Species: *Peltigera pacifica* Vitik., fringed pelt

**Photo Source:** CalPhotos (2021)

**Photo Credits:** All photos: Scot Loring

**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>Table 1. Current status of fringed pelt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity</td>
</tr>
<tr>
<td>--------</td>
</tr>
</tbody>
</table>
Species Account: *Peltigera pacifica*

### NatureServe CA

**Species Rank:**

**G3G4**

**Range Rank:**

**S2**

**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.

**S2:** Imperiled — Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

**Range Rank** — A numeric range rank (i.e., G3G4) is used to indicate the range of uncertainty about the exact status of this species.

### California Rare Plant Rank

**Rank:**

**2B.2**

2B: Rare and endangered in California, more common elsewhere.

0.2: Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

This taxon was added to the *CNPS Inventory of Rare and Endangered Plants of California* in 2021.

### California State Listing

**Status:**

Not listed

### USDA Forest Service

**Survey and Manage Category:**

Survey and Manage Category E: Manage all known sites; pre-disturbance surveys not required; carry out strategic surveys.

### USD I FWS

**Status:**

Not listed

### USDI BLM

**Status:**

Not listed

### NatureServe OR

**Status:**

Not listed

### Oregon State Listing

**Status:**

Not listed

### NatureServe NV

**Status:**

Not present

### Nevada State Listing

**Status:**

Not present

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**Notes:**

- California Natural Diversity Database, California Dept. of Fish & Wildlife [CNDDB 2021, 2021a]
- California Native Plant Society [CNPS 2021]
- California Department of Fish and Wildlife [CDFW 2021]
- US Forest Service Region 5 Forester’s List [USDA 2013] and Pacific NW Survey and Manage [USDA & BLM 2014]
- US Department of Interior Fish and Wildlife Service [USFWS 2021]
- US Department of Interior Bureau of Land Management [BLM 2020]
- Oregon Biodiversity Information Center [ORBIC 2019]
- Oregon Department of Agriculture [ODA 2018]
- Nevada Natural Heritage Program [NNHP 2021]
- Nevada Division of Forestry [NDF 2012]

Note: Individual State Heritage Programs (CNDDB, ORBIC, NNHP) represent NatureServe and contain more up-to-date ranks for their state than NatureServe Explorer.
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>CNDDDB EOs</th>
<th>Non-CNDDDB 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>Six Rivers:</td>
<td>1, 2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>14-Sep-2005</td>
<td>2</td>
</tr>
<tr>
<td>Totals:</td>
<td>N/A</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

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1 1909.12 Chapter 10, Section 12.53, components 2, 3, and 4.
Species Account: *Peltigera pacifica*

Fringed pelt was last updated in the CNDDB on July 6, 2021 (CNDDB 2021), and therefore all Calflora, CCH, and/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, and/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.

Fringed pelt is mainly distributed in the Pacific Northwest of North America (British Columbia, Washington, and Oregon), with its northern limit in coastal Alaska, and its southern extent in Montana, northern Idaho, and California (Stone 2007, Carlberg 2014, CNALH 2021). Within California, fringed pelt has only been observed at two locations in the Klamath Ranges (KR) bioregion of Del Norte County (Table 4). These locations are within 20 km of the border with Oregon (Carlberg 2014), with the closest Oregon location in the Siskiyou Mountains of Josephine County (CNALH 2021). Both California records of this species are located on the Six Rivers National Forest, with one (record #1) located within the Siskiyou Wilderness (CNDDB 2021). Both records were observed in 2005, and at that time, both populations were described as “small.” Their population trends are unknown, as they have not been visited again (Carlberg 2014, Carlberg 2021 pers. comm., CNDDB 2021).

There are two additional California specimen records of Peltigera pacifica available from the Consortium of North American Lichen Herbaria online portal (CNALH 2021) that were not included in this analysis; both are highlighted in pink at the bottom of Table 4. One is a collection made by Kerry Knudsen from Monterey County, and the other is a collection made by William Cooke in Del Norte County. The identification of the Cooke collection is in doubt based on identification of duplicate specimens at other herbaria (CNALH 2021), and the identification of the Knudsen specimen needs to be checked, as it may be Peltigera praetextata (Carlberg 2021 pers. comm.).

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

Fringed pelt is a smooth, bluish-grey (sometimes tinted brown), foliose lichen up to 10 cm in diameter (Vitikainen 1985, Stone 2007, McCune and Yang 2021). In California, it grows in North Coast coniferous forest and riparian forest on thick moss mats on granite from 1320–1375 m (4330–4510 ft) (Carlberg 2014, CNPS 2021). Both locations are in moist, dense forest on upper, north- to northwest-facing slopes above roads (Carlberg 2014). Elsewhere, it grows on soil, rocks, logs, and tree bases (usually mossy), and at higher elevations, it can be found in creek draws and on forested lake shores (Stone 2007, Carlberg 2014). There is speculation that this lichen is located in creek draws, because it requires high humidity throughout the year (Stone 2007). Associated species in California are not well documented but include Pseudotsuga menziesii, Abies concolor, and abundant lichens and bryophytes (Carlberg 2021 pers. comm., CNDDB 2021). In Oregon, additional associates include Acer spp., Tsuga heterophylla, and Thuja plicata (CPNWH 2021).

The cosmopolitan genus Peltigera (Peltigeraceae) is common and widespread on most continents (Miadlikowska and Lutzoni 2000, Martínez et al. 2003, Stone 2007). Depending on the taxonomic authority, 40 to 66 species are recognized worldwide (Miadlikowska and Lutzoni

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2 Basis for other 1909.12 Chapter 10, Section 12.53 components.
Species Account: *Peltigera pacifica* 2021-10-06

2000, Martínez et al. 2003), with some researchers speculating that there are many undescribed *Peltigera* species awaiting names in North America (O’Brien et al. 2009). In phylogenetic analyses of the genus, fringed pelt is placed in a clade with *P. polydactyla* in section *Polydactylon*, a group of 19 lichens from both the New and Old Worlds that are found in boreal old growth and tropical montane forests (Miadlikowska and Lutzoni 2000, Martínez et al. 2003, Magain et al. 2017). Fringed pelt is distinguished from other species within the genus by having a single photobiont (the cyanobacterium [blue-green alga] *Nostoc*), a glabrous (as opposed to tomentose), often shiny, blue-grey upper surface (sometimes with brown tint), and narrow main lobes with ruffled-looking margins due to small marginal lobules (Brodo et al. 2001, Stone 2007, McCune and Yang 2021). The lower side of the lichen body is white with pale to darker grey, brown, or black mottling, has distinctly raised veins 0.8–1.5 mm wide, and has slender, glabrous rhizines, 2–4 mm long (Goward et al. 1995, Stone 2007). In this lichen, all chemical spot tests are negative, but the chemicals tenuiorin, methyl gyrophorate, gyrophoric acid, peltidactylin, dolichorrhizin, and zeorin are present (Goward et al. 1995, Brodo et al. 2001, Stone 2007, McCune and Yang 2021). In addition, it sometimes has a disheveled appearance, with a partially discolored upper surface and margins partially consumed by herbivores (Stone 2007).

One of the most convenient ways for lichens to disperse is by soredia and isidia, which are asexual structures that contain cells from both the photosynthetic and fungal symbiont (Lepp 2012). Isidia are sometimes present in fringed pelt (McCune and Yang 2021), but it is more likely that this lichen reproduces asexually via dispersal of the lobules, which also contain cells from both the photosynthetic and fungal symbionts (Stone 2007, Magain et al. 2017, McCune and Yang 2021). Each lobule narrows where attached to the thallus, making it easily separated for dispersal. Since lobules are relatively heavy, they likely spread by rain, waterflow, and animal vectors (Stone 2007). This lichen is often found near creeks, which means high water levels could aid dispersal in winter months (Stone 2007). Apothecia (sexual, spore-producing reproductive structures) are sometimes found on the upper side of the narrow lobes, which means that spores may be dispersed by wind, water, and animals over longer distances (Stone 2007, Carlberg 2014, McCune and Yang 2021). However, these spores only disperse the fungal symbiont. This means that the fungal symbiont needs to find and capture the photobiont (*Nostoc*) in order to develop into the cyanolichen fringed pelt (Lepp 2012). The substrate upon which *Peltigera* grow (in this case often moss) is likely the source of *Nostoc* (Zúñiga et al. 2017).

Like all lichens, this species grows and photosynthesizes when moist/wet and becomes dormant when dry. Therefore, its growth and productivity are linked to moisture in its environment (Naesborg 2021 pers. comm.). In studies of a different species of *Peltigera* (*P. rufescens*), growing on moss has been shown to confer several advantages, including decreased desiccation, fewer temperature extremes, increased availability of carbon dioxide, and extended periods of optimal net photosynthesis due to higher humidity (Colesie et al. 2012). Like other cyanolichens, fringed pelt has the ability to fix atmospheric nitrogen and contribute it to the forest ecosystem (Rosentreter 1995). Many cyanolichens are also critical components of the food-chain, which may be why this lichen is often seen partially consumed by herbivores (Rosentreter 1995, Stone 2007).

A major concern for some lichen species during their growth phase is sensitivity to air pollution. Although fringed pelt was included in field surveys investigating lichen pollution sensitivity in
Oregon, there was no decision made about air pollution sensitivity in this lichen (Geiser and Neitlich 2007, Carlberg 2014). Similarly, fire effects on fringed pelt have not been studied, as is the case with most lichens (Peterson and Ikeda 2017). When lichens are hydrated and not dormant, smoke from fires can have detrimental effects similar to air pollution (Geiser and Neitlich 2007, Peterson and Ikeda 2017). In addition, the fire retardant used in fighting fires is known to be toxic to lichens (Peterson and Ikeda 2017). As this lichen often grows near or at ground level, ground fires in its habitat, even during its dormant phase, could be detrimental. Southeastern U.S. long leaf pine forests that experience frequent ground fires (1–3 year intervals) have low macrolichen diversity and no ground lichens (DeBolt et al. 2017). Many cyanolichens do not enter forest stands until late successional stages and become more abundant in old-growth coniferous forests only after 200 years (Rosentreter 1995).

**Overview of ecological conditions for recovery, conservation, and viability**\(^3\) including Threats and Risk Factors

In California, fringed pelt has only been observed in very wet forest in Del Norte County where it reaches its southern range limit. Neither of the two known locations has a habitat occurrence ranking (CNDDB 2021). Outside of California, narrowing of riparian buffers is considered a strong threat to fringed pelt, because of the high humidity level this lichen prefers (Stone 2007). The only threats listed for this lichen in the CNDDB (2021) are forest thinning, recreation, and collecting. Both of the known records are located in the Six Rivers National Forest on protected lands. One is located in the Siskiyou Wilderness in a Wild River Corridor and is relatively well protected but could be damaged by recreation; the other record is located in a Late Successional Reserve but could be damaged by tree thinning (Carlberg 2014). This lichen is protected (Category E) under the USDA/USDI Northwest Forest Plan which seeks to protect at-risk species in old-growth forests (USDA and BLM 2020).

Fringed pelt is most common in regions with maritime influence, and its preferred habitat becomes increasingly scarce to the south of Oregon (Carlberg 2014). At its southernmost distributional limit in Del Norte County, it may be threatened by increasing temperatures and a changing microclimate due to climate change. Climate-driven changes to coastal lichen floras have already been recorded, and as the coolest climate zones shrink, species in the southernmost ranges could be lost (Geiser and Neitlich 2007). Predicted increases in fire frequency, especially in species-rich, old-growth stands, would be detrimental both due to heat stress and smoke pollution; cyanolichens with small population sizes, such as fringed pelt, may be especially sensitive to these changes (Geiser and Neitlich 2007).

**Taxonomy**\(^4\)

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

<table>
<thead>
<tr>
<th>Table 3. Name status of fringed pelt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entity</td>
</tr>
</tbody>
</table>

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\(^3\) 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:** No synonyms are listed for this species (Tucker 2014, Esslinger 2018, McCune and Yang 2021).

**Consortium of North American Lichen Herbaria (CNALH 2021):**

**Type locality:** Canada. British Columbia. 10 km N of Kitsumkalum Lake on E branch road (Goward 81-2025, UBC) (Vitikainen 1985).

### Key literature


Literature cited


Species Account: *Peltigera pacifica*


Persons Contacted


Author(s) and Date:

Ellen A. Dean, California Native Plant Society, Associate Rare Plant Botanist, 24 September 2021; finalized 6 October 2021.

Reviewer(s) and Date:

Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 30 September 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 fringed pelt within California (CNDDB, CNALH databases).

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.

<table>
<thead>
<tr>
<th>Rec. #</th>
<th>Locality</th>
<th>Count y</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>DOE FLAT TRAIL TO BUCK LAKE, SIX RIVERS NATIONAL FOREST. MAPPED ACCORDING TO 2005 CARLBERG COORDINATES, ALONG USFS RD 18N10 ABOUT 0.5 AIR MILE WSW OF BUCK LAKE, IN THE SW 1/4 OF THE NW 1/4 OF PROJECTED SECTION 1.</td>
<td>Del Norte</td>
<td>Devils Punchbowl (4112376)</td>
<td>CNDDB, Sep 2021 (EO1); CNALH, Apr. 2021 (OSC-142594); Carlberg 2021 pers. comm.</td>
<td>13-Sep-2005</td>
<td>OLD-GROWTH PSEUDOTSUGA MENZIESII/ABIES CONCOLOR FOREST. SEEPY WET VERTICAL ROAD CUT BACK THROUGH LARGE (HOUSE-SIZED) ROCK. ABUNDANT LICHENS &amp; BRYOPHYTES. MOSS ON GRANITE.</td>
<td>FOCUS AREA FOR RECREATION; POTENTIAL FOR ACCIDENTAL DAMAGE OR COLLECTING AT THIS OCCURRENCE.</td>
<td>SIX RIVERS NF (Siskiyou Wilderness)</td>
<td>4223</td>
</tr>
<tr>
<td>2</td>
<td>AT HAIRPIN OF FS ROAD 16N03 OFF 16N02, ABOUT 0.5 AIR MILE WEST OF HURDYGRUDY BUTTE, SIX RIVERS NATIONAL FOREST. MAPPED ACCORDING TO 2005 CARLBERG COORDINATES, IN THE NW 1/4 OF THE SW 1/4 OF PROJECTED SECTION 17.</td>
<td>Del Norte</td>
<td>Hurdygurdy Butte (4112377)</td>
<td>CNDDB, Sep 2021 (EO2); Carlberg 2021 pers. comm.</td>
<td>14-Sep-2005</td>
<td>OLD GROWTH FOREST NEAR HIGH SEEPY ROAD CUT BANK. MIXED HARDWOOD-CONIFER FOREST. MOSSY ROCK.</td>
<td>AREA MAY BE SUBJECT TO THINNING.</td>
<td>SIX RIVERS NF</td>
<td>4643</td>
</tr>
<tr>
<td></td>
<td>Smith River Trail</td>
<td>Del Norte</td>
<td>Hiouchi (4112471)</td>
<td>CNALH, Apr. 2021 (MU-L-3827)</td>
<td>8-Jul-1950</td>
<td>Growing on ground.</td>
<td></td>
<td>Six Rivers NF</td>
<td>1520</td>
</tr>
</tbody>
</table>
Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.

<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></td>
<td>Santa Lucia Mountains: Limekiln State Park: high up slope above Hare Creek Trail: past junction with trails to waterfall and lime kilns</td>
<td>Monterey</td>
<td>Lopez Point (3612115)</td>
<td>CCH2, Nov. 2020 (UCR-195729); CNALH, Apr. 2021</td>
<td>4-Sep-2008</td>
<td>Coast redwood forest. On shaded understory of upper limit of redwood forest.</td>
<td></td>
<td>Los Padres NF (Ventana Wilderness)</td>
<td></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, and/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.>