

Dudleya abramsii ssp. *parva* (= *Dudleya parva*)
(Conejo Dudleya)

**5-Year Review:
Summary and Evaluation**



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**U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California**

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5-YEAR REVIEW

Dudleya abramsii ssp. *parva* (= *Dudleya parva*)
(Conejo Dudleya)

I. GENERAL INFORMATION

Purpose of 5-Year Review:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview:

As summarized in the recovery plan for this species, Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin (Service 1999), Conejo dudleya (*Dudleya abramsii* ssp. *parva*) is a succulent, rosette-forming perennial plant in the stonecrop family (Crassulaceae). *Dudleya abramsii* ssp. *parva* is currently restricted to a narrow band of recorded occurrences along a 16-kilometer (km) (10-mile (mi)) stretch of land from the western portion of the Simi Hills, through Mountclef Ridge, to the Conejo Grade in Ventura County, California, where it is threatened by development and recreational activities. *Dudleya abramsii* ssp. *parva* grows at the base of scattered rock outcrops of the Conejo volcanics in grassland and cactus dominated coastal sage scrub habitat, which also provides nesting habitat for the Bell's sage sparrow (*Amphispiza belli belli*) and the southern California rufous-crowned sparrow (*Amophila ruficeps canescens*), both of which are designated by the State of California as species of special concern. A significant portion of the plant's habitat occurs on lands designated as "open space" by the Conejo Open Space Conservation Authority (COSCA), or on parklands managed by the Ventura County Department of Parks and Recreation; the remaining habitat is owned and managed by the cities of Thousand Oaks and Simi Valley, or is privately owned.

Methodology Used to Complete the Review:

This review was prepared by the Ventura Fish and Wildlife Office (VFWO), following guidance issued by Region 8 in March 2008. In preparing this review, we used information from the

recovery plan, survey information from experts who have been monitoring various localities of this species, and the California Natural Diversity Database (CNDDDB) maintained by the California Department of Fish and Game. The recovery plan and personal communications with experts were our primary sources of information used to update the species' status and threats. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing or the last 5-year review. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years. For this review, we will use the currently recognized name for the taxon, *Dudleya parva*, rather than use the name under which the species was listed, *Dudleya abramsii* ssp. *parva*.

Contact Information:

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FR Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the FR on March 5, 2008 (73 FR 11945). The Service received one response collectively regarding all 58 species covered in the notice, which we have considered in preparing this 5-year review.

Listing History:

Original Listing

FR Notice: 62 FR 4172

Date of Final Listing Rule: January 29, 1997

Entity Listed: *Dudleya abramsii* ssp. *parva* (subspecies)

Classification: Threatened

Associated Rulemakings: N/A

Review History: N/A

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for *Dudleya parva* [*Dudleya abramsii* ssp. *parva*] is 2C according to the Service's 1999 recovery plan for this species, based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority

Guidelines, 48 FR 43098, September 21, 1983). This number indicates that the taxon is a species that faces a high degree of threat and has a high potential for recovery. However, note that because at the time of listing, this taxon was considered a subspecies, the correct recovery priority number should have been “3”, rather than “2”. The “C” indicates conflict with construction or other development projects or other forms of economic activity.

Because the scientific name of this species has recently been changed back to *Dudleya parva* (see “Changes in Taxonomic Classification or Nomenclature” below), thus no longer classifying it as a subspecies, the original recovery priority number of 2C would be correct and should remain the same.

Recovery Plan or Outline

Name of Plan or Outline: Recovery Plan for Six Plants from the Mountains Surrounding the Los Angeles Basin

Date Issued: September 30, 1999

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The Act defines species as including any subspecies of fish or wildlife, or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition limits listing as distinct population segments to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species’ listing is not addressed further in this review.

Updated Information on Current Species Status, Biology, and Habitat:

Species Biology and Life History

Dudleya parva is a long-lived, succulent dicot, rosette-forming perennial herb in the stonecrop family (Crassulaceae) that is native to California (CNPS 2008). In California there are 39 different species and subspecies within the *Dudleya* genus, which fall under 3 subgenera (*Dudleya*, *Hasseanthus*, and *Stylophyllum*), with *D. parva* belonging to the subgenus of *Dudleya* (Bartel 1993). Species that fall under the subgenus *Dudleya* are unique from the other two subgenera in that they have above-ground stems (caudices), five sepals that are erect to slightly spreading at the tips, and erect fruit (follicles). Under this subgenus, *D. parva* (Conejo dudleya), *D. abramsii* ssp. *bettinae* (San Luis Obispo serpentine dudleya), and *D. cymosa* ssp. *marcescens* (marcescent dudleya) are the only three species with vernal leaves (summer deciduous) (McCabe in litt. 2008a). *Dudleya parva* blooms in late spring (May-June) and has an inflorescence stem 5 to 18 centimeters (cm) (2.0 to 7.1 inches (in)) long with pale yellow-green flowers that often exhibit flecks of red on the keel (Bartel 1993, McCabe in litt. 2008a).

Dudleya parva does not always resprout with the same number of rosettes or in the same locations as rosettes from the previous year. This species forms roots that are narrowed and

swollen at irregular intervals, and has rhizome-like branches that extend out from the roots of the plant. During most of the year, the rhizomes resemble shriveled roots and are very fragile, leading to breakage when plants are removed from hard, rocky substrate. As a result, these rhizomes are generally not a good field identification character for this species and have not been previously noted (McCabe in litt. 2008a). *Dudleya parva* is similar to *D. blochmaniae*, in that the above-ground parts of the plant die back after flowering, but the plant can persist for some time as underground rootstock, perhaps up to several years (McCabe in litt. 2008a, Sagar in litt. 2008b).

Pollination and reproductive strategies vary within the *Dudleya* taxa. In general, the *Dudleya* species that are more rare tend to reproduce earlier (e.g., *D. parva* often reproduces within a year after germination) and subsequently have a lower reproductive output (*D. parva* and *D. blochmaniae* ssp. *blochmaniae* have the lowest output among the *Dudleya* taxa that occur in the vicinity of the Santa Monica Mountains). Pollination within the *Dudleya* taxa depends on characteristics such as corolla size, color, and petal fusion (Aigner 2004). The *Dudleya* species which have small yellow to orange flowers (including *D. parva*) are pollinated by bees and flies, while species with larger red flowers are pollinated mostly by hummingbirds. Furthermore, flowers pollinated by hummingbirds tend to produce more nectar than those pollinated by bees and flies, which is a characteristic directly related to the degree of auto-fertility (the proportion of flowers that will set fruit, without mechanical aid, in an insect-proof greenhouse). Plants with a lower nectar content, such as *D. parva*, tend to exhibit a higher degree of auto-fertility and subsequently have been found to be prone to pollinator unreliability, short and unpredictable reproductive seasons, small population size, and high population turnover (Dorsey 2007). *Dudleya parva* will hybridize with some of the other *Dudleya* species (e.g., *D. pulverulenta*), which is typical of the *Dudleya* genus (McCabe in litt. 2008b). *Dudleya parva* seeds sprout in the winter when there is ample precipitation and continue to grow throughout the rainy season (Dorsey 2007). There is evidence that mosses and lichens aid in seed recruitment and germination by providing nutrients, moisture, substrate, and protection against herbivory by snails and slugs (Riefner and Bowler 1995).

In a study conducted in 2006 (Fraga and Wall in litt. 2006), seeds were collected from 80 *Dudleya parva* plants at one of the Wildwood Park occurrences (See Table 1, DUPA 3). This study found that out of the 80 plants surveyed, seed production ranged from 10 to 686 seeds per individual, with an average of 180 seeds per individual. Another study performed on *D. parva* ex situ found that the average number of fruits produced per individual was 24 and the maximum number of seeds per fruit was 79; both findings are in the low range of the spectra for *Dudleya* taxa from the Santa Monica Mountains area (Dorsey 2007).

In cultivation, some *Dudleya parva* will bloom within the first year after germination; however, in a dry year in the wild, very few of the plants within a population may bloom (McCabe in litt. 2008b). Although many of the plants may begin to form flowering stems in the spring, they will abandon reproduction if there is not enough moisture (Burgess in litt. 2008b). While many of the *Dudleya* species can self-pollinate, it is uncertain whether *D. parva* is capable of this. Because it is such a long-lived species, not much is known about the exact life span of *D. parva*, but one plant in cultivation is reported to be 24 years old (McCabe in litt. 2008b). In cultivation, favorable soil moisture conditions are required for the seedlings of this species to become

established; the same is perceived to be true of seedling establishment in the wild, but more information is needed to make this determination. The plants may spread slowly underground by roots or stems, and any stem within 2 to 3 cm (0.8 to 1.2 in) of a centrally established individual may be a clone of that individual (McCabe in litt. 2008b). In a recent greenhouse study, conducted in Santa Cruz, California, by Stephen McCabe and Rachel Ormes, *D. parva* was rooted from the leaves of the plant, making it the only known species in the *Dudleya* subgenus to exhibit this behavior (McCabe in litt. 2008a). This phenomenon leads to some speculation of a taxonomic relationship between *D. parva* and the vernal members of the subgenus *Hasseanthus*, which can also be rooted from leaf cuttings (McCabe in litt. 2008a).

Historic and Current Distribution

Dudleya parva was first described in 1923 as *D. parva* by Joseph Rose and Anstruther Davidson, based on a collection by Mrs. J. Bullard that was made the year before at Conejo Grade near Newbury Park (Moran 1948). According to records available through the California Natural Diversity Database (Bittman in litt. 2008, CNDDDB 2008a, in litt. 2008b), the California Consortium of Herbaria (Consortium)(Consortium 2008), Stephen McCabe of the University of California Santa Cruz arboretum (McCabe in litt. 2008b), Rick Burgess of the City Planning Office of Thousand Oaks (Burgess in litt. 2008b), Tarja Sagar of the National Park Service (Sagar in litt. 2008a), and several other recently published reports (Fraga and Wall in litt. 2006, Dorsey 2007), all known occurrences of *D. parva* are within eastern Ventura County, California, along an east-west trending ridgeline formed of Conejo volcanics. The entire distribution of the species is scattered over a 16 km (10 mi) stretch of land in the western end of the Simi Hills, along Mountclef Ridge, terminating near Conejo Grade, and covering a total of several hundred acres (CNDDDB 2008a, in litt. 2008b; Sagar in litt. 2008a).

There are 18 reported occurrences of *Dudleya parva* in southern California (Fraga and Wall in litt. 2006; Bittman in litt. 2008, CNDDDB 2008a, in litt. 2008b; Consortium 2008; Sagar in litt. 2008a), most of which are part of a large meta-population which extends along the northern slope of Mountclef Ridge from the Ronald Reagan Library in the east to Camarillo Springs Road in the west (Bittman in litt. 2008, Burgess in litt. 2008a, McCabe in litt. 2008b). Since the time of listing, seven new occurrences have been recorded, two of which were surveyed before the time of listing, but not yet recorded (Fraga and Wall in litt. 2006; CNDDDB in litt. 2008b; Consortium 2008; Sagar in litt. 2008a, pers. comm. 2008c). These new occurrences are within the same band of Conejo volcanics; four occur among other known populations near Thousand Oaks and the other three occur just northeast of the previously recorded species distribution, on the eastern side of Highway 23 in the vicinity of Simi Valley. Although there has been an increase in the documented number of occurrences, they all fall within the same continuous band of Conejo volcanics; therefore, there has been no significant change in the known geographic range of the species since the species' listing in 1997.

A large portion of the plant's habitat is on lands designated as "open space" by the Conejo Open Space Conservation Authority (COSCA), which jointly manages parklands with the Conejo Parks and Recreation Department. The remaining occurrences of the species are on "open space" or park lands managed by the Ventura County Department of Parks and Recreation and the Cities of Thousand Oaks or Simi Valley; a small portion of the habitat is privately owned.

Abundance and Population Trends

The population boundaries and numbers for *Dudleya parva* exhibit some annual fluctuations; however, the species has generally remained in the same suitable habitat areas noted at the time of listing in 1997 (Bittman in litt. 2008; CNDDDB 2008a, in litt. 2008b; McCabe in litt. 2008b; Sagar in litt. 2008a). Since the time of listing, the number of documented individuals within the noted occurrences of the species has increased in some cases, while decreasing somewhat in others; however, the information gathered from the more recent population surveys seems to show that overall the species has remained at relatively constant levels since the time of listing (Fraga and Wall in litt. 2006; CNDDDB 2008a, in litt. 2008b; McCabe in litt. 2008b; Sagar in litt. 2008a). Most likely, the more recently documented occurrences do not represent new populations, but rather occurrences of the species that had not previously been detected due to ruggedness of terrain or the level of survey effort expended. It is difficult to accurately track annual fluctuations in the number of individuals of *D. parva* due to the fact that the species is summer deciduous, making it hard to find for 5 to 7 months of the year, and may even remain dormant as underground rootstock in some very dry years (Burgess in litt. 2008b, McCabe in litt. 2008b, Sagar in litt. 2008b).

At the time of listing in 1997, there were approximately 11 known occurrences of *Dudleya parva* (Service 1997). Element occurrence (EO) number 6 (CNDDDB 1997) was accidentally deleted from CNDDDB within the last few years, but will be re-entered into the system (Bittman in litt. 2008). Including EO 6, there are currently 18 known occurrences of the species (Fraga and Wall in litt. 2006; Bittman in litt. 2008; CNDDDB 2008a, in litt. 2008b; Consortium 2008; McCabe in litt. 2008b; Sagar in litt. 2008a). The largest reported populations occur in Wildwood Regional Park (several thousand individuals), the Joel McCrea Wildlife Preserve (Burgess in litt. 2008b), and at two sites near California Lutheran University, which had a reported combined population (DUAB 101 and EO 10) of approximately 2,000 plants in 2003 (CNDDDB 2008a, Sagar in litt. 2008a).

The Conejo Grade occurrence (EO 5) was reported to have greater than 600 individuals as of 1983. A fire on the Conejo Grade in August of 1984 killed some of the *Dudleya pulverulenta* within 20 meters (m) (66 feet (ft)) of the *D. parva* site, but the effects on the *D. parva* in the area are uncertain. Stephen McCabe and Tarja Sagar revisited the area in 2006 and although the *D. pulverulenta* had recovered in the same location as before, the *D. parva* population had declined from what it was in the early 1980s, even in the absence of major human recreational threats (McCabe in litt. 2008b). The occurrence north of U.S. Highway 101, just north of Peak 915 (EO 8) ranged between approximately 250 and 300 individuals from 1991 to 1993. A new occurrence of the species (documented since the time of listing) was reported near the western portion of California Lutheran University (DUAB 101), consisting of approximately 1,000 individuals as of 2003 (Sagar in litt. 2008a). Additionally, the population near the western portion of California Lutheran University (EO 10) that was known to exist before the time of listing was reported to have only 50 individuals in 1991, but was reported to contain approximately 1,000 individuals in 2003 (Sagar in litt. 2008a).

The McCrea Wildlife Preserve occurrence (EO 3) ranged from approximately 2,000 to 10,000 individuals between 1983 to 1987 (CNDDDB 2008a) and was most recently reported as comprising approximately 160 individuals in 2003 (Sagar in litt. 2008a); however, the most

recent survey in 2003 was likely conducted over only a portion of the suitable habitat within this occurrence and does not necessarily indicate a drastic decline of the species in this area. Stephen McCabe visited this site in 1990 (the third unusually dry year in a row) and noted that, although *D. parva* seemed relatively abundant for such a dry year, there were many hollow casts in the clay soil where roots of the individuals had previously been, perhaps indicating decline. He visited the site again in 2001 and noted that, although the population was still in existence, the number of informal hiking trails since the early 1980s had increased, some evidence of trampling by hikers, and an increase in the numbers of invasive species in the area (McCabe in litt. 2008b). Since the time of listing, a new occurrence has been recorded near the Reagan Library in Thousand Oaks (DUAB 103), containing approximately 200 individuals as of 2003 (Sagar in litt. 2008a). Another occurrence not previously reported at the time of listing, north of Olsen Road and east of Highway 23 (DUPA 2), had greater than 250 individuals in 1998 (CNDDDB in litt. 2008b).

Table 1: Population Records for *Dudleya parva* extracted from Fraga and Wall in litt. 2006; Burgess in litt. 2008b; CNDDDB 2008a, in litt. 2008b; Consortium 2008; McCabe in litt. 2008b; and Sagar in litt. 2008a.

| Identification Number | Name | Current Trend | Year Collected/ Observed | Year Surveyed | Population Size | Reference | Site Manager/ Owner |
|-----------------------|---|---------------|--------------------------|---|---|---|--|
| CNDDDB EO 3 | Head of Arroyo Santa Rosa, within McCreia Wildlife Preserve | Unknown | 1987 1990 | 1980 (Nakai) 1983 (Verity) 1987 (Burgess) 1990 (McCabe) 2001 (McCabe) 2003 (Sagar) | -- <10,000 2,000-3,000 -- -- 160 | CNDDDB 2008a, Consortium 2008, McCabe 2008b | McCrea Wildlife Preserve – COSCA |
| CNDDDB EO 5 | Conejo Grade | Unknown | 1922 (Bullard) 1983 | 1983 (Cochrane & McCabe) 2006 (McCabe & Sagar) | >600 -- | CNDDDB 2008a, McCabe 2008b | Private |
| CNDDDB EO 6 | 0.5 air miles S of HWY 101, 1.1 air miles SW of Camarillo Oak Grove County Park | Unknown | 1980 1987 | 1980 (McLeod) | -- | CNDDDB 1994 | Private |
| CNDDDB EO 7 | 1.7 air miles NNE of Camarillo Oak Grove Co. Park | Unknown | 1960 | 1974 (Verity) 1991 (Burgess) | -- -- | CNDDDB 2008a | Private/ May be designated as open space. |
| CNDDDB EO 8 | N of HWY 101, just N of peak 915 on Topo | Unknown | 1993 | 1991 (Bowland) 1993 (Bowland) | 250 300 | CNDDDB 2008a | CTO/ May go to COSCA |
| CNDDDB EO 9 | South of Mountclef Ridge, N fork of Arroyo Conejo, Wildwood County Park | Unknown | 1984 | 1983 (Cochrane) 1984 (Thomas) 2003 (Sagar) | -- -- 850 | CNDDDB 2008a | Ventura County Parks and Recreation |
| CNDDDB EO 10 | W portion of California Lutheran University land | Unknown | 1991 | 1983 (Verity) 1991 (Bowland) 2003 (Sagar) | -- 50 1000 | CNDDDB 2008a | CLU Open Space |
| CNDDDB EO 12 | W end of Mountclef Ridge, Wildwood County Park | Unknown | 1984 | 1983 (Cochrane) 1984 (Thomas) 2003 (Sagar) | -- -- 500 | CNDDDB 2008a | Ventura County Parks and Recreation |
| CNDDDB EO 13 | Upper end of N fork Arroyo Conejo | Unknown | 1980 | 1983 (Cochrane) | -- | CNDDDB 2008a | COSCA/ CRPD |
| CNDDDB EO 15 | Mountclef Ridge, N of Norwegian Grade Summit | Unknown | 1991 | 1991 (Wishner) 1997 (Gale, Parikh, and Tierney) | <100 75-200 | CNDDDB 2008a | YMCA |

| | | | | | | | |
|--------------|--|---------|------|------------------------------|--------|----------------------------------|------------------------------|
| CNDDDB EO 16 | 0.3 Mi due E of Mountclef Peak on Topo | Unknown | 1991 | 1991 (Bowland) | 25 | CNDDDB 2008a | COSCA/ CRPD |
| DUAB 101 | SW of Cal Lutheran Campus, just off Morningstar Ct. | Unknown | 2003 | 2003 (Sagar) | 1,000 | Sagar 2008a-recorded as DUAB 101 | Will become open space COSCA |
| DUAB 102 | 300 meters N of Wood Ranch Reservoir | Unknown | -- | unknown | -- | Sagar 2008a-recorded as DUAB 102 | Simi Valley |
| DUAB 103 | 200 ft from wooden gate of Reagan Library | Unknown | 2003 | 2003 (Sagar) | 200 | Sagar 2008a-recorded as DUAB 103 | Simi Valley |
| DUPA 1 | 0.2 mi S of Hill Canyon Sewage Treatment Facility | Unknown | 1996 | 1996 (Harrison) | -- | Consortium 2008 | COSCA or CTO |
| DUPA 2 | East of HWY 23, N of Olsen Rd. | Unknown | 1998 | 1998 (VanderPluym) | >250 | VanderPluym 1998 (CNDDDB 2008b) | Simi Valley? |
| DUPA 3 | Wildwood Canyon Park, NE portion of Santa Rosa Trail | Unknown | 2006 | 2006 (Fraga, Thibault, Bair) | >2,000 | Fraga and Wall 2006 | COSCA/ CRPD |
| DUPA 4 | Wildwood Canyon Park, SW portion of Santa Rosa Trail | Unknown | 2006 | 2008 (Sagar) | -- | Sagar 2008 | COSCA/ CRPD |

CNDDDB identification # = occurrence number assigned by the California Natural Diversity Database (CNDDDB 2008a).

COSCA = Conejo Open Space Conservation Authority

CRPD = Conejo Recreation and Parks Department

CTO = City of Thousand Oaks

Habitat or Ecosystem Conditions

On a broad scale, suitable habitat for *Dudleya parva* is comprised of coastal sage scrub and valley and foothill grassland with clay or volcanic soils at elevations ranging from 60 to 450 meters (180 to 1350 ft) (CNPS 2008), on slopes ranging from 0 to 90 degrees, but most commonly on north-facing slopes of approximately 10 degrees (Dorsey 2007). This species is highly localized in its distribution, occurring exclusively in thin-soiled substrate over rocky outcrops derived from the Miocene Conejo volcanics (Burgess in litt. 2008b).

The plants associated with *Dudleya parva*, include but are not limited to spikemoss (*Selaginella bigelovii*), California buckwheat (*Eriogonum fasciculatum*), Conejo buckwheat (*E. crocatum*), chalk dudleya (*Dudleya pulverulenta*), Blochman's dudleya (*D. blochmaniae*), Blochman's larkspur (*Delphinium parryi* ssp. *blochmaniae*), black sage (*Salvia mellifera*), dwarf plantain (*Plantago erecta*), California sagebrush (*Artemisia californica*), lemonadeberry (*Rhus integrifolia*), foothill needlegrass (*Nassella lepida*), oat grass (*Avena* spp.), goldfields (*Lasthenia chrysostoma*), California broom (*Lotus scoparius*), mountain mahogany (*Cercocarpus betuloides*), species of cacti, and non-native annuals. Additionally, *D. parva* is often found growing in association with the federally listed endangered plant Lyon's pentachaeta (*Pentachaeta lyonii*) (CNDDDB 2008a).

Changes in Taxonomic Classification or Nomenclature

Dudleya parva was recognized as a distinct species by Munz and Keck in 1959 and 1968, Nakai in 1983, and Moran in 1980 (McCabe in litt. 2008a). In 1991, Bartel published a revision

treating *D. parva* as a subspecies of *D. abramsii* (Bartel 1991) based on similarities between the flowers of *D. abramsii* and *D. parva* noted by Reid Moran (1948). However, *D. parva* and *D. abramsii* have differing micromorphological leaf surface characters, caudex diameters, and wound responses that appear to clearly separate the two (McCabe in litt. 2008a). The name of this species has been returned to *Dudleya parva* (from *Dudleya abramsii* ssp. *parva*) as of November 2006 (Jepson Flora Project 2008).

Genetics

No new studies concerning the genetics of this taxon have been conducted since the time of listing.

Five-Factor Analysis

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

When *Dudleya parva* was listed in 1997, we discussed that the species was threatened by urban development, equestrian facilities and activities, recreational activity (mountain biking, off-road vehicles, hiking, and rock climbing), and fire suppression activities (mostly due to disruption of habitat from fuel modification and the creation of fire breaks around buildings) (Service 1997). We also noted that portions of the *D. parva* population had been extirpated by development, including a segment of one occurrence near the Ronald Reagan Library (McClelland Consultants 1989). The species' listing rule and recovery plan both noted that because a significant portion of the existing distribution of the species was located on private lands with increasing development pressures, the species faced an ongoing threat of habitat loss (Service 1997, 1999).

At present, habitat encroachment from new or existing development and fire suppression activities surrounding several of the known *Dudleya parva* occurrences continues to be a threat (Burgess in litt. 2008b, Wishner pers. comm. 2008). Within the city of Thousand Oaks, city regulations require a fire clearance zone of 30.5 m (100 ft) from the building pad. Fuel modification is a less substantial threat to the *D. parva* occurrences that are within Thousand Oaks city limits compared to occurrences outside city limits, because in most cases the city requires a buffer zone around new development, ensuring that sensitive plants do not fall within the fuel modification zone (Burgess in litt. 2008b,c). Ventura County requires a fire clearance of 30.5 meter (100 ft) from the building itself (Burgess in litt. 2008c). In general, the occurrences that are within the "open space" managed by COSCA are not threatened by fuel modification activities, as these activities are carefully controlled and managed within COSCA boundaries to prevent undue ground disturbance (Burgess in litt. 2008b). Outside COSCA boundaries, the most common method of fuel reduction is with a "weed whacker" (Burgess in litt. 2008c), which could have adverse impacts on *D. parva* in sensitive habitat areas.

Currently, an environmental impact report (EIR) is being prepared for a housing development (Wildwood Preserves; Assessor's Parcel Number 520-0-180-23), which is proposed for the north slope of Mountclef Ridge in the Simi Hills. In addition to the direct impacts the construction of this project would have on *D. parva* habitat (EO 12), this housing development would include equestrian facilities and extensive fuel modification activities that would also directly negatively

impact the species both immediately and over the long term (Wishner pers. comm. 2008). Additionally, one other area of suitable habitat is proposed for development in the near future, potentially directly affecting a portion of the population (DUAB 101 from Table 1) (Sagar pers. comm. 2008c).

Human recreational activities, such as hiking, rock climbing, biking, and horseback riding continue to threaten the species (Burgess in litt. 2008b, McCabe in litt. 2008b, Sagar in litt. 2008b). The plants occur low to the ground in rocky outcrops and often near trails, where they could be easily trampled. Mountain bikers and hikers often leave established trails and thus some of the plants are at risk of being trampled (Burgess in litt. 2008b, McCabe in litt. 2008b). A few crushed plants have been observed in Wildwood Park and in the McCrea Wildlife Preserve in the last few years, but many of the habitat sites are slightly less accessible (McCabe in litt. 2008b, Sagar in litt. 2008b). It appears that there has been little change in how occurrences of *D. parva* within public access areas have been managed over the years.

In summary, threats to *Dudleya parva* and its habitat remain similar to what they were at the time of listing, but the intensity of these threats may have decreased slightly since listing, because over the last few years the amount of *D. parva* habitat that has been identified on public open space or parklands has increased. Of the 18 recorded occurrences of *D. parva*, at least 60 to 75 percent (based on land-area) are located on public lands that are not subject to large-scale, land-use conversion; the remaining portion are located on private lands where potential development is not precluded (see Appendix 1).

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

In the listing rule for the species, we discussed that species of *Dudleya* are collected by professional horticulturalists as well as amateur collectors and gardeners (Service 1997). A special issue of the Cactus and Succulent Journal was published by the Cactus and Succulent Society of America (CSSA) that focused on *Dudleya* in 2004 (CSSA 2004). An incident of removal of chalk dudleya (*D. pulverulenta*) occurred near a public access location in Topanga Canyon in 1999, illustrating that collection of *Dudleya* species continues to be a threat to members of this genus (Farris in litt. 1999). Although we do not have specific reports of unauthorized collection of *D. parva*, we believe that due to the accessibility of some of the habitat sites to the public and the appeal of *Dudleya* species to horticulturalists, collection still constitutes a threat to the species (Burgess in litt. 2008b). However, due to the vernal nature of this species (leaves wither and fall off in the summer), it may be slightly less attractive to collectors than non-vernal species.

FACTOR C: Disease or Predation

Disease or predation was not considered a threat to the species at the time of listing (Service 1997), and is not necessarily considered a threat at this time. However, some damage from caterpillars (species unknown) eating out the inside of the stems of plants within the *Dudleya* taxa (including *D. parva*) has been reported in many locations. These hollow roots and stems were first noticed in some other *Dudleya* species individuals as early as 1990 and have been reported as far south as the considerably isolated Isla Zapato in Mexico, leading to speculation

that it is a native caterpillar that is responsible for the damage (McCabe in litt. 2008b).

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms thought to have some potential to protect *Dudleya parva* included: (1) the California Environmental Quality Act (CEQA); 2) listing in the California Native Plant Society's Inventory, List 1B (California endemic, rare, threatened, or endangered in California); (3) local land use laws, regulations, and policies; and (4) the Federal Endangered Species Act (Act) in those cases where *D. parva* occurs and is incidentally protected in habitat occupied by a listed wildlife species. The listing rule (62 FR 4172) provides an analysis of the level of protection that was anticipated from those regulatory mechanisms. This analysis appears to remain valid.

(1) California Environmental Quality Act (CEQA): CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved. However, if there are no feasible mitigation measures, and if the lead agency believes the benefits of the project outweigh the environmental risks, it may approve a project by making a statement of overriding considerations. If the lead agency is interested in having the project proceed, it is likely to approve the report or make the statement of overriding considerations even if listed species are affected. We noted in the listing rule that local lead agencies responsible for enforcing the regulations of CEQA have made determinations that have or could negatively impact *Dudleya parva* (Service 1997).

(2) California Native Plant Society's Inventory, List 1B: *Dudleya parva* is listed in the California Native Plant Society's Inventory, under List 1B: California endemic, rare, threatened, or endangered in California (CNPS 2008). In accordance with chapter 10 sec. 1901 of the California Department of Fish and Game Code, inclusion of this species on List 1B indicates that *D. parva* is eligible for State listing; however, this species is not currently State listed and is therefore not protected by the California Endangered Species Act (CESA).

(3) Local land use laws, regulations, and policies

County of Ventura: Although the County of Ventura does not have any specific laws or regulations that protect *Dudleya parva*, the Biological Resources Element from the general plan for the County of Ventura (2008) states that they aim to "Preserve and protect significant biological resources in Ventura County from incompatible land uses and development." Significant biological resources include "endangered, threatened, or rare species" and their habitats, "wetland habitats, coastal habitats, wildlife migration corridors" and "locally important species/communities." The County of Ventura's policies relevant to endangered species conservation include:

"1. Discretionary development which could potentially impact biological resources shall be evaluated by a qualified biologist to assess impacts and, if necessary, develop mitigation measures.

2. Discretionary development shall be sited and designed to incorporate all feasible measures to mitigate any significant impacts to biological resources. If the impacts cannot be reduced to a less than significant level, findings of overriding considerations must be made by the decisionmaking body. ...

5. The California Department of Fish and Game, the U.S. Fish and Wildlife Service, National Audubon Society and the California Native Plant Society shall be consulted when discretionary development may affect significant biological resources. The National Park Service shall also be consulted regarding discretionary development within the Santa Monica Mountains or Oak Park Area.” (County of Ventura 2008)

City of Thousand Oaks: Although the City of Thousand Oaks does not have any specific laws or regulations that protect *Dudleya parva*, the Conservation Element from the general plan for the City of Thousand Oaks states that the City “shall encourage and promote the preservation of all rare, threatened, endangered, or sensitive species listed by State and Federal agencies, the California Native Plant Society, and the City of Thousand Oaks” (City of Thousand Oaks 1996). However, this simply states that the City recognizes the need for preservation of rare or listed species and does not afford any specific implemented forms of protective regulations or actions by the City.

Conejo Open Space Conservation Authority (COSCA): *Dudleya parva* occurs on lands managed by COSCA, which is a joint powers authority agency established between the City of Thousand Oaks and the Conejo Parks and Recreation District. While the Conejo Parks and Recreation District manages the smaller, more developed park units in and around the city of Thousand Oaks in Ventura County, the Conservation Authority acquires and manages the larger and undeveloped park units as open space. As of October 2008, COSCA has initiated a public planning process for 3,800 acres of the lands they manage; we are not able to determine at this time whether proposed changes to management of these lands will affect *D. parva* (Harris 2008).

In summary, the Endangered Species Act is the primary Federal law that provides some level of protection for this species since its listing as threatened in 1997. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in the absence of the Endangered Species Act.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

Fire suppression, fuel modification, wildfire survivability, and invasive species

At the time of listing, we discussed general threats to the *Dudleya* genus, including the effects of grazing, often resulting in habitat type conversion from native grass species to non-native, invasive annual grass species; fire suppression activities for the last 200 years; and increased incidence of fire ignition near the wildland-urban interface, leading to more frequent fires (Service 1997). Competition from non-native annuals is a threat to *D. parva* because such species tend to take over habitat for the species and compete for the same limited resources (Sagar in litt. 2008b). Fuel modification activities (e.g., the creation of fuel breaks, etc.) have led to an increase in the number of invasive species in the southern California shrubland and grassland ecosystems (Keeley 2006), creating an indirect threat to *D. parva*. The natural fire

regimes of some of these areas have been affected due to increased human-caused fire ignitions, often leading to more frequent fires despite fire suppression activities, which subsequently can have drastic effects on the grassland, coastal sage scrub, chaparral, and oak woodland ecosystems and the native species that reside there (Syphard et al. 2007). In some cases, *D. parva* is directly threatened by fuel modification efforts, due to the extent of development in close proximity to suitable habitat for the species (Service 1997, 1999, Burgess in litt. 2008b, Wishner pers. comm. 2008).

Stochastic extinction

At the time of listing, we noted that due to the limited number of individuals and existing range of *Dudleya parva*, this species was at risk of extinction from naturally occurring events, such as fire, drought, disease, or rock slides (Service 1997). Although the plants have the ability to survive as underground rootstock during the dormant period and probably would not be significantly affected during a small, low-intensity fire, there is a high probability that even the dormant rootstock of the plants may not survive a larger, high-intensity fire (Sagar in litt. 2008b). The shrublands of southern California (including areas within the distribution of *D. parva*) are often subject to large, high-intensity fires (Keeley et al. 1999), which may pose a threat to the species. As a result of the small population size and range of *D. parva*, the genetic viability and thus resilience of the species to human-caused or natural disasters may be greatly reduced (Menges 1991, Ellstrand and Elam 1993).

Climate Change

Current climate change predictions for terrestrial areas in the northern hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, IPCC 2007). Recently, the potential impacts of climate change on the flora of California were discussed by Loarie et al. (2008). Based on modeling, they predicted that species' distributions will shift in response to climate change and that the species will "move" to higher elevations and northward, depending on the ability of each species to do so. The Santa Monica Mountains and Simi Hills are expected to increase in diversity, becoming potential future refugia for some species (Loarie et al. 2008). Increases in species diversity in these higher elevations and northern locations due to climate change have the potential to result "...in new species mixes, with consequent novel patterns of competition and other biotic interactions..." with unknown consequences to the species which currently exist there (Loarie et al. 2008). While we lack adequate information to make specific and accurate predictions regarding how climate change, in combination with other factors such as small population size, will affect *Dudleya parva*, small-ranged species such as *D. parva* are more vulnerable to extinction due to these changing conditions (Loarie et al. 2008).

In summary, the combination of threats associated with urban development, recreational activities, and fire suppression (discussed in Factor A); collection for horticultural, botanical interests, and educational purposes (Factor B); and the low numbers of individuals and limited range of *Dudleya parva* make it particularly vulnerable to extinction from random human-caused or natural events.

III. RECOVERY CRITERIA

Recovery plans provide guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust enough, to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

The recovery plan indicates that delisting for *Dudleya parva* can be considered when the following criteria have been achieved:

1. All the current sites (including seedbanks) are fully protected and managed with the primary intention of preserving the populations in perpetuity (addresses Listing Factors A and E).

This criterion is relevant and up-to-date. Although a portion of the *Dudleya parva* sites occur on park lands (either city, county, or regional) and are currently safe from new development threats, very few, if any, of the existing occurrences are currently being managed specifically in the interest of *D. parva*; therefore, this criterion has been partially, but not fully met.

2. All the current sites (including seedbanks) are shown to be self-sustaining over a minimum of 10 years (addresses Listing Factors A and E).

This criterion is relevant and up-to-date. The most current observations for several of the *Dudleya parva* sites seem to show that the number of individuals are remaining at similar levels to the time of listing and the species is extant, while some of them seem to be decreasing (Burgess in litt. 2008; CNDDDB 2008a, in litt. 2008b; McCabe in litt. 2008b; Sagar in litt. 2008a); therefore, this criterion has been partially, but not fully met.

IV. SYNTHESIS

The status of *Dudleya parva* has not changed substantially since the time of listing in 1997. At the time of listing, a total of 11 occurrences of *D. parva* were known to exist. Currently, there are 18 known occurrences of the species, some of which are extant and seem to be relatively stable; however, there has not been a significant increase in the overall species' population size

or range (Burgess in litt. 2008b; CNDDDB 2008a, in litt. 2008b; McCabe in litt. 2008b; Sagar in litt. 2008a). Although a portion of the *D. parva* habitat is somewhat protected through parks, preserves, and “open space” designations, these lands are managed for a variety of recreational and open space values, and not specifically for the preservation of this species.

Overall, the number of *Dudleya parva* occurrences that are known to exist on public lands has increased since the time of listing, but there is still a portion of the species’ habitat that occurs on private lands and continues to be subject to development threats (Bittman in litt. 2008; Burgess in litt. 2008b; CNDDDB 2008a, in litt. 2008b; Sagar pers. comm. 2008c; Wishner pers. comm. 2008). There is a lack of current information about the species and the existing occurrences, as well as potential habitat for the species. The species remains threatened due the low numbers of individuals, limited range, and ongoing threats to the species, such as fire suppression, collection by humans, impending development, and human recreational activities. Therefore, we believe *D. parva* still meets the definition of threatened, and recommend no status change at this time.

V. RESULTS

Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist (*indicate reasons for delisting per 50 CFR 424.11*):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No Change

New Recovery Priority Number and Brief Rationale: 2C. The recovery priority of 2C is the correct number for a species that faces a high degree of threat and with a high potential for recovery.

VI. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Conduct new, up-to-date, extensive population surveys of known occurrences and areas of suitable habitat.
2. Develop and implement monitoring and adaptive management plans for known existing occurrences. Monitoring should occur at intervals of 3 years and include population abundance surveys, habitat condition assessment, and documentation of existing and potential threats.
 - 2a. Work closely with agencies such as COSCA and the Ventura County Parks and Recreation Department to implement a species monitoring and public outreach program, in addition to implementing new conservation measures for the species (e.g., fencing off certain areas, etc.) and preserving additional suitable habitat for the species.

- 2b. Enhance public outreach and education of private land owners in the area; develop incentives aimed at conservation of the species. Seek input from public and other stakeholders on the management and preservation of the species.
 - 2c. Work with county and city planning departments to develop a species conservation plan; if development does occur, onsite protection should be required.
3. Update and expand knowledge of the species' life history and specific habitat requirements.

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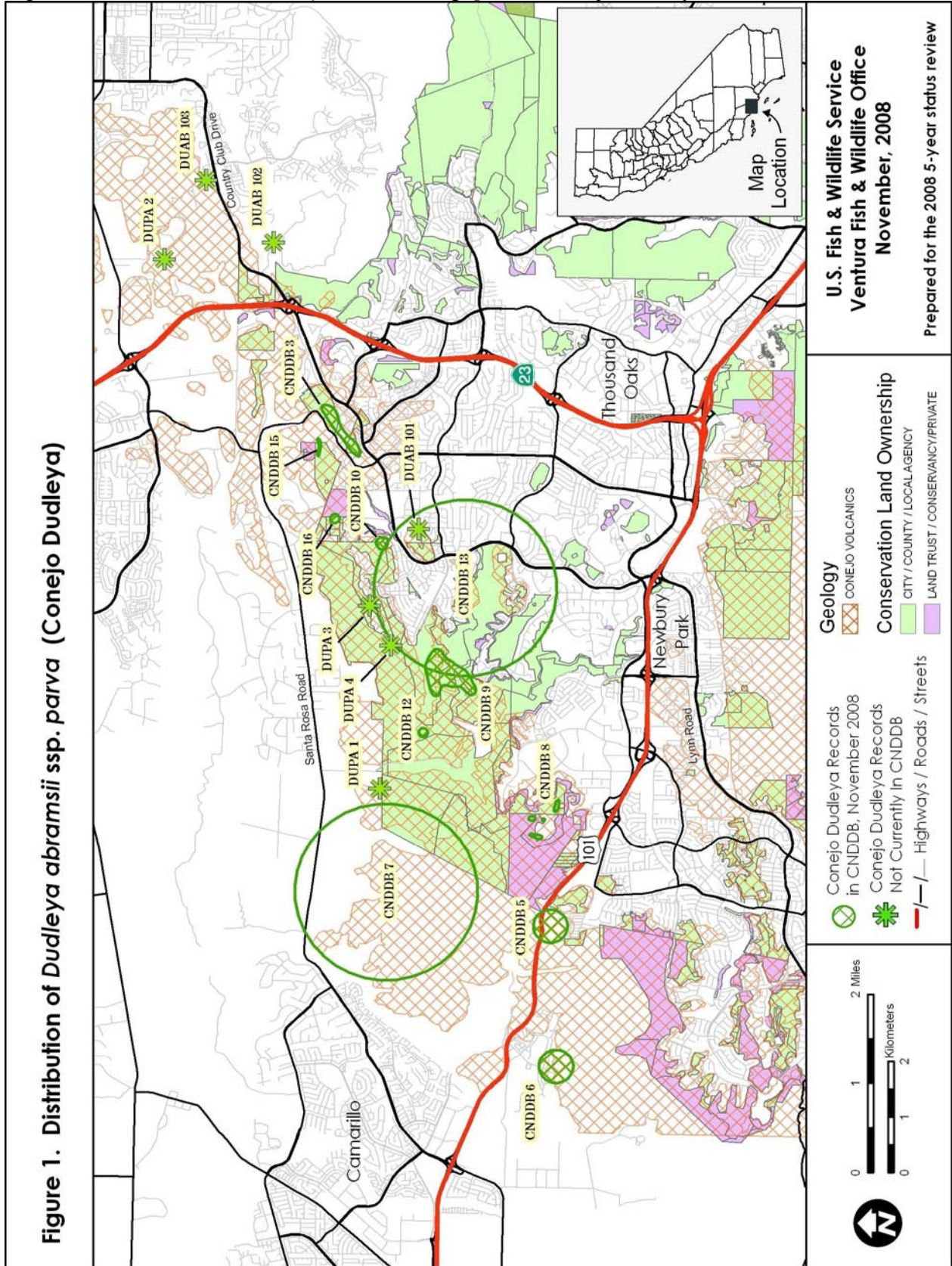
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Figure 1. Distribution of *Dudleya abramsii* ssp. *parva* (Conejo Dudleya)



U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Dudleya abramsii ssp. *parva* (= *Dudleya parva*)
(Conejo Dudleya)

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number: N/A

Review Conducted By: Heather Abbey

FIELD OFFICE APPROVAL:

Field Supervisor, U.S. Fish and Wildlife Service

Approve Diane K. Wade Date 1/14/09

REGIONAL OFFICE APPROVAL:

Assistant Regional Director, U.S. Fish and Wildlife Service, Region 8

Approve Milp7m Date 3/31/09