lacustris (With.) Lutzoni- Common on streamside rocks of Opal Creek and Battle Ax Creek. A:Villella obs. s.n.

Japewia tornoënsis (Nyl.) Tonsberg -Found on twig litter in lichen rich conifer forest. A: N. Hillyard 1300

Koerberiella wimmeriana (Körber) Stein - On non-calcareous creekside rocks in mixed conifer-deciduous riparian forest. B: 28417; 28374
Lecanora circumborealis Brodo & Vitik. - Uncommon on bark of *Alnus rubra*. A: Villella obs. s.n.
Lecanora impudens Degel. - Common on bark of deciduous trees. B: 28380
Lecanora pacifica Tuck. - On *Acer macrophyllum* branches at the edge of an open area on large rock outcrops. A: N. Hillyard 1311; B: 24434; 28435
Lecanora polytropa (Ehrh.) Rabenh. - On boulders in higher elevation areas. A: Villella obs. s.n.
Lecanora pulicaris (Pers.) Ach. - On *Alnus rubra* twigs in the riparian zone of mixed conifer-deciduous forest. B: 28418
Lecidea atrobrunnea subsp. ***atrobrunnea*** (Ramond ex Lam. DC.) Schaerer- A: J. Robertson 9549
Lecidella elaeochroma (Ach.) M. Choisy- On bark of *Acer macrophyllum* on edge of openings. B: 28439; 28379, Pittam, Fennel & McCune s.n.
Lepra amara (Ach.) Hafellner- A: J. Robertson 9590; B: Pittam, Fennel & McCune s.n.
Lepra ophthalmiza (Nyl.) Hafellner- On the *Alnus rubra* boles in the riparian zone of mixed conifer-deciduous dominant forests and at the edge of an area of historic mining disturbance. B: 28408; 28420; C: A. Ingersoll 1120140
Lepraria elobata Tønsberg - On rock, welded tuff, boulder in at the edge of an area of historic mining disturbance. B: 37654
Lepraria finkii (B. de Lesd.) R. C. Harris - D: S. Rogers s.n.
Lepraria pacifica Lendemer- Bark of *Thuja plicata* in conifer forest between Jawbone Flats and Ruth mine above trail. B: 28401; D: C. Kuzis CK2016.49
Leptogidium contortum (Henssen) T. Sprib. & Muggia - Uncommon on twigs of *Taxus brevifolia* and *Tsuga heterophylla* B: 22074, 28405; C: R. Ulrich 1120144
D: M. Rozzatti M.R.2018-8A, L. Blackwood-07
Leptogium pseudofurfuraceum P. M. Jørg. & Wallace - On moss over seepy rock near road and creek old growth *Pseudotsuga -Tsuga* forest. B: 22441
Leptogium saturninum (Dickson) Nyl. - B: Pittam, Fennel & McCune s.n.
Letharia vulpina (L.) Hue - uncommon on snags and other woody substrates in open forests and on ridges. A. Villella s. n. obs.
Lichenomphalia umbellifera (L.: Fr.) Redhead, Lutzoni, Moncalvo & Vilgalys - B: Pittam, Fennel & McCune s.n.
Lobaria anomala (Brodo & Ahti) T. Sprib. & McCune - Uncommon epiphyte on conifer branches and the bark of *Rhododendron macrophyllum*. A: J. P. Dey 27384, 27425; B: Pittam, Fennel & McCune s.n.; C: D. Glavich 1122140, R. Ulrich 1120144; D: Danielle - Group A11, Hutten & Villella 13
Lobaria anthrapsis (Ach.) T. Sprib. & McCune **-** Epiphyte on conifer bark and *Acer macrophyllum* branches and bark in riparian old growth. A: J. P. Dey 27435; B: Pittam, Fennel & McCune s.n.; D: C. Fields CF-10.25.17-11, H. Stewart-Ahn HAS-10.25.17-L1

Lobaria hallii (Tuck.) Zahlbr. - Uncommon epiphyte on hardwoods. B: Pittam, Fennel & McCune s.n.

Lobaria oregana (Tuck.) Müll. - Rare to abundant epiphyte on conifer boles, branches, and snags. A: N. Hillyard 1303, J. Villella 102504-30; B: Pittam, Fennel & McCune s.n.; C: R. Ulrich 1120144, A. Mikulin 1122140; D: K. Baldwin BAC001, M. Kyle M.K.2016. *Lobaria oregana* cyanomorph- rare epiphyte found on *Abies sp.* twigs at the edge of an area of historic mining disturbance. B: 28401

Lobaria pulmonaria (L.) Hoffm. - Rare to common epiphyte on the bark of *Rhododendron macrophyllum*, boles of *Chrysolepis chrysophylla*, and branches of *Pseudotsuga menziesii*. B: Pittam, Fennel & McCune s.n.; C: A. Mikulin 1122140, R. Ulrich 1120144; D: K. Edmonds OC.10.02

Lobaria scrobiculata (Scop.) DC. - Rare epiphyte on the bark of *Rhododendron macrophyllum and Taxus brevifolia*. C: D. Glavich 1122140; D: LC10.27.15-03. B: Pittam, Fennel & McCune s.n.

Loxospora elatina (Ach.) A. Massal - Common on *Abies amabilis* snags and bark of *Thuja plicata* in open mixed conifer forest. B: 28383; C: L. Lasselle 1120140

Loxosporopsis corallifera Brodo, Henssen & Imshaug - On the bark of *Thuja plicata* in mixed conifer forest with open to partial canopy cover. B: 28382; D: K. Baldwin BAC023, Hutten & Villella s. n.

Massalongia carnosa (Dickson) Körber - On moss over andesite rock on shade andesite rock outcrops and talus in mixed conifer forest. A: R. Robertson 9571, 9601; B: 37795; D: Villella 052103-01

Melanelixia glabratula (Lamy) Sandler & Arup **-** E: Pittam, Fennel & McCune s.n.

Melanelixia subaurifera (Nyl.) O. Blanco et al. **-** On branches and boles of *Alnus rubra* adjacent open areas near Jawbone Flats. A: J. P. Dey 33430; D: B. Stragier BS-10.28.15-67, P. Hamar PH-10.28.15-105

Melanohalea exasperatula (Nyl.) O. Blanco et al.- On the bark of *Alnus rubra* adjacent open areas near Jawbone Flats. D: P. Hamar PH-10.28.15-105

Menegazzia subsimilis (H. Magn.) R. Sant. - On bark of hardwoods especially *Alnus rubra* at lower elevations. B: Pittam, Fennel & McCune s.n.

Menegazzia terebrata (Hoffm.) A. Massal. - On the boles of *Alnus rubra* among trees and outcrops near a waterfall and in a mixed conifer-deciduous stand adjacent to an open field. B: 27365; D: R. Pigman RP-10.28.15-02; B: Pittam, Fennel & McCune s.n.

Micarea peliocarpa (Anzi) Coppins & R. Sant. - On wood and old mine timbers at the edge of an area of historic mining disturbance. B: 28394

Microcalicium disiminatum (Ach.) Vainio- uncommon on older wooden buildings. F: D33W-b, I12

Miriquidica instrata (Nyl.) Hertel & Rambold- On andesite rock on open ridgetop with andesite rock outcrops and scattered tree cover. B: 37776b

Montanelia panniformis (Nyl.) Divakar, A. Crespo, Wedin & Essl.- A: R. Robertson s. n.

Mycoblastus affinis (Schaerer) T. Schauer **-** On bark in old growth *Pseudotsuga menziesii* stands. A: P. Przybylowicz 9606-8; J. Robertson 9570; D: K. Edgington s.n.
Mycoblastus sanguinarius (L.) Norman **-** On the bark *Pseudotsuga menziesii* and decaying log in old growth. D: C. Kuzis CK2015.54, CK2016.39
Mycocalicium subtile (Pers.) Szatala - On wooden buildings E: A11E, A9E
Nephroma bellum (Sprengel) Tuck. - Common on conifer branches in old growth. A: J. P. Dey 27443; B: ; C: R. Ulrich 1120144; D: C. Mitchell CM-10.24.17-09, Stragier BS-10.26.15-54
Nephroma helveticum subsp. ***tropicum*** Ach. - Uncommon on conifer twigs in riparian zones. A: J. P. Dey 27383, J. Robertson 9617; B: Pittam, Fennel & McCune s.n.; C: R. Ulrich 1120144; D: R. Sullivan RS-10.27.15-32; W. Weinstock WW.25.10.16-#2
Nephroma laevigatum Ach. **-** On *Acer macrophyllum* and *Thuja plicata t*wigs near Jawbone Flats and in riparian zones. B: Pittam, Fennel & McCune s.n.; D: Æ. Wiklund Æ.W.22-10-2018-1, P. Hamar PH-10.27.15-99
G4, S3, 2 ***Nephroma occultum*** Wetmore **-** Rare as a conifer epiphyte in the mid to upper canopy in cyanolichen rich sites. C: R. Ulrich 1120144; D: Hutten & Villella s. n.
Nephroma parile s. lat. (Ach.) Ach. - A: J. Villella 102504-31; D: Hutten & Villella 22, 31
Nephroma resupinatum (L.) Ach. - A: J. Robertson 9561; B: Pittam, Fennel & McCune s.n.
Nodobryoria oregana (Tuck.) Common & Brodo - Rare to common on conifer branches, boles, and snags. C: D. Glavich 1122140, R. Ulrich 1120144; D: S. Pierce SP-10.27.15-59, J. Barnhert JB-10.24.17-02
Normandina pulchella (Borrer) Nyl. - B: Pittam, Fennel & McCune s.n.
Ochrolechia juvenalis Brodo - On a dead conifer in *Pseudotsuga menziesii* stands with southwest slopes and seepy draws. B: 21999; D: C. Kuzis CK2016.48
Ochrolechia laevigata (Räsänen) Verseghy - On the bark of deciduous trees in riparian zones and at the edge of an area of historic mining disturbance. A: J. Robertson 9611, R. Robertson 9622; B: 22071; 28378; D: L. Vadopalas LV-10.27.15-74, D. Tello DT-10.24.17-01
Ochrolechia oregonensis H. Magn. - Common on conifer bark. B: 22068, Pittam, Fennel & McCune s.n. ; C: D. Glavich 1122140
Ochrolechia subpallescens Verseghy**-** B: Pittam, Fennel & McCune s.n.
Opegrapha species. Ach. **-** B: Pittam, Fennel & McCune s.n.
Ophioparma rubricosa (Müll. Arg.) S. Ekman- On the wood of a conifer snag at the edge of an area of historic mining disturbance. B: 28410
G2 (Proposed) ***Pannaria oregonensis*** McCune & M. Schultz **-** On conifer and *Fraxnius latifolia* branches in low elevation riparian forests. B: 37560, 37559, 38058; S. Pittam 1013
Parmelia hygrophila Goward & Ahti - Rare to common on the boles of *Chrysolepis chrysophylla*, *Pseudotsuga menziesii*, and *Tsuga heterophylla*. A: J. Robertson 9573; J. Villella 102404-18; B: 29573; Pittam, Fennel & McCune s.n. ; C: L. Laselle 1120140, R. Ulrich 1120144
Parmelia pseudosulcata Gyelnik - B: Pittam, Fennel & McCune s.n.
Parmelia saxatilis (L.) Ach. - On *Pseudotsuga menziesii* bark in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. B: 22007; C: D. Glavich s. n.

Parmelia sulcata Taylor - Common epiphyte on conifers and *Rhododendron macrophyllum*. A: J. Villella 102504-20; B: Pittam, Fennel & McCune s.n. C: A. Mikulin 1122140; D: A. Abigail 20, Hutten & Villella 20

Parmeliella parvula P. M. Jørg. - On *Abies sp.* branches at the edge of an area of historic mining disturbance. B: 28403

Parmeliopsis ambigua (Wulfen) Nyl. - On the boles of conifers. D: G. Jackmond 29, I. Matsuoka 10

Parmeliopsis hyperopta (Ach.) Arnold **-** Common on the boles of conifers, *Alnus rubra* and *Rhododendron macrophyllum*. C: A. Ingersoll 1120140, R. Ulrich 1120144; D: R. Pigman RP-10.27.15-03

Parmotrema perlatum (Hudson) M. Choisy- B: Pittam, Fennel & McCune s.n.

Peltigera aphthosa (L.) Willd.- Uncommon on soil and over bryophytes on the forest floor. A: Villella obs. s.n.

Peltigera aquatica Miadl. & Lendemer- Uncommon to locally common, on inundated rocks in streams. A: R. Robertson 9595; J. Villella 062303-2; D: Æ. Wiklund Æ.W.24-10-2018-1

Peltigera britannica (Gyelnik) Holt. - On moss, soil, and rotten wood along trails and in riparian areas. A: J. Villella 102404-2; 102404-18 (photomorph); C: W. Uriu WU10.27.15-81; D: A. Landers 10252016.5; Æ. Wiklund Æ.W.23-10-2018-2

Peltigera collina (Ach.) Schrader **-** Common as an epiphyte, especially on hardwoods. A: Villella obs. s.n.; B: Pittam, Fennel & McCune s.n.

Peltigera degenii Gyelnik - On moss over down trees. D: J. McDaniel JM10-23-04, M. Kyle M.K.2016

Peltigera leucophlebia (Nyl.) Gyelnik - On soil and moss along creeks and in disturbed areas adjacent creeks. A: J. Robertson 9588; R. Robertson 9593**;** D: D. DeGeare DD-10.27.15-11, W. Uriu WU-10.27.15-86

Peltigera membranacea (Ach.) Nyl. **-** On soil. A: J. Robertson 9592; B: Pittam, Fennel & McCune s.n. D: A. Landers 10252016.4

Peltigera neopolydactyla (Gyelnik) Gyelnik - On moss over humus/rock/soil along trails. A: J. Villella 102404-3; D: K. Thompkins KT102416-1, W. Uriu WU10.27.15-83

Peltigera pacifica Vitik.- On moss over rocks along creeks. D: J. Marlor 10.25.16.09, LC10.27.15-15

Peltigera venosa L. Hoffm. - Uncommon on exposed soil and rocks. A: R. Robertson 9558, J. Villella 091002-01

Pertusaria leioplaca DC.- On the bark of *Acer macrophyllum* branches at the edge of an open area on a large rock outcrop. B: 28432

Pertusaria subambigens Dibben- A: N. Hillyard 1295, 1299

Phlyctis argena (Ach.) Flotow - On conifer snag at the edge of an area of historic mining disturbance. B: 28411

Phylliscum demangeonii (Moug. & Mont.) Nyl. **-** Uncommon on large boulders in north-facing rock outcrop and talus slope. A: G. McHenry-Teller 90606.703, J. Robertson 9576

Physcia adscendens (Fr.) H. Olivier **-** B: Pittam, Fennel & McCune s.n.

Physcia alnophila (Vainio) Loht., Moberg, Myllys & Tehler - B: Pittam, Fennel & McCune s.n.
Physcia tenella (Scop.) DC. **-** B: Pittam, Fennel & McCune s.n.
Pilophorus acicularis (Ach.) Th. Fr. **-** Common on non-calcareous rock in partial to full shade near or along trails. A: N. Hillyard 1301, R. Robertson 9608; D: D. DeGeare DD-10.26.15-09, R. Balkcom RB-10.25.17-L06
Pilophorus clavatus Th. Fr. - Uncommon on non-calcareous rock in partial shade near or along trails. D: R. Balkcom RB-10.24.17-L01, L. Boizot LB-10.27.15-63
G3G4, S2, 2 ***Pilophorus nigricaulis*** M. Satô **-** On volcanic rock outcrops and talus and non-volcanic rock near creek. B: 27377, 22076
Placopsis lambii Hertel & V. Wirth **-** Common on volcanic rocks. A: R. Robertson 9609; B: Pittam, Fennel & McCune s.n.; D: M. Kyle M.K.2016
Placynthiella icmalea (Ach.) Coppins & P. James - B: Pittam, Fennel & McCune s.n.
Placynthiella uliginosa (Schrader) Coppins & P. James- A: J. Robertson 9548
Platismatia glauca (L.) W. L. Culb. & C. F. Culb. **-** Common epiphyte species. B: 37781, Pittam, Fennel & McCune s.n. ; C: A. Ingersoll 1120140, R. Ulrich 1120144; D. M. Bernstein MB.10.25.16-3L, P. Hamar PH-10.28.15-07
Platismatia herrei (Imshaug) W. L. Culb. & C. F. Culb. **-** Common epiphytic species. A: J. Robertson 9569; B: 37783, Pittam, Fennel & McCune s.n.; C: D. Glavich 1120144, R. Ulrich 1120144; D: P. Hamar PH-10.26.15-90, T. Linja TL-1.16.15-59
Platismatia lacunosa (Ach.) W. L. Culb. & C. F. Culb. - Uncommon epiphyte on deciduous trees. D: C. Kuzis CK2016.47, P. Hamar PH-10.26.15-117
Platismatia norvegica (Lynge) W. L. Culb. & C. F. Culb. - Uncommon to common epiphyte on conifers, deciduous trees, and evergreen shrubs. A: J. Robertson 9567, 9912; C: A. Mikulin 1122140, R. Ulrich 1120144; D: P. Hamar PH-10.27.15-94, G. Hanson GH.10.23.18-02
Platismatia stenophylla (Tuck.) W. L. Culb. & C. F. Culb. - Common epiphyte on conifers. A: J. P. Dey 27379; B: 37782, Pittam, Fennel & McCune s.n.; C: A. Ingersoll 1120140, R. Ulrich 1120144; D. T. Buntain 15, T. McCallum 10
Plectocarpon nephromeum (Norman) Sant. **-** Rare lichenicolous fungi on *Nephroma* species. A: J. Villella 120905-01
Polycauliona polycarpa (Hoffm.) Frödén, Arup, & Søchting - B. Pittam, Fennel & McCune s.n
Polychidium musicola (Sw.) Gray **-** On moss over rock in rock outcropping adjacent open field. D: B. Stragier BS-10.26.15-58
Porpidia carlottiana Gowan **-** Crust on non-calcareous creekside rocks. B: 28375, 22437
Porpidia crustulata (Ach.) Hertel & Knoph - Crust on bridge timbers of bridge over Battle Axe Creek and on rock and andesite rock on shaded andesite rock outcrops and talus in mixed conifer forest and in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. A: J. Robertson 9553, N. Hillyard 1304; B: 28377; 22057
Porpidia flavicunda (Ach.) Gowan - Crust on andesite rock in shaded andesite rock outcrops and talus in mixed conifer forest. B: 37792

Porpidia thompsonii Gowan - Crust on iron-rich rock at the edge of an area of historic mining disturbance. B: 28388 C: L. Lasselle 1120140

Protoparmelia badia (Hoffm.) Hafellner **-** On large boulders in a talus field. A: J. Villella s.n. obs.

Pseudephebe pubescens (L.) M. Choisy **-** On rock in old growth. D: R. Balkcom RB-10.25.17.01

Pseudocyphellaria citrina (Gyeln.) Lücking, Moncada & S. Stenroos **-** On conifer branches and twigs along roads and trails, and at the edge of an area of historic mining disturbance. B: 28404; C: R. Ulrich 1120144; D: J. Villella 14-446, C. Kuzis CK2015.52; E: Pittam, Fennel & McCune s.n.

G5, S3, List 3 ***Pseudocyphellaria hawaiiensis*** H. Magn. **-** On conifer branches and twigs along roads and trails. A: T. Wheeler 2164; D: K. Pepe KP.10.23.18-03

G4, S3, List 2 ***Pseudocyphellaria mallota*** (Tuck.) H. Magn. **-** Uncommon on *Tsuga heterophylla* and *Taxus brevifolia* twigs in riparian forest along rivers and in moist settings. D: L. Calabria LC.10.24.18.01, H. S. Ahn 10.23.18.2a, Villella-17-500

G3G4, S3, List 4 ***Pseudocyphellaria rainierensis*** Imshaug - Uncommon on conifer boles, branches, and twigs in riparian areas. **-** A: J. Robertson 9566; B. 22075; C: R. Ulrich 1120144; D: N. Rosatti NR-10.24.17-05, H. Ahn-Stewart HAS10.24.17. Ll

Psoroma hypnorum (Vahl) Gray - Uncommon on epiphytic bryophytes along creeks and humus over rock on ridgetop with rock outcrops. B: 28422; D: S. Pierce SP-10.27.15-60, T. Linja TL-10.27.15-45, J. Villella 062303-01

Ptychographa xylographoides (Nyl.) - Uncommon on rotten wood in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. B: 22004

Pyrenula occidentalis (R. C. Harris) R. C. Harris **-** B: Pittam, Fennel & McCune s.n.

Ramalina dilacerata (Hoffm.) Hoffm. **-** Uncommon on hardwoods especially in moist forests. A: Villella obs. s.n.; B: Pittam, Fennel & McCune s.n.

Ramalina farinacea (L.) Ach. - Common on trees at lower elevations. B: Pittam, Fennel & McCune s.n.

Rhizocarpon cinereonigrum Vainio- Uncommon on talus in rock outcrop near Jawbone Flats. A: J. Robertson 9551

Rhizocarpon distinctum Th. Fr.- Uncommon on talus in rock outcrop near Jawbone Flats. A: J. Robertson 9551, J. Robertson 9587

Rhizocarpon geographicum (L.) DC. - Common, on rock along a trail to Ruth Mine. D: C. Mitchell CM-2017 1024-06

Rhizocarpon grande (Flörke ex Flotow) Arnold **-** Uncommon on talus in rock outcrop near Jawbone Flats. A: J. Robertson 9552, R. Robertson 9585

Rhizocarpon lecanorinum Anders- On andesite rock on open ridgetop with andesite rock outcrops and scattered tree cover. A: J. Robertson 9579, R. Robertson 9524; B: 37774

Ricasolia amplissima (Scop.) Forssell (cyanomorph) **-** Rare epiphyte on *Tsuga heterophylla* branch. A: J. P. Dey 33397; C: R. Ulrich 1120144

Rinodina disjuncta Sheard & Tønsberg **-** Common on *Alnus rubra* adjacent to creeks in mixed dominance riparian forest. B: 28424

Rinodina hallii Tuck. - Crust on *Acer circinatum* in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. B: 22003

Rinodina trevisanii (Hepp) Körber **-** Crust on *Acer macrophyllum* at the edge of an open area on a large rock outcrop. B: 28438

Scytinium californicum (Tuck.) Otálora, P. M. Jørg. & Wedin - On rocks and moss over rock outcrops along streams and near waterfalls. B: 27367

Scytinium gelatinosum (With.) Otálora, P. M. Jørg. & Wedin- On rocks and moss over rock outcrops along streams and near waterfalls. A: R. Robertson 9614, J. Villella 061003-01; D: Æ. Wiklund Æ.W.23-10-2018-3

Scytinium* cf. *lichenoides (L.) Otálora, P. M. Jørg. & Wedin - Epiphyte in riparian old growth. A: J. Villella 061003-01; B: 22073; D: Hutten & Villella s. n.

Scytinium* cf. *palmatum (Hudson) Gray- A: R. Robertson 9603; D: J. Nannes 33

G3/G4, S2, List 3 ***Scytinium platynum*** (Tuck.) Otálora, P. M. Jørg. & Wedin - On bryophyte covered, seepy, riverbed cliff wall. A: J. Villella 061402-01; B. Pittam, Fennel & McCune s.n.; D: L. Calabria LC 10.27.15-22

Scytinium polycarpum (P. M. Jørg. & Goward) Otálora, P. M. Jørg. & Wedin- Epiphyte on deciduous trees and shrubs and on moss along creeks. B: 22069; 38059, Pittam, Fennel & McCune s.n.; D: M. Zirpoli MZ.10.25.16 L3

Scytinium cf. ***rivale*** (Tuck.) Otálora, P. M. Jørg. & Wedin - On non-calcareous rocks in creek beds of mixed dominance riparian forest. A: R. Robertson 9619; B: 28412

Scytinium tacomae (P. M. Jørg. & Tønsberg) McCune - D: Epiphyte on mossy *Acer circinatum* branch in cool, moist, old-growth riparian forest. D: L. Calabria LC.10.27.15-23

Solorina crocea (L.) Ach. - On thin soil over rocks on ridge tops. A. J. Villella obs s.n.

Sphaerophorus tuckermanii Räsänen - Common epiphyte on conifers. D: J. Gurel JG-10.29.15-34, A. Morris AM-10.25.17-02; E: Pittam, Fennel & McCune s.n.

Sphaerophorus venerabilis Wedin, Högnabba & Goward - Common epiphyte on conifers. B: Pittam, Fennel & McCune s.n.; D: J. Gurel JG-10.27.15-28; A. Morris AM-10.25.17-03

Staurothele drummondii (Tuck.) Tuck. - Common on dry rocks in shaded forest. A: Villella obs s.n.

Staurothele fissa (Taylor) Zwackh **-** Uncommon on shaded moist rocks. A: Villella obs. s.n.

Stereocaulon alpinum Laurer ex Funck- Moss mats on rocky, shaded to open ridgetop with andesite outcrops and scattered tree cover. B: 37779

Stereocaulon intermedium (Savicz) H. Magn. - On a talus slope of volcanic rock. B: 22058

Stereocaulon sterile (Savicz) I. M. Lamb ex Krog **-** On rock and moss over rock on open ridgetop with andesite outcrops and scattered tree cover. B: 37780; 37651

Stereocaulon tomentosum Fr.- On rock, and moss mats and humus over rock and gravel at the edge of an area disturbed by mining and along stream beds and creeks. A: J. Villella 102404-4; B: 28392; 37650; D. H. Stewart-Ahn HAS-10.24.17-L1, W. Suda WS1022A3

Sticta fuliginosa (Hoffm.) Ach. - Epiphyte on conifers. A: J. P. Dey 27454, 27429; B: 28396, Pittam, Fennel & McCune s.n.

Sticta limbata (Sm.) Ach. **-** A: J. P. Dey 27428; C: R. Ulrich 1120144; E: Pittam, Fennel & McCune s.n.

G5, S3, 4 ***Sticta*** cf. ***weigellii*** *s. lat.* (Ach.) Vainio. - Common epiphyte on conifers and deciduous trees. A: Villella 102504-25, 102504-16; B: 22065; 27369 C: R. Ulrich 1120144; D: E. Greer EG-10.24.17-13, Hutten & Villella 25

Tephromela atra (Hudson) Hafellner - Epiphyte on *Acer circinatum* in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. B: 22002

Thamnolia subuliformis (Ehrh.) W. L. Culb. - On moss mats and thin soil over rock on open ridgetop with andesite rock outcrops with scattered tree cover. B: 37777; D: R. Balkcom RB-10.25.17-02

Thelotrema lepadinum (Ach.) Ach. - Common on bark of *Pseudotsuga menziesii* and *Thuja plicata*. A: J. Robertson 9563; B: Pittam, Fennel & McCune s.n.

Tingiopsidium sonomense (Tuck.) Hafellner & T. Sprib. - On shaded talus and andesite rock outcrops in mixed conifer forest. B: 37794

Trapelia corticola Coppins & P. James - Bryophilous on *Ptilidium* sp. over conifer root in an open mixed conifer stand. B: 28384

Trapelia glebulosa (Sm.) J. R. Laundon- A: N. Hillyard 1298

Trapeliopsis flexuosa (Fr.) Coppins & P. James - A: J. Robertson 9547

Trapeliopsis granulosa (Hoffm.) Lumbsch **-** On old mine timbers and rotten wood at the edge of an area of historic mining disturbance. B: 28387; 28440

Trapeliopsis pseudogranulosa Coppins & P. James - On wood and old mine timbers at the edge of an area of historic mining disturbance and flood scarred base of *Pseudotsuga menziesii* near a waterfall. B: 28393, 27368

Tuckermannopsis chlorophylla (Willd.) Hale- Common epiphyte on conifers and snags. A: J. Robertson 9620; B: Pittam, Fennel & McCune s.n.; C: D. Glavich 1120140; D: Lydia-Group A 21;

Tuckermannopsis orbata (Nyl.) M. J. Lai - Common epiphyte on conifers and *Rhododendron macrophyllum*. C: D. Glavich 1122140, R. Ulrich 1120144; D: B. Stragier BS-10.26.15-65, E: Pittam, Fennel & McCune s.n.

Tuckermannopsis platyphylla (Tuck.) Hale- Uncommon to abundant epiphyte on *Pseudotsuga menziesii*. C: A. Ingersoll 1120140; D: B. Stragier BS-10.26.15-64

G4/G5, S2, 3 ***Tuckermannopsis subalpina*** (Imshaug) Kärnefelt **-** Common to abundant epiphyte on *Abies amabilis* and *Taxus brevifolia*. C: A. Ingersoll 1120140, A. Hardman s.n.

Umbilicaria angulata Tuck. - On open to shaded ridgetop and talus with andesite rock outcrops in mixed conifer forest. B: 37798, 37788

Umbilicaria dealbata McCune in. ed.- On shaded talus and andesite rock outcrops in mixed conifer forest. B: 37797

Umbilicaria havaasii Llano - On rock on open ridgetop with andesite rock outcrops with scattered tree cover. B: 37784; D. RB-10.25.17-04

Umbilicaria hyperborea (Ach.) Hoffm. - On andesite rock on open to shaded ridgetop with andesite rock outcrops B: 37786

Umbilicaria phaea Tuck. - On andesite rock on open to shaded ridgetop with andesite rock outcrops with scattered tree cover and in mixed conifer forest. B: 37787; 37799
Umbilicaria polyphylla (L.) Baumg.- On andesite rock on open ridgetop with andesite rock outcrops with scattered tree cover. B: 37789
Umbilicaria torrefacta (Lightf.) Schrader - On rock on open ridgetop with andesite rock outcrops with scattered tree cover. B: 37785
Usnea ceratina Ach. **-** B: Pittam, Fennel & McCune s.n.
Usnea cornuta subsp. ***cornuta*** Körber - Epiphyte on conifers. D: G. Jackmond 21
Usnea dasypoga (Ach.) Nyl. - Epiphyte on conifers, deciduous trees, and snags. C: A. Ingersoll 1120140
Usnea diplotypus Vainio **-** Uncommon on litter under conifers. C: A. Hardman 54651
Usnea filipendula Stirt. - Common epiphyte. C: A. Ingersoll s.n.
Usnea flavocardia Räsänen- B: Pittam, Fennel & McCune s.n.
Usnea fulvoreagens (Räsänen) Räsänen **-** B: Pittam, Fennel & McCune s.n.
Usnea glabrata (Ach.) Vainio - Epiphytic on *P. menziesii* twigs. C: R. Ulrich
Usnea lapponica Vainio **-** Uncommon epiphyte on trees. C: A. Rosso 54671
Usnea longissima Ach. - Sporadically occurring epiphyte on conifers and hardwoods especially near major streams and rivers. B: 28576, Pittam, Fennel & McCune s.n.; D: K. Boulden 6, W. Weinstock WW.25.10.16-4; G: A. Rosso L 664
Usnea pacificana P. Halonen - Epiphyte on conifers, deciduous trees, and snags. B: 28423, 29568; C: A. Hardman s.n.
Usnea scabrata Nyl. - Epiphyte on conifers and bare snags. A: J. Robertson 9572; B: 22009, 29571; B: Pittam, Fennel & McCune s.n.*;* C: A. Mikulin 1122140, R. Ulrich 1120144; D: T. Linja TL-10.27.15-55, T. McCallum 16
Usnea subfloridana Stirton - Epiphyte on conifers. C: A. Mikulin 1122140; B: Pittam, Fennel & McCune s.n.
Verrucaria hydrela Ach. - On non-calcareous creekside rocks in a mixed dominance riparian forest. B: 28414
Verrucaria margacea (Wahlenb) Wahlenb. - On non-calcareous on creekside rocks in mixed dominance riparian forest. B: 28413
Verrucaria muralis Ach. - Iron-rich boulder at the edge of an area of historic mining disturbance. B: 28390
Vulpicida canadensis (Räsänen) - J.E. Mattsson & M. J. Lai **-** Epiphyte on *Pseudotsuga menziesii* C: D. Glavich 1122140
Xanthomendoza oregana (Gyelnik) Søchting, Kärnefelt & S. Y. Kondr. - A: Rare on outer branches of *Acer macrophyllum* in exposed habitats. A: Villella obs. s.n.
Xanthoparmelia cumberlandia (Gyelnik) Hale- On rock in mixed forest. B. Pittam, Fennel & McCune s.n.
Xanthoparmelia mougeotii (Schaerer) Hale - On the vertical face of a shaded rock cliff near the Starvation Mill site in Jawbone Flats. A: Villella obs. s.n.

Xylographa hians Tuck. - On wood and old mine timbers at the edge of an area of historic mining disturbance. B: McCune 28394
Xylospora friesii (Ach.) Bendiksby & Timdal- On charred snag in a *Pseudotsuga menziesii* stand with southwest slopes and seepy draws. B: 2200

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Figure 3. A view looking to the northeast from the North Fork Santiam River towards Henline Mountain in the Opal Creek Wilderness before and after the Beachie Creek Fire.

Figure 4. A view looking to the east up the Little North Fork Santiam River in the Three Pools area before and after the Beachie Creek Fire.

Figure 5. Post fire view looking up Little North Santiam River Canyon showing high and mid-level intensity burned areas.

Figure 6. View looking to the east up the Little North Fork Canyon towards Elkhorn and the Opal Creek Wilderness before and after the Beachie Creek Fire.