

INVENTORY FOR SPECIAL STATUS BRYOPHYTE SPECIES



Report to Eugene District, Bureau of Land Management

John A. Christy
November 2006

Acknowledgements

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INVENTORY FOR SPECIAL STATUS BRYOPHYTE SPECIES, EUGENE DISTRICT BLM

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Summary

Eight sites on the Eugene BLM District were inventoried for Special Status bryophyte species, four on the east (Cascade) side of the District, and four on the west (Coast Range) side. Sites were selected by BLM in areas of high annual precipitation. The moss *Fissidens pauperculus* was found at two of the Coast Range sites, and the lichen *Hydrothyria venosa* was found at one of the Cascades sites. Suitable habitat for eight other target Special Status species was observed at all sites inventoried, but additional species were not detected.

Background

The Bureau of Land Management's Special Status Plant Program has identified several species of bryophytes of conservation concern that are suspected to occur on the Eugene District. These have not been confirmed from the district and require the skills of a specialist to locate and identify them. Finding these species on the Eugene District would increase BLM's knowledge base and would inform managers about the likelihood of habitat to support these species and whether field surveys are needed for subsequent efforts. BLM contracted with John Christy to conduct intuitive controlled surveys for these species. Targeted habitat was old growth and late-successional stands of Douglas fir and hemlock that had not been inventoried previously.

Methods

BLM provided me with a list of Special Status bryophyte species (Table 1), maps, aerial photos, gate keys, and standard forms used in botanical surveys. BLM selected nine sections of land to inventory, based on presence of old growth and late-successional stands of Douglas fir and hemlock in areas of high annual precipitation (Table 2). Stands were located in both the Cascade foothills and Coast Range. Approximately 40 acres were to be surveyed at each site, for a total of about 360 acres.

Analysis of the nine stands selected by BLM indicated that they were all forested stream canyons of various depths. Bryophyte habitats most likely present in these stands would be (1) trees and shrubs, (2) bare soil, (3) rocks, (4) dark recesses under rocky overhangs, fallen logs, and rootwads, (5) rotten decorticated logs, and (6) animal dung. It was unlikely that wetlands of any extent would be found except for very small areas of stream terrace or along the margins stream channels, and this would rule out Special Status

Table 1. BLM 2006 Special Status Bryophyte List

Liverworts	Mosses	
		Micromitrium synoicum
		Oxystegus tenuirostris
Calypogeia sphagnicola	Bruchia bolanderi	Physcomitrella patens
Cephaloziella spinigera	Bruchia flexuosa	Physcomitrium immersum
Chiloscyphus gemmiparus	Campylopus schmidii	Plagiopus oederiana
Diplophyllum plicatum	Codriophorus ryszardii (= Racomitrium ryszardii, R. "aquaticum")	Platyhypnidium riparioides
Haplomitrium hookeri	Crumia latifolia	Polytrichum sexangulare
Jamesoniella autumnalis var. heterostipa	Cynodontium jeneri	Pseudephemerum nitidum
Lophozia laxa	Entosthodon fascicularis	Rhytidium rugosum
Marsupella sparsifolia	Ephemerum crassinervium	Schistostega pennata
Metzgeria temperata	Ephemerum serratum	Scouleria marginata
Porella bolanderi	Fissidens fontanus	Splachnum ampullaceum
Radula brunnea	Fissidens grandifrons	Tayloria serrata
Scapania obscura	Fissidens pauperculus	Tetraxis geniculata
Schofieldia monticola	Grimmia anomala	Tetraplodon mnioides
Sphaerocarpos hians	Hedwigia stellata	Thamnobryum neckeroides
	Limbella fryei	Trematodon boasii
		Tripterocladium leucocladulum

bryophytes that require open graminoid or shrub-swamp habitats. Based on this analysis, I focused my search effort on nine target species from Table 1: *Diplophyllum plicatum*, *Metzgeria temperata*, *Fissidens pauperculus*, *Platyhypnidium riparioides*, *Schistostega pennata*, any of the dung mosses (*Splachnum ampullaceum*, *Tayloria serrata*, *Tetraplodon mnioides*), and *Tetraxis geniculata*.

I selected blocks of approximately 40 acres to sample at each site, based on the most practicable access point. When access permitted, I focused search effort on lower-elevation portions of sites because bryophyte diversity is generally greatest on lower slopes and in riparian areas where more moisture is available. In contrast, the bryoflora of ridgetops, upper slopes and upper stream channels is usually relatively species-poor because conditions are drier and streams in these areas are often intermittent.

Sites were searched intuitively for habitat and substrates specific to the nine target Special Status species. Trees and shrubs were searched for *Diplophyllum plicatum* and *Metzgeria temperata*. Bare soil of damp stream cutbanks, slipfaces, and rootballs of fallen trees were searched for *Fissidens pauperculus*. Rocks in streams were searched for *Platyhypnidium riparioides*. I used a headlamp to search dark recesses under rocky overhangs, fallen logs, and rootwads for *Schistostega pennata*, and often poorly-lit rotten decorticated logs for *Tetraxis geniculata*. The dung mosses *Splachnum ampullaceum*, *Tayloria serrata*, and *Tetraplodon mnioides* were much more problematic to search for

because they can occur almost anywhere and exhibit irregular and spotty distributions. There is no good search mode for these except to keep one's eyes open in any habitat.

Traverses of 40-acre blocks focused on riparian zones and opposing slopes. Some stands required entry from ridgetops or upper slopes, allowing examination of upper slopes and a variety of aspects en route to the canyon bottom, providing a general picture of less favorable habitat in the survey blocks.

Nomenclature in this report mostly follows the PLANTS database (<http://plants.usda.gov>) except for two names for which synonyms are provided in parentheses.

Results

Field work was completed over a period of seven days in August and September 2006, with Ashton Christy assisting in the work in August. Of the nine sites selected by BLM, all but one (Site 5) were accessible (Table 2). Site 5 was deemed inaccessible after walking for a mile past a gate without a BLM lock, only to find that the needed spur extending a further half-mile to BLM land was impassable. Alternative access from Deadwood Creek Road would have required a half-mile bushwhack across private land. As a substitute for the work foregone at Site 5, I assessed the status of *Campylopus schmidii* and off-highway vehicle use at Heceta Sand Dunes ACEC/ONA, to which BLM agreed. The work at the ACEC is addressed in a separate report.

Table 2. Nine sites selected by BLM for survey, showing 40-acre blocks surveyed during this contract
Site 1: Oregon, Linn Co.: Eugene BLM District, 6 mi SE of Crawfordsville, 1 mi N of Georges Knob. T15S, R01W, Sec. 03, NW4NE4, SW4NE4. Elev. 950-1300 ft.
Site 2: Oregon, Lane Co.: Eugene BLM District, tributary of Eagle Creek, 6 mi ESE of Lowell, 0.25 mi WSW of Eagles Rest. T20S, R01W, Sec. 12, SW4NE4. Elev. 1800-2500 ft.
Site 3: Oregon, Lane Co.: Eugene BLM District, Lick Creek, 6 mi SE of Culp Creek. T22S, R01W, Sec. 25, NW4SW4. Elev. 1800-2200 ft.
Site 4: Oregon, Douglas Co.: Eugene BLM District, upper Middle Fork of Mosby Creek, 12 mi SSW of Culp Creek, 1.5 mi NE of Huckleberry Mt. T23S, R01W, Sec. 31, SE4NE4, NE4SE4. 2000-2400 ft.
Site 5: Lane Co.: 3 mi WNW of Greenleaf. T17S, R09W, Sec. 01. Site was inaccessible.
Site 6: Oregon, Lane Co.: Eugene BLM District, Greenleaf, Wheeler Creek drainage. T17S, R08W, Sec. 05, SE4SE4. 550-800 ft.
Site 7: Oregon, Lane Co.: Eugene BLM District, upper Miller Creek drainage, 3 mi NW of Walton. T17S, R08W, Sec. 25, NE4SW4. Elev. 1200-1650 ft.
Site 8: Oregon, Lane Co.: Eugene BLM District, 1 mi WSW of Linslaw, 1 mi SE of Richardson, T18S, R08W, Sec. 19, NE4NE4. Elev. 550-800 ft.
Site 9: Oregon, Lane Co.: Eugene BLM District, headwaters of Whittaker Creek, 5 mi SW of Austa. T18S, R09W, Sec. 36, SW4SW4, SE4SW4; T19S, R09W, Sec. 01, NW4NW4. Elev. 900-1200 ft.

The eight sites inventoried were steep-sided forest canyons of various depths. Elevations ranged from 550 to 2600 feet. Soils were universally rocky, derived from basalt and andesite in the Cascade foothills and sandstone in the Coast Range. Six of the eight sites contained old-growth fire-scarred trees with a younger cohort of post-fire hemlock with diameters up to 24-30 inches, and two sites were mid-seral. Exposures of bedrock were limited to stream channels or slipfaces of slumps on higher slopes. Wetlands were restricted to stream channels and very narrow terraces at the bottom of the canyons.

Although all sites inventoried were selected because they occur in areas of higher annual precipitation on the District and are all classified as mesic, relative zonation of wet and dry microsites was evident in these stands. In general, the bryophyte flora at sites sampled on the east side of the District (Sites 1, 2, 3, 4) was best developed in the riparian zone within 10-20 vertical feet above the stream channel, regardless of width of the canyon bottom. This mesic zone was characterized by (1) *Oxalis oregana*, *Tiarella trifoliata*, and *Athyrium filix-femina*, (2) bryophyte cover ranging from 70-100 percent, and (3) up to 10 or more species of liverworts. Above this zone *Oxalis* disappeared, bryophyte cover declined to less than 30 percent except on decaying wood, and only 3-5 species of liverworts could be found. Logs in the relatively dry upper two-thirds of slopes supported only a few relatively drought-resistant species such as *Hypnum circinale*, *Dicranum fuscescens*, and *Scapania bolanderi*. The liverworts *Cephalozia lunulifolia* and *Lepidozia reptans* were restricted to logs in the lower half of slopes and into the riparian zone, but were the most drought-resistant among the cohort of small liverworts occurring on decaying wood. In contrast, species typical of the mesic riparian zone on the west side of the District (Sites 6, 7, 8, 9) extended 100-200 feet further upslope than they did on the east side.

BLM Special Status species. Of the nine Special Status bryophyte species targeted for this inventory, *Fissidens pauperculus* was found at two sites. Although the focus of the inventory was on bryophytes, the Special Status lichen *Hydrothyria venosa* was also found at one site.

Fissidens pauperculus was seen along streams in two places at Site 6 and in several small patches at Site 8. These populations occurred on moist rock and steeply sloping to vertical banks of moist soil in cutbanks above the streams. Populations at Site 6 each measured about 3 feet long and extended 12-18 inches above the stream, while those at Site 8 each measured about 12-18 inches long and extended 12-18 inches above the stream. All populations occurred under dense *Alnus rubra* and *Rubus spectabilis*, and associated species included *Fissidens bryoides*, *Porotrichum bigelovii*, *Isothecium myosuroides*, *Eurhynchium praelongum*, *Epipterygium tozeri*, *Riccardia multifida*, *Porotrichum bigelovii*, and *Hookeria lucens*. Because *Fissidens pauperculus* depends on bare soil for survival, locations of these populations change yearly because of reworking of the substrate by winter rain and floodwater, and competition from other bryophytes and vascular plants. The small size and semi-ephemeral habit of this species makes it easy to overlook, but its long-term viability seems secure. *Fissidens pauperculus* was originally placed on the Oregon Natural Heritage Information Center's rare plant list in 1998 because fewer than five historic records were known from Oregon, but purposive

surveys made since the late 1990's have turned up at least 25 sites. Because of the number of known populations and their estimated viability, it was agreed in the October 2006 rare plant meeting at Oregon State University that *Fissidens pauperculus* be removed from the upcoming 2007 list.

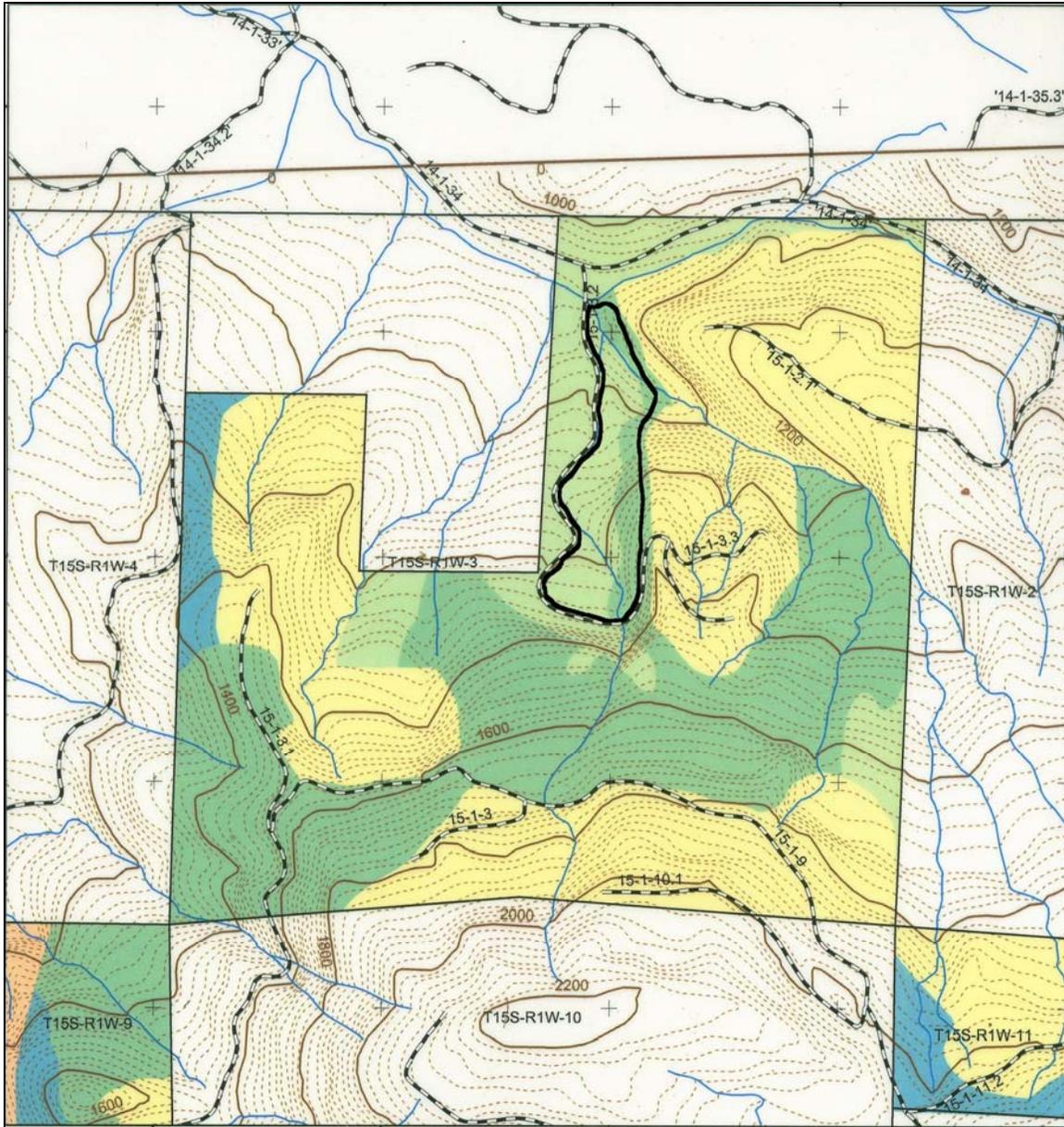
Hydrothyria venosa was seen once in a streambed at Site 4. The population extended 10-15 feet along the stream and measured about 3-5 feet wide, covering approximately 50-75 square feet. Habitat was riparian bottom composed of *Tsuga heterophylla* and *Alnus rubra*, with openings in the canopy above cobble bars. Thalli of *Hydrothyria* were attached to submerged stones and occurred with the aquatic bryophytes *Chiloscyphus polyanthos*, *Fissidens ventricosus*, and *Scapania undulata*. Water was clear and cold, with a flow of about 3-5 cfs at this time of year. The total extent and area of occupancy of this population is uncertain. Although nearly a quarter-mile of stream was surveyed, additional plants could have been overlooked, and there could be more plants upstream. Long-term viability of this population is unknown. The portion of the stream that I saw looked healthy, with no recent large-scale sediment deposition, and it is well buffered by a large block of high-quality old-growth habitat on BLM ownership in Section 31. However, much of the remaining headwaters of the Middle Fork of Mosby Creek on private land to the south of Section 31 of have been clearcut, putting the stream at potential risk of sedimentation from road and slope failures, as well as elevated water temperatures.

Site 1: Oregon, Linn Co.: Eugene BLM District, 6 mi SE of Crawfordsville, 1 mi N of Georges Knob. T15S, R01W, Sec. 03, NW4NE4, SW4NE4. Elev. 950-1300 ft.

Access: Site 1 was accessed from three points along road 15-1-3.2, the first where the road fish-hooks to the east near the center of Section 3, the second about halfway downhill toward the junction with road 14-1-34, and the third just S of the stream crossing at the bottom of the hill near the road junction.

Results: The 40 acres surveyed at this site were ridges, benches, the stream channel, and opposing slopes E of the road. Search effort focused on the stream channel. I found 43 species of bryophytes (15 liverworts, 28 mosses). Primary vegetation on the relatively gentle slopes was mesic late-seral *Pseudotsuga menziesii* and post-fire *Tsuga heterophylla* with an understory of *Acer circinatum* and *Polystichum munitum*. Scattered *Gaultheria shallon* and *Mahonia nervosa* occurred in drier openings or upper slopes. On lower slopes and in the riparian zone the understory changed to *Polystichum munitum* and *Oxalis oregana*. Large-diameter *Thuja plicata* had been cut out of the stand many years ago. *Oplopanax horridus* was scattered throughout the stand and was abundant along the creek with *Alnus rubra* and *Rubus spectabilis*. Fire-scarred firs up to 48 inches in diameter were interspersed with post-fire hemlocks up to 24 inches in diameter. Rotten decorticated logs were plentiful and hosted the richest liverwort flora found at any of the sites inventoried, including *Tetraphis pellucida* and the only sighting for *Geocalyx graveolens*. The perennial creek included the aquatic bryophytes *Chiloscyphus polyanthos* and *Fissidens ventricosus*, and dripping outcrops supported *Conocephalum conicum*, *Pellia neesiana*, and *Porotrichum bigelovii*. Dark, moist crevices under overhangs were perfect habitat for *Schistostega pennata*, but none was found.

BLM Special Status species: No BLM Special Status species of bryophytes were found at Site 1.



Site 1: Oregon, Linn Co.: Eugene BLM District, 6 mi SE of Crawfordsville, 1 mi N of Georges Knob. T15S, R01W, Sec. 03, NW4NE4, SW4NE4. Elev. 950-1300 ft.

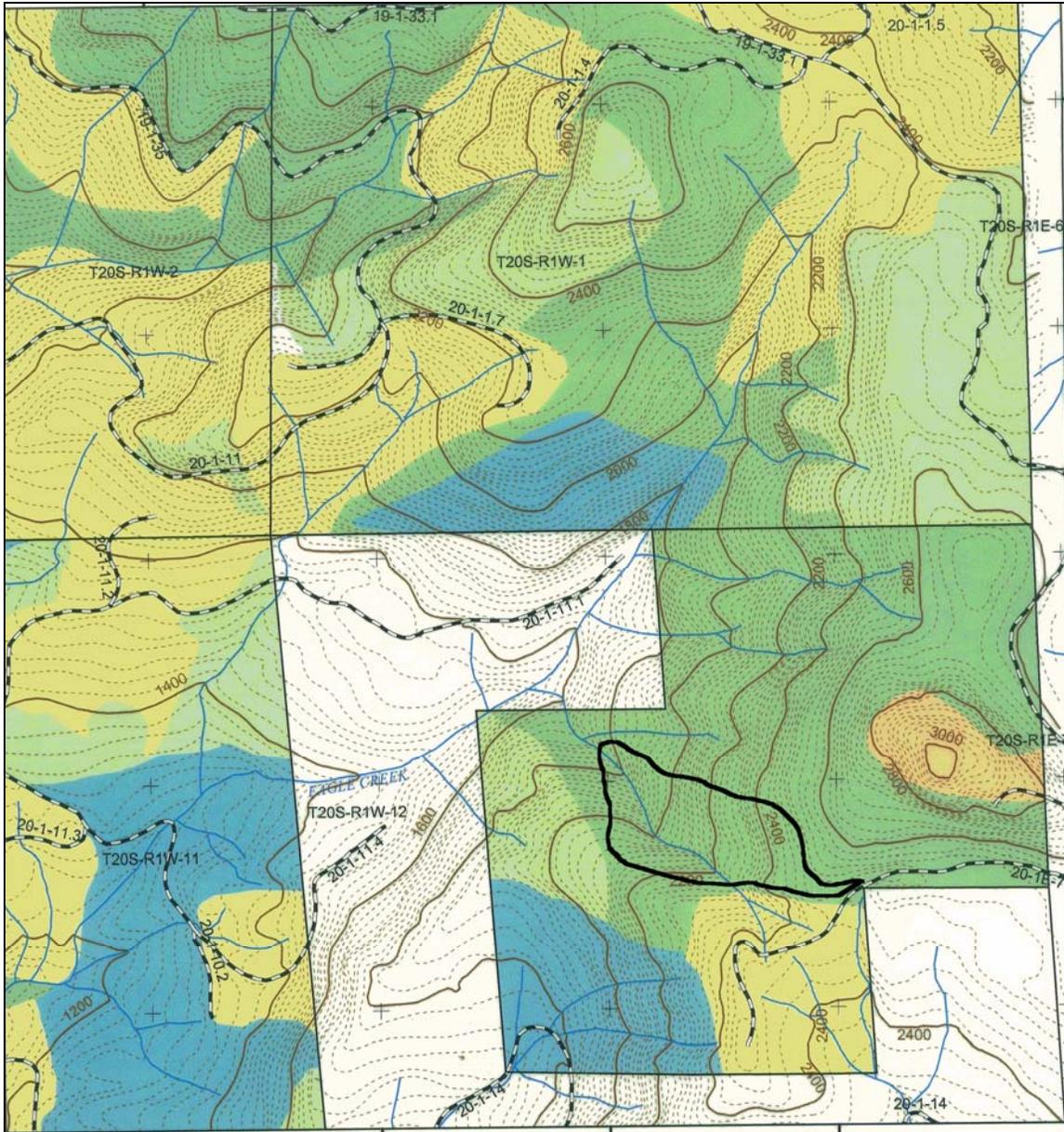
Area sampled is outlined in black. No BLM Special Status species of bryophytes were found at Site 1.

Site 2: Oregon, Lane Co.: Eugene BLM District, tributary of Eagle Creek, 6 mi ESE of Lowell, 0.25 mi WSW of Eagles Rest. T20S, R01W, Sec. 12, SW4NE4. Elev. 1800-2500 ft.

Access: Site 2 was accessed from road 20-1E-7, about 1/4 mile W of the Eagles Rest trailhead, leaving the road where it begins to curve to the S near the 1/16 property corner, proceeding NW along the contour, then W downslope to the canyon bottom.

Results: The 40 acres surveyed at this site included the headwall, ridge spurs, stream channel, benchland, and opposing slopes. Search effort focused on the steep and sometimes deeply incised stream channel. I found 31 species of bryophytes (7 liverworts, 24 mosses). Primary vegetation on upper slopes was dry, mid-seral *Pseudotsuga menziesii* with an understory of *Acer circinatum*, *Gaultheria shallon*, and *Mahonia nervosa*. Diameters of firs ranged from 18-30 inches. Sites with shallow soil over bedrock supported little vegetation other than the moss *Rhytidiadelphus triquetrus*. A few *Arbutus menziesii*, *Calocedrus decurrens*, and *Chrysolepis chrysophylla* were present on the slopes, as well as a single old-growth, fire-scarred *Calocedrus decurrens*. Rotten decorticated logs greater than 18-20 inches in diameter were scarce, presumably because previous burns had removed large trees and snags, and the paucity of logs was reflected in the poor liverwort count. Lower slopes and benches created more mesic sites where *Acer macrophyllum*, *Tsuga heterophylla*, and *Acer circinatum* were more plentiful, and some *Pseudotsuga menziesii* reached diameters of 30-40 inches. Bryophyte habitat improved where very steep gradients along the stream channel created dripping cliffs and slip faces with exposures of seepy soil and bedrock. Deep shade in overhangs provided good habitat for *Schistostega pennata*, but none was found.

BLM Special Status species: No BLM Special Status species of bryophytes were found at Site 2.



Site 2: Oregon, Lane Co.: Eugene BLM District, tributary of Eagle Creek, 6 mi ESE of Lowell, 0.25 mi WSW of Eagles Rest. T20S, R01W, Sec. 12, SW4NE4. Elev. 1800-2500 ft.

Area sampled is outlined in black. No BLM Special Status species of bryophytes were found at Site 2.

Site 3: Oregon, Lane Co.: Eugene BLM District, Lick Creek, 6 mi SE of Culp Creek. T22S, R01W, Sec. 25, NW4SW4. Elev. 1800-2200 ft.

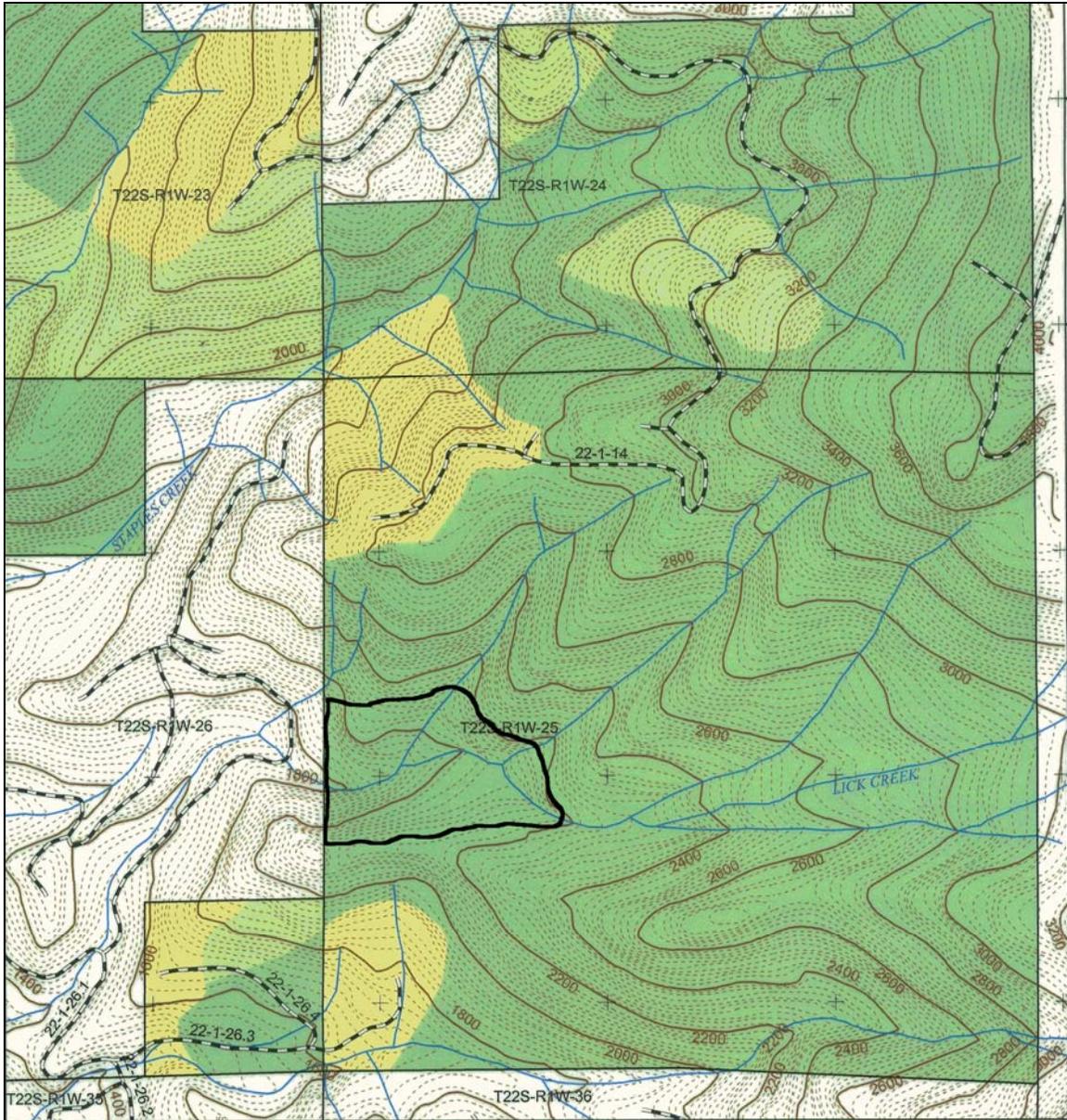
Access: Site 3 was accessed from where road 22-1-26.1 crosses Lick Creek, proceeding E up the drainage into old-growth on BLM ownership.

Results: The 40 acres surveyed at this site were stream channel, side channels, and opposing slopes. Search effort focused on the stream channel and north-facing slopes. I found 36 species of bryophytes (12 liverworts, 24 mosses). Primary vegetation on the slopes was *Pseudotsuga menziesii*, *Tsuga heterophylla*, and *Mahonia nervosa*. Large-diameter fire-scarred firs were interspersed with post-fire hemlocks up to 24 inches in diameter. Conditions were dry except near the base of the slopes just above the riparian zone and in deeply incised gullies. Rotten decorticated logs were plentiful and hosted common bryophytes such as *Buckiella undulata* (= *Plagiothecium undulatum*), *Cephalozia lunulifolia*, *Eurhynchium oregonum*, *Rhizomnium glabrescens*, *Scapania bolanderi* and *Scapania umbrosa*. The moss *Tetraphis* and other species of liverworts typical of more humid conditions were absent. Parts of the streambed were deep, dark, and narrow, forming slot-like canyons with significant exposures of vertical rock faces 12-15 feet high. Deeply shaded overhangs and high humidity in these canyons were perfect habitat for *Schistostega pennata*, but none was detected. The most common mosses on these shady rock exposures were *Claopodium bolanderi*, *Heterocladium macounii*, and *Porotrichum bigelovii*.

BLM Special Status species: No BLM Special Status species of bryophytes were found at Site 3.



Stand structure, upper slope at Site 3.



Site 3: Oregon, Lane Co.: Eugene BLM District, Lick Creek, 6 mi SE of Culp Creek. T22S, R01W, Sec. 25, NW4SW4. Elev. 1800-2200 ft.

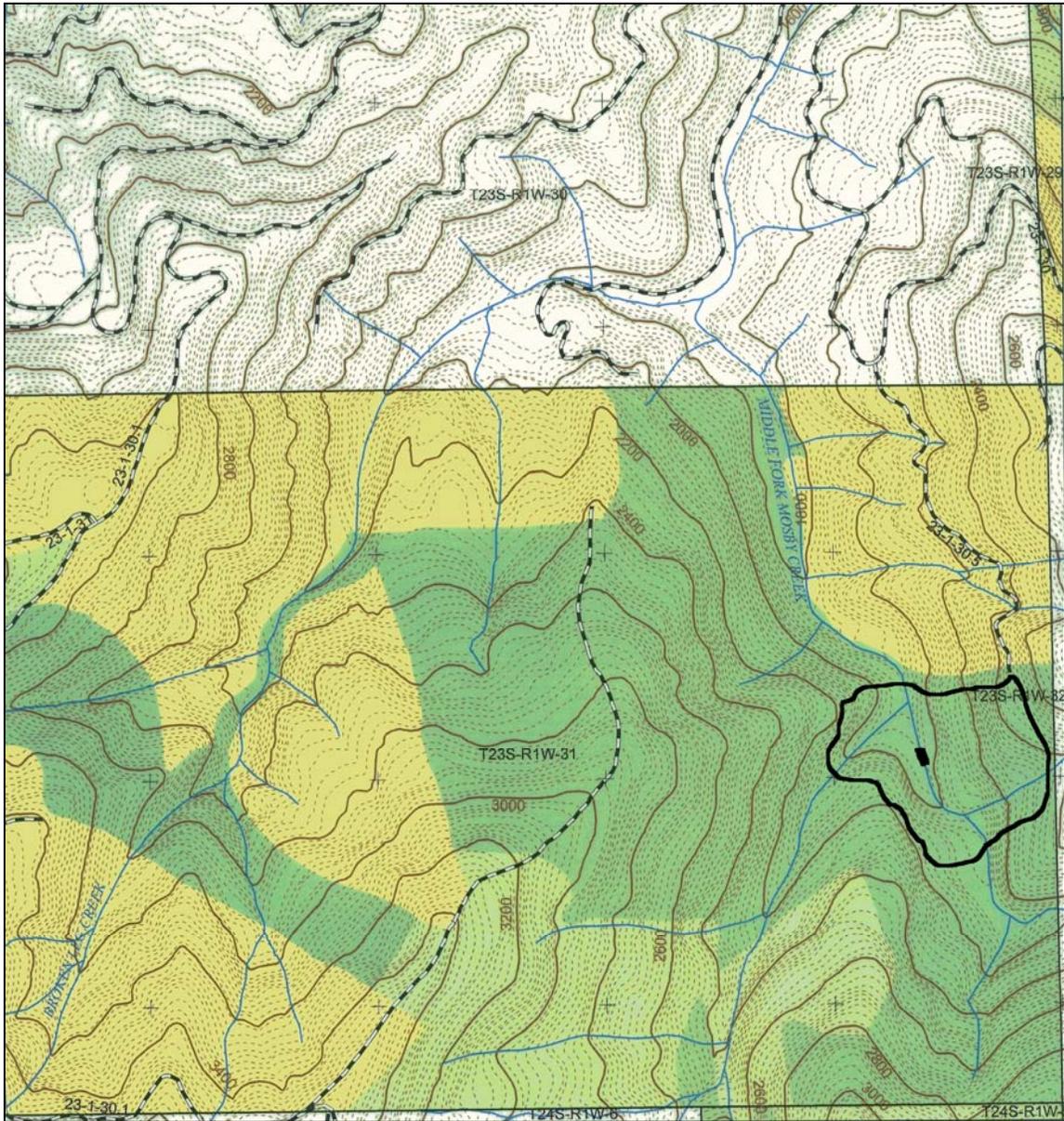
Area sampled is outlined in black. No BLM Special Status species of bryophytes were found at Site 3.

Site 4: Oregon, Douglas Co.: Eugene BLM District, upper Middle Fork of Mosby Creek, 12 mi SSW of Culp Creek, 1.5 mi NE of Huckleberry Mt. T23S, R01W, Sec. 31, SE4NE4, NE4SE4. 2000-2400 ft.

Access: Site 4 was accessed from the landing at the end of road 23-1-30.5, proceeding S along the contour into old-growth, then SW downslope to the canyon bottom.

Results: The 40 acres surveyed at this site were the stream channel, side channels, and opposing slopes. Search effort focused on the stream channel, stream terrace, and north-facing slopes. I found 35 species of bryophytes (12 liverworts, 23 mosses). Primary vegetation on the slopes was late-seral *Pseudotsuga menziesii* with post-fire *Tsuga heterophylla*, scattered *Chrysolepis chrysophylla*, and an understory of *Gaultheria shallon* and *Rhododendron macrophyllum*. Scattered *Calocedrus decurrens* and *Xerophyllum tenax* were also present. Large-diameter fire-scarred firs were interspersed with post-fire hemlocks up to 24 inches in diameter. Conditions were dry except near the base of the slopes just above the riparian zone and in deeply incised gullies. Rotten decorticated logs were plentiful, those on upper and mid slopes supporting a depauperate flora of *Hypnum circinale*, *Dicranum fuscescens*, and *Scapania bolanderi*. Logs on lower slopes and in the canyon bottom supported a somewhat richer flora of *Buckiella undulata* (= *Plagiothecium undulatum*), *Cephalozia lunulifolia*, *Eurhynchium oreganum*, *Rhizomnium glabrescens*, *Scapania bolanderi* and *Scapania umbrosa*. The moss *Tetraphis* and other species of liverworts typical of more humid conditions were absent. In some places, the stream had a well-developed terrace up to 50 feet wide, supporting dense growth of *Oxalis oregana* and *Hylocomium splendens*. Elsewhere the stream bottom narrowed and had large log jams. Occasional exposures of vertical bedrock along the stream provided deep shade, overhangs, and high humidity, but no *Schistostega pennata* was found. The most common mosses on these shady rock exposures were *Claopodium bolanderi*, *Heterocladium macounii*, and *Porotrichum bigelovii*. I saw in the stream what was probably a tadpole of the tailed frog, *Ascaphus truei*. I was not able to capture it to examine the mouthparts, but the habitat seemed correct for this species.

BLM Special Status species: The lichen *Hydrothyria venosa* was seen once along the streambed, the population extending 10-15 feet along the stream and measuring about 3-5 feet wide. Habitat was late-seral riparian stream bottom composed of hemlock and alder, with openings in the canopy above cobble bars. Thalli of *Hydrothyria* were attached to submerged stones and occurred with the aquatic bryophytes *Chiloscyphus polyanthos*, *Fissidens ventricosus*, and *Scapania undulata*. I did not flag or GPS the *Hydrothyria* because my work was focused on bryophytes and at the time I did not realize that it was on the BLM Special Status species list. The location on the map should be sufficient to relocate the populations, as it is likely that plants are generally distributed along the creek and fairly conspicuous among the rocks of the streambed.



Site 4: Oregon, Douglas Co.: Eugene BLM District, upper Middle Fork of Mosby Creek, 12 mi SSW of Culp Creek, 1.5 mi NE of Huckleberry Mt. T23S, R01W, Sec. 31, SE4NE4, NE4SE4. 2000-2400 ft.

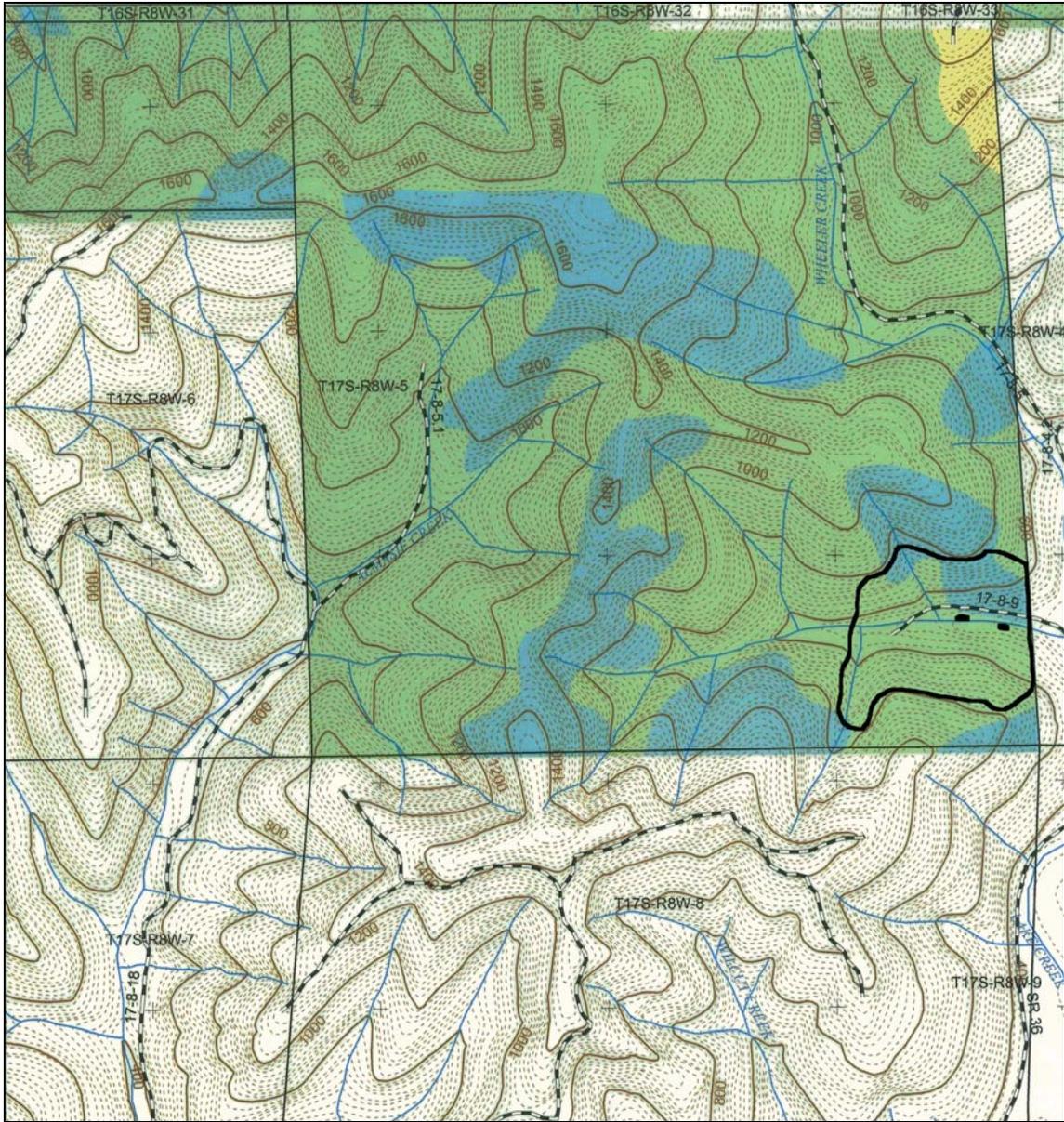
Area sampled is outlined in black. The location of *Hydrothyria venosa* is shown as a black polygon.

Site 6: Oregon, Lane Co.: Eugene BLM District, Greenleaf, Wheeler Creek drainage. T17S, R08W, Sec. 05, SE4SE4. 550-800 ft.

Access: Site 6 was accessed off road 17-8-4.2, leaving the road at a clearcut and heading W up an unnamed drainage into BLM ownership. The BLM map shows spur 17-8-9 entering this drainage but no sign of a road was evident on the ground.

Results: The 40 acres surveyed at this site were the stream channel, side channels, and opposing slopes. Search effort focused on the stream channel and north-facing slopes. I found 38 species of bryophytes (9 liverworts, 29 mosses). Primary vegetation on the slopes was scattered mid to late-seral *Pseudotsuga menziesii* with a very high cover of *Acer macrophyllum* on uplands and *Alnus rubra* along the stream bottom (cover photo). Understory in uplands was primarily *Acer circinatum*, *Oxalis oregana*, and *Polystichum munitum*, with *Rubus spectabilis* on the creek bottom. Firs and snags up to 40 inches in diameter were fire-scarred. Scattered *Tsuga heterophylla* and *Thuja plicata* were also present. Conditions were mesic throughout the stand, and *Antitrichia curtipendula* formed mats in the tree canopy and was occasional on logs, shrubs, and the forest floor where it had established from litterfall. Plentiful rotten decorticated logs supported a moderately rich liverwort flora, extensive mats of *Tetraphis pellucida*, but no *Tetraphis geniculata*. Typical species on logs included *Buckiella undulata* (= *Plagiothecium undulatum*), *Eurhynchium oreganum*, *Lepidozia reptans*, *Rhizomnium glabrescens*, and *Scapania bolanderi*. The north-facing slope had an old slump terrace with exposed sandstone bedrock in the slip face. *Bartramia pomiformis* and *Hypnum subimponens* were uncommon finds, the former confined to exposures of sandstone bedrock and the latter to trunks of *Acer macrophyllum*. While *Hypnum subimponens* is a common moss at lower elevations in western Oregon, this was the only time it was seen in the stands sampled.

BLM Special Status species: *Fissidens pauperculus* occurred on moist rock and steeply sloping to vertical soil banks along the streambed. Two populations were seen, each measuring about 3 feet long and extending 12-18 inches above the stream, occurring under dense shade of *Alnus rubra* and *Rubus spectabilis*. Associated species included *Fissidens bryoides*, *Porotrichum bigelovii*, *Isothecium myosuroides*, *Eurhynchium praelongum*, *Epipterygium tozeri*, and *Riccardia multifida*. I did not flag or GPS these populations because it is difficult to separate *Fissidens pauperculus* from the common *Fissidens bryoides* in the field, and I did not want to flag populations of *Fissidens bryoides*. The location on the map should be sufficient to relocate the general area of populations, but these will change yearly because of reworking of the substrate by winter rain and floodwater, and competition from other bryophytes and vascular plants.



Site 6: Oregon, Lane Co.: Eugene BLM District, Greenleaf, Wheeler Creek drainage. T17S, R08W, Sec. 05, SE4SE4. 550-800 ft.

Area sampled is outlined in black. Locations for *Fissidens pauperculus* are shown as two black polygons.

Site 7: Oregon, Lane Co.: Eugene BLM District, upper Miller Creek drainage, 3 mi NW of Walton. T17S, R08W, Sec. 25, NE4SW4. Elev. 1200-1650 ft.

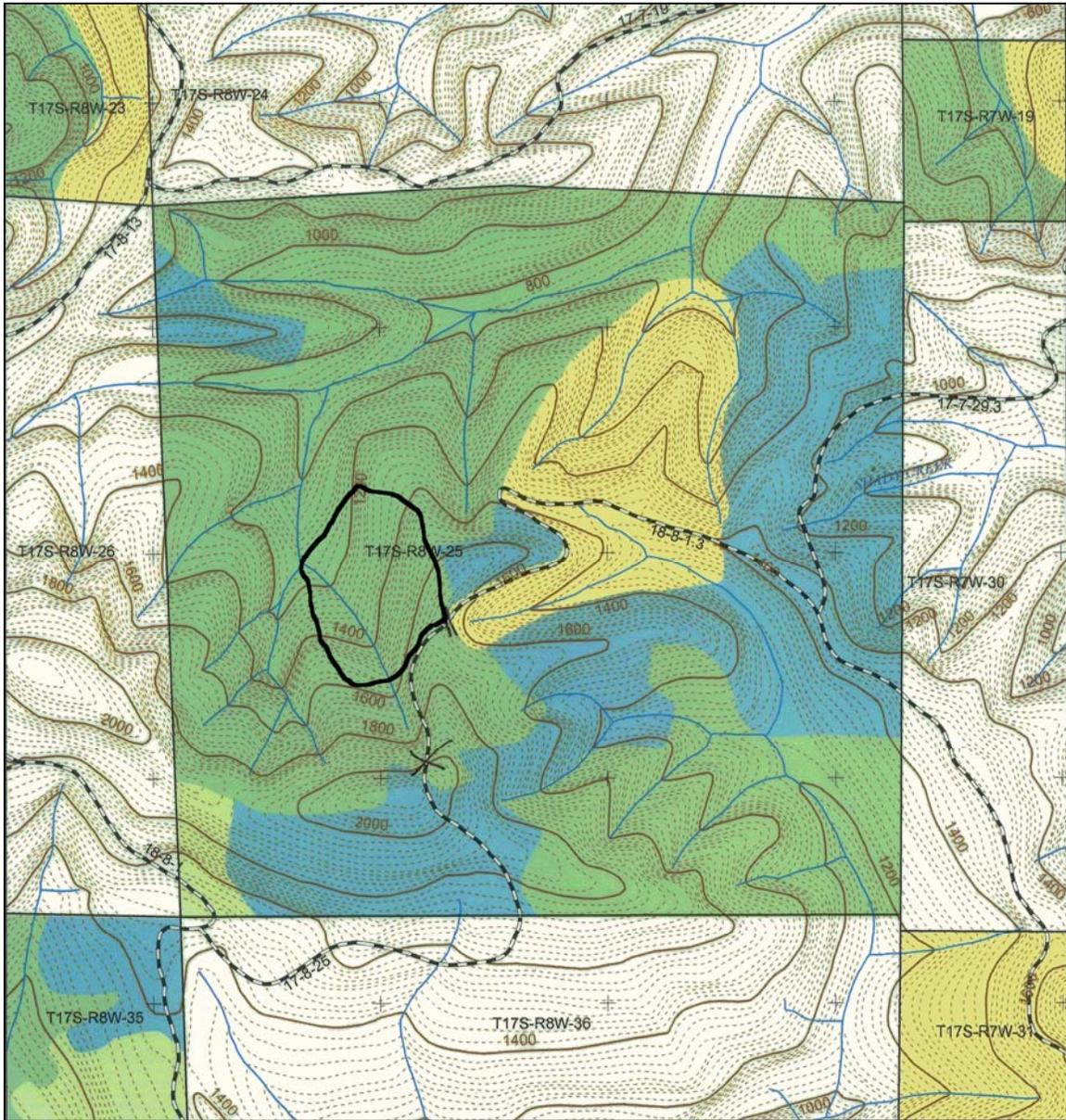
Access: Site 7 was accessed from the end of road 18-8-1.3 near the center of Section 25, proceeding W over a low berm, down onto a bench, then NW downslope to the canyon bottom. The BLM map shows road 18-8-1.3 continuing south into Section 36 and connecting with road 18-8-1, but beyond the current end of graveled surface the road becomes an unimproved cat track and is impassable to standard vehicles.

Results: The 40 acres surveyed at this site included the stream channel, side channels, benchland, and opposing slopes. Search effort focused on the stream channel and lower slopes. I found 30 species of bryophytes (7 liverworts, 23 mosses). Primary vegetation was late-seral *Pseudotsuga menziesii* with an understory of *Mahonia nervosa* on the upper slopes, changing to a more mesic stand with post-fire *Tsuga heterophylla* and an understory of *Acer circinatum* and *Polystichum munitum* on the lower slopes and creek bottom. Fire-scarred firs up to 60 inches in diameter were interspersed with hemlocks up to 24 inches in diameter. *Thuja plicata*, *Alnus rubra*, and *Acer macrophyllum* were present on slopes, and *Oplopanax horridus* was plentiful in the riparian area. Rotten decorticated logs were abundant but supported a low diversity of bryophytes, including lots of *Tetraphis pellucida* but no *Tetraphis geniculata*. The moss *Antitrichia curtispindula* was present in the tree canopy, indicating abundant moisture during the wet season. The stream was nearly dry at this time of year, and in general the bryoflora of this site was unremarkable.

BLM Special Status species: No BLM Special Status species of bryophytes were found at Site 7.



Stand structure,
bench on upper
slope, Site 7.



Site 7: Oregon, Lane Co.: Eugene BLM District, upper Miller Creek drainage, 3 mi NW of Walton. T17S, R08W, Sec. 25, NE4SW4. Elev. 1200-1650 ft.

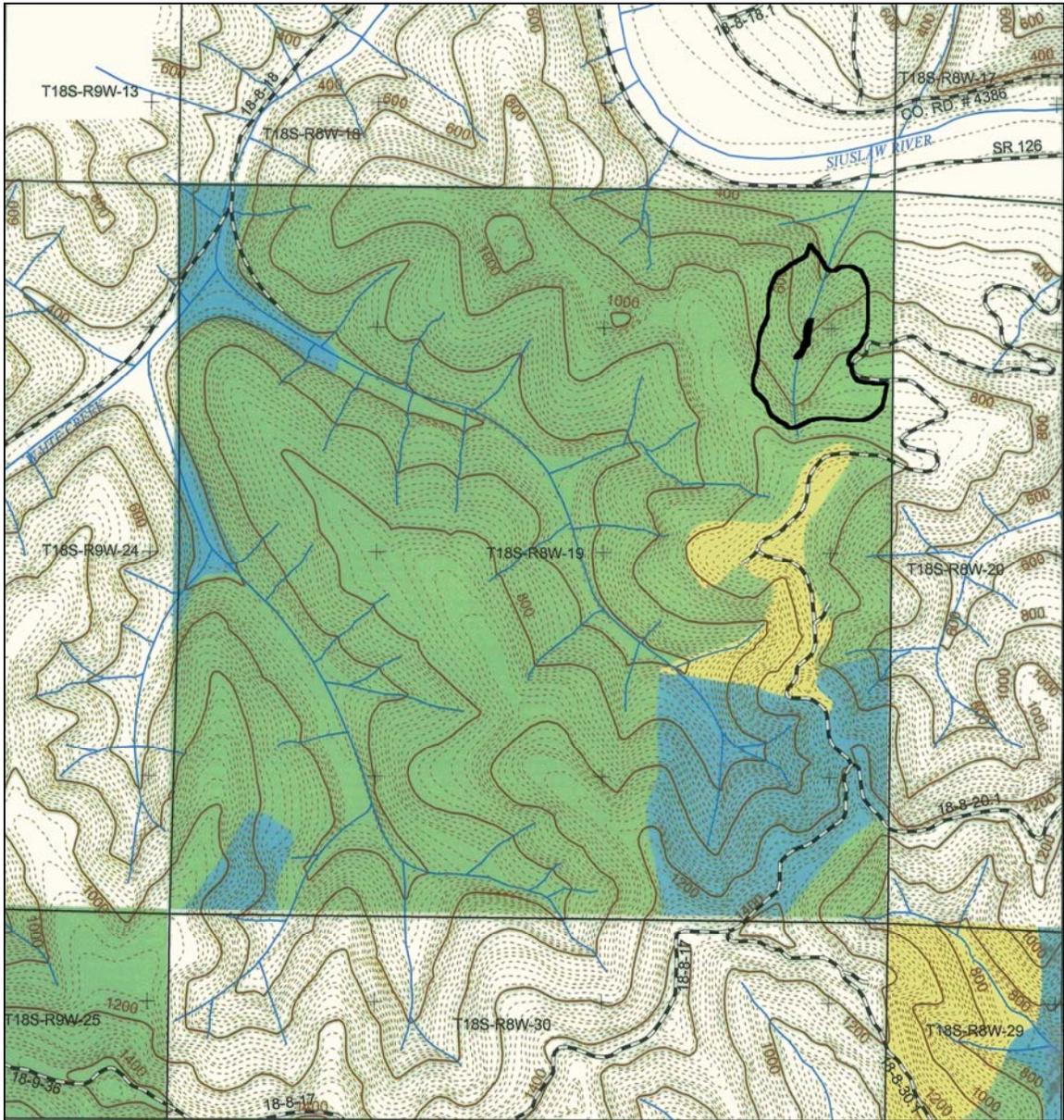
Area sampled is outlined in black. No BLM Special Status species of bryophytes were found at Site 7.

Site 8: Oregon, Lane Co.: Eugene BLM District, 1 mi WSW of Linslaw, 1 mi SE of Richardson, T18S, R08W, Sec. 19, NE4NE4. Elev. 550-800 ft.

Access: Site 8 was accessed from a bend in road 18-8-17 where it enters the NE corner of Section 19, proceeding S to a bench, W into the headwall and stream area, then N downstream toward Highway 126.

Results: The 40 acres surveyed at this site included benchland, the headwall, the deeply incised and high-gradient stream channel, and steeply-sloped sidewalls. Search effort focused on the deeply-incised stream channel and headwall slippage areas. I found 38 species of bryophytes (9 liverworts, 29 mosses). Primary vegetation was late-seral *Pseudotsuga menziesii* with post-fire *Tsuga heterophylla* and an understory of *Polystichum munitum* and *Oxalis oregana*. *Acer circinatum* was more abundant on steep slopes, and *Alnus rubra* and *Rubus spectabilis* were abundant along the stream channel. Large-diameter firs were interspersed with hemlocks up to 20 inches in diameter. High precipitation was evidenced by *Blechnum spicant*, *Athyrium filix-femina*, *Dicentra formosa*, and *Oplopanax horridus* occurring well above the riparian zone, as well as evidence of recent soil slippage on steep slopes. Rotten decorticated logs were plentiful, supporting a moderately rich bryoflora but inexplicably no *Tetraphis*. The moss *Antitrichia curtispindula* formed large, extensive mats in the tree canopy and was abundant on logs, shrubs, and the forest floor where it had established from litterfall. The stream canyon dropped precipitously to the north, with unstable slopes with soil slippage and exposed sandstone bedrock. Deeply-shaded clefts under eight-foot overhangs of sandstone along the creek created perfect habitat for *Schistostega pennata*, but none was found. *Porotrichum bigelovii*, *Conocephalum conicum*, and *Plagiomnium insigne* were abundant along the narrow and steep stream channel, and *Hookeria lucens* and *Bartramia pomiformis* were uncommon finds, the former confined to the stream channel and the latter to exposures of sandstone bedrock.

BLM Special Status species: *Fissidens pauperculus* occurred on moist exposures of steeply sloping to vertical soil banks above the streambed. Four small populations were seen, each measuring about 12-18 inches long and extending on soil banks 12-18 inches above the stream, occurring under dense shade of *Rubus spectabilis*. Associated species included *Fissidens bryoides*, *Eurhynchium praelongum*, *Epipterygium tozeri*, *Porotrichum bigelovii*, and *Hookeria lucens*. I did not flag or GPS these populations because it is difficult to separate *Fissidens pauperculus* from the common *Fissidens bryoides* in the field, and I did not want to flag populations of *Fissidens bryoides*. The location on the map should be sufficient to relocate the general area of populations, but these will change yearly because of reworking of the substrate by winter rain and floodwater, and competition from other bryophytes and vascular plants.



Site 8: Oregon, Lane Co.: Eugene BLM District, 1 mi WSW of Linslaw, 1 mi SE of Richardson, T18S, R08W, Sec. 19, NE4NE4. Elev. 550-800 ft.

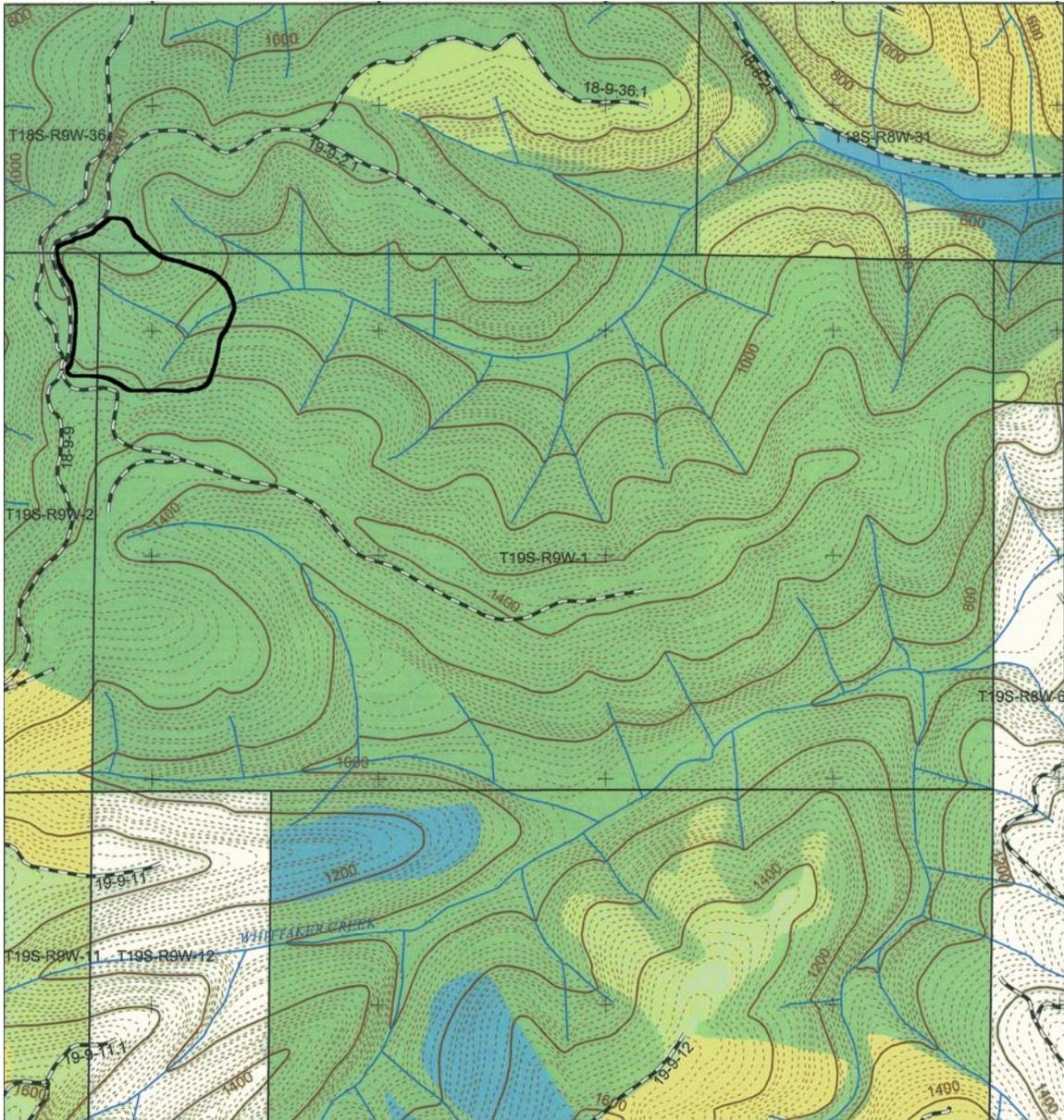
Area sampled is outlined in black. Locations for four small populations of *Fissidens pauperculus* are shown as a single black polygon.

Site 9: Oregon, Lane Co.: Eugene BLM District, headwaters of Whittaker Creek, 5 mi SW of Austa. T18S, R09W, Sec. 36, SW4SW4, SE4SW4; T19S, R09W, Sec. 01, NW4NW4. Elev. 900-1200 ft.

Access: Preferred access to Site 9, at the end of road 18-8-21 along Whittaker Creek, was judged unsafe because of evidence of recent unlawful activity at the site. Less desirable access was made along the ridgetop off road 19-9-2.1, about 1/2 mile NE of the junction with road 18-9-9, then downslope to the canyon bottom and back up the headwall to the junction of the two roads.

Results: The 40 acres surveyed at this site included upper stream and side channels in the east-facing headwall, and opposing slopes. Search effort focused on the stream bottom, around rootballs, and in areas where soil slippage had exposed bare soil and sandstone bedrock. I found 28 species of bryophytes (6 liverworts, 22 mosses). Primary vegetation on upper slopes was early to mid-seral and relatively dry *Pseudotsuga menziesii* with an understory of *Rhododendron macrophyllum*, *Mahonia nervosa*, and *Gaultheria shallon*. Late-seral conditions were absent from the area sampled, and diameters of firs ranged from 12-30 inches. Lower slopes supported a more mesic understory of *Polystichum munitum*. The headwall area had an intermittent stream with no surface water at this time of year. *Oplopanax horridus* was conspicuous in the intermittent streambed. Rotten decorticated logs were scarce, presumably because previous burns had removed large trees and snags. The paucity of logs and lack of surface water is reflected in the poor liverwort count, and in general the bryoflora of this site was unremarkable.

BLM Special Status species: No BLM Special Status species of bryophytes were found at Site 9.



Site 9: Oregon, Lane Co.: Eugene BLM District, headwaters of Whittaker Creek, 5 mi SW of Austa. T18S, R09W, Sec. 36, SW4SW4, SE4SW4; T19S, R09W, Sec. 01, NW4NW4. Elev. 900-1200 ft.

Area sampled is outlined in black. No BLM Special Status species of bryophytes were found at Site 9.

Appendix 1. Bryophytes observed at eight sites sampled for BLM Special Status species, Eugene District BLM, August-September 2006.

Site 1: Oregon, Linn Co.: Eugene BLM District, 6 mi SE of Crawfordsville, 1 mi N of Georges Knob. T15S, R01W, Sec. 03, NW4NE4, SW4NE4. Elev. 950-1300 ft.

Liverworts

Calypogeia azurea
Cephalozia bicuspidata ssp. *bicuspidata*
Cephalozia lunulifolia
Chiloscyphus polyanthos
Chiloscyphus profundus (= *Lophocolea heterophylla*)
Conocephalum conicum
Frullania nisquallensis
Geocalyx graveolens
Lepidozia reptans
Pellia neesiana
Porella navicularis
Riccardia multifida
Scapania bolanderi
Scapania umbrosa
Scapania undulata var. *undulata*

Mosses

Antitrichia curtipendula
Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium bolanderi
Claopodium crispifolium
Claopodium whippleanum
Dendroalsia abietina
Dicranum fuscescens
Dicranum scoparium
Eurhynchium oreganum
Eurhynchium praelongum
Fissidens bryoides
Fissidens ventricosus
Hylocomium splendens
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Plagiomnium insigne
Plagiothecium laetum
Pohlia cruda
Porotrichum bigelovii

Pseudotaxiphyllum elegans
Rhizomnium glabrescens
Rhytidiadelphus loreus
Rhytidiadelphus triquetrus
Scleropodium obtusifolium
Tetraphis pellucida

Site 2: Oregon, Lane Co.: Eugene BLM District, tributary of Eagle Creek, 6 mi ESE of Lowell, 0.25 mi WSW of Eagles Rest. T20S, R01W, Sec. 12, SW4NE4. Elev. 1800-2500 ft.

Liverworts

Chiloscyphus polyanthos
Frullania nisquallensis
Pellia neesiana
Porella cordaeana
Porella navicularis
Radula complanata
Scapania bolanderi

Mosses

Antitrichia curtipendula
Brachythecium frigidum
Claopodium bolanderi
Claopodium crispifolium
Dendroalsia abietina
Dichodontium pellucidum
Dicranum fuscescens
Dicranum scoparium
Dicranum tauricum
Eurhynchium oregonum
Eurhynchium praelongum
Fissidens bryoides
Hygrohypnum ochraceum
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Orthotrichum consimile
Orthotrichum lyellii
Plagiomnium insigne
Porotrichum bigelovii
Rhytidiadelphus triquetrus
Scleropodium obtusifolium

Site 3: Oregon, Lane Co.: Eugene BLM District, Lick Creek, 6 mi SE of Culp Creek. T22S, R01W, Sec. 25, NW4SW4. Elev. 1800-2200 ft.

Liverworts

Calypogeia azurea
Cephalozia bicuspidata ssp. *bicuspidata*
Cephalozia lunulifolia
Lepidozia reptans
Porella cordaeana
Porella navicularis
Porella roellii
Radula complanata
Riccardia latifrons
Scapania bolanderi
Scapania umbrosa
Scapania undulata var. *undulata*

Mosses

Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium bolanderi
Claopodium whippleanum
Dendroalsia abietina
Dichodontium pellucidum
Dicranum fuscescens
Dicranum scoparium
Dicranum tauricum
Eurhynchium oreganum
Fissidens bryoides
Fissidens ventricosus
Heterocladium macounii
Hylocomium splendens
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Orthotrichum consimile
Porotrichum bigelovii
Rhizomnium glabrescens
Rhytidiadelphus loreus
Rhytidiadelphus triquetrus
Scleropodium obtusifolium

Site 4: Oregon, Douglas Co.: Eugene BLM District, upper Middle Fork of Mosby Creek, 12 mi SSW of Culp Creek, 1.5 mi NE of Huckleberry Mt. T23S, R01W, Sec. 31, SE4NE4, NE4SE4. 2000-2400 ft.

Liverworts

Cephalozia lunulifolia
Chiloscyphus polyanthos
Frullania californica
Frullania nisquallensis
Lepidozia reptans
Porella navicularis
Porella roellii
Riccardia latifrons
Riccardia multifida
Scapania bolanderi
Scapania umbrosa
Scapania undulata var. *undulata*

Lichens

Hydrothyria venosa

Mosses

Bryum pseudotriquetrum
Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium bolanderi
Claopodium crispifolium
Claopodium whippleanum
Dichodontium pellucidum
Dicranum fuscescens
Dicranum tauricum
Eurhynchium oreganum
Fissidens bryoides
Fissidens ventricosus
Heterocladium macounii
Hylocomium splendens
Hypnum circinale
Isopterygiopsis pulchella
Isothecium myosuroides
Leucolepis acanthoneuron
Neckera douglasii
Polytrichastum alpinum
Porotrichum bigelovii
Rhizomnium glabrescens
Rhytidiadelphus loreus
Scleropodium obtusifolium

Site 6: Oregon, Lane Co.: Eugene BLM District, Greenleaf, Wheeler Creek drainage. T17S, R08W, Sec. 05, SE4SE4. 550-800 ft.

Liverworts

Calypogeia azurea
Conocephalum conicum
Frullania nisquallensis
Lepidozia reptans
Porella navicularis
Riccardia latifrons
Riccardia multifida
Scapania bolanderi
Scapania undulata var. *undulata*

Mosses

Antitrichia curtipendula
Bartramia pomiformis
Brachythecium frigidum
Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium crispifolium
Claopodium whippleanum
Dicranum fuscescens
Dicranum scoparium
Epipterygium tozeri
Eurhynchium oregonum
Eurhynchium praelongum
Fissidens bryoides
Fissidens pauperculus
Homalothecium fulgescens
Hypnum circinale
Hypnum subimponens
Isopterygiopsis pulchella
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Orthotrichum lyellii
Orthotrichum pulchellum
Plagiomnium venustum
Pohlia cruda
Porotrichum bigelovii
Rhizomnium glabrescens
Rhytidiadelphus loreus
Tetraphis pellucida

Site 7: Oregon, Lane Co.: Eugene BLM District, upper Miller Creek drainage, 3 mi NW of Walton. T17S, R08W, Sec. 25, NE4SW4. Elev. 1200-1650 ft.

Liverworts

Chiloscyphus profundus (= *Lophocolea heterophylla*)
Frullania nisquallensis
Lepidozia reptans
Porella navicularis
Radula bolanderi
Scapania bolanderi
Scapania umbrosa

Mosses

Antitrichia curtispindula
Atrichum selwynii
Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium crispifolium
Claopodium whippleanum
Dicranum fuscescens
Dicranum scoparium
Eurhynchium oregonum
Eurhynchium praelongum
Heterocladium macounii
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Orthotrichum lyellii
Orthotrichum consimile
Plagiomnium insigne
Plagiomnium venustum
Rhizomnium glabrescens
Rhytidiadelphus loreus
Tetraphis pellucida
Uloa obtusiuscula

Site 8: Oregon, Lane Co.: Eugene BLM District, 1 mi WSW of Linslaw, 1 mi SE of Richardson, T18S, R08W, Sec. 19, NE4NE4. Elev. 550-800 ft.

Liverworts

Calypogeia muelleriana
Cephalozia bicuspidata ssp. *bicuspidata*
Cephalozia lunulifolia
Conocephalum conicum
Frullania nisquallensis
Lepidozia reptans

Metzgeria conjugata
Porella navicularis
Scapania bolanderi

Mosses

Antitrichia curtipendula
Bartramia pomiformis
Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium bolanderi
Claopodium crispifolium
Dicranum fuscescens
Dicranum scoparium
Dicranum tauricum
Epipterygium tozeri
Eurhynchium oregonum
Eurhynchium praelongum
Fissidens bryoides
Fissidens pauperculus
Hookeria lucens
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Metaneckera menziesii
Neckera douglasii
Orthotrichum consimile
Orthotrichum lyellii
Plagiomnium insigne
Plagiomnium venustum
Plagiothecium laetum
Pogonatum contortum
Porotrichum bigelovii
Rhizomnium glabrescens
Rhytidiadelphus loreus
Rhytidiadelphus triquetrus

Site 9: Oregon, Lane Co.: Eugene BLM District, headwaters of Whittaker Creek, 5 mi SW of Austa. T18S, R09W, Sec. 36, SW4SW4, SE4SW4; T19S, R09W, Sec. 01, NW4NW4. Elev. 900-1200 ft.

Liverworts

Frullania nisquallensis
Lepidozia reptans
Porella navicularis
Radula bolanderi
Scapania bolanderi
Scapania umbrosa

Mosses

Antitrichia curtipendula
Atrichum selwynii

Buckiella undulata (= *Plagiothecium undulatum*)
Claopodium crispifolium
Claopodium whippleanum
Dicranum fuscescens
Eurhynchium oregonum
Eurhynchium praelongum
Fissidens bryoides
Hypnum circinale
Isothecium myosuroides
Leucolepis acanthoneuron
Neckera douglasii
Orthotrichum consimile
Orthotrichum lyellii
Plagiomnium insigne
Pohlia cruda
Porotrichum bigelovii
Pseudotaxiphyllum elegans
Rhizomnium glabrescens
Rhytidiadelphus loreus
Rhytidiadelphus triquetrus