

**INVENTORY OF RARE BRYOPHYTES IN
UNIQUE WETLAND
ECOSYSTEMS ON THE
ROGUE RIVER-SISKIYOU NATIONAL FOREST**



Photo: L. Wilson

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U.S.D.A FOREST SERVICE REGION 6 AND U.S.D.I BUREAU OF LAND MANAGEMENT

INTERAGENCY SPECIAL STATUS AND SENSITIVE SPECIES PROGRAM

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INTRODUCTION

The Rogue River-Siskiyou National Forest (RRSNF) dissects a geographically diverse area of Oregon, creating a high level of endemism with regard to vascular plants. At this point much less is known about non-vascular plant diversity in the region so botanists on the forest proposed a project to inventory unique wetland ecosystems for Region 6 Sensitive, Strategic and Oregon Biologic Information Center (ORBIC) list 3 and 4 bryophytes (mosses, liverworts and hornworts). The project received funding from the Interagency Special Status and Sensitive Species Program (ISSSSP) for field work to begin during the 2009 field season. This report summarizes findings of the inventory.

Wetland ecosystems are an uncommon feature of the steep and highly dissected Siskiyou Mountains in Southwest Oregon. They are dispersed more so within the Southern Oregon Cascade portion of the forest, but are still considered an uncommon feature on the landscape when compared to unique upland ecosystems such as prairies or rock outcrops.

In comparison to northwestern Oregon and western Washington little information exists with regard to Sensitive wetland associated bryophytes in southwest Oregon. This may be due to the fact that large metropolitan areas with universities are mostly lacking from the region and therefore the expertise and funding to accomplish this type of work is not as available. It is also likely due to the remoteness and difficulty in accessing habitats within the region. Past inventories in the region by botanists and bryologists such as Dave Wagner, Dan Norris, Judith Harpel, Scot Loring, Wayne Rolle, Clint Emerson, Richard Helliwell and others have resulted in unusual and unsuspected finds of several different species of Sensitive bryophytes.

This inventory's main objective is to provide new information on distribution, abundance and habitat for Sensitive wetland associated bryophyte species with little known information from the southwest Oregon area. Additional objectives include helping field botanists to address Sensitive bryophyte species in Biological Evaluation (BE) documents for projects on the forest by increasing the knowledge base for these organisms and to increase the ability of botanists in the region to assess the conservation status of these seldom studied and very rare bryophyte species.

These objectives were accomplished through survey and inventory of several high quality habitat wetland areas by qualified botanists as well as by sharing data and information through this report, site reports and the Natural Resource Inventory System (NRIS) database.

METHODS

A total of 44 wetland ecosystems were initially identified as potential survey areas on the forest. Out of that list 28 wetlands were prioritized to be inventoried for bryophytes listed as Sensitive or Strategic by Region 6 of the USDA Forest Service. Bryophyte species not formally listed as Sensitive by the Forest Service, but considered uncommon or rare (List 3 and 4) by ORBIC were also inventoried. Incidental sightings of Sensitive lichens, fungi and vascular plants were noted as well.

The 28 inventory areas were chosen subjectively using local botanist's knowledge of known wetlands, GIS aerial imagery, proximity to known sites of Sensitive bryophytes, access to survey areas and overall probability of locating new sites. It was decided that a subjective non-random

approach to delineating survey areas would serve as a better way to locate new sites of Sensitive bryophytes. This means that the data collected cannot be used in statistical analysis but we felt at this juncture it was more important to locate new sites rather than be able to extrapolate from such a limited knowledge base. It seemed more important to conduct baseline inventory from which future studies or inventories could work off of.

Inventories were conducted in separate wetlands by Forest Service and contract botanists. The highest likelihood habitat areas were picked out and given to Scot Loring a local contractor in the Rogue Valley. This was due to Scot’s past history in the area and his local knowledge of wetland bryophytes in the Southern Oregon Cascades. A second set of lower potential habitat wetlands were surveyed by Forest Service botanists Clint Emerson, Wayne Rolle, Laurel Wilson and Jee Lee. The wetlands were usually surveyed in teams of two or three. Wayne Rolle accompanied Scot Loring during a few of the areas he surveyed.

Aerial and topographic maps were created for proposed wetland survey areas using GIS Arc Map. The maps were used extensively in the field to locate and survey the wetland areas. Previously known sites were included on the maps in order to revisit them during the inventory. Notes and sketches were made on the maps that were later incorporated into data forms and eventually into the NRIS database.

Survey and inventory at each of the 28 wetlands entailed one to three botanists walking nearly the entire extent of each wetland as delineated on aerial maps. The search strategy fell between an intuitive controlled and complete inventory method depending on the size and shape of the wetland. Some of the areas were completely searched, while others that tended to extend up or down streams, or continue on for hundreds of acres separated by small areas of forest, were searched in the highest potential habitats.

Search criteria focused on habitat for Sensitive, Strategic and ORBIC List 3 and 4 bryophyte species known or suspected to occur on the RRSNF. Habitat and corresponding Sensitive species searched for are outlined in Table 1.

Table 1. General Habitat Type and Associated Sensitive Bryophyte Species

<p><i>Sphagnum</i> Associated Species <i>Calypogeia sphagnicola</i> <i>Pohlia sphagnicola</i> <i>Cephaloziella spinigera</i> <i>Kurzia makinoana</i> <i>Harpanthus flotovianus</i></p>	<p>Rich Montane Fen Species “brown mosses” <i>Meesia uliginosa</i> <i>Helodium blandowii</i> <i>Pseudocalliergon trifarium</i> <i>Tomentypnum nitens</i> <i>Tritomaria exsectiformis</i></p>
<p>Sub-Alpine Lake and Stream Margin Species <i>Trematodon boasii (asanoi)</i> <i>Bruchia bolanderi</i> <i>Schistostega pennata</i></p>	<p>Dung and Peatland Loving Species <i>Tayloria serrata</i> <i>Splachnum ampulaceum</i></p>

While searching the wetlands for Sensitive bryophytes other more common and dominant species were noted and included as part of the data set entered into the NRIS database. Each

wetland was characterized in a general sense with regard to vascular plant communities and hydrologic systems. Complete floristic inventories of the bryophyte flora were not completed due to time and funding constraints, however the lists that were made represent a majority of the species found in each wetland. If species were unknown in the field and seemed unusual they were collected and either keyed in the lab and discarded if common or vouchered and were sent to an expert in identification of bryophytes for a final determination. Unknown and Sensitive liverwort specimens were observed under a compound microscope and oil bodies were photographed, sketched and/or described for subsequent verifications by experts.

RESULTS

A total of 29 new Forest Service listed Sensitive or Strategic sites were documented during this inventory effort. Four wetland bryophyte species currently listed as Sensitive were documented across 14 different sites. Three bryophytes listed as Strategic were located at 3 sites and one unlisted species new to the Oregon moss flora was discovered. Also located incidentally were 2 species totaling 7 new sites of non-wetland associated bryophytes, 1 sensitive fungus species documented from 2 sites, 1 strategic lichen species documented from one site and 2 sensitive vascular plant species each documented once. The following table outlines the species that were found in each wetland and associates collection numbers with each site where a collection was made.

Table 2. List of Species and Sites Found During Inventory

Targeted Wetland Bryophytes				
Species	Wetland(s)	Collection Number	UTM¹	Conservation Status
<i>Calypogeia sphagnicola</i>	Lemmingsworth Gulch Beaver Complex 68-800 Road Muir Creek	Emerson 1092 Emerson 1094 Loring 5379 Loring 5372	417626E 4652956N 560677E 4686336N 534716E 4751202N 552836E 4767605N	Forest Service (FS) Sensitive
<i>Cephaloziella spinigera</i>	68-800 Road	Loring 5380	534710E 4751179N	FS Strategic
<i>Helodium blandowii</i>	Hamaker Meadow Muir Creek Devils Club	Loring 5369 Loring 5371 Rolle 7-28-09	554978E 4767593N 552663E 4766524N 559597E 4768461N	FS Sensitive
<i>Meesia uliginosa</i>	Frey Creek Walch Fen McDonald Basin	Loring 5384 Loring 5246 Loring 5361	556257E 4721683N 554915E 4688626N 519710E 4658613N	FS Sensitive
<i>Tomentypnum nitens</i>	Hamaker Meadow Black Bear Deadwood Creek Walch Fen	Loring 5376 Loring 5383 Loring 5385 Loring 5245	555248E 4767796N 555771E 4721430N 552023E 4683514N 555075E 4688743N	FS Sensitive
Incidental Wetland Bryophytes				
<i>Campylium</i>	Soda Springs	Emerson1102B	559136E 4769379N	New to

¹ UTM Zone 10, NAD 1983 Conus

<i>stellatum</i>				Oregon ²
<i>Chiloscyphus gemmiparus</i>	Hinkle Lake	Emerson 1113	475840E 4651777N	FS Strategic
<i>Eucladium verticillatum</i>	Dead Indian Soda Springs	Loring 5500	545366E 4686852N	FS Strategic
Incidental Upland Bryophytes				
<i>Grimmia anomala</i>	Hamaker Meadow 1000 Springs 68-800 Road Deadwood Creek Tamarack Upper Steve's Fork	Loring 5368 Loring 5383 Loring 5381 Loring 5386 Loring 5534 Loring 5269	554962E 4767530N 557275E 4748139N 534712E 4751127N 551857E 4683366N 507212E 4651138N 472861E 4647435N	FS Sensitive
<i>Schistidium cinclododonteum</i>	McDonald Basin	Loring 5362	Not Available	FS Strategic
Incidental Fungi				
<i>Climacocystis borealis</i>	South Fork Rogue River Black Bear	Loring 5380 Loring 5381	Not Available Not Available	FS Sensitive
Incidental Lichens				
<i>Leptogium teretiusculum</i>	Dead Indian Soda Springs	Loring 5501	545293E 4686840N	FS Sensitive
Incidental Vascular Plants				
<i>Carex capitata</i>	Walch Fen	No collection made: Observed by Loring	Not Available	FS Sensitive
<i>Scheuzeria palustris var. americana</i>	North Fork Rogue River	No collection made: Observed by Emerson and Rolle	555804E 4769981N	FS Sensitive

Bryophyte Species

The following narratives about each species provide some background with regard to distribution and significance of each collection. Only wetland associated bryophytes are included in this section because of their relevance to this project.

Calypogeia sphagnicola

This is a liverwort known from fen and bog habitats where it usually grows amongst various species of peat moss or *Sphagnum*, hence the specific epithet *sphagnicola*. The species range is circumboreal and bipolar. In the Pacific Northwest, it is known from British Columbia, Washington, Montana, and Oregon. There are three known occurrences that are relatively near to Rogue River-Siskiyou National Forest land, one on the Umpqua National Forest found by Richard Helliwell and two found by Dave Wagner on the southern Oregon coast near Gold Beach and Brookings. This liverwort had not been previously found on the RRSNF until this inventory project when it was located from four different wetlands including a Darlingtonia

² Due to this being an unknown species in Oregon prior to this inventory there has not been sufficient time to give it a conservation ranking. It is likely it will become FS Sensitive in the near future.

bog/fen two miles north of the California border. This new occurrence from Lemmingsworth Gulch represents the southern extent of the species range within North America.

Campylium stellatum

This moss species can be somewhat common in mineral rich fens throughout many states and provinces of Canada but was not known from Oregon before this inventory took place (Henas, L., BFNA, 2000, Lawton, 1971). Since then another collection was

made from a serpentine fen in the Blue Mountains of Northeast Oregon (pers. com. Rausch, Joseph). The site that was found during this inventory was from a rich calcareous spring in the high Cascade Mountains just north of Crater Lake NP. The site is named Soda Springs because of the calcium rich water that flows from the boxed spring into a channel with tufa³ deposits lining the banks. The moss was not collected on the tufa deposit, but instead found growing on

soil within the broader fen that the spring flows into.



Figure 1. *Calypogeia sphagnicola*

Photo: S. Loring

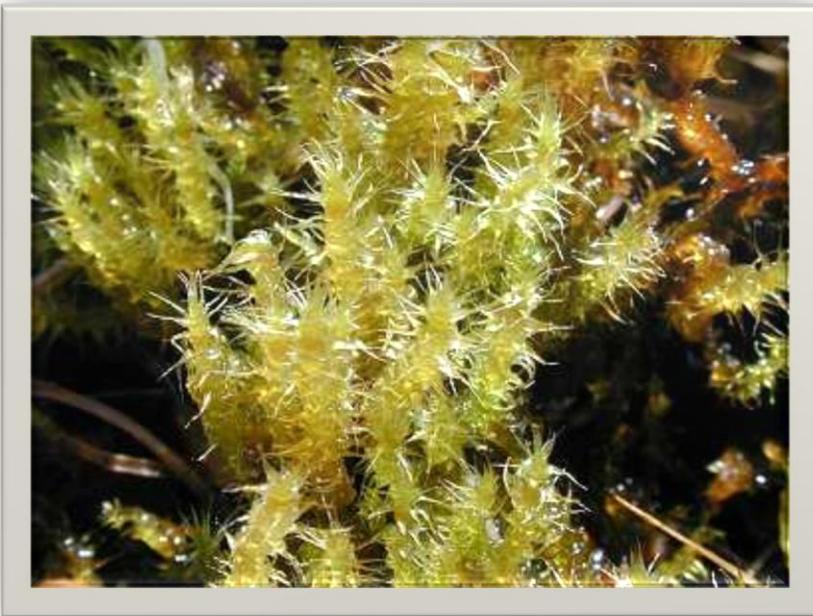


Figure 2. *Campylium stellatum*

Photo: Michael Luth, UW-Stevens Pt. Freckmann Herb.

Cephaloziella spinigera

This liverwort species was documented for the first time on the RRSNF during the inventory. It was found growing along with *Calypogeia sphagnicola* amongst *Sphagnum* within a wetland above the 68-800 Road in the upper Rogue River watershed within the Cascades. Though more common in boreal zones of the world it was previously only known from two other sites in Oregon (Christy and Wagner, 1996 and 2007).

³ Tufa is a somewhat soft type of rock formed by the precipitation of carbonate minerals. It is often associated with springs and lakesides. Often, but not always, it indicates a limestone influence.

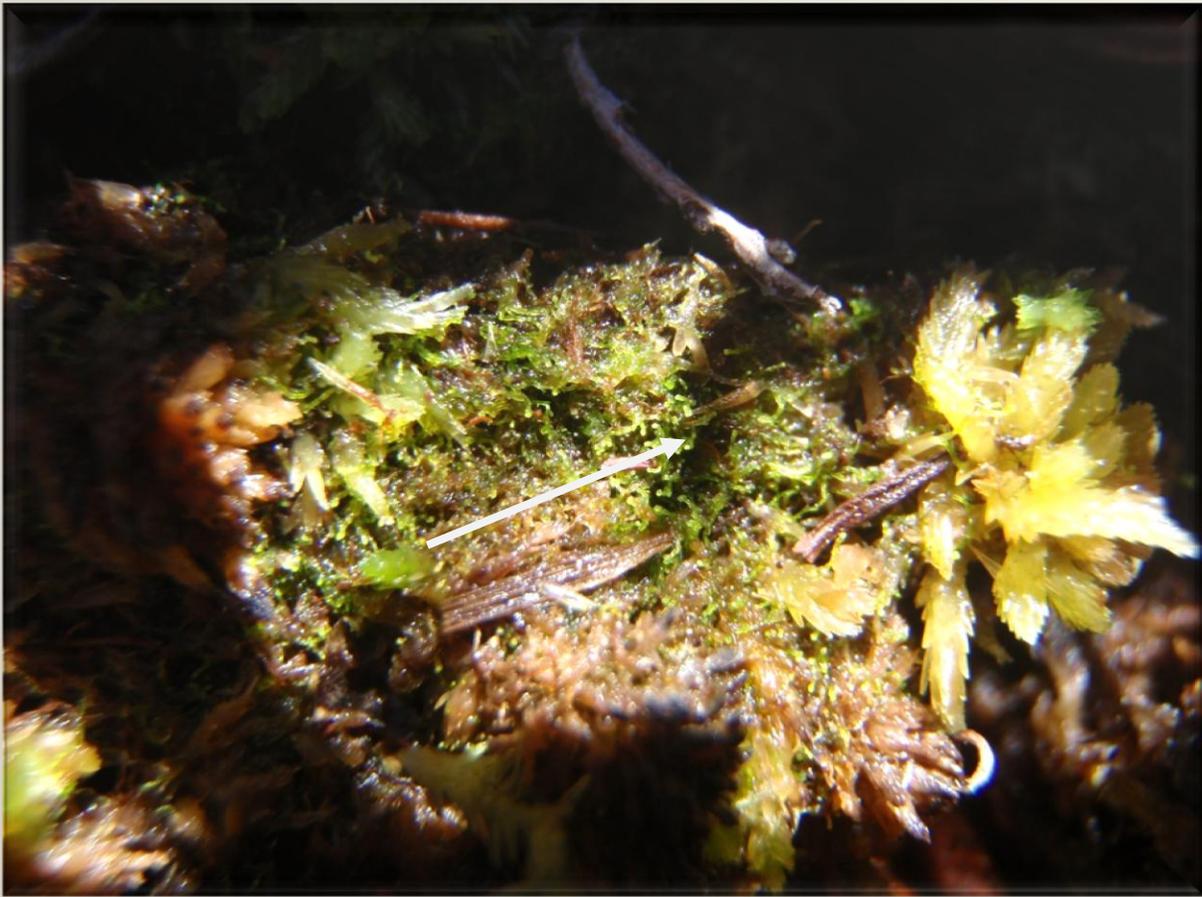


Figure 3. *Cephaloziella spinigera* growing with *Sphagnum*

Photo: S. Loring

Chilocyphus gemmiparus

This liverwort species was collected within a cold spring fed stream near Hinkle Lake just 1 air mile north of the California border within Josephine County, Oregon. Previously only known from six localities worldwide (Christy & Wagner, 2006)



Figure 4. *Chilocyphus gemmiparus* habitat

Photo: C. Emerson

this site represents the furthest western locality and the first site known from the Klamath-Siskiyou Mountains. Of note is the extensive damage to the meadow vegetation and soil adjacent to the stream where this species was collected.

Eucladium verticillatum

This moss species was collected on tufa at Dead Indian Soda Springs. This represents the first documented site of this species on the RRSNF. Currently the species is listed as Strategic because further information is needed before assigning it a conservation status. Based on most of the known locations in Oregon occurring within only a few different watersheds on Medford BLM land, it is likely this species will be elevated to the Sensitive species level on Forest Service lands in the near future.

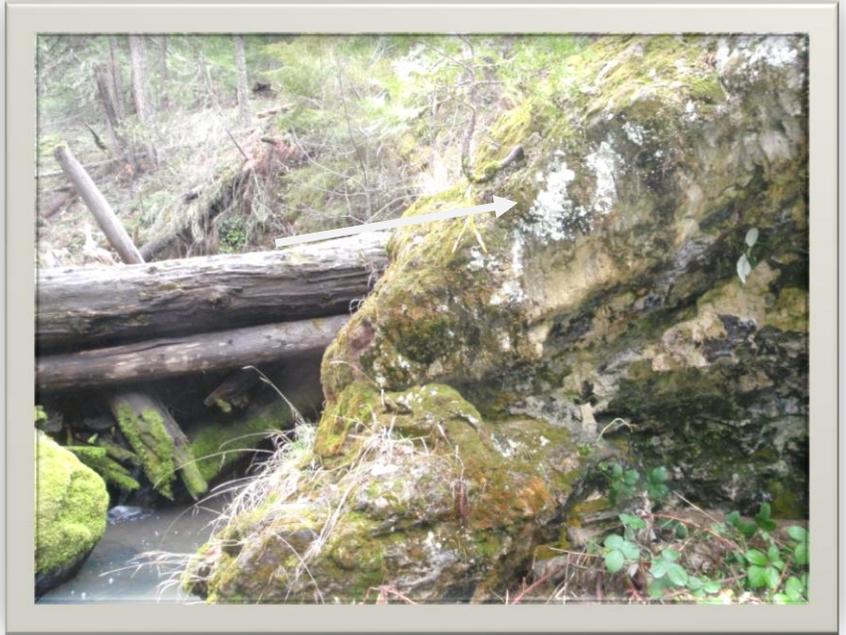


Figure 5. Tufa habitat where *Eucladium verticillatum* was found. Photo: S. Loring

Helodium blandowii

The sensitive listed moss *Helodium blandowii* was known from one site on the RRSNF prior to this inventory. The one occurrence was found in 1999. Unfortunately that site could not be relocated during this survey. Three new sites were located within three separate wetlands as a result of this inventory.



Figure 6. *Helodium blandowii* from Hammaker Meadow Photo: S. Loring

Meesia uliginosa

Prior to this inventory *Meesia uliginosa* was only known from one site in Oregon at McDonald Basin in the Siskiyou Mountains on the RRSNF (Christy, 2007). That site was revisited and subsequently verified as still being extant and healthy. An additional two new locations were found during surveys of rich montane fens along Frey and Muir Creek both of which flow into the upper Rogue River high in the Cascades.

Tomentypnum nitens

This moss was found within four wetlands during the inventory. When located it usually was found to be quite abundant covering large portions of each wetland. The site found within the Deadwood Creek wetland may represent the furthest known southern location for this species. The species is generally more common in a boreal setting and becomes somewhat rare

throughout its range south of the Canadian border. Evidence could not be found that it has been located in California (Christy, 2007). The Deadwood Creek site lies about 20 miles north of the California border.



Figure 7. *Meesia uliginosa* growing with *Aulacomnium palustre* (yellow in back)
Photo: S. Loring



Figure 8. *Tomentypnum nitens* from black bear swamp.

Photo: S. Loring

Wetlands

The table below displays the 28 wetlands that were surveyed along with general site and survey information about each one.

Table. 3 Wetland Survey Information

Wetlands	Date Surveyed	Surveyor(s)	Elevation	TRS ⁴	Wetland Type(s)
Upper Rogue	7/28/2009	Emerson, Rolle	5000 ft	28S 5E S33	Riverside Seeps/Hummocks
Hammaker Meadow	9/10/09,11/9/09	Loring, Rolle	4000 ft.	29S 4E 10, 11	Emergent Shrub/Forb, Rich Montane Springs/Fen
Black Bear Swamp	10/20/2009	Loring	4100 ft.	34S 4E S2	Emergent Shrub, Rich Montane Spring/Fen
Skeeter Swamp	10/21/09	Loring	3600 ft.	36S 4E S06	Emergent Shrub Dominated
Devils Club Wetland	7/27-7/28/2009	Emerson, Rolle	5000 ft.	29S 5E S06	Rich Montane Springs/Fen
Muir Creek Wetland	9/11/09, 10/22/09, 11/1/09	Loring, Rolle	3900 ft.	29S 4E S9	Rich Montane Springs/Fen, Emergent Forb
Kangaroo Mtn.	8/4/2009	Emerson, Rolle, Lee	6100 ft.	18N 12W S13,14	Serpentine Spring/Seep and Montane Meadow
Walch Fen	9/24/2009	Loring	4800 ft.	37S 4E S15	Rich Montane Springs/Fen
Daley Creek	8/19/2009	Emerson, Wilson	4500 ft.	37S 4E S33	Emergent Shrub Dominated
McDonald Basin	10/4/2009	Loring	5900 ft.	40S 1W S24	Seeps and Springs, Emergent Forb
Ashland Creek Spruce Wetland	8/18/2009	Rolle, Emerson, Wilson	6200 ft.	40S 07W S17	Englemann Spruce Forested and Montane Meadow
Frey Creek	10/19/2009	Loring	4400 ft.	34S 4E S02	Forested and Emergent Forb, Seeps and Springs
North Fork Rogue	9/22/2009	Emerson, Rolle	4000 ft.	29S 4E S02	Rich Montane Springs/Fen, Sphagnum
68-800 Road	10/12/2009	Loring	4800 ft.	30S 2E S34	Emergent Forb, Seeps and Springs
Butte Creek Beaver Dam	8/17/2009	Emerson, Wilson	4850 ft.	37S 4E S14	Emergent Forb Dominated

⁴ All Township, Range and Section listed are the Willamette Meridian except for Upper Steve's Fork and Kangaroo Mountain which are Humboldt Meridian.

Lemmingsworth Gulch	7/18/2009	Emerson, Lee, Wilson	2000 ft.	41S 11W S03	Darlingtonia Bog/Fen
Deadwood Cr.	9/12/2009	Loring	4600 ft.	37S 4E S32	Rich Montane Springs/Fen, Sphagnum
Browns Creek	9/23/2009	Emerson, Wilson	3600 ft.	30S 3E S24	Rich Montane Springs/Fen, Sphagnum
\$8 Mountain	10/29/09	Loring	1600 ft.	8W 38S S20	Darlingtonia Bog/Fen
Hinkle Lake	8/5/2009	Emerson, Lee	5600 ft.	41S 5W S09	Montane Meadow, Streams, Lake Margin
Thousand Springs	10/13/2009	Loring	4800 ft.	31S 4E S12	Englemann Spruce Forested
Split Rock Creek	8/3/2009	Emerson, Lee	5700 ft.	40S 1W S13	Montane Meadow and Stream
Tamarack Cr.	9/9/2009	Loring	5900 ft.	41S 2W S11, 14	Emergent Forb Dominated, Streams
Soda Springs	9/21/2009	Emerson, Wilson	5000 ft.	29S 5E S06	Calcareous Spring, Tufa, Stream
Upper Steve's Fork Creek	10/29/2009	Loring	4800 ft.	19N 8E S06	Montane Meadow, Stream/Rivulets
Dead Indian Soda Springs	10/27/2009	Loring	2800 ft.	37S 3E S22	Calcareous Spring, Tufa, Stream
Beaver Complex	8/19/2009	Emerson, Wilson	5100 ft.	37S 5E S29	Emergent Shrub, Sphagnum
South Fork Rogue	10/18/2009	Loring	4600 ft.	34S 4E S36	Englemann Spruce Forested, Sphagnum

The following maps, photos and short narratives provide more specific information about each wetland. Because this was not a complete inventory of all wetland bryophyte species only the most common associated mosses and liverworts were noted. Many of the wetlands heavily impacted by cattle only had a few very common species like *Philonotis* and *Aulacomnium* present. The purpose of this section is to show each wetland with associated rare bryophyte species spatially represented. Though one could look up all this information in NRIS, this report summarizes it all into one document (albeit a large one by digital standards). The accuracy and scale of each aerial map should be enough to direct intrepid bryologists to within an area close enough to locate these very cryptic organisms. However, as was already noted, beaver activity, flood events, time and general hydrologic uncertainty could factor in with regard to relocating these sites in the future. As is normally the case, additional collecting at these sites should be limited and done only for regional herbaria where specific scientific research is the goal.

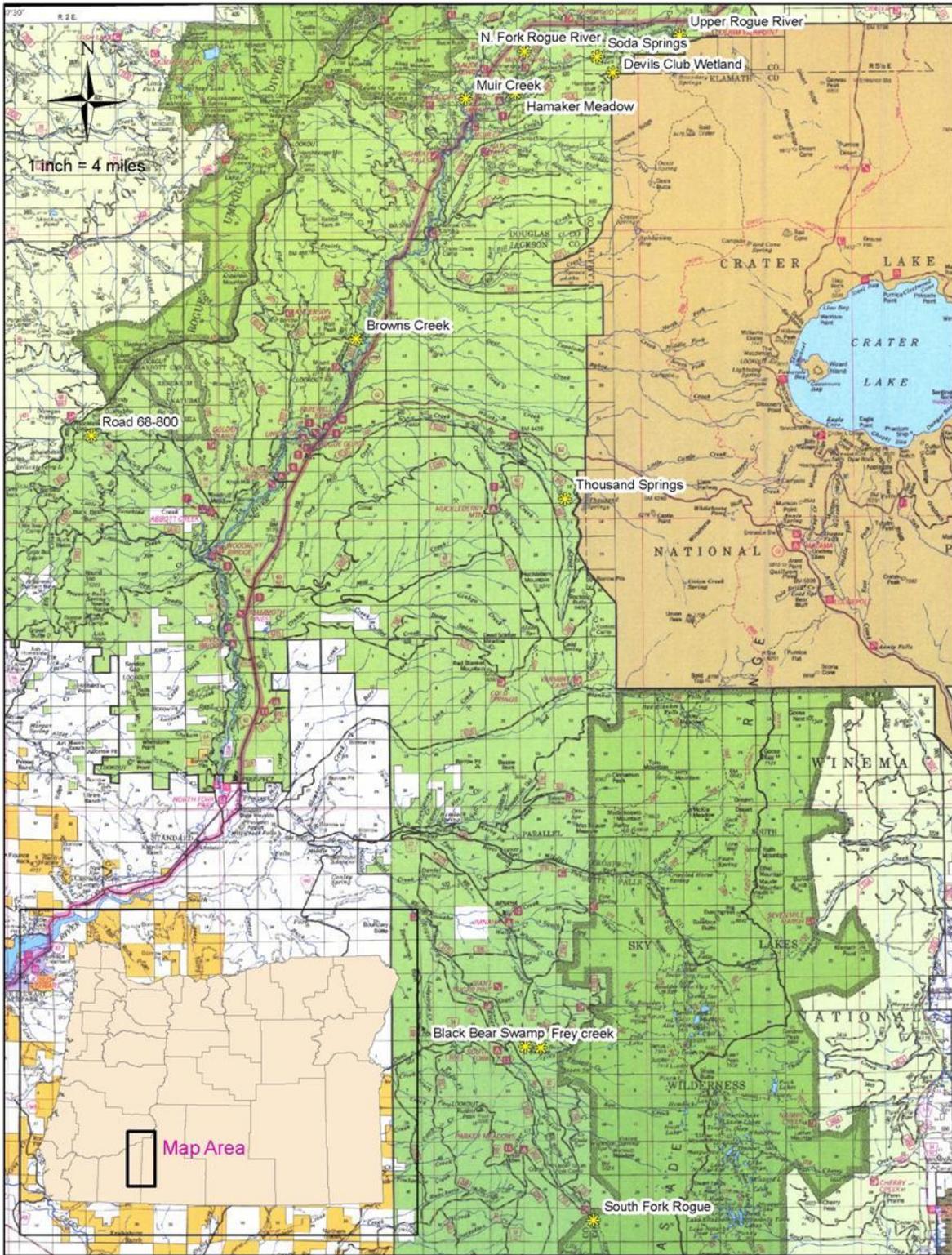


Figure 9. Map showing locations of upper Rogue River wetlands (northeastern extent of RRSNF)

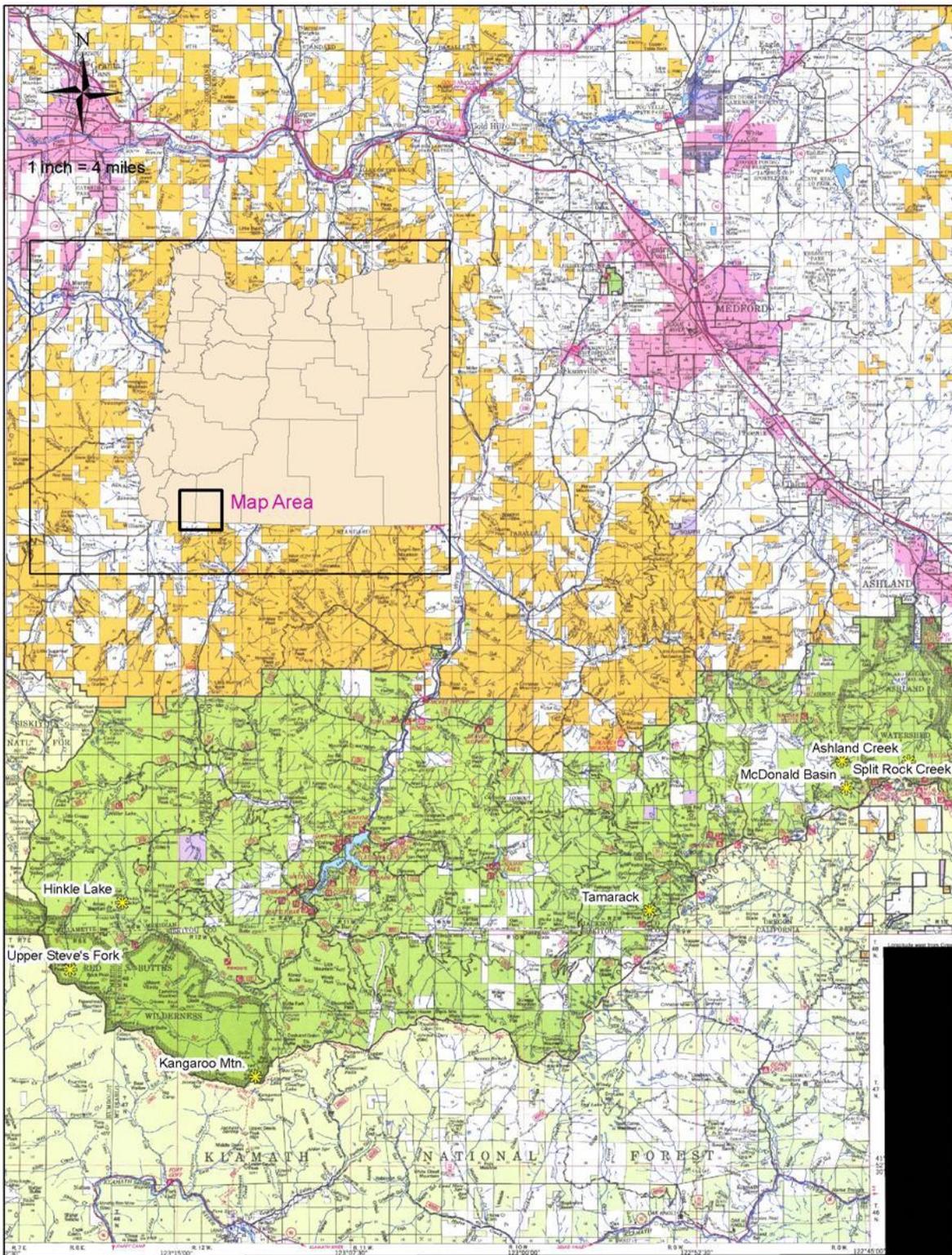


Figure 11. Map of eastern Siskiyou Mountain wetlands

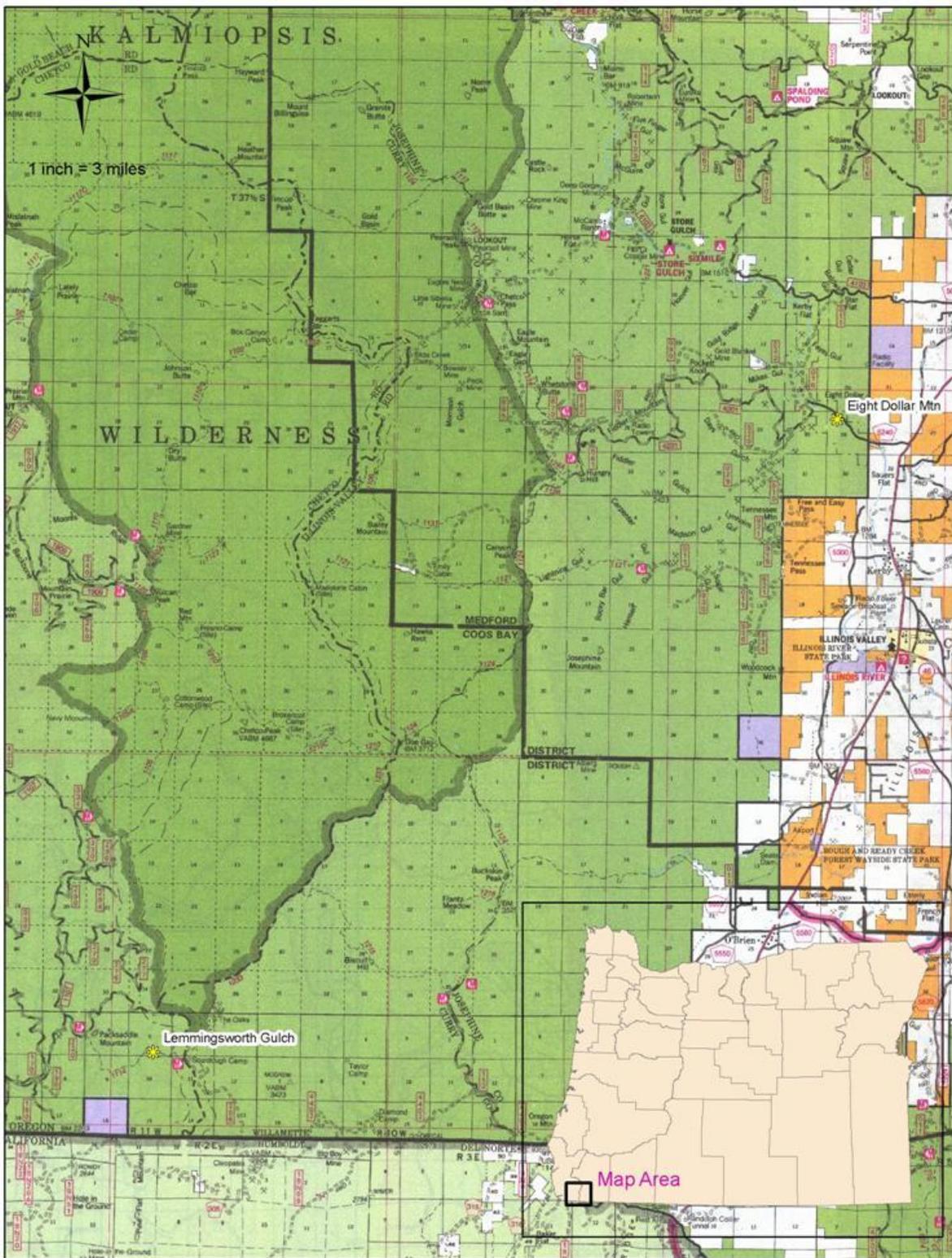


Figure 12. Map of western Siskiyou Mountain wetland locations

Upper Rogue River Wetland

About 3 acres were surveyed along the uppermost reaches of the Rogue River in the high Cascade's of Southern Oregon. The main species targeted was the liverwort *Tritomaria exsectiformis*. Several sites of this liverwort had previously been found by the author about 2 miles to the north in very similar habitat on the Umpqua NF. Surprisingly the species was not located even though the habitat was nearly identical to the known sites along Silent Creek on the Umpqua NF. The habitat surveyed can be characterized as small to medium sized hummocks of bryophytes and herbaceous vascular plants that occur along the river bank. In addition there were small rich seep areas that flowed from higher on the banks into the main stem of the river. The surrounding forest is dominated by lodgepole pine (*Pinus contorta*) growing on very deep pumice soils. Common bryophytes observed include the aquatic emergent species *Bachytheceium frigidum*, *Hygrohypnum bestii* and *Chilocyphus polyanthus* found within the river. *Aulocomnium palustre*, *Lophozia incisa*, *Lepidozia reptans* and *Philonotis fontana* growing within hummocks along the banks of the river. No Sensitive, Strategic or otherwise ORBIC listed bryophytes were located in this survey area.

Hammaker Meadow

The survey area consists of flat to gently sloped wetland meadows to both sides of the Rogue River. The survey polygon has a wetland to the north, then bottlenecks along the Rogue to the south, then widens up again further south into the bulk of the survey area. The north wetland is dominated by *Philonotis fontana* with significant *Meesia triquetra* to its southern end and a small population of *Sphagnum* to the far west. Two sensitive (*Helodium blandowii* and *Tomentypnum nitens*) and one strategic (*Grimmia anomala*) bryophyte species were located during the survey.



Figure 14. Hammaker meadow rich montane fen habitat where *Tomentypnum nitens* was found
Photo: S. Loring

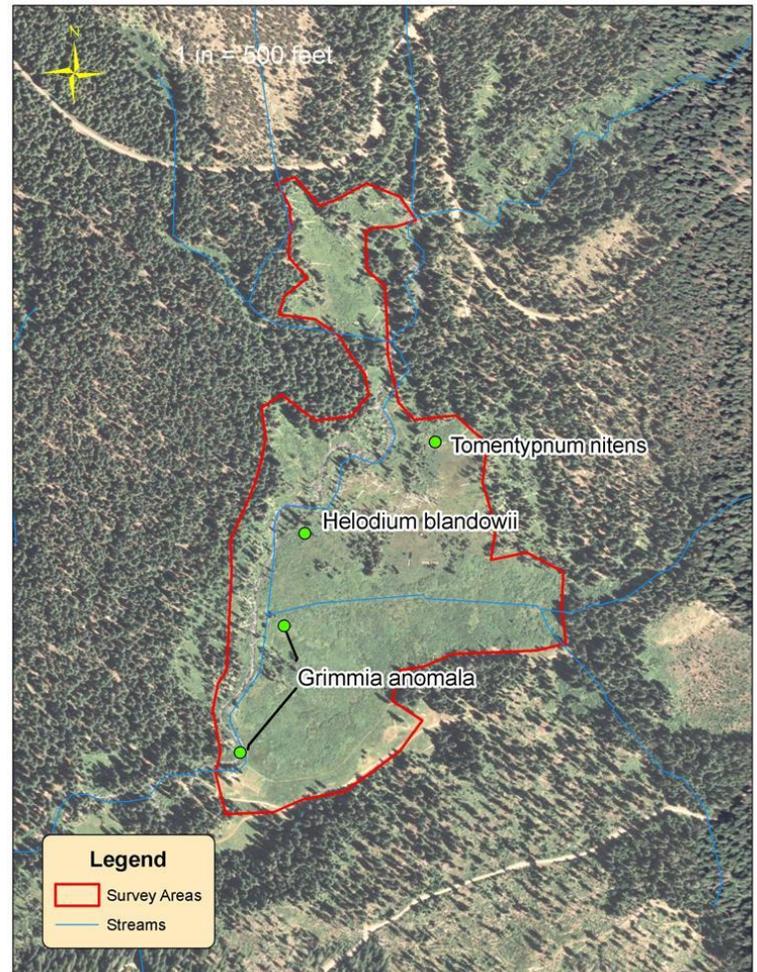


Figure 13. Hammaker meadow bryophyte occurrences

Black Bear Swamp

The survey area consists of flat wetland meadows with occasional brush thickets (mostly to the north) and scattered individual and small groups of trees. The southern half has the most water – the northern end is slightly drier.

Hamatocaulis vernicosus is the dominant bryophyte throughout much of the survey area, especially in the wetter areas (appears as a “golden to more often reddish *Drepanocladus*” (note: *D. aduncus* is also present). No *Sphagnum* exists at this wetland. Cow pies were



Figure 15. Black bear swamp, rich montane fen habitat

Photo: S. Loring

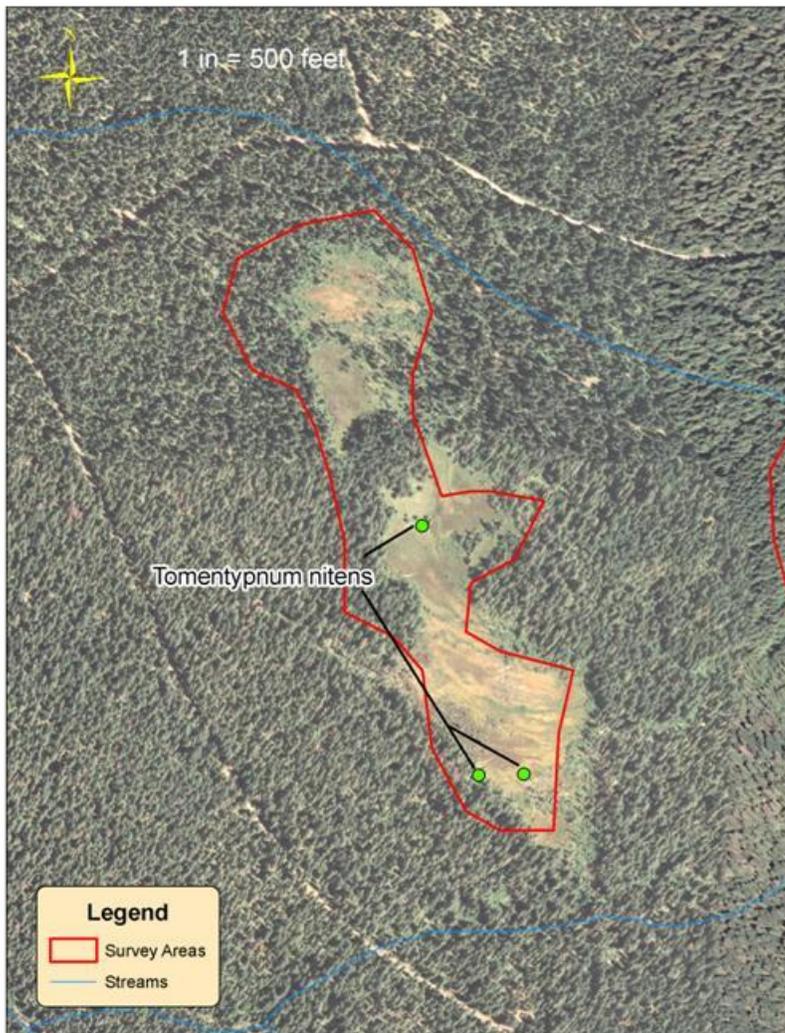


Figure 16. Black bear swamp bryophyte occurrences

seen near the center of the wetland, mostly along the dry margins, but appeared to be from previous years. The sensitive moss *Tomentypnum nitens* was found in several small populations within this wetland. The sensitive fungus *Climacocystis borealis* was found in the forest adjacent to the wetland.

Skeeter Swamp

The survey area consists of +/- flat wetlands consisting mostly of dense brush but also with some meadow areas. The narrow, northern-most part of the polygon has a dry meadow nearly lacking any *Carex*. A thicket of brush exists alongside the meadow, similar in composition to the larger thicket discussed below but also with *Crataegus douglasii*, *Cornus sericea*, *Philadelphus lewisii*, and *Prunus emarginata*. The central, widest, largest part of the polygon is almost entirely a dense thicket of brush composed of *Salix spp*, *Spiraea douglasii*, and *Carex* (appears to be *C. utriculata* or *C. mertensii*). *Philonotis fontana*, *Aulacomnium palustre*, and *Drepanocladus aduncus* are generally the

dominant bryophytes. A few *Populus tremuloides* and *P. trichocarpa* exist at the margins, which

are otherwise lined with large *Salix* specimens. The brush opens up at the southern end of this area where there is a series of ponds and drainages that feed into them – much of the highest bryophyte diversity and coverage of this wetland is in this vicinity. South of this central wide area, the polygon narrows and follows a creek, along which is densely brushy. A wetland at the southern end of the polygon is centered on the creek, which fans out there and flows north to the aforementioned survey area. No sensitive bryophytes or *Sphagnum* species were found. No evidence of grazing exists.

Devils Club Wetland

This wetland has the furthest south known site of devil’s club (*Oploplanax horridum*) within the species range and is named such for this reason. The wetland is a complex of calcareous seeps and springs within a matrix of true fir (*Abies magnifica* var. *shastensis* and *Abies procera*) forest along a sloping hillside facing due north. The survey unit further to the east (as can be seen on the map) is characterized by an area of standing water. The seeps and the margins of the pond were all intensively surveyed seeming like good habitat for *Tomentypnum nitens*, *Helodium blandowii* and *Pseudocalliergon trifarium*. *Helodium blandowii* was discovered in the area pinpointed on the map. Common bryophytes include *Bryum pseudotriquetrum*, *Aulacomnium palustre*, *Philonotis fontana*, *Marchantia* sp. and *Blepharostoma trichophyllum*. No other Sensitive, Strategic or otherwise ORBIC listed bryophytes were discovered.



Figure 17. *Helodium blandowii* occurrence at the Devils Club Wetland

Muir Creek

The survey area consists of flat to gently sloped wetland meadows and brushy thickets to both sides of Muir Creek. Muir Creek is a large perennial drainage flowing south into the Rogue. It has little habitat along its banks favorable to sensitive bryophytes. It has no bedrock, the creek bed being composed of sorted sand, gravel, and cobble. Its bryoflora is dominated by *Fontinalis neomexicana*. The remainder of the wetland polygon is a mosaic of wetland meadows and

thickets (often large) of brush that is often very dense. The meadow bryoflora is mostly *Aulacomnium palustre*, *Philonotis fontana*, *Sphagnum*, *Meesia triquetra*, *Drepanocladus aduncus* and *Helodium blandowii* (in some areas). Two sensitive bryophytes were located. *Helodium blandowii*, a moss, and *Calypogeia sphagnicola*, a liverwort, were found in the wetland.

Kangaroo Mountain

Surveys were focused on wet seep areas along the northeast aspect of Kangaroo Mountain. The area is heavily influenced by ultramafic geologic conditions, serpentine soils and marble is also present. In addition a more typical non-serpentine forb dominated montane meadow was surveyed in an area adjacent to the serpentine seeps along Kangaroo Mountain. In general, bryophyte diversity was low, but the species that were seen were somewhat unusual. *Pseudoleskeella serpentensis*, an ORBIC List 4 species, was found throughout the area. Also a sterile specimen of the rare genus *Enthostodon* was collected but warrants further study before an identification can be made. *Polygonum bistortoides*, *Veronica copelandii*, *Carex scabriuscula* and *Helenium bigelovii* were common vascular plants in the seep areas. Surrounding forest is dominated by *Abies magnifica* var. *shastensis*. Several rare vascular plants occur in this area and were previously documented.

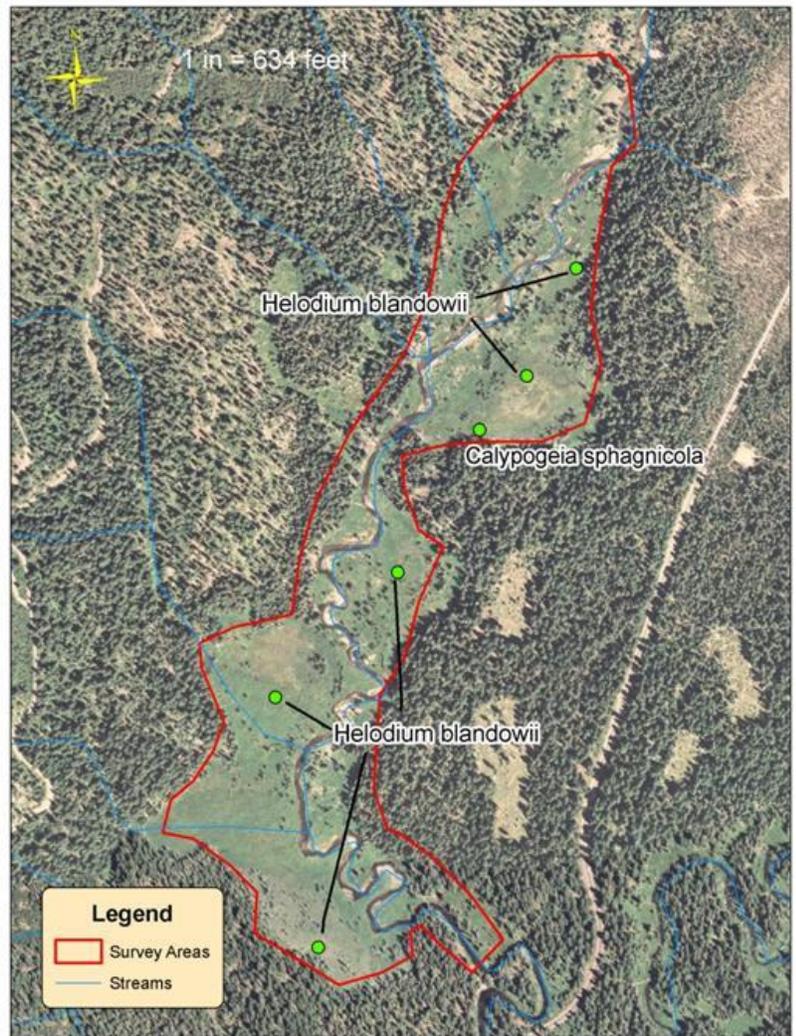


Figure 18. Muir Creek wetland bryophyte occurrences



Figure 19. Kangaroo Mtn. serpentine seep area

Photo: C. Emerson

Walch Fen

Survey area is composed of gently sloped wetland meadows leading down south to an unnamed tributary of South Fork Little Butte Creek. Bryophyte coverage of this wetland varies but is very dense throughout much of it, especially in the larger, wetter, open area that is centrally located in the survey polygon. Small pockets and stringers of trees exist (*Pinus contorta* and *Picea engelmannii*) and shrub cover is generally sparse to light (*Salix species* and *Betula glandulosa*); see below for forb/gram species. No species of *Sphagnum* were found. Heavy cattle grazing was observed. *Tomentypnum nitens* was relocated throughout a large portion of the wetland and *Meesia uliginosa* was located for the first time in this wetland. The sensitive sedge *Carex capitata* was an incidental find within this wetland as well. The rare liverwort *Chilocyphus gemmiparus* could not be relocated within the stream, though a significant effort was made to do so.

Daley Creek

The survey area is an emergent wetland complex with areas of bryophyte diversity focused on the margins. Daley Creek runs through the middle of the wetland and is probably the main source of water. Ground water and springs also likely feed the wetland along the margins. Surveys were focused on the margins of standing water and in areas where hummocks were forming. There are cattle in the area but they are not impacting this wetland to the extent of many of the others surveyed in this area. This is probably because of the large expanses of open water within this wetland. A large clear cut and overstory removal harvest surrounds the wetland. There were no rare bryophytes located at this wetland and should generally be considered poor habitat for them.

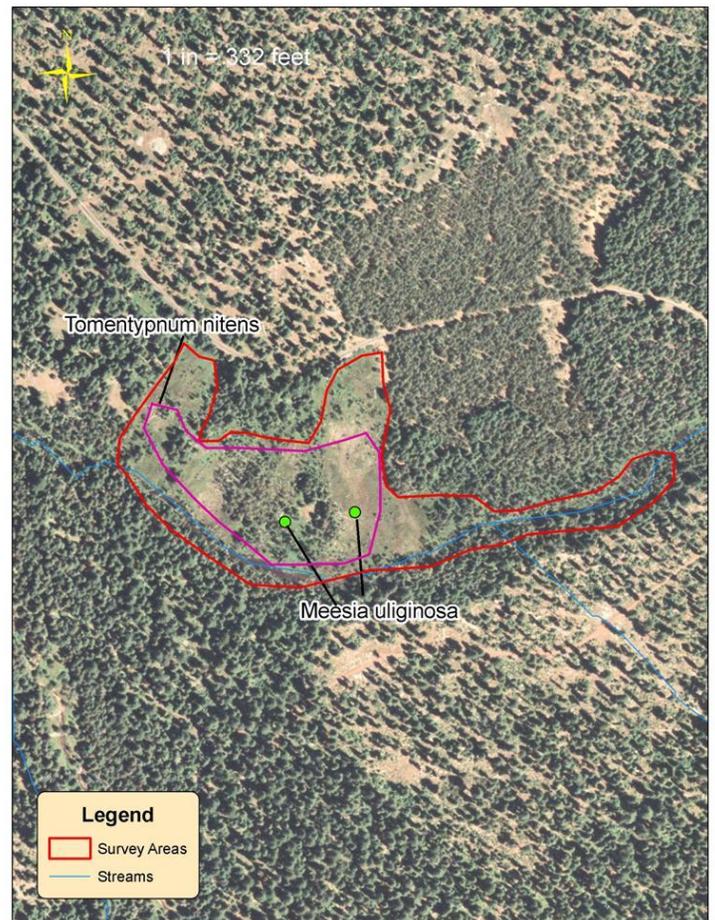


Figure 20. Walch fen rare bryophyte occurrences

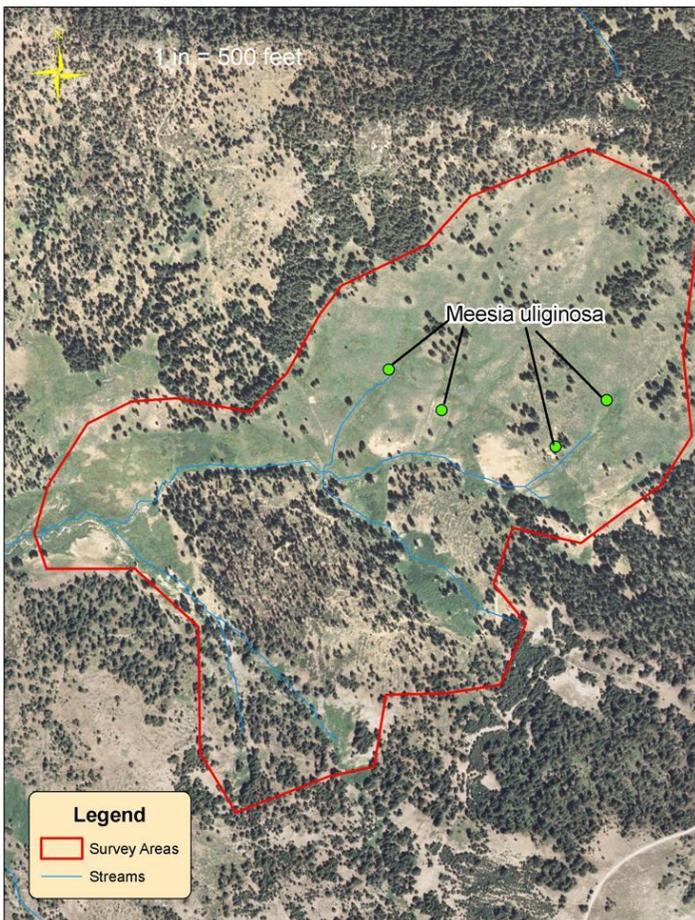


Figure 21. *Meesia uliginosa* relocation in McDonald basin

McDonald Basin

The survey area consists of southwest-facing headwater slopes ranging from gentle to moderate and meeting McDonald Creek at the bottom, which drains west and was flowing only at its downslope end of the basin during the time of survey. The slopes are generally dry except for small spring-fed drainages, including small rivulets, and small benches that are lined with a generally very narrow band of wetland vegetation consisting of species such as *Carex spp*, *Juncus spp*, grasses, *Gentiana simplex(?)*, most of which are senescent and unidentifiable. One of the small annual grasses present is likely an *Agrostis* or *Muhlenbergia* but has no remaining florets. *Philonotis fontana* is by far the dominant bryophyte along these wet areas, followed by the sensitive listed *Meesia uliginosa* as a distant second.

Ashland Creek Spruce Wetland

The survey was focused around two large wetland complex's that feed into separate forks of Ashland Creek. The lower wetland (further north on the map) is forested and dominated primarily by Englemann's spruce (*Picea engelmannii*) with several shrub species such as *Vaccinium*, *Alnus* and *Ribes* dominating the understory. The second area surveyed is a montane meadow dominated by forb species typical of higher altitudes in the Siskiyou Mountains. Bryophyte diversity was found to be generally low in both areas. No rare bryophyte species were collected during the survey.

Frey Creek

Survey area is composed of gentle southwest-facing slopes with a series of small wetland

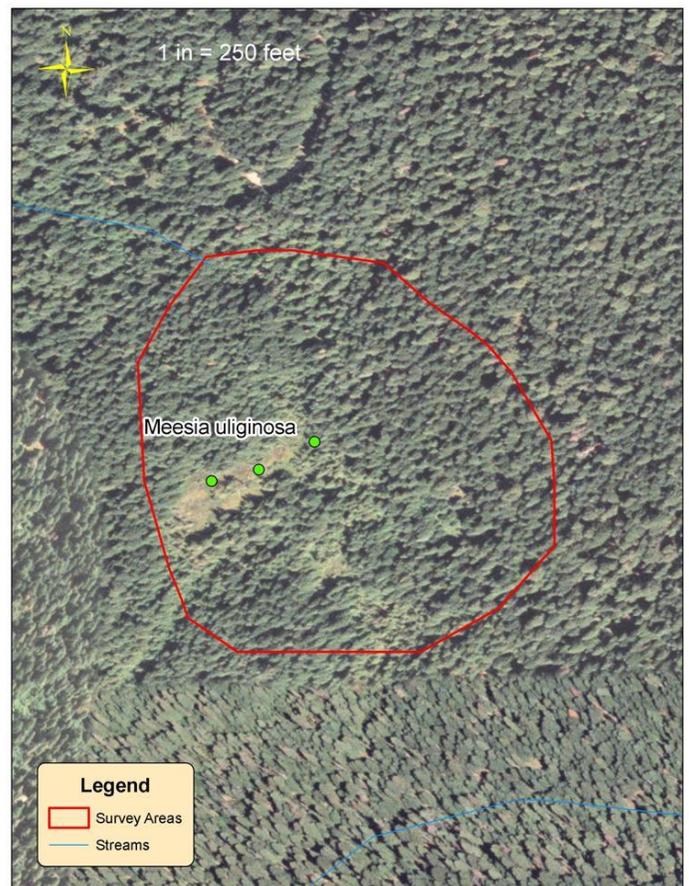


Figure 22. *Meesia uliginosa* in Frey Creek wetland

meadows and also forested wetlands consisting of numerous springs, small drainages, seeps, and small stagnant pools located on otherwise dry ground. Moderate to heavy bryophyte coverage exists throughout much of the meadows. The wet areas in the forest are often lined with moderate bryophyte coverage. The flora differed greatly between that of the meadows and the forested wetlands. No species of *Sphagnum* were found. No evidence of cattle grazing was observed. Multiple small patches of *Meesia uliginosa* were found spread out over three locations in the largest of the meadow areas.

North Fork Rogue River Wetland

This is a large wetland complex that lies along the Rogue River further downstream by about 5 miles from the previously mentioned Upper Rogue River survey area. The survey area can be characterized as a matrix of calcareous springs where groundwater surfaces randomly throughout the wetland. The southwest corner of the survey area (see map) is covered by dense hummocks of *Sphagnum*. Within this wetland area good habitat was observed for *Tritomaria exsectiformis*, *Calypogeia sphagnicola*, *Helodium blandowii*, *Tomentypnum nitens*, *Harpanthus flotovianus*, *Cephaloziella spinigera*, *Meesia uliginosa*, *Pseudocalliergon trifarium*, *Schistostegga pennata*. Considering the apparent high quality of the habitat it was somewhat surprising that none of these or any other rare bryophytes were encountered within this survey area. The rare vascular plant *Scheuchzeria palustris* var. *americana* was located for the first time on the RRSNF within this wetland

68-800 Rd. Wetland

Survey area is composed of nearly flat to gently sloped wetland meadows draining to the east. A drainage forms and flows out at the eastern part of the wetland and small ponds exist centrally. Heavy bryophyte coverage, dominated by *Sphagnum* and *Polytrichum commune*, exists in the eastern half of the wetland. These species taper off quickly in the western half, where bryophyte cover is also much lower, with *Aulacomnium palustre*, *Fontinalis neomexicana*, *Timmia austriaca*, and *Philonotis fontana* being common instead. Evidence of light cattle grazing was observed at the west end of the wetland. The sensitive liverworts *Calypogeia sphagnicola* and

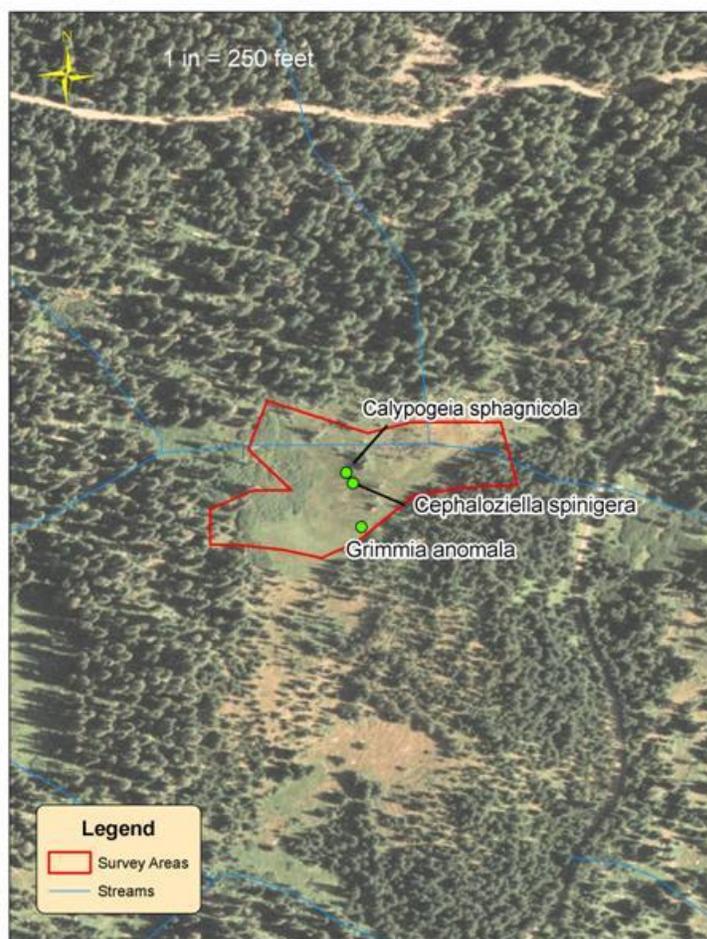


Figure 23. Rare bryophyte sites in the 68-800 Rd. wetland



Figure 24. The 68-800 Rd. wetland

Photo: S. Loring

Cephaloziella spinigera were found growing within *Sphagnum* sp. in the middle of the wetland. *Grimmia anomala* was found on rocks within and around the wetland.

Butte Creek Beaver Dam

This survey area encompasses a large wetland complex created by several beaver dams that occur along the headwaters of Little Butte Creek. The wetland is extensive and a large portion of it is inundated, with emergent vegetation prevailing.

There is a historic site of *Helodium blandowii* reported from the wetland but it could not be relocated during our survey. Possibly because the area where it was previously known from was inundated with water due to newly constructed beaver dams. Habitat was also observed for *Tomentypnum nitens* but this species was not found. Extensive cattle disturbance is present at this site.

Lemmingsworth Gulch

Darlingtonia fens were the target of the survey. Three separate fens occur within the Lemmingsworth Gulch Research Natural Area as can be seen on the map. Overall bryophyte diversity is not as high in these fens as the cold calcareous fens of the high Cascades yet unusual species were encountered due to the uniqueness of the habitat. The sensitive liverwort *Calypogeia sphagnicola* was found growing within dense mats of *Cephaloziella pleneiceps* along moist banks of Packsaddle Gulch, a small stream running through the furthest west of the series of Darlingtonia bogs.

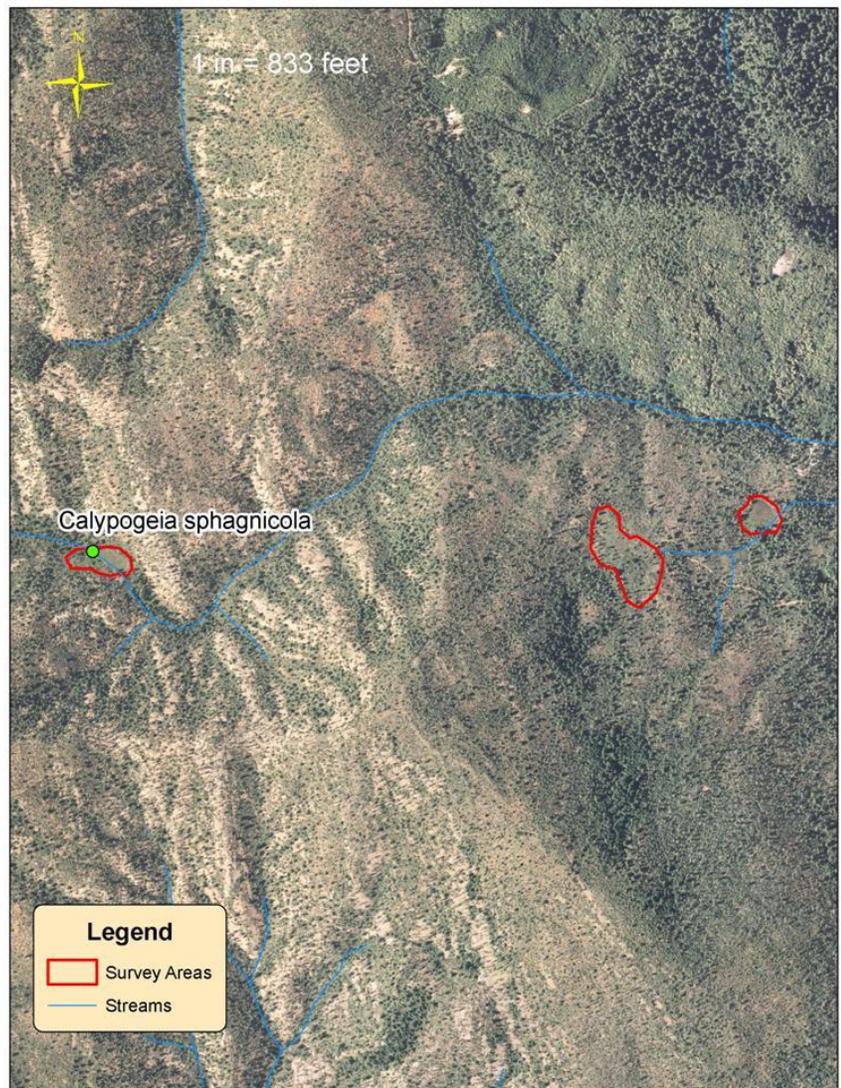


Figure 25. Lemmingsworth gulch RNA Darlingtonia fens

Deadwood Creek

Survey area is composed of flat to gently sloped wetland meadows following both sides of Deadwood Creek (perennial). Moderate to heavy bryophyte coverage exists throughout most of the area. A large area (~1ac) in the center of the survey polygon has *Sphagnum* (mostly *S. squarrosum*) where it is often the dominant bryophyte. This acre is the most bryologically diverse part of the wetland and has the most bryophyte biomass. The *Tomentypnum nitens* population overlaps with this acre. *Grimmia anomala* was also found on rocks on the edge of the wetland.

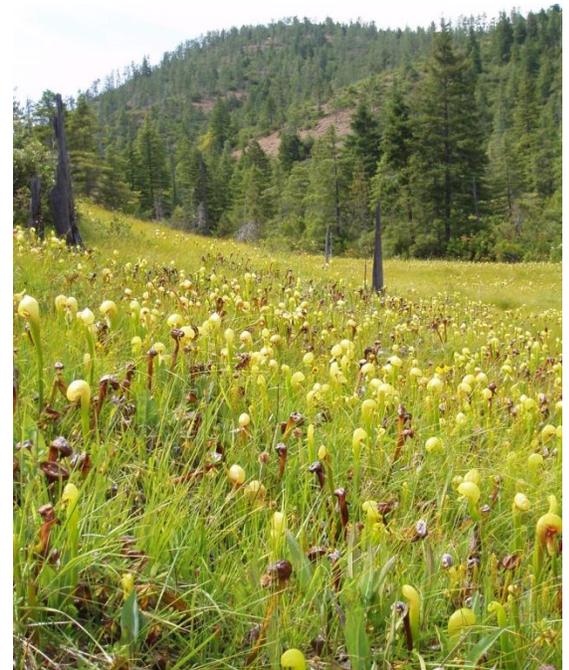


Figure 26. Lemmingsworth gulch Darlingtonia fen

Photo: C. Emerson



Figure 27. Deadwood Creek rare bryophyte occurrences

Browns Creek

This is a large open meadow wetland with a matrix of very wet areas fed by groundwater as could be seen by the many sphagnum hummocks throughout. The wetland is formed by springs that feed the North Fork Rogue River and Brown's Creek. Severe disturbance has occurred throughout the wetland from the presence of several dozen cattle. Habitat is present for *Calypogeia sphagnicola*, *Meesia uliginosa*, *Helodium blandowii*, *Cephaloziella spinigera* and *Pseudocalliergon trifarium*. None of these or any other rare bryophyte species were located. *Philonotis spp.* dominated the wetland, possibly due to the very disturbed habitat.

\$8 Mountain

Survey area is composed of south facing slopes that are mostly steep but flatten out somewhat at the down-slope end in the vicinity of Eight Dollar Mt Rd. Rock and soil are all pure serpentine and often crumbly and unstable. This wetland consists of springs, seeps, and small drainages braiding through otherwise dry ground. I have previously been through this area in late summer and recall it having much less water during that time of year. Bryophyte coverage is very sparse and consists of species that are typically not associated with wetlands. The most botanically interesting aspect of this wetland was the vascular plants, even though it was fall season. This area is mostly a jeffrey pine savanna with lesser amounts of other trees. Shrubs are scattered and coverage is light – most being very dry upland species. The forb/gram layer is vastly different in wet areas compared to dry areas. Cattle-grazing was not apparent within this wetland.

Hinkle Lake

This survey area encompasses about 5 acres focusing on the margin of Hinkle Lake and the associated streams meandering throughout the montane meadows and prairies that surround and feed into the lake. The lake occurs in a large depression at the base of a broad canyon. The associated meadows are dominated by montane forb species typical of the Siskiyou Mountains. A very rare liverwort, *Chilocyphus gemmiparus* (Coll. #CJE1113), was located in a slow moving, yet very cold, stream meandering through the meadows. This liverwort is only known from a handful of sites



Figure 29. Illegal OHV activity in the meadow where *C. gemmiparus* was found

Photo: C. Emerson

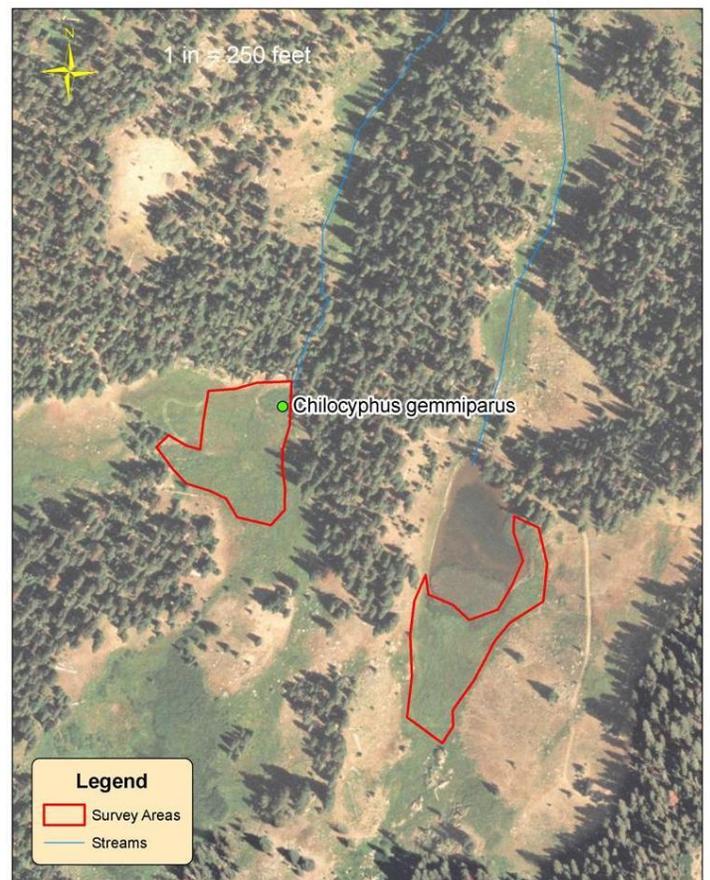


Figure 28. Hinkle Lake *Chilocyphus gemmiparus* site

worldwide. There is some taxonomic ambiguity with regard to this species. David Wagner is in the process of placing it in a new genus (pers. com. Dave Wagner). Illegal OHV use threatens the ecosystem in this area.

Thousand Springs

Survey area consists of an un-named creek flowing west and fed by Thousand Springs located in Crater Lake NP. This creek has a very small watershed, experiences very little if any seasonal change in flow (as is evident by the non-vascular flora on rocks/logs in the creek) or temperature, has multiple waterfalls, and confluences with Union Creek. It is completely within old-growth coniferous forest and lined with *Picea engelmannii*, *Tsuga heterophylla*, *Abies spp*, and *Pseudotsuga menziesii*, with shrub and forb cover being sparse (most forbs not identifiable this time of year). *Brachythecium frigidum*, *Chiloscyphus polyanthos*, and other species are dominant bryophytes along this un-named creek. One rare upland bryophyte (*Grimmia anomala*) was found growing on rocks within the wetland.

Split Rock Creek

The survey was focused on Split Rock Creek and the matrix of montane forb dominated wetlands and seeps that feed into the creek. The area primarily faces north to north to northwest. Submerged rocks and moist soil banks were inspected for rare bryophytes along the creek. Within the montane meadows, hummocks were searched where springs and seeps were flowing. Potential habitat was found for *Chilocyphus gemmiparus* in the creek but only *Chilocyphus polyanthus* was observed. Habitat for *Meeisia uliginosa* exists within the meadow but none was found during the survey. No other rare bryophytes were found within the survey area.

Tamarack Creek

The bryoflora is dominated by *Drepanocladus aduncus*, *Philonotis fontana*, and *Aulacomnium palustre*. Survey area is near the head of Tamarack Creek, just north of the Siskiyou crest. Slopes are gentle and average westerly. It consists of meadows with a wide range of moisture regimes from perennial wetland to drier conditions that at best are seasonally wet. The area to the southeast of the polygon is the wettest meadow. It had flowing rivulets at the time of survey, and along with the parts of the main creek, has the most bryophyte diversity (especially along rivulets) with moderate to heavy coverage whereas the remainder of the wetland has less. Several small drainages cross through the polygon, but the main one running east-west through the center was the only one with flowing water at the time of survey.

Soda Springs

Soda springs is a calcium rich spring that forms a wetland complex surrounding Minnehaha Creek. The spring is boxed at the site where it emerges from the ground. A minimal amount of tufa deposit has accumulated around the head of the spring. Habitat was thought to be present for *Meeisia uliginosa*, *Helodium blandowii*, *Pseudocalliergon trifarium* and *Tomentypnum nitens*, but none of these species were found. A new recorded moss species for the state of Oregon was collected at this site. The species *Campylium stellatum* as determined by Dave Wagner, is the first location of this species known in Oregon. Other more common bryophyte



species found include *Brachythecium frigidum*, *Leptobryum pyriforme*, *Campyliadelphus chrysophyllus*, *Pohlia wahlenbergii*, *P. cruda* and *Drepanocladus aduncus*.



Figure 30. Soda springs

Photo: L. Wilson

Figure 31. Soda Springs bryophyte occurrence

Upper Steve's Fork

The survey area is composed of two separate wetland meadows at the head of Steve Fork Creek, just north of the Siskiyou crest. The southern (upper) meadow has much more moisture than the northern meadow, with rivulets of flowing water and small stagnant pools at its downslope end. A small lake exists to the east of this meadow. *Philonotis fontana* and *Aulacomnium palustre* are the dominant bryophytes in the wet areas, though total bryophyte cover is only 5-10% in most areas (except in rivulets, which have higher cover and diversity). *Polytrichum juniperinum* inhabits the higher, drier microhabitats of the meadow.

Dead Indian Soda Springs

The survey area is composed of moderate to steep slopes of varying aspects along Dead Indian Creek. There are three main soda springs, each with significant tufa built up. Bryophytes and free-living algae dominate the life found on the tufa. Few vascular plants are associated with the springs themselves. No species of *Sphagnum* were found. No evidence of cattle grazing was observed. Small patches of *Eucladium verticillatum* were found on tufa at the largest spring.

Crumia latifolia was relocated from a previously known site. Though it is not listed as strategic or sensitive by the Forest Service, it is somewhat rare and of interest.

Leptogium teretiusculum an ORBIC List 3 lichen was located on a *Arbutus menziesii* bole in the forest above the soda springs.

Beaver Complex

The survey area is a large emergent wetland complex with a class 2 stream feeding it. This wetland was found to be heavily impacted by cattle. Several dozen cows were observed wallowing in it during our survey. It is located near the crest of the Cascades and feeds into Little Butte Creek. The only habitat in the wetland that had not been trampled by cows was a roughly acre sized *Sphagnum* bog area located in the southwestern portion of the wetland.

Calypogeia sphagnicola was found growing amongst the *Sphagnum*. No other rare

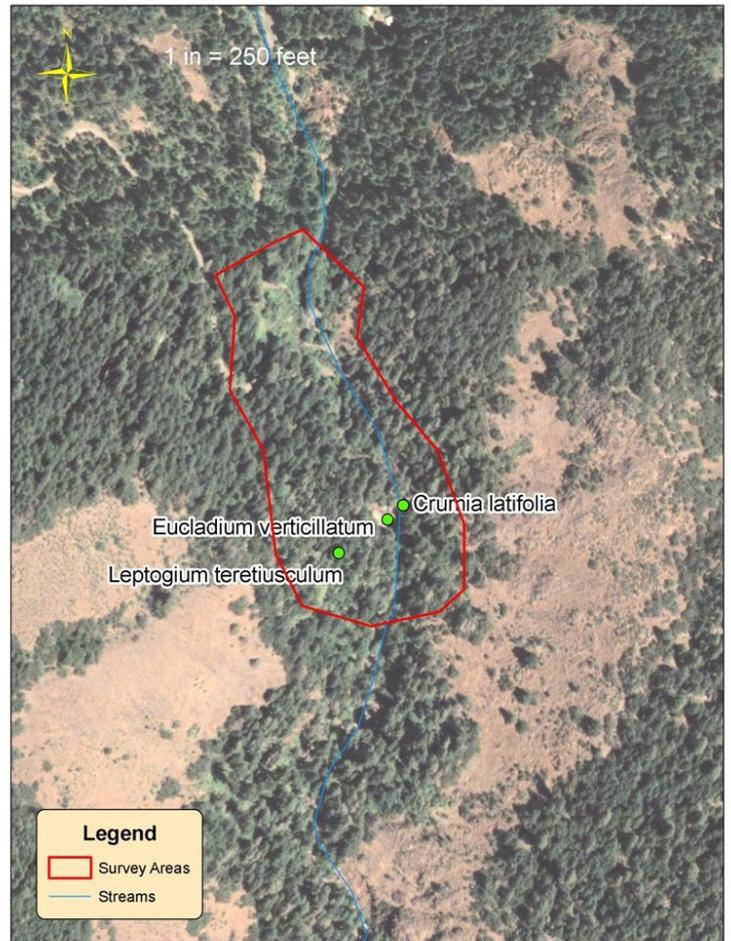


Figure 32. Dead Indian Soda Springs

bryophytes were found within this wetland.

South Fork Rogue River

The upper band of the wetland (furthest from the river) has most of the wettest areas. Though this area has the greatest bryophyte diversity and biomass, it is still generally low in these qualities. *Rhizomnium magnifolium* is generally the dominant bryophyte, with several others also common. The middle band is more densely forested, often slightly raised in elevation compared to the upper band, and generally drier. The lower band follows the river and varies in canopy density, often consisting of high-water channels/annually flooded areas.

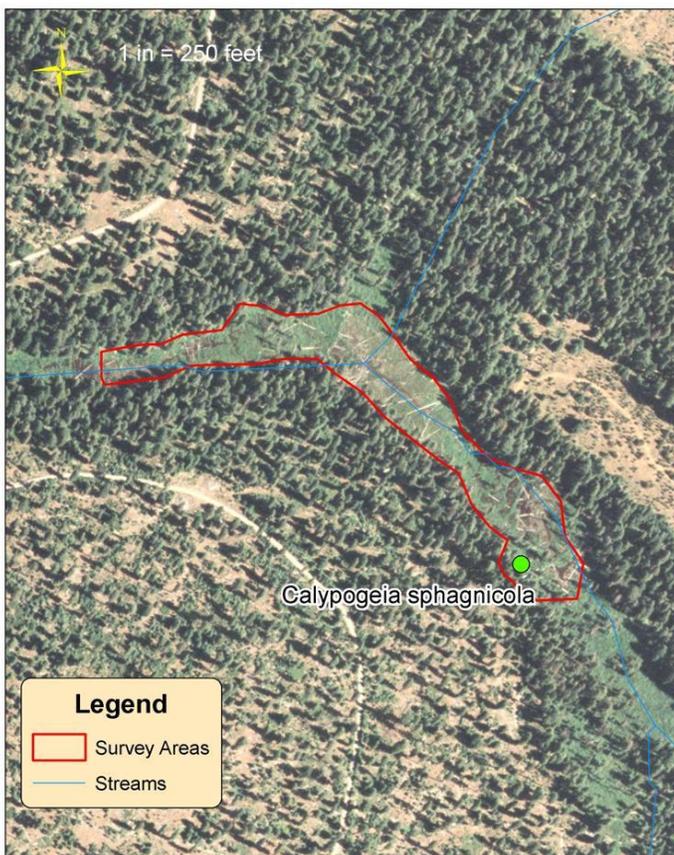


Figure 33. Beaver complex wetland bryophyte occurrence

Bryophyte diversity and quantity is usually quite low in these two bands, although the river itself has much more. Two species of Sphagnum were found and evidence of cattle was present. No sensitive bryophytes were found in this wetland but the sensitive fungus *Climacocystis borealis* was located in the adjacent forest.

CONCLUSION

This project sought to discover new sites of Sensitive wetland bryophytes on the RRSNF and this was accomplished through the inventories that were conducted. Rich montane fen/spring, Sphagnum bog and calcareous spring habitats were targeted and searched during the inventory. Many of the targeted bryophyte species were discovered while others that seemed likely were not located (*Schistostegga pennata* and *Tritomaria exsectiformis*). In addition several non-targeted but equally rare bryophyte species were located incidentally including a species new to the state.

The main habitat type that was neglected is sub-alpine lake and stream margins. Nearly all the potential sub-alpine lake margin habitat on the RRSNF resides deep within wilderness. It was decided that in order to survey a larger set of wetlands accessibility by vehicle was necessary (though some sites required 1-2 mile hikes). There is a great deal of sub-alpine lake margin habitat within the Sky Lakes Wilderness and future inventories could focus on that area.

Originally there were more wetlands designated to be inventoried within the western Siskiyou and Coast Mountains on the Gold Beach and Powers Ranger Districts. Unfortunately, due to injury the main author was unable to complete as many of these surveys as planned. Future rare bryophyte inventories could focus on these already delineated areas.

Due to limited time, funding and available information about specific species it was decided to focus the inventory on currently listed Forest Service Sensitive, Strategic and ORBIC List 3 and 4 species. Future work would likely benefit from conducting complete inventories within wetlands in order to create comprehensive species lists within a given unit. Not only would this mean more thorough data would be available but it is likely that previously unknown or poorly known species would turn up. During this project it was the botanists' best intention to find any and all species present but the reality was that more time spent in the laboratory looking over specimens was needed. The complete inventory method is likely to turn up more bryophyte species previously unknown in Oregon or even new species to science.

Conducting this inventory helped local botanists gain a better understanding of the habitat, range and likelihood of discovering these rare bryophyte species within the various types of projects that require a biological evaluation of potential effects to the environment, including these cryptic wetland associated species. Increasing the knowledge base and understanding of these Sensitive species helps the Forest Service conduct its mission of implementing the RRSNF Forest Plan as well as the NW Forest Plan. Future inventories will improve management of these species and continue the implementation of these plans as set forth in the National Forest Management Act.

ACKNOWLEDGEMENTS

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plethora of Sensitive vertebrate, invertebrate, plants and fungi species that can be found in the Pacific Northwest region (R6). Thanks goes to Kelli Van Norman, Darci Rivers-Pankratz and Carol Hughes from the ISSSSP program for assistance and guidance. Field work was accomplished with help from Wayne Rolle, Laurel Wilson and Jee Lee. Laurel Wilson, Jee Lee and Catherine Dunn all helped with data entry and analysis for the final product. Dave Wagner provided final verification of specimens and general distribution information. John Christy provided information on the status of *Campylium stellatum* in Oregon.

LITERATURE CITED

Christy, J. and Wagner, D. 1996. *Guide for the Identification of Rare, Threatened, or Sensitive Bryophytes in the Range of the Northern Spotted Owl, Western Washington, Western Oregon and Northwestern California*. BLM Oregon-Washington State Office, Portland, Oregon.

Christy, J. 2007. *Tomentypnum nitens Species Fact Sheet*. ISSSSP Program Website: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-bryophytes.shtml>

Christy, J. 2007. *Meesia uliginosa Species Fact Sheet*. ISSSSP Program Website: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-bryophytes.shtml>

Henas, L. 2000. *Campylium, Bryophyte Flora of North America, Provisional Publication*. Buffalo Museum of Science. <http://www.mobot.org/plantscience/bfna/v2/CampCampylium.htm>

Lawton, E. 1971. *Moss Flora of the Pacific Northwest*. The Hattori Botanical Society. Nichinan, Japan. 362 pp.

Wagner, D. and Christy, J. 2006. *Chilocyphus gemmiparus Species Fact Sheet*. ISSSSP Program Website: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-bryophytes.shtml>

Wagner, D. and Christy, J. 2007. *Calypogeia sphagnicola Species Fact Sheet*. ISSSSP Program Website: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-bryophytes.shtml>