

Eriastrum densifolium subsp. *sanctorum*
(Santa Ana River woolly-star)

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



Eriastrum densifolium subsp. *sanctorum* (Santa Ana River woolly-star) habitat.
Photo credit Nancy Ferguson (USFWS).

**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, CA**

August 2023

5-YEAR REVIEW

Eriastrum densifolium subsp. *sanctorum* (Santa Ana River woolly-star)

GENERAL INFORMATION

Subspecies: *Eriastrum densifolium* subsp. *sanctorum* (Santa Ana River woolly-star), a plant subspecies

Date listed under the Endangered Species Act: September 28, 1987

Federal Register citation: Service 1987 (52 FR 36265)

Classification: Endangered

Recovery Plan: There is no recovery plan for this species.

Recovery Priority Number: 6C

BACKGROUND

Under the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), the U.S. Fish and Wildlife Service (Service), referred to as “we” in this document, maintains 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: Service 2010. *Eriastrum densifolium* subsp. *sanctorum*, Santa Ana River woolly-star; 5-year Status Review: Summary and evaluation. Department of the Interior. 36 pp.

Federal Register notice announcing this status review: On May 20, 2021, 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 from the public (Service 2021, pp. 27462–27464). No information relative to the *Eriastrum densifolium* subsp. *sanctorum* was received during the open comment period.

Species Overview and Habitat: *Eriastrum densifolium* subsp. *sanctorum* is a subshrub occasionally reaching 1 meter (m) [3.3 feet (ft)] in height. *Eriastrum densifolium* subsp. *sanctorum* plants have an average life span of approximately 5 years with some plants surviving at least 10 years (Burk *et al.* 1989, p. 21). Plants have gray-green stems with light gray-green leaves generally curving upward. The bright blue funnel-shaped flowers are usually longer than 25 millimeters (mm) [1.0 inch (in)] but may be up to 30 mm (1.4 in) long or occasionally as short as 20 mm (0.8 in). have been recognized. The length of the tube forming the base of the corolla is a key feature that distinguishes *E. d.* subsp. *sanctorum* from four other subspecies of *Eriastrum densifolium*; corolla tube lengths in the other subspecies do not exceed 20 mm (0.8 in) (Patterson 1993, p. 828).

Eriastrum densifolium subsp. *sanctorum* is endemic to the Santa Ana River drainage of Southern California. This subspecies was formerly a conspicuous shrub in the alluvial fan sage scrub community on the higher floodplain terraces of the Santa Ana River and its tributaries in

Orange, Riverside, and San Bernardino counties, California. Historically, *E. d.* subsp. *sanctorum* occupied about 110 kilometers (60 miles) of habitat along the Santa Ana River from elevations of about 150 m (500 ft) in the vicinity of Santa Ana Canyon in Orange County up to about 600 m (2,000 ft) at the base of the San Bernardino Mountains, through Riverside County (Service 1987, p. 36266). *Eriastrum densifolium* subsp. *sanctorum* may have occupied alluvial fan sage scrub habitats in Orange County as far downstream as Santiago Canyon (Craig 1934, p. 390; Zembal and Kramer 1984, p. 2). The subspecies is considered extirpated from Orange County and Riverside County (Zembal and Kramer 1985, p. 3; Service 1987, p. 36268).

ASSESSMENT

Information Acquired Since the Last Status Review

This 5-year Review was conducted by the Service's Carlsbad Fish and Wildlife Office. Data for this review were solicited from interested parties through a *Federal Register* notice announcing this review on May 20, 2021. We also contacted the California Department of Fish and Wildlife and 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.

We received additional survey reports/monitoring reports from the California Department of Fish and Wildlife. The results indicate the species and subsequent threats are still present on the landscape. The species distribution also remains the same as described in our 2010 5-year Status Review.

SUMMARY OF NEW INFORMATION SINCE 2010

Distribution

At listing, *Eriastrum densifolium* subsp. *sanctorum* occurred at 11 extant occurrences located in isolated stands along the Santa Ana River in San Bernardino County between 360 m and 600 m (1,200 and 2,000 ft) in elevation. Between listing and the 2010 status review, 12 new occurrences were detected and 2 occurrences were extirpated (EO 3 and EO 27), such that there were 21 extant occurrences in 2010. Additionally, the status of two occurrences were considered unknown (EO 18 and EO 2), although they were categorized as presumed extant for the 2010 status review (Service 2010, p. 6). For this review, these two occurrences are classified as possibly extirpated due to the date of the last known positive observations (1927, 1987) and severe habitat degradation within the polygons. Brush clearing and discing in 2005 possibly extirpated Verdemon (EO 18) and development may have eliminated Canyon Road (EO 2) (CNDDDB 2023, pp. 3, 13). The status of EO 28 was also changed from extant to possibly extirpated since it has not been observed since 1985 and the habitat was considered degraded (CNDDDB 2023, p. 21). Note, EO 32, from the last 5-year review, is no longer included in the CNDDDB database as it was found to be a misidentified occurrence. Therefore, it has been removed from our occurrence table in this status review (Table A1).

There are currently 23 extant or presumed extant occurrences of *Eriastrum densifolium* subsp. *sanctorum*, 2 more than documented in the 2010 5-Year Review (Figure 1; Appendix A). Several occurrences are in need of monitoring as there are no survey records for decades, making it hard to accurately determine the occupancy at these occurrences.

Threats

Urban development within the floodplain, aggregate mining, and physical alteration of flooding conditions were identified as threats impacting habitat occupied by *Eriastrum densifolium* subsp. *sanctorum* (Service 1987, p. 36268). The rangewide threat of alteration of hydrology has been evidenced primarily from the construction of Seven Oaks Dam that has significantly altered the natural fluvial processes of the Santa Ana River mainstem. Flood control channels have similarly removed alluvial systems in Lytle Creek Wash. Off-highway vehicle (OHV) use continues to impact habitat and plants at more than half of the extant occurrences. The alteration of hydrological regimes continues to be the primary rangewide threat to the species. Ongoing climate change impacts (changes in precipitation and temperature) are affecting all occurrences and poses an increasing threat to this species in the future. The threat of hybridization continues to not be well understood and impacts to *E. d.* subsp. *sanctorum* are unknown.

Conservation

In Riverside County, *Eriastrum densifolium* subsp. *sanctorum* is covered by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), which addresses the conservation needs of the species on non-federal lands and affords specific protections to covered occurrences. The MSHCP affords some level of protection to several occurrences and the Woolly Star Preserve Area (WSPA) provides additional protections within its boundaries, although vehicle trespass, homeless encampments, and trash dumping were noted during 2019 survey efforts (Aspen 2020, p. 8).

The Upper Santa Ana River Habitat Conservation Plan has a conservation strategy with objectives and actions that help benefit *Eriastrum densifolium* subsp. *sanctorum* in the Santa Ana River wash including long term conservation and restoration of habitat, monitoring of population trends, threats analysis, out plantings, as well as minimization measures for any activity that negatively impacts the plant (ICF 2021, pp. 5-44–5-49).

Conclusion

After reviewing the best available scientific information, we conclude that *Eriastrum densifolium* subsp. *sanctorum* remains an endangered subspecies. The evaluation of threats affecting the subspecies under the factors in 4(a)(1) of the Act and analysis of the status of the subspecies in our 2010 5-year review remains an accurate reflection of the species current status. Therefore, we recommend no change in status at this time.

RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be initiated over the next 5 years. The actions are intended to reduce threats to *Eriastrum densifolium* subsp. *sanctorum* and provide information to better understand the biological and physical factors limiting the population growth and distribution. We recognize that conservation of this subspecies will require cooperation and

coordination with partners to minimize impacts from current threats, aid future restoration, and maximize effectiveness of limited funding.

1. Work with partners to identify opportunities for conservation or preservation of *E. d.* subsp. *sanctorum* occurrences on private lands. Support land acquisition to meet Habitat Conservation Plan goals. Work with local, State, and Federal partners to identify and leverage funding (i.e., section 6) to acquire suitable habitat.
2. Conduct rangewide surveys for *E. d.* subsp. *sanctorum* to help update the distribution and current baseline conditions.
3. Identify seed accessions within the California Botanical Garden (formerly Rancho Santa Ana Botanical Garden) seed bank and complete seed collection and viability testing.
4. Conduct small-scale *E. d.* subsp. *sanctorum* plant seeding experiments.
5. Determine extent of genetic differences between *E. d.* subsp. *sanctorum* populations.
6. Conduct experiments to determine how to restore Riversidean Alluvial Fan Sage Scrub habitat to help facilitate recolonization of *E. d.* subsp. *sanctorum* to alluvial benches.

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U.S. Fish & Wildlife Service

Santa Ana River woolly-star

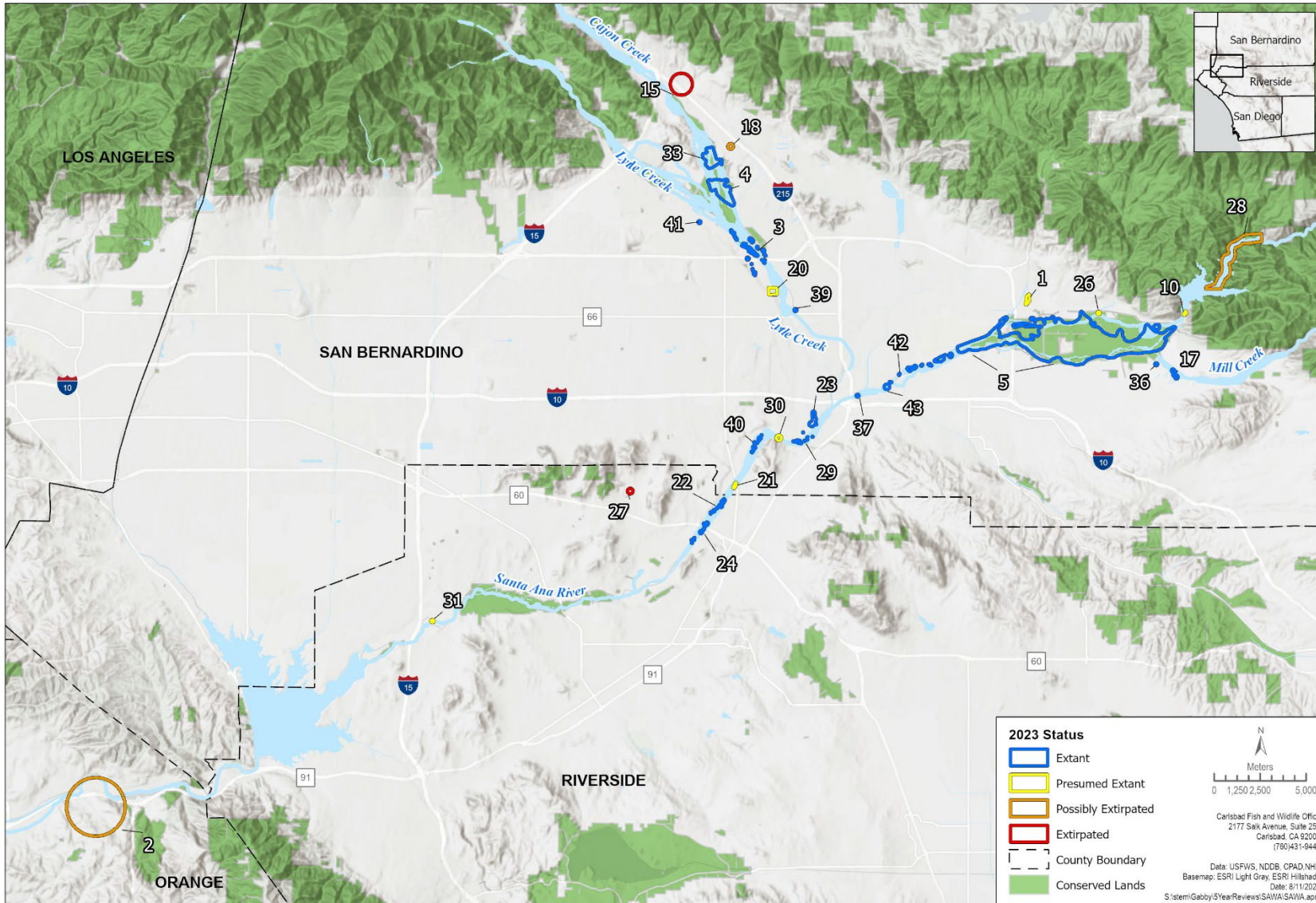


Figure 1. Rangewide occurrence map for *Eriastrum densifolium* subsp. *sanctorum*.

APPENDIX A

Table A1. Occurrence Table for *Eriastrum Densifolium* subsp. *Sanctorum*.

Location	Occurrence (Occurrence Alias) ¹	County	Element Occurrence	Count	2010 Status	2023 Status ³	Last Year Observed	Current Threat	Ownership/ Conservation
Mill Creek	Mill Creek Wash	San Bernardino	17	None	Extant	Extant	2010	Unknown	Unknown/Unknown
Mill Creek	Florida Street	San Bernardino	36	2 (10)	N/A	Extant	2014	Factor A: Alteration of hydrology, water recharge activities	San Bernardino Valley Water Conservation District
Cajon Creek Wash	Devore/Cajon Canyon	San Bernardino	15	50(85)	Extirpated	Extirpated	Unknown	Extirpated by discing in '85	Extirpated
Cajon Creek Wash	Verdemont/Cajon Wash	San Bernardino	18	16 (87), 0 (05)	Presumed extant	Possibly Extirpated	1987	Factor A: Development; alteration of hydrology Factor E: Hybridization	Private/Unknown
Cajon Creek Wash	Institution Road North/Cajon Wash	San Bernardino	33	5325 (08), 8,864 (13), 2,410 (17), 51-100 (20)	Extant	Extant	2020	Factor A: Aggregate mining; OHVs Factor E: Hybridization	San Bernardino County Flood Control District/Lytle Creek Ranch Mitigation
Cajon Creek Wash	Institution Road South/Cajon Wash	San Bernardino	4	5325 (08), 6790 (2017)	Extant	Extant	2017	Factor A: Aggregate mining; OHVs Factor E: Hybridization	San Bernardino County Flood Control District/Lytle Creek Ranch Mitigation
Lytle Creek Wash	Highland Ave/lower Lytle Creek Wash	San Bernardino	3	444 (88), 0 (05), 100s (08)	Extant ²	Extant	2016	Factor A: OHVs (impacted by 210 freeway in 2005) Factor E: Hybridization	Lytle & Cajon Creek Conservation Banks
Lytle Creek Wash	Line Avenue/lower Lytle Creek Wash	San Bernardino	20	20 (87)	Extant	Presumed Extant	1987	Factor A: Aggregate mining; Alteration of hydrology Factor E: Hybridization	Private/Unknown

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Location	Occurrence (Occurrence Alias) ¹	County	Element Occurrence	Count	2010 Status	2023 Status ³	Last Year Observed	Current Threat	Ownership/ Conservation
Lytle Creek Wash	Flores Street	San Bernardino	39	115 (12)	N/A	Extant	2012	Factor A: Development; alteration of hydrology, OHVs	Unknown
Lytle Creek Wash	N Sycamore Ave Water Tank	San Bernardino	41	1 (13), 1(14)	N/A	Extant	2014	Factor A: Development; alteration of hydrology	Unknown
Santa Ana River and Wash Mainstem	Santa Ana River Canyon	San Bernardino	28	Collection only	Extant	Possibly Extirpated	1985	Factor A: Alteration of hydrology	SBNF/Unknown
Santa Ana River and Wash Mainstem	Santa Ana River Powerhouse	San Bernardino	10	30 (87), 60 (92)	Extant	Presumed Extant	1992	Factor A: Alteration of hydrology	Private inholding in SBNF/Unknown
Santa Ana River and Wash Mainstem	Plunge Creek at Greenspot Rd/Santa Ana River/	San Bernardino	26	120 (07)	Extant	Presumed Extant	2007	Factor A: Alteration of hydrology	San Bernardino County Flood Control District /Mitigation land
Santa Ana River and Wash Mainstem	Santa Ana Wash	San Bernardino	5	1000s (86), 51 (03), 5140 (08), >1000 (10); 128 (12), 1 (14), 96 (15), 444 (17), 10,000 (18), <100 (21)	Extant ²	Extant	2021	Factor A: Floodplain development, aggregate Mining; Alteration of hydrology; OHVs	BLM and San Bernardino County Flood Control District/BLM ACEC, WSPA

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Location	Occurrence (Occurrence Alias) ¹	County	Element Occurrence	Count	2010 Status	2023 Status ³	Last Year Observed	Current Threat	Ownership/ Conservation
Santa Ana River and Wash Mainstem	Boulder Avenue	San Bernardino	1	50 (85)	Extant	Presumed Extant	1997	Factor A: Alteration of hydrology; OHVs	Private/Unknown
Santa Ana River and Wash Mainstem	Mt Vernon Avenue/Santa Ana River	San Bernardino	23	2000 (98), 2 (18), 28 (19)	Extant	Extant	2019	Factor A: Floodplain development; Alteration of hydrology	City of Colton/Unknown
Santa Ana River and Wash Mainstem	La Cadeña Drive/Santa Ana River	San Bernardino	29	300 (08), 51 (14)	Extant	Extant	2020	Factor A: Floodplain development; OHVs Factor E: Hybridization	San Bernardino County Flood Control District?/Unknown
Santa Ana River and Wash Mainstem	La Loma Hills/Santa Ana River	San Bernardino	30	36 (02)	Extant	Presumed Extant	2002	Factor A: Floodplain development; Alteration of hydrology Factor E: Hybridization	Unknown/Unknown
Santa Ana River and Wash Mainstem	Riverside Avenue/Santa Ana River	San Bernardino	21	2(94)	Extant	Presumed Extant	1994	Factor A: Alteration of hydrology; OHVs	Riverside County Flood Control District/Unknown
Santa Ana River and Wash Mainstem	Alamo Street/Santa Ana River	Riverside	22	3(07), 45 (13)	Extant	Extant	2013	Factor A: Alteration of hydrology; OHVs	Riverside County Flood Control District/Western Riverside County Multiple Species Habitat Conservation Plan

Location	Occurrence (Occurrence Alias) ¹	County	Element Occurrence	Count	2010 Status	2023 Status ³	Last Year Observed	Current Threat	Ownership/ Conservation
Santa Ana River and Wash Mainstem	Fairmont Park Golf Course/Santa Ana River	Riverside	24	11 (07), 12 (13), 1 (14)	Extant	Extant	2014	Factor A: Alteration of hydrology; OHVs	Riverside County Flood Control District/Western Riverside County Multiple Species Habitat Conservation Plan
Santa Ana River and Wash Mainstem	Jensen Quarry/Sunnyslope	Riverside	27	0 (00)	Extirpated	Extirpated	1998	Extirpated by golf course construction	Extirpated
Santa Ana River and Wash Mainstem	Temescal Avenue/Santa Ana River	Riverside	31	1 (06)	Extant	Presumed Extant	2006	Factor A: Floodplain development; Alteration of hydrology; OHVs	Unknown/Western Riverside County Multiple Species Habitat Conservation Plan
Santa Ana River and Wash Mainstem	Weir Canyon Road (at Monte Vista Rd)/Cajon Creek	Orange	2	None	Presumed Extant	Possibly Extirpated	1927	Factor A: Alteration of hydrology, development	Unknown/Unknown
Santa Ana River and Wash Mainstem	East of I-215	San Bernardino	37	1 (12 or 13)	N/A	Extant	2013	Factor A: Alteration of hydrology; OHVs	Unknown
Santa Ana River and Wash Mainstem	Riverside Avenue	San Bernardino	40	32 (13)	N/A	Extant	2013	Factor A: Alteration of hydrology; OHVs	San Bernardino County
Santa Ana River and Wash Mainstem	Orange Show Road	San Bernardino	42	435 (17)	N/A	Extant	2017	Factor A: Floodplain development; Alteration of hydrology; OHVs	San Bernardino County Flood Control District

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Location	Occurrence (Occurrence Alias) ¹	County	Element Occurrence	Count	2010 Status	2023 Status ³	Last Year Observed	Current Threat	Ownership/ Conservation
Santa Ana River and Wash Mainstem	Waterman Ave	San Bernardino	43	1 (15), 2 (16,17), 0 (19)	N/A	Extant	2019	Factor A: Alteration of hydrology; OHVs	San Bernardino County Flood Control District

¹ Bold text indicates occurrence is new since listing.

² Occurrences merged since 2010 5-year review.

³ Highlighted text indicates a change in status of the occurrence since the 2010 5-year review.

FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

Approved

Scott A. Sobiech
Field Supervisor