Galbreath Special Status Species Assessment - Fungi, Bryophytes

Before I worked on this project, I had no idea how to apply GIS to basic ecological concepts. – Christoph Schopfer, Geography Major

Project Summary

A team of students and Center staff mapped potential habitat for 110 special status plants and animals on the Galbreath Wildlands Preserve. We identified special status species with potential to occur in the Galbreath Preserve using existing agency databases and publications. These included fungi, bryophytes, plants, invertebrates, amphibians, reptiles, birds and mammals. For each species, we collected biological information, undertook GIS-based habitat suitability analysis, and assessed the likelihood of occurrence within preserve boundaries. The project created professional experience for Biology and Geography undergraduates and graduate students who worked on an interdisciplinary team to develop assessment techniques and methods. See Methods (PDF) and Species List (PDF) for additional information.

Project Lead: Claudia Luke

Dates: 2010-2011

Funding: Robert and Sue Johnson Family

Students: Neal Ramus (Business), Emily Harvey (Biology), Kandis Gilmore (Biology), Linden Schneider (Biology), Christoph Schopfer (Geography), James Sherwood (Geography)

Fungi, Bryophytes

These results are part of a larger assessment of all special status species with potential to occur at the Galbreath Wildlands Preserve. Assessments were conducted as planning exercise and do not constitute evidence of occurrence.

Fungi

Usnea longissima, Long-Beard Lichen: USLO Text, USLO Map

Bryophytes

Fissidens pauperculus, Minute Pocket Moss: FIPA Text, FIPA Map

Entosthodon kochii, Koch's Cord Moss: ENKO Text, ENKO Map

Didymodon norrisii, Norris' Beard Moss: DINO Text, DINO Map

Status:

Federal: None

State: None

Other: G4 S4.2, USFS: S


Photo: Karen Dillman


Photo: Stephen Sharnoff

Species Description:

Long beard lichen is long (15-35 cm or more) hair lichen in the family Usneaceae. It is a pale yellowish-green, consisting of a single, unbranched (or sparsely branched) central strand and numerous short lateral branchlets; white central cord becoming in part exposed (decorticate). Soredia are absent. (From CDFFP 2010)

Nomenclature: *Usnea longissima* Ach. Parmeliaceae (USDA 2010)

Synonyms: none

Distribution:

Historically, this taxon was fairly common and nearly circumboreal in distribution, occurring in eastern and western North America, Scandinavia, Europe, Asia (including China, Indonesia, India, and Bhutan) and Africa (Keon 2002). (From Ponzettii and Wittmann 2006)

In California, the species is known from:

San Francisco Bay Area northward to Humboldt County in the North Coast Ranges (Hale and Cole1988); AK to CA, western Cascades (McCune and Geiser 1997) (From Sholars and Golec 2007)

Life History & Threats:

Long-lived, slow establisher. Disperses almost exclusively by vegetative fragmentation, fertile individuals very rare (Keon 2001). Wind dispersed and dispersal limited (Keon 2001) (From Sholars and Golec 2007)

Impacts associated with timber harvest and recreation activities could affect this species through habitat modification and direct injury to plants. (From CDFFP 2010)

Sensitive to air pollution and timber harvesting (Keon 2001, Bittman 2003) (From Sholars and Golec 2007)

Historic and current illegal harvesting for floral shops, other decorative uses, and medicinals may also contribute to the declining abundance of this species… Forest management practices may threaten existing populations directly by harvest of host trees. Additional loss of populations, loss of suitable habitat, and forest fragmentation would increase the already large distances between existing populations. Since this species is notoriously slow to disperse and

establish in new locations, forest management practices may slow recovery time. (From Ponzettii and Wittmann 2006).

Habitat & Habitat Associations:

Vegetation Types:

> North Coast Coniferous Forest, Broadleaved Upland Forest, grows in the "redwood zone" on a variety of trees (CNDDB 2003). Dependent and pendant on older conifers, hardwoods and snags (From Sholars and Golec 2007)

Not confined to old growth as CDFFP (2010) have reported occurrences in older second growth with some old growth residuals and in small Douglas Firs (*Pseudotsuga mensezii*) (< 16 in.) with some old hardwoods nearby.

Topography and Microclimates: Full light, generally high in the canopy of host tree, moist microclimate (Sholars and Golec 2007). Well ventilated, semi-open canopy forests (USEPA 2006)

Elevation: 0 to 600 m (CDFFP 2010) (The Study Area ranges from 230 m to 710 m in elevation).

Species Associations:

> Found on a variety of trees including big leaf maple (*Acer macrophylum*), oaks (*Quercus sp.*), ash (*Fraxinus sp.*), Douglas-fir (*Pseduotsuga mensezii*), and bay (*Umbelularia californica*) in the "redwood zone". (From CDFFP 2010)

Other Special Habitat Features:

> Dependent and pendant on older conifers, hardwoods and snags, presence correlated with stand age (Keon 2001) (From Sholars and Golec 2007)

Conceptual Basis for GIS Model Development: Potential habitat in the Study Area was mapped as areas:

- below 630 m (a 30 m buffer on the known elevational occurrences of this species is included)
- coniferous forest (i.e. Redwood-Douglas fir mix (*Sequoia sempervirens-Pseudotsuga menziesii)* and Pacific Douglas fir (*Pseudotsuga menziesii var.menziesii) vegetation type*s) with a canopy cover of ≥ 40%
- broadleaved upland forest (i.e. mixed, montane mixed or single dominant hardwoods with a canopy cover of ≥ 40%)

Best potential habitat in the areas identified above was mapped as vegetation with a DBH greater than 61 cm (24 in). We chose the higher DBH category (> 61 cm) as best habitat for this species since the next lowest category (28 – 61 cm [11 – 24 in]) would include many locations where trees are too small to support this species.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Habitat for Long Beard Lichen, broad leaved upland and coniferous forests, is abundant throughout the Galbreath Wildlands Preserve. Large trees with which this species is associated, are most abundant in the northeastern corner of the Preserve. Habitat quality for Long Beard Lichen is moderate. Much of the old growth on the Preserve has been selectively logged (a practice not allowed since 2000) and this species is reported to be sensitive to logging practices. However, logging does not preclude the occurrence of this species since large populations are known to occur on timber company lands with modern harvesting plans (Doell 2004).

Nearest Occurrence:

> Documented Occurrences in Galbreath Wildlands Preserve: A previous site visit of the Galbreath Wildlands Preserve did not record this species (SSU Field Station and Nature Preserves 2010)
>
> Nearest Occurrence to Galbreath Wildlands Preserve: Long Beard Lichen is known from as many as 300 occurrences in California (Doell 2004) and occurs in counties to the north (Humboldt) and south (Sonoma) of Mendocino County. Occurrences are reported in Stewart's Point and Annapolis quads to the south of the Preserve and in the Yorkville quad immediately northeast of the Preserve (CNDDB 2010). Distribution maps (Doell 2004) indicate that these occurrences may be a little as 10 miles from the Preserve.

Summary: We anticipate that Long Beard Lichen is 'Likely to Occur' in the Preserve because moderate quality habitat is patchily distributed in the Preserve, and this species is known to occur in nearby areas to the south and northeast.

References

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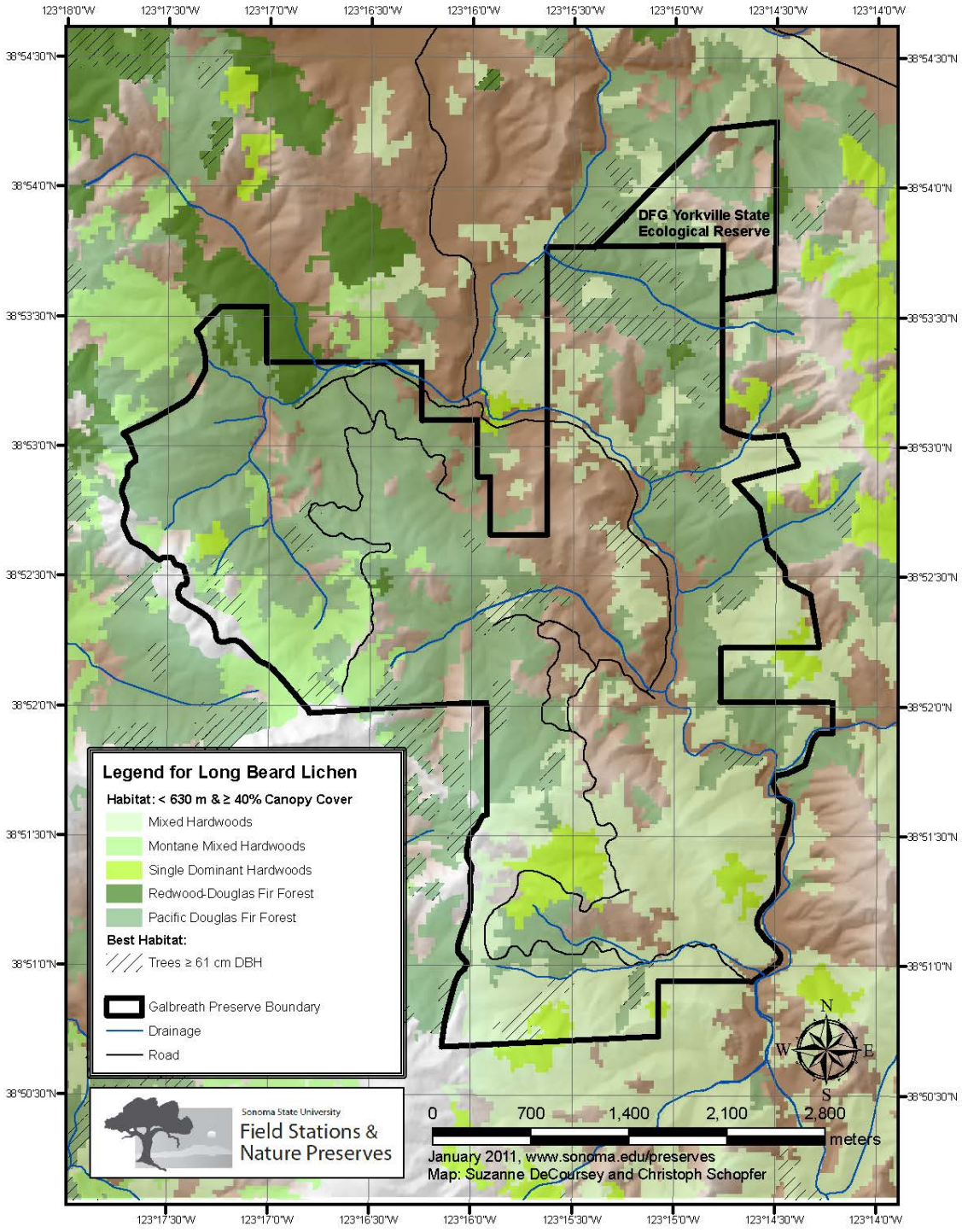
Figure 1: Potential habitat for Long Beard Lichen *(Usnea longissima)*



Status:

Federal: None

State: None

CNPS: 1B.2

Other: None


Photo: T.McIntosh


Photo: R. Belland

Species Description:

The poor pocket moss is a tiny moss that forms loosely gregarious and usually tiny patches over compact soil. Individual plants average 1.5–2.5 mm in length and have 3–5 pairs of leaves, which grow downwards across the substratum. All members of the genus Fissidens are easily distinguished from other mosses by the paired leaves flattened in one plane along the stem, somewhat reminiscent of fern fronds. Also, leaves are partly folded to the base, another distinctive characteristic of this genus. In the poor pocket moss, the folded portions average one-half to two-thirds the length of the leaf. The largest upper leaves of the poor pocket moss average 1.5–2.1 mm in length. The leaf tips are acute to short acuminate, and the upper leaf margins are nearly entire to irregularly uneven to somewhat toothed. Leaves of the poor pocket moss lack the distinct border that is characteristic of some other species of this genus. The leaf mid-rib ends 6–15 cells below the apex, another distinctive feature of this species (most other tiny species have longer mid-ribs). Leaves are similar in appearance whether wet or dry. (From Poor Pocket Moss Recovery Team 2007)

This species is autoecious (male and female reproductive structures on the same plant) and, in most mature populations, sporophytes are produced annually. The stalk below the capsule is yellow when young, becomes reddish with age, and is usually 2–3 mm long. Its capsule is ovoid to oblong-ovoid and inclined to slightly bent. (From Poor Pocket Moss Recovery Team 2007)

Nomenclature: *Fissidens pauperculus* Howe Fissdentaceae (USDA 2010)

Synonyms: none

Distribution: This species is found throughout the west coast of North America from British Colombia to California where it is associated with the Coast Redwood (*Sequoia sempervirens*) forest (eFloras 2008).

Life History & Threats: The Minute Pocket Moss is rhizautoicous and gonioautoicous producing one sporophyte annually in mature populations (eFloras 2008; Poor Pocket Moss Recovery Team 2007). This species is possibly threatened by erosion caused by severe storms and trails, as well as consecutive hot dry summers (Poor Pocket Moss Recovery Team 2007)

Habitat & Habitat Associations:

Aquatic Habitat Types: Dried stream beds or on banks (eFloras 2008). Stream channels and water splash zones (Dillingham 2006)

Vegetation Types: Habitat for this species is damp coastal soil in North Coast coniferous forests dominated by needle leaved evergreen trees (CNPS 2010).

In the main part of its range in California, the species appears most frequently on soil in redwood forests. (From Poor Pocket Moss Recovery Team 2007)

Topography and Microclimates: heavily shaded habitats (Poor Pocket Moss Recovery Team 2007).

Elevation: 10 to 1024 m (CNPS 2010) (The Study Area ranges from 230 to 710 m)

Geology and Soils: hard packed silt rich soils (Poor Pocket Moss Recovery Team 2007) bare moist soil banks (NatureServe 2009)

Species Associations: Coastal Redwood (*Sequoia sempervirens*)

Other Special Habitat Features: May be adapted to survive in early successional microhabitats (Poor Pocket Moss Recovery Team 2007).

Conceptual Basis for GIS Model Development: Potential habitat in the Study Area was mapped as areas:

- Vegetation with Coastal Redwood (i.e., Redwood-Douglas fir mix (*Sequoia sempervirens-Pseudotsuga menziesii*) and Pacific Douglas fir (*Pseudotsuga menziesii var.menziesii*) vegetation types) with $\geq$ 40 % canopy cover. We included Pacific Douglas Fir vegetation because redwood has been observed to occur within this vegetation type, albeit at much lower density. Coastal Redwoods are generally distributed within Pacific Douglas Fir vegetation in steep sided canyons in northern area of the Study Area. We included a datalayer showing this approximated distribution (see methods for details of datalayer construction).

- Streams in north coast coniferous forests

Note that loam soils are so abundant in the Study Area that they are not mapped.

We additionally mapped best potential habitat in the areas identified above as areas with:

- redwoods (i.e., Redwood-Douglas Fir Forest plus additional redwood layer estimate)

- $\geq$ 70% canopy cover

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Minute Pocket Moss occurs on loam soils or streambeds and banks in heavily shaded North Coast coniferous forests, particularly in areas with Coastal Redwood. Habitat in the Preserve is abundant but mostly moderate in quality:

- Preserve soils are almost all loam.
- North Coast coniferous forest with ≥ 70% canopy cover is common.
- Watercourses are generally common in forested areas, and most retain water year-round.

High quality habitat (i.e., areas with Coastal Redwood), is far less abundant, occurring in one area on the northwest border of the Preserve and as small scattered fragments in northern drainages on the Preserve.

Nearest Occurrence:

> Documented Occurrences in Galbreath Wildlands Preserve: Previous species list for the Galbreath Wildlands Preserve did not document this species (SSU Field Station and Nature Preserves 2010).
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: Minute Pocket Moss is widespread and know to occur in areas north and south of the Preserve boundaries. The species is known from 2 occurrences in Mendocino County (Calflora 2010). The nearest occurrence is approximately 22 miles north of the Galbreath Wildlands Preserve in the Upper Russian River watershed (Calflora 2010).

Summary: We anticipate this widespread species to be "Likely to Occur" because habitat is abundant and of moderate quality.

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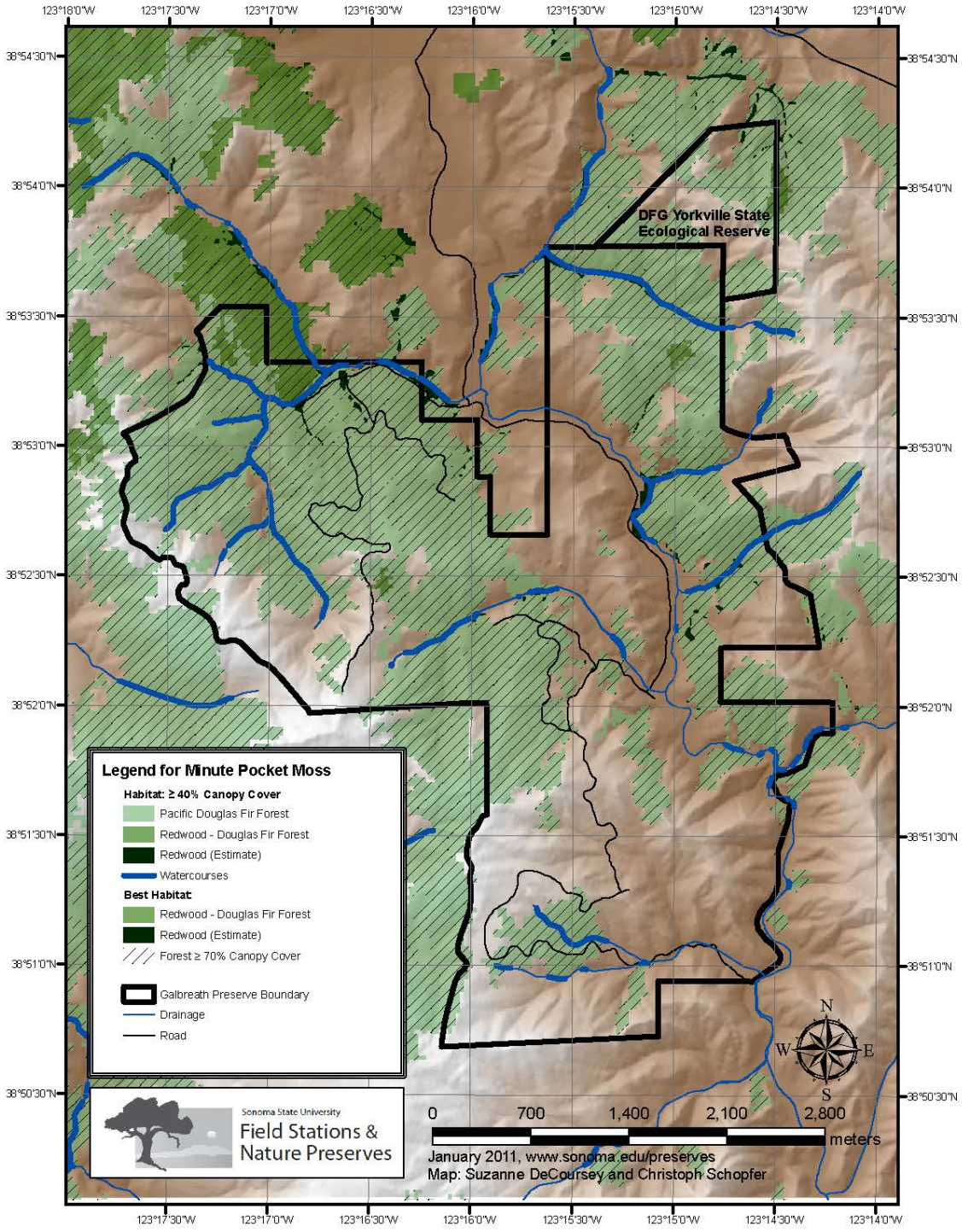
Species Account Description: Linden Schneider

Figure 2: Potential habitat for Minute Pocket Moss *(Fissidens pauperculus)*



Status:

Federal: None

Not Photo Available

State: None

CNPS: 1B.3

Other: None

Species Description: Koch's Cord Moss is yellow and 2 to 3 mm tall (eFloras 2008). The leaves are variously contorted when dry, oblong to ovate or obovate, imbricate, and somewhat concave with entire margins and a broadly acute apex (eFloras 2008). The seta is 3.5 to 7 mm and the short pyriform capsule is 1 to 1.4 mm with the neck being shorter than the spore sac and a single peristome with narrowly lanceolate, finely papillose teeth (eFloras 2008).

Nomenclature: *Entosthodon kochii* H.A. Crum & L.E. Anderson Funariaceae (USDA 2010)

Synonyms: none

Distribution: This species occurs in California with occurrence records in Lake, Mendocino, Marin, Monterey, San Luis Obispo and Mariposa counties (Calflora 2010; CNPS 2010; eFloras 2008).

Life History & Threats: Koch's Cord Moss is a short-lived species (eFloras 2008).

Habitat & Habitat Associations:

Aquatic Habitat Types: riverbanks on newly exposed soil (eFloras 2010).

Vegetation Types: Habitat for this species is on soil in cismontane woodland dominated by trees that are deciduous, evergreen or both with open canopies (CNPS 2010).

Topography and Microclimates: open soil (eFloras 2010). Rocky forested north-facing slopes (Crum and Anderson 1955)

Elevation: 180 to 1000 m (CNPS 2010) (The Study Area ranges from 230 to 710 m)

Geology and Soils: rocky, newly exposed soil (eFloras 2010, Crum and Anderson 1955)

Conceptual Basis for GIS Model Development: Potential habitat in the Study Area was mapped as areas with:

- cismontane woodlands (i.e., mixed, mixed montane or single dominant hardwoods with canopy cover 10 to 40%)
- drainages in cismontane woodlands

We additionally mapped best potential habitat in the areas identified above as:

- rocky soils (gravelly loam, cobbly loam, or alluvium)
- north-facing slopes (areas facing NW, N, or NE with a slope > 7 deg)
- bare soil within 100 m of cismontane woodland.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Koch's Cord Moss occurs in moist cismontane woodlands, especially on disturbed rocky soils. Habitat quality is moderate to good and limited in distribution in the Preserve. The largest contiguous patch of good habitat is located in the central and northeastern areas of the Preserve.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: A previous site visit of the Galbreath Wildlands Preserve did not find this species (SSU Field Station and Nature Preserves 2010)
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: This species is known from 4 occurrences in California, one from each of four disjunct counties (Calflora 2010). CNPS (2010) reports one in Mendocino County, but Calflora (2010) reports this occurrence to the east in Lake County in the Purdy's Garden quad. The nearest reported occurrence is approximately 17 miles northeast of the Galbreath Wildlands Preserve in the Purdy's Gardens quad on the border of the Upper Cache Creek and Upper Russian River watersheds (Calflora 2010).

Summary: We anticipate this little known species to be "Unlikely to Occur" in the Galbreath Wildlands Preserve because although good quality habitat is present, Koch's Cord Moss is extremely rare, its occurrence in Mendocino County is in doubt, and its disjunct poorly documented distribution suggests poor predictability of additional occurrences.

References

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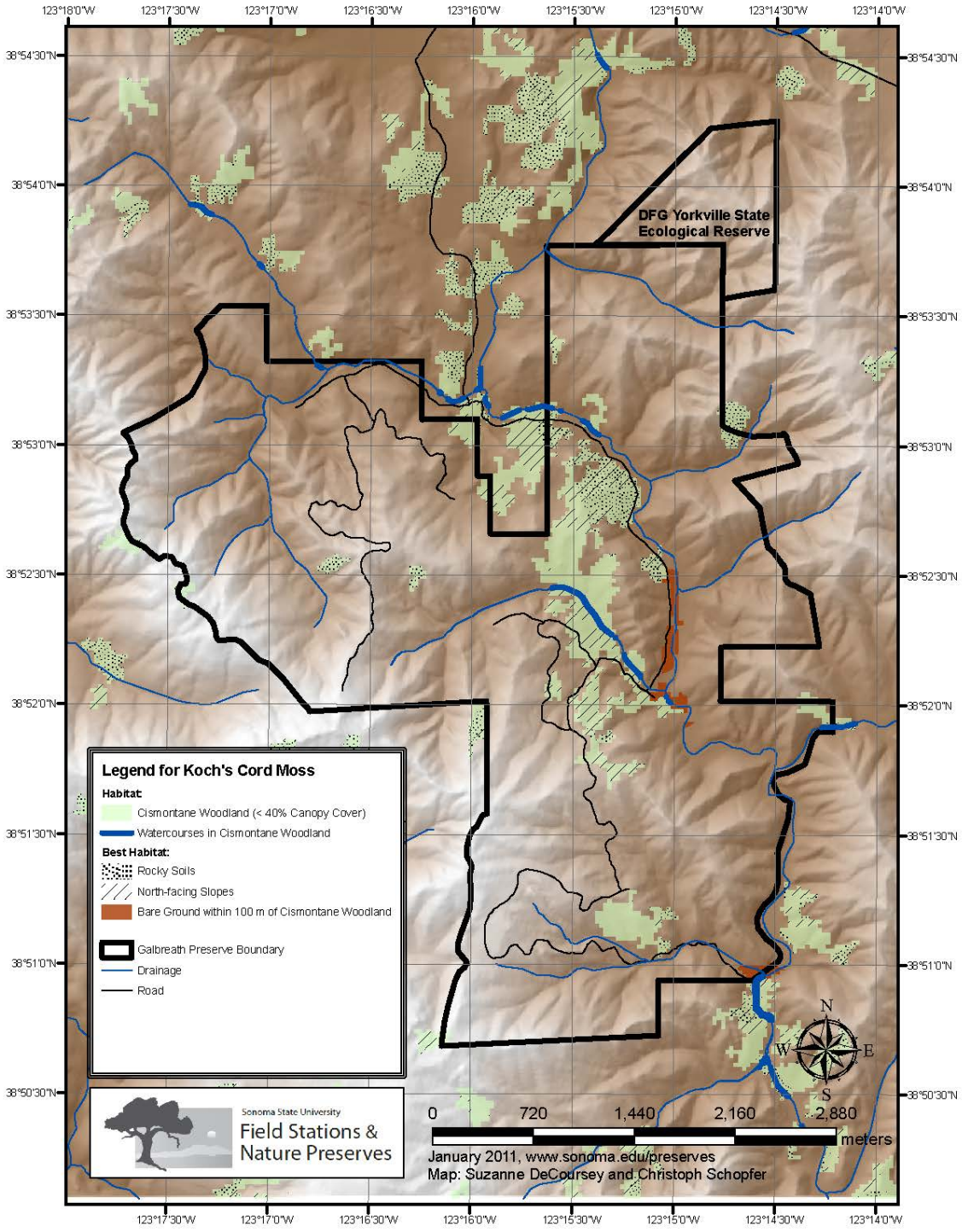
Species Account Description: Linden Schneider

Figure 3: Potential habitat for Koch's Cord Moss *(Entosthodon Kochii)*



Status:

Federal: None

State: None

CNPS: 2.2

Other: None

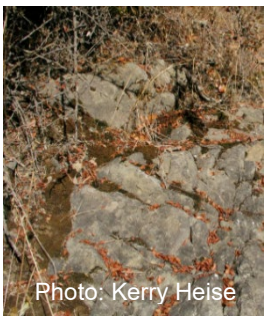


Photo: Kerry Heise

Species Description: Norris' Bread Moss is red-brown, brick or rose red and can be blackened above and red-brown to tan below (eFloras 2008). The stems are 1 to 1.5 cm long, ovate to ovate-lanceolate leaves that are appressed when dry and spreading and not keeled when moist (eFloras 2008). The base is weekly differentiated in shape and the apex is acute to short acuminate (eFloras 2008). The seta is 1 to 1.4 cm and the capsule is 1.5 to 3 mm lacking peristome teeth (eFloras 2008).

Nomenclature: Didymodon norrisii R.H. Zander Pottiaceae (USDA 2010)

In general the genus Didymodon is difficult to work with and can be confused with other more common species therefore it is important to obtain verification from an expert that is familiar with this species. This is a new species first described from California and Oregon in 1999. (From Harpel 2008)

Synonyms: none

Distribution:

Endemic to Western North America. Known only from California, Oregon and British Columbia. (From Harpel 2008)

Life History & Threats: Norris' Beard Moss is a bryophyte with capsules maturing in May (eFloras 2008).

When first described by Zander (1999) sporophytes were unknown and it was assumed that the broken leaf tips served as a means of asexual reproduction. These asexual reproductive structures serve as a rapid way to distribute but they lack genetic out crossing that may be needed for long term survival. (From Harpel 2008)

Trail and road construction where habitat is altered could provide a threat to populations. Fire may be a primary threat depending upon the intensity of the burn. Rock climbing on cliffs with known populations could also be a threat. (From Harpel 2008).

Road maintenance and logging are also threats (CNPS 2010).

Habitat & Habitat Associations:

Vegetation Types: Habitat for this species is intermittently mesic rocks in cismontane woodland dominated by trees that are deciduous, evergreen or both with open canopies, lower montane coniferous forests dominated by open to dense stands of conifers and broadleaved trees in the understory, chaparral and fields (CNPS 2010; eFloras 2008; Harpel 2008).

Topography and Microclimates: Full sun (Whittemore 2010) Open oak and chaparral forests (Harpel 2008)

Elevation: 200 to 1973 m (CNPS 2010; Heise 2008) (The Study Area ranges from 200 to 740 m).

Geology and Soils: seasonally wet rock (Whittemore 2010). Dry wash, dry sunny boulders (Zander 1999) rocky drainages (Dillingham 2006).

Didymodon norrisii is restricted to rock substrate with some sheet drainage of water in low to moderate elevations (200-1500 m). Serpentine, calcareous, and volcanic boulders and outcrops in fields, cliffs, and runoff areas are typical habitat for this densely matted moss (From Heise 2008)

Species Associations: Occurrences in grassland above Blue Oak (*Quercus douglasii)* stands and in open Oak (*Quercus sp.)* forests have been noted (Harpel 2008).

Conceptual Basis for GIS Model Development: Potential habitat in the Study Area was mapped as:

- Drainages and cliffs in areas with:
    - Cismontane woodlands (i.e., mixed, mixed montane, or single dominant hardwoods with canopy cover 10 to 40%)
    - Coniferous forests
    - Chaparral (i.e., northern mixed chaparral and scrub oak)
    - Grasslands

No data are available for rocky outcrops in the Study Area.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Norris' Beard Moss is found on rocks (typically serpentine, volcanic, or calcareous) often in drainages running though grasslands, chaparral, cismontane or coniferous forests. Habitat quality for this species is likely poor in the Preserve. Rocks in the Preserve are comprised of sandstone, siltstone, shale and schist. In addition, this species has been impacted by logging in other areas of its range; the Preserve has a long history of logging before 2000) which may have negatively affected habitat quality in the past. Timber harvest plans indicate that both clear cut and selection cut methods were used to harvest Redwood, Douglas Fir, and hardwoods at least between 1988 and 2000. Areas of best potential habitat are likely along the rocky portions of drainages that dry during the summer – such as the mainstem of Rancheria Creek. Habitat quantity may be greater than that indicated in Figure 4

if potential habitat occurs on rock outcrops away from drainages. Rock outcrops are abundant in all areas of the Preserve.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: Previous species list for the Galbreath Wildlands Preserve did not document this species (SSU Field Station and Nature Preserves 2010).
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: This species is documented in mountainous areas (coast ranges and sierras) of northern California (9 counties), central California (8 counties)(Calflora 2010). It is known from one occurrence in Mendocino County (Calflora 2010) in the outer coast range and 9 occurrences in the inner coast ranges in Lake County. The nearest occurrence is approximately 18 miles northeast of the Galbreath Wildlands Preserve in Lake County in the Upper Cache Creek watershed (Calflora 2010). Occurrence of this species on the Galbreath Wildlands Preserve would constitute a slight southern range extension in the north coast ranges.

Summary: We anticipate Norris' Beard Moss to be "Unlikely to Occur" due to the lack of typical rock substrate types and a history of logging on the Preserve.

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Species Account Description: Linden Schneider

Figure 4: Potential habitat for Norris' Beard Moss *(Didymodon norrisii)*