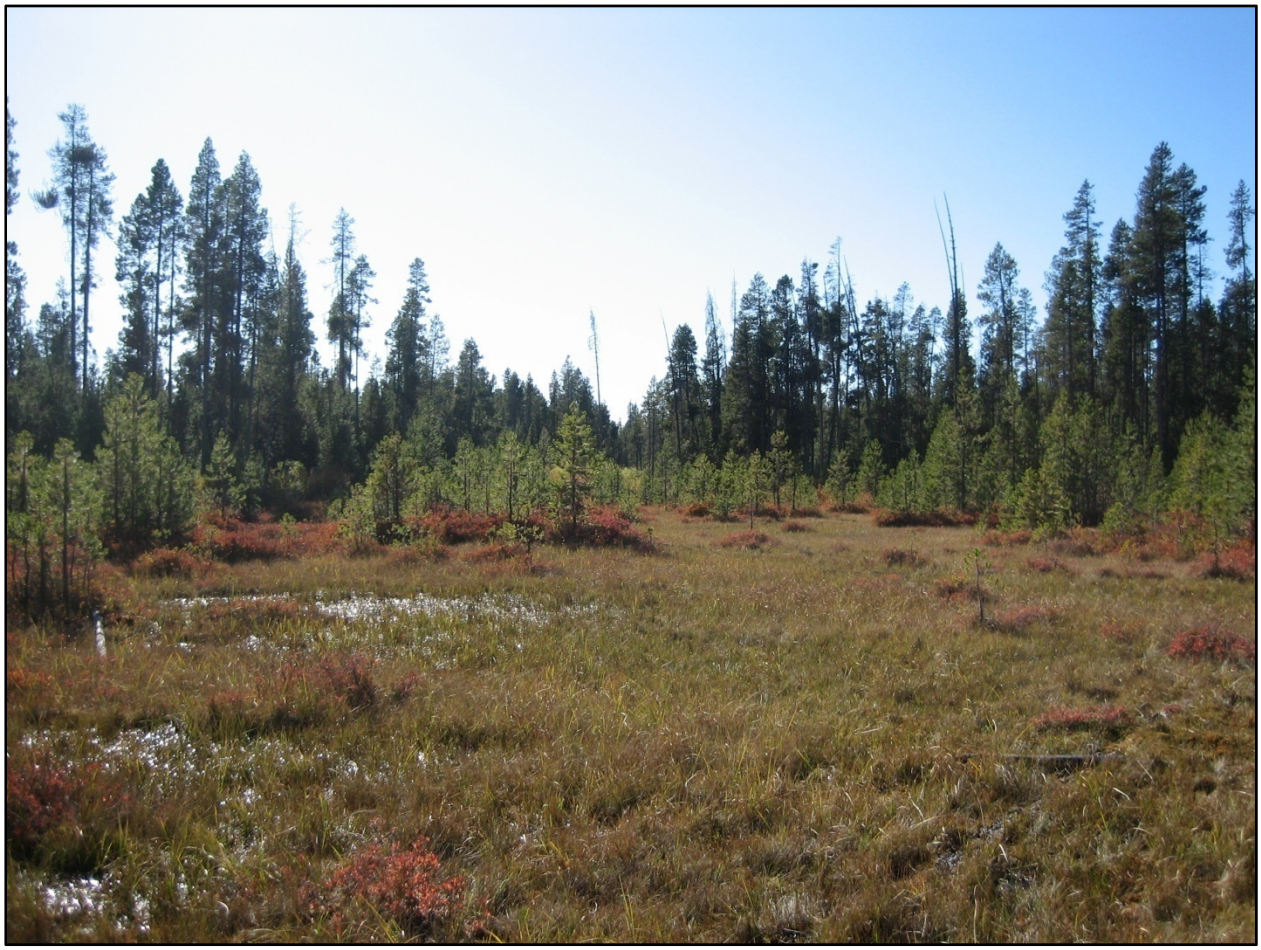
Bryophyte and Sedge Inventory of Wetlands on Chemult Ranger District
Fremont-Winema National Forests
USDA Forest Service Region 6

January 2010



The northeastern edge of Stimson Fen

Prepared by:
Missy Anderson, West Zone Botanist, Fremont-Winema National Forests
Rick Dewey, Assistant Forest Botanist, Deschutes National Forest

INTRODUCTION:

This project was funded by the Region 6 Interagency Special Status/Sensitive Species Program (ISSSSP). The objectives were to:

1) Determine the abundance, distribution, and habitat condition of rare bryophytes and sedges on Chemult Ranger District of the Fremont-Winema National Forest.
2) Increase Forest knowledge of habitat and identification of these species, and create a voucher collection for future reference.

The Bryophyte and Sedge inventory was conducted on approximately 530 acres of wetlands during July-September 2009. See attached map.

BACKROUND:

A number of bryophyte and *Carex* species were added to the Region 6 sensitive species list in January 2008. Incidental finds of some of these species had been previously located on Chemult District. *Pseudocalliergon trifarium*, *Splachnum ampullaceum*, and *Tomentypnum nitens* were located at a single fen on Chemult. The *Pseudocalliergon* and *Splachnum* are only known to occur on the Winema NF in Region 6. The Chemult site is one of three known locations of *Pseudocalliergon* and one of two sites of *Splachnum*; the other sites occur on Klamath District. Also on Chemult District, *Carex capitata* was found in Parker Meadow and *Carex lasiocarpa* var. *americana* at Stimson Meadow. Both sedges are currently only known from two sites on the Forest. Additional suitable habitat for these bryophytes and sedges, and possibly other wetland species (marked with *), is present on Chemult, but has not been explored. Much of the suitable habitat on Chemult is located in the Jack Creek and Antelope grazing allotments, where wetlands and meadows provide a major part of the forage base for livestock. This project is needed to determine the abundance and distribution of these rare bryophytes and sedges, as well as habitat characteristics and habitat condition.

TARGET SPECIES LIST AND RANKS:

* *Helodium blandowi* G5S2 List 2
Pseudocalliergon trifarium G4S1 List 2
Splachnum ampullaceum G5S1 List 2
Tomentypnum nitens G5S2 List 2
* *Tritomaria exsectiformis* G5S2 List 2
Carex capitata G5S2 List 2
Carex lasiocarpa var. *americana* G5T5S2 List 2
* *Utricularia minor* G5S2 List 2

PROJECT DESIGN AND METHODS:

To locate wetlands with potential habitat, areas were targeted that have a present vegetation component of the few-flowered spikerush community (comprised of the plant associations MW49-11, SW41-12 and/or CLM9-11) as described by Kovalchik (1987). Such areas are essentially fen plant communities, which locally, appear to provide the most suitable habitats for each of the target species. Available GIS coverages do not delineate the few-flowered spikerush

plant associations, thus riparian mapping conducted during the Ecological Unit Inventory (EUI) on the Winema NF was used. There are several EUs with a few-flowered spikerush community component, including principally the 2006 and 2017 map units. The few-flowered spikerush community also exists as a minor component of map units 2001 and 2002. This selection process initially identified 143 polygons covering about 2000 acres. The area of potential habitat was further adjusted by adding some areas designated in the corporate plant association GIS layer as wet meadow. The survey areas were refined using District knowledge, satellite imagery and cursory field visits, as an ongoing process.

The search pattern used was a random meander, covering areas that appeared likely to have target species, based on habitat and the judgment of the surveyor. If target species were present, habitat was assessed and described and locations were recorded with GPS instruments. Vouchers were collected to provide a reference source for future forest inventories.

Multiple reference texts and lists were consulted during bryophyte identifications, including Christy and Wagner (1996, 1999), Doyle and Stotler (2006), Godfrey (1977), Norris and Shevock (2004), Paton (1999), Schuster (1966-1992), and Vitt, Marsh and Bovey (1988). *Carex* identifications utilized Hitchcock and Cronquist (1973) and Wilson et al. (2008).

RESULTS:

New sensitive species sites:
Sixty-two polygons were surveyed, covering about 530 acres. Individual polygons included either a single prospective peatland/wet meadow or two or more closely adjacent peatlands/wet meadows comprising a physically and, potentially, biologically integrated system. In this project, a sensitive species "site" refers to the polygon within which that species was detected. Therefore, where multiple discrete occurrences of a given species were detected within a single polygon, these occurrences were regarded as subpopulations at that site. Most of the polygons in the Antelope allotment (northern part of District) were surveyed by Rick Dewey, resulting in 63 sensitive species sites out of 31 polygons visited. Polygons from the Jack Creek allotment (southern half) were surveyed by Missy Anderson with 6 sensitive species sites out of 31 polygons visited. The newly detected sites of sensitive species are as follows: *Carex capitata* (CACA13) = 6; *Carex lasiocarpa* var. *americana* (CALAA) = 2; *Pseudocalliergon trifarium* (CATR27) = 4; *Helodium blandowii* (HEBL2) = 6; *Splachnum ampullaceum* (SPAM5) = 12; *Tomentypnum nitens* (TONI70) = 21; *Tritomaria exsectiformis* (TREX3) = 8; *Utricularia minor* (UTMI) = 10. The sites found tended to be small and scattered. All sites have less than 5 acres of occupied habitat, and many less than 0.1 acre. A table listing each sensitive species site found, grouped by species, is attached as Appendix A.

Overview of sites along the same creek or spring complex:

Seller's Creek (9407-450 Rd)
Species Present: CACA13, TONI70
Acres of occupied habitat: 0.49

Jack Creek & tributaries (8802 north and south, 8821, 8821-322, 8821-460, 8829-010, 9418-390, 9418-490 – north and south, 94-420, 94-460, Johnson, upper Jack)

Species Present: CACA13, CALAA, CATR27, HEBL2, SPAM5, TONI70, TREX3, UTMI
Acres of occupied habitat: 17.88

Crooked Meadow (94-580)

Species Present: CACA13, SPAM5, TONI70, TREX3, UTMI
Acres of occupied habitat: 2.29

Wilshire (north and south)

Species Present: TONI70, UTMI
Acres of occupied habitat: 1.07

Dry Meadow

Species Present: TONI70
Acres of occupied habitat: 0.59

Rock Creek above Riders Camp (8829-190 – north)

Species Present: SPAM5, TONI70, UTMI
Acres of occupied habitat: 0.44

N. of Parker Meadow (88-780)

Species Present: HEBL2, SPAM5, TONI70, TREX3
Acres of occupied habitat: 0.70

Huckleberry Spring (north and south)

Species Present: TONI70
Acres of occupied habitat: 4.9

Dempsey Spring + N of 9415 Rd. (8817-320)

Species Present: CACA13, CALAA, HEBL2
Acres of occupied habitat: 0.28

Forked Horn Springs

Species Present: HEBL2
Acres of occupied habitat: 1.9

Carex species.

Twelve species of *Carex*, including two R6 sensitive species, were detected in the course of the project-related surveys. A list of these taxa is attached as Appendix B.

Bryophyte species.

About 210 vouchers of bryophytes were collected in conjunction with the project-related field surveys. To date, 32 taxa including five R6 sensitive species have been identified. A list of these taxa is attached as Appendix C.

DISCUSSION:

Overwhelmingly, the sensitive species sites for this survey were found in wetlands designated as EUI type 2006. One of the *Splachnum ampullaceum* sites was found in EUI type 2008 and 2 sedge sites (1 *Carex capitata* and 1 *Carex lasiocarpa* var. *americana*) were found in EUI type 2017. Of the total number of wetlands designated as EUI 2006 on the Chemult District, about 60% have been surveyed. It should be noted that most of the EUI 2006 units surveyed in this project were included based on their identification by Chemult Ranger District staff as among those least subjected to disturbance. As such, the remaining EUI 2006 polygons may not have as much suitable habitat as those visited in this survey.

No single polygon contains all the target species, but many polygons include two or more sensitive species occurrences. The fen below Stimson Meadow (8821 Rd.) has 7 sensitive species occupying 4.43 acres. The area between Moffit and Jamison Meadows (8802-north) has 6 sensitive species occupying 2.04 acres. An area east of Johnson Meadow has 5 sensitive species occupying 0.49 acres. The fen below Stimson Meadow and the fen at Forked Horn springs are probably the sites with the largest continuous suitable habitat, with the caveat that many areas along the main stem of Jack Creek are broken up by private land, which were not part of this survey. In addition, some of the sites above are known sites of sensitive wildlife species, including the Oregon Spotted Frog and Evening Field Slug.

Observations from survey notes indicate there are management activities occurring at most of the sites. Most of the potential and occupied habitat for the target species in this survey, and all but one of the newly detected sites are within either the Antelope cattle allotment or the Jack Creek sheep allotment. Most of the areas surveyed have been marked for riparian thinning or have already had some form of treatment with the resultant thinning piles in the meadow. Although some sites show no evidence of recent fire activity, some sites show evidence that piles have been burned on meadows, or that burning of adjacent uplands occurred right to the edge of the meadow. Some of the sites are in areas currently being evaluated for groundwater removal or beaver re-location.

There are 69 new sites to manage for, some in areas with multiple potential or actual threats to the habitat. For the majority of the sites, the habitats are essentially fen plant communities. While management recommendations or other information specific to each species' ecology may not be available, there is information available regarding montane fens, including a large body of literature from work in the U.S. Rocky Mountains, British Columbia, and the Sierra Nevada (Johnston, 2009; Weixelman and Cooper, 2009; Rocchio, 2006; Chimner et al., 2008). Draft versions of the USDA Forest Service Groundwater Dependent Ecosystems Inventory and Monitoring Level 1 and Level 2 Protocols are due to be released for review by field units in early 2010 with field testing to follow in the summer of 2010.

An in-depth review of literature to determine the relevance of available studies to management of these areas was not done for this report. It would be difficult to make specific management recommendations using observations made during this survey beyond some general suggestions. Nonetheless, managers are required to ensure continued viability of these species throughout their ranges on National Forest System Lands. As many sites are impacted as a result of

management, and many sites have limited extent, these observations and suggestions may be useful, however poorly defined. Ultimately further study is necessary to refine guidelines for these areas.

Some general suggestions based on observations from this survey, and knowledge of effects of management follow. Depending on the site, some of the suggestions below may not apply (i.e. for a highly-altered site), or may not be practical.

1. It is appropriate to regard the peatlands/wet meadows occurring on the Chemult Ranger District as both communities including a remarkable number of rare plant sites, as well as uncommon and sensitive plant communities unto themselves. Given the unusually high concentration in the area, it is suggested that more work be done to map, characterize, and assess the condition of these communities and develop management guidelines.

2. While to varying degrees management of woody encroachment and adjacent timber and transportation activities have caused undesirable disturbances to these peatland/wet meadow communities, livestock grazing is generally the most evident detrimental disturbance in these particular wetland habitats. Evidence exists in the common incidence of peat pedestals, bare peat, exotic plants, and native increasers. The effects of livestock grazing and alternative approaches to livestock management in these habitats will be evaluated in depth during the Antelope Allotment Management Plan Update, scheduled for 2010. The decision is expected to include a monitoring plan and an adaptive management process for maintaining riparian habitats, including peatlands/wet meadows.

3. As noted above, most of the areas surveyed have been marked for riparian thinning/conifer encroachment removal or have already had some form of treatment. Piling thinned materials on peatlands/wet meadows kills the vascular and non-vascular plants covered by the pile and removes the covered areas from the total of that peatland's suitable habitats for rare and other native peatland plants for many years. Pile burning over peat destroys the underlying peat and creates craters of varying depth. These craters may encourage colonization by less desirable wetland plant species and otherwise retard natural restoration of the burn site. Heavy thinning and piling of thinned materials at the edges of a peatland/wet meadow is also generally not recommended. These edges often constitute a relatively rare ecotonal habitat where perennial dampness and shaded rotten wood may support rare plants including the liverwort *Tritomaria exsectiformis* and, potentially, the moss *Meesia uliginosa*.

   Suggested mitigations for vegetation treatments include the following:
   a) Assess whether there is need to conduct activities in/around these specialized habitats on a site by site basis.
   b) Consider retention of shade and woody debris in portions of the damp ecotonal zones.
   c) Avoid piling and burning in peatlands/wet meadows. When thinned materials consist of relatively small volumes of sapling-sized trees, lop and scatter may be an economical and relatively harmless alternative to piling.
   d) Where piles already exist on occupied peatlands/wet meadows, consider removing them, if possible. If existing piles cannot be removed in a timely manner, retention is almost certainly preferable to burning.

4. The integrity of peatland ecosystems is inherently tied to the hydrologic conditions that support peat accumulation (Weixelman and Cooper, 2009). It is suggested that management with the potential to substantially alter the hydrology of an area be avoided in peatlands/wet meadows. These actions might be warranted for activities such as: groundwater removal; inundation (dam construction – natural or otherwise); road construction; and where disturbance causes excessive dewatering via channel, ditch, trail, or extensive pedestaling.

Additional observations:

1. Indicator species. During the course of the fieldwork associated with this project, the number of plant species initially considered to be candidates for absolute indicators (locally) of fens with perennial surface water steadily decreased. Species initially on this list included analogue sedge (*Carex simulata*), few-flowered spikerush (*Eleocharis quinqueflora*), tinker's penny (*Hypericum anagalloides*), primrose monkeyflower (*Mimulus primuloides*), elephanthead lousewort (*Pedicularis groenlandica*), scentbottle (*Plantanthera dilitata* var. *dilitata*), Oregon saxifrage (*Saxifraga oregana*) and bog blueberry (*Vaccinium uliginosum*). As fieldwork progressed, it became apparent that, while each of these species is strongly associated with perennially wet fens, all, to varying degrees, can be found on organic soils where surface water in August or September is neither visible nor freely expressed with the pressure of a knee or boot toe. Currently, the species that are relatively common and appear to have the strongest association with perennially wet fen surfaces include the insectivorous plants (*Drosera anglica, D. rotundifolia, Utricularia intermedia*) and the mosses *Meesia triquetra* and *Tomentypnum nitens*. Species-specific plant cover values and associated monitoring of local water table behavior during June-October in a broad range of peatlands/wet meadows and moist meadows is necessary to more fully utilize plant species as indicators of the varied water table regimes represented among Chemult Ranger District wetlands and meadows.

2. Under-represented species. It is unexpected that sticky tofieldia (probably *Triantha occidentalis*), which is commonly found on the fens of Deschutes National Forest, and slender cottongrass (*Eriophorum gracile*) and buckbean (*Menyanthes trifoliata*), which are occasionally seen on the fens of Deschutes National Forest, were rarely observed during the surveys associated with this project. These species were observed in just two of the sixty-two polygons surveyed during this project. Fens on both the Deschutes National Forest and the Chemult Ranger District are closely related physically, each group principally forming over Mazama pumice. These two field units are physically adjacent, and each is within the known range of these three plant species. A possible explanation that may merit some form of testing is that differing management practices (historical and present) between these two field units may be a causal factor.

3. *Tomentypnum nitens*. This is a circumboreal moss whose known range in the Pacific Northwest does not extend further south than southern Oregon. While currently an R6 sensitive species, recent exploration of fens on Deschutes National Forest and this project on the Chemult Ranger District have resulted in the detection of more than twenty sites on each of these field units. It currently appears likely that the local density of species

sites, spanning only about 90 miles in and near the eastern Cascade flank, and strongly related to Mazama pumice, is far higher than elsewhere in Oregon or Washington. Based on data currently (1/7/2010) residing in NRIS TESP, only two other R6 national forests have a documented presence of this species (Ochoco NF, 2 sites; Malheur NF, 2 sites). Within its local range, the moss is well represented in perennially wet fens, perhaps to the point of being the single best indicator of this habitat type. Fen visits on the Chemult Ranger District have documented a large variance in the abundance of this moss among fens. Observations at these fens also hint at a possible competitive dynamic between this moss and another locally common wetland moss, *Aulacomnium palustre*. Each of these mosses generally favors hummocks and other slightly raised topographic features within very wet fens. Notably, in Oregon, *Tometypnum nitens* appears to be restricted to fens, while *Aulacomnium palustre* occupies a broad range of perennially or seasonal wet habitats. More directed investigation would be necessary to test a very tentative understanding that *Aulacomnium palustre* is more tolerant of physical and chemical disturbance than *Tomentypnum nitens*.

***Tomentypnum nitens* in Johnson meadow exclosure.**

4. Fens and peat. Fens, along with bogs, are sometimes described as types of peatlands. Peatlands, in turn, are sometimes defined in terms of depth and the organic fraction of the peat. Whether a given landscape feature qualifies as a peatland, or fen, may depend on seemingly arbitrary percentages or decimal fractions. While the persistent need for quantitative circumscriptions in science is not disputed, this project provided an interesting insight to one of its field workers. In the northern part of the project area there is a relatively flat, several-acre expanse in lodgepole pine forest, where surface vegetation was recently entirely removed during, apparently, the excavation and removal of pumice to be used as a surface dressing for a local non-paved Forest road. The western edge of this excavation tapped into a perennial seep, leaving an area of seepage within about an eight inch layer of pumice overlying some hard, impenetrable surface. The surface of

this seepy pumice is occupied by a fairly rich community of typical fen species including analogue sedge, Jones' sedge (*Carex jonesii*), few-flowered spikerush, Sierra shooting star (*Dodecatheon jeffreyi*), tinker's penny, field woodrush (*Luzula campestris*), primrose monkeyflower, elephanthead lousewort, scentbottle, hooded lady's tresses (*Spiranthes romanzoffiana*) and the mosses *Aulacomnium palustre* and *Philonotis fontana*. This set of observations suggests that, at least botanically, a fen can exist independent of peat, relying only on perennial groundwater discharge and a suitable inorganic aggregate. Over time of course, peat will form, but it can be viewed as the product, not a necessary feature, of a botanical fen.

5. *Carex* species. Some of the *Carex* species detected during the course of this project, including *C. echinata* ssp. *echinata*, *C. jonesii* and *C. luzulina*, were apparently not previously documented on the Chemult Ranger District. *Carex capitata* was found in the somewhat drier portions of otherwise perennially wet fens and in one instance, on organic soil that was only seasonally wet. *Carex jonesii* was a relatively common constituent of fens in the northern half of the District. *Carex simulata* is one of the more notable of the *Carex* species encountered in this project. It is often a dominant or co-dominant vascular plant in a visually striking type of perennially wet fen community featuring very low plant structure, a rich assemblage of graminoids and forbs, and a high cover of mosses.

Carex echinata* ssp. *echinata

Carex capitata

6. Bryophyte species. Based on fieldwork associated with this project and other recent surveys on Deschutes, Ochoco and Malheur National Forests, a number of the bryophytes detected during this project appear to be strongly associated with fen habitats. This group includes *Bryum pseudotriquetrum, Bryum weigelii, Calliergonella cuspidata, Hamatocaulis vernicosus, Helodium blandowii, Hypnum pretense, Plagiomnium rugicum* and *Tomentypnum nitens.* Other bryophytes commonly found in the fens of Chemult Ranger District and other central Oregon forests, including *Aulacomnium palustre, Drepanocladus aduncus, Marchantia polymorpha, Philonotis fontana* and *Rhizomnium* spp., tend to be associated with wet habitats in general. *Sphagnum* spp. are commonly present and frequently highly abundant in the fens of the Chemult Ranger District.

Species of this genus are commonly noted to be good indicators of local water chemistry (especially pH and calcium levels) as well as local differences in water table behavior. Numerous collections of these mosses were made during the course of this project, but species identifications and subsequent analysis of distribution patterns are still pending.

7. Lesser bladderwort. Field study conducted in the course of this project suggests that the lesser bladderwort may be somewhat more frequent on the Chemult Ranger District than previously understood. While suitable habitat for this species on the District is probably restricted to shallow, persistent (May-October) to near-persistent standing water over peat in fens, its presence is typically difficult to detect with simple visual examination. Like its common associate, flatleaf bladderwort (*Utricularia intermedia*), it is a rooted plant, but unlike the latter, whose much larger photosynthetic shoots are generally arrayed near the water surface, lesser bladderwort's minute leafy shoots are often found at or just below the surface of the loosely organized, low density muck underlying the clear to often, murky water of the pool. Detection often requires gently dredging this loose muck with an extended index finger. The anchored stems of the bladderwort, when present, can be felt as thin threads resisting the passage of the finger. Unfortunately, this is a somewhat destructive sampling technique, and was generally pursued only long enough to permit a confident determination of presence. Minute size would appear to largely differentiate the lesser bladderwort from the flatleaf bladderwort and the less frequently encountered common bladderwort (*Utricularia vulgaris*). However, small shoots were sometimes encountered that resembled small versions (immature) of the flatleaf bladderwort. Examples of this material, along with all "good" lesser bladderwort collections were sent to Dr. Richard Halse at the Oregon State University Herbarium for examination. All collections were determined to be *Utricularia minor*. It has been noted (Neid, 2006) that degradation of water quality, which can be caused by cattle grazing, can eliminate occurrences of *Utricularia minor* and other *Utricularia* species. It is conjectured that grazing promotes water turbidity, which is known to adversely affect *Utricularia* species. It is also likely that individual plants are destroyed or damaged by the direct physical impact of hoof placement.

8. Small capsule dung moss (*Splachnum ampullaceum*). Numerous detections of this moss occurred within fens. Based on these observations it is apparent that this moss requires both dung and a persistently (May-October) or near-persistently wet setting. While confident identification of source was not always possible, it is evident that the majority of observed substrates for this moss were cattle dung. While good ecological or biodiversity-based arguments can be made for the general exclusion of cattle from fens, persistence concerns for *Splachnum ampullaceum* would not be a part of those arguments.

Splachnum ampullaceum, surely the most beautiful adornment a cowpie could ever have!

Status of other Final Products:

1) NRIS TESP survey and site forms and data entry – completed, see tables and maps.
2) Comprehensive bryophyte and *Carex* lists for areas surveyed; lists included in this report.
3) Voucher specimens –completed, verified by Rick Dewey (Deschutes NF), held by R. Dewey and M. Anderson

Literature Cited

Chimner, R., D. Cooper, K. Nydick and J. Lemly. 2008. Final Report: Regional Assessment of Fen Distribution, Condition and Restoration Needs, San Juan Mountains. Cooperative effort of the Michigan Technological University, Colorado State University and the Mountain Studies Institute. 43 pp.

Johnston, B. 2009. Ground Water Dependent Ecosystem Inventory and Monitoring Protocol Development: Grand Mesa-Uncompagre-Gunnison National Forests. Draft, 10 pp. with forms.

Kovalchik, B.L.1987. Riparian zone associations: Deschutes, Ochoco, Fremont, and Winema National Forests. USDA Forest Serv. Reg. 6. Ecol. Tech. Pap. 279-87. Portland, Ore.

Neid, S. 2006. *Utricularia minor* L. (lesser bladderwort), A Technical Conservation Assessment. Colorado Natural Heritage Program, Colorado State University.

Rocchio, J. 2006. Rocky Mountain Subalpine-Montane Fen Ecological System. Colorado Natural Heritage Program, Colorado State University.

Weixelman, D., and D. Cooper. 2009. Assessing Proper Functioning Condition for Fen Areas in the Sierra Nevada and Southern Cascade Ranges of California. USDA R5-TP-028

APPENDIX A

Sites Found

PLANT CODE	SITE NAME	SITE ID	DATE FOUND	ACRES OCCUPIED	EUI
CACA13	9407-450	06021109008	7/16/2009	0.08	2000
CACA13	8802 - north	06021109018	8/26/2009	0.02	2006
CACA13	9415	06021109021	9/4/2009	0.02	2017
CACA13	8821	06021109046	9/10/2009	0.03	2006
CACA13	94-580	06021109061	7/9/2009	0.58	2006
CACA13	Wilshire	06021109063	8/5/2009	0.02	2006
CALAA	94-420	06021109012	8/20/2009	0.02	2006
CALAA	9415	06021109022	9/4/2009	0.1	2017
CATR27	8802 - north	06021109019	8/26/2009	0.02	2006
CATR27	9418-490 - north	06021109026	9/9/2009	0.02	2006
CATR27	8821-460	06021109031	9/9/2009	0.21	2006
CATR27	8821	06021109041	9/10/2009	0.02	2006
HEBL2	8817-320 - south	06021109023	9/4/2009	0.03	2006
HEBL2	8817-320 - north	06021109024	9/4/2009	0.13	2006
HEBL2	8821	06021109042	9/10/2009	0.02	2006
HEBL2	8821-322	06021109048	9/18/2009	1.3	2006
HEBL2	88-780	06021109055	9/29/2009	0.06	2006
HEBL2	Forked horn springs fen	060211EO09072	8/19/2009	1.9	2006
SPAM5	9418-390	06021109014	8/25/2009	1.3	2006
SPAM5	8802 - north	06021109016	8/26/2009	0.02	2006
SPAM5	8802 - south	06021109020	8/26/2009	0.02	2008
SPAM5	9418-490 - north	06021109027	9/9/2009	0.03	2006
SPAM5	8821	06021109045	9/10/2009	0.04	2006
SPAM5	8821-322	06021109049	9/18/2009	0.03	2006
SPAM5	8829-010	06021109051	9/24/2009	0.05	2006
SPAM5	8829-190 - north	06021109053	9/25/2009	0.03	2006
SPAM5	88-780	06021109057	9/29/2009	0.03	2006
SPAM5	9418-490 - south	06021109060	9/30/2009	0.01	2006
SPAM5	Crooked Meadow	060211EO09070	9/24/2009	0.01	2006
SPAM5	north Parker meadow	060211EO09075	8/27/2009	0.01	2006
TONI70	Johnson	06021109001	6/8/2009	0.95	2006, 2000
TONI70	Wilshire	06021109002	6/8/2009	0.64	2006
TONI70	Dry	06021109003	6/10/2009	0.59	2006
TONI70	Crooked Meadow	06021109004	7/9/2009	1.6	2006

PLANT CODE	SITE NAME	SITE ID	DATE FOUND	ACRES OCCUPIED	EUI
TONI70	upper Jack	06021109006	7/10/2009	1.3	2006
TONI70	9407-450	06021109007	7/16/2009	0.41	2000
TONI70	94-460	06021109009	7/17/2009	1.6	2006
TONI70	Wilshire - north	06021109010	8/6/2009	0.41	2006
TONI70	94-420	06021109011	8/20/2009	0.82	2006
TONI70	9418-390	06021109013	8/25/2009	0.16	2006
TONI70	8802 - north	06021109015	8/26/2009	1.9	2006
TONI70	9418-490 - north	06021109025	9/9/2009	0.4	2006
TONI70	8821-460	06021109030	9/9/2009	0.33	2006
TONI70	8821	06021109040	9/10/2009	4.3	2006
TONI70	8821-322	06021109047	9/18/2009	1.7	2006
TONI70	8829-010	06021109050	9/24/2009	0.29	2006
TONI70	8829-190 - north	06021109052	9/25/2009	0.4	2006
TONI70	88-780	06021109054	9/29/2009	0.56	2006
TONI70	9418-490 - south	06021109058	9/30/2009	0.54	2006
TONI70	Huckleberry spring south	060211EO09073	9/10/2009	3.4	2006
TONI70	Huckleberry spring north	060211EO09074	9/10/2009	1.5	2006
TREX3	94-580	06021109005	7/10/2009	0.08	2006
TREX3	8802 - north	06021109017	8/26/2009	0.02	2006
TREX3	9418-490 - north	06021109028	9/9/2009	0.03	2006
TREX3	upper Jack	06021109029	8/20/2009	0.02	2006
TREX3	8821	06021109044	9/10/2009	0.03	2006
TREX3	88-780	06021109056	9/29/2009	0.04	2006
TREX3	9418-490 - south	06021109059	9/30/2009	0.03	2006
TREX3	Cabin spring meadow	060211EO09071	9/3/2009	0.01	2006
UTMI	8821-460	06021109032	9/9/2009	0.02	2006
UTMI	Johnson	06021109033	7/2/2009	0.17	2000
UTMI	94-580	06021109034	7/10/2009	0.02	2006
UTMI	upper Jack	06021109035	7/10/2009	0.02	2006
UTMI	94-460	06021109036	7/17/2009	0.02	2006
UTMI	Wilshire - north	06021109037	8/6/2009	0.02	2006
UTMI	8802 - north	06021109038	8/26/2009	0.02	2006
UTMI	9418-490 - north	06021109039	9/9/2009	0.02	2006
UTMI	8821	06021109043	9/10/2009	0.03	2006
UTMI	8829-190 - north	06021109062	9/25/2009	0.01	2006

APPENDIX B

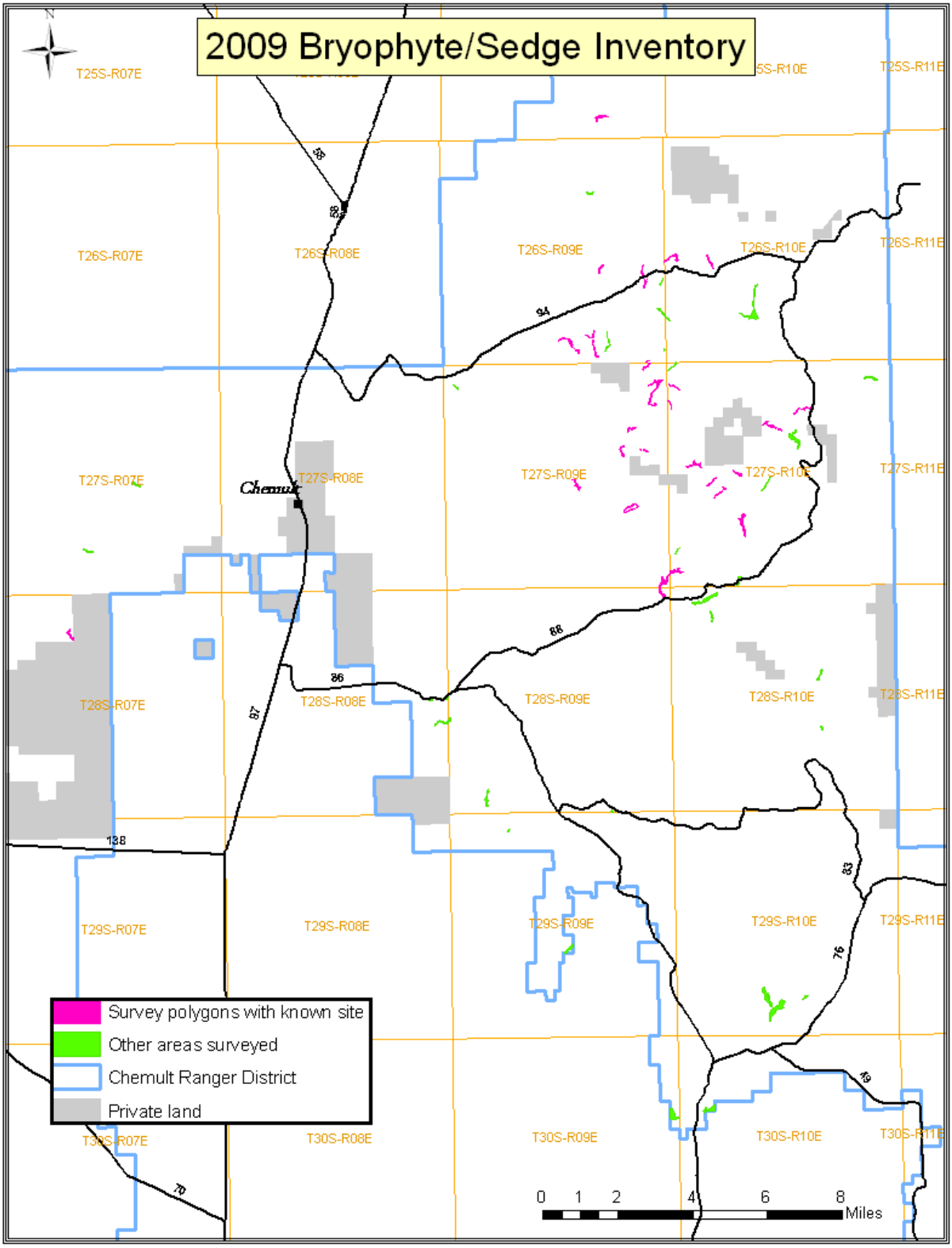
Carex taxa encountered in the course of 2009 Chemult ISSSSP surveys.

C. angustata
C. aquatilis
C. athrostachya
C. aurea
C. buxbaumii
C. canescens
C. capitata
C. cusickii
C. echinata ssp. echinata
C. halliana
C. jonesii
C. lasiocarpa var. americana
C. luzulina
C. microptera
C. pellita
C. simulata
C. subfusca
C. utriculata
C. vesicaria

APPENDIX C

Bryophyte taxa encountered in the course of 2009 Chemult ISSSSP surveys.
("m" = moss; "l" = liverwort)

Amblystegium polygamum (m)
Aulacomnium palustre (m)
Blepharostoma trichophyllum (l)
Bryum pseudotriquetrum (m)
Bryum weigelii (m)
Calliergon cordifolium (m)
Calliergon trifarium (m)
Calliergonella cuspidata (m)
Cephalozia lunulifolia (l)
Chiloscyphus polyanthos (l)
Climacium dendroides (m)
Drepanocladus aduncus (m)
Drepanocladus exannulatus (m)
Fontinalis sp. (m)
Hamatocaulis vernicosus (m)
Helodium blandowii (m)
Hypnum pratense (m)
Lophocolea bidentata (l)
Lophocolea minor (l)
Lophozia ascendens (l)
Lophozia guttulata (l)
Marchantia polymorpha (l)
Meesia triquetra (m)
Philonotis fontana (m)
Plagiomnium rugicum (m)
Rhizomnium pseudopunctatum (m)
Riccardia latifrons (l)
Scapania undulata (l)
Sphagnum spp. (m)
Splachnum ampullaceum (m)
Tomentypnum nitens (m)
Tritomaria exsectiformis (l)


2009 Bryophyte/Sedge Inventory
T25S-R07E
T25S-R10E
T25S-R11E
T26S-R07E
T26S-R08E
T26S-R09E
T26S-R10E
T26S-R11E
T27S-R07E
T27S-R08E
T27S-R09E
T27S-R10E
T27S-R11E
Chemult
T28S-R07E
T28S-R08E
T28S-R09E
T28S-R10E
T28S-R11E
T29S-R07E
T29S-R08E
T29S-R09E
T29S-R10E
T29S-R11E
T30S-R07E
T30S-R08E
T30S-R09E
T30S-R10E
T30S-R11E
Survey polygons with known site
Other areas surveyed
Chemult Ranger District
Private land
0 1 2 4 6 8
Miles