5-YEAR REVIEW

***Eremogone ursina* (*Arenaria ursina*)**
(Bear Valley sandwort)

GENERAL INFORMATION

Species: *Eremogone ursina* (*Arenaria ursina*), (Bear Valley sandwort), a plant species
Date listed under the Endangered Species Act: September 14, 1998
Federal Register citation: USFWS 1998 (63 FR 49006–49022)
Classification: Threatened
Recovery Priority Number: 8

BACKGROUND

Under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq*.), the U.S. Fish and Wildlife Service (USFWS), referred to as "we" in this document, maintain lists of endangered and threatened wildlife and plant species (referred to as the List) in the Code of Federal Regulations (CFR) at 50 CFR 17.11 (for wildlife) and 17.12 (for plants). Section 4(c)(2)(A) of the Act requires us to review each listed species' status at least once every 5 years.

Most recent status review: USFWS. 2015. *Eremogone ursina* (Bear Valley sandwort) 5-year review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, Carlsbad, California. 47 pp.

We initiated a status review for *Eremogone ursina* in 2011. The review was finalized on August 14, 2015 and recommended no change in listing status. This and other reviews can be viewed at the species page on the Environmental Conservation Online System (ECOS).

Federal Register Notice citation announcing this status review: On January 27, 2020, we published a *Federal Register* notice announcing initiation of the 5-year review of this species, and the opening of a 60-day comment period to receive information (USFWS 2020, pp. 4692–4694). We received no information about *Eremogone ursina*.

ASSESSMENT

Information acquired since the last status review

This 5-year review was conducted by the USFWS Carlsbad Fish and Wildlife Office. Data for this review were solicited from the public and interested parties through a *Federal Register* notice announcing this review on January 27, 2020 (USFWS 2020, pp. 4692–4694). We also contacted the U.S. Forest Service (USFS) 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.

SUMMARY OF NEW INFORMATION SINCE 2015

Biology and occurrence status

At the time of listing in 1998, *Eremogone ursina* was known from eight pebble plain complexes in the vicinity of Big Bear and Baldwin Lakes. At the time of the last 5-year review in 2015, we considered *E. ursina* extant at 29 occurrences from 10 pebble plain complexes (USFWS 2015, pp. 7, 43–45).

Since 2015, no studies have examined *Eremogone ursina* biology, life history, or genetics. We do have new information from site visits by the USFS, and from the California Natural Diversity Database (CNDDB) (CDFW 2021, entire).

Since the 2015 5-year review, we have received new information about seven *Eremogone ursina* occurrences. Five were not included in our 2015 5-year review but are in CNDDB [Element Occurrence (EO) numbers 19, 38, 46, 53, 54], and two (0512MT-KAD-E020 and 0512MT-MBC-E395) are in the USFS occurrence database. These new occurrences increase the total number of *E. ursina* occurrences to 36 (Tables 1, 2; Figure 1).

Of the 29 occurrences considered in the 2015 5-year review, 22 have had a change in status. Three occurrences that were extant in 2015 (EOs 10, 17, and 34) are possibly extirpated, because portions of the occurrences have been developed and there have been no observations for over 20 years. The remaining 19 occurrences that were extant in 2015 are now presumed extant, because they have not been observed for over 10 years. The seven new occurrences that were not discussed in the 2015 review are all presumed extant, except for 0512MT-MBC-E395, which is considered extant.

Table 1. Summary of *Eremogone ursina* occurrence number and status at listing, in 2015, and in 2021, indicating whether the occurrence is extant, presumed, extant, or possibly extirpated.[1]

Occurrence status	Number of occurrences at listing	Number of occurrences in 2015	Number of occurrences in 2021
Extant	29	29	8
Presumed extant	NA	NA	25
Possibly extirpated	NA	NA	3
Total	**29**	**29**	**36**

[1] We considered an occurrence "extant" if the occurrence has been observed within 10 years (since 2011). We considered an occurrence "presumed extant" if it has not been observed for over 10 years, but suitable habitat is present. We considered an occurrence "possibly extirpated" if it has not been observed for over 20 years despite surveys, or if habitat has been degraded or partially developed.

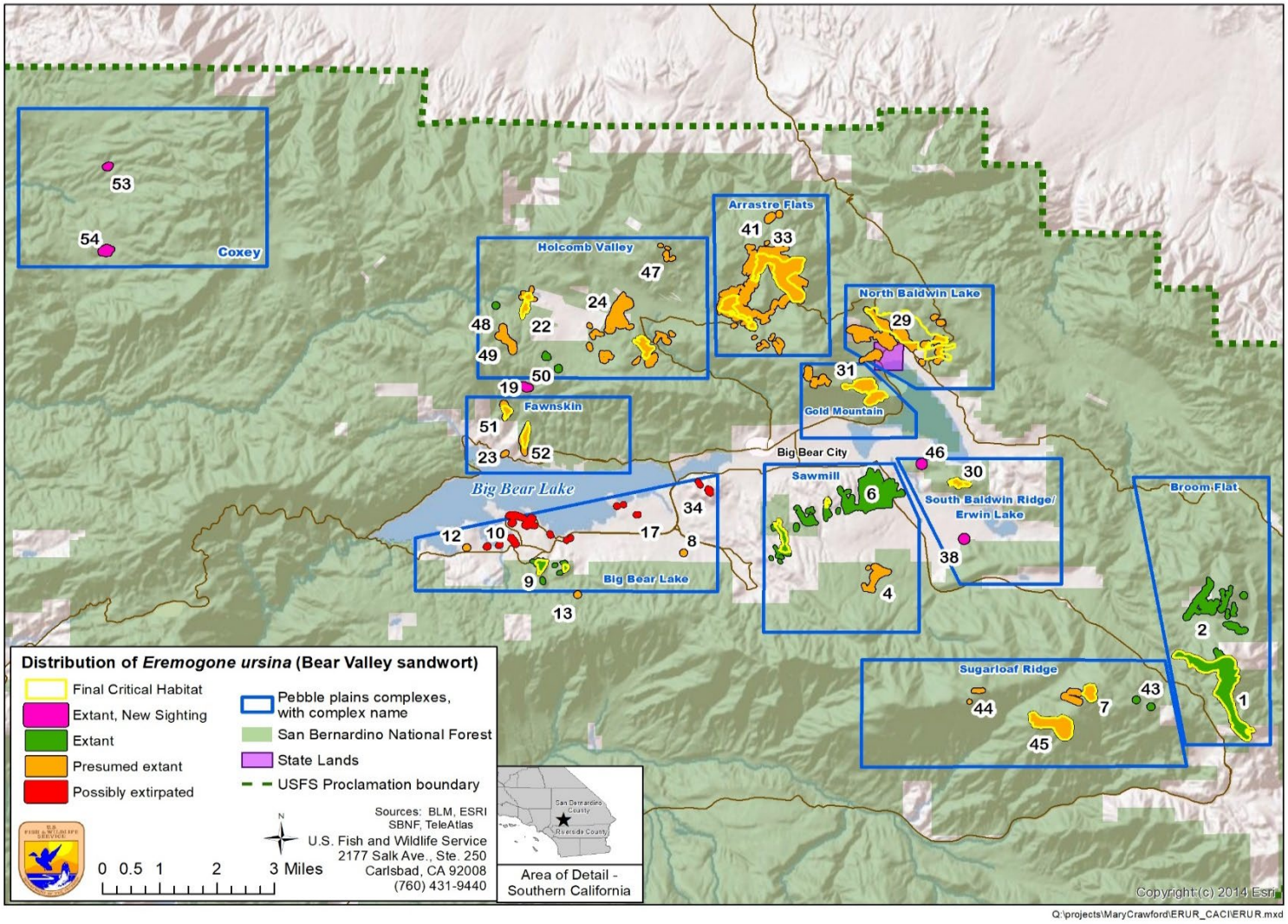

Figure 1. Map of *Eremogone ursina* occurrences, showing occurrence status and identifying whether the occurrence is new since the 2015 5-year review. The numerical label indicates the CNDDB EO number.

Table 2. Occurrence information for *Eremogone ursina*, prepared for the 2021 5-year review.

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Broom Flat (including Onyx Peak)	1	350 (2010, partial survey); 40 (2016, partial survey)	Extant	Extant	Extant	USFS, Private	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants; Fire Suppression.	This EO was affected by fire suppression activities resulting from the 2015 Lake Fire. A dozer line damaged pebble plain habitat in an area 9 to 24 meters (m) [30 to 80 feet (ft)] wide. Approximately 18 uprooted *E. ursina* were observed (USFS 2015, pp. 71–72).	USFS 2020; CDFW 2021, p. 1
Broom Flat (including Onyx Peak)	2	1,030 plus (2010), approximately 500 (2014), 260 (2015)	Extant	Extant	Extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants; Fire Suppression. E: Climate change.	The EO was affected by fire suppression activities during the 2015 Lake Fire. A dozer line damaged pebble plain habitat in an area 9 to 15 m (30 to 50 ft) wide. One uprooted *E. ursina* was observed.	USFS 2020; CDFW 2021, p. 3
Sawmill	4	NA	Extant	Extant	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants. E: Climate change.	The status is presumed extant because the occurrence has not been observed in 20 years, but suitable habitat is still present.	USFS 2020; CDFW 2021, p. 4
Sawmill	6	Unknown (1981), Unknown (2000), 650 (2005)	Extant	Extant	Extant	USFS, Private, Private conservation (San Bernardino Mountains Land Trust)	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants. E: Climate change.	Parts of the occurrence have been extirpated due to development. Threats to extant areas include off-highway vehicles and nonnative plants (CDFW 2021).	USFS 2020; CDFW 2021, p. 5
Sugarloaf Ridge	7	"Scarce" (2008), 0 (2014, partial survey)	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Fire Suppression. E: Climate change.	This EO is presumed extant because plants have not been observed since 2008.	USFS 2020; CDFW 2021, p. 7
Big Bear Lake	8	NA	Extant	Extant	Presumed extant	Private	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1978.	CDFW 2021, p. 8

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Big Bear Lake	9	203 (2005), 500 (2010), 7,207 (2016)	Extant	Extant	Extant	USFS, Private	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	Trampling/non-OHV recreational is a threat to this occurrence (CDFW 2021)	USFS 2020; CDFW 2021, p. 9
Big Bear Lake	10	NA	Extant	Extant	Possibly extirpated	Private and private conservation organizations (San Bernardino Mountains Land Trust, Inland Empire Resource Conservation District)	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	The occurrence is possibly extirpated because portions of the occurrence are developed.	CDFW 2021, p. 10
Big Bear Lake	12	NA	Extant	Extant	Presumed extant	Private	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	Development is a threat to this occurrence. The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1981.	CDFW 2021, p. 11
Big Bear Lake	13	NA	Extant	Extant	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1979.	USFS 2020; CDFW 2021, p. 12,
Big Bear Lake	17	NA	Extant	Extant	Possibly extirpated	Private	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	The occurrence is possibly extirpated because portions of the area have been developed. Plants have not been observed at the occurrence since 1981.	CDFW 2021, p. 13
NA	19	NA	NA	NA	Presumed extant	USFS	NA	This EO was not considered in our 2015 5-year review. The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1979.	CDFW 2021, p. 14

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Holcomb Valley	22	0 (2012, partial survey	Extant	Extant	Presumed extant	USFS, Private	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	The occurrence is presumed extant because plants have not been observed since 2000.	CDFW 2021, p. 15
Fawnskin	23	NA	Extant	Extant	Presumed extant	Private	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants; Fire Suppression. E: Climate change.	The occurrence is presumed extant because undeveloped habitat is still present in the area. No surveys have been conducted since 1981.	CDFW 2021, p. 16
Holcomb Valley	24	500 (2009, partial survey), 5,025 (2000)	Extant	Extant	Presumed extant	USFS, Private	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	The CNDDB lists development and recreational use (non-OHV) as additional threats (CNDDB 2021)	USFS 2020; CDFW 2021, p. 17
North Baldwin Lake	29	965 (2009)	Extant	Extant	Presumed extant	USFS, State, Private	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants; Mining. E: Climate change.	The northwestern part of this occurrence burned in the 2017 Holcomb Fire (USFS 2017, p. 14). However, because of sparse fuel within pebble plain habitat, the fire was spotty, and no plants showed evidence of burning (USFS 2017, p. 14). In 2020, the northwestern portion of the occurrence was affected by unauthorized cable trenching (Eliason 2020, pers. comm.)	USFS 2020; CDFW 2021, p. 18
South Baldwin Ridge/Erwin Lake	30	1,000 (2008), 1,750 (2005)	Extant	Extant	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants. E: Climate change.	This occurrence has not been observed since 2008, but habitat is still present in the area.	USFS 2020; CDFW 2021, p. 20
Gold Mountain	31	NA	Extant	Extant	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants. E: Climate change.	The occurrence has not been observed since 2000.	CDFW 2021, p. 21

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Arrastre Flats	33	NA	Extant	Extant	Presumed extant	USFS, Private	A: Roads and Trails; Alteration of Hydrology; Nonnative Plants; Mining. E: Climate change.	The occurrence has not been observed since 2000. The eastern part of this occurrence burned in the 2017 Holcomb Fire, and aerial fire retardant was applied (USFS 2017, p. 14). However, because of sparse fuel within pebble plain habitat, the fire was spotty, and no plants showed evidence of burning (USFS 2017, p. 14).	CDFW 2021, p. 22
Big Bear Lake	34	NA	Extant	Extant	Possibly extirpated	Private	A: Urbanization; Roads and Trails; Alteration of Hydrology. E: Climate change.	The occurrence is possibly extirpated because portions of the area have been developed. Plants have not been observed at the occurrence since 1981.	CDFW 2021, p. 23
South Baldwin Ridge/Erwin Lake	38	NA	NA	NA	Presumed extant	USFS, Private	A: Urbanization; Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants. E: Climate change.	This EO was not considered in our 2015 5-year review. The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1981.	, USFS 2020;CDFW 2021, p. 24
Arrastre Flats	41	NA	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Nonnative Plants; Mining. E: Climate change.	This occurrence is presumed extant because suitable habitat exists in this area, although there have been no site visits since 1981.	USFS 2020; CDFW 2021, p. 25
Sugarloaf Ridge	43	5 (2008, partial survey), 100 (2009, partial survey), 1000 (2010, partial survey), 35 (2014, partial survey)	Extant	Extant	Extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Fire Suppression. E: Climate change.	There has been one site visit since 2014, when 35 plants were detected.	USFS 2020; CDFW 2021, p. 26
Sugarloaf Ridge	44	10 (2008, partial survey)	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Fire Suppression. E: Climate change.	The EO has not been observed since 2008.	USFS 2020; CDFW 2021, p. 27

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Sugarloaf Ridge	45	NA	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Fire Suppression. E: Climate change.	The EO has not been observed since 2000.	USFS 2020; CDFW 2021, p. 28
South Baldwin Ridge/Erwin Lake	46	NA	NA	NA	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants. E: Climate change.	This EO was not considered in our 2015 5-year review. The occurrence is presumed extant because undeveloped habitat is present in the area, even though there have been no surveys since 1981.	USFS 2020; CDFW 2021, p. 29
Holcomb Valley	47	NA	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	The EO has not been observed since 2000.	USFS 2020; CDFW 2021, p. 30
Holcomb Valley	48	80 (2012)	Extant	Extant	Extant	USFS	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	No change in EO status, conservation status, or threats	USFS 2020; CDFW 2021, p. 31
Holcomb Valley	49	Unknown (2009)	Extant	Extant	Presumed extant	USFS	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	The EO has not been observed since 2009.	USFS 2020; CDFW 2021, p. 32
Holcomb Valley	50	1,800 (2012)	Extant	Extant	Extant	USFS	A: Roads and Trails; Alteration of Hydrology; Mining. E: Climate change.	Threats information wasn't listed in the 2013 5-year review but is in the CNDDB.	USFS 2020; CDFW 2021, p. 33
Fawnskin	51	NA	Extant	Extant	Presumed extant	USFS	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants; Fire Suppression. E: Climate change.	Threats information wasn't listed in the 2015 5-year review but is in the CNDDB. The occurrence is now presumed extant, since it hasn't been observed for over 10 years.	USFS 2020; CDFW 2021, p. 34

Pebble Plain Complex	CNDDB EO number	Post-listing plant counts (Count, Year)	Status at listing	2015 Status	2021 Status	Ownership (2021)	Threats (2021)	2015–2021 change summary	References
Fawnskin	52	NA	Extant	Extant	Presumed extant	USFS, Private	A: Urbanization; Roads and Trails; Alteration of Hydrology; Nonnative Plants; Fire Suppression. E: Climate change.	Mining is additional threat (CDFW 2021). The occurrence is now presumed extant, since it hasn't been observed for over 20 years.	USFS 2020; CDFW 2021, p. 35
NA (Dawn o' Day Canyon)	53	NA	NA	NA	Presumed extant	USFS	NA	This occurrence wasn't included in the 2015 5-year review. The occurrence is presumed extant, since it hasn't been observed for over 10 years.	USFS 2020; CDFW 2021, p. 36
NA (Little Pine Flat)	54	NA	NA	NA	Presumed extant	USFS	NA	This occurrence wasn't included in the 2015 5-year review. The occurrence is presumed extant, since it hasn't been observed for over 10 years.	USFS 2020; CDFW 2021, p. 37
Broom Flat (including Onyx Peak)	NA (USFS Site ID 0512MT-MBC-E395)	260 (2015)	NA	NA	Extant	USFS	A: Roads and Trails; Alteration of Hydrology; Trampling of Habitat; Nonnative Plants; Fire Suppression. E: Climate change.	This occurrence was discovered in 2015. No threats were documented at the occurrence. The location is approximately 0.55 kilometers (0.34 miles) northeast of CNDDB EO 1.	USFS 2020
North Baldwin Lake	NA (USFS Site ID 0512MT-KAD-E020)	500 (2009)	NA	NA	Presumed extant	USFS	NA	This occurrence was not included in the 2015 5-year review.	USFS 2020

Threats

Our 2015 5-year review discussed Factor A threats to *Eremogone ursina* from urbanization, roads and trails, alteration of hydrology, trampling, nonnative invasive plants, mining, and fire suppression, and Factor E threats from climate change. This section summarizes new information about threats to *E. ursina* from fire suppression and climate change. We do not have new information about other threats identified in the 2015 5-year review, so refer to USFWS 2015 (pp. 10–13, 19–22) for discussion of those threats.

In 2020, an unauthorized trenching incident in the northwestern part of EO 29 affected pebble plain habitat in the area (Eliason 2020, pers. comm.). Because the damage occurred at a portion of only one occurrence, we do not consider trenching a threat to the species at this time.

Fire suppression

In 2015, the Lake Fire burned approximately 31,359 acres (ac) [12,691 hectares (ha)] in the San Bernardino Mountains (USFS 2015, p. 2). The fire did not burn any areas occupied by *Eremogone ursina* (USFS 2015, p. 7), but suppression efforts outside the burned area did affect plants and critical habitat. Specifically, dozer lines through the Broom Flat pebble plain complex (EOs 1 and 2) damaged pebble plain habitat and uprooted plants (USFS 2015, pp. 70–74, 92).

In 2017, the Holcomb Fire burned 1,503 ac (608 ha) in the San Bernardino Mountains northeast of Baldwin Lake (USFS 2017, p. 6). The USFS initiated emergency consultation with us for 11 species, including *Eremogone ursina* (USFS 2017, p. 3). The fire burned areas occupied by *E. ursina* (USFS 2017, pp. 23–24): portions of EOs 29 and 33 burned in the fire, but because of sparse fuel within pebble plain habitat, the fire was spotty and no plants showed evidence of burning (USFS 2017, p. 14). The USFS determined that fire suppression and suppression repair activities adversely affected individual plants and critical habitat (USFS 2017, p. 27). Post-fire Burned Area Emergency Response (BAER) treatments (e.g., fencing) were expected to be beneficial by reducing the likelihood of off-highway vehicle incursions and allowing vegetation recovery (USFS 2017, pp. 27–28).

Climate change

The term “climate change” refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2013, p. 1450). In 2015, we considered changes in temperature and hydrological conditions from climate change a rangewide threat to *Eremogone ursina* (USFWS 2015, p. 32). Since 2015, new projections of future climate across the range of *E. ursina* have become available (CEC 2019) and are described below.

Temperature changes

Southern California has already experienced a warming trend from 1951 to 2006 (Hall *et al*. 2018, p. 9). In the San Bernardino Mountains, Cal-Adapt models project increases in annual average maximum and minimum temperatures between a baseline time period (1961 to 1990) and an end of century period (2070 to 2090) (CEC 2019). Specifically, between 2070 and 2090,

annual average maximum temperatures are projected to increase by 6.1 degrees Fahrenheit (°F) [3.4 degrees Celsius (°C)] under Representative Concentration Pathway (RCP) 4.5 (a scenario of stabilizing emissions), and by 8.9 °F (4.9 °C) under RCP 8.5 (a scenario of increasing emissions) (CEC 2019). The frequency, duration, and intensity of heat waves is also expected to increase (Hall *et al*. 2018, p. 12; Kalansky *et al*. 2018, p. 21).

Precipitation changes

Precipitation in southern California is highly variable from year to year (Hall *et al*. 2018, p. 12; Kalansky *et al*. 2018, p. 24). Models of future precipitation generally project small mean changes relative to the historical variability, and the overall direction of future precipitation is unclear (Hall *et al*. 2018, p. 13). Models project increases in extreme precipitation frequency and intensity (Polade *et al*. 2017, p. 7; Swain *et al*. 2018, p. 428), including increases in the frequency of atmospheric-river storms, which deliver intense precipitation and can cause severe flooding (Dettinger 2011, p. 519). However, droughts are also projected to become more frequent and intense and will be exacerbated by higher temperatures (Kalansky *et al*. 2018, p. 25).

In Big Bear Valley (San Bernardino Mountains), average annual precipitation ranges from about 18 to 35 inches. Due to a rain shadow effect, precipitation generally decreases from west to east across the valley (USGS 2012, p. 4). Therefore, the effects of changing precipitation amount and timing will also likely differ at a relatively small scale in the San Bernardino Mountains (Tank *et al*. 2009).

Snowpack changes

Warming trends have already driven declines in mountain snowpack across the western United States (Mote *et al*. 2018, p. 4). Snowpack is affected by temperature and precipitation. In a warmer climate, a higher proportion of precipitation is expected to fall as rain rather than snow, and snowpack is expected to melt earlier and more quickly (Viers *et al*. 2013, p. 9; Dettinger *et al*. 2018, p. 21). Snow lines are also expected to rise (Dettinger *et al*. 2018, p. 21).

Sun *et al*. (2016, p. 93) used downscaled general circulation models under two scenarios to predict future snowfall and snowpack in the southern California mountains. Their models included the San Bernardino, San Jacinto, and Los Angeles County Mountains. They projected that under RCP 8.5, midcentury mean snowfall would be 30 percent lower than baseline snowfall, and that snowfall loss would be greatest at lower and mid-elevations (Sun *et al*. 2016, pp. 106–107). Projections of timing of snow-free date (i.e., how much earlier snow melts compared to baseline) differed depending on the model used, but on average, the snow-free date occurred 16 days earlier (Sun *et al*. 2016, p. 108).

Potential effects of climate change on *Eremogone ursina*

The effects of climate change on *Eremogone ursina* and its habitat have not been directly studied, and there is uncertainty in the predictions of downscaled climate models. However, the projected abiotic pressures resulting from climate change—increased temperature, changes in precipitation, and reduced snowpack and earlier runoff—could alter the hydrology of pebble plain habitat occupied by *E. ursina*. Changing hydrology may result in erosion of the clay soil,

exposing the roots of pebble plain plants and resulting in plant desiccation and death. Additionally, increased temperatures may reduce the extent of frost heaving—the upwards swelling of soil in below-freezing temperatures—which helps pebble plain habitat persist by pushing stone fragments to the soil surface and limiting encroachment of trees and shrubs. Over time, an increase in erosion events and earlier thawing may reduce the amount or quality (or both) of pebble plain habitat that supports *E. ursina*.

Consultation on U.S. Forest Service activities

In 2019, we issued a biological opinion for the ongoing activities affecting 12 mountain plant species on the San Bernardino National Forest, including *Eremogone ursina* (USFWS 2019, entire). We discussed the general effects of nine USFS management programs on listed plants (USFWS 2019, pp. 18–26), and specific effects to *E. ursina* (USFWS 2019, pp. 60–67).

We determined that the implementation of the U.S. Forest Service's Revised Land Resource Management Plan (Forest Plan, USFS 2006, entire) was not likely to jeopardize the continued existence of *Eremogone ursina* (USFWS 2019, pp. 66–67). We reached that conclusion because 1) USFS has developed a Pebble Plain Habitat Management Guide, which describes specific management strategies to promote recovery of pebble plain plants, and 2) USFS will avoid and minimize impacts from management activities (USFWS 2019, p. 67). To avoid and minimize those impacts, the biological opinion incorporated multiple protective measures (USFWS 2019, pp. 9–12), in addition to measures already being implemented by USFS (USFWS 2019, Enclosure Appendix A).

Summary of threats

Since the 2015 5-year review, we received new information about ongoing threats impacting *Eremogone ursina* occurrences across the range. The new information relates to the threats of (1) fire suppression activities, (2) road and trails [off-highway vehicles (OHVs)], and (3) climate change. However, the new information does not alter the analysis or conclusions of our 2015 5-year review (USFWS 2015, pp. 11–34).

CONCLUSION

In the 2015 5-year review, we considered *Eremogone ursina* extant in 29 occurrences. Since then, we have received new survey and monitoring information and some new information about threats to *E. ursina*. We updated our 2015 occurrence status determinations and added 7 additional occurrences, bringing the total to 36 (Table 2). Of the 29 occurrences we discussed in the previous review, 21 have had a change in status, mostly due to a lack of surveys within the past 10 years. Of the 36 known occurrences, 8 are extant, 25 are presumed extant, and 3 are possibly extirpated. All occurrences continue to face multiple threats such as urbanization, roads and trails, altered hydrology, and climate change. Currently, information we received since the previous review does not appreciably alter our understanding of the species' distribution or ecology, and we believe the species remains threatened.

After reviewing the best available scientific information, we conclude that *Eremogone ursina* remains a threatened species. The evaluation of threats affecting the species under the factors in

4(a)(1) of the Act and analysis of the status of the species in our 2015 5-year review remains an accurate reflection of the species current status.

RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be completed over the next 5 years. Successful implementation of these actions will reduce threats to *Eremogone ursina* and provide information to better understand the biological and physical factors limiting the population growth and distribution. We recognize that conservation of this taxon will require cooperation and coordination with partners to minimize impacts from current threats and aid with future restoration efforts.

1. Work with USFS land managers to reduce impacts to *E. ursina* and its habitat from recreational and unauthorized OHV use. Coordinate with USFS on implementation of the Pebble Plains Habitat Management Guide.

2. Reach out to private landowners to identify opportunities for conservation on private lands. Work with private landowners, local governments, and conservation organizations to conserve and manage habitat.

3. Continue to monitor *E. ursina* occurrences to provide early detection of downward trends in population numbers or quality of pebble plain habitat, or both. Regular monitoring of pebble plain complexes can also help with early detection of increasing threats to specific areas (e.g. unauthorized OHV trails).

4. Study *E. ursina* population genetics, including levels of genetic diversity and differentiation among and within occurrences. Determine levels of inbreeding, relatedness, and ploidy. This information will help us assess current levels of genetic diversity and gene flow and determine if genetic management is needed and assess appropriate seed sources for potential future reintroduction or augmentation activities.

5. Collect *E. ursina* seed and conserve seed in an *ex situ* (off-site) conservation seed bank, to preserve the genetic diversity in the species.

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FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

X Approve

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