

5-YEAR REVIEW

Sacramento Orcutt grass (*Orcuttia viscida*)

GENERAL INFORMATION

Species: Sacramento Orcutt grass (*Orcuttia viscida*)

Date listed: March 26, 1997

Federal Register (FR) citation: 62 FR 14338 (Service 1997)

Classification: Endangered

State Listing:

Sacramento Orcutt grass was listed by the State of California as endangered in 1979.

BACKGROUND

Species overview:

Sacramento Orcutt grass is a narrowly distributed annual grass in the Orcuttieae tribe of the grass family Poaceae. The range of the species lies in a narrow zone of remnant depositional stream terraces at the base of the Sierran foothills in northern hardpan and northern volcanic mudflow vernal pools (Stone *et al.* 1988, p. 1). Species in the Orcuttieae tribe require seasonally inundated vernal pools with a long hydroperiod and adequate sunlight and are typically found in the deepest parts of the pool bottoms where most other plants cannot survive the long periods of inundation. Like other members of the Orcuttieae tribe, Sacramento Orcutt grass has two distinct vegetated forms. After seeds germinate in mid- to late-winter, Sacramento Orcutt grass develops into an aquatic stage with submerged or semi-submerged aquatic leaves characterized by C4 photosynthesis (photosynthesis where a four-carbon compound is produced instead of a typical three-carbon compound). As the vernal pools dry down in late spring, Sacramento Orcutt grass individuals grow new terrestrial leaves and lose the aquatic leaves. As individuals enter their terrestrial stage, any refilling of vernal pools will drown the plants leading to the loss of most or all of that year's reproductive potential.

Most recent status review:

[Service] U.S. Fish and Wildlife Service. 2008. Sacramento Orcutt Grass (*Orcuttia viscida*). 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 23 pp.

We did not recommend a status change in the 2008 status review.

FR notice citation announcing this status review:

[Service] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 40 Species in California, Nevada, and Oregon. Federal Register 87:5832–5834.

We did not receive information from the public regarding Sacramento Orcutt grass in response to the notice.

ASSESSMENT

Information acquired since the last status review:

This 5-year review was conducted by the U.S. Fish and Wildlife Service's (Service) Sacramento 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, performed a literature search, reviewed information from our own files, and obtained data from an occurrence search of the California Natural Diversity Database (Diversity Database) maintained by the California Department of Fish and Wildlife.

Two new occurrences of Sacramento Orcutt grass have been added to the Diversity Database since our 2008 status review (Service 2008, p. 5; Diversity Database 2024, entire) and four introductions have occurred at sites that have not yet been added to the Diversity Database. However, the distribution of Sacramento Orcutt grass remains largely unchanged since the 2008 status review (addressed in **Distribution**). Some occurrences have been surveyed regularly in recent years while others have not been surveyed on a regular basis (addressed in **Abundance**). Updates on threats since the last 5-year status review, including the new threats of climate change impacts and pesticides, are addressed in the **Threats** section. Progress towards recovery criteria, including the protection of one additional occurrence of Sacramento Orcutt grass, is summarized in the **Recovery Criteria** section.

Distribution:

Sacramento Orcutt grass is endemic to the Southeastern Sacramento Valley Vernal Pool Region and has always been restricted to Sacramento County (Service 2005, p. II-88). The current distribution of Sacramento Orcutt grass is similar to as described in the 1997 listing rule and the 2008 status review (Service 1997, p. 14340; Service 2008, pp. 5, 10). At the time of listing, Sacramento Orcutt grass was known to occur within a 350-square-kilometer (135-square-mile) area in eastern Sacramento County (Service 1997, p. 14340). Only 40 kilometers (18 miles) separated the northernmost from the southernmost population of the species (Service 1997, p. 14340). Two of the nine known populations were thought to be extirpated: the Orangevale population (Diversity Database occurrence 4) and one population associated with Kiefer landfill (part of Diversity Database occurrence 6) (Service 1997, p. 14340). The 2008 5-year review reported one additional occurrence (Diversity Database occurrence 20) that was presumed extant and was mapped to a location on the Arroyo Seco Conservation Bank based on the description from a 1998 collection (Service 2008, pp. 5, 10; Diversity Database 2024, p. 15). At the time of the previous status review, the species was known to occur within the Cosumnes/Rancho Seco Lake, Mather, and Phoenix Field and Park vernal pool core areas (Service 2008, p. 5).

The Diversity Database currently reports a total of 12 occurrences, 2 of which are presumed extirpated (Table 1; Diversity Database 2024, entire). Since the previous status review, the status of Diversity Database occurrence 20 at the Arroyo Seco Conservation Bank has been changed to extirpated (Diversity Database 2024, p. 15). The Diversity Database notes that no plants were observed when the entire Bank was surveyed in 2010 and 2011, and that the vernal pool is now a permanent marsh and no suitable habitat remains (Diversity Database 2024, p. 15). Since the last status review, Sacramento Orcutt grass has also been planted in five locations in the Mather vernal pool core area at the Kiefer Landfill Wetland Preserve, Sylva site, Kassis site, Mather Wetland Preserve, and Montelena Wetland Preserve (Table 1; Witham 2022, pp. 1–2). The Sylva

and Kassis sites were inoculated with Sacramento Orcutt grass seeds in 2014 and 2016, and the Kiefer Landfill, Mather, and Montelena wetland preserves were inoculated in 2016. Except for the Kiefer Landfill Wetland Preserve, which contains a previously documented natural population of Sacramento Orcutt grass, these locations have not been incorporated into the Diversity Database (Witham 2022, p. 1). Finally, two additional occurrences of Sacramento Orcutt grass were identified within the Mather core area north of occurrence 19 and have been added to the Diversity Database (occurrences 21 and 22; Table 1). The four introduction sites and two new Diversity Database occurrences are within the previously known range of the Sacramento Orcutt grass and therefore, do not change our understanding of the overall distribution of the species.

Table 1. Sacramento Orcutt grass core recovery areas and associated occurrences (Witham 2022, pp. 1–2; Diversity Database 2024, entire).

Vernal Pool Core Area	Location	Diversity Database Occurrence Number	Occurrence Type/Presumed Status	Protection Status
Cosumnes/ Rancho Seco Lake	Rancho Seco Lake	16	Natural/Extant	Conservation easement for the Sacramento Municipal Utility District (SMUD) Nature Preserve Mitigation Bank, established 2014
Mather	Kiefer Landfill Wetland Preserve	1, 6	Natural (enhanced) /Extant	Conservation easement
	Anatolia Preserve (a.k.a., Sunrise-Douglas Conservation Bank)	17, 18	Natural/Extant	Conservation easement
	South of Glory Lane	19	Natural/Extant	Conservation easement for the Cordova Hills Onsite Preserve
	Arroyo Seco Conservation Bank	20	Natural/Extirpated	Conservation easement, but no longer contains suitable habitat
	North of Glory Lane	21	Natural/Extant	None
	Rio del Oro, West of Grant Line Road	22	Natural/Extant	None, but is within a proposed preserve associated with the South Sacramento Habitat Conservation Plan
	Sylva site	N/A	Introduced/Extant	Conservation easement for the Werre-Laguna Preserve with the Sacramento Valley Conservancy
	Kassis site	N/A	Introduced/Extant	Conservation easement for the Werre-Laguna Preserve with the Sacramento Valley Conservancy
	Mather Wetland Preserve	N/A	Introduced/Extant	Conservation easement for the Illa M. Collin Conservation Preserve (Mather)
Montelena Wetland Preserve	N/A	Introduced/Extant	Conservation easement for the Montelena Wetland Preserve	

Vernal Pool Core Area	Location	Diversity Database Occurrence Number	Occurrence Type/Presumed Status	Protection Status
Phoenix Field and Park	Phoenix Field	5	Natural/Extant	Department Ecological Reserve
	Phoenix Park	15	Introduced/Extant	City of Fair Oaks Park
N/A	Orangevale	4	Natural/Extirpated	None, the area has been developed

Abundance:

As with many vernal pool annual plants, population sizes of Sacramento Orcutt are highly variable from year to year as the number of plants varies with period and amount of rainfall (Service 2005, p. II-90). No specific information on abundance of Sacramento Orcutt grass was presented in the 1997 listing rule. At the time of the 2008 review, monitoring had not been continuous at all sites, and quantitative information was only available for five of the nine known occurrences (Service 2008, p. 10). The species was thought to be stable at the five monitored occurrences (Service 2008, p. 10). Surveys have been conducted at nine occurrences since the 2008 review (Diversity Database 2024, entire). During the summers of 2010 and 2011, a comprehensive status survey was conducted for Sacramento Orcutt grass, six other vernal pool grasses, and Hoover’s spurge (*Chamaesyce hooveri*) (Witham 2013, entire). Survey methods included the use of aerial imagery to review occurrences remotely with GIS and visitation of accessible occurrences (Witham 2013, pp. 2–5). Upon completion of the comprehensive survey, Sacramento Orcutt grass field survey reports were submitted to the Diversity Database.

Surveys have been infrequent since the comprehensive survey, and the Diversity Database shows surveys have only occurred at occurrences 5, 15, and 22 in the last decade (Diversity Database 2024, pp. 4, 8, 17). Annual monitoring of Sacramento Orcutt grass has occurred at the two occurrences within the Phoenix Field Ecological Reserve (Phoenix Field; occurrence 5) and Phoenix Park Vernal Pool Preserve (Phoenix Park; occurrence 15) since 2014 (Bjerke, California Department of Fish and Wildlife, *in litt.* 2024). At Phoenix Field and Phoenix Park, the frequency of Sacramento Orcutt grass in two pools, pools A and B, was recorded as well as the frequency of the invasive species waxy mangrass (*Glyceria declinata*) (see further discussion of waxy mangrass in **Threats**). Frequency was quantified through a grid technique using the percentage of grid cells occupied by the target species as the frequency. Between 2014 and 2023, the frequency of Sacramento Orcutt grass in vernal pool A ranged from a high of approximately 55% in 2015 to a low of approximately 15% in 2021 (Bjerke *in litt.* 2024, Figure 1). Vernal pool B showed a similar trend, with the highest frequency of approximately 55% in 2015 and the lowest frequency of Sacramento Orcutt grass at approximately 25% in 2021 (Bjerke *in litt.* 2024, Figure 2).

Surveys completed in the summer of 2021 found very few or no Sacramento Orcutt grass plants at the introduced occurrence sites on the Kiefer Landfill Wetland Preserve, which may be attributed to changes in the timing of precipitation (See further discussion in **Threats**; C. Witham, biological consultant, pers. comm. 2022). The greatest number of Sacramento Orcutt grass individuals was observed across all introduced sites in 2023 (Table 2; Diversity Database 2023,

p. 2). The Sacramento Municipal Utility District (SMUD) Nature Preserve Mitigation Bank and Anatolia Preserve have also been regularly monitored. Sacramento Orcutt grass plant counts for the SMUD Preserve for 2021, 2022, and 2023 were one, zero, and seven respectively (Area West Environmental, Inc. 2023, p. 29). The Anatolia Preserve supports approximately 850 plants on average (Helix Environmental Planning 2023a, p. 6). The 2023 Anatolia Preserve surveys showed a decrease in both plant height and density compared to the 2022 surveys (Helix Environmental Planning 2023a, p. 6). The 2022 surveys showed an increase in height, density, and area compared to 2021 (Helix Environmental Planning 2023b, p. 6), and the 2021 surveys showed a decrease in abundance of the species compared to 2020 surveys (Helix Environmental Planning 2021, p. 7).

Table 2. Plant counts from 2017–2023 for the introduced Sacramento Orcutt grass occurrences (Diversity Database 2023, p. 2).

Site Name (Number of Pools)	2017	2018	2019	2020	2021	2022	2023
Kiefer (3)	932	2,037	643	5	0	180	493
Montelena (3)	944	858	880	0	0	200	1,375
Mather (3)	411	605	2,463	0	0	567	3,170
Kassis (6)	882	732	1,144	2	0	974	2,137
Sylva (7)	3,329	2,916	3,609	161	0	1,123	3,671
Total	6,498	7,148	8,739	168	0	3,044	10,846

Threats:

At the time of listing, the primary threat to Sacramento Orcutt grass was loss of habitat by urban development, the proposed expansion of Kiefer Landfill, and proposed gravel and aggregate mining (Service 1997, p. 14338). Currently, all but two of the extant occurrences (numbers 21 and 22) are protected from development. However, impacts from surrounding land use, adjacent road widening, and other human activities continued to be threats to the species at the time of the 2008 status review (Service 2008, p. 8) and continue to act on the species. Gravel and aggregate mining are not currently considered threats to any Sacramento Orcutt grass occurrences.

Drought and climate change were identified as threats in the 2008 status review (Service 2008, p. 14), and they continue to act on the species. Further, recent observations suggest the timing of precipitation, specifically late season precipitation, which is exacerbated by climate change, can negatively impact the species. Recent climate models have predicted less frequent but more extreme daily precipitation, indicating that the number of drought years will increase while the storms that occur in wet years will bring more precipitation and flood risk concentrated in fewer number of days (Bedsworth *et al.* 2018, pp. 25–26). Simulations of precipitation specifically for the Sacramento Valley predict less precipitation from November to January and possibly more precipitation from February to May (Houlton and Lund 2018, p. 21). Seasonal summer dryness may also become prolonged due to earlier spring soil drying that lasts longer into the fall and winter rainy season (Bedsworth *et al.* 2018, p. 26). Sacramento Orcutt grass requires vernal pools with long inundation periods, and the species responds strongly to the seasonality of rainfall and pool inundation. However, despite having an aquatic life stage, Sacramento Orcutt grass cannot

tolerate pooling water after transitioning to the terrestrial life stage (Witham pers. comm. 2022). In both 2020 and 2021, pool inundation at the introduced sites in the Mather vernal pool core area occurred during the winter months, but low rainfall totals resulted in the pools drying down by late April and early May (Witham pers. comm. 2022). Late season rain in late May and June resulted in the pools refilling, and surveys of the outplanted areas in the summer of 2020 and 2021 found very few or no terrestrial Orcutt grass plants (Witham pers. comm. 2022).

Another threat to the species that was identified at listing and continues to act on the species is competition from invasive plants such as waxy manna grass (Service 1997, p. 14348). This perennial grass forms dense stands and can invade Sacramento Orcutt grass habitat and displace the plant (Service 2008, p. 8). The threat of competition from invasive plants has increased since listing, and at least seven extant occurrences are impacted by invasive plants (Diversity Database 2024, entire). The percent frequency of waxy manna grass has been tracked at Phoenix Field in vernal pool B from 2014 to 2023 (Bjerke *in litt.* 2024, Figure 3). The percent frequency of waxy manna grass in the pool ranged from a low of 2% in 2016 to a high of 18% in 2020 (Bjerke *in litt.* 2024, Figure 3).

The Environmental Protection Agency (Agency) released final biological evaluations assessing the effects of labeled uses of three neonicotinoid pesticides on listed species (Agency 2022a, entire; Agency 2022b, entire; Agency 2022c, entire). The three pesticides (clothianidin, imidacloprid, and thiamethoxam) are registered for use on a variety of agricultural crops and there are also some non-agricultural applications. The three pesticides target insect species by acting on their neurotransmitters to cause excessive nervous stimulation, paralysis, and death. The overall importance of pollinating insects for Sacramento Orcutt grass is poorly understood. The plants are adapted for wind pollination; however, some insect pollination may occur, including by native bees, which have been observed gathering pollen from Sacramento Orcutt grass (Griggs 1974, as cited in Stone *et al.* 1988, p. 16). The Agency's final biological evaluations determined that the three pesticides are highly toxic to invertebrate pollinators including bees, have the potential to result in bee brood and colony reductions, and if affected bee colonies or populations of other invertebrate pollinators decline near Sacramento Orcutt grass, there is a potential for the three pesticides to indirectly adversely affect the species (Agency 2022a, pp. 4, Appendix 4-1; Agency 2022b, pp. 2, Appendix 4-1; Agency 2022c, pp. 3, Appendix 4-1). The Agency anticipates releasing amended proposed interim decisions, and a national consultation with the Agency is currently pending.

The Clean Water Act and the Porter-Cologne Water Quality Control Act:

In the final listing rule, we identified section 404 of the Clean Water Act as a regulatory mechanism that provided inadequate protection to Sacramento Orcutt grass (Service 1997, p. 14347). As described in the 2008 status review, Section 404 of the Clean Water Act at that time may have afforded some protection to Sacramento Orcutt grass (Service 2008, p 13). That protection was through the issuance of U.S. Army Corps of Engineers (Corps) permits for the discharge of dredged or fill material into waters of the United States. The Corps at that time interpreted 'the waters of the United States' to include not only traditional navigable waters but also other defined surface waters that are adjacent or hydrologically connected to traditional navigable waters. Before issuing a Section 404 permit for a project that may affect federally listed species, the Corps is required under section 7 of the Endangered Species Act to consult with the Service.

On May 25, 2023, the Supreme Court issued a decision on *Sackett v. EPA*. The Supreme Court concluded that the then-interpretation of adjacent wetlands as ‘waters of the United States’ “was inconsistent with the text and structure of the [Clean Water Act]” if it incorporated the “significant nexus” test and defined “adjacent” in any way other than the *Rapanos v. United States* plurality definition. The *Rapanos* plurality definition for ‘waters of the United States’ covered “relatively permanent, standing or continuously flowing bodies of water” that are connected to traditional navigable waters, as well as wetlands with a “continuous surface connection” to such waterbodies. On August 29, 2023, the U.S. Environmental Protection Agency and Department of the Army announced a final rule amending the 2023 definition of ‘waters of the United States’ that conform with the May 2023 decision. The rule removes the significant nexus test along with the adjacency test from consideration when identifying jurisdictional tributaries and other waterbodies (Corps of Engineers 2023, p. entire), which has the potential to reduce protection of more isolated and ephemeral, or seasonally flooded, waterbodies like vernal pools.

While the Clean Water Act, as it exists currently, may have increasing inadequacies in protecting Sacramento Orcutt grass habitat, California State’s Porter-Cologne Water Quality Control Act still regulates proposed discharge of fill material into ‘waters of the state’. Waters are more broadly defined under the Porter-Cologne Water Quality Control Act, which regulates potential discharges that may affect water quality of surface or ground waters, wherever those discharges may occur (State Water Resources Control Board 2019, p. 22). The most recent court decisions include the First Appellate District-issued opinion on *Sweeney et al. v. California Regional Water Quality Control Board, San Francisco Bay Region et al.* (Case Number A153583). In the wake of this opinion, the State Water Board confirmed on April 6, 2021, the board’s continued authority to apply the State water quality procedures to all waters, not just waters of the United States, as a matter of policy (State Water Resources Control Board 2021, entire).

Recovery criteria:

The recovery criteria for Sacramento Orcutt grass and 19 other listed plants and animals are described in the 2005 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005, pp. III-87–III-120). This recovery plan uses an ecosystem-level approach of analysis because many of the listed species and species of concern addressed in the plan co-occur in the same natural ecosystem and share the same threats. The five key elements that comprise the ecosystem-level recovery and conservation strategies are habitat protection (recovery criteria 1A–E), adaptive habitat management and monitoring (recovery criteria 2A–D), status surveys (recovery criteria 3A–B), research (recovery criteria 4A–C), and participation and outreach (recovery criteria 5A–D). The recovery criteria for downlisting Sacramento Orcutt grass have not been met (Table 3), thus delisting criteria are not fully assessed here.

Table 1. Recovery criteria for Sacramento Orcutt grass. Status at the time of the last review (Service 2008) and currently are assessed.

Recovery Criteria	2008 Status	2024 Status
1A. 95% of suitable vernal pool habitat within each prioritized core area for the species is protected (Cosumnes/Rancho	Partially met	Partially met. Vernal pool grassland habitat within the Phoenix Field and Park Core Area was 97.7% protected as of 2018 (Witham 2021, geodatabase; Vollmar <i>et al.</i> 2017, geodatabase). However, as of

Recovery Criteria	2008 Status	2024 Status
Seco, Mather, and Phoenix Field and Park core areas).		2018, vernal pool grassland habitat within the Cosumnes/Rancho Seco Core Area was only 40% protected and only 28% of habitat was protected in the Mather Core Area (Witham 2021, geodatabase; Vollmar <i>et al.</i> 2017, geodatabase).
1B. 100% of species occurrences distributed across the species geographic range and genetic range are protected. Protection of extreme edges of populations protects the genetic differences that occur there.	Partially met	Partially met. Since the last status review, Diversity Database occurrence 16 has been protected by the SMUD Bank conservation easement that was established in 2014. Eight of ten (80%) extant natural occurrences are now protected.
1C. Reintroductions must be carried out and meet success criteria established in the Recovery Plan.	Not met	Partially met. Outplantings of Sacramento Orcutt grass have occurred at four sites: the Montelena Wetland Preserve, Mather Wetland Preserve, Kassis site, and Sylva site (Witham 2022, entire). The Kiefer Landfill Wetland Preserve population has also been enhanced through additional plantings. Reintroductions have not occurred in the Rancho Seco or Orangevale areas, both of which are specified in the Recovery Plan (Service 2005). No habitat remains in Orangevale, so no reintroductions will be occurring in this area.
1D. Additional occurrences identified through future site assessments, GIS and other analyses, and status surveys that are determined essential to recovery are protected. Any newly found occurrences may count towards recovery goals if the occurrences are permanently protected as described in the Recovery Plan.	Not met	Not met. Neither of the extant occurrences identified since the 2005 Recovery Plan (occurrence numbers 21 and 22) are currently protected. However, occurrence 22 may be protected in the future by a proposed preserve.
1E. Habitat protection results in protection of hydrology essential to vernal pool ecosystem function, and monitoring indicates that hydrology that contributes to population viability has been maintained through at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.	Not met	Not met. The status remains as described in Service (2008). Monitoring of hydrology has not occurred for extant populations.
2A. Habitat management and monitoring plans that facilitate maintenance of vernal pool ecosystem function and population viability have been developed and implemented for all habitat protected, as previously discussed in sections 1A–E.	Partially met	Partially met. The status remains the same as at the time of the 2008 status review. Habitat management and monitoring plans have been developed for ten of the known extant occurrences. Management plans are in place for the Kiefer Landfill Wetland Preserve (two occurrences), Anatolia Preserve (two occurrences), Arroyo Seco Conservation Bank (extirpated

Recovery Criteria	2008 Status	2024 Status
		occurrence), Phoenix Field (one occurrence), Phoenix Park (one occurrence), SMUD Bank (one occurrence), Werre-Laguna Preserve (two occurrences), Mather preserve (one occurrence), Montelena Preserve (one occurrence), and Diversity Database occurrence 19 (South of Glory Lane, a.k.a., Cordova Hills Onsite Preserve).
2B. Mechanisms are in place to provide for management in perpetuity and long-term monitoring of 1A–E, as previously discussed (funding, personnel, etc.).	Partially met	Partially met. The status remains the same as at the time of the 2008 5-year review. Seven occurrences of Sacramento Orcutt grass have long-term funding for management and monitoring in perpetuity. These are the Kiefer Landfill Wetland Preserve (two occurrences), Anatolia Preserve (two occurrences), SMUD Nature Preserve Mitigation Bank, Cordova Hills Onsite Preserve, and the Arroyo Seco Conservation Bank (one extirpated occurrence).
2C. Monitoring indicates that ecosystem function has been maintained in the areas protected under 1A–D for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.	Not met	Partially met. Annual monitoring of Sacramento Orcutt grass has occurred at the two Phoenix Field and Park occurrences since 2014 (Bjerke <i>in litt.</i> 2024). Monitoring has also occurred at all other protected sites with the exception of Cordova Hills Onsite Preserve, which was protected only as of this year. Additionally, occurrence 20 is in an area that presumably no longer contains suitable vernal pool habitat, as it has been converted to permanent marsh (Diversity Database 2024, p. 15).
2D. Seed banking actions have been completed for species that would require it as insurance against risk of stochastic extirpations or that will require reintroductions or introductions to contribute to meeting recovery criteria.	Not met	Partially met. Seeds were collected in 2013 and 2016 and are stored at the California Botanic Garden (California Plant Rescue 2024).
3A. Status surveys, 5-year status reviews, and population monitoring show populations within each vernal pool region where the species occur are viable (e.g., evidence of reproduction and recruitment) and have been maintained (stable or increasing) for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.	Not met	Partially met. Annual monitoring of Sacramento Orcutt grass has occurred at protected occurrences (See also 2C). However, annual monitoring has not occurred at the occurrences which are not on protected lands.

Recovery Criteria	2008 Status	2024 Status
3B. Status surveys, status reviews, and habitat monitoring show that threats identified during and since the listing process have been ameliorated or eliminated. Site-specific threats identified through standardized site assessments and habitat management planning also must be ameliorated or eliminated.	Not met	Not met. This status remains as described in Service (2008). Status surveys show that the threat of invasive plants such as waxy mangrass has increased since the time of listing, and other identified threats including drought and climate change continue to act on the species.
4A. Research actions necessary for recovery and conservation of the covered species have been identified (these are research actions that have not been specifically identified in the recovery actions but for which a process to develop them has been identified). Research actions (both specifically identified in the recovery actions and determined through the process) on species biology and ecology, habitat management and restoration, and methods to eliminate or ameliorate threats have been completed and incorporated into habitat protection, habitat management and monitoring, and species monitoring plans, and refinement of recovery criteria and actions.	Not met	Partially met. Studying the main competitor, the invasive waxy mangrass, has been identified as a research need.
4B. Research on genetic structure has been completed and results incorporated into habitat protection plans to ensure that within and among population genetic variation is fully representative by populations protected in the Habitat Protection section of this document, described previously in sections 1A–E.	Not met	Not met. The status remains the same as described in Service (2008). Research on the genetic structure of the species has not been conducted.
4C. Research necessary to determine appropriate parameters to measure population viability has been completed.	Not met	Not met. The status remains as described in Service (2008). Research necessary to measure population viability for Sacramento Orcutt grass has not been completed.

Recovery Criteria	2008 Status	2024 Status
5A. Recovery Implementation Team is established and functioning to oversee rangewide recovery efforts.	Partially met	Partially met. The Service has established an internal vernal pool working group within the Sacramento Fish and Wildlife Office to assess and work towards the goals outlined in the Recovery Plan. This team will not function as the official recovery implementation team as it will only consist of Service employees, but the hope is that this internal working group will eventually provide the basis for creating a true Recovery Implementation Team as well as regional working groups.
5B. Vernal pool regional working groups are established and functioning to oversee regional recovery efforts.	Not met	Not met. The internal vernal pool working group has currently not expanded to a regional working group effort, but that is the intent.
5C. Participation plans for each vernal pool region have been completed and implemented.	Not met	Not met. This action has not been initiated; participation plans have not been developed for each vernal pool region.
5D. Vernal pool region working groups have developed and implemented outreach and incentive programs that develop partnerships contributing to achieving recovery criteria 1–4.	Not met	Not met. Regional vernal pool working groups have not yet been formed.

Conclusion:

After reviewing the best available scientific information, we conclude that Sacramento Orcutt grass remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Endangered Species Act and analysis of the status of the species in our 2008 status review remains an accurate reflection of the current status.

RECOMMENDATIONS FOR FUTURE ACTIONS

Here we propose several habitat conservation and ecological research recommendations which will aid in the recovery and conservation of Sacramento Orcutt grass. Some of these recommendations have already been discussed in previous recovery documents (Service 2008, p. 17) and remain valid.

1. Conduct a Species Status Assessment for the next 5-year status review to assess the species status and determine whether downlisting is appropriate. Currently, most of the extant natural occurrences are permanently protected in perpetuity.
2. Conduct a study to identify methods to control the dispersal of the invasive waxy mangrass in vernal pool habitat.
3. Develop and implement a management plan for control of invasive plants, particularly waxy mangrass. Phoenix Field, Phoenix Park, and Kiefer Landfill Wetland Preserve should be targeted for control of waxy mangrass. All remaining Sacramento Orcutt grass occurrences should be surveyed for waxy mangrass and managed accordingly.

4. Implement appropriate levels of grazing at the Rancho Seco site to benefit Sacramento Orcutt grass.
5. Work with partners and private landowners to secure protection of the remaining unprotected occurrences of the species. Currently there are only two unprotected occurrences, one of which is within the footprint of a proposed preserve.

Field Supervisor, Sacramento Fish and Wildlife Office

Approve _____ **Date** _____

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