Species: *Carex nardina* Fries, nard sedge

**Photo Sources:** Calphotos 2020; NRCS 2020

**Photo Credits:** Top left and bottom right: Dana York; top center and bottom left: Joy Mastrogiuseppe et al. 1998 at NRCS 2020; bottom center: Britton and Brown 1913 at NRCS 2020.

**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*      | G4G5, S1 | G4: Apparently Secure — Uncommon but not rare; some cause for long-term concern due to declines or other factors.  
G5: Demonstrably Secure — Common; widespread and abundant. |
Species Account: *Carex nardina*

| Range Rank — A numeric range rank (i.e., G4G5) is used to indicate the range of uncertainty about the exact status of this species. 
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 nation or state/province. |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>California Rare Plant Rank&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
| 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* on List 2 in 2013 (CNPS 2020). |

| California State Listing<sup>c</sup> | Not listed |
|---|
| USDA Forest Service<sup>d</sup> | Not listed |
| USDI FWS<sup>e</sup> | Not listed |
| USDI BLM<sup>f</sup> | Not listed |
| NatureServe OR<sup>g</sup> | S2, HP List 2 |
| S2: Imperiled in Oregon because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences. 
List 2: Threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. |

| Oregon State Listing<sup>h</sup> | Not listed |
|---|
| NatureServe NV<sup>i</sup> | Not listed |
| Nevada State Listing<sup>j</sup> | Not listed |

<sup>a</sup> California Natural Diversity Database, California Dept. of Fish & Wildlife [CNDDB 2020, 2020a]
<sup>b</sup> California Native Plant Society [CNPS 2020]
<sup>c</sup> California Department of Fish and Wildlife [CDFW 2020]
<sup>d</sup> US Forest Service Region 5 Forester’s List [USDA 2013] and Pacific NW Survey and Manage [USDA & BLM 2014]
<sup>e</sup> US Department of Interior Fish and Wildlife Service [USFWS 2020]
<sup>f</sup> US Department of Interior Bureau of Land Management [BLM 2020]
<sup>g</sup> Oregon Biodiversity Information Center [ORBIC 2019]
<sup>h</sup> Oregon Department of Agriculture [ODA 2018]
<sup>i</sup> Nevada Natural Heritage Program [NNHP 2020]
<sup>j</sup> 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>CNDDB EOs</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, 2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>8-Sep-2011</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>
Sources: Distribution: CNDDDB 2020. Baselayers: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.
Nard sedge was last updated in the CNDDB on 2 December 2013 (CNDDB 2020), 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.

In California, nard sedge is only known from two location records in the Marble Mountains in the Klamath Ranges (KR) bioregion; the two populations are separated from each other by about 2.7 miles (CNDDB 2020). Both records are on the Klamath National Forest in the Marble Mountain Wilderness. Nard sedge was first recorded in California when both Marble Mountains populations were discovered in 2011, and the locations have not been visited again since that date. The populations are small, with just a few scattered individuals (Slakey et al. 2013). Outside of California, nard sedge has an Arctic-alpine distribution and occurs in western North America, far eastern Siberia, the Canadian Arctic archipelago and coast, Greenland, Iceland, and northern Scandinavia (Sawtell 2012). The nearest population of nard sedge in Oregon is on Mount Thielsen, which is 118 air-miles away (York 2012).

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

Nard sedge is a perennial, densely cespitose, rhizomatous herb with flowering stems (culms) to 15 cm tall (Cronquist et al. 1977, Wilson et al. 2008); it fruits from August to September (Slakey et al. 2013, CNPS 2020). In California, plants are found on north-facing limestone rock outcrops within subalpine coniferous forest between 2,105 and 2,175 meters in elevation (York 2012, Slakey et al. 2013, CNPS 2020). In other parts of its range, nard sedge grows in dry, rocky, windswept locations within alpine or arctic tundra, steppe, and heath; it is most common on thin, sandy silt in the crevices of rocks on slopes, or in rocky, gravelly areas, usually with a calcareous substrate, although it also can be found off limestone or on sandy beaches (Beschel 1970, Freedman et al. 1982, Sawtell 2012, Slakey et al. 2013). In the Marble Mountains, associates include *Polystichum lonchitis*, *Cystopteris fragilis*, *Saxifragopsis fragarioides*, *Campanula rotundifolia*, *Polemonium pulcherrimum*, *Oxyria digyna*, *Angelica arguta*, and *Achillea millefolium* (York 2012). In Washington state, in the Enchantment Lakes Basin, associates include *Polemonium pulcherrimum*, *Phlox pulvinata*, *Silene acaulis*, *Campanula scabrella*, and *Smelowskia calycina* (del Moral 1979).

*Carex* is a genus of ca. 2000 species found worldwide (FNA 1993+). According to phylogenetic and taxonomic work performed by Sawtell (2012), nard sedge belongs within *Carex* section *Filifoliae* and is most closely related to *C. elynoides*; *Carex elynoides* is a United States native with a distribution restricted to the states adjacent to and including the Rocky Mountains as well as Nevada (NRCS 2020). In some taxonomic treatments, nard sedge is separated into three species: *C. nardina*, *C. hepburnii*, and *C. stantonensis*; phylogenetic and taxonomic work by Sawtell has shown that these species are best treated as one highly variable species (FNA 1993+, Sawtell 2012). The identity of the California populations as *C. nardina* has been confirmed by *Carex* expert Barbara Wilson, who examined specimens from these populations (York 2020 pers. comm., Zika pers. comm. 2020).

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2 Basis for other 1909.12 Chapter 10, Section 12.53 components.
Like all *Carex*, the flowers of nard sedge are unisexual, with the pistillate flowers enclosed in an envelope called a perigynium. In nard sedge the plants are monoecious, with both staminate and pistillate flowers in the same inflorescence and the staminate flowers borne above the pistillate within a unit called a spikelet; each flower in the spikelet is subtended by a flower bract (or scale) (Wilson et al. 2008). Section *Filifoliae* is a group of sedges with inflorescences with just one erect, terminal spikelet (Sawtell 2012). Nard sedge is distinguished by its narrow leaves to 0.5 mm wide, dense, fibrous, persistent, yellowish leaf sheaths, and perigynia nearly lacking in hairs. It is similar to *C. filifolia*, which can be found in similar environments, but the perigynia of *C. filifolia* are hairy (Wilson et al. 2008).

All sedges are wind pollinated. The seeds are dispersed within their perigynia, and dispersal agents include water, wind, and animals (Wilson et al. 2008). Nard sedge is known to be dispersed in Greenland through endozoochory (internal transport) by Canada Geese, but wind-dispersal has been noted for this species elsewhere (Green et al. 2018). Whether it is dispersed by animals or wind in the Marble Mountains is unknown. In a study in the Rocky Mountains, nard sedge was more common in areas with a high snowpack (Buena de Mesquita 2016), which would indicate it needs plenty of moisture due to snowmelt. Sedge seeds generally germinate in moist, sunny, disturbed openings; the seeds are usually dormant when they first mature, preventing germination until the next growing season (Wilson et al. 2008). If conditions are unsuitable during the next growing season, the seeds can remain viable for years in the soil seed bank (Wilson et al. 2008). In the Arctic, field research has shown that nard sedge can develop a seed bank in sandy environments (Freedman et al. 1982); whether it develops a seed bank in the shallow soils of rock ledges in the Marble Mountains is unknown. In addition to reproducing by seed, sedges can also reproduce asexually by their rhizomes. The life span of sedge genets has been measured for very few species and ranges from 30–50 years or longer (Newhouse et al. 1995). Studies in Ellesmere Island, Canada have shown that nard sedge can develop an association with a mycorrhizal symbiont; other studies have shown the species to be non-mycorrhizal (Kohn and Stasovski 1990).

### Overview of ecological conditions for recovery, conservation, and viability 3 including Threats and Risk Factors

Although widespread globally, *Carex nardina* is rare throughout much of its range in North America (Slakey et al. 2013). It is known from just six herbarium collections in Oregon, where it is considered rare (HP List 2) (ORBIC 2019, CPNWH 2020). In California, it is known from just two records in the Marble Mountain Wilderness Area; neither record is ranked in the CNDDB as to site quality (CNDDB 2020). Given the remote area where this species is found, there are no obvious, current threats to this species in California. In addition, it is possible that further populations of this species will be found. However, given the small number of known populations in the state, as well as the small size of both populations, one or both could be extirpated through a stochastic event (Slakey et al. 2013). The most likely future threat to this species in California is climate change which could affect the amount of precipitation, snow pack depth, and moisture availability in the Marble Mountains; this is especially likely given that the

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3 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.
California records are roughly at the southern extent of the species’ range in North America (Slakey et al. 2013).

**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>CNDDB and CNPS</td>
<td>Carex nardina Fries</td>
</tr>
<tr>
<td>Jepson eFlora</td>
<td>Not yet treated</td>
</tr>
<tr>
<td>Flora of North America</td>
<td>Carex nardina Fries</td>
</tr>
<tr>
<td>USDA NRCS* PLANTS</td>
<td>Carex nardina Fr.</td>
</tr>
</tbody>
</table>

*Natural Resources Conservation Service [NRCS 2020]

**Synonymy:** Carex elyniformis A. E. Porsild; C. hepburnii Boott; C. nardina var. atriceps Kükenthal; C. nardina subsp. hepburnii (Boott) Á. Löve, D. Löve & B. M. Kapoor; C. nardina var. hepburnii (Boott) Kükenthal; C. stantonensis M. E. Jones; Vignea nardina (Fr.) Sojak (FNA 1993+, Tropicos 2020).

Jepson eFlora link (JEPS 2020): Nard sedge is not yet included in the Jepson eFlora (Zika 2020 pers. comm.); it will be included in the Jepson Interchange at a later date (Rosatti 2020 pers. comm.).

**Type locality:** Sweden. Lule Lappmark, Vinhaure (Ångström 2626, U) (Sawtell 2012).

**Key literature**

Sawtell, W. M. 2012. *A Systematic Revision of the Carex nardina complex (Cyperaceae).* Thesis submitted to the Faculty of Graduate and Postdoctoral Studies, University of Ottawa.


**Literature cited**


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4 1909.12, Chapter 10, Section 12.53, component 1.
Species Account: Carex nardina


Sawtell, W. M. 2012. *A Systematic Revision of the Carex nardina complex (Cyperaceae).* Thesis submitted to the Faculty of Graduate and Postdoctoral Studies, University of Ottawa.


Persons Contacted

Author(s) and Date:

Reviewer(s) and Date:
Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 16 March 2021; Julie Ann Kierstead, USDA Forest Service Region 5, Ecosystem Planning, 14 May 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 nard sedge within California (NRIS, CNDDB, Calflora/CCH 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 red.

<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>SOUTHEAST SLOPES OF KINGS CASTLE, APPROXIMATELY 0.5 MILE WEST OF PARADISE LAKE, KLAMATH NATIONAL FOREST.</td>
<td>Siskiyou</td>
<td>Marble Mountain (4112352)</td>
<td>CNDDB, Nov 2020 (EO 1)</td>
<td>8-Sep-2011</td>
<td>A FEW SCATTERED INDIVIDUALS OBSERVED IN 2011.</td>
<td></td>
<td>KLAMATH NF</td>
<td>7150</td>
</tr>
<tr>
<td>2</td>
<td>NORTH SLOPE OF BLACK MARBLE MOUNTAIN, APPROXIMATELY 1 AIR MILE N OF MARBLE VALLEY FOREST SERVICE STATION, KLAMATH NF.</td>
<td>Siskiyou</td>
<td>Marble Mountain (4112352)</td>
<td>CNDDB, Nov 2020 (EO 2)</td>
<td>13-Aug-2011</td>
<td>A FEW SCATTERED INDIVIDUALS OBSERVED IN 2011.</td>
<td></td>
<td>KLAMATH NF</td>
<td>6900</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.>
Species Account: Carex nardina

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.