Surveys for Rare Bryophytes in the Three Sisters Wilderness

Bend Fort Rock and Sisters Ranger Districts

Deschutes National Forest

Christina Veverka & Rick Dewey
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Figure 1. *Harpanthus flotovianus* occurs on wet, peaty soil on this north-aspect seepage slope immediately above a soppy-wet fen in upper SW portion of Three Creek drainage. Elevation = 6520 feet.

Acknowledgements

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Objectives

The intent of this project was to identify and then visit promising habitats for rare bryophytes at subalpine and alpine elevations within the Three Sisters Wilderness Area on Deschutes National Forest.

Introduction

This project focused on surveys for rare bryophytes within selected portions of the Three Sisters Wilderness area within Deschutes National Forest. For purposes of this project, "rare" includes bryophytes either recognized as "sensitive" by the USFS Region 6 Forester, or assigned Oregon state ranks of S1 or S2 by the Oregon Biodiversity Information Center (ORBIC). For Region 6 of the Forest Service, Sensitive Species are defined as "those plant and animal species for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density and habitat capability that would reduce a species' existing distribution" (Forest Service Manual 2670.5). According to ORBIC (July 2013), a S2 species is "imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction."

The area around Broken Top in the Three Sisters Wilderness features a notably high incidence of potential habitat for bryophytes, including scree fields, seasonal and perennial seepage patches, and seasonal and perennial spring- and snowmelt-fed channels. Additionally, several rare bryopyte species have been previously documented within the vicinity of Broken Top. These records include the rare leafy liverwort *Nardia japonica*, discovered by bryologist Dave Wagner in a seep on the southeast flank of the mountain. Two known sites of the leafy liverwort *Rivulariella gemmipara* (*Chiloscyphus gemmiparus*) and a single known site of the leafy liverwort *Harpanthus flotovianus* are known within the Fall Creek drainage south of South Sister. Additionally, the rare moss *Bruchia bolanderi* is also known from this general area. This information is summarized in Table 1.

Table 1. Documented occurrences of rare bryophytes within the Three Sisters Wilderness

Species	Status	NRIS EO#	Location	Discovery Date
Chiloscyphus gemmiparus	OR-SEN	06010100440	Green Lakes Trail	9/4/2006
Chiloscyphus gemmiparus	OR-SEN	06010112002	lower Fall Ck. drainage	8/7/2102
Harpanthus flotovianus	OR-SEN	06010112003	lower Fall Ck. drainage	8/7/2012
Nardia japonica	OR-SEN	06010184002	Broken Top	8/23/1984
Bruchia bolanderi	ORBIC S2	06010178001	MirrorLakes Trail	1/1/1978

The following areas were the focus of surveys:

- seeps on southeast flank of Broken Top (elev. = 7200-7920 ft.)
- Broken Top glacial lake (elev. = 8040-8160 ft.)
- Ball Butte (elev. = 7320-7560 ft.)
- Golden Lake (elev. = 6640 ft.)
- sub-alpine meadows on north side of Broken Top (elev. = 6640-7320 ft.)
- groundwater discharge sites along Broken Top Trail (elev. = 6220-7100 ft.)
- upper reaches N. Fk. Tumalo Ck. and upper Happy Valley (elev. = 6460-7560 ft.)
- upper SW portion of Three Creek drainage (elev. = 6400-6640 ft.)
- central and eastern portion of Park Meadow and adjacent upslope meadows (elev. = 6160-6340 ft.)

Figure 2. Habitat at Broken Top *Jungermannia polaris* site.

Access to the upper Soda Creek drainage, Ball Butte and the southeast flank of Broken Top were on day trips using the Broken Top trailhead off Forest Service Roads 370 and 380, with access from Todd Lake and the Cascades Lakes Highway. The meadows on the north side of Broken Top were accessed through backcountry walk from Golden Lake, a 7.5 mile hike from the Park Meadow trailhead at Forest Road 16. Access to the upper SW Three Creek drainage was from

the campground at Three Creek Meadow, either by the Three Creek Meadow Trail or by cross-country hiking. Access to Park Meadow was via the Park Meadow Trail from its trailhead at Forest Road 16.

Methods

Pre-field work to identify promising habitats for survey was conducted using GoogleEarth, USFS NAIP aerial imagery and USF&WS National Wetland Inventory mapping. All identified sites were at elevations above 6000 feet. A map of surveyed areas is presented in Appendix A. At each site moss and liverwort samples were collected, along with pertinent site data such as GPS coordinates, aspect, and elevation. Critical examination of specimens was conducted at the duty station lab. Specimens identified as potential rare species were submitted to the USFS Region 6 Inventory program for verification by Dave Wagner, a regional bryophyte expert.

Survey information and site data for new rare bryophyte occurrences were entered into the USFS NRIS TES database. Confirmed rare specimens will be sent to the herbarium at Oregon State University.

Figure 3. Close-up of liverwort collection with *J. polaris.* Note:
The gray-green color is from *Anthelia juratzkana*.

Results

Sites of four rare bryophytes were newly detected during this project. These included one site of *Jungermannia polaris* that was found in alpine spring habitat on the southeast flank of Broken Top at 7500 feet (Figures 2 and 3). This tiny liverwort was found on moist, mineral soil of the spring bank, intermixed with *Anthelia juratzkana* and *Cephalozia ambigua* (both liverworts). This is the second occurrence of *J. polaris* documented on the Deschutes National Forest. The first was discovered in 2012 on the bank of an alpine spring above tree line in the Diamond Peak Wilderness. Within the region, *J. polaris* has also been documented on the Gifford Pinchot, Wallowa-Whitman, and Willamette National Forests.

Table 2. New sites of rare bryophytes in the Broken Top area

Species	Status	NRM EO#	Location
Jungermannia polaris	OR-SEN	06010100490	Broken Top meadow
Polytrichastrum sexangulare var. *sexangulare*	OR-STR	06010100489	Broken Top Trail
Harpanthus flotovianus	OR-SEN	06010514001	upper SW Three Ck. drainage
Harpanthus flotovianus	OR-SEN	06010114004	upper Happy Valley
Harpanthus flotovianus	OR-SEN	06010114002	Broken Top Trail, above Todd Lake
Harpanthus flotovianus	OR-SEN	06010114003	Broken Top Trail, upper Soda Ck. drainage
Harpanthus flotovianus	OR-SEN	06010114006	Broken Top Trail, upper Soda Ck. drainage
Rivulariella gemmipara	OR-SEN	06010514005	Park Meadow
Rivulariella gemmipara	OR-SEN	06010514006	upper SW Three Ck. drainage
Rivulariella gemmipara	OR-SEN	06010114007	upper Happy Valley (above 370 road)
Rivulariella gemmipara	OR-SEN	06010114005	upper reach North Fork Tumalo Ck.
Rivulariella gemmipara	OR-SEN	06010114008	Along 370 road above Todd Lake
Rivulariella gemmipara	OR-SEN	06010114001	Broken Top Trail, above Todd Lake

Also within the Broken Top basin, a new occurrence of *Polytrichastrum sexangulare* var. *sexangulare* (an OR-STR moss) was discovered on the moist bank of an ephemeral drainage crossing the Broken Top trail. The site was found at 7100 feet within an open stand of mountain hemlock (*Tsuga mertensiana*) and mountain heather (*Phyllodoce* sp.) This is the first occurrence of this species on the Deschutes Forest, and also the first known site within the East Cascades physiographic province of Oregon (Oregon Biodiversity Information Center). Previously this species was known from sites on the Mt. Hood, Mt. Baker-Snoqualmie, Okanogan and Willamette National Forests.

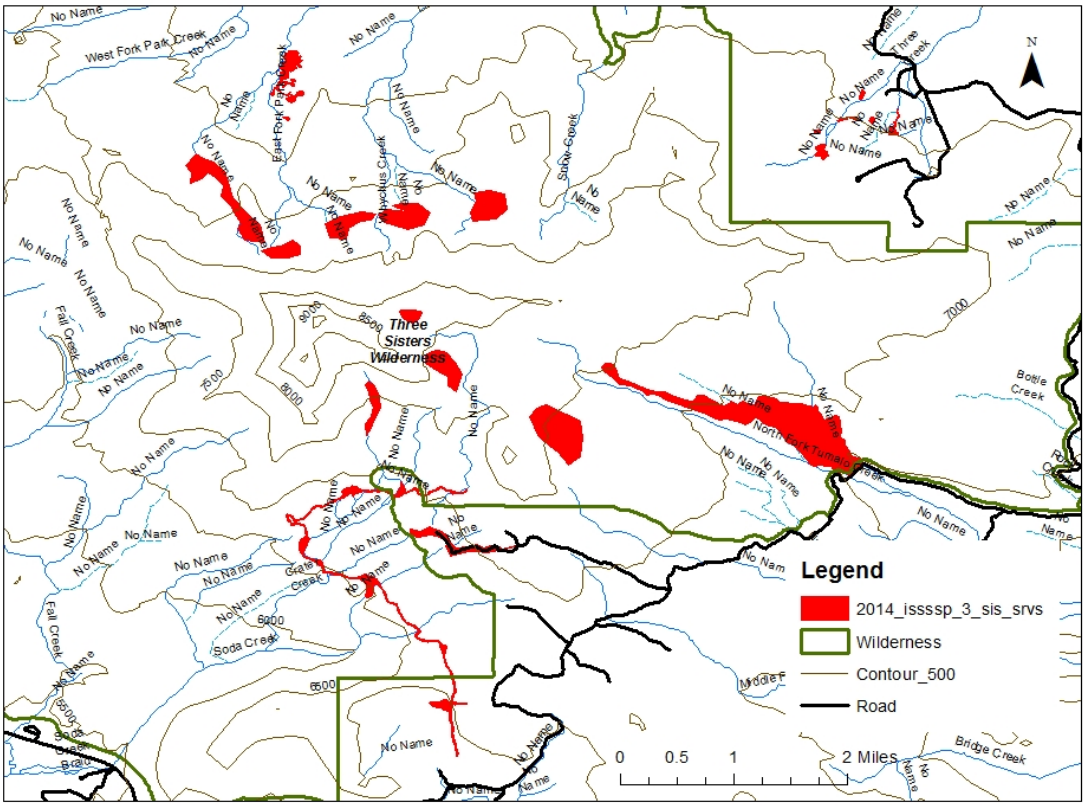
During the surveys the moss *Tortula obtusifolia* was collected, a species previously undocumented within Oregon (per. comm. Dave Wagner). While not rare, this species has a rather isolated and scattered distribution across North America.

Figure 4. Habitat site near Broken Top trail for *Polytrichastrum sexangulare* var. *sexangulare*.

Five additional sites of the leafy liverwort *Harpanthus flotovianus* were located. These sites occurred on wet peaty soil of small, groundwater-fed channels and seepage slopes at 1) Park Meadow, 2) upper SW Three Creek drainage, 3) upper Happy Valley and near the Broken Top Trail 4) above Todd Lake and 5) in the upper Soda Creek drainage. Six sites of this OR-SEN species are now known on Deschutes National Forest, and all are either within or closely adjacent to the Three Sisters Wilderness Area. Six additional sites of the newly described leafy liverwort *Rivulariella gemmipara* (formerly *Chiloscyphus gemmiparus*) were detected in small groundwater-fed channels 1) along the eastern edge of Park Meadow and 2) near the Broken Top Trail above Todd Lake, and in somewhat larger, groundwater-fed creeks 3) in the upper SW Three Creek drainage, 4) in upper Happy Valley, 5) in the upper portion of the North Fork Tumalo Creek drainage, and 6) along the 46-370 road shortly above Todd Lake. Eight sites of this OR-SEN leafy liverwort are now documented on Deschutes National Forest, and each of these occurs within or closely adjacent to the Three Sisters Wilderness Area.

Figure 5. *Tortula obtusifolia* found on basalt in scree field below Broken Top.

Figure 6. Both *Harpanthus flotovianus* and *Rivulariella gemmipara* occur at this fen and a seepage system along Broken Top Trail above Todd Lake. Elevation = 6520 feet.

Appendix A. Map of project survey areas.

Survey Areas, 2014 ISSSSP Three Sisters NWA Rare Bryophytes