Dudleya cymosa ssp. *marcescens*
(Marcescent Dudleya)

5-Year Review: Evaluation and Summary

Photo: Ken Niessen USFWS

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

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GENERAL INFORMATION:

Species: *Dudleya cymosa* ssp. *marcescens*
FR citation: 62 FR 4172
Date listed: 29 January 1997
Classification: Threatened

BACKGROUND:

Most recent status review:
U.S. Fish and Wildlife Service. 2009. *Dudleya cymosa* ssp. *marcescens* (Marcescent Dudleya) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, California.

FR Notice citation announcing this status review:
Initiation of 5-Year Status Reviews of 40 Species in California, Nevada and Oregon. Notice of initiation of reviews; request for information. (87 FR 5832), 22 February, 2022.

State and Local Listing

Dudleya cymosa ssp. *marcescens* is listed under the California Endangered Species Act as rare, and has a California Rare Plant Rank of 1B.2 (CNDDB 2023 p. 59). It is considered to be a locally important plant by Ventura County (Ventura County Planning Division 2022 p. 21).

ASSESSMENT:

Information acquired since the last status review:
This 5-year review was conducted by the U.S. Fish and Wildlife Service (Service) Ventura Fish and Wildlife Office. Data for this review were solicited from interested parties through a Federal Register notice announcing this review on February 2, 2022. We also contacted species experts to request any data or information we should consider in our review. Additionally, we conducted a literature search and a review of information in our files.

Introduction
Dudleya cymosa ssp. *marcescens* (Crassulaceae) occurs in the Santa Monica Mountains of Los Angeles and Ventura counties, California (CDFW 2023), with all occurrences bounded by a rectangular area of about 24 kilometers (km, 15 miles (mi)) by 7 km (5 mi). The species is a perennial forb with vernal leaves that die back in the dry season after flowering, leaving the plant inconspicuous on the landscape (Service 1997). Plants are found on volcanic rock faces where moss and lichen substrate is available for recruitment and growth (Riefner et al. 2003 p. 5). *Dudleya cymosa* ssp. *marcescens* is considered difficult to identify because of its wide range of

morphological variation, possible hybridization, and inaccessible cliff habitat (Dorsey et al. 2013 p. 34).

Population data:

Distribution:

At the time of listing in 1997 (Service 1997), there were 7 known occurrences of *Dudleya cymosa* ssp. *marcescens*. The number of known occurrences has gradually increased to 14 (Table 1, Service 1999 p. 27, Service 2009 p. 6, Dorsey et al. 2013 pp. 29-41; CNDDB 2023 (last updated 2015), Guilliams and Hasenstab-Lehman 2021 pp. 35-37). Most of these occurrences have been recently confirmed as extant (Guilliams and Hasenstab-Lehman 2021 pp. 35-37). Nine of the occurrences are at least partially on public land, and thirteen of the fourteen occurrences are in the fire footprint of the 2018 Woolsey Fire (Guilliams and Hasenstab-Lehman 2021 p. 27).

Unpublished data suggest that several known occurrences of *Dudleya cymosa* ssp. *marcescens* are more extensive than currently documented and that there may be several undocumented occurrences (Devlin Gandy pers. comm. 2023). If the undocumented occurrences are verified, the range of the species would extend by 1.5 km (1 mi) to the west and 4.5 km (3 mi) to the east.

Table 1. Occurrences of *Dudleya cymosa* ssp. *marcescens*. Data are from CDFW 2023 (last updated 2015) and Guilliams and Hasenstab-Lehman (2021 pp. 35-37). CNDDB = California Natural Diversity Database, EO = Element Occurrence, CDPR = California Department of Parks and Recreation, NPS = National Park Service. To help correlate site names with those in older documents, older site names are given in the Notes column.

CNDDB EO Number	Location	Last Year Seen	Site Owner	Notes
1	Seminole Hot Springs	2020	Los Angeles County	Mountains Restoration Trust formerly listed as site owner.
2	Yerba Buena Road	1978	Private	
3	Yerba Buena/Cotharin	2020	Private	Includes former EO 4
5	Salvation Army Camp	2020	Private	Includes NPS DUCYM 104 “Mott Rd”
6	Rock Pool, Malibu Creek State Park	2020	CDPR	Includes Century Lake
7	Udell Gorge, Malibu Creek State Park	2020	CDPR	
8	Hidden Valley	2020	NPS/Private	
9	Mulholland and Yerba Buena Road	2020	Private	
10	Malibu Creek S of Malibu Lake	2020	CDPR	Possibly part of EO 7, formerly NPS DUCYM 205
11	Trancas Canyon 1.8 mi N of Kincaid Ranch	2020	NPS	Possibly combine with EO12
12	Trancas Canyon 0.9 mi W of Saddle Rock	2003	NPS	Possibly combine with EO 11. Formerly NPS DUCYM 202.

CNDDB EO Number	Location	Last Year Seen	Site Owner	Notes
13	Camp Shalom	2020	Private	Formerly NPS DUCYM 203
14	Circle-X Grotto	2020	NPS	Formerly NPS DUCYM 101
15	Carlisle Canyon, Echo Cliffs	2020	NPS	Formerly NPS DUCYM 206

***Abundance*:**
Twelve of the 14 known occurrences were surveyed in 2020 and a total of 6,148 individuals were found (Table 2, Guilliams and Hasenstab-Lehman 2021 pp. 35-37, 42-43). Two of the occurrences were not surveyed because they could not be located. The study also assessed trends in abundance and concluded that two thirds of the surveyed occurrences were stable and one third were declining over time. No occurrences were considered to be increasing. Some of the occurrences were scored as "stable" despite having fewer individuals over time (EO 7, EO 13), because it was felt they were in the process of recovering from moderate effects of the 2018 Woolsey Fire. In general, declines can be attributed to the effects of the Woolsey Fire, which burned 11 of the 12 occurrences observed during the 2020 surveys.

Table 2. Abundance of *Dudleya cymosa* ssp. *marcescens*. Data are from CDFW 2023, Dorsey et al. 2013 pp. 29-41, Guilliams and Hasenstab-Lehman 2021 pp. 35-37). CNDDB = California Natural Diversity Database, EO = Element Occurrence, SBBG = Santa Barbara Botanic Garden.

CNDDB EO Number	Year Surveyed	Number	2020 Trend	Effects of 2018 Woolsey Fire	Notes
1	1979 1982 2005 2010 2020	present < 50 100 400 309	stable	moderate	
2	1978 2003	9 0	unknown	unknown	not found in 2020 surveys
3	1974 1979 1994 2003 2006 2020	abundant present > 1,000 1,500 4,100 >506	decline	low	
5	1979 2003 2010 2011 2020	present 300 1,283 12 83	decline	moderate	2010 count likely includes some *D. lanceolata*, 2011 count only part of one polygon.
6	1981 1984 2003 2005 2010 2020	< 50 >50 1,700 hundreds 1,484 370	decline?	low	

CNDDB EO Number	Year Surveyed	Number	2020 Trend	Effects of 2018 Woolsey Fire	Notes
7	1982 1984 2003 2010 2020	<50 <50 1,000 0 596	stable?	moderate	2003 number given in 2009 5-yr belongs to EO 8
8	1984 2003 2010 2020	> 100 4,000 2,819 1,255	stable?	(low)	2010 partial survey. Outside the Woolsey Fire perimeter.
9	1993 2010 2020	> 100 0 207	stable	moderate	
10	2003 2010 2020	1,000 400 587	stable	severe	
11	2003 2020	170 30	decline	severe	
12	2003 2010	170 0	unknown	unknown	not found in 2020 surveys
13	2010 2020	900 392	stable	moderate	
14	2003 2010 2020	1,000 350 1,769	stable	low	
15	2010 2020	100 44	stable	low	

Conservation seed banking:
There is one accession of *Dudleya cymosa* ssp. *marcescens* seed at the Santa Barbara Botanic Garden, a Center for Plant Conservation (CPC) approved conservation seed bank (California Plant Rescue 2023). The accession was collected from CNDDB EO 14, Circle-X Grotto on 24 July 2020 and represents 33 maternal lines with 23,580 seeds.

Genetics and Taxonomy:
Field identification of *Dudleya cymosa* ssp. *marcescens* is less certain than of other Santa Monica Mountains *Dudleya* taxa because of high morphological variability and likely hybridization (Dorsey et al. 2013 p. 4, Hasenstab-Lehman and Guilliams 2020 pp. 27-28 and pers. comm. 2023). Some occurrences (EOs 5, 6, 13, 14, 15) may be hybridizing with *Dudleya lanceolata* and *Dudleya cymosa* ssp. *cymosa* (Guilliams and Hasenstab-Lehman 2021 pp. 42-43, 46, 57). Recent genetic work has shown that ssp. *marcescens* does not form a monophyletic clade within *Dudleya cymosa* (Hasenstab-Lehman and Guilliams 2020 entire). In the future, *Dudleya cymosa* ssp. *marcescens* may be part of a taxonomic rearrangement of *Dudleya cymosa* and may no longer be recognized as a narrow taxonomic entity (Hasenstab-Lehman and Guilliams 2020 pp. 27-28 and pers. comm. 2023). However, there should be more genetic work and common garden experiments completed before making any formal taxonomic decisions that would affect listing status (Hasenstab-Lehman and Guilliams 2020 p. 30 and pers. comm. 2023).

EVALUATION OF THREATS:

At the time of listing in 1997, the threats to *Dudleya cymosa* ssp. *marcescens* were identified as development, recreational trampling and rock climbing, illegal collecting, and fire destroying plants and substrate (Service 1997 entire). The 2009 5-year review introduced climate change as a threat, specifically the ability of the species to move on the landscape as vegetation shifts in response to climate change (Service 2009 pp. 8-14).

Development:
Nine of the fourteen *Dudleya cymosa* ssp. *marcescens* occurrences are on public lands owned by Los Angeles County, California Department of Parks and Recreation, and the National Park Service (Table 1, CDFW 2023). The threat of development is low at these locations because these public organizations generally manage for resource conservation. The remaining occurrences are on private land, where development may occur. However, the taxon grows on cliffs or steep rocky areas that may help protect it from direct impacts of development.

Besides being federally listed as threatened, it is a special status plant for the State of California (CNDDB 2023 p. 59) and a locally important plant for the County of Ventura (Ventura County Planning Division 2022 p. 21). However, as the 2009 five-year review discusses (Service 2009 pp. 11-13), protections are often functionally weak, and plants can still be impacted by future development. Development is uncertain and remains a threat to *Dudleya cymosa* ssp. *marcescens.*

Rock climbing:
In the past, the overall impact from rock climbing to the taxon was not considered to be large and immediate (Dorsey et al. 2013 pp. 8-9). The 2009 5-year found that some occurrences are at greater risk than others from rock climbing because of the desirability of certain cliff faces over others for that recreational activity. Some occurrences have sustained significant loss of plants due to rock climbing (Service 2009 pp. 8-10, Dorsey et al. 2013 pp. 40-41, Guilliams and Hasenstab-Lehman 2021 pp. 41-42, 46). Rock climbing remains a threat where it currently occurs and where it may occur in the future.

Illegal collecting:
Illegal collecting of the genus *Dudleya* in general has emerged as an increasing problem (e.g., Department of Justice 2021). We are not aware of any recent reports of illegal collecting of *Dudleya cymosa* ssp. *marcescens*. However, poaching may be difficult to directly determine (Guilliams and Hasenstab-Lehman 2021 p .31) and, given that some of the areas where *Dudleya cymosa* ssp. *marcescens* occurs have high recreational traffic or are easily accessible, the likelihood of illegal collection is thought to be high (Guilliams and Hasenstab-Lehman 2021 p. 31). Illegal collecting remains a threat.

Wildfire:
Since its 1997 listing, mortality and the destruction of moss habitat by wildfire has been considered a threat (Service 1997) to *Dudleya cymosa* ssp. *marcescens.* After the 2018 Woolsey Fire, two of eleven occurrences had severe effects from wildfire, five had moderate effects, and four had low effects (Table 2, Guilliams and Hasenstab-Lehman 2021 pp. 42-43), with

occurrences responding differently to wildfire depending on the density of the immediate local vegetation. *Dudleya cymosa* ssp. *marcescens* typically occurs on steep, sparsely vegetated cliff faces that are not highly invasible by non-native annuals (Dorsey et al. 2013 p.8). However, the expansion of non-native annual grasses that more easily carry fire is predicted to occur in *Dudleya cymosa* ssp. *marcescens* habitat, and this may make the habitat more likely to burn and the effects of fire may be more severe (Sandel and Dangremond 2012 entire, Hall et al. 2018 p. 53). Wildfires remain a threat to the taxon, and the threat may increase if invasion by non-native annual grasses increases the fuel load and susceptibility of suitable habitat to fire.

Climate change effects:
The 2009 5-year review introduced climate change as a threat to *Dudleya cymosa* ssp. *marcescens* (Service 2009 p. 13). Effects of climate change for the Los Angeles area include predicted rising annual and extreme high temperatures (Hall et al. pp. 10-11) and increased episodic rainfall with more extreme floods and drier droughts (Hall et al. pp. 11-14, 18). Changes in climate could threaten *Dudleya cymosa* ssp. *marcescens* through habitat degradation or migration, mortality through drought or erosion, and increased non-native annual grasses leading to greater competition or fire susceptibility (Service 2009 p. 13). Recently, the current effects of non-natives and erosion were assessed to be low for the taxon (Guilliams and Hasenstab-Lehman 2021 pp. 42-43).

As climate changes and vegetation shifts, optimal habitat for *Dudleya cymosa* ssp. *marcescens* may also shift, and the taxon may not be able to disperse far and fast enough to match the vegetation shift. Although the taxon is dormant in the dry part of the year, more intensively dry summers with long-term drought could kill plants. Conversely, more intense precipitation could cause increased erosion on the steep cliff habitat of *Dudleya cymosa* ssp. *marcescens*, destroying plants. Non-native annual grasses are expected to increase in dominance because of increased fire frequency (Hall et al. 2018 p. 53) and with increasing annual temperatures (Sandel and Dangremond 2012 entire). The increased annual grass dominance can in turn both promote more fire and may have more negative competitive effects on *Dudleya cymosa* ssp. *marcescens*. Because the taxon characteristically occurs on steep cliffs with sparse vegetation that does not carry fire well, this may not negatively affect the taxon. However, if non-native annual grass cover does increase and fires do increase in frequency or intensity at *Dudleya cymosa* ssp. *marcescens* occurrences, the taxon could be negatively impacted. The threat of climate change on *Dudleya cymosa* ssp. *marcescens* remains.

EVALUATION OF DELISTING CRITERIA:

The delisting criteria for *Dudleya cymosa ssp. marcescens* are given in the Recovery Plan (Service 1999, p. 42) and shown below.

Delisting criteria for *Dudleya cymosa* ssp. *marcescens*

1. *All current sites (including seedbanks) are fully protected and managed with the primary intention of preserving the populations in perpetuity.*

- This criterion has not been met. Not all sites, including on public property, are fully protected and managed with the primary intention of preserving populations in perpetuity.

2. *All current sites (including seed banks) are shown to be self-sustaining over a minimum of 10 years.*
    - This criterion has not been met. There has been insufficient monitoring to demonstrate that populations are self-sustaining.

CONCLUSION:

We reviewed the best available scientific information and evaluated the threats affecting *Dudleya cymosa* ssp. *marcescens* in 2023 under factors in 4(a)(1) of the U.S. Endangered Species Act of 1973 (as amended). There has been no substantial change in threats since time of listing and more occurrences are known. However, especially with the restricted range of the taxon, there is still the potential for loss of plants through development, recreational trampling and rock climbing, illegal collecting, fire, and climate change. Therefore, we conclude that the taxon still meets the definition of a threatened species and recommend no change in status.

RECOMMENDATIONS FOR FUTURE ACTIONS:

1. Continue genetic, common garden, and other analyses to determine if *Dudleya cymosa* ssp. *marcescens* is a valid narrow taxon, or part of the range of variation of a more widespread and abundant taxon.

2. Conduct thorough surveys of known occurrences, adjacent areas, and other areas of suitable habitat to potentially increase the extent of known occurrences and document new occurrences. Develop and implement a monitoring plan. Monitoring should include population abundance surveys, habitat condition assessment, and documentation of existing and potential threats.

3. Work with public and private entities to prevent damage to plants and to raise public awareness to support appropriate conservation measures.

4. Update and expand knowledge of the taxon's life history and specific habitat requirements, especially regarding fire.

5. Improve the completeness of coverage of *Dudleya cymosa* ssp. *marcescens* in conservation seed banks, with more occurrences over more years.

APPROVAL:

***For* Lead Field Supervisor, Fish and Wildlife Service**

Approved CATHERINE DARST Digitally signed by CATHERINE DARST Date: 2023.02.23 11:23:42 -08'00'

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