Species: *Fissidens aphelotaxifolius* Pursell, brook pocket moss

*Figs. 1-15. Fissidens aphelotaxifolius*, sp. nov.—Fig. 1. Habit of a stem with an axillary perichaetium.—Figs. 2-9. Leaves.—Fig. 10. Median marginal portion of a dorsal lamina.—Fig. 11. Median marginal portion of a vaginant lamina.—Figs. 12-13. Leaf apices.—Fig. 14. Transverse section of a ventral lamina.—Fig. 15. Transverse section of costa and vaginant lamina.—Figs. 16-17. *Fissidens taxifolius* Hedw.—Fig. 16. Transverse section of a ventral lamina.—Fig. 17. Transverse section of costa and vaginant lamina. [Figs. 1-6, 10, 11, 15-15 from holotype, Schofield 80787; Fig. 6, 7 from Schofield 80293; Fig. 8 from Schofield 18873; Fig. 9 from Schofield 14010; Figs. 16-17 from Weber (B-19194), Boone Co., Iowa (PAC)].

**Image Source:** Pursell (1976).

**Image Credit:** ©Torrey Botanical Society (re-used with permission). Illustrator not specified.
**Status**

Table 1 summarizes the current status of this species or subspecies/variety by various ranking entities and defines the meaning of the status.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Status</th>
<th>Status Definition</th>
</tr>
</thead>
</table>
| NatureServe CA\(^a\)                | G3G4   | G3: Vulnerable — At moderate risk of extinction or elimination due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.  
G4: Apparently Secure — Uncommon but not rare; some cause for long-term concern due to declines or other factors.  
S1: Critically Imperiled — Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.  
Range Rank — A numeric range rank (e.g., G3G4) is used to indicate the range of uncertainty about the exact status of a taxon. |
| California Rare Plant Rank\(^b\)   | 2B.2   | 2B: Plants rare, threatened, or endangered in California, but more common elsewhere.  
0.2: Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat). |
| California State Listing\(^c\)      | Not listed | This species was added to the *CNPS Inventory* in 2001 and was last updated on January 7, 2015. |
| USDA Forest Service\(^d\)           | S      | Sensitive                                                                        |
| USDI FWS\(^e\)                      | Not listed |                                                                                  |
| USDI BLM\(^f\)                      | Not listed |                                                                                  |
| NatureServe OR\(^g\)                | SNR    | Not ranked in Oregon.                                                             |
| Oregon State Listing\(^h\)          | Not listed |                                                                                  |
| NatureServe NV\(^i\)                | Not present |                                                                                  |
| Nevada State Listing\(^j\)          | Not present |                                                                                  |

\(^a\) California Natural Diversity Database, California Dept. of Fish & Wildlife [CNDDB 2021, 2021a]  
\(^b\) California Native Plant Society [CNPS 2021]  
\(^c\) California Department of Fish and Wildlife [CDFW 2021]
Distribution, abundance, and population trend on the planning unit

Table 2 summarizes the distribution and frequency of this species or subspecies/variety within National Forest System Lands in California. Table 4 in Appendix 1 lists all known occurrences of this species or subspecies/variety within California. Individual occurrences are defined as sites that contain an individual, population, or groups of populations of the plant that are located more than 1/4 (0.25) of a mile apart from each other as defined by the CNDDB.

<table>
<thead>
<tr>
<th>National Forest System (NFS) lands in California</th>
<th>Record #s (from Table 4)</th>
<th>CNDDB EOss</th>
<th>Non-CNDDB Records</th>
<th>Recent (seen in past 20 years)</th>
<th>Historical (not seen in past 20 years)</th>
<th>Most Recent Obs. Date</th>
<th>Total Records on NFS lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klamath:</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>15-Oct-2012</td>
<td>1</td>
</tr>
<tr>
<td>Sierra:</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Totals:</td>
<td>N/A</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

1 1909.12 Chapter 10, Section 12.53, components 2, 3, and 4.
Sources: Distribution: CNDDB 2021. Baselayers: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.
Brook pocket moss was last updated in the CNDDB on April 29, 2014 (CNDDB 2021), and therefore all Calflora, CCH, or NRIS records prior to this date are assumed to have already been reviewed and entered into the CNDDB for this plant. Accordingly, only records from Calflora, CCH, or NRIS reported after this date have been reviewed for potential new or updated occurrence information and are included in Table 4 in Appendix 1 as applicable.

Brook pocket moss is endemic to North America and ranges from Alaska southward to western British Columbia (including Vancouver Island and the Queen Charlotte Islands), western Washington, Oregon, and California (Pursell 1976, 2007; CNABH 2021). The species may be rare in Oregon since no collection records from that state were found in the CNABH (2021) or CPNWH (2021) databases.

In California, brook pocket moss is known from two locations, one in Siskiyou County in the Klamath Ranges (KR) bioregion and the other in Madera County in the central High Sierra Nevada (cSNH) bioregion (Pursell 1976, Norris and Shevock 2004a, CNDDB 2021, CNABH 2021).

The Siskiyou County record is located on the Klamath NF within the Russian Wilderness. The Madera County occurrence is located on the Sierra NF with first collections in October 2000 and a repeat visit in October 2012. There is no information on population size or trends over time.

**Brief description of natural history and key ecological functions**

*Fissidens aphelotaxifolius* is a small moss (to 17 mm high) with distichous leaves (i.e., arranged alternately in two ranks in the same plane on opposite sides of the stem); the leaves are costate, strap-shaped to lanceolate, and have the complex structure that is characteristic of the genus (family Fissidentaceae), consisting of a split base (pair of vaginant laminae) clasping the stem, a ventral lamina (sometimes called the apical or distal lamina) located above the vaginant laminae, and a dorsal lamina that occupies the length of the leaf opposite the vaginant and ventral laminae (Pursell 1976, 2007; Norris and Shevock 2004b; Suzuki et al. 2018). This group has 440–600 species including many in the tropics; 16 species or varieties of *Fissidens* have been recorded in California (Norris and Shevock 2004a). *Fissidens aphelotaxifolius* belongs to the subgenus *Pachyfissidens*; identification to species may be difficult (Norris and Shevock 2004b, Pursell and Bruggeman-Nannenga 2004, Suzuki et al. 2018).

Some species of *Fissidens* are aquatic or grow submerged in water; the habitat of *F. aphelotaxifolius* has been described as wet soil, humus and rocks along streams and in splash zones near waterfalls, and in damp or wet crevices of rocky cliffs (Pursell 1976, 2007; CNPS 2021; CNDDB 2021). In California, the species has been found only on granitic rocks at elevations of 6,300–6,540 feet. At the Siskiyou Co. locality it was growing in a rock crevice within a riparian area surrounded by *Abies magnifica* var. *shastensis* forest (Pursell 1976). At the locality in Madera Co., it was found on wet, underhanging rock beside a cascading stream in

---

2 Basis for other 1909.12 Chapter 10, Section 12.53 components.
mixed coniferous forest, associated with *Darmera peltata*, *Rhododendron occidentale*, and *Cornus* sp. (CNDDB 2021, CNABH 2021).

Sexual reproduction is evidently absent in *F. aphelotaxifolius*, as the perigonia and sporophytes have not been seen. Reproduction may thus be strictly vegetative by means of clusters of photosynthetic, branched filaments produced near the leaf bases (Pursell 1976, 2007).

Unlike vascular plants, mosses lack well-developed water-conducting tissues and must absorb most or all of their water and nutrients through their leaves (Norris 2003). They also have a remarkable ability to tolerate desiccation, which may help to explain their persistence over the last 400 million years (Proctor 2000, Oliver et al. 2005, Liu et al. 2019).

**Overview of ecological conditions for recovery, conservation, and viability**

Brook pocket moss is regionally endemic in the Pacific Northwest and reaches its southern range limit in California where it is evidently rare and known from two widely separated localities. It may be rare in Oregon as well, but there are many collections from British Columbia where the species has been assigned a status of S4 (apparently secure; NatureServe 2021).

No site-specific threats were noted in the CNDDB (2021), but mosses in California are generally threatened by loss of often small and highly isolated populations, which are vulnerable to extirpation by alteration of habitat or loss of their specific microenvironments (Shevock 2003). In many cases, natural recolonization from such losses would be extremely unlikely since available spore or plant fragments are so far away.

In order for populations of *F. aphelotaxifolius* to remain viable over time, the water sources that feed its streamside habitats would need to remain stable. Therefore, extended drought due to climate change might be detrimental.

**Taxonomy**

Table 3 summarizes this species or subspecies/variety’s name status in key literature.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Name Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNNDDB and CNPS</td>
<td><em>Fissidens aphelotaxifolius</em> Purs.</td>
</tr>
<tr>
<td>Norris and Shevock (2004a, 2004b)</td>
<td><em>Fissidens aphelotaxifolius</em> Pursell</td>
</tr>
<tr>
<td>California Moss eFlora</td>
<td><em>Fissidens aphelotaxifolius</em> Pursell</td>
</tr>
<tr>
<td>Flora of North America</td>
<td><em>Fissidens aphelotaxifolius</em> Pursell</td>
</tr>
<tr>
<td>USDA NRCS* PLANTS</td>
<td><em>Fissidens aphelotaxifolius</em> Purs.</td>
</tr>
</tbody>
</table>

* Natural Resources Conservation Service [NRCS 2021]

---

3 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.
4 1909.12, Chapter 10, Section 12.53, component 1.
Synonymy: There are no taxonomic or nomenclatural synonyms for this species (Pursell 2007, TROPICOS 2021).

California Moss eFlora link: https://ucjeps.berkeley.edu/cgi-bin/get_moss_treatment.pl?taxon=Fissidens%20aphelotaxifolius

Type locality: CANADA. BRITISH COLUMBIA: Queen Charlotte Islands. Damp cliff cranny in canyon, Upper Victoria Lake, Moresby Island, Schofield 30787 (holotype UBC, isotype DUKE) (Pursell 1976).

Key literature


Literature cited


Species Account: *Fissidens aphelotaxifolius*  

2021-10-04


http://ucjeps.berkeley.edu/IMJ.html [accessed February 2021].


Author(s) and Date:
R. Douglas Stone, California Native Plant Society, Associate Rare Plant Botanist, 09 March 2021; finalized 04 October 2021

Reviewer(s) and Date:
Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 27 April 2021

Formatting: Form is set up as 508 compliant. Please use the “styles” if further formatting is necessary.

Purpose: This is to maintain the best available science on a species that could be used by the Forest Service in a variety of functions. Specifically, there would be additional steps and evaluations to determine whether or not this species would be considered a Species of Conservation Concern under the 2012 Planning Rule or a Sensitive Species under the 1982 Planning Rule.
Appendix 1: Known Occurrences

Table 4. Known occurrences of brook pocket moss within California (NRIS, CNDDB, Calflora/CCH databases).

<table>
<thead>
<tr>
<th>Rec. #</th>
<th>Locality</th>
<th>County</th>
<th>Quad</th>
<th>Ref. (Source)</th>
<th>Date Last Obs’d</th>
<th>Population Info</th>
<th>Threats</th>
<th>Land Mgr.</th>
<th>Elev. (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOWER RUSSIAN LAKE OVERFLOW.</td>
<td>Siskiyou</td>
<td>Eaton Peak (4112238)</td>
<td>CNDDB, February 2021 (EO 1)</td>
<td>XXXXXX XX</td>
<td>NEEDS FIELDWORK.</td>
<td></td>
<td>Klamath NF</td>
<td>6540</td>
</tr>
<tr>
<td>2</td>
<td>ABOUT 100 YARDS UPSTREAM FROM FOREST SERVICE ROAD 7S08 ALONG OWL CREEK, 0.75 MILE EAST OF WHISKY FALLS, WHISKEY RIDGE.</td>
<td>Madera</td>
<td>Shuteye Peak (3711934)</td>
<td>CNDDB, February 2021 (EO 2)</td>
<td>15-Oct-2012</td>
<td>OBSERVED IN 2000 AND 2012.</td>
<td></td>
<td>Sierra NF</td>
<td>6400</td>
</tr>
</tbody>
</table>
Appendix 2: Additional Considerations at the Forest Level

<This section, including the next 5 subheadings, would be filled out by Forest Service botanists.>

<Forest Name>

Geographic distribution within the Forest

A. Scarce or isolated
B. Patchy or gaps
C. Contiguous

<Select a geographic distribution rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Abundance of the species on the Forest

A. Rare – current abundance is low enough that stochastic and other factors could lead to potential imperilment.
B. Uncommon – current abundance is large enough that demographic stochasticity is not likely to lead to rapid local extinction, but, in combination with highly variable environmental factors, could pose a threat.
C. Common – current abundance is large enough that species persistence is not threatened by demographic stochasticity in combination with environmental variation.
D. Insufficient information to draw inferences about criterion.

<Select a species abundance rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Population trend on the Forest

A. Significant downward or suspected downward population trend.
B. Stable population.
C. Upward population trend.
D. Insufficient information to draw inferences about criterion.

<Select a population trend rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Habitat trend on the Forest

A. Decline in habitat quality or quantity.
B. Stable amounts of suitable or potential habitat, relatively unchanged habitat quality.
C. Improving habitat quality or increasing amounts of suitable or potential habitat.
D. Insufficient information to draw inferences about criterion.

<Select a habitat trend rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>
Vulnerability of habitat on the Forest

A. Substantial modification of habitat has occurred or is anticipated with conditions departing from expectations based on NRV, or habitat is impacted by modern stressors such as drought, climate change, high intensity wildfire and wildfire suppression disturbances, loss of natural openings due to historical wildfire suppression, nonnative invasive species, water impoundments and diversions, and recreation, etc.

B. Habitat modification is likely to result in ecological patterns similar to the range of historical conditions, but is being impacted by modern stressors.

C. Habitat resilient, changes are similar in frequency and intensity to those expected from NRV, and modern stressors not significant.

D. Insufficient information to draw inferences about criterion.

<Select a habitat vulnerability rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Additional Forest specific information related to the SCC determination

<This section is provided for Forest botanists to add additional Forest specific information that is not captured in the section above, if necessary. Provide a narrative description here of the additional relevant information. State “No additional information” if this section is not used.>