Plant Species Evaluation Form

**Jaffueliobryum rauui** (Austin) Thériot

**RAU'S JAFFUELIOBRYUM MOSS**

**Family:** Grimmiaeae  
(CNPS 2018) **PLANTS Symbol:** JARA  
(USDA 2018) **Calif. Endemic:** No  
(CNPS 2018)

**Synonyms/Other Names:** This species was first described as *Grimmia (Coscinodon) rauui* Austin from a T.S. Brandegee collection in Colorado (Austin 1875). Lesquereaux and James (1884) proposed the name *Coscinodon rauui* (Austin) Lesq. & James, mysteriously dropping the “e” from “rauei”. Theriot (1928) placed it in the new genus *Jaffueliobryum*, but later authors did not follow suit. Herbert Habeeb (1950) subsumed it under *Grimmia wrightii*, as *G. wrightii var. rauui* (Austin) Habeeb, citing variability of the leaf margin characters that separate them. Churchill (1981) divided Grimmiaeae into the subgenera *Grimmiioideae* and *Coscinodontoideae*, and in the latter recognized *Jaffueliobryum* once again (ITIS 2018; Tropicos 2018). Although higher taxonomic levels have been shuffled around in subsequent treatments, *Jaffueliobryum* has retained its support. Phylogenetic analyses (Hernandez-Maqueda et al. 2008) confirm this distinction, demonstrating that it belongs not in Grimmiaeae, but in Ptychomitriaceae.

**Identification Issues:** Brinda (2000) describes the distinctive field characters of the genus *Jaffueliobryum* thus: immersed capsules with large calyptrae and bright green, ovate leaves with long hairpoints. Similarly, Hastings in the *Jepson Moss eFlora* (2017), describes the distinctiveness of *Jaffueliobryum* thus: *Jaffueliobryum* and *Coscinodon* have been removed from *Grimmia* on the basis of the very distinctive calyptra, which is campanulate, plicate, fringed basally. *Coscinodon* has exserted capsules; *Jaffueliobryum* has immersed capsules (meaning that they are nestled in the terminal leaves). One is alerted to think of *Jaffueliobryum* when one is in rocky areas of the southwestern deserts and sees an ashy brown or tan moss with very long and decurrent hyaline awns. In the field, the two species of *Jaffueliobryum* approach *Crossidium* because of the dense and erect awns on the dry plant.

The two *Jaffueliobryum* species found in North America can be confused because they prefer similar habitat, are often found together, and have a similar appearance due to the ashen fuzziness conferred by the density of long hairpoints on the leaves. *Jaffueliobryum wrightii* is very closely related to *J. rauui* (Hernandez-Maqueda et al. 2008), and the two species have been treated as one for much of their taxonomic history. To distinguish between them, Brinda (2000) emphasizes the distal shape of the leaf lamina, which are acute to acuminate in *J. rauui*, versus broadly acute-rounded in *J. wrightii*. That is, leaves of *J. wrightii* are more abruptly rounded to a longer hairpoint. In addition, *J. rauui* leaves are keeled and its proximal stem leaves are mostly spreading versus appressed in *J. wrightii*. Spence (2007) utilizes the same key characters in the *Flora of North America North of Mexico* (FNANM) as Brinda, elaborating that there “are a variety of other partially overlapping characters that separate the two, including leaf width at widest point, lamina length, costal width, lamina cell length and angle between the margin at the leaf widest point and the tip of the awn, and capsule and operculum length.”
**Taxonomy:**
Taxonomic description is provided from *Flora of North America North of Mexico*, Volume 27 (Spence 2007).

Species in Genus: 3 (2 in flora)  
Etymology: named for Félix Jafuell, 1857-1931, clergyman who collected plants in South America, and Greek bryum, moss.

Genus Description: Plants 3-15(-20) mm, in dense cushions, dark olive, yellow-green, or dull green to olivaceous. Leaves broadly ovate to obovate, concave or somewhat keeled, margins plane, smooth or weakly serrate to erose distally, distal lamina mostly 1-stratose, rarely with 2-stratose streaks, specialized laminal and marginal chlorophyllose structures absent, awn short to twice lamina length, distal leaves typically with longer awns; basal cells elongate-rectangular to oblong, with straight, somewhat lax, sometimes weakly hyaline walls; mid leaf and distal cells isodiametric, oval to irregularly rhomboidal; distal cells becoming hyaline with age. Gemmae absent. Sexual condition autoicous or rarely cryptoicous; perichaetial leaves enlarged, long-awned. Seta short, straight. Capsule erect, immersed, symmetric, globose to ovoid; annulus differentiated, typically persistent; operculum conic, short to long-rostrate, falling detached from columella. Calyptra campanulate, mitrate, sometimes erose or lobed at base, large, covering 1/2-3/4 of capsule, plicate.

Species Description: Plants in small dense cushions or turfs, yellow-green to dark olivaceous, hoary. Stems 5-20 mm, sparsely branched. Leaves crowded, ovate to obovate, imbricate to appressed-julaceous distally, somewhat spreading to squarrose-recurved proximally, 0.6-1.2 mm excluding awn, apex acute to acuminate, lamina 1-stratose to rarely 2-stratose in bands, awn length highly variable, 0.3-1.4 mm, hyaline; costa in transverse-section distinctly keeled; proximal cells rectangular, 15-40 × 10-20 µm, often appearing lax; mid leaf cells isodiametric to short-oval, (5-)8-12(-20) µm; distal cells somewhat longer than mid leaf cells. Sexual condition c; perichaetial leaf lamina to 1.5 mm, awn 1-1.7 mm. Seta 0.4-0.6 mm. Capsule yellow-brown turning red-brown with age, ovoid to subglobose, 0.8-1 mm; operculum short-rostrate, 0.5-0.6 mm. FNANM Treatment Author: Spence, J. R.

**Status:**
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

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<th>G-rank</th>
<th>S-rank</th>
<th>CRPR</th>
<th>R5 FSS</th>
<th>NFP SM</th>
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Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2018b), Nevada Division of Forestry Fully Protected Plant Species (NAC 527)(NDF 2012), Oregon Department of Agriculture Listed Plants (ODA 2014); G-rank=Global Conservation Status (CDFW 2018a; NatureServe 2018); S-rank=Subnational (state or province-level) Conservation Status (CDFW 2018a; NatureServe 2018; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2018); R5 FSS=USDA Forest Service Region 5 Regional Forester Sensitive Plant Species List (USDA 2013); NFP SM=Forest Service and Bureau of Land Management Northwest Forest Plan Survey and Manage Species (USDA 2001); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); SWAP=California State Wildlife Action Plan Status (CDFW 2015); NNHP=Nebraska Natural Heritage Program Status (NNHP 2017); NNPS=Nebraska Native Plant Society Status (NNHP 2017); ORBIC=Oregon Biological Information Center Status (ORBIC 2016); OCS=Oregon Conservation Strategy Species (ODFW 2016); IUCN=International Union for Conservation of Nature Red List Status (IUCN 2017).

**Distribution:** *Jaffueliobryum raui* is a common species in drier parts of the United States, especially on the Great Plains and the Colorado Plateau, extending to the Mojave Desert of
California. It is known from: Alberta, Canada; Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, Oklahoma, South Dakota, Texas, Utah, and Wisconsin in the United States (Spence 2007). This species appears to be disjunct to southern Alberta, but the distribution is likely continuous, as the band of calcareous bedrock on which it occurs runs along the Rocky Mountain Front Range from Alberta well into Montana. Sites in the Driftless Area of Iowa, Minnesota, and Wisconsin may be truly disjunct. However, more collecting is likely to fill in gaps in its range in the northern Great Plains and clarify its status in the Great Basin (Spence 2007). This would also be the case within California. The disjunction between Mendocino County and the collections in the California deserts suggest that this species will eventually be encountered elsewhere in similar California habitats. Harpel (1999) in describing its first documentation from California, asserted that it was overlooked in general because of its small size and xeric habitat requirements.
**Distribution in Mendocino NF. Sources:**


**Locations within California:**

Record numbers indicate sites that contain an individual, population, or groups of populations located within ¼ mile of each other, per the California Natural Diversity Database (CNDDDB 2017) definition of Element Occurrences (EOs) in California. Official EO numbers for plants in California are determined solely by the CNDDDB and are included within the Reference (Source) column for CNDDDB data. Duplicate records from the same site are given the same record number and included in red. The Population Info column includes total number of individuals and total number and size of populations/sub-populations when provided. Elevations provided in meters from source have been converted to feet. If not provided in original source, Land Manager information was obtained using the California Protected Areas Database (CPAD 2016) and Quad information was obtained using 24K Quads, SDE Feature Class (CDFG 2013). All other information is directly from the Reference (Source) unless additional citation is given.

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<th>Rec. #</th>
<th>Locality</th>
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<th>Quad</th>
<th>Reference (Source)</th>
<th>Date Last Observed</th>
<th>Population Info</th>
<th>Threats</th>
<th>Land Manager</th>
<th>Elev. (ft.)</th>
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<td>1</td>
<td>MARTINEZ CANYON NEAR AGUA ALTA CANYON W OF HIGHWAY 86 AND THE COACHELLA VALLEY, SANTA ROSA MOUNTAINS.</td>
<td>Riverside</td>
<td>Martinez Mtn. (3311653)</td>
<td>CNDDDB, May 2017 (EO 1)</td>
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<td>AT THE END OF BULL CANYON ROAD (USFS ROAD 7S13), SAN JACINTO MOUNTAINS.</td>
<td>Riverside</td>
<td>Butterfly Peak (3311655)</td>
<td>CNDDDB, May 2017 (EO 2)</td>
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<td>Indian Cove (3411612)</td>
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<td>VIDAL VALLEY BETWEEN TURTLE MOUNTAINS AND MOPAH RANGE.</td>
<td>San</td>
<td>Vidal NW (3411426)</td>
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<td>UPPER SECTION OF GREENWATER CANYON, GREENWATER VALLEY, DEATH VALLEY NATIONAL PARK.</td>
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**Jaffueliobryum rauui** (Austin) Thériot

### Distribution on National Forest System (NFS) Lands:
(Please see Reference column of Locations table above for references pertaining to Record Numbers indicated on NFS lands.)

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<th>National Forest System (NFS) lands</th>
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**Demographic and Population Trends:** No studies are known on population effects from human activities or fluctuations, cyclic patterns in natural populations.

**Life History:** The gametophyte persists as a perennial structure. The sporophyte capsules mature spring-summer depending on elevation (Spence 2007).

**Diversity:** The genus *Jaffueliobryum* contains three species distributed in Mexico, South America (Bolivia), and central Eurasia (China, Mongolia, Russia), of which two species occur in North America (Spence 2007). There are no studies on phenotypic or genetic diversity. There is some variety of substrate preference, and the great geographical range would suggest that some regional diversification would have occurred.
**Habitat:** *Jaffueliobryum* is distributed in cold to hot and arid regions, often on calcareous rock. *Jaffueliobryum raui* in particular, is considered widespread in North America and locally common on dry sandstone or limestone rock, open arid to semi-arid shrub, woodland communities, grasslands, rarely on compacted sandy soil; moderate to high elevations (200-2,100 m) (Spence 2007). This species was first discovered in California on a ridge on limestone rock outcrops in chamise chaparral by Judith Harpel (Harpel 1999). CNDDB (2017) occurrences mention a substrate of boulders, outcrops, and rocky ledges of basalt, granite, volcanic, and limestone rocks. Various sparse desert plant communities are mentioned, with dominants such as *Atriplex, Acacia,* and *Larrea.* CNPS (2018) lists the following plant communities: alpine dwarf scrub, chaparral, Mojave desert scrub, and Sonoran desert scrub. This species occupies relatively protected microhabitats in these harsh environments as partial, diffuse light or crevices are often mentioned.

**Habitat Status or Trend:** Only one of the seven CNDDB occurrences listed an occurrence rank (Fair). All occurrences list the population as presumed extant only. Four occurrences are from herbarium specimens collected prior to 1980 and three are from herbarium specimens collected since 2000 (CNDDB 2017).

Because of the arid, rocky nature of the habitat, this species is unlikely to be significantly affected by fire.

**Capacity for the Species to Disperse:** Gemmae, the common asexual reproductive strategy in mosses, is absent in this group. The sexual condition is listed as autoicous (Spence 2007), meaning that both male and female organs are on the same stem. No studies have been done on reproductive strategy or dispersal.

Since this species appears to be restricted to arid rocky habitats and possibly shows a preference for calcareous substrates, which are rare and widely separated in the California Floristic Province, it is likely that it has only localized habitat connectivity (where arid calcareous outcrops are frequent), such as in the southeastern deserts, where most of the collections came from.

**Threats:** Potentially threatened by vehicles such as ORV activity (CNDDB 2017). Possibly threatened by road or trail construction and maintenance, and mining (CNPS 2018).

Six of seven known California locations were collected on public lands (BLM, USFS, and NPS). This species is likely more widespread than is currently known.

**Literature Cited**


[CDFG] California Department of Fish and Game. 2013. 24K Quads, SDE Feature Class. Index for 1:24,000-scale (24K), 7.5-minute by 7.5-minute, paper U.S. Geological Survey maps in California.

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[CDF] California Department of Forestry and Fire Protection. 2009. 1:24,000 County Boundaries (cnty24k09_1_poly) [shapefile]. California Department of Forestry and Fire Protection, California Department of Fish and Game. Berkeley Library Geodata. Available at: https://geodata.lib.berkeley.edu/catalog/ark28722-s73w23 [10 December 2017].


Jaffueliobryum rauui (Austin) Thériot


Persons Contacted:


**Author(s) and Date:**
Alison Colwell, Assistant Rare Plant Botanist, California Native Plant Society, (916) 738-7619, acolwell@cnps.org;
Aaron E. Sims, Rare Plant Botanist, California Native Plant Society, (916) 324-3816, asims@cnps.org. September 20, 2018.

**Reviewer(s) and Date:**
David Magney, Rare Plant Program Manager, California Native Plant Society, (916) 447-2677 ext. 205, dmagney@cnps.org. September 24, 2018.

**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.

**Additional Considerations at the Forest Level:** Habitat amount and juxtaposition of both the species and habitat locations.