Species: *Piperia colemanii* Rand. Morgan & Glicenstein, Coleman's rein orchid

Photo Source: CalPhotos (2021)

Photo Credits: Left and bottom middle: Stephanie Puenties (SPI, used with permission). Top right: Dean Wm. Taylor. Bottom right: Steven Perry (used with permission).

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 1. Current status of Coleman's rein orchid.

Entity	Status	Status Definition
NatureServe CA[a]	G4 S4	G4: Apparently Secure — Uncommon but not rare; some cause for long-term concern due to declines or other factors. S4: Apparently Secure — Uncommon but not rare; some cause for long-term concern due to declines or other factors.
California Rare Plant Rank[b]	4.3	4: Plants of limited distribution. 0.3: Not very threatened in California.

		This taxon was added to the *CNPS Inventory of Rare and Endangered Plants of California* in 2001 and has undergone no changes in rank since that time.
California State Listing[c]	Not listed	
USDA Forest Service[d]	Not listed	
USDI FWS[e]	Not listed	
USDI BLM[f]	Not listed	
NatureServe OR[g]	Not present	
Oregon State Listing[h]	Not present	
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]
[d] US Forest Service Region 5 Forester's List [USFS 2013] and Pacific NW Survey and Manage [USFS & BLM 2014]
[e] US Department of Interior Fish and Wildlife Service [USFWS 2021]
[f] US Department of Interior Bureau of Land Management [BLM 2020]
[g] Oregon Biodiversity Information Center [ORBIC 2019]
[h] Oregon Department of Agriculture [ODA 2018]
[i] Nevada Natural Heritage Program [NNHP 2021]
[j] 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.

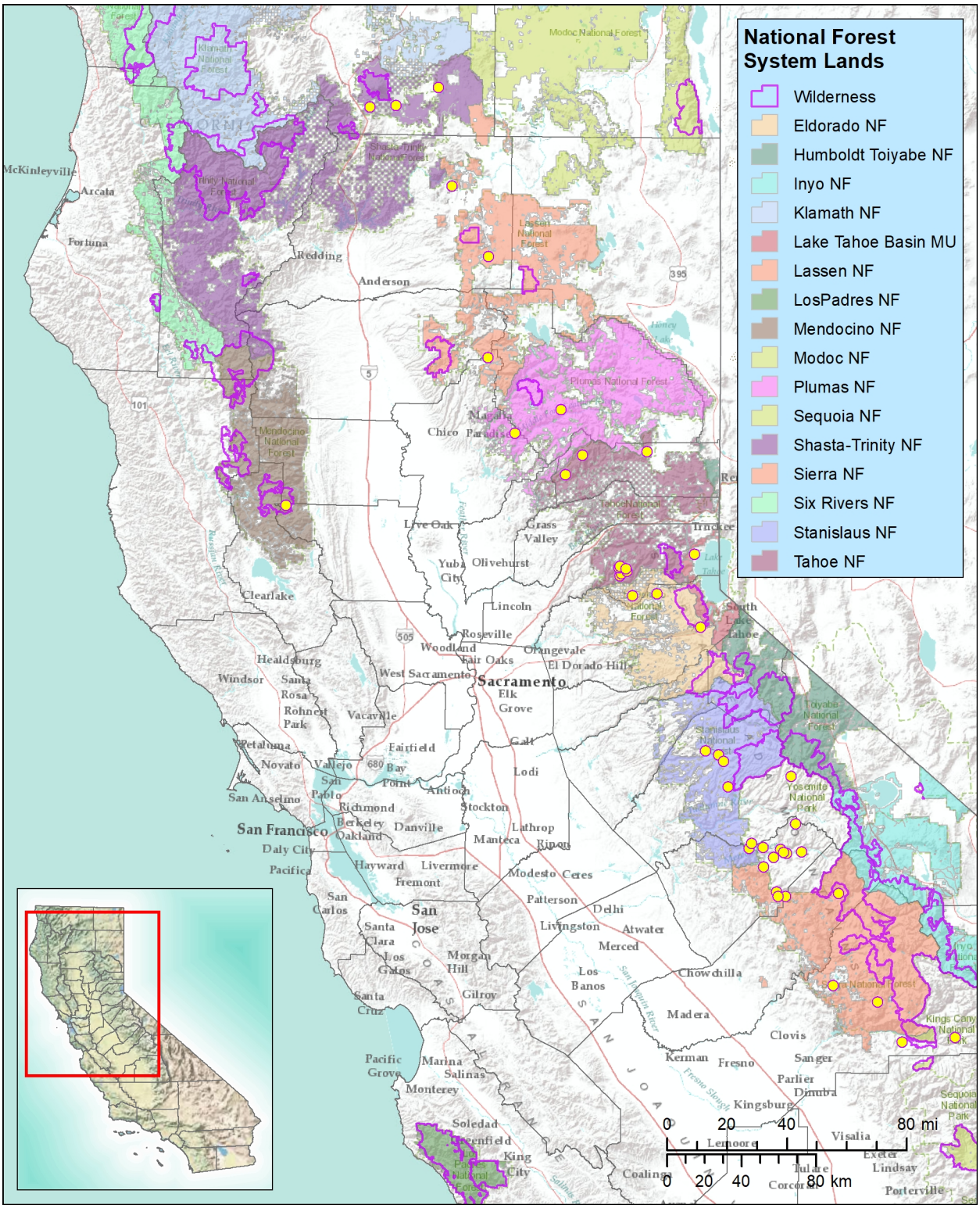
Distribution, abundance, and population trend on the planning unit[1]

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 2. Known occurrence frequency of Coleman's rein orchid within the planning area (NRIS, CNDDB, Calflora/CCH databases).

National Forest System (NFS) lands in California	Record #s (from Table 4)	CNDDB EOs	Non-CNDDB Records	Recent (seen in past 20 years)	Historical (not seen in past 20 years)	Most Recent Obs. Date	Total Records on NFS lands
Eldorado:	4, 5, 30	0	3	3	0	30-Jun-2019	3
Lake Tahoe Basin MU:	28	0	1	0	1	1909	1
Lassen:	1, 32	0	2	1	1	16-Jul-2019	2
Mendocino:	3	0	1	0	1	10-Jul-1972	1
Plumas:	2, 31	0	2	0	2	15-Jul-1991	2
Shasta-Trinity:	37	0	1	0	1	13-Jul-1981	1
Sierra:	8, 10	0	2	0	2	9-May-1952	2
Stanislaus:	43, 45	0	2	0	2	22-Jul-1952	2
Tahoe:	23, 24, 25, 26, 27, 29, 34, 35, 36	0	9	9	0	9-Jul-2018	9
Totals:	N/A	0	23	13	10	N/A	23

[1] 1909.12 Chapter 10, Section 12.53, components 2, 3, and 4.



Sources: *Distribution*: Morgan and Glicenstein 1993, Calflora 2021, CalPhotos 2021, CCH1 2021, CCH2 2021, Denson pers. comm. 2021, NRIS 2020. *Baselayers*: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.

Coleman's rein orchid is endemic to California, where it is found in the High Cascade Range (CaRH), High North Coast Ranges (NCoRH), and Sierra Nevada (SN) bioregions of Siskiyou, Shasta, Plumas, Butte, Sierra, Colusa, Placer, El Dorado, Tuolumne, Mariposa, Madera, and Fresno counties (Morgan and Glicenstein 1993, Calflora 2021, CalPhotos 2021, CCH1, CCH2 2021, Denson pers. comm. 2021, JEPS 2021, NRIS 2021). Forty-five location records for Coleman's rein orchid are included and addressed in this account (Table 4). In addition to these records, Sierra Pacific Industries also has over 430 observations of Coleman's rein orchid that are not reported by CCH or Calflora. These records are from the North Coast, Klamath, Cascade and Sierra Nevada ranges, and include observations from Humboldt, Trinity, Tehama, Amador and Calaveras counties (Lindstrand pers. comm. 2021). While this suggests that Coleman's rein orchid is more widespread and common than previously thought, not all of these records have associated vouchers or photos for confirmation of identification and some may be revisits to the same populations. Coleman's rein orchid is difficult to identify, and location records may need to be checked by an expert.

Twenty-three of the 45 location records in Table 4 are on National Forest lands, with one record (#3) on the Mendocino National Forest, one record (#37) on the Shasta-Trinity National Forest, two records on the Lassen National Forest (#'s 1 and 32), one record each on the Lake Tahoe Basin Management Unit and in Giant Sequoia National Monument, nine records on the Tahoe National Forest, three records on the Eldorado National Forest, two records each on the Plumas National Forest, the Sierra National Forest, and the Stanislaus National Forest. Thirteen records are managed by Yosemite National Park, and one record is managed by Kings Canyon National Park. One record is on private land, and the seven remaining records are of unknown land ownership. The Mendocino National Forest record (#3) is an apparently disjunct population from the Snow Mountain Wilderness. Twenty-one records are recent, having been visited in the last 20 years. Twenty-two records are historical, with seven of these records not visited in over 100 years. The observation dates for the remaining two records are unknown (Morgan and Glicenstein 1993, Calflora 2021, CalPhotos 2021, CCH2 2021, Denson pers. comm. 2021, NRIS 2021).

Fifteen records have some quantitative measure of population size. These estimates range between one and 12 individuals. Occurrences for this species typically have only a few individuals, and occurrences of 10 or more individuals would be unusual to find (Lindstrand pers. comm. 2021). Only four records (#'s 4, 15, 29, and 39) have been visited over multiple years. Record # 29 was visited twice with one individual found in 2015, and none found in 2018 (Calflora 2021, CCH2 2021, NRIS 2021). Overall, there is not enough information to determine the population trends of this species.

Three records were not included in the distribution for this account and are highlighted in pink at the end of Table 4. The record from El Dorado County (Calflora 2021) Based on both the color of the flowers and their long, slender spurs, the record from El Dorado County (Calflora 2021) is clearly not Coleman's rein orchid. Based on location (near the city of Fresno) and elevation, the record from Fresno County (CCH1 2021) is probably also not Coleman's rein orchid. The record

of unknown county (CCH2 2021) did not have precise enough location information to include in this account.

Brief description of natural history and key ecological functions[2]

Coleman's rein orchid is a perennial, terrestrial herb 16–53 cm in height. It grows from a rounded tuberoid and usually produces two to three (or sometimes four) grass-like, basal leaves. The inflorescence is a raceme of unscented green flowers. The flowering period is June–August (FNA 1993+, Morgan and Glicenstein 1993, CNPS 2021, JEPS 2021). This species can be distinguished from the similar *Piperia unalascensis* by the length of its floral spur (no more than 2 mm compared to 4-5 mm spur in *P. unalascensis*), the depth of its tuber (usually 6-11 cm underground, compared to less than 6 mm for *P. unalascensis*), having 0 – 2 stem bracts (versus 2 – 5), and by the shape of the flower's lip, which is usually more hastate or triangular-lanceolate than in *P. unalascensis*.

Coleman's rein orchid is usually found in open mixed conifer forests at 1200–2300 m in elevation. It also occasionally occurs in chaparral or disturbed areas and may prefer sandy substrates (Morgan and Glicenstein 1993, Coleman 1995, Calflora 2021, CCH2 2021, NRIS 2021). Associated plants include *Abies concolor*, *A. magnifica*, *Acmispon nevadensis* var. *nevadensis*, *Calocedrus decurrens*, *Calochortus leichtlinii*, *Corallorhiza maculata*, *C. striata*, *Cornus nuttallii*, *Cypripedium montanum*, *Erigeron breweri* var. *breweri*, *Hieracium albiflorum*, *Leptosiphon ciliatus*, *Melica aristata*, *Pinus jeffreyi*, *P. lambertiana*, *P. ponderosa*, *Piperia transversa*, *Quercus kelloggii*, and *Trisetum canescens* (Coleman 1995, Calflora 2021, CCH2 2021, NRIS 2021). Coleman's rein orchid frequently co-occurs with *Piperia unalascensis*, but there is no evidence that they hybridize in the wild (Morgan and Glicenstein 1993).

California is the center of diversity for the genus *Piperia*, and all 10 species in this genus are present in the state (Ackerman 1977, Coleman 1995, George et al. 2009, JEPS 2021). Recent molecular studies suggest that while *Piperia* is morphologically different from *Platanthera*, it is phylogenetically nested within the genus (Bateman et al. 2003, Lauri et al. 2007, Bateman et al. 2009). *Piperia* has comparatively shorter floral spurs and rounded (instead of elongated) tuberoids (Ackerman 1977, Bateman et al. 2003). Ecologically, *Piperia* is more likely to be found growing in dry sites (Ackerman 1977). Several *Piperia* species have small geographic ranges, and those with larger ranges have had their populations fragmented by development (Lauri et al. 2007).

Piperia, like other orchids, depend on relationships with both pollinators and mycorrhizal fungi (Trembley 1992, Gravendeel et al. 2004, Krupnick et al. 2013, Pandey et al. 2013, Bainbridge 2017). Floral spurs in *Platanthera* (and presumably *Piperia*) are probably adaptations for pollination by Lepidoptera (Bateman et al. 2003), and Coleman's rein orchid is likely pollinated by moths (Bainbridge 2017). Spur length and floral scent may be important for reproductive isolation between different species of *Piperia* (Ackerman 1977). No studies have been done on seed dispersal in *Piperia*, but in other orchids it is hypothesized that seeds travel on average 6

[2] Basis for other 1909.12 Chapter 10, Section 12.53 components.

meters from the parent plants (Lauri et al. 2007). *Piperia* produce more viable seed when outcrossed than when selfed (Lauri et al. 2007). Low seed germination and low seedling survival are common traits in orchids, particularly in temperate terrestrial orchids (George et al. 2009). Orchids depend on mycorrhizal associations for germination, seedling survival, and adult success in many cases (particularly for terrestrial orchids like Coleman's rein orchid) (Pandey et al. 2013, Bainbridge 2017). All orchids are parasitic on their fungal associates at the beginning of their life cycle, but photosynthetic orchids may eventually provide carbon to their associated fungi later in life (Pandey et al. 2013). Research has found that *Piperia yadonii* (CRPR 1B.1; CNPS 2021) is associated with a wide variety of fungal species, and that these associates vary with habitat (Pandey et al. 2013). Coleman's rein orchid may have similar generalist fungal associations (Bainbridge 2017). *Piperia* species regenerate from their tuberoids at the beginning of the growing season and regrow their tuberoids every year. Evidence suggests that these structures may help some species of *Piperia* to survive drought in the late summer and fall (Coleman 1995, Pandey et al 2013), and the depth of Coleman's rein orchid's tubers could also help this species escape fire.

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

Habitat quality has not been described for any location records of Coleman's rein orchid. Although all orchids are protected by the Convention on International Trade in Endangered Species (CITES), populations of Coleman's rein orchid tend to be small, which leaves them more vulnerable to extirpation (Bainbridge 2017). Climate change and habitat alteration are probably the most pressing threats to this species (Krupnick et al. 2013, Colwell pers. comm. 2021). Due to their relationships with the species around them, orchids are very vulnerable to climate change, disturbance, or other disruptions to their habitat, with terrestrial orchids being the most vulnerable (Krupnick et al. 2013). Human activities (e.g., logging and fire suppression or mitigation activities) that change microclimates or cause soil disturbance could disrupt relationships with mycorrhizal associates (Coleman 1995, Bainbridge 2017). Studies of *Piperia yadonii* showed that this species did not survive disturbance though it could eventually recolonize disturbed sites (George et al. 2009). Some evidence suggests that Coleman's rein orchid can survive disturbance, as it is often found in old roads and skid trails in the northern part of its range (Lindstrand pers. comm. 2021). Climate change could also potentially disrupt plant-pollinator relationships for many flowering plant species. Changes in either plant or pollinator phenology could disrupt plant-pollinator relationships. Changes in co-flowering species could also disrupt plant-pollinator relationships, potentially affecting long-term reproductive success and survival of insect-pollinated wildflowers like *Piperia* species and other orchids (Alexander et al. 2015, Theobald et al. 2017). A plant's ability to migrate due to climate change could also be restricted by biotic interactions or dispersal ability (Ettinger and HilleRisLambers 2013). The difficulty in replicating orchids' symbiotic relationships makes habitat protection particularly important for their conservation.

[3] 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.

Sixteen records of Coleman's rein orchid were found within previous fire perimeters. Ten of these locations have been burned within the last 20 years, and three locations (record #'s 2, 3, and 10) burned in 2020 in the North Complex, August Complex, and Creek fires (CalPhotos 2021, CCH1 2021, CCH2 2021, Denson 2021, FRAP 2021, NRIS 2021). The disjunct population in the North Coast Ranges (#3) has burned in 2001, 2018, and 2020 (CCH2 2021, FRAP 2021). At least one record (# 5) has probably been burned in the Caldor Fire (Perry pers. comm. 2021). One record (# 29) was observed two years after being burned, but was not relocated five years post-fire (FRAP 2021, NRIS 2021). Low-intensity fires may be important for maintaining habitat for Coleman's rein orchid, but large fires that result in habitat type conversion or destruction of fungal associates could reduce suitable habitat for this species or extirpate some populations (Bainbridge 2017, Colwell pers. comm. 2021). Future monitoring is recommended for populations of Coleman's rein orchid that have been exposed to fire.

Taxonomy[4]

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

Table 3. Name status of Coleman's rein orchid.

Entity	Name Status
CNDDB and CNPS	*Piperia colemanii* Morgan & Glicenstein
Jepson eFlora	*Piperia colemanii* Rand. Morgan & Glicenstein
Jepson Manual (1993)	Not treated
Flora of North America	*Piperia colemanii* Rand. Morgan & Glicenstein
USDA NRCS[a] PLANTS	*Piperia colemanii* R. Morgan & Glicenstein

[a] Natural Resources Conservation Service [NRCS 2021]

Synonymy: *Platanthera colemanii* (Rand. Morgan & Glicenstein) R.M. Bateman

Jepson eFlora link (JEPS 2021): https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=76514

Type locality: "United States. California: Mariposa Co.: Tamarack Flat, Yosemite National Park" (*Abrams 4698*, holotype DS; isotype NY) (Morgan and Glicenstein 1993, JSTOR 2021)

Key literature

Ackerman, J. D. 1977. Biosystematics of the genus *Piperia* Rydb. (Orchidaceae). *Botanical Journal of the Linnean Society* 75: 244–270.

Bainbridge, S. 2017. Species Evaluation Form: *Piperia colemanii* Morgan & Glicenstein. (Coleman's rein orchid) NatureServe, Arlington, Virginia.

Bateman, R. M., K. E. James, Y. Luo, R. K. Lauri, T. Fulcher, P. J. Cribb, and M. W. Chase. 2009. Molecular phylogenetics and morphological reappraisal of the *Platanthera* clade (Orchidaceae: Orchidinae) prompts expansion of the generic limits of *Galearis* and *Platanthera*. *Annals of Botany* 104: 431–445.

Coleman, R. A. 2002. *The Wild Orchids of California*, 2nd Edition. Ithaca, NY: Cornell University Press.

[4] 1909.12, Chapter 10, Section 12.53, component 1.

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Morgan, R. and L. Glicenstein. 1993. Additional California taxa in *Piperia* (Orchidaceae). *Lindleyana* 8(2): 89–95.

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Persons Contacted

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Author(s) and Date:

Molly S. Wiebush, California Native Plant Society, Rare Plant Botanist Coordinator, 28 September 2021; finalized 15 October 2021.

Reviewer(s) and Date:

Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 30 September 2021; Julie Ann Kierstead, USDA Forest Service Region 5, Ecosystem Planning, 11 October 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 Coleman's rein orchid within California (NRIS, CNDDB, Calflora/CCH databases).

REDACTED FOR CONSERVATION PURPOSES

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.>