

**Initial Bryophyte and Lichen Inventories  
Malheur National Forest  
Project Report by Rick Dewey, Project Lead  
March 2009**

Introduction

This project was an effort to augment a rather sparse data set concerning the bryophyte and lichen flora of Malheur National Forest. Along with Ochoco National Forest, Malheur National Forest stands apart from other "eastside" Oregon national forests (Deschutes, Fremont-Winema, Umatilla, Wallowa-Whitman) in the relatively small number of R6 Sensitive bryophyte and lichen taxa that are either documented or suspected (2008) to occur within its borders. This appears, at least in part, to reflect a paucity of cryptogamic field work on this forest, which in turn likely results from its geographic remoteness relative to eastside population centers and institutions of higher learning. While there is also a possibility that Malheur National Forest is simply less biodiverse than most other eastside Oregon forests, this matter can only be addressed with continuing field work. A better understanding of the actual occurrence on Malheur National Forest of rare cryptogams is critical to ongoing project/activity effects analyses and in turn, the informed management/conservation of these rare taxa and their habitats on the Forest.

Objectives

There were two basic objectives of this project: 1) conduct systematic surveys for the several Sensitive species documented or suspected to occur on the Forest. These include the liverworts *Jungermannia polaris* (JUPO3) and *Peltolepis quadrata* (PEQU7), the mosses *Encalypta intermedia* (ENIN), *Helodium blandowii* (HEBL2), *Schistidium cinclidodonteum* (SCCI5), *Splachnum ampullaceum* (SPAM5), *Tomentynum nitens* (TONI70) and *Tortula mucronifolia* (TOMU70), and the lichens *Dermatocarpon meiophyllizum* (DEME) and *Leptogium burnetiae* (LEBU5); 2) expand the list of bryophytes and lichens known on the Forest, and augment the existing collections of these taxa in the Forest herbarium. Of the taxa listed above, only *Helodium blandowii* was documented (one site) on the Forest prior to this project.

Methods

Species Fact Sheets, available at the ISSSSP website, provided basic information about the range and habitat associations of most of the target Sensitive species. No Fact Sheet was available for the moss *Encalypta intermedia* and only rather non-specific habitat information was acquired for this species. While a Fact Sheet was available for the lichen *Leptogium burnetiae*, its described habitats spanned such a range (coastal to Sonoran Desert) as to essentially be very non-specific. The eight other Sensitive cryptogams suspected or documented on the Forest could be included in one of three basic habitat types: 1) montane, higher elevations (5000' +), 2) peatlands and 3) riparian-aquatic. Taxa associated with the montane, higher elevations group include

JUPO3, PEQU7, SCCI5 and TOMU70. Taxa generally restricted to peatlands include HEBL2, SPAM5 and TONI70. The sole riparian-aquatic taxon is (DEME). For purposes of efficiency, it was decided to focus on these three basic habitat types, and their associated eight Sensitive taxa, while hoping to encounter ENIN and LEBU5 as incidentals. Aside from this basic strategy, a brief visit to the Shake Table RNA was planned, as this site appeared to provide good habitat for the lichen *Texosporium jacobisanti* or other "vagrant" lichens. This taxon is not considered suspected on Malheur National Forest, but is documented on adjacent Ochoco National Forest.

Forest staff made several recommendations of areas that are relatively under-explored or otherwise of special interest. Gene Yates (WAW NF Botanist) suggested exploration of the Shake Table RNA, as well as the higher elevation, north-aspects along the Strawberry and Aldrich Mountains. Mike Tatum (MAL NF Natural Resource Team Lead) knew of an interesting sippy corner of Flood Meadow (Long Creek RD), and Joe Rausch (MAL NF Botanist) suggested visiting the complex wetland system in Logan Valley (Prairie City RD). A combination of the Malheur NF Forest Map, district maps, Malheur NF GIS and Google Earth was used to identify possible peatlands across the Forest. A total of 38 potential peatlands were identified and selected for inclusion in the project. A small packet was developed that included color imagery, elevations and labeled roads for each of these sites. Because many of these peatlands were located near or above 5000' elevation, it seemed quite possible and convenient, in many cases, to examine peatlands and associated higher montane habitat types during the same walkabout. Several sites of interest simply as promising representations higher elevation montane habitat types were identified within the Aldrich and Strawberry Mountains.

On the ground, locational information was noted using district maps and a Garmin GPS 12 unit set to NAD 1927 projection. Field notes in a narrative style were kept in a 6x9" spiral-bound notebook. Collections were placed in standard, folded paper vouchers. Triggers to make a particular collection, in order of priority, were 1) status as an identifiable or possible R6 Sensitive species, 2) new to project collections, and 3) new to a particular walkabout. The latter trigger frequently did not trigger a collection. Digital photography was used to record both landscapes views and specific collection sites. Bryophyte identifications were performed by Rick Dewey, with counsel occasionally provided by David Wagner. Lichen verifications/identifications were performed by Doug Glavich.

## Results

Fieldwork was conducted between August 25 and September 12, 2008. A total of at least 15 field days were planned but only 10 were realized. Initiation of field work in mid-August was blocked pending resolution of concerns about the project lead's permission to travel off-forest during a period of travel restrictions relating to national USFS "fire borrowing". Sites on the old Long Creek Ranger District were visited during the first week of fieldwork. During the second week, sites on the old Bear Valley, Burns and Prairie Creek Ranger Districts were visited. Due to loss of five planned field days, and low productivity of searches in higher elevation montane habitat types during the first

week of fieldwork, it was decided that focus of the second field week should be potential peatland sites. Relative to their total area on federal lands in the PNW, these habitats support a disproportionate number of the R6 USFS and OR-WA BLM Sensitive plant species. Accordingly, and regrettably, planned sites in the Strawberry and Aldrich Mountains (except for Cedar Grove Botanical Area) were set aside for another year. Of the 38 potential peatlands targeted for examination, 32 were actually visited. Overall, a total of 43 sites were visited and are listed as Appendix F. For purposes of discussing project results, former Malheur National Forest district designations - corresponding to currently available "district" maps - will be used.

During the 10 days of fieldwork, 177 vouchers of bryophytes and 51 vouchers of lichens were collected. At present, the bryophyte collections have been determined to include 36 genera and 47 species of mosses, 11 genera and 14 species of liverworts. A project bryophyte list and a list of bryophyte taxa by collection site are included as Appendix A and B. The lichen collections have been determined to include 19 genera and 29 species. A project lichen list and a list of lichen taxa by collection site are included as Appendix C and D. Brief field notes relating to all sites visited are included as Appendix E.

Six new Sensitive bryophyte sites were detected along with one new Sensitive lichen site. The new Sensitive bryophyte sites include three new records for *Helodium blandowii* (East Fork Big Creek, Long Creek RD; 37/3760 peatland-meadow, Burns RD; Soup Spring, Burns RD), two new records for *Tomentynum nitens* (East Fork Big Creek, Long Creek RD; 37/3760 peatland-meadow, Burns RD) and one new record for *Meesia uliginosa* (Flood Meadow, Long Creek RD). The Sensitive lichen *Dermatocarpon meiphyllizum* was detected in the South Fork of Long Creek, Long Creek RD. Project areas surveyed and Element Occurrence data were entered into NRIS TESP-INSP in January, 2009. Additionally, a willow presenting the vegetative morphological characters of the Sensitive *Salix wolfii* was detected at Logan Valley, Prairie City RD.

## Discussion

1) Cedar Grove Botanical Area. As also noted in the wake of intense wildfires on both Deschutes and Ochoco National Forests, exposed mineral soil (due to litter and duff consumption) in the upper portion of the CGBA (lower portion not seen) supported a conspicuous abundance to the moss *Funaria hygrometrica* and the liverwort *Marchantia polymorpha*. At least within the area of these three forests, these two bryophytes clearly are early seral specialists in colonizing mineral soil in damp forest communities that have experience intense wildfire. The explosive, post-fire appearance of these bryophytes begs the question of source. Both species typically are found in these pre-fire damp communities, so some "spore banking" would be expected. However, the same heat that consumed litter and duff would be expected to destroy these spores. On the other hand, post-fire, long distance transport (from outside the fire perimeter) would hardly seem capable to so thickly inoculating the burned area. There is reason to suppose that some disjunct, "out of place" bryophytes might have been present, along with the *Cupressus (Chamaecyparis) nootkatensis*. Unfortunately, it appears that only a small portion of the pre-fire cover and, probably, diversity remains. As of 3/18/2009, there is an ongoing

effort to resolve the identity of a moss collected here during this project. Initially identified as *Mnium marginatum* by the project lead, David Wagner has seen the collected material and tentatively identified it as *Mnium blytii*, an ORNHIC S1 species.

2) Shake Table RNA. As reportedly a little-disturbed juniper/sagebrush/bunchgrass community, this specially designated area was visited with the hope of detecting the lichen *Texosporium sancti-jacobi*. While multiple species of *Umbilicaria* and *Leptogium* were observed, *Texosporium* was not seen. Given the reports of relatively little disturbance, it was particularly disheartening to observe such intensive infestation by the annual grasses *Ventenata dubia*, *Bromus japonicus* and *B. brizaeformis*. Lesser amounts of *Taeniatherum caput-medusae* and *Festuca bromoides* were also present. If no active monitoring is in place, initiation of monitoring, even at this advanced stage of infestation, might be very productive. Will densities of these grasses continue to increase? Are these grasses competing among themselves? How are the native grasses, forbs and even shrubs, responding to this infestation? How is the infestation affecting vertebrate and invertebrate animals that utilize the RNA?

3) *Dermatocarpon meiophyllizum*. This R6 Sensitive lichen species was detected only in the South Fork of Long Creek on the Long Creek RD. Examining creeks for this lichen was opportunistic, not systematic. Nevertheless, at least short reaches of nearly a dozen other creeks were checked. These creeks included: (Long Creek RD) - Long, Pepper, Camp, Mosquito, Swamp Gulch and Little Boulder; (Bear Valley) - Murderer's, South Fork Deer and Camp; (Burns RD) - Gribble; (Prairie City) - Bosenberg. There is some evidence, based on the distribution of this lichen on Ochoco National Forest, that it may exhibit some geological/chemical specificity or intolerance. Notably though, also on Ochoco National Forest, this lichen is found in streams that conspicuously differ in volume/rate of flow, sediment/suspended cow manure load, and probably temperature.

4) Photointerpretation of potential peatlands. Developing a list of potential/candidate peatlands primarily involved use of Malheur NF GIS and Google Earth. Initially, a Forest map was examined and labeled springs and meadows were highlighted. This, however, resulted in perhaps a hopelessly large number of features requiring further analysis. Fortunately, available Malheur NF GIS included a plant association layer, which was used to map the locations of the wet meadow (MW) vegetation series. Experience on Deschutes NF has shown that this series includes a large percentage of that Forest's known peatlands. These locations were then located with Google Earth, and images at an appropriate scale were printed. Resolution and color with Google Earth appears to be comparable to the 0.5 meter resolution imagery available through the USFS Imager Server. Without the advantage of ground-truthing, a fair number of potential peatlands (12) were later found to be meadows. Ground-truthing notably improved the ability to differentiate peatlands and meadows with Google Earth, but a margin of error continued to exist.

5) Malheur NF peatlands. As used here, the term "peatland" is referring to a plant community occurring atop and giving rise to a "soil" with a significant component of only partially decomposed organic material. These low-density soils generally qualify as

histosols, with an obvious organic content to a depth of 40 cm. (about 16"). During this project, peat was generally identified by probing with a narrow (1 cm) fiberglass rod five feet in length. Low resistance to penetration by the rod was considered indicative of peat. Peat depth, generally, was simply a matter of depth of penetration by the rod. Peatland depth, explored in this manner in this project, rarely was less than 36" and frequently exceeded the penetration/extraction limit (52") imposed by the length of the rod. Also, as peat formation appears to be dependent on saturated soil conditions over much, or more commonly all, of the growing season, peatland soil surfaces generally exhibit standing water, or water movement in narrow, shallow channels, or soppiness, or at least the ability, when kneeled upon, to create a soggy trouser knee (even in August or September). In this project, peatlands were generally differentiable from "meadows" both by botanical composition and fundamentally, by soil character. Meadows, although often resembling peatlands in aerial view, are likely to have a larger percentage of herbaceous cover as grasses, and their denser, mineral, non-histic soils are often dry at and near the surface in August and September. Penetration of meadow soils in late summer with the fiberglass rod generally did not exceed six inches. Not unexpectedly, the distinction between peatland and meadow was not always obvious in the field. In fact, it was quite common for peatland and meadow to intergrade within a single topographic setting. While perhaps somewhat oversimplified, observations by the project lead on Deschutes, Ochoco and Malheur NFs suggest that, hydrologically, meadows acquire their moisture primarily from early season surface flow, relating to melting snow (at and/or remote from site), while peatlands are fed primarily by local groundwater sources that are likely to be perennial.

6) Malheur NF fens. In some classification systems, at least, there are two basic types of peatlands: bogs and fens, each characterized by hydrology and, in turn, by chemistry and botanical composition. Hydrologically, bogs are depression phenomena; surface water drains in, but there is no outlet. Fens, in contrast, typically exhibit some degree of topographic gradient and experience a throughput of water. A more detailed characterization of fens might include the following: 1) groundwater-fed wetland, 2) nutrient limited, low rates of productivity and 3) dominated by Cyperaceae and mosses. It would appear that all the peatlands visited in the course of this project were fens. There is, however, notable variance in the structure and botanical composition of these fens. The range of this variance is basically from sedge-rush dominated fens where mosses are inconspicuous and accounting for a low percentage of total community biomass, to fens where mosses are conspicuous and appear to account for 50% or more of community biomass. Frequently, these "high sedge/rush" and "high moss" communities were found in the same fen, suggesting that these fens be referred to as "fen systems" or "fen complexes". For the most part, the new sites of R6 Sensitive *Helodium blandowii* and *Tomentypnum nitens* detected during this project were located in "high moss" communities.

7) Fen classification. Much has been written about the "poor-rich" gradient among fens, including the use of somewhat commonly used categorical terms such as "poor", "moderately rich", "rich" and "extremely rich". The poor-rich gradient generally corresponds to increasing pH and calcium levels, with more less differentiable botanical

(and invertebrate) communities associated with the several chemically-based fen categories. As they are in bogs, various groups of *Sphagnum* mosses are important components of the more acidic poor, moderately rich and even rich fens. "Brown mosses" are conspicuous components of rich and extremely rich fens and include the genera *Drepanocladus* and *Calliergon*, and the species *Tomentypnum nitens*, *Bryum pseudotriquetrum* and *Aulacomnium palustre* - all of which (except for *Calliergon* on Malheur NF) are found in fens on Deschutes, Ochoco and Malheur NFs. While no chemical data was gathered during this project, bryological data would suggest that most Malheur NF fens would be included in the "rich" or "extremely rich" categories within the poor-rich fen gradient. Chemical, and a more comprehensive botanical characterization of Malheur NF fens, along with further basic inventory and description of fens in central-eastern Oregon and in montane portions of the Pacific Northwest, would greatly facilitate the classification of Malheur NF fens.

8) Central Oregon fens. The project lead has had opportunities to examine numerous fens and fen complexes on Deschutes, Ochoco and Malheur NFs. It is apparent that in terms of structure and botanical composition, the fens of Malheur NF are much more similar to those of Ochoco NF than to those of Deschutes NF. On Deschutes NF, many fens include a combination of the mosses *Hamatocaulis vernicosus* and/or *Drepanocladus aduncus*, *Meesia triquetra*, *Tomentypnum nitens*, *Aulacomnium palustre*, *Philonotis fontana* and *Sphagnum* species. Less common mosses include *Calliergonella cuspidata*, *Calliergon stramineum* and *Helodium blandowii*. Common vascular plant associates include *Tofieldia glutinosa*, *Menyanthes trifoliata*, *Pedicularis groenlandica*, *Saxifraga oregana*, *Betula glandulosa*, *Eleocharis quinqueflora*, *Carex aquatilis*, *C. utriculata*, *Juncus ensifolius*, *J. balticus*, *J. orthophyllus* and *J. nevadensis*. Less common vascular plants include *Eriophorum gracile*, *Drosera* species and *Utricularia* species. The herbaceous vegetation of fens/fen complexes with some combination of these species is typically of short stature and mosses are at least co-dominants with the herbaceous vascular plants within these communities. Relative to the Deschutes NF, fen plant communities on both the Ochoco and Malheur NFs appear to be less diverse and more prone to sedge-rush dominance. The apparently fen-dependent moss *Hamatocaulis vernicosus* has yet to be found on Ochoco NF and appears to have been detected at only one or two sites on Malheur NF. The moss genera *Calliergonella*, *Calliergon* and *Sphagnum* were not detected on Malheur NF, while *Calliergonella* is undetected on Ochoco NF and *Calliergon* and *Sphagnum* are known from only one fen complex. Similarly, the moss *Meesia triquetra* has been detected at only a single fen complex on Ochoco NF and just two fen complexes on Malheur NF. In the absence, or near absence, of these several moss genera, fen moss communities on Ochoco and Malheur NFs tend to be dominated by *Philonotis fontana* and *Drepanocladus aduncus*. Greater simplicity appears to be reflected in the vascular plant community as well. Among the genera *Tofieldia*, *Menyanthes*, *Eriophorum*, *Drosera* and *Utricularia*, none are yet detected on Ochoco NF while *Menyanthes* and *Eriophorum* have been detected at a single fen system on Malheur NF. It seems likely that some of these "missing" genera will be detected with further fieldwork on Malheur NF. It is also possible that vascular plant taxa other than those documented on Deschutes NF fens, may have gone undetected by the project lead during fieldwork on Malheur NF. Clearly, more fieldwork, including more intensive and

comprehensive botanical inventory of Malheur (and Ochoco) NF peatlands would promise insights at both the local and regional level.

9) Fen edges. Fen edges appear to constitute a singular and botanically diverse habitat. Typically, very high, perennial soil moisture levels combined with an abundance of down trees in a broad range of decay classes provides micro-habitats that may rarely exist elsewhere within an "eastside" Oregon forest. Southern edges of fens, due to shading, generally provide the best of the fen edge habitat. This is a particularly good habitat for a diversity of leafy liverworts. The R6 Sensitive moss *Meesia uliginosa* was found in fen edge habitat during this project.

10) Cattle grazing and fens. Due to the low density of peat, fens are particularly susceptible to mechanical disturbance by cattle. Cattle do not appear to be particularly drawn to sappy wet areas, and if a fen complex includes grassy meadows, cattle may well focus their initial grazing here. It seems likely that, as grass stubble height becomes very low, or grassy meadows are not well-represented within a particular pasture, cattle will choose to graze in fens. The effects of cattle grazing in fens appear to be potentially numerous and probably quite complex. 1) "Post-holing" - the creation of cylindrical wells by sinking hooves, appears to frequently directly destroy the vegetation pressed into the bottom of the well. 2) Even in deep peat, dense layers of potentially impervious inorganic matter seems to commonly exist at relatively low depths. Depending on the permeability of these layers, peat compaction that may occur with post-holing, has the potential to alter the horizontal movement of water through the peat, and in turn locally alter both surface moisture conditions for bryophytes and subsurface conditions for rooted vascular plants. 3) Cow manure, which may be present in remarkable volumes, seems to have the potential to alter the pre-cow chemical dynamic of a peatland. Fens are inherently nutrient-poor ecosystems. It is reasonable to suppose that nutrient enrichment of these systems could result in vegetational succession marked by changes in community species composition and structure, with possible negative consequences that would include decline in or loss of previously rare species. Additional basic effects data is much in need. Simply monitoring a few post-holes would be helpful. Is there actually peat compression beneath them? If so, what is its new density? Does decompression occur? At what rate? Presuming that the post-hole will eventually fill in, how long does this take? What factors seem to be involved in its filling? Development and implementation of a simple monitoring plan is much in need. The much cow-disturbed sites of *Tomentypnum nitens* and *Helodium blandowii* at the 37/3760 fen complex would be a good initial candidate. Enclosures might help address the issue of possible beneficial herbivory. Does cattle grazing here actually benefit the rare mosses by reducing competition (for light and space) by local sedges and forbs, or does the physical and chemical disturbance associated with grazing outweigh any possible benefits?

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## References

Christy, John and David Wagner. 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. USDI Bureau of Land Management, USDA Forest Service, The Nature Conservancy and Northwest Botanical Institute, Portland, OR.

Christy, John and David Wagner. 1999. Checklist of mosses of Oregon. <<http://darkwing.uoregon.edu/~fieldbot/or Moss.html>>. Oregon Natural Heritage Program, Northwest Botanical Institute. July 1999.

Doyle, William and Raymond Stotler. 2006. Contributions toward a bryoflora of California III. Keys and annotated species catalog for liverworts and hornworts. Madrono, Vol. 53, No. 2, pp. 89-197, 2006.

Godfrey, Judith. 1977. The Hepaticae and Anthocerotae of Southwestern British Columbia. Ph.D. Thesis, University of British Columbia, September 1977.

Hajek, Michal, Michal Horsak, Petra Hajkova and Daniel Dite. 2006. Habitat diversity of central European fens in relation to environmental gradients and an effort to standardize fen terminology in ecological studies. Perspectives in Plant Ecology, Evolution and Systematics 8 (2006) 97-114.

Lawton, Elva. 1971. Moss Flora of the Pacific Northwest. Hattori Botanical Laboratory. Nichinan, Japan. 362 pp.

McCune, Bruce and Linda Geiser. 1997. Macrolichens of the Pacific Northwest. Oregon State University Press, Corvallis, OR.

Paton, Jean. 1999. The Liverwort Flora of the British Isles. Harley Books. 626 pp.

Schuster, Rudolph. 1966-1992. The Hepaticae and Anthocerotae of North America East of the Hundredth Meridian. Volumes 1-6. Columbia University Press, New York. 802, 1062, 880, 1334, 854, 937 pp.

Vitt, Dale, Janet Marsh and Robin Bovey. 1988. Mosses, Lichens & Ferns of Northwest North America. Lone Pine Publishing, Canada. 296 pp.

## Appendix A

| <b>Malheur NF Bryophytes</b>         |                             |
|--------------------------------------|-----------------------------|
| <b>Mosses</b>                        | <b>Mosses (cont.)</b>       |
| Amblystegium riparium                | Plagiomnium medium          |
| Atrichum selwynii                    | Plagiomnium rugicum         |
| Aulacomnium palustre                 | Pleurozium schreberi        |
| Barbula vinealis                     | Pohlia nutans               |
| Brachythecium frigidum               | Polytrichum commune         |
| Brachythecium rivulare               | Pteigynandrum filiforme     |
| Bryum pseudotriquetrum               | Rhizomnium magnifolium      |
| Bryum weigeli                        | Rhizomnium pseudopunctatum  |
| Ceratodon purpureus                  | Rhytidiadelphus triquetrus  |
| Dicranum tauricum                    | Roellia roellii             |
| Drepanocladus aduncus                | Scleropodium obtusifolium   |
| Drepanocladus sendtneri              | Scouleria aquatica          |
| Drepanocladus uncinatus              | Timmia austriaca            |
| Eurhynchium praelongum var. stokesii | Tomentypnum nitens          |
| Fontinalis neo-mexicana              | Tortula ruralis             |
| Funaria hygrometrica                 |                             |
| Grimmia alpicola var. rivularis      |                             |
| Grimmia montana                      | <b>Liverworts</b>           |
| Grimmia pulvinata                    | Blepharostoma trichophyllum |
| Hamatocaulis vernicosus              | Calypogeia fissa            |
| Helodium blandowii                   | Cephalozia lunulifolia      |
| Homalothecium nevadense              | Chiloscyphus polyanthos     |
| Hypnum pratense                      | Jungermannia leiantha       |
| Leptobryum pyriforme                 | Lepidozia reptans           |
| Lescurea radicata var. radicata      | Lophozia ascendens          |
| Meesia triquetra                     | Lophozia incisa             |
| Meesia uliginosa                     | Lophozia ventricosa         |
| Mnium marginatum (M. blytii?)        | Marchantia polymorpha       |
| Orthotrichum affine                  | Pellia sp.                  |
| Orthotrichum rupestre                | Riccardia chamedryfolia     |
| Orthotrichum speciosum               | Riccardia latifrons         |
| Philonotis fontana                   | Scapania undulata           |

## Appendix B

| <b>Malheur NF Bryophytes by Site</b> |                 |                                 |
|--------------------------------------|-----------------|---------------------------------|
| <b>Taxon</b>                         | <b>Location</b> | <b>Other Included Taxa</b>      |
| Hypnum pratense                      | Flood Mdw       |                                 |
| Aulacomnium palustre                 | Flood Mdw       |                                 |
| Meesia triquetra                     | Flood Mdw       |                                 |
| Drepanocladus aduncus                | Flood Mdw       | PHFO                            |
| Brachythecium frigidum               | Flood Mdw       |                                 |
| Philonotis                           | Flood Mdw       |                                 |
| Drepanocladus                        | Flood Mdw       |                                 |
| Marchantia polymorpha                | Flood Mdw       |                                 |
| Bryum weigeli                        | Flood Mdw       |                                 |
| Meesia triquetra                     | Flood Mdw       |                                 |
| Rhizomnium pseudopunctatum           | Flood Mdw       | BRWE, PHFO, HYPR                |
| Cephalozia                           | Flood Mdw       | MEUL                            |
| Meesia uliginosa                     | Flood Mdw       |                                 |
| Leptobryum pyriforme                 | Flood Mdw       |                                 |
| Brachythecium frigidum               | Flood Mdw       |                                 |
| Brachythecium frigidum               | Flood Mdw       |                                 |
| Lophozia incisa                      | Flood Mdw       |                                 |
| Bryum weigeli                        | Flood Mdw       | BRPS, PHFO                      |
| Drepanocladus aduncus                | S Fk Long Ck    |                                 |
| Drepanocladus                        | S Fk Long Ck    |                                 |
| Drepanocladus                        | S Fk Long Ck    |                                 |
| Fontinalis neo-mexicana              | S Fk Long Ck    |                                 |
| Bryum weigeli                        | S Fk Long Ck    | BRPS, BRFR                      |
| Roellia roellii                      | S Fk Long Ck    |                                 |
| Grimmia montana                      | S Fk Long Ck    |                                 |
| Tortula                              | S Fk Long Ck    |                                 |
| Amblystegium riparium                | S Fk Long Ck    |                                 |
| Lescurea radicata var. radicata      | S Fk Long Ck    |                                 |
| Grimmia alpicola var. rivularis      | S Fk Long Ck    |                                 |
| Dicranum tauricum                    | S Fk Long Ck    |                                 |
| Barbula vinealis                     | S Fk Long Ck    |                                 |
| Drepanocladus aduncus                | 3945 Rd         |                                 |
| Bryum weigeli                        | Harper Mdw      | BRPS                            |
| Polytrichum commune                  | Harper Mdw      |                                 |
| Lophozia ventricosa                  | Harper Mdw      | LOAS, HYPR, CELU, CHPO, PLME/IN |
| Plagiomnium rugicum                  | Harper Mdw      | MAPO                            |
| Calypogeia fissa                     | Harper Mdw      | RILA                            |
| Scapania undulata                    | Harper Mdw      | RILA                            |
| Scapania                             | Harper Mdw      | CHPO                            |
| Drepanocladus uncinatus              | Harper Mdw      |                                 |
| Pleurozium schreberi                 | Harper Mdw      |                                 |
| Dicranum tauricum                    | Harper Mdw      | CAFI                            |
| Riccardia chamedryfolia              | Twin Springs    |                                 |

| <b>Malheur NF Bryophytes by Site</b>    |                        |                            |
|---|------------------------|----------------------------|
| <b>Taxon</b>                            | <b>Location</b>        | <b>Other Included Taxa</b> |
| Tortula ruralis                         | Camp Ck                |                            |
| Racomitrium                             | Camp Ck                |                            |
| Pteigynandrum filiforme                 | Camp Ck                |                            |
| Homalothecium nevadense                 | Camp Ck                |                            |
| Orthotrichum speciosum                  | Mosquito Ck            |                            |
| Ceratodon purpureus                     | Mosquito Ck            |                            |
| Grimmia pulvinata                       | Mosquito Ck            |                            |
| Grimmia pulvinata                       | Mosquito Ck            |                            |
| Rhytidiadelphus triquetrus              | Mosquito Ck            |                            |
| Orthotrichum affine                     | Mosquito Ck            |                            |
| Bryum weigelii                          | Swamp Gulch<br>Mdw     | RHMA, CHPO                 |
| Atrichum selwynii                       | Swamp Gulch<br>Mdw     | LEPY                       |
| Leptobryum pyriforme                    | Swamp Gulch<br>Mdw     |                            |
| Rhizomnium magnifolium                  | Swamp Gulch<br>Mdw     |                            |
| Drepanocladus aduncus                   | Swamp Gulch<br>Mdw     |                            |
| Scleropodium obtusifolium               | Swamp Gulch Ck         |                            |
| Eurhynchium praelongum var.<br>stokesii | Swamp Gulch Ck         |                            |
| Brachythecium                           | Swamp Gulch Ck         |                            |
| Timmia austriaca                        | Swamp Gulch Ck         |                            |
| Scleropodium obtusifolium               | Swamp Gulch Ck         | CHPO                       |
| Plagiomnium medium                      | Swamp Gulch Ck         |                            |
| Scouleria aquatica                      | Swamp Gulch Ck         |                            |
| Brachythecium rivulare                  | E Fk Big Ck Wetl       |                            |
| Plagiomnium medium                      | E Fk Big Ck Wetl       | MAPO                       |
| Meesia triquetra                        | E Fk Big Ck Wetl       |                            |
| Drepano-Hamato                          | E Fk Big Ck Wetl       | METR                       |
| Drepanocladus aduncus                   | E Fk Big Ck Wetl       |                            |
| Drepano-Hamato                          | E Fk Big Ck Wetl       | METR                       |
| Philonotis fontana                      | E Fk Big Ck Wetl       | BRPS                       |
| Drepanocladus                           | E Fk Big Ck Wetl       |                            |
| Tomentypnum nitens                      | E Fk Big Ck Wetl       |                            |
| Drepanocladus aduncus                   | E Fk Big Ck Wetl       |                            |
| Drepanocladus                           | E Fk Big Ck Wetl       |                            |
| Meesia triquetra                        | E Fk Big Ck Wetl       |                            |
| Drepanocladus                           | E Fk Big Ck Wetl       |                            |
| Hamatocaulis vernicosus                 | E Fk Big Ck Wetl       |                            |
| Helodium blandowii                      | E Fk Big Ck Wetl       |                            |
| Helodium blandowii                      | E Fk Big Ck Wetl       |                            |
| Bryum weigelii                          | E Fk Big Ck Wetl<br>S. | MAPO                       |
| Bryum                                   | 2055 Rd Mdw            |                            |
| Brachythecium frigidum                  | 2055 Rd Mdw            |                            |

| <b>Malheur NF Bryophytes by Site</b> |                    |                            |
|--------------------------------------|--------------------|----------------------------|
| <b>Taxon</b>                         | <b>Location</b>    | <b>Other Included Taxa</b> |
| Drepanocladus aduncus                | 2055 Rd Wetl       |                            |
| Drepanocladus sendtneri              | 2055 Rd Wetl       |                            |
| Drepanocladus aduncus                | 2055 Rd Wetl       |                            |
| Drepanocladus sendtneri              | 2055 Rd Wetl       |                            |
| Drepanocladus sendtneri              | 2055 Rd Wetl       | DRAD                       |
| Plagiomnium rugicum                  | 2055 Rd Wetl       |                            |
| Drepanocladus aduncus                | 2055 Rd Wetl       |                            |
| Drepanocladus aduncus                | 2055 Rd Wetl       |                            |
| Plagiomnium                          | 2055 Rd Wetl       |                            |
| Bryum pseudotriquetrum               | 2055 Rd Wetl       |                            |
| Bryum                                | 2055 Rd Wetl       |                            |
| Eurhynchium                          | Cedar Grove        |                            |
| Brachythecium frigidum               | Cedar Grove        |                            |
| Funaria hygrometrica                 | Cedar Grove        | BR(CR)                     |
| Jungermannia leiantha                | Cedar Grove        | BRFR                       |
| Blepharostoma trichophyllum          | Cedar Grove        | LERE                       |
| Plagiomnium                          | Cedar Grove        |                            |
| Pohlia                               | Cedar Grove        |                            |
| Lophozia ventricosa                  | Cedar Grove        | CELU                       |
| Timmia austriaca                     | Cedar Grove        |                            |
| Timmia austriaca                     | Cedar Grove        |                            |
| Mnium marginatum (M. blytii?)        | Cedar Grove        | CHPO                       |
| Pellia                               | Cedar Grove        |                            |
| Pellia                               | Cedar Grove        |                            |
| Pterigynandrum filiforme             | Cedar Grove        |                            |
| Brachythecium frigidum               | Cedar Grove        |                            |
| Tortula                              | Shake Table<br>RNA |                            |
| Bryum                                | Shake Table<br>RNA |                            |
| Tortula ruralis                      | Shake Table<br>RNA |                            |
| Orthotrichum rupestre                | Murderer's Ck      |                            |
| Plagiomnium rugicum                  | 24/641 Rd Wetl     |                            |
| Drepanocladus aduncus                | 24/641 Rd Wetl     |                            |
| Drepanocladus aduncus                | 24/641 Rd Wetl     |                            |
| Plagiomnium rugicum                  | 24/641 Rd Wetl     |                            |
| Drepanocladus sendtneri              | 24 Rd              |                            |
| Drepanocladus                        | 24/805 Rd Wetl     |                            |
| Rhizomnium                           | 24/805 Rd Wetl     |                            |
| Aulacomnium palustre                 | 24/805 Rd Wetl     |                            |
| Drepanocladus                        | 24/805 Rd Wetl     |                            |
| Plagiomnium rugicum                  | 63/31 Rd Wetl      |                            |
| Drepanocladus aduncus                | 63/31 Rd Wetl      |                            |
| Drepanocladus aduncus                | 31 Rd Wetl         |                            |
| Drepanocladus aduncus                | 31 Rd Wetl         |                            |
| Drepanocladus                        | 3770/610 Rd        |                            |

| <b>Malheur NF Bryophytes by Site</b> |                 |                            |
|--------------------------------------|-----------------|----------------------------|
| <b>Taxon</b>                         | <b>Location</b> | <b>Other Included Taxa</b> |
|                                      | Wetl            |                            |
| Bryum pseudotriquetrum               | 31/3770 Mdw     |                            |
| Drepanocladus aduncus                | 31/723 Rd Wetl  |                            |
| Plagiomnium                          | 31/723/Rd Wetl  |                            |
| Drepanocladus                        | Myrtle Ck Mdw   |                            |
| Tomentypnum nitens                   | 37/3760 Rd Wetl | BRPS                       |
| Plagiomnium rugicum                  | 37/3760 Rd Wetl | TONI, AUPA, BRPS           |
| Tomentypnum nitens                   | 37/3760 Rd Wetl |                            |
| Pohlia nutans                        | 37/3760 Rd Wetl | CELU, LOVE                 |
| Cephalozia lunulifolia               | 37/3760 Rd Wetl | PONU, AUPA, LOPHO, CEPHA   |
| Lophozia ascendens                   | 37/3760 Rd Wetl | CHPO                       |
| Lophozia ascendens                   | 37/3760 Rd Wetl |                            |
| Leptobryum pyriforme                 | 37/3760 Rd Wetl |                            |
| Drepanocladus                        | 37/3760 Rd Wetl |                            |
| Helodium blandowii                   | 37/3760 Rd Wetl |                            |
| Helodium blandowii                   | 37/3760 Rd Wetl |                            |
| Drepanocladus aduncus                | 37/3760 Rd Wetl |                            |
| Plagiomnium rugicum                  | 37/3760 Rd Wetl | BRPS                       |
| Brachythecium                        | 37/3760 Rd Wetl |                            |
| Drepanocladus aduncus                | 37/3760 Rd Wetl |                            |
| Drepanocladus                        | 37/3760 Rd Wetl |                            |
| Drepanocladus aduncus                | 37/3760 Rd Wetl |                            |
| Helodium blandowii                   | Soup Spring     | BRPS, AUPA, PLRU, DREPA    |
| Drepanocladus aduncus                | Soup Spring     |                            |
| Drepanocladus aduncus                | Soup Spring     |                            |
| Plagiomnium rugicum                  | Soup Spring     |                            |
| Eurhynchium praelongum var. stokesii | Gribble Spring  | BRFR                       |
| Chiloscyphus polyanthos              | Gribble Spring  |                            |
| Drepanocladus aduncus                | Gribble Spring  | PHFO, BRPS                 |
| Drepanocladus sendtneri              | Gribble Spring  |                            |
| Aulacomnium palustre                 | Lowe Mill Mdw   | PHFO, BRPS, DREPA          |
| Drepanocladus                        | Cabin Mdw       | PHFO                       |
| Philonotis fontana                   | Haystack Mdw    | BRACH                      |
| Bryum pseudotriquetrum               | Logan Valley    | AUPA, BRACH, DREPA, PLAGI  |
| Brachythecium                        | Logan Valley    |                            |
| Plagiomnium                          | Logan Valley    |                            |
| Rhizomnium                           | Logan Valley    |                            |
| Drepanocladus                        | Logan Valley    |                            |
| Bryum pseudotriquetrum               | Logan Valley    |                            |
| Drepanocladus aduncus                | Logan Valley    |                            |
| Drepanocladus aduncus                | Logan Valley    |                            |
| Drepanocladus uncinatus              | Bosonberg Ck    |                            |
| Brachythecium frigidum               | Bosonberg Ck    |                            |
| Drepanocladus                        | Bosonberg Ck    |                            |
| Bryum                                | Bosonberg Ck    |                            |

| <b>Codes, Appendix B</b>   | <b>Taxon</b> |
|----------------------------|--------------|
| Aulacomnium palustre       | AUPA         |
| Bryum ~creberrimum         | BR(CR)       |
| Brachythecium              | BRACH        |
| Brachythecium frigidum     | BRFR         |
| Bryum pseudotriquetrum     | BRPS         |
| Bryum weigelii             | BRWE         |
| Calypogeia fissa           | CAFI         |
| Cephalozia lunulifolia     | CELU         |
| Cephaloziella              | CEPHA        |
| Chiloscyphus polyanthos    | CHPO         |
| Drepanocladus aduncus      | DRAD         |
| Drepanocladus              | DREPA        |
| Hypnum pratense            | HYPR         |
| Leptobryum pyriforme       | LEPY         |
| Lepidozia reptans          | LERE         |
| Lophozia ascendens         | LOAS         |
| Lophozia                   | LOPHO        |
| Lophozia ventricosa        | LOVE         |
| Marchantia polymorpha      | MAPO         |
| Meesia triquetra           | METR         |
| Meesia uliginosa           | MEUL         |
| Philonotis fontana         | PHFO         |
| Plagiomnium                | PLAGI        |
| Plagiomnium medium/insigne | PLME/IN      |
| Plagiomnium rugicum        | PLRU         |
| Pohlia nutans              | PONU         |
| Rhizomnium magnifolium     | RHMA         |
| Riccardia latifrons        | RILA         |
| Tomentypnum nitens         | TONI         |

## Appendix C

| <b>Malheur NF Lichens</b>                |
|--|
| <i>Alectoria imshaugii</i>               |
| <i>Alectoria sarmentosa</i>              |
| <i>Bryoria fremontii</i>                 |
| <i>Bryoria glabra</i>                    |
| <i>Bryoria lanestris</i>                 |
| <i>Cetraria chlorophylla</i>             |
| <i>Cetraria platyphylla</i>              |
| <i>Cladonia carneola</i>                 |
| <i>Cladonia cf. chlorophaea</i>          |
| <i>Dermatocarpon meiophyllizum</i>       |
| <i>Evernia prunastri</i>                 |
| <i>Hypogymnia imshaugii</i>              |
| <i>Hypogymnia occidentalis</i>           |
| <i>Karnefeltia merrillii</i>             |
| <i>Leptogium sp. (lichenoides group)</i> |
| <i>Letharia columbiana</i>               |
| <i>Letharia vulpina</i>                  |
| <i>Melanelia elegantula</i>              |
| <i>Melanelia multispora</i>              |
| <i>Nodobryoria abbreviata</i>            |
| <i>Parmelia sulcata</i>                  |
| <i>Parmeliopsis ambigua</i>              |
| <i>Parmeliopsis hyperoptera</i>          |
| <i>Peltigera praetextata</i>             |
| <i>Peltigera rufescens</i>               |
| <i>Platismatia glauca</i>                |
| <i>Umbilicaria hyperoptera</i>           |
| <i>Umbilicaria phaea</i>                 |
| <i>Umbilicaria torrefacta</i>            |
| <i>Usnea lapponica</i>                   |
| <i>Vulpicida canadensis</i>              |

## Appendix D

| <b>Malheur NF Lichens by Site</b>                   |                      |
|---|----------------------|
| <b>Taxon</b>  | <b>Site</b>          |
| <i>Dermatocarpon cf. meiophyllizum</i>              | S Fork Long Ck       |
| <i>Dermatocarpon meiophyllizum</i>                  | S Fork Long Ck       |
| <i>Letharia columbiana</i>                          | S Fork Long Ck       |
| <i>Peltigera praetextata</i>                        | 3945 Rd              |
| <i>Cetraria platyphylla</i>                         | 3945 Rd              |
| <i>Hypogymnia imshaugii</i>                         | 3945 Rd              |
| <i>Bryoria fremontii</i>                            | 3945 Rd              |
| <i>Alectoria sarmentosa</i>                         | 3945 Rd              |
| <i>Alectoria imshaugii</i>                          | 3945 Rd              |
| <i>Parmeliopsis hyperoptera</i>                     | 3945 Rd              |
| <i>Parmeliopsis ambigua</i>                         | 3945 Rd              |
| <i>Cetraria platyphylla</i>                         | Twin Springs         |
| <i>Bryoria fremontii</i>                            | Twin Springs         |
| <i>Vulpicida canadensis</i>                         | Camp Ck              |
| <i>Melanelia multispora</i>                         | Camp Ck              |
| <i>Usnea lapponica</i>                              | Camp Ck              |
| <i>Cladonia cf. chlorophaea</i>                     | Camp Ck              |
| <i>Evernia prunastri</i>                            | Mosquito Ck          |
| <i>Parmelia sulcata</i>                             | Mosquito Ck          |
| <i>Bryoria fremontii</i>                            | 4560 Rd              |
| <i>Hypogymnia occidentalis</i>                      | Swamp Gulch Ck       |
| <i>Bryoria lanestris</i>                            | Cow Camp Mdws        |
| <i>Letharia vulpina</i>                             | Cow Camp Mdws        |
| <i>Karnefeltia merrillii</i>                        | Cow Camp Mdws        |
| <i>Alectoria imshaugii</i>                          | Cedar Grove Bot Area |
| <i>Bryoria fremontii</i>                            | Cedar Grove Bot Area |
| <i>Leptogium sp. (lichenoides group)</i>            | Shake Table RNA      |
| <i>Leptogium sp. (pulvinatum/lichenoides group)</i> | Shake Table RNA      |
| <i>Umbilicaria phaea</i>                            | Shake Table RNA      |
| <i>Umbilicaria torrefacta</i>                       | Shake Table RNA      |
| <i>Umbilicaria hyperoptera</i>                      | Shake Table RNA      |
| <i>Peltigera rufescens</i>                          | Shake Table RNA      |
| <i>Parmelia sulcata</i>                             | Murderer's Ck        |
| <i>Nodobryoria abbreviata</i>                       | Pine Spring          |
| <i>Bryoria fremontii</i>                            | Soup Spring          |
| <i>Bryoria glabra</i>                               | Gribble Spring       |
| <i>Nodobryoria abbreviata</i>                       | Gribble Spring       |
| <i>Bryoria fremontii</i>                            | Gribble Spring       |
| <i>Letharia vulpina</i>                             | Gribble Spring       |
| <i>Parmelia sulcata</i>                             | Gribble Spring       |
| <i>Platismatia glauca</i>                           | Gribble Spring       |
| <i>Cetraria chlorophylla</i>                        | Gribble Spring       |
| <i>Melanelia elegantula</i>                         | Gribble Spring       |
| <i>Parmeliopsis ambigua</i>                         | Gribble Spring       |

| <b>Malheur NF Lichens by Site</b> |               |
|-----------------------------------|---------------|
| <b>Taxon</b>                      | <b>Site</b>   |
| <i>Parmeliopsis hyperoptera</i>   | Gibble Spring |
| <i>Cetraria chlorophylla</i>      | Gibble Spring |
| <i>Hypogymnia occidentalis</i>    | Gibble Spring |
| <i>Cladonia carneola</i>          | Call Mdw      |
| <i>Karnefeltia merrillii</i>      | Bosenberg Ck  |

## Appendix E

### Field Notes Malheur Bryophyte/Lichen Inventory, August-September, 2008

Note: Based on subsequent microscopic examinations, mosses referred to in these notes as "red-stemmed *Pohlia*" appear actually to be the moss *Bryum pseudotriquetrum*.

**Keeney and Clark Meadows** - 8/25/2008. Entry from south side off 3947 road. Moist-dry grassy meadows. At DP1477, mostly *Alopecurus* with 3+ feet deep incised channel. *Juncus balticus* in patches, but even its soil now dry. DP 1477 - looking west from approx. southern interface of Keeney and Clark Meadows. No bryos amidst grasses or on dry rocks in channel. Not pretty, but on channel walls and in meadow proper there is some red-stemmed *Pohlia*, *Bryum pseudotriquetrum* and *Philonotis*. Lots of cows and cow effects out here. *Achillea*, *Madia*, *Potentilla*, *Lupinus*. At forest edge and deeper is *Ribes*, PICO, *Antennaria*, *Fragaria*, *Vaccinium scoparium*, ABCO, PSME, *Linnaea*, *Chimaphilla*, *Polytrichum juniperinum*, LAOC, *Rosa* and *Prunus*.

**Flood Meadow** - 8/25/2008. Moist grassy meadow except at upper SE corner where springs/seeps create small but active creek flowing NNE. Wetland about 4 acres? At least one mounded flark (spring well) with depth > 5 feet. Heavily grazed; nothing much above 6-12" with tops intact. PICO and LAOC at edge, PICO within. *Saxifraga oregana*, *Hypericum anagalloides*, broad-bladed *Carex*, ball-headed *Carex*, *Eleocharis quinqueflora*, *Juncus ensifolius*, *Polemonium*, *Mimulus (guttulata?)*, *Carex utriculata (C. vesicaria?)*, *Carex aquatilis*, *Phelum*, *Pedicularis*, *Equisetum arvense*. DP 1478 - SSW across peatland from flark. Bryo-rich seepage area (includes ***Meesia uliginosa***) at wetland-PICO interface at UTM (NAD 27) 346182, 4941942. GPS where Long Creek crosses 3945 = 346090, 4942578.

**S. Fork Long Creek/3945 wetland** - 8/26/2008. Wetland is primarily NE of creek/road intersect. DP 1479 - NW from 3945 road across seep area along (giving rise to perennial portion of) S. Fork Long Creek. Biomass in seep area perhaps mostly *Drepanocladus* followed by close-cropped *Carex*. Perhaps 1/2 dozen low forb species. Peat penetrated (with thin fiberglass rod) to depth of 36" before stopped by density-based resistance. *Juncus balticus* + *Philonotis* near creek itself. *Fontinalis* on rocks in creek near fence. DP 1480 - N down creek, immediately N of E-W fence. Rock in creek with *Dermatocarpon*. Creek has small amount aquatic *Ranunculus*, but no duckweed. Most biomass in creek is *Fontinalis*. High seasonal flow in creek evident by 1) large bare rocks in dry channels and 2) debris caught on barbed wire E-W fence 18" above channel bottom. Walked north to 342892, 4941918. Much *Bryum weigelii* at terrace/upland interface here, and *Dermatocarpon* still on rocks in creek (up to 18" above current water level. Creek seems to continually gather water from local seeps/high water table. Lots of *Marchantia* along portion of creek walked. Evident that wetland at NE corner of creek

and 3945 once fenced, but fencing now in complete disrepair. GPS where S. Fork Long Creek crosses 3945 = 343090, 4941406.

**3945 Seep** - 8/26/2008. Located just west (about 1/3 mile?) on 3945 from S. Fork Long Creek. Wetness crosses road, but primary source is on upland side of road. Very high density of cattle hoof impact and poop. *Carex*, *Juncus balticus*, *Alopecurus*, *Drepanocladus*, *Philonotis*, red-stemmed *Pohlia*. On uphill side of road, peat underlain by rock at only 6-8". GPS = 342595, 4941217. Patches of *Ventenata* along the 3945 road between here and NW edge of Keeney Meadow.

**Harper Meadow** - 8/26/2008. Accessed from east by 484 road. E upper end appears to be wettest. Main body of meadow at this end is tall sedges (or would be tall if not grazed down), including *C. utriculata*. Bryophyte cover not easily found. *Bryum weigelii* at edge. Peat depth = 36" in area of CAUT. SE corner meadow lined with PIEN, is shady and has some amazing bryo community, both mosses and leafy liverworts. PIEN has died and fallen out into wetland and provides great substrate; peat depth here = 46"; GPS = 347126, 4940406. DP 1481 - SE across meadow to SE corner with sappy, PIEN-shaded amazing bryo community.

**Twin Springs above Pepper Creek** - 8/26/2008. GPS = 350730, 4945180. Road seems to be pretty much built over springs headwater; culvert delivering low volume dribble on downhill side. Clumps of *Riccardia* on earthen wall in falling dribble. Stock pond covered in duckweed (*Lemna*) catches flow from culvert. Some very tall *Juncus*-like + *Typha*-like plants with blades up to 8' tall. Slow trickle out of pond and down channel for about 200 m, then dry. *Ventenata* patches in non-forested, scabby area east of creek and above 151 road. Meadow at jct. 565/151 roads is dry, grassy, with *Phleum*, *Dactylis* and *Agropyron*. Area with mix of PIPO, ABGR, JUOC and LAOC.

**Camp Creek at jct. 3600/3660** - 8/27/2008. Nice rocks but no *Dermatocarpon*. *Philonotis* and lots of sexual *Marchantia* at water edge. PIPO, *Alnus*, *Ribes cereum*, *Cornus*, *Symphoricarpos*. Collected *Melanelia*, *Usnea* and *Vulpicida* on cottonwood. Shortly north down 3600 road collected several mosses from very large (30' tall) free-standing rock outcrop between 3600 and road. Lots of the *Lescurea* look-alike *Pterigynandrum filiforme* here. Teasel (*Dipsacus*) scattered along 36 road all the way down to Middle Fork John Day. Meadow W of 36 just before 20 road is moist, tall graminoid dominated; didn't bother getting out of vehicle.

**893 Road along Mosquito Creek** - 8/27/2008. Just up from 20 road. Collected off S-aspect road-cut rock face, then down along creek, where *Evernia*, *Parmelia* and *Rhytidiadelphus triquetrus* vouchered. Much *Cornus*, *Acer glabrum*, *Rosa*, ABGR, PSME and *Symphoricarpos*. Very thick cover of weedy, palmate-leaved *Potentilla* (*recta*?) all along 893 road + some *Dipsacus*.

**Swamp Gulch Meadow** - 8/27/2008. Forested entry from S corner very botanically rich. PIEN, LAOC, ABCO, *Alnus*, *Symphoricarpos*, *Vaccinium*, *Ribes* (prickly), *Linnaea*, *Clintonia*, *Pyrola secunda*, fern *Athyrium* (?), *Equisetum arvense*, *Trientalis* (?), orchid

(in fruit). Sippy zone begins while still in woods; peat with several inorganic strata, >52" (as deep as fiberglass rod can reach). S entry has central wet zone with at least one small creek; this is where *Alnus*, *PIEN*, *Scirpus* is abundant. Slightly upslope is *ABGR*, *Rosa*, *Vaccinium*, *Chimaphilla*, *Rubus* (thimbleberry), *Vaccinium scoparium*, *Linnaea*, *Clintonia*. Much very rotten wood. *Pedicularis* at edge. Main body meadow at S end dominated by tall, broad-bladed grass with broad-leaved *Carex* under this; *Hypericum anagalloides*, *Polemonium*, *Mimulus guttatus*, *Rhizomnium*, *Philonotis*, *Marchantia* and red-stemmed *Pohlia*. Peat depth > 52". Main meadow is moist, dominated by tall grasses (*Calamagrostis?*, *Poa pratense*, *Phleum*) and *Juncus balticus*; mosses beneath = dried red-stemmed *Pohlia*, *Drepanocladus*, *Rhizomnium*. Palmate-leaved *Potentilla* common as is *Arnica*-like (tall, opposite-leaved, in fruit) plant. Very odd observation: patches of *Veratrum* fairly common with most seeming to have never flowered, mostly now silver-stemmed with dark, withered leaves. Almost all appears to have been trampled, along with intermixed graminoids - as though selectively trampled or perhaps bedded upon. DP 1482 - SSE from N end of meadow. *Alnus* and *PIEN* along E and W edges. *Alnus* area at S end meadow with botanically diverse forested area behind that, visible. Other main body meadow plants include *Galium*, *Solidago*, *Achillea*, and smelly mint. N end of main meadow with 6" penetration. Much of main meadow with diverse herb cover over more or less bare, dark soil. Channel in N-central portion main meadow with headcut 18" deep.

**Swamp Gulch Creek** - 8/27/2008. Adjacent to 4560 road. Highly shaded by *PIEN*, *Alnus*. Lots of rocks, mostly with *Scleropodium* above road, and *Scleropodium* and *Scouleria* below road. Some interesting mosses on rotten wood collected. *Eurhynchium* on gravel, *Chiloscyphus* and *Scapania* on rocks but too little of it to collect.

**740 road basin meadow** - 8/27/2008. North a bit of 740 road, entered on foot from S side; seems to be basin with drainage out. Lowest points with little vegetation and cracking, gleyed soil. Very interesting, often non-recognizable flora featuring very tall, septate-stemmed rushes with inflorescence an apical cylinder about same diameter as stem. Little moss presence but a *Brachythecium*-like moss here and there. Believe I saw wild turkeys at meadow/woods interface on NW side meadow. DP 1483 - NW across meadow from SE corner.

**Wetland N of 2090/048 jct.** - 8/27/2008. Apparently groundwater -fed. Very wet on southern end, where *Scirpus*-dominated. Central portion basically a shallow pond with tall rushes. N end mostly bare, cracking soil. Where ground cover exists under *Scirpus*, seems mostly to be *Hypericum anagalloides* and *Plagiomnium*, DP 1484 - N across wetland from near 048 road.

**E. Fork Big Creek wetland (north)**- 8/28/2008. Access off upper 519 road. Edge - *PIEN*-*PICO*. S end = *Scirpus*, orchid, *Polemonium*, *Trifolium*, *Galium*, *Aster*, *Saxifraga oregana*, *Equisetum arvense*. Peat depth = 42"+ (stopped due to resistance and sore hands). Woods at S end have *Linnaea*, *Clintonia*, *Pyrola secunda*, *Trientalis* (?), *Rosa*, *Vaccinium*, *Chimaphilla*, *Vaccinium scoparium*. Spring channel originating in SE corner wetland flows W around S end of wetland and then NW. Spring origin at 359358,

4961199. *Aulacomnium palustre*, *Brachythecium* (*velutinum?*), *Marchantia*, *Plagiomnium*, and small *Bryum*/*Pohlia* clumps at forest/wetland interface at S end. Wetness within wetland not a simple pattern. Frequency of non-soppy areas at first increases with northern travel N, but still a mosaic of soppy areas toward N end. Even at that, in dry surface areas (but wet if you kneel) peat is 52"+. *Menyanthes*, *Eriophorum*, and *Tomentypnum nitens* (TONI) first seen as entered N-most 1/3 of wetland. DP 1486 - TONI site looking S. DP 1486 - TINO site looking N. In each of these photos, silver tape of rod handle is just visible in center of field. DP 1487 - *Eriophorum* immediately SE of TONI. S 2/3s of wetland is almost totally *Meesia triquetra* with small amounts *Drepanocladus* intermixed or rarely, in its own little pockets. *Meesia* cover probably 50%+ in S 2/3s. Evidence of deer/elk but none of cows. TONI cover very limited at this site - 3 small patches within 1-2' of one another. Each patch about 6x6" and not solid at that. TONI GPS = 359304, 4961284. N 1/3 of wetland with 6" standing water; too wet for bryos and only a little *Meesia* seen (hard to see due to density and height of a near monoculture of *Carex* which is not with flowers or fruits). At far N end, still soppy, but some PIEN and *Alnus* occurring. In this area found some nice patches of *Helodium blandowii* (HEBL). GPS of HEBL = 359210, 4961361. HEBL pretty well distributed within 20x20 m area here, but this appears to be its only occurrence on wetland. An interesting observation: still soppy wet, but bryo community seems to be transitional, with *Meesia* inconspicuous and *Drepanocladus*, *Rhizomnium* and *Philonotis* now present among the relatively thick, tall sedge-forb cover. Not always, but these mosses often present in rather thick clumps, as though collectively competing for space/light as a clump that can resist being overrun by the taller vascular plants. Peat depth at HEBL site = 52"+. DP 1488 - close-up of HEBL. In exiting to NE of wetland, found spring apparently feeding into the NE corner of wetland. GPS = 359226, 4961420. This is also a rich HEBL site on soppy soil, at a steeper gradient than the wetland proper, with only 6" penetration by rod. HEBL carpets perhaps 4x4 m area. *Galium*, *Trientalis* (?), *Hypericum anagalloides*, *Equisetum arvense*, *E. hyemale* (?), *Saxifraga oregana*, *Aster*, *Carex* present. Finding HEBL on anything other than a low-gradient, deep, soppy peatland is very unexpected. DP 1489 - NW from above SE corner of wetland; pool formed by SE corner spring is visible in lower left.

**E. Fork Big Creek wetland (south)** - 8/28/2008. Only about 200m south of wetland described above. Smaller, more or less circular, perhaps 50 m in diameter. Walked from NE corner through middle, then along S end and part of E side. Most of wetland with little moss/forb cover beneath a tall, high-density layer of *Scirpus*-*Carex*. S end of wetland with spring water flowing from east to west with much *Marchantia*, *Bryum weigelii*, *Rhizomnium* (*magnifolium?*) and *Drepanocladus*.

**Lost Creek wetland** - 8/28/2008. Access off 519 road. DP 1490 - S across wetland. Low bryo diversity. Central area very wet with mostly soppy wet dark muck under dense array of graminoid stems with *Scirpus* in wettest areas, and mix of tall grasses and sedges. As move outside this central area, transitions to lower statured sedge community with *Juncus ensifolius*, *Deschampsia* (?), *Drepanocladus* and *Marchantia*. At wetland/forest interface, a transitional moss community of *Mniaceae*, *Drepanocladus* and red-stemmed *Pohlia*. DP 1491 - N across wetland. Not much light penetrates this thick

cover of sedges. Actually, both dark and dry under this sedge mass. Found a couple of small (largest = 3x4 m), low-statured communities dominated by *Eleocharis* with ground cover of *Hypericum anagalloides*, *Philonotis* and lesser amount of *Drepanocladus*.

**199 meadow** - 8/28/2008. SE of jct. of 519/199 roads. Only walked in northern - apparently dampest - part of meadow. Numerous small, shallow channels (damp, but no free water) make their way downslope under cover of grasses and *Juncus balticus* and *J. ensifolius*. Only moss evident is *Drepanocladus* on damp soil. Looking S, downslope, seems evident from extent of hay-color, that bit of groundwater dampness up at northern end doesn't extend further down into meadow. Some old and newer cow poop, but otherwise not much sign. Interesting that in this upper, groundwater damp area, grasses have been selectively grazed to < 1" tall, while the abundant *J. balticus* and *J. ensifolius* is untouched. Fruiting stems of these 2 species create a brown color to local vegetation. Just empty glumes now, but appears that *Ventenata* is abundant at meadow/forest interface at this NW corner. DP 1492 - SSE down across meadow. Brownish vegetation in foreground is *J. balticus* and *J. ensifolius*. Evident that this groundwater source is more productive in volume earlier in season.

**Little Boulder Creek wetland** - 8/29/2008. Accessed by hiking about 1 mile north of Cow Camp Meadows, off 2055 road. Meadow at head of creek that drains down to Cow Camp Meadows is mostly dry earth with cow-trampled *Veratrum*, *Aster*, *Achillea* and other forbs and grasses, too grazed to identify. Fresh cow poop. There are 2 spring channels on W side of meadow with low volume flow. Along these channels are *Alnus*, *Mimulus guttata*, *Trifolium*, *Equisetum arvense*, *J. balticus*, *C. (utriculata?)*, 2 other *Carex* spp., red-stemmed *Pohlia*, *Philonotis*, *Marchantia*, *Brachythecium* (*Scleropodium?*), *Drepanocladus*, *Plagiomnium*, *Aulacomnium palustre*. Spring channels emerge from PIEN-ABGR/*Alnus* woods where *Aulacomnium palustre* occurs on forest floor, well away from channels. Also here is *Vaccinium scoparium*, *Chimaphilla*, *Linnaea* and *Osmorhiza* (it's been everywhere this week). A short distance west of this meadow is the wetland, which appears to be a somewhat distant tributary to Little Boulder Creek. Wet/damp PIEN woods on eastern edge of wetland has very extensive bryo cover. *Aulacomnium palustre* is on mounds around bases of small PIEN and PICO. *Drepanocladus* (huge, orange - later determined to be *D. sendtneri*) is in thick patches in depressions. *Pedicularis* present along with erect *Plagiomnium* and red-stemmed *Pohlia*. GPS at this eastern edge of wetland = 375420, 4947665. PIEN-PICO woods around E and S edges of wetland are potentially botanically lush, with thick moss cover, *Pedicularis*, *Castilleja*, *Lilium* with knee-high fruits, *Delphinium* (?) in fruit, orchid, *Veratrum*, *Parnissa*. However, this area is intensely used by cattle, with much trampling of vegetation, post-holing and manure. Active spring channel runs through W side of wetland. DP 1494 - SSE across wetland from forest edge on NW side. Spring channel that runs through W side wetland is immediately behind camera. Wetland is interesting. Sappy wet throughout with rich mix for forbs and graminoids. Moss cover is very high (80%), with much *Drepanocladus* which grows so densely that it barely can branch (tight, upright stems). Next most abundant moss is *Plagiomnium* with the habit of *Rhizomnium*. *Marchantia*, red-stemmed *Pohlia* and *Aulacomnium palustre* are discontinuously present. *Meesia triquetra*, TONI and HEBL not seen. Two vascular plant "indicators" of rich fens,

Eriophorum and Menyanthes, not detected. Maximum penetration by rod is about 40" (stopped due to density-related resistance). Pedicularis, Eleocharis, Juncus ensifolius and J. balticus are major components of cover across wetland.

**Cedar Grove Botanical Area** - 9/8/2008. Accessed from 2150 road. DP 1495 - Marchantia (females) with Funaria hygrometrica; both still abundant of post-fire mineral soil in burned portion of Grove. Nearby Galium, Clintonia (in fruit), Vaccinium, Linnaea, Osmothiza, Epilobium angustifolium, Bryoria, Hypogymnia imshaugii, Letharia, Nodobryoria, Cetraria, Alectoria, Epilobium #2, Lactuca serriola, Achillea, Ribes (prickly), Cirsium vulgare. Active gurgling spring flowing perhaps the length of Grove (only walked about in the upper 1/2). So much bark strips fallen from trunks of fire-killed cedars forest floor resembles floor of Eucalyptus grove. Spring channel is "greenist" portion of Grove: regenerating cedar, Athyrium, Saxifrage, Streptopus, Vaccinium (big leaves), Rubus parviflorum, Montia. Fire pretty much burned though portion of Grove visited; old duff seems entirely gone with mineral soil exposed. Some cedar surviving + a surprising amount of ABCO. Funaria carpets everywhere with Marchantia where soil currently damp/moist. Other bryos pretty much only along spring channel. Lichens mostly available as litter fall.

**Shake Table RNA** - 9/28/2008. Accessed from SE off 2490 road and crossing Murderers Creek on foot. Walked about only in eastern 1/3 of RNA. DP 1496 - WNW from SE corner of RNA; much of the senescent grasses up here are the annual invasives Ventenata dubia, Bromus japonicus, B. brizaeformis and Festuca bromoides. Also conspicuous is JUOC, Artemisia, Purshia, Eriogonum and Allium. DP 1497 - NNW with Larch Mtn. in background. Grasses in view probably 50% Ventenata. Taeniatherum caput-medusae at 309544, 4903608; a 5x5 m patch. Lots of Umbilicaria on rocks and Leptogium and Tortula on soil. No sign of Texasporium.

**24/641 wetland** - 9/8/2008. Immediately S of 24/641 wetland. Juncus balticus, robust Carex (not utriculata), Polemonium, Aster and Salix. Sippy wet with standing water in places, Carex and Juncus is thick, somewhat less than knee-high. Bryos not always evident unless in large clumps. Bryos = Drepanocladus, Plagiomnium, red-stemmed Pohlia, Rhizomnium. GPS = 317352, 4897223. Looks like possibly 3 species of Salix here. No discernable creek channels. Map indicates this is where creek converts from intermittent to perennial. In driving to this site, crossed S. Fork Deer Creek. At roadside, channel with dense cushions Brachythecium frigidum, Marchantia and short-stemmed Bryum. DP 1498 - S across 24/641 wetland.

**Deer Creek channel** - 9/9/2008. About 1/2 mile E on 24 road from 641 road. At intermittent eastern portion of creek; no well-defined channel at this point. DP 1499 - E across depressed area with carpet of Drepanocladus and whorled-leaved vascular herb. Carpet looks like it should overlay peat but does not; this and rest of this riparian system has dark but largely inorganic, dense soil.

**24/805 wetland** - 9/9/2008. N side 805 - Carex, Juncus, grasses, all with mean height of about 10"; peat depth 52"+ in prime locations with Drepanocladus and Rhizomnium

abundant. GPS = 321498, 4896791. DP 1500 - SE across 24/805 wetland (north). Rod is in sippy area with 52"+ penetration. Wetland/meadow on S side 805 is drier but also with Salix, Carex and Juncus; mosses, however, are inconspicuous; 6" penetration due to density-related resistance. Much post-holing by cattle. PICO is dominant adjacent conifer.

**31/63 wetland** - 9/9/2008. NW of 31/63 jct. 2-3 acres of Juncus, Carex, Salix, Betula. Aulacomnium on mounds associated with Betula and Salix. Lots of Drepanocladus away from mounds. Some Rhizomnium, red-stemmed Pohlia. Peat 52"+. GPS 321294, 4892802. DP 1501 - NW across wettest portion of wetland. Much moss biomass and post-holing by cattle at this site. Adjacent vegetation with PICO and Artemisia.

**North 31 wetland** - 9-9-2008. On W side 31 road, < 2 miles S of 31/63 jct. Very wet. No evidence of cows. Carex uticulata but not Juncus seen. Salix, Saxafraga oregana, lots of Drepanocladus, Rhizomnium, Aulacomnium palustre, Philonotis, red-stemmed Pohlia, Marchantia. Surprising: hydrology and peat suggests that this should be a rich fen, but few moss or vascular indicator species present. Juncus balticus in drier conditions near edge. Alnus grove to south essentially without bryos. DP 1502 - W across wetland. GPS = 321440, 4889939.

**Pine Spring meadow** - 9/9/2008. Accessed off the 3170 road. Is apparently a dry meadow system, with bone-dry, cracked soil and very closely cropped vegetation (mean height about 2"). No groundwater except very near 3170/640 jct.

**3770/610 wetland** - 9/9/2008. Clearly quite wet earlier in season, but hard to find obvious dampness or any green bryos at this time. Lower (southern) part dry at surface and rod penetrates only about 6". Upper end with large, mostly dead Salix has greatest current moisture. Some green Drepanocladus, Philonotis and red-stemmed Pohlia. Resistant first 6", but then rod sinks to 52"+, Aulacomnium palustre present about raised areas at Salix bases. DP 1503 - SW across upper (northern) dampest portion of wetland. In this area, dominant vascular plant appears to be a smallish version of Juncus balticus. Lots of Salix present but browsed down and not easily seen. Some Betula present, but hard to see for same reason. Cow manure present but not fresh. Related note: 1) Didn't walk out onto it, but Wymer Meadow seems to have mostly seasonal moisture (except for Camp Creek running through it) and a weak groundwater supply. 2) Checked a short, rocky section of Camp Creek above Wymer Meadow. Smooth, gray rocks with lots of Nostoc discs, but no Dermatocarpon.

**31/3770 meadow** - 9/9/2008. Meadow about 1/4 mile SW of jct. Currently very dry. Soil would be very dark brown if damp, but no peat here. Vegetation grazed to about 2" high. A single moss species (Pohlia) carpeting soil under a nearly non-existent herbaceous cover. Carex seems to be present but so short it's hard to recognize. Also, Potentilla and some small composites.

**31/723 wetland, north** - 9/9/2008. Adjacent PIPO, PICO and ABCO. Carex utriculata, Juncus ensifolius, Polemonium, Saxifraga oregana, Epilobium,, Aster, Alnus. Soppiness

meanders through length of wetland, flowing SE. Sedges grazed, but little evidence of cows. Drepanocladus, Philonotis, Rhizomnium. Peat depth an easy 52"+. DP 1504 - NW over a sippy portion of wetland. Juncus balticus in less wet areas. GPS = 326378, 4878886.

**31/723 meadow, south.** - 9/10/2008. Very pretty but only wet/damp earlier in season. Some Carex patches but mostly brown Juncus balticus. Soil too firm for rod to penetrate. Clumps of larger, mostly dead Salix on meadow bordered by PIPO, large aspen and some PICO. Hard to find any mosses at all in early morning light. Mean vegetation height 14-16".

**37/3760 meadow/wetland** - 9/10/2008. NW corner with Juncus balticus, browsed Salix, Philonotis. No penetration with rod due to dryness/density of soil. SW end with grove of 6-12' tall Salix. Tomentypnum near meadow/forest interface on W side of wedge of forest protruding N between SW and SE lobes of meadow. TONI begins just N of N extent of Salix grove in SW lobe. S edge of this TONI begins at 329830, 4876100. Along with TONI is heavily browsed Salix (<2' tall), Betula and Juncus balticus. S of TONI, bryo community is largely Drepanocladus, Aulacomnium palustre, Plagiomnium and red-stemmed Pohlia. TONI at this site is amazingly abundant - it is the primary moss cover by far with 80%+ cover. TONI area heavily impacted by cattle, with much post-holing and displacement of TONI clumps that appear to be air drying and dying. Graminoid community generally about 12-16" high, but apparently would be much taller if not grazed. In this taller-statured community, appears that grazing provides more light for mosses, even while causing a large amount direct destruction of TONI individuals. Helodium blandowii abundant at N-most point of forest protrusion between SW and SE lobes of meadow. GPS = 329954, 4876139. Peat at this site with very resistant inorganic strata; rod finally reaches peat base at 36-48". Salix, Betula, PICO, Juncus balticus and TONI along with the HEBL. Moving to SE around protrusion, HEBL stops at 330001, 4876121 (TONI stops a bit sooner). Sippy wetness continues SE for a bit after HEBL drops out. Surface flow of water in shallow, narrow channels only near N end of protrusion. Surface just damp on SW side of protrusion where TONI first seen. Interesting: NE edge of SE lobe has sippy wet meadow-woods interface and W aspect, not very different from NE edge of SW lobe where TONI was first encountered. Aspen line NE edge of SE lobe, but not NE edge of SW lobe. DP 1505 - SW into initial HEBL site, top of rod in middle of view. DP 1506 - NW across prime (locally), sippy HEBL and TONI habitat at N-most portion of point. DP 1507 - S up SE lobe, center of "point" on far right. Dark pattern of Juncus seen in wet area on left. DP 1508 - SW up SW lobe. Center of "point" on far left. Willow grove visible at rear of lobe.

**Myrtle Creek wetland** - 9/10/2008. Wetness is in the main southern lobe. Far S end of lobe seems to lack any sippy areas to surface flow, but is damp and rod penetrates to 44" before stopping due to resistance. Midway along W side of lobe it is sippy with slow-moving water in a few channels. Community is Juncus balticus, Carex, willow, Betula, Saxifraga, Polemonium, orchid. Bryophyte-wise, this seems to be a Philonotis, Plagiomnium, Aulacomnium, Drepanocladus community.

**Soup Spring** - 9/10/2008. Accessed by walking downslope from 3700187 road. DP 1509 - HEBL (with little bit AUPA) mounding at base of *Betula*. Community here mostly *Carex utriculata*, *Betula*, *Equisetum arvense*, *Drepanocladus*, *Philonotis* and *Marchantia*. GPS = 325779, 4872423. Peat at HEBL site = 52"+. DP 1510 - SW up SW arm/lobe. Elevated ground about 50 m distant is the sippy HEBL area, which extends at least 50 m further up arm. Down here at photo point, it's damp, but not sippy and there is no HEBL. *Betula* still here, but *Carex utriculata* largely replaced by *Scirpus*. From N going S (going upslope), S arm is dry, wet, dry, then wet again. Primary moss seems to be *Philonotis*. Upper wet area (S-end of S arm/lobe) with very dense *Juncus balticus* and *Scirpus*. Mosses not readily seen. Scattered *Salix*, *Betula*, *Drepanocladus* and *Aulacomnium palustre*. 20" (loud) headcut just below confluence of channels from S and SW arms. Smaller N arm damp to sippy. Mean vegetation height only about 12". Scattered short willow, diminutive *Juncus balticus*, *Carex* and an unbranched *Equisetum*. Pretty much a *Drepanocladus*, *Aulacomnium palustre* and *Philonotis* show. No cattle here presently, but oceans of cow manure locally distributed with patchwork of very heavily grazed veg. (*Carex* apparently preferable to *Juncus*). Downslope extent of HEBL in SW arm = 325826, 4872439. Actually, this is about 25 m downslope from bench talked about in DP 1510. HEBL seems to stop at about point where SW arm abruptly narrows (325720, 4872409). Shortly into HEBL area of SW arm, channel draining this arm, while only 1-2' wide, is 3.5' deep (classic "E" channel). Looks like should be big concern about headcut below confluence working its way up this channel, altering channel morphology and local hydrology, including that of HEBL site.

**Brad Spring Meadow** - 9/10/2008. Pretty much a dry meadow with cracked earth, except for a couple of small green damp spots.

**Gribble Spring** - 9/11/2008. Good lichen diversity in ABGR woods along creek, below meadow and just above 187 road. DP 1511 - SE down the lower, wet portion of Gribble Spring Meadows. Higher, upper 1/2 is dry but beautiful, ringed by old PIPO. Good fencing in area, but along road (closed with earthen berms at the 187 road) N of meadow, fence gates are down in two places, giving cattle free run. Wet meadow with *Salix*, *Betula*, *Polemonium*, *Saxifraga oregana*, fruiting composite (*Aster*?), *Scirpus*, *Juncus balticus*. Very graminoid (vs. moss) dominated. Looks wet, but most water seems to occur in small channels (collectors flowing SW into main, SE flowing channel on S side of meadow. Peat maximum at 26-28". Mosses conspicuous only along channels. Pretty much just *Drepanocladus*, *Philonotis*, red-stemmed *Pohlia* and *Marchantia*. Surprisingly, no *Aulacomnium palustre* seen. Perhaps because not greatly wet. No mounding of bryos evident at bases of relatively few *Salix* and *Betula*. Major stench of fresh cow manure throughout meadow.

**37/440 wetland** - 9/11/2008. Dampest localities on either side of 37 road are damp-sippy-standing water. Seems to be a simple composition with *Salix*, *Scirpus*, *Carex utriculata*, *Philonotis* and *Drepanocladus*.

**Lowe Mill Site Meadow** - 9/11/2008. Only two more or less green spots in whole system. Checked out the one immediately accessible by 2820-497 road. Very heavily

grazed (about 2" stubble height) and gouged by cattle hooves. *Salix*, *Juncus balticus*, *Carex*. Mosses at willow bases and away. Saw only *Philonotis*, *Drepanocladus*, red-stemmed *Pohlia* and *Aulacomnium palustre* (AUPA at willow bases). Again, sedges appear to be preferred forage relative to rushes. Adjacent veg. = PIPO, *Artemisia*, *Ribes cereum*. Perhaps a bit of groundwater product responsible for the two more or less green patches, but clearly this meadow system is very largely fed by early season surface flow. Any groundwater product appears to be seasonal as well.

**Call Meadow** - 9/11/2008. No damp soil surface seen. Whole system seems to be fed by early season surface flow. Areas looking dampest with Google Earth are dry and brown now. *Potentilla*, *Carex*, *Juncus*, various grass species. *Salix* for most part along channels but some also on terraces. Mosses pretty much just *Aulacomnium palustre* and *Brachythecium*.

**Cabin Meadow** - 9/11/2008. All soil surfaces dry, although some greenish patches/swaths here and there. Any groundwater product is apparently weak and seasonal. System seems to be primarily fed by early season surface flow. Mix of grasses, forbs, *Carex* and *Juncus*. Likely to some mosses present, but none apparent. That said, just located a spring box on west side of meadow. Good rate of flow, but most is captured by box and piped underground to a trough at S end of meadow. Sippy soil in vicinity of spring box with *Drepanocladus*, *Philonotis*, *Juncus ensifolius* and *Carex utriculata*.

**Haystack Meadow** - 9/11/2008. All soil surfaces dry. *Aster* (?) in fruit, *Potentilla*, *Juncus ensifolius*, *Carex*, *Poa pratense*, *Phleum*, *Philonotis*, *Pohlia/Bryum*, *Brachythecium*. Pond, apparently human-made, near center of meadow. Water present, but level well below surface of adjacent meadow. Water source a puzzle. Pond level = current water table of meadow? Bit of channel entering from W, but dry now and not evident that it carries much water earlier in season.

**Logan Valley** - 9/12/2008. Entry from 815 road (to Big Creek Forest Camp), just N of 16 road. Probably a wonderful vibrant sight in spring/early summer, but now dry and brown. Mdw portion largely hard earth with rounded gravels, *Agropyron* (up to chest-high) with assorted forbs (*Achillea*, senescent *Aster*?). Occasional pockets of dense *Juncus balticus* - apparently the wettest sites earlier in the summer; patches of *Philonotis* found here. Much bleached, cut PICO in mdw N of PICO-aspen woods, with an extensive *Artemisia* community N or this. PICO-aspen woods with more soil moisture than adjacent mdw. Areas of damp soil and then areas that are drier. 24" penetration (with much effort) before hitting bottom. Lots of *Carex* and *Ribes*-like shrub in these woods, and lots of young aspen, but everything here is much grazed/browsed, trampled by cattle. Found a *Botrychium* rooted in center of rotten log, with leaves barely poking out through cracks in log! Apparently has some cow-protection in this log. Moss carpets common; seem to be mostly *Aulacomnium palustre*, red-stemmed *Pohlia*, *Plagiomnium/Rhizomnium*, perhaps 2 *Brachythecium* spp., *Drepanocladus*. As leaving these woods on W side, enter damp-sippy area with *Juncus* spp.; *J. nevadensis* (round, septate leaves) probably most common, then *J. balticus*. A very short-statured *Salix*

(about 12") intermixed with *Juncus*. *Salix* with wooly hairs on dorsal leaf surface - is a dead ringer for *Salix wolfii* seen this summer on Williams Prairie on Ochoco NF. GPS = 370142, 4893656. Peat depth = 20". Obvious from soundings that peat in PICO-aspen woods and out here in *Salix* area is peppered with large gravel. Within a square meter area can hit (false) rock bottom at depths ranging from 6-14" (20" may just be a particularly consolidated gravel layer with more peat beneath?). DP 1513 - *Salix wolfii* @ GPS given above. *S. wolfii* seems to be mostly on damp/wet but not sippy peat. Its western extent seems to coincide with a more or less pure stand of *Juncus nevadensis* and *J. balticus* on very sippy peat. Not much cow evidence in *S. wolfii* area, perhaps because is otherwise mostly *Juncus*, which cattle don't much like to eat. DP 1514 - WNW across sea of *J. nevadensis* and a ball-headed sedge. Stems emerging from standing water. Virtually no cow disturbance. With standing water and more or less no shrubs, mosses found in little mounds of their own making, along with *Hypericum anagaloides* and *Saxifraga* (?). Small amount *Pedicularis* present. Moss in these clumps = *Drepanocladus*. DP 1515 - edge of *J. nevadensis* sea . Looks like soppiness can be tied to Google Earth imagery. Looks like it runs continuously in WNW direction to next N-S road to west. My survey route stopped before reaching that road, thinking I'd pretty much seen the plant composition by this point. Stopped at brisk-flowing N-S channel/ditch. GPS here = 369549, 4894031. There appeared to be a *S. wolfii* here and there in very sippy habitat to W of initial sighting, but it then appears to have been replaced with a *Salix* with glabrous/less pubescent, more narrowly lanceolate leaves. DP 1516 - dry, eastern portion of Logan Valley, W of Big Creek Campground. Soil in this portion of mdw, sandwiched between SE corner of PICO-aspen woods and 815 road, is littered with hand-worked obsidian flakes. Is this site known to forest archaeologist?

**Bosenberg Creek** - 9/12/2008. Near jct. 1648064 and 070 roads. Creek flows through very tall wall of large-aggregate fill across channel (roadbed for 070 road). Walked along N along creek from about 100 m below 070 to about 200 m above. Nice, rocky splash zone immediately below 070 road fill. Mini-marsh immediately above 070 due to damming effect of roadbed. Rocks in creek but no *Dermatocarpon* seen. Streamside bryoflora suggest indicates a typical, low-volume, scour-prone creek with *Brachythecium frigidum*, *Drepanocladus*, *Bryum*.

### Appendix F

| Site                           | Location                                | District   | Date      | Habitat                      | Elevation (ft) | Collect? | Photos |
|--------------------------------|---|------------|-----------|------------------------------|----------------|----------|--------|
| Keeney/Clark Mdws.             | Accessed from 3947 Rd.                  | Long Creek | 8/25/2008 | Meadow                       | 5480-5560      | No       | Yes    |
| Flood Mdw.                     | Accessed from 3945 Rd.                  | Long Creek | 8/25/2008 | Fen & meadow                 | 5160           | Yes      | Yes    |
| South Fork Long Ck.            | N. along ck. from 3945 Rd.              | Long Creek | 8/26/2008 | Fen & meadow                 | 5360-5420      | Yes      | Yes    |
| 3945 Rd.                       | Shortly W. on 3945 from S. Fk. Long Ck. | Long Creek | 8/26/2008 | Rocky seep                   | 5510-5550      | Yes      | No     |
| 3945 Rd.                       | Shortly W. on 3945 from Flood Mdw.      | Long Creek | 8/26/2008 | Moist montane forest         | 5320           | Yes      | No     |
| Harper Mdw.                    | Accessed from E. by 484 Rd.             | Long Creek | 8/26/2008 | Fen & meadow                 | 5280-5360      | Yes      | Yes    |
| Upper Pepper Ck., Twin Springs | Accessed by 565 Rd.                     | Long Creek | 8/26/2008 | Riparian & meadow            | 4520-4840      | Yes      | No     |
| Camp Ck.                       | Near jct. 36/3660 Rds.                  | Long Creek | 8/27/2008 | Riparian                     | 3920           | Yes      | No     |
| Camp Ck.                       | Shortly below (N.) of 36/3660 jct.      | Long Creek | 8/27/2008 | Moist, massive rock outcrop. | 3880           | Yes      | No     |

| Site                          | Location  | District    | Date      | Habitat   | Elevation (ft) | Collect? | Photos |
|-------------------------------|---|-------------|-----------|---|----------------|----------|--------|
| Mosquito Ck.                  | Along 893 Rd., shortly above jct. with 20 Rd.         | Long Creek  | 8/27/2008 | Roadside rock outcrop; moist riparian forest.                     | 3600           | Yes      | No     |
| Swamp Gulch Mdw.              | Accessed from S. by 4560 Rd.                          | Long Creek  | 8/27/2008 | Forested wetland, fen and meadow.                                 | 4240-4300      | Yes      | Yes    |
| Swamp Gulch Ck.               | Accessed from 4560 Rd.                                | Long Creek  | 8/27/2008 | Riparian  | 4300-4400      | Yes      | No     |
| 740 Rd.                       | Shortly N. of 740 Rd. on user-made road.              | Long Creek  | 8/27/2008 | Basin meadow  | 4140           | Yes      | No     |
| 2090/048 Rds.                 | Immediately NW of 2090/048 jct.                       | Long Creek  | 8/27/2008 | Marsh and meadow  | 4140           | No       | Yes    |
| East Fork Big Ck. wetland - N | Accessed via the 2090-519 Rd.                         | Long Creek  | 9/28/2008 | Forested wetland & fen  | 4920           | Yes      | Yes    |
| East Fork Big Ck. wetland - S | Only about 100m S. of E. Fk. Big Ck. wetl. - N        | Long Creek  | 8/28/2008 | Fen   | 4920           | Yes      | No     |
| Lost Ck.                      | Accessed off the 2019-519 Rd.                         | Long Creek  | 8/28/2008 | Fen   | 4650           | Yes      | No     |
| 199 Rd.                       | Accessed off 2090-199 Rd.                             | Long Creek  | 8/28/2008 | Meadow  | 4240-4360      | No       | Yes    |
| Little Boulder Ck.            | Accessed by hiking N. from 2055 Rd. at Cow Camp Mdws. | Long Creek  | 8/29/2008 | Fen & meadow (two adjacent features); damp and dry montane forest | 5160-5740      | Yes      | Yes    |
| Cedar Grove Botanical Area    | Accessed from 2150 Rd.                                | Bear Valley | 9/8/2008  | Damp montane forest   | 5600-5920      | Yes      | Yes    |

| Site             | Location   | District    | Date     | Habitat                                    | Elevation (ft) | Collect? | Photos |
|------------------|--|-------------|----------|--|----------------|----------|--------|
| Shake Table RNA  | Accessed from 2490 Rd.                                       | Bear Valley | 9/8/2008 | Juniper / sagebrush / bunchgrass community | 4320-4640      | Yes      | Yes    |
| 24/641 Rds.      | Immediately S. of 24/641 jct.                                | Bear Valley | 9/8/2008 | Fen  | 5280           | Yes      | Yes    |
| Deer Ck. terrace | Along 24 Rd., about 0.5 mile E. of 641 Rd.                   | Bear Valley | 9/9/2008 | Riparian, meadow                           | 5330-5390      | Yes      | Yes    |
| 2400-805 Rd.     | N. and S. sides 2400-805 Rd.                                 | Bear Valley | 9/9/2008 | Fen & meadow                               | 5190           | Yes      | Yes    |
| 31/63 Rds.       | NW of 31/63 jct.; Snowshoe Ck.                               | Bear Valley | 9/9/2008 | Fen & meadow; dry montane forest           | 5100           | Yes      | Yes    |
| 31 Rd. - N.      | W. side 31 Rd., < 2 mi. S. of 31/63 jct.; Hog Ck.            | Bear Valley | 9/9/2008 | Fen & meadow                               | 5280           | Yes      | Yes    |
| Pine Spring      | Access via the 3170 Rd.                                      | Bear Valley | 9/9/2008 | Meadow and seep                            | 5600-5680      | No       | No     |
| 3770-610 Rd.     | W. of 610, about 0.7 mi. N. of jct. with 3770 Rd.            | Bear Valley | 9/9/2008 | Fen & meadow                               | 5440-5480      | Yes      | Yes    |
| 31/3770 Rds.     | W. of 31 Rd., shortly S. of jct. with 3770 Rd.               | Bear Valley | 9/9/2008 | Meadow; dry montane forest                 | 5880-5920      | Yes      | No     |
| 3100-723 Rd. - N | Immediately N. of 463 Rd., just E. of jct. with 3100-723 Rd. | Bear Valley | 9/9/2008 | Fen  | 5680           | Yes      | Yes    |

| Site                           | Location   | District                                     | Date      | Habitat                       | Elevation (ft) | Collect? | Photos |
|--------------------------------|--|--|-----------|-------------------------------|----------------|----------|--------|
| 3100-723 Rd. - S               | Shortly S. of 463 Rd., just E. of jct. with 3100-723 Rd.   | Bear Valley                                  | 9/10/2008 | Meadow; moist montane forest. | 5720           | No       | No     |
| 37/3760 Rds.                   | Immediately S. of 37 Rd., shortly E. of jct. with 3760 Rd. | Burns (small western portion in Bear Valley) | 9/10/2008 | Fen & meadow                  | 5320           | Yes      | Yes    |
| Myrtle Ck.                     | Accessed from the 3100-935 Rd.                             | Bear Valley                                  | 9/10/2008 | Fen & meadow (mostly meadow)  | 5660-5720      | Yes      | No     |
| Soup Spring                    | Accessed from 3700-187 Rd.                                 | Burns  | 9/10/2008 | Fen                           | 5800-5860      | Yes      | Yes    |
| 3700-187 Rd. - W               | Toward W end of 3700-187 Rd., S side.                      | Burns  | 9/10/2008 | Meadow                        | 5920-5950      | No       | No     |
| Gribble Spring                 | Accessed from 3700-187 Rd. at Gribble Spring brook.        | Burns  | 9/11/2008 | Fen                           | 5920-5960      | Yes      | Yes    |
| 37/440 Rds. at West Myrtle Ck. | W. and E. sides 37 Rd. at 37/440 jct.                      | Burns  | 9/11/2008 | Riparian wetland & fen.       | 5720-5740      | No       | No     |
| Low Mill Site                  | S. end, accessed from 2820-497 Rd.                         | Burns  | 9/11/2008 | Meadow                        | 5720           | Yes      | No     |

| Site          | Location  | District     | Date      | Habitat                            | Elevation (ft) | Collect? | Photos |
|---------------|---|--------------|-----------|------------------------------------|----------------|----------|--------|
| Call Mdw.     | On both W. and E. sides 28 Rd., just N. of jct. with 2820 Rd. | Burns        | 9/11/2008 | Meadow                             | 5400           | Yes      | Yes    |
| Cabin Mdw.    | In angle between 28 and 2800-304 Rds.                         | Burns        | 9/11/2008 | Spring, meadow                     | 5360           | Yes      | No     |
| Haystack Mdw. | In angle between 28 and 2800-189 Rds.                         | Burns        | 9/11/2008 | Meadow                             | 5390           | Yes      | No     |
| Logan Valley  | N. of 16 Rd., between 924 and 815 spurs.                      | Prairie City | 9/12/2008 | Fen, meadow, alluvial aspen groves | 5120           | Yes      | Yes    |
| Bosenberg Ck. | Accessed at 1648-064/070 jct.                                 | Prairie City | 9/12/2008 | Riparian                           | 5200-5280      | Yes      | No     |