Plant Species Evaluation Form

Clarkia gracilis (Piper) Nels. & Macbr. **subsp.** *tracyi* (Jeps.) Abdel-Hameed & R. Snow

TRACY'S CLARKIA

Family: Onagraceae (CNPS 2018)

PLANTS Symbol: CLGRT (USDA 2018)

Calif. Endemic: Yes (CNPS 2018)

Synonyms/Other Names: *Clarkia gracilis* was described by Nelson and MacBride (1918) as a recombination of the earlier name *Godetia gracilis* Piper. In 1968, Abdel-Hameed and Snow subsumed *Godetia cylindrica* var. *tracyi* Jeps into *C. gracilis*, creating the taxon being treated here (Tropicos 2018).

Identification Issues: Provided information about floral traits and geographic range, differentiation of this taxon is straightforward. Identification of sterile material is problematic (Lewis 2012).

Taxonomy:

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Species In Genus: +- 41 species: western North America, 1 South America. Etymology: (Captain William Clark, 1770--1838, of Lewis & Clark Expedition). Note: Self-fertile; self-pollinated or outcrossed; on herbarium specimens, curvature of inflorescence axis in bud generally reliable, pollen color generally not.

Flower: petals generally 20--30 mm, pink-lavender, base red; stigma exserted beyond anthers. eFlora Treatment Author: Harlan Lewis.

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).

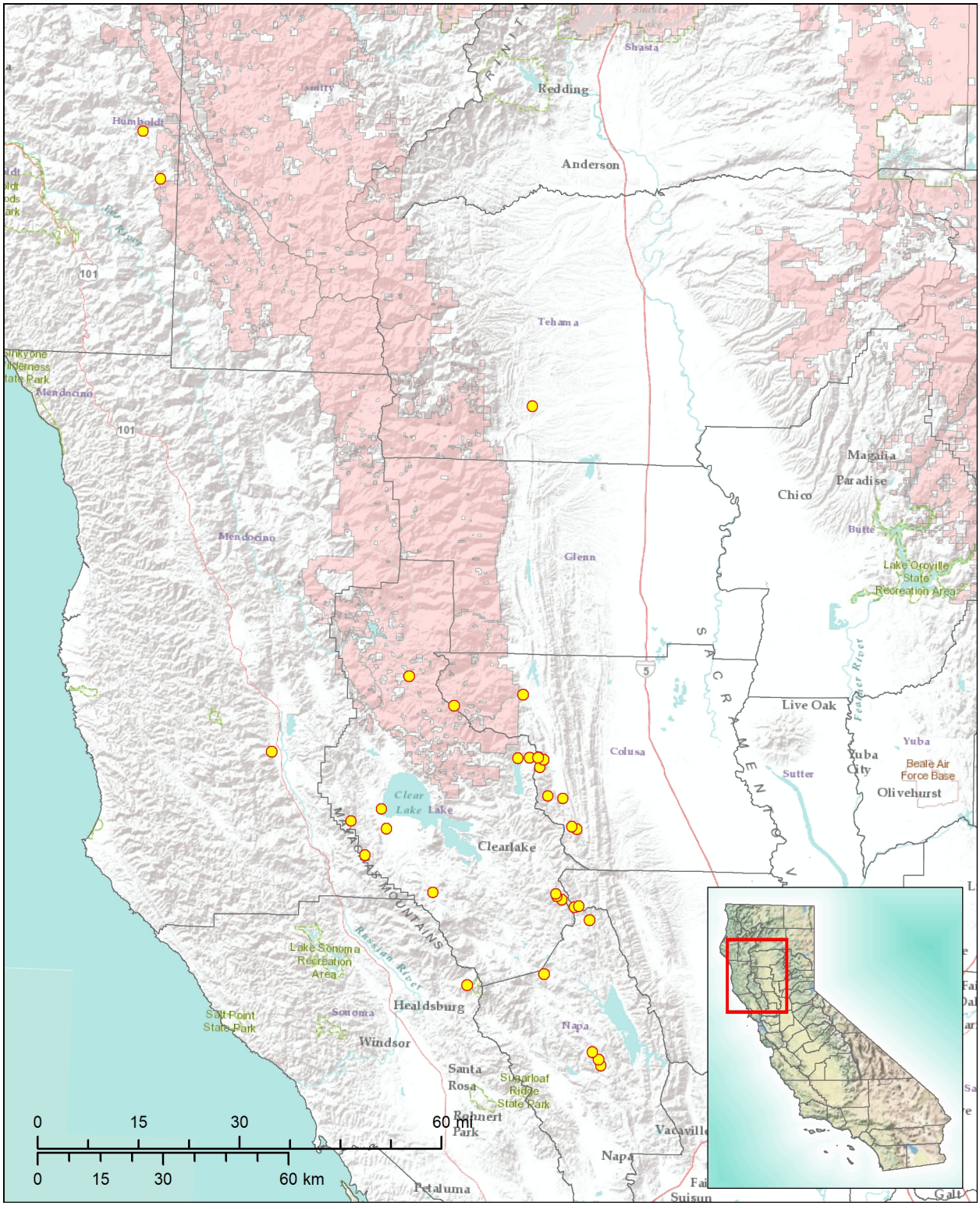
State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G5T3	CA: S3 NV: Not listed OR: Not listed	4.2	Not listed	Not listed	Not listed

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: *Clarkia gracilis* subsp. *tracyi* is a California endemic taxon, which occurs in the Inner North Coast Ranges (NCoRI) bioregion. It has been found in Colusa, Humboldt, Lake,

Mendocino, Napa, Tehama, and Trinity counties (CNPS 2018, Lewis 2012). The only National Forest System lands on which this taxon occurs fall within Mendocino NF; additional records exist from a five-mile buffer around Mendocino NF and Six Rivers NF (Calflora 2017, CCH 2017).



Sources: *Distribution*: Calflora 2017, CCH 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.

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
1	On Route 128, near milepost 16.15, about 0.2 mile east of Lower Chiles Valley road turnoff	Napa	Chiles Valley (3812253)	CCH, Jan 2017 (RSA495972)	24-May-1988				
1	On Route 128 between turnoff to Route 121 and Spanish Flat Road at milepost 18.71	Napa	Chiles Valley (3812253)	CCH, Jan 2017 (RSA495971)	24-May-1988				
2	Napa County: West side of Lower Chiles Valley Road, 1/4 mile NW of Highway 128	Napa	Chiles Valley (3812253)	CCH, Jan 2017 (UCD104571)	2-Jun-1995				984
2	Chiles Valley	Napa	Chiles Valley (3812253)	CCH, Jan 2017 (JEPS110695)	13-Jun-1982				975
3	Napa County: Turtle Rock-Rutherford. Lower Chiles Valley Road. Chiles Valley	Napa	Chiles Valley (3812253)	CCH, Jan 2017 (UCD63363)	11-Jun-2006				886
4	Ida Clayton Rd.	Sonoma	Mount St. Helena (3812266)	Calflora, May 2017 (jgr18552)	24-May-1986	1+ individuals			2208
5	.1 mile north of Snell Valley Rd. on Butts Canyon Rd.	Napa	Aetna Springs (3812264)	CCH, Jan 2017 (JEPS110764)	22-Jun-1980				670
6	Napa County: Berryessa-Knoxville Road. Knoxville Public Lands	Napa	Knoxville (3812273)	CCH, Jan 2017 (UCD54391)	11-Jun-2006			Knoxville Wildlife Area	1280

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
6	Napa County: Knoxville Public Lands	Napa	Knoxville (3812273)	CCH, Jan 2017 (UCD63050)	11-Jun-2006			Knoxville Wildlife Area	2133
7	Knoxville Rd	Napa	Jericho Valley (3812274)	Calflora, May 2017 (wb1194-842)	31-May-2009	1+ individuals			2024
7	Near Knoxville 2 miles SE of Lake Co. line on Berryessa Rd.	Napa	Knoxville (3812273)	CCH, Jan 2017 (RSA537552)	28-May-1989				2001
7	near Knoxville (2 mi se of Lake County line on Berryessa Road, extreme n Napa County)	Napa	Knoxville (3812273)	CCH, Jan 2017 (UC1586100)	28-May-1989				2000
8	near Knoxville (2 mi se of Lake County line on Berryessa Road, extreme n Napa County)	Napa	Knoxville (3812273)	CCH, Jan 2017 (JEPS85844)	28-May-1989				2000
9	0.1 mi up BLM Rd at sharp curve -- BLM Land just NW of Napa Co	Lake	Jericho Valley (3812274)	Calflora, May 2017 (wb1194-841)	25-May-2008	1+ individuals		BLM	2133
9	Lake County: McLaughlin UC Reserve. Northern Research Hill area, just S of Hunting Creek, crossing road to Dunnigan Hill	Lake	Jericho Valley (3812274)	CCH, Jan 2017 (UCD20443)	2-Jun-2002				2080
10	Lake County: Between Quarry Valley View Road and Quarry Valley Road, McLaughlin Preserve. ~5-10 min drive away from McLaughlin Preserve Field Station.	Lake	Jericho Valley (3812274)	CCH, Jan 2017 (UC2043696)	26-Apr-2015				2264

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
11	Bottle Rock Road 1.2 miles N jct. Sulphur Springs Road (ca. 1.3 road mi n of Glenbrook)	Lake	The Geysers (3812277)	CCH, Jan 2017 (JEPS101733)	22-Jun-1998				2600
12	Lake County: Mclaughlin UC Reserve. West of Morgan valley Road, SSE of reserve headquarters and E of tailings pond	Lake	Jericho Valley (3812274)	CCH, Jan 2017 (UCD160686)	10-May-2015				2200
13	Lake County: Highland Springs	Lake	Highland Springs (3812288)	CCH, Jan 2017 (UCD112031)	13-May-2007			Highland Springs Rec. Area	1975
14	serpentine hill just S of junction of Highway 175 and Highway 29, ca. 2 mi S Lakeport	Lake	Lakeport (3912218)	CCH, Jan 2017 (JEPS101732)	18-Jun-1998				1400
15	Colusa County: Payne Ranch (owned by BLM), lands to the SW of the intersection of Hwys 20 and 16. Unnamed drainage south of Hwy 20 between Hwy 16 and Lynch Canyon that drains to Bear Creek by passing under Hwy 20	Colusa	Salt Canyon (3912213)	CCH, Jan 2017 (UCD63104)	18-May-2008				1143
15	Colusa County: Bear Creek Botanical Management Area. Caltrans right-of-way on south side of Hwy 20, about 0.5 mile west of Hwy 20/16 instersection (between Colusa Co. mileposts 2.17 and 2.25)	Colusa	Wilbur Springs (3912214)	CCH, Jan 2017 (UCD63914)	24-May-2001				1122

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
15	Bear Creek Botanical Management Area. Caltrans right-of-way, south side of Hwy 20, c. 0.5 mi west of Hwy 20/16 intersection (between mileposts 2.17 and 2.25).	Colusa	Wilbur Springs (3912214)	CCH, Jan 2017 (UCR212337)	24-May-2001				1122
16	serpentine hill just S of junction of Highway 175 and Highway 29, ca. 2 mi S Lakeport	Lake	Lakeport (3912218)	CCH, Jan 2017 (JEPS101731)	4-Jun-1998			BLM	1400
17	Colusa County: Bear Valley. Bear Valley Road. Bear Valley Creek	Colusa	Wilbur Springs (3912214)	CCH, Jan 2017 (UCD70216)	24-Jun-1998				1214
18	Lakeport	Lake	Lakeport (3912218)	Calflora, May 2017 (jgr19471)	12-May-2002	1+ individuals			1371
19	Bear Valley	Colusa	Wilbur Springs (3912214)	Calflora, May 2017 (jgr11179)	6-Jun-1993	1+ individuals			1316
20	Inner North Coast Ranges. Eaton Springs, about 2.4 km east of Walker Ridge Road. Meadow opening	Colusa	Wilbur Springs (3912214)	CCH, Jan 2017 (CHSC88596)	6-Jun-2001			BLM	2339
21	Walker Ridge. Barrel Springs area	Lake	Leesville (3912224)	CCH, Jan 2017 (CAS1131261)	12-Jun-2011			BLM	2402
21	East side of county near Barrel Spring on the east side of Baldy Mtn. and west of Walker Ridge Rd. 0.8 mi south of Bartlett Springs Rd	Lake	Leesville (3912224)	CCH, Jan 2017 (CHSC71439)	15-Jul-1998			BLM	2100

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
21	Lake County: Walker Ridge. Barrel Springs area	Lake	Leesville (3912224)	CCH, Jan 2017 (UCD110411)	12-Jun-2011			BLM	2402
21	0.8 mi s of Bartlett Springs Road (e side of county near Barrel Spring on e side of Baldy Mountain and w of Walker Ridge Road); Baldy Mountain	Lake	Leesville (3912224)	CCH, Jan 2017 (JEPS93865)	15-Jul-1998			BLM	2100
22	Mendocino County: Ukiah, Low Gap Road, 1 mile past Low Gap Park parking lot	Mendocino	Ukiah (3912322)	CCH, Jan 2017 (UCD104568)	10-May-1998				800
23	Inner North Coast Range. Bartlett Springs Rd. (M12, County Rd. 303) at Indian Valley Reservoir. On a roadside slope	Lake	Hough Springs (3912225)	CCH, Jan 2017 (CHSC68549)	3-May-1997			BLM	1500
24	1.8 mi W of Bear Valley Rd -- Rte M12 (Brim Rd)	Colusa	Leesville (3912224)	Calflora, May 2017 (wb1194-843)	18-Apr-2010	1+ individuals			1713
24	Bear Valley-Bartlett Springs Rd. midway up east side of Walker ridge.	Colusa	Leesville (3912224)	CCH, Jan 2017 (CDA12217)	1-Jun-1993				1640
24	Bear Valley-Bartlett Spring Road, midway up E side of Walker Ridge.	Lake	Leesville (3912224)	CCH, Jan 2017 (UCR80859)	1-Jun-1993			BLM	1640
25	roadside near small moist meadow 0.7 mi. from Walker Ridge Rd. junction	Lake	Hough Springs (3912225)	CCH, Jan 2017 (UC1728661)	14-Jun-1986			BLM	2320

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
26	Inner North Coast Ranges. Dry stony ground adjacent to a spring and rocky drainage on northeast side of Bartlett Springs Road 1.1 km northwest of Walker Ridge summit	Lake	Leesville (3912224)	CCH, Jan 2017 (CHSC78677)	30-May-2000				2070
27	Goat Mt Rd.	Colusa	Fouts Springs (3912236)	Calflora, May 2017 (jgr1661)	3-May-1997	1+ individuals		Mendocino NF	5853
28	Along Little Stony Creek, on Goat Mtn. Rd. ~ 1/2 km. W of intersection with Lodoga-Stonyford Rd.	Colusa	Gilmore Peak (3912235)	CCH, Jan 2017 (CDA15461)	19-Jun-1998				1312
28	Northern California. North Coast Ranges. Along Little Stony Creek, on Goat Mtn. Rd. ~ 1/2 km. W of intersection with Lodoga-Stonyford Rd. UTM: 10S, 05401 N, 43499 E	Colusa	Gilmore Peak (3912235)	CCH, Jan 2017 (CHSC79534)	19-Jun-1998				1312
28	Along Little Stony Creek, on Goat Mtn. Rd., ~0.5 km W of intersection with Lodoga-Stonyford Rd.	Colusa	Gilmore Peak (3912235)	CCH, Jan 2017 (HSC94165)	19-Jun-1998				1312
28	Colusa County: Inner North Coast Ranges. Along Little Stony Creek, on Goat Mountain Road. Around 1/2 km west of intersection with Lodoga-Stonford Road	Colusa	Gilmore Peak (3912235)	CCH, Jan 2017 (UCD146724)	19-Jun-1998				1312

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
29	on rd. to Snow Mt. from Upper Lake (at small tributary to Bear Creek, Mendocino Nat'l Forest); Mendocino Nat'l Forest	Lake	Potato Hill (3912237)	CCH, Jan 2017 (UC1728672)	17-Jun-1986			Mendocino NF	2100
30	hills n Paskenta; ; Paskenta, Tehama Co.	Tehama	Paskenta (3912285)	CCH, Jan 2017 (JEPS1958)	9-May-1932				
31	Red mountain, small colony summit of rd thru serpentine.Uncommon	Humboldt	Dinsmore (4012345)	CCH, Jan 2017 (BLMAR7)	17-Jun-1993				2953
32	Buck Mountian, lower foothills of its northwest slope.	Humboldt	Larabee Valley (4012346)	CCH, Jan 2017 (SEINET200783)	28-Jun-1931				

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:	-	-	-	-	-	-	-	0
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	27, 29	0	2	0	2	3-May-1997	6	2
Modoc:	-	-	-	-	-	-	-	0
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	2	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	0	2	0	2	N/A	8	2

Demographic and Population Trends: Total number of occurrences for this taxon were estimated using GIS tools and methods described by Green and Sims (2018). Of 32 records for this subspecies, none provide information related to population biology or demography. Just eight records (25% of the total) are based on observations made within the last 20 years (Calflora 2017, CCH 2017). Existing data are insufficient to gauge the viability of *C. gracilis* subsp. *tracyi* populations.

Life History: This taxon is a herbaceous annual, which blooms between April and July (CNPS 2018). While the pollination biology of *C. gracilis* subsp. *tracyi* is not well understood, other members of the genus *Clarkia* are pollinated by a variety of Coleoptera, Diptera, Hymenoptera and Lepidoptera—most prominently by Bombyliid flies, and by bees of the families Halictidae and Megachilidae (CPC 2018).

Diversity: The genus *Clarkia* comprises five morphologically diverse elements, formerly recognized as distinct genera (*Clarkia, Eucharidium, Godetia, Heterogaura*, and *Phaeostoma*). It is closely related to *Oenothera*, and contains several species recombined from that genus (Gottlieb and Ford 1996). All told, *Clarkia* consists of 42 species; these are distributed across western North America, with one species native to South America (Knies et al. 2004). Thirty-two species are diploid, seven tetraploid, and three hexaploid. Differences in chromosome number and architecture, as well as floral morphology, translate into strong reproductive isolation in the group (Gottlieb and Ford 1996). But such clearly demarcated species barriers provide a stage for instantaneous speciation via allopolyploidy, a phenomenon that has been well studied in this genus. And indeed, about a third of *Clarkia* species show evidence of polyploid origins. *Clarkia gracilis* belongs to the phylogenetically basal section Primigenia; the majority of taxa in this section are diploid, with firm species boundaries. But *C. gracilis* is a tetraploid (n = 14), with a diverse suite of morphological, ecological, chromosomal, and genomic characteristics drawn from disparate parts of the phylogeny. The species originated, possibly more than once, in the context of a shifting Pleistocene climate, via a polyploid cross between *C. amoena* subsp. *huntiana* and another diploid parental species from the section Flexicaulis. *Clarkia gracilis* subsp. *tracyi* is one of four recognized subspecies; it occupies a geographically restricted range, and is the only subspecies exhibiting a preference for serpentine habitats (Abdel-Hameed and Snow 1972).

Habitat: *Clarkia gracilis* subsp. *tracyi* occurs in open, grassy areas within chaparral and woodland habitats, at elevations between 65 and 650 meters. It is tolerant of ultramafic substrates, and shows a preference for serpentine habitats (CCH 2017, CNPS 2018). Woody taxa associated with this taxon include: *Cupressus macnabiana, Heteromeles arbutifolia, Pinus sabiniana, Quercus douglasii*, and *Q. durata*. Herbaceous associates include: *Bromus madritensis, B. hordeaceus, Calochortus* sp., *Castilleja* sp., *Collinsia sparsiflora, Delphinium uliginosum, Dodecatheon* sp., *Lomatium ciliolatum* var. *hooveri, Lupinus* sp., *Madia* sp., *Pterideridia* sp., *Ranunculus* sp., *Sanicula tuberosa, Toxicoscordion venenosum*, and *Vicia* sp. (CCH 2017).

Habitat Status or Trend: The North Coast Ranges bioregion has been subject to both logging and fire abatement during the past century; large, fire-resistant trees were removed, while overall forest density increased as much as two-fold (Knapp et al. 2013). The result is a considerable reduction in forest gap size and frequency (Skinner 1995), as well as shading-out of understory shrubs and herbaceous taxa (Knapp et al. 2013). Ongoing climate change will produce a longer fire season, while also increasing landscape productivity, augmenting already-high fuel loads (Lenihan et al. 2003). Intense burns and short fire return intervals can have dramatic effects on plant community composition, potentially shifting ecosystems to alternative stable states, even in fire-adapted chaparral communities (Callaway and Davis 1993, Zedler et al. 1983). As an herbaceous chaparral taxon, *C. gracilis* subsp. *tracyi* has probably been impacted by these human-mediated trends.

Capacity for the Species to Disperse: The seeds of *Clarkia* species are typically small, bullet-shaped, and unornamented but for microscopic-scale reticulations of the exotesta, suggesting short-range dispersal by gravity and surface flows. The genus includes both outcrossing and obligately selfing taxa, the latter characteristic having evolved at least 12 times in the group's history. Selfers tend to occupy smaller ranges and more marginal habitats than outcrossers; they flower earlier in the season, and produce smaller seeds (Knies et al. 2004). Given its restricted range and preference for marginal edaphic conditions, *C. gracilis* subsp. *tracyi* may be among the selfing taxa, a trait that would aid in colonization of insular serpentine

sites (Baker 1955). Seed dormancy is common in *Clarkia*; multi-year seed banks ensure site persistence, while preserving genetic diversity in small and isolated populations (McCue and Holtsford 1998).

Threats: Among the primary threats to this taxon is the expanding footprint of urban and suburban development in the north coast region (CNPS 2018). Soil-restricted endemic taxa like *C. gracilis* subsp. *tracyi* may be at special risk from climate change, as their narrow ecological requirements and insular distributions make adaptive migration difficult (Harrison et al. 2009).

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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.