Plant Species Evaluation Form

Lilium rubescens Wats.

REDWOOD LILY

Family: Liliaceae (CNPS 2018) | **PLANTS Symbol:** LIRU (USDA 2018) | **Calif. Endemic:** Yes (CNPS 2018)

Synonyms/Other Names: *Lilium rubescens* was described by S. Watson in 1879. The taxon was combined as *L. washingtonianum* var. *rubescens* by Tilton in 1916. The latter is regarded as an illegitimate name, and will be seldom encountered in the literature (Tropicos 2018).

Identification Issues: This taxon may be confused with *L. washingtonianum* or *L. kelloggii*, both of which have a white to pink perianth, and occur in northwestern California. *Lilium kelloggii* can be excluded on the basis of its reflexed perianth parts and yellow midribs. *Lilium washingtonianum* is a more difficult case: its flower is generally larger than that of *L. rubescens* (albeit with some overlap in the size range); the bloom of *L. washingtonianum* is also borne at a more pronounced angle off the plant axis, i.e. nodding to ascending, rather than ascending to erect as in *L. rubescens* (Skinner 2012). These are subtle and overlapping traits; observation of multiple individuals of both species will provide a sense for the range of variation expected in each.

Taxonomy:

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Species In Genus: +- 100 species: northern temperate, tropical mountains of eastern Asia. Etymology: (Greek: lily). Note: Variable, hybridization common. Many species declining from habitat destruction, collecting; few thrive in gardens. Generally flowers May--Aug.

Habit: Plant < 2 m, often glaucous; bulb +- erect-ovoid, scales unsegmented, longest 4--9 cm. Leaf: in 3--9 whorls, generally +- ascending, 3--13 cm, generally oblanceolate; margin generally wavy. Inflorescence: flowers 1--40, ascending to erect. Flower: funnel-shaped, fragrant; perianth parts 4.2--6.6 cm (inner wider, strongly oblanceolate), recurved in distal 33--50%, adaxially white, turning pink-purple, magenta spots minute, abaxially often +- red or +- purple; stamens held at same level as perianth, filaments +- parallel except distally, anthers 4--8 mm, pale yellow, pollen yellow; pistil 2.7--3.8 cm. Fruit: 2--3.7 cm, generally ribbed. eFlora Treatment Author: Mark W. Skinner.

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).

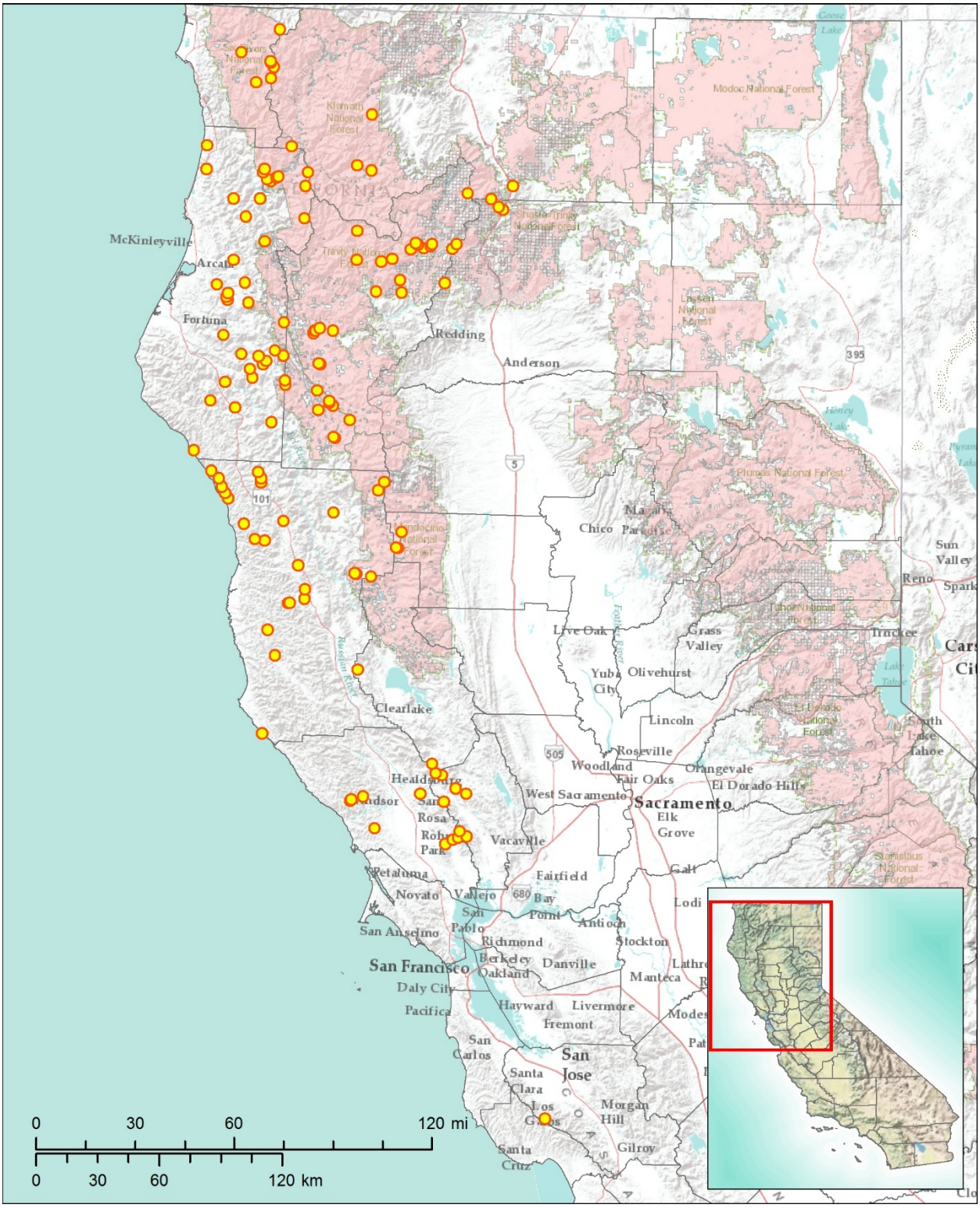
State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G3	CA: S3 NV: Not listed OR: Not listed	4.2	Not listed	Not listed	Not listed

SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Not listed	Not listed	Not listed	Not listed

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=Nevada Natural Heritage Program Status (NNHP 2017); NNPS=Nevada 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: *Lilium rubescens* is found in southwestern Oregon and northwestern California, with occurrences as far south as the San Francisco Bay area, encompassing the Northwestern (NW) and San Francisco Bay (SnFrB) bioregions within the California Floristic Province (CNPS 2018, Skinner 2012). The are records of this species from the following counties: Del Norte, Glenn, Humboldt, Lake, Mendocino, Napa, Santa Cruz, Shasta, Siskiyou, Sonoma, and Trinity (CNPS 2018). National Forest System lands on which *L. rubescens* exists include Klamath NF, Mendocino NF, Shasta-Trinity NF, and Six Rivers NF (Calflora 2017, CCH 2017, NRIS 2017).



Sources: *Distribution*: Calflora 2017, CCH 2017, NRIS 2017. *Layers*: USDA Forest Service, Pacific Southwest National Forests: CPAD 2016. California counties: CDF 2009. *Basemaps*: California inset map: © 2013 National Geographic Society, i-cubed (Esri 2017a). Main map: Esri, DeLorme, USGS, NPS (Esri 2012) and Esri, USGS, NOAA (Esri 2017b).

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 (CNDDB 2017) definition of Element Occurrences (EOs) in California. Official EO numbers for plants in California are determined solely by the CNDDB and are included within the Reference (Source) column for CNDDB 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.

Redacted for conservation purposes.

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.)

National Forest System (NFS) lands	Record #s (from Locations table above)	CNDDB EOs	Non-CNDDB Records	Recent (seen in past 20 yrs.)	Historic (not seen in past 20 yrs.)	Most Recent Obs.	EOs/ Recs. (5 mile buffer)	Total Records on NFS lands
Angeles:	-	-	-	-	-	-	-	0
Cleveland:	-	-	-	-	-	-	-	0
Eldorado:	-	-	-	-	-	-	-	0
Inyo:	-	-	-	-	-	-	-	0
Klamath:	121, 123, 124, 127, 130	0	5	0	5	31-Jul-1980	9	5
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	26, 30, 31, 34, 41, 45	0	6	4	2	26-Jul-2001	5	6
Modoc:	-	-	-	-	-	-	-	0
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	55, 57, 58, 66, 67, 74, 75, 76, 77, 78, 79, 85, 86, 89, 90, 92, 93, 94, 95, 97, 99, 100, 102, 103, 104, 112	0	26	5	21	19-Jun-2016	16	26
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	49, 50, 52, 54, 59, 61, 62, 71, 80, 81, 106, 113, 115, 117, 118, 119, 122, 126, 128, 129, 131, 132, 133, 134	0	24	0	24	17-Jul-1994	7	24
Stanislaus:	-	-	-	-	-	-	-	0

National Forest System (NFS) lands	Record #s (from Locations table above)	CNDDB EOs	Non-CNDDB Records	Recent (seen in past 20 yrs.)	Historic (not seen in past 20 yrs.)	Most Recent Obs.	EOs/ Recs. (5 mile buffer)	Total Records on NFS lands
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	0	61	9	52	N/A	37	61

Demographic and Population Trends: *Lilium rubescens* is known from approximately 134 occurrences in California. Total number of occurrences for this taxon were estimated using GIS tools and methods described by Green and Sims (2018). Of the 134 occurrences of this taxon, nine contain information related to population size; none of these offer multi-year data. Seven records document between one and ten individuals; one has 23, and one has 76 (Calflora 2017, CCH 2017, NRIS 2017). *Lilium rubescens* is ranked as Vulnerable in California (NatureServe 2018). Lilium rubescens is not listed in the Oregon Flora and putative specimens collected from Oregon have al been identified as *L. washingtonianum* ssp. *purparascens*, suggesting that *L. rubescens* may never have been present in the state (Meyers et al. 2015). Additional field surveys will be required for a better-founded understanding of population status and dynamics in this species.

Life History: *Lilium rubescens* is a perennial bulbiferous herb that blooms from April to August, sometimes extending the flowering period into September (CNPS 2018). Plants in the genus *Lilium* are pollinated by an array of insects, as well as by hummingbirds (Trochilidae). Among the insects are bees (Hymenoptera: Apidae), especially bumblebees (*Bombus* spp.), and Lepidoptera, including swallowtail butterflies (*Papilio* spp.) and sphinx moths (Sphingidae) (CPC 2018). While the specific pollinators of *L. rubescens* are not known, they probably come from some or all of these groups.

Diversity: The genus *Lilium* consists of about 100 species, distributed across the temperate latitudes of the northern hemisphere, with a few representatives in the mountainous parts of tropical eastern Asia (Skinner 2012c). The genus was traditionally divided into seven sections, based upon fifteen morphological characters; recent molecular phylogenetic analyses largely support this arrangement, with limited reorganization. *Lilium rubescens* is sister to *L. bolanderi* and *L. kelloggii*, nested within *Pseudolirium*, a monophyletic section found only in North America (Douglas et al. 2011, Gao et al. 2013). *Lilium* evolved during the Miocene, about 10Mya (Vinnersten and Bremer 2001); much of the group's species diversity in Asia results from orogenic events at the margins of the Tibetan Plateau, which drove speciation via allopatry and habitat disparification. Global biogeographic inference in *Lilium* remains enigmatic, as a result of poor phylogenetic resolution at basal splits between Asian, European and North American clades (Gao et al. 2013).

Lilium taxa are known for rampant hybridization in cultivation, and there is some evidence for this in wild populations. Promiscuous gene flow, together with edaphic specialization, seems to play a large role in diversification within *Lilium* (Douglas et al. 2011).

Habitat: *Lilium rubescens* occurs on dry soils in chaparral, and in forest gaps at elevations between 30m and 1,800m (Skinner 2012c). It is known from broadleaf upland forests, north coast coniferous forests, and lower- and upper montane coniferous forests. This species can tolerate serpentine-derived substrates, and some degree of disturbance, it is sometimes found on roadsides (CNPS 2018).

Habitat Status or Trend: The Klamath Ranges (KR) and adjacent bioregions of northwestern California have played host to a remarkable diversification in plant species, as a consequence of complex geology and long history of isolation (Whittaker 1960). The region is one of six globally important temperate forest biodiversity hotspots, having served as a climatic refugium during the Pleistocene. More than a century of land use, including logging, mining, grazing and modification of fire regimes, has significantly altered much of the region. Only 28% of the old-growth forest remains within the Klamath Ranges bioregion, and ongoing human impacts continue to degrade wild communities, especially in mesic lowland and mid-elevation areas, partly encompassing the elevation range of *L. rubescens*. The scale and speed of anthropogenic climate change might exceed the capacity of the Klamath region to provide refugia for taxa of low mobility and narrow ecological requirements, though careful management may partially mitigate this risk (Olson et al. 2012).

The southern end of this species' range touches upon the heavily populated San Francisco Bay area. State and local government began a program of open space preservation early in this region's development, and have added to conservation-directed holdings consistently over the years (Santos et al. 2014). But urbanization continues apace, and an array of direct- and indirect effects of human activity, including wildfire and climate change, are rapidly modifying habitat at low- and middle elevations (Chornesky et al. 2015).

Capacity for the Species to Disperse: *Lilium* fruits are loculicidal, opening along suture lines to expose compact, flattened seeds in an arrangement reminiscent of stacked coins. Upon dehiscence, dispersal occurs principally by gravity, with some wind-scattering as a result the seeds' small size, flattened geometry and the presence of a marginal wing. *Lilium* endosperm contains aleurone and fatty oils, but no starch. This chemical makeup suggests the possibility of ant-mediated dispersal, a phenomenon observed in allied genera, though the absence of a true elaiosome means this mode is at best secondary (Kubitzki 1998). While studies of dispersal distance in *L. bolanderi* are lacking, its seed morphology and inferred dispersal mode(s) suggest a preponderance of short-distance dispersal events, perhaps favoring persistence over colonization. Recruitment can also occur asexually, by means of underground bulbs; this too is a mechanism of persistence, more than of dispersal. Self-incompatibility is the norm in *Lilium*; but it attenuates around floral senescence, allowing self-fertilization to occur if outcrossing has failed (Ascher and Peloquin 1966). Accordingly, isolated jump-dispersal events may produce viable populations—albeit of low genetic diversity.

Threats: This species is threatened by the direct- and indirect effects of urbanization, as well as by disturbance associated with timber extraction, road construction and grazing. Competition from invasive plant taxa may reduce population viability in parts of the range; and overzealous collection for the horticultural trade is likely to have a significant effect. The buds and flowers are relished by deer; flowering individuals are often found protected by surrounding shrubs. Lilium rubescens hybridizes with *L. bolanderi*, and likely with other *Lilium* species in its range; this poses a risk of genetic dilution (CNPS 2018). Ex situ conservation may be possible via seed banking, It isunlikely for this species to be grown ex situ, however, as allied taxa do not thrive in captivity (Skinner 2012c).

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Julie A. Kierstead, USDA Forest Service Region 5 Ecosystem Planning, 27 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.

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