5-YEAR REVIEW
Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*) and Sebastopol meadowfoam (*Limnanthes vinculans*)

GENERAL INFORMATION

Species: Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*) and Sebastopol meadowfoam (*Limnanthes vinculans*), three plant species; as currently listed in 50 CFR 17.12
Date listed: December 2, 1991
FR citation: 56 FR 61173
Classification: Endangered

State Listing
Burke's goldfields and Sebastopol meadowfoam were listed by the State of California as endangered in 1979. Sonoma sunshine was listed by the State of California as endangered in 1992.

BACKGROUND:

Most recent status review: Since the original listing in 1991, there has been one 5-year review for these species in 2008. [CLICK HERE TO VIEW DOCUMENT]

FR Notice citation announcing this status review: A notice announcing initiation of the 5-year review of these taxa and the opening of a 60-day period to receive information from the public was published in the Federal Register on 18 June, 2018 (83 FR 28251-28254).

ASSESSMENT:

Information acquired since the last status review:

This 5-year review was conducted by the U.S. Fish and Wildlife Service's (USFWS) Sacramento Fish and Wildlife Office (SFWO). Data for this review were solicited from interested parties through a Federal Register notice announcing this review on June 18, 2018. We did not receive any information from the public on these species in response to our Federal Register Notice announcing this 5-year review. We also contacted state agencies and species experts to request information we should consider in our review, and conducted a search of the California Natural Diversity Database (CNDDB) maintained by the California Department of Fish and Wildlife. Additionally, we conducted a literature search and a review of information in our files. Since the last 5-year review, the preparation of a Recovery Plan for the Santa Rosa Plain defines downlisting and delisting criteria for all three species (Service 2016). The Recovery Plan also describes core and management areas for recovery efforts (Service 2016).

For all species, the number of occurrences in CNDDB have changed since the last 5-year review (CNDDB 2018). Occurrence numbers in CNDDB may change as new information reveals that

some occurrences should be combined due to proximity, or may change because of discoveries or introductions at new locations. CNDDB defines an occurrence as a location occupied by the species that is separated by at least one-fourth mile from other locations of the species that contain populations, individuals, or colonies. Locations less than one-fourth mile apart are considered a single occurrence and may contain one or more populations. Additionally, we received survey reports from the Laguna de Santa Rosa Foundation through their Adopt-a-Vernal Pool citizen science monitoring project (H. Wermuller, Laguna de Santa Rosa Foundation, *in litt*. 2018), which also include occurrence information for all species. Updated occurrences for all species, including a comparison of status between the past and current 5-year reviews, are included in Appendix A (Table A1). Introductions of the three species, as recommended in the previous status review and in the Recovery Plan, have occurred during mitigation activities and within conservation banks. A summary of conservation banks, easements, and preserves including existing and new occurrences, are included in Appendix A (Table A2).

All threats present in the last 5-year review remain as current threats (see threats assessment in the previous 5-year review (Service 2008), and threat analysis in the 2016 Recovery Plan, Service 2016). The largest continuing threats to these species are urban development and land conversion to agriculture (such as vineyards), associated agricultural activities and wastewater irrigation, and alteration of hydrology. A new threat mentioned in the Recovery Plan is the potential loss of pollinators (Factor E) to all three species (Service 2016). Many vernal pool plants have co-evolved with specialized bee pollinators that are vulnerable to habitat loss and fragmentation (Thorp and Leong 1998). Each of the species in this review have multiple pollinators including at least one specialist bee pollinator, and primary pollinators for each species had higher visitation rates in natural vs. created vernal pools (Gilmore *et al*. 2012). Another potential new threat to the species being introduced to created vernal pools is soil compaction (Factor E). Evidence that soil compaction reduces the growth, survival, and reproductive output of Sebastopol meadowfoam has important implications for created vernal pools constructed using heavy construction equipment (Jensen 2011).

Other new or updated information is provided for each species below:

Sonoma sunshine

Since the 2008 5-year review, updated information on Sonoma sunshine includes new occurrences, notably a range expansion, seed collection and banking, and studies on reproductive ecology and the pollinator community.

Historically, Sonoma sunshine was only known to occur in Sonoma County. Since the last 5-year review, the range for Sonoma sunshine has increased to include the town of Windsor in Sonoma County, and an isolated occurrence was noted in a vernal pool in Mendocino County west of Laughlin (CNDDB 2018). Additionally, Sonoma sunshine has been introduced to at least 12 new sites during mitigation activities or to establish conservation banks (although note that "sites" may not refer to unique CNDDB occurrences) (Service 2016).

The Windsor occurrences have the same threats as the other occurrences within the Santa Rosa Plain, and the 2016 Recovery Plan includes these occurrences in its range. The Mendocino

occurrence is potentially threatened by already known threats including highway maintenance and competition with non-native plants (CNDDB 2018), but was documented after the completion of the Recovery Plan.

Seeds were collected from four sites in 2009 and stored at the Rancho Santa Ana Botanic Garden (CDFG 2010). The quantity of seeds collected at each site represented 365 maternal lines, and germination percent was 90%. Based on the quantity of seed and number of individuals sampled, the botanic garden considers this collection sufficient to serve its intended purpose although the seed quantity is low.

Several ecological studies have provided new information about Sonoma sunshine. It is a predominately out-crossing species, although germination of closed-pollinated seeds in the greenhouse demonstrated that self-fertilized seedlings may be viable in the right conditions (Sloop and Brown 2012). Sonoma sunshine had the most diverse pollinator community of the three plants in this review (Gilmore *et al*. 2012). The most abundant native pollinator was the solitary bee *Andrena blennospermatis*, and other pollinators included the European honeybee (*Apis mellifera*), four species of generalist native bees, and syrphid flies (Gilmore *et al*. 2012). Native pollinators (solitary bee and syrphid fly) were more abundant in natural vernal pools than in created vernal pools (Gilmore *et al*. 2012), and seed set was higher in natural pools than created pools (Sloop and Brown 2012).

Burke's goldfields

Since the 2008 5-year review, updated information on Burke's goldfields includes new or updated occurrences, a progress report for a genetic study, seed collection and banking, and studies on reproductive ecology and the pollinator community.

Although the known distribution of Burke's goldfields remains largely the same as in the last 5-year review (within Mendocino, Lake, and Sonoma Counties), there are several new occurrences: three new occurrences in Lake County and two new occurrences in Sonoma County (Table A1). There is also one new occurrence in Napa County. Additionally, the species was introduced to at least three new sites during mitigation activities or to establish conservation banks (CNDDB 2018). An occurrence in Mendocino County that was previously thought to be extirpated was rediscovered in 2010 (CNDDB 2018).

A progress report for a population genetics study of Burke's goldfields provides results from the first year of a study that will quantify genetic diversity across and within individuals and populations, investigate genetic differences between natural vs. created vernal pools, and conduct seed transplant experiments into created vernal pool habitat (Emery 2018). In 11 sites sampled in 2017, the subsample of Burke's goldfields tested had high levels of genetic variation, relatively low genetic structure, and low levels of inbreeding. Plants sampled between natural vs. created vernal pools showed similar levels of genetic variation and inbreeding, although the researchers caution against drawing strong conclusions because of the limited sample size. A transplant experiment to plant seeds intro constructed donor pools was delayed because of fires in the area that limited site access and because of delayed responses for site access from landowners, but is planned to start in 2019.

Seeds were collected from three sites in 2009 and stored at the Rancho Santa Ana Botanic Garden (CDFG 2010). The quantity of seeds collected at each site represented 254 maternal lines, and germination percent was 45%, 92%, and 98% for each of the three ascensions. Based on the quantity of seed and number of individuals sampled, the botanic garden considers this collection sufficient to serve its intended purpose.

As with the other species in this review, Burke's goldfields are a primarily out-crossing species (Sloop and Brown 2012). Open pollinated inflorescences had higher seed set with higher viability of seeds, although there was successful germination of seeds developed in enclosed inflorescences (Sloop and Brown 2012). In a recent pollinator study, the most frequent pollinator visitor to Burke's goldfields was the Bombyliid fly (*Conophorus cristatus*) (Gilmore *et al*. 2012). Bombyliid fly visitation frequency was highly variable, but they may actually be the primary pollinator of Burke's goldfields. This suggests that the plant may not rely on the specialist solitary bee pollinator *Andrena submoesta*. Both Bombyllid fly and solitary bee visits were significantly higher in natural compared to constructed vernal pools, although the number of visits by solitary bees was low. Syrphid fly visitation rates and seed set were similar between natural and constructed pools (Gilmore *et al*. 2012; Sloop and Brown 2012).

Sebastopol meadowfoam

Since the 2008 5-year review, updated information on Sebastopol meadowfoam includes new or updated occurrences, seed collection and banking, and studies on population genetics, reproductive ecology, and the pollinator community.

Sebastopol meadowfoam occurrences are located within Sonoma and Lake Counties. Since the last 5-year review, one additional occurrence has been found in Napa County and two additional occurrences have been found in Sonoma County. Sebastopol meadowfoam has been introduced to at least three new sites during mitigation activities or to establish conservation banks (Service 2016; CNDDB 2018).

A study evaluating the impacts of habitat restoration on population genetic structure of Sebastopol meadowfoam over 10 years of habitat mitigation (Halbur *et al*. 2014) addresses the threat of disruption of gene flow due to habitat restoration efforts (Service 2008). Genetic diversity in Sebastopol meadowfoam was similar between natural and created vernal pools, and there was no evidence of founder effects or increased rates of inbreeding depression in created pools, together suggesting that seed translocation has not disrupted large-scale patterns of population structure. However, mitigation activities have demonstrably changed gene flow, particularly in the center of the species range where mitigation activity is concentrated. Evidence of restoration activities in genetic structure is demonstrated by a reduction in the extent of isolation-by-distance in the range center (e.g., individuals in created pools had similar relatedness across almost twice the distance then those in natural pools) and by a shift of at least one genetic boundary (Halbur *et al*. 2014). Results demonstrate the importance of conserving Sebastopol meadowfoam at both created and natural sites.

Seeds were collected from four sites in 2009 and stored at the Rancho Santa Ana Botanic Garden (CDFG 2010). The quantity of seeds collected at each site represented 68 maternal lines, and

germination was not tested based on the small quantity of seed. Based on the quantity of seed and number of individuals sampled, the botanic garden does not consider this collection sufficient to serve its intended purpose and suggests that additional seed should be collected to augment this collection.

Like the other two species in this review, Sebastopol meadowfoam is a predominately out-crossing species. The average number of seeds germinated was similar between open-pollinated and enclosed inflorescences, although seeds were visually sorted based on characters predicting viability (Sloop and Brown 2012). The dominant pollinator for Sebastopol meadowfoam is the specialist bee, *Andrena pulverea*, which was abundant at both natural and created vernal pools (Gilmore *et al.* 2012). The plant has another specialist bee pollinator, *Panurginus occidentalis*. No generalists were collected using nets at the flowers, suggesting that specialist pollinators may competitively exclude other generalist native bees. (Gilmore *et al.* 2012). Solitary bee visits were significantly higher in natural compared to constructed vernal pools, while European honeybee abundance was higher in created sites (Gilmore *et al.* 2012). Average seed set was higher at natural pools compared to constructed pools (Sloop and Brown 2012).

Conclusion:

After reviewing the best available scientific information, we conclude that Sonoma sunshine, Burke's goldfields, and Sebastopol meadowfoam remain endangered. 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 the 2008 5-year review remains an accurate reflection of the species current status, with the exception that an additional threat—potential loss of pollinators—has been added. Soil compaction may also be a threat to the species introduced to created vernal pools.

RECOMMENDATIONS FOR FUTURE ACTIONS:

The Recovery Plan (Service 2016) includes a detailed narrative with recommended actions. Recovery plan action 2.0, "Develop a central database for survey data from all natural and created occurrences of the three plant species including information on protection status," will be helpful to manage updated occurrence information for upcoming status reviews and to track recovery progress. In addition, the database should track the location of source seed for sites with created occurrences. Recovery plan action 3.0, "Collect and store seeds from all occurrences of all three plant species," was partially implemented through seed collection in 2009. Because the Rancho Santa Ana Botanic Garden did not consider the seed collected from Sebastopol meadowfoam in 2009 to be sufficient to fill the collection's purpose based on the quantity of seed collected and individuals sampled, we recommend supplemental collection of Sebastopol meadowfoam seeds (as well as additional occurrences sampled for all three species).

In response to the recently discovered range expansion of Sonoma sunshine, we recommend surveying vernal pools in Mendocino County near the recent observation of Sonoma sunshine to search for additional occurrences.

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date 5/2/2019

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Appendix A: Supplemental Tables

Table A1. Summary of CNDDB occurrences, including both current status and status described in the 2008 5-year review. New occurrences do not have a 2008 status, and occurrences that CNDDB merged with other occurrence numbers are noted as such in the 2018 status.

Common Name	Element Occurrence	2008 Status	2018 Status	Occurrence Type	County
Sonoma sunshine	2	Extirpated	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	3	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Sonoma sunshine	5	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	6	Presumed Extant	Merged w/ EO 10		
Sonoma sunshine	7	Presumed Extant	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sonoma sunshine	8	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	9	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	10	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	11	Presumed Extant	Merged w/ EO 9		
Sonoma sunshine	12	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	13	Possibly Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Sonoma sunshine	15	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	16	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	17	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	18	Extirpated	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sonoma sunshine	20	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	22	Presumed Extant	Extirpated	Natural/Native occurrence	Sonoma
Sonoma sunshine	23	Presumed Extant	Merged w/ EO 10		
Sonoma sunshine	24	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	25	Presumed Extant	Merged w/ EO 10		
Sonoma sunshine	26	Presumed Extant	Merged w/ EO 10		
Sonoma sunshine	27	Presumed Extant	Merged w/ EO 10		
Sonoma sunshine	28	Presumed Extant	Merged w/ EO 8		
Sonoma sunshine	29	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	30	Presumed Extant	Merged w/ EO 8		
Sonoma sunshine	31	Presumed Extant	Merged w/ EO 8		
Sonoma sunshine	32		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sonoma sunshine	33		Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	35		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sonoma sunshine	36		Presumed Extant	Natural/Native occurrence	Sonoma
Sonoma sunshine	37		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma

Table A1. Summary of CNDDB occurrences, continued.

Common Name	Element Occurrence	2008 Status	2018 Status	Occurrence Type	County
Sonoma sunshine	38		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sonoma sunshine	39		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sonoma sunshine	40		Presumed Extant	Natural/Native occurrence	Mendocino
Burke's goldfields	1	Possibly Extirpated	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	2	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Burke's goldfields	3	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Burke's goldfields	4	Extirpated	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	5	Possibly Extirpated	Presumed Extant	Natural/Native occurrence	Mendocino
Burke's goldfields	6	Presumed Extant	Presumed Extant	Natural/Native occurrence	Lake
Burke's goldfields	7	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	8	Presumed Extant	Merged w/ EO 7		
Burke's goldfields	10	Presumed Extant	Merged w/ EO 7		
Burke's goldfields	11	Presumed Extant	Presumed Extant	Transplant Outside of Native Hab./Range	Lake
Burke's goldfields	12	Presumed Extant	Merged w/ EO 4		
Burke's goldfields	13	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	14	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	15	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	16	Possibly Extirpated	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	17	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	18	Presumed Extant	Merged w/ EO 4		
Burke's goldfields	19	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	21	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	22	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	23	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	24	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	25	Presumed Extant	Presumed Extant	Introduced Back into Native Hab./Range	Sonoma
Burke's goldfields	26	Presumed Extant	Possibly Extirpated	Natural/Native occurrence	Sonoma
Burke's goldfields	27	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	28	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	29	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Burke's goldfields	30	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	31	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	32	Presumed Extant	Merged w/ EO 2		
Burke's goldfields	33	Presumed Extant	Merged w/ EO 27		
Burke's goldfields	34	Presumed Extant	Merged w/ EO 13		
Burke's goldfields	35		Presumed Extant	Natural/Native occurrence	Lake
Burke's goldfields	36		Presumed Extant	Natural/Native occurrence	Napa

Table A1. Summary of CNDDB occurrences, continued.

Common Name	Element Occurrence	2008 Status	2018 Status	Occurrence Type	County
Burke's goldfields	37		Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	38		Presumed Extant	Natural/Native occurrence	Lake
Burke's goldfields	39		Presumed Extant	Natural/Native occurrence	Lake
Burke's goldfields	40		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Burke's goldfields	41		Presumed Extant	Natural/Native occurrence	Sonoma
Burke's goldfields	42		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Burke's goldfields	43		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sebastopol meadowfoam	1	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	2	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	3	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	5	Presumed Extant	Merged w/ EO 1		
Sebastopol meadowfoam	6	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	7	Possibly Extirpated	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	9	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	10	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	12	Extirpated	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	14	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	15	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	16	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	17	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	18	Possibly Extirpated	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	20	Possibly Extirpated	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	21	Presumed Extant	Presumed Extant	Introduced Back into Native Hab./Range	Sonoma
Sebastopol meadowfoam	22	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	24	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	25	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	26	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma

Table A1. Summary of CNDDB occurrences, continued.

Common Name	Element Occurrence	2008 Status	2018 Status	Occurrence Type	County
Sebastopol meadowfoam	27	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	28	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	29	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	30	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	31	Possibly Extirpated	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	33	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	34	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	35	Presumed Extant	Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	36	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	37		Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	38	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	39	Presumed Extant	Presumed Extant	Natural/Native occurrence	Napa
Sebastopol meadowfoam	40	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	42	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	43	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	46	Extirpated	Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	47	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	48	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	49	Presumed Extant	Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	50	Presumed Extant	Presumed Extant	Introduced Back into Native Hab./Range	Sonoma
Sebastopol meadowfoam	52		Possibly Extirpated	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	53		Presumed Extant	Natural/Native occurrence	Napa
Sebastopol meadowfoam	54		Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	55		Presumed Extant	Natural/Native occurrence	Sonoma
Sebastopol meadowfoam	56		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma
Sebastopol meadowfoam	57		Presumed Extant	Transplant Outside of Native Hab./Range	Sonoma

Table A2. Summary of conservation banks and preserves for Santa Rosa Plain plant species.

Name	Sonoma sunshine	Burke's goldfields	Sebastopol meadowfoam	Source
Alton Lane Mitigation Site	x	x		S. Buss *in litt*. 2018
Alton North Conservation Bank	x	x		Service 2016
Alton South Conservation Bank		x		S. Buss *in litt*. 2018
Bouverie Preserve	x			Werdmuller *in litt*. 2018
Carinalli Todd Road Mitigation Bank	x		x	Service 2016
Christina Preserve			x	S. Buss *in litt*. 2018
Davis Preserve			x	S. Buss *in litt*. 2018
Desmond Mitigation Bank			x	Service 2016
FEMA (Yuba Drive Unit)			x	S. Buss *in litt*. 2018
Fulton Road Mitigation Bank	x	x		Service 2016
Gobbi Preserve	x		x	S. Buss *in litt*. 2018
Hale Mitigation Bank	x	x	x	S. Buss *in litt*. 2018
Hazel Mitigation Bank	x	x	x	Service 2016, S. Buss *in litt*. 2018
Horn Mitigation Bank (parcels 1, 2, 3)	x	x	x	Service 2016
Laguna (Carinalli) Mitigation Bank			x	Service 2016
Margaret Preserve			x	Service 2016
Margaret West Conservation Bank			x	S. Buss *in litt*. 2018
SACMA and SACMA II Preserves		x		S. Buss *in litt*. 2018
Shilo Preserve			x	S. Buss *in litt*. 2018
SIMI Goldfields Preserve	x	x		Service 2016
Slippery Rock Mitigation Bank	x	x	x	Service 2016
Southwest Santa Rosa Vernal Pool Preservation Bank (Engel Bank)	x		x	Service 2016, S. Buss *in litt*. 2018
Swift/Turner Conservation Bank	x	x	x	Service 2016
Terra Bagnata Conservation Easement	x		x	S. Buss *in litt*. 2018
Theiller CDFW property			x	Sloop and Ayres 2009
Todd Road Preserve			x	Werdmuller *in litt*. 2018
Walker Avenue			x	S. Buss *in litt*. 2018
Wikiup Mitigation Bank		x		S. Buss *in litt*. 2018
Woodbridge Preserve	x	x		Emery 2018, S. Buss *in litt*. 2018
Wright Preservation Bank		x	x	Service 2016
Yuba Mitigation Site			x	Service 2008
Zero Todd Road	x			S. Buss *in litt*. 2018