

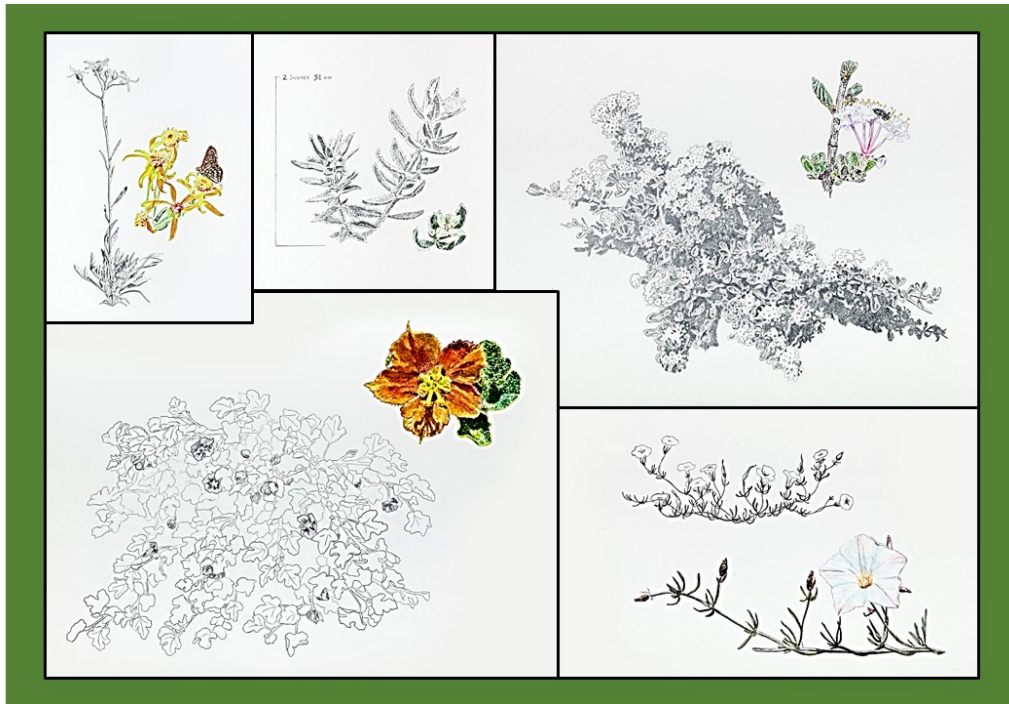
Stebbins' morning-glory
(Calystegia stebbinsii)

Pine Hill ceanothus
(Ceanothus roderickii)

Pine Hill flannelbush
(Fremontodendron californicum ssp. decumbens)

El Dorado bedstraw
(Galium californicum ssp. sierrae)

Layne's butterweed
(Packera layneae)



Illustrations by Bureau of Land Management

5-Year Review:
Summary and Evaluation
U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Sacramento, California

May 2019

5-YEAR REVIEW

Stebbins' morning-glory
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Pine Hill ceanothus
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I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview:

As summarized from the Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills (Service 2002), Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed occur exclusively or primarily on gabbro soils in chaparral and woodland vegetation communities in the Central Sierra Nevada foothills in California. Though varied in their responses, all have adapted to fire in some capacity.

Stebbins' morning-glory is a leafy herbaceous perennial (persisting or living for several years with a period of growth each year) vine in the morning-glory family (Convolvulaceae). The species is

restricted to the Pine Hill Preserve and immediate vicinity in El Dorado County and two sites near Grass Valley in Nevada County.

Pine Hill ceanothus is a prostrate (low-growing) evergreen shrub of the buckthorn family (Rhamnaceae) that generally grows to 3 meters (m) (9.8 feet (ft)) in diameter. The branches radiate from a central axis and root when they come into contact with the ground. The species is restricted to the Pine Hill Preserve and the immediate vicinity.

Pine Hill flannelbush is a branched evergreen shrub of the cacao family (Sterculiaceae) growing to 1.3 m (4.3 ft) tall. Dense hairs cover the leaves and light-orange to reddish-brown flowers appear from late April to early July. This subspecies is also restricted to the Pine Hill Preserve and immediate vicinity; however, there is compelling ongoing research which may indicate it also occurs in Yuba and Nevada Counties (Kelman *et al.* 2006).

El Dorado bedstraw is a softly hairy perennial herb in the coffee family (Rubiaceae). The pale yellow flowers, which are clustered at the tips of stems, appear in May and June. El Dorado bedstraw is restricted to the Pine Hill Preserve and the immediate vicinity.

Layne's butterweed is a perennial herb of the aster family (Asteraceae) that sprouts from a rootstock. Each flower head has five to eight orange and yellow flowers. This species occurs at the Pine Hill Preserve and the immediate vicinity, in addition to several locations in Yuba, Placer, and Tuolumne Counties.

Methodology Used to Complete This Review:

Staff of the Sacramento Fish and Wildlife Office prepared this review using information contained in published journal articles, unpublished technical reports, and the California Natural Diversity Database (CNDDB) maintained by the California Department of Fish and Wildlife (CDFW). The recent publications and personal communications with species experts were our primary sources of information used to update the species status and threats sections of this review. This review was prepared following the Region 8 guidance issued in March 2008.

Contact Information:

Lead Regional Office: Angela Picco, Deputy Division Chief of Listing and Recovery, Pacific Southwest Regional Office, Region 8; (916) 414-6490.

Lead Field Office: Josh Hull, Listing and Recovery Division Chief, Sacramento Fish and Wildlife Office; (916) 414-6742.

Federal Register (FR) Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of these taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register on June 18, 2018 (83 FR 28251–21254). We received one response as a result of the notice, which was an update from the U.S. Forest Service (USFS) (USFS, *in litt.* 2018).

Listing History:

Original Listing

FR Notice: 61 FR 54346–54358

Date of Final Listing Rule: October 18, 1996

Entity Listed: Stebbins' morning-glory (*Cahystegia stebbinsii*)

Classification: Endangered

Entity Listed: Pine Hill ceanothus (*Ceanothus roderickii*)

Classification: Endangered

Entity Listed: Pine Hill flannelbush (*Fremontodendron californicum* ssp. *decumbens*)

Classification: Endangered

Entity Listed: El Dorado bedstraw (*Galium californicum* ssp. *sierrae*)

Classification: Endangered

Entity Listed: Layne's butterweed (*Senecio layneae*; thereafter named *Packera layneae*)

Classification: Threatened

State Listing: Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed were all listed by the State of California as rare in 1979. Stebbins' morning-glory was listed by the State of California as endangered in August of 1981. Pine Hill ceanothus was listed by the State of California as rare in 1982.

Associated Rulemakings: None

Review History: No formal status reviews have been conducted for these species since the time of their initial listing.

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority numbers for the species discussed in this review are described in the recovery plan (Service 2002) and are based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 FR 43098, September 21, 1983).

The recovery priority number for Stebbins' morning-glory, Pine Hill ceanothus, and Layne's butterweed is 5C. This number indicates that the taxon is a species that faces a high degree of threat and has a low potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity.

The recovery priority number for Pine Hill flannelbush and El Dorado bedstraw is 6C. This number indicates that the taxon is a subspecies that faces a high degree of threat, has a low potential for recovery, and has potential conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline

Name of Plan: Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills

Date Issued: June 2002

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy

The Endangered Species Act defines “species” as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition of species under the Act limits listing as distinct population segments to species of vertebrate fish or wildlife. Because the species under review are plants, the DPS policy is not applicable, and the application of the DPS policy to the species’ listing is not addressed further in this review.

Information on the Species and its Status

Species Biology and Life History

Stebbins’ morning-glory is a leafy herbaceous perennial vine in the morning-glory family (Convolvulaceae) which is shade intolerant (Baad and Hanna 1987) and has an extensive root system which seems to survive much longer than aboveground vegetation persists at any one location (L. Eng, *in litt.* 1999, as cited in Service 2002). Though initially thought to be an obligate seeding species, a study by Ayres (2009) indicates it may have the capability to recruit by seed or resprout after fire or other disturbance. It is clear however, that seeds require scarification or heat treatment for successful germination (Nosal 1997; Ayres 2011) and that it has a seedbank that may persist for over 60 years (Ayres 2011). Plants grow from seed rapidly and flower profusely 2-3 years after fire. As the canopy closes during the interfire period, vegetative succession can choke out Stebbins’ morning-glory; however, as long as the soil seed bank has been replenished, populations can become established once again after fire (Marsh and Ayres 2002).

Pine Hill ceanothus is a prostrate evergreen shrub of the buckthorn family (Rhamnaceae) that generally grows to 3 m (9.8 ft) in diameter. Flower/fruit development in this species is negatively affected by canopy shading (James 1996). Unlike most chaparral shrub species, Pine Hill ceanothus will not resprout from a caudex (woody axis comprising the stem and root) after a fire, and therefore, depends on nearby plants connected via branch layering for survival or the seedbank for re-establishment (Boyd 2007). There is reason to believe that seeds can survive at least 80 years in the seedbank (Ayres 2011; Boyd 2007). Hot/cold stratification, but not necessarily fire (Boyd 2007), seems to be required for germination (James 1996; Boyd 2007). Because juvenile plants do not begin flowering until 5-6 years after fire, populations need a fire-free period of at least six years to replenish the seed bank (Marsh and Ayres 2002; Ayres 2011), otherwise populations may be permanently lost.

Pine Hill flannelbush is a branched evergreen shrub of the cacao family (Sterculiaceae) that typically grows up to 1.3 m (4.2 ft) tall. Pine Hill flannelbush resprouts from its crown after a fire

(Wilson *et al.* 2009) and relies on fire or other heat treatment for the establishment of seedlings (Boyd and Serafini 1992).

El Dorado bedstraw is a softly hairy perennial herb in the coffee family (Rubiaceae) with stems up to 30 centimeters (12 inches) in length. Little is known about the reproductive biology, ecology and demography of El Dorado bedstraw; however, the species was documented to have resprouted post-wildfire (Wilson *et al.* 2009).

Layne's butterweed is an early successional perennial herb of the aster family (Asteraceae). It is unclear whether the species has the ability to resprout from its caudex after disturbance (Marsh and Ayres 2002). Although the seed of this species seems to germinate in a wide range of soil conditions and adult plants grow in a wide range of slope, aspect, light and elevation levels (Williams 2014), it appears to have little or no persistent seedbank, a short seed dispersal distance (Williams 2014), and is also shade intolerant (Baad and Hanna 1987). It is likely the species functions as a fugitive species, depending on a short fire return interval to create a regeneration niche and a supply of the short-lived seed from a nearby reproducing population to colonize the patch (Marsh and Ayres 2002). Little else is known about reproductive biology, ecology, and demography of the species.

Please see the recovery plan (Service 2002) for further information about biology and life history of these five species.

Spatial Distribution

At the time of listing Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed occurred primarily on the Pine Hill formation an area of approximately 10,400 hectares (ha) (25,700 acres (ac)), in western El Dorado County, California, ranging in elevation from 138 to 628 m (453 to 2,060 ft). In addition, Stebbins' morning-glory and Layne's butterweed had "a few known isolated occurrences in El Dorado, Nevada and/or Tuolumne Counties" (Service 1996).

Today, the species continue to occur primarily at the Pine Hill Preserve, but some species now have additional populations that have been discovered or introduced outside this area (**Figure 1, Figure 2**). Specifically, Stebbins' morning-glory has a few known occurrences in Nevada County near Grass Valley. Besides occurring within the Pine Hill Preserve itself, Layne's butterweed also currently exists in five general areas: 1) two locations near Brownsville in Yuba County; 2) Sugarpine Reservoir and Michigan Bluff on Tahoe National Forest in Placer County; 3) Little Bald Mountain and along Traverse Creek near Georgetown on El Dorado National Forest in El Dorado County; 4) scattered private lands in El Dorado County outside the Pine Hill Preserve; and 5) roughly six locations near Don Pedro Reservoir in Tuolumne County. The Layne's butterweed populations in Yuba and Placer Counties and two of the six Tuolumne County populations have been newly discovered since listing. Although Pine Hill flannelbush is stated to occur in Nevada and Yuba Counties according to CNDDDB data used to create **Appendix A**, studies are ongoing to determine if these are the listed entity. Until proven by genetic studies and documented in a scientific journal to be Pine Hill flannelbush, we do not consider them so.

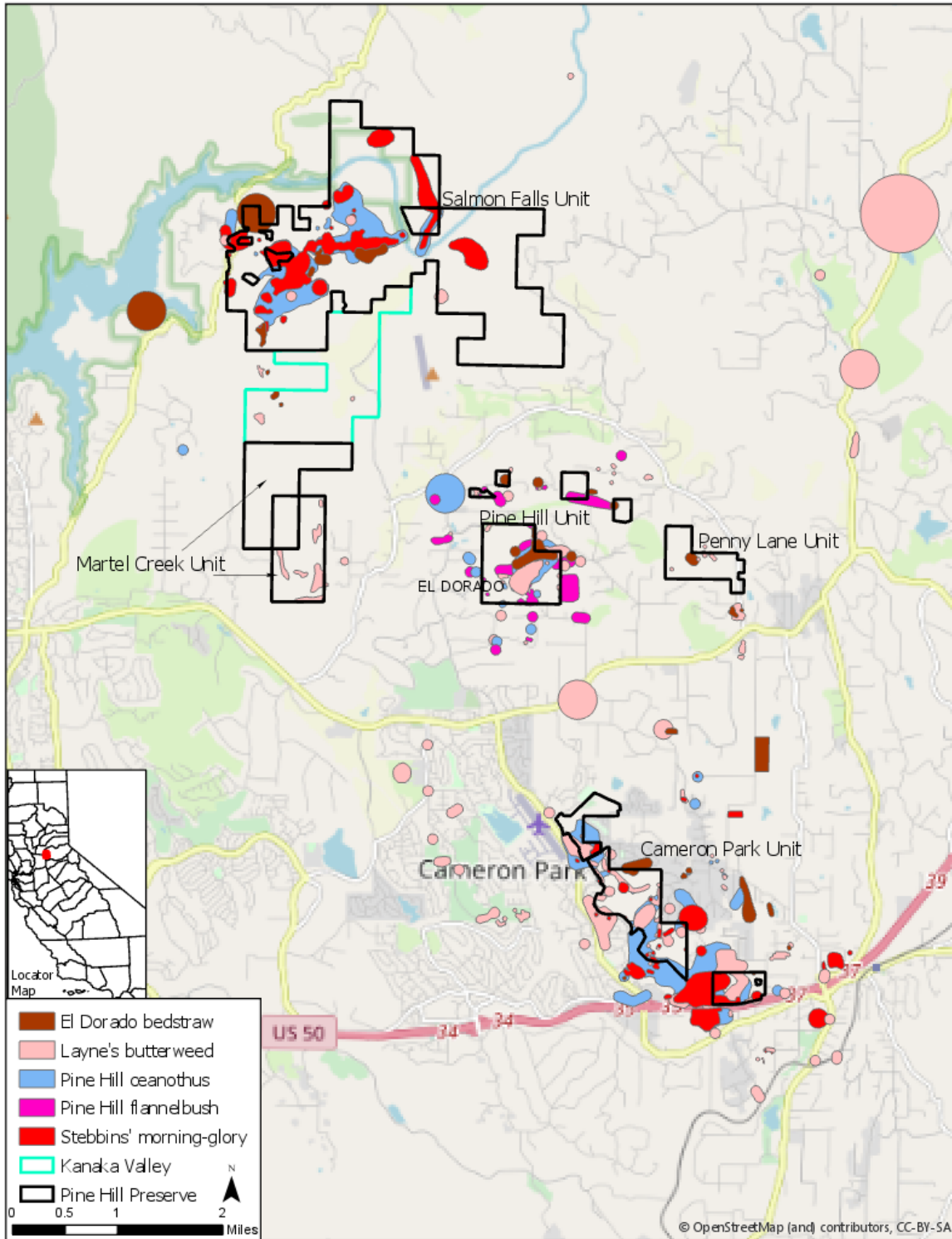


Figure 1. Location of Pine Hill Preserve units and distribution of Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed. Note: The specialty El Dorado bedstraw preserve is not shown on this map, as it has not yet been identified on the landscape. However, it will eventually represent one of the six Pine Hill Preserve units.

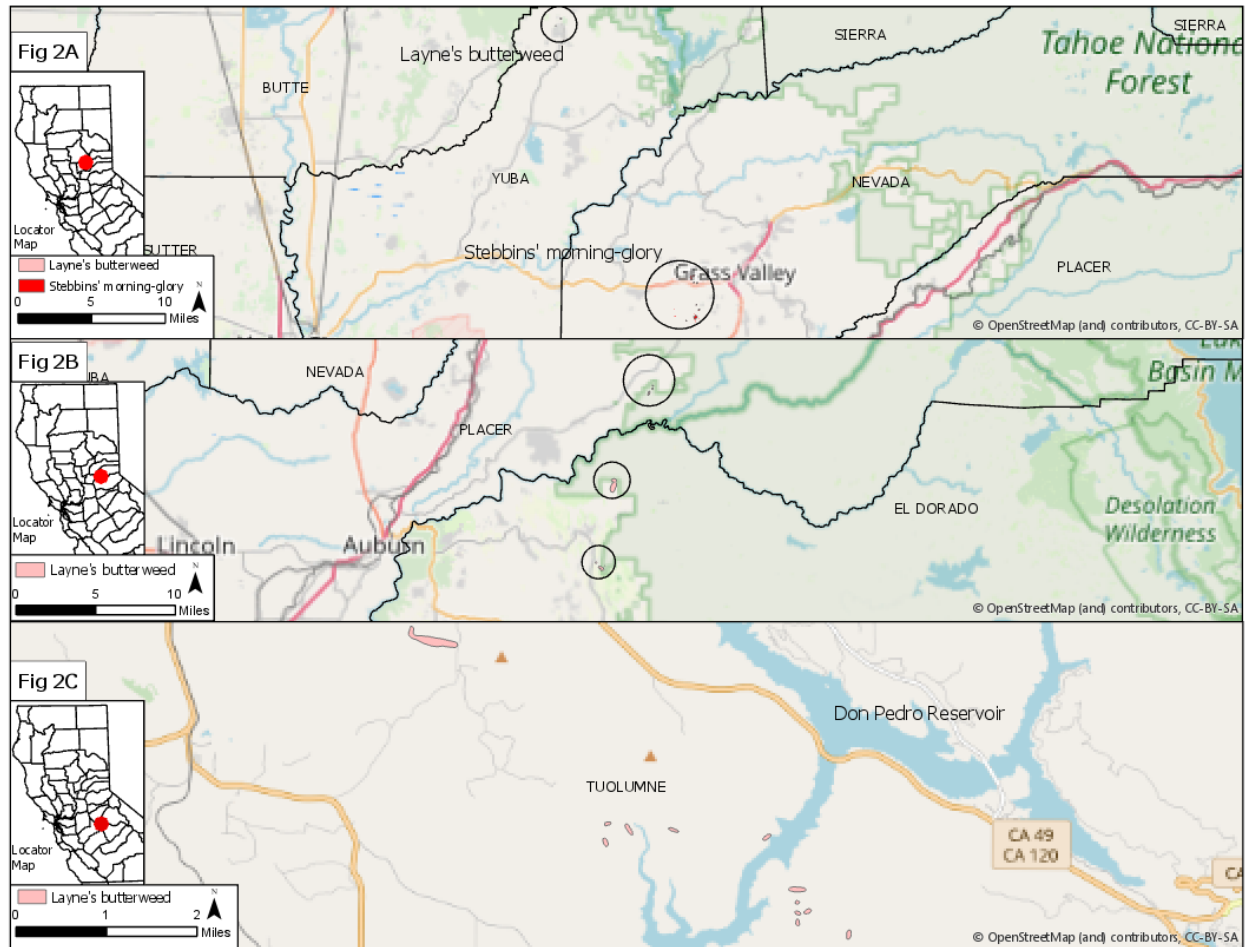


Figure 2. Fig 2A: Yuba/Nevada County, Fig 2B: Placer/northern El Dorado County and Fig 2C: Tuolumne County occurrences of Stebbins' morning-glory and Layne's butterweed

The term *occurrence* was used in the recovery plan to refer to a grouping of plants in a particular location, mainly based on CNDDB data. Hereafter, we use a single term, *population*, to refer to any grouping of plants which is separated from the next grouping by at least 0.25 mi (0.4 km). While maximum distance for genetic exchange is not specifically known for any of these plant species, based on general seed dispersal characteristics, 0.25 mi is a reasonable distance beyond which to assume genetic exchange does not typically occur. In regards to this 5-year review, *population* shall be synonymous with occurrence, location, etc., even though future genetic work may reveal it does not genetically fit the definition of a population.

As shown in **Appendix A**, several occurrences of most species have either been newly discovered since listing or are considered possibly extirpated since listing. Notably, in 2007 the Bureau of Land Management (BLM) discovered El Dorado bedstraw for the first time within the Penny Lane unit at the Pine Hill Preserve, which already supported Layne's butterweed (G. Hinshaw, *in litt.* 2018). None of the species have newly discovered occurrences that lie outside of their known range.

Abundance

Abundance for each of the species was not discussed in the final listing rule; however, based on the date of occurrences reported to CDNNB, we see, as discussed above and shown in Appendix A, that there have been numerous newly discovered populations of Stebbins' morning-glory, El Dorado bedstraw, and Layne's butterweed reported to CNDDDB since listing. New occurrences of Pine Hill flannelbush reported in Yuba and Nevada Counties since listing (Appendix A), as noted above, have not yet been confirmed as the listed taxa.

Each of the five listed species was most recently surveyed within the Pine Hill Preserve between 2007 and 2009 (BLM 2010), and abundance for each species is listed in **Table 1**.

Table 1. Abundance of federally listed gabbro soil plants in 2007-2009 at Pine Hill Preserve.

Species	2007 survey	2008 survey	2009 survey
Stebbins' morning-glory	>8,850	>8,700	>9,820
Pine Hill ceanothus	>22,420	>33,000	>55,350
Pine Hill flannelbush	>62	>76	>104
El Dorado bedstraw	>4,854	>5,700	>21,000
Layne's butterweed	>5,310	>4,700	>9,100

In general, a direct comparison of species abundance now versus at the time of listing is not possible due mainly to lack of abundance data at the time of listing. Contributing to that challenge is that there is not consistent *current* abundance data for many of the populations, especially those on private lands. However, given the increase in the number of populations of Stebbins' morning-glory, El Dorado bedstraw, and Layne's butterweed since listing, it is likely that overall abundance has increased for those species (CNDDDB 2018). It is unlikely that abundance of Pine Hill ceanothus and Pine Hill flannelbush has increased since listing, due to a further reduction in their range, lack of suitable habitat, and the fact that both species are long-lived. However, as noted below, with the increased protection of habitat, it is likely that no further significant *decline* in abundance of these species has occurred.

Habitat or Ecosystem

In addition to occurring on gabbro soils, Stebbins' morning-glory and Layne's butterweed are also known to occur on serpentine soils. Two of the three serpentine sites for Stebbins' morning-glory in Nevada County are possibly extirpated, but the species continues to persist at one serpentine site in that county and an additional serpentine site near Shingle Springs in El Dorado County. All serpentine sites, with the possible exception of the one in Shingle Springs, continue to support Layne's butterweed. Persistence in at least two separate habitat/soil types benefits these species by increasing their degree of representation.

From 2009-2014, Melanie Gogol-Prokurat developed a habitat suitability model for disturbance-dependent rare plant species of the gabbro soils. Among other things, her findings indicate that while the species are often found together in the landscape, they require different microhabitats for successful conservation and may require a matrix of conservation sites at different successional stages (Gogol-Prokurat 2014).

Most of the conservation effort that has occurred since listing has focused on acquisition of habitat and research into determining the appropriate fire return interval to best manage that habitat for this suite of gabbro plants. As further described below, much of the required gabbro habitat necessary for recovery of the species has been acquired into public ownership since the time of listing; however, roughly 405 ha (1,000 ac) of habitat has yet to be placed into conservation ownership.

Changes in Taxonomic Classification or Nomenclature

In the second edition of the Jepson Manual, the genus to which Layne's butterweed belongs was changed from *Senecio* to *Packera* (Baldwin *et al.* 2012). The Service is not aware of any changes in taxonomic classification or nomenclature for Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, or El Dorado bedstraw since the time of listing.

Although Pine Hill flannelbush is currently considered a subspecies by the Service, Kelman *et al.* (2006) found that the Pine Hill flannelbush at the Pine Hill Preserve was genetically distinguishable from the California flannelbush (*F. californicum*) sampled. This distinction, coupled with unique morphology and ecology, was enough for Kelman *et al.* (2006) to support the treatment of *F. decumbens* as a species. Should Pine Hill flannelbush become formally treated as a species, instead of a subspecies, its endangered status would not change, though its recovery priority number would change from 6C to 5C.

Species-specific Research and/or Grant-supported Activities

In 2014, the Cooperative Endangered Species Conservation Fund (under section 6 of the Endangered Species Act) awarded \$332,475 to the American River Conservancy to purchase and protect the 22 acre Cameron Meadows property. This land, lying within the Cameron Park unit of the Pine Hill Preserve, will substantially help to conserve Stebbins' morning-glory, Pine Hill ceanothus, El Dorado bedstraw, and Layne's butterweed at the site.

Although Stebbins' morning-glory was initially thought to be an obligate seeding species (regenerating from seed only, not resprouts), recent research indicates it may also resprout from rootstock post-fire. Ayres (2009) found that a closely related species has a woody caudex and other characteristics which enables it to survive and resprout after fire. If future research indicates Stebbins' morning-glory can recruit by seed and resprout, this will be a significant finding in terms of determining best management practices to maintain its habitat.

Denise Della Santina conducted a burn trial in coordination with Nevada County at the Stebbins' morning-glory occurrence off McCourtney Road near Grass Valley. The study revealed that morning-glory flourished after a controlled 2016 burn, but that the flannelbush of unknown identity at the same site did not respond favorably to the fire (D. D. Santina, *in litt.* 2018). As noted above, the flannelbush of unknown identity growing in Yuba and Nevada Counties have undergone genetic study and additional studies are ongoing. The genetic analysis completed by Kelman *et al.* (2006) supports the treatment of Pine Hill flannelbush as a *species* (*F. decumbens*), as opposed to a subspecies. In addition, they found that the flannelbush of unknown identity in Yuba County shared a number of alleles with both the California flannelbush *and* the Pine Hill flannelbush, and the analyses did not clearly distinguish its taxonomic relationships. Kelman *et al.* (2006) believe it is possible that the Yuba County population represents a historical hybrid between California flannelbush and Pine Hill flannelbush. The study did not include analysis of the Nevada County population.

Based on morphological and molecular data, Shannon Still found the flannelbush populations of unknown identity at the McCourtney Road site in Nevada County and the Dobbins site in Yuba County appeared to be “*F. decumbens*” (B. Brenneman, *in litt.* 2018a). He claims that the morphological characters match those of Pine Hill flannelbush and that the molecular work cannot distinguish the populations of unknown identity from the Pine Hill flannelbush of El Dorado County, but that it can distinguish them from California flannelbush (B. Brenneman, *in litt.* 2018a). There is no discussion regarding his inherent assumption of the species status, as opposed to subspecies status, of Pine Hill flannelbush. The currently listed entity is the subspecies *F. californicum* ssp. *decumbens*. Since confirmation has not been made of the true identity of the flannelbush in Yuba and Nevada Counties, we will not consider these individuals the listed taxa at this time. It is expected that research will continue in this regard.

In an effort to clarify phylogenetic lineages and degree of genetic diversity within extant populations, further genetic studies of all five species have been conducted since the time of listing. None has resulted in findings directly relevant to attainment of recovery criteria. Therefore, they will not be elaborated upon here.

Five-Factor Analysis

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act.

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

At the time of listing, all of the species discussed in this review were threatened by urbanization and the ensuing habitat fragmentation, along with road construction and maintenance, off road vehicle use, and mining.

Pine Hill Preserve lands

Since the original recovery plan was published, there has been considerable work done toward the completion of a Conservation Strategy for Gabbro Soil Species in El Dorado County. This document, still in preparation, is being developed by a multi-party technical team comprised of representatives from CDFW, California Native Plant Society, El Dorado County, El Dorado Irrigation District, Science Applications International Corporation, BLM, U.S. Bureau of Reclamation, and the Service, under direction of a team comprised of management staff from the same organizations, as well as the American River Conservancy. The document is intended to provide a framework for the mitigation of impacts to the eight Gabbro soil rare plants (including the five addressed in this review) and the planning of ongoing and future acquisition and restoration activities aimed at conservation of these species and their habitats. Although the document has not been completed, conservation efforts have generally proceeded according to the most current draft of the strategy.

Large strides have been made toward the identification and protection of units within the Pine Hill Preserve since the time of listing. Specifically, the following six units make up the Pine Hill Preserve: Salmon Falls, Martel Creek, Pine Hill, Penny Lane, Cameron Park, and a specialty El Dorado bedstraw preserve (**Figure 1**). Though not identified on the landscape yet, the specialty El Dorado bedstraw preserve, once described, will be considered one of the six Pine Hill Preserve

units. Within those units, federal and state partners, municipalities, and land conservancy groups have collectively conserved 1,000 ha (2,471 ac) since 1996 (A. Ehrgott, *in litt.* 2018), which is in addition to lands already owned by BLM and CDFW and other lands in conservation ownership. Preserved sites outside the Pine Hill Preserve units will not be described individually here, however one of these, the Kanaka Valley area, is indicated on Figure 1. This acquisition, completed in 2010, has a significant conservation value as it is relatively large at nearly 1,500 ac. and provides a key connection between the Salmon Falls and Martel Creek units.

According to the U.S. Census Bureau, El Dorado County has grown from 146,863 residents in 1996 (time of listing) to 188,399 people in 2018, a growth of over 28% (California Department of Finance 2018). In spite of this growth in population, further urban development within gabbro habitat has decreased considerably and fragmentation of habitat has stabilized, at least in and around the Pine Hill Preserve units. As described further under Recovery Criteria, roughly 1,619 ha (4,000 ac) in western El Dorado County, including considerable acreage of suitable habitat, has been acquired into conservation ownership since the time of listing to protect habitat for these five species, in addition to other rare species. In these areas, the habitat has been, and will continue to be, protected from further destruction and modification, and ultimately will be managed for the recovery of the species.

BLM lands

In Yuba County, BLM is in the process of possibly selling two properties to the county which would likely result in impaired management capability and possible habitat loss and/or fragmentation for Layne's butterweed. These sites are the Yuba County landfill and Brownsville Park (B. Brenneman, *in litt.* 2018b).

National Forest lands

In 2016, Layne's butterweed was impacted by fire and fire suppression activities during the Trailhead fire on the Eldorado National Forest. The burn was low intensity and patchy. Monitoring inconsistencies between 2016 and 2018 makes it difficult to gauge if the slight decline in observed plants is reflective of an unfavorable response to fire by the plants (USFS, *in litt.* 2018).

The population of Layne's butterweed at Sugarpine Reservoir (not included to date in CNDDDB) is impacted by erosion because there is a recreational trail that runs through the sloped hillside where the population resides (C. Rowe, *in litt.* 2018). In addition, although not currently impacting the population, the area immediately downslope is proposed for inundation related to reservoir management and areas to the east and west are part of a timber sale unit (C. Rowe, *in litt.* 2018). The nearby population at Michigan Bluff was noted in 2018 to be threatened by active timber harvest and mining activities; however, further details about the effects of these activities on the species are not known (C. Rowe, *in litt.* 2018).

In general, Factor A threats are still present at some level for all five species, although development threats have been reduced at the Pine Hill Preserve. Threats from fire suppression activities, off road vehicle use, and mining activities affect Layne's butterweed on Tahoe and Eldorado National Forests.

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The overutilization of these species for commercial, recreational, scientific, or educational purposes was not believed to be a major threat to the species at the time of listing nor is it thought to be a threat now.

FACTOR C: Disease or Predation

In the listing rule, wilt disease is listed as a *potential* threat to Pine Hill flannelbush; however, it has not been observed in wild plants. Disease was not listed as a threat to any of the other taxa. Predation was listed as a threat for Pine Hill flannelbush because significant pre-dispersal predation by insects and post-dispersal predation by rodents has been observed. Overgrazing was listed as a predation threat to Stebbins' morning-glory, El Dorado bedstraw, and Layne's butterweed.

Currently, disease is not known to be a problem to any of the taxa. Although predation is a natural part of the system, it still presents a concern for Pine Hill flannelbush populations which are already experiencing a reduction in range and number of plants. Herbivory by insects and rodents continues to negatively affect flannelbush populations by preventing them from increasing in size. Additional studies regarding the effects of predation on the Pine Hill flannelbush have not been conducted since the time of listing.

Currently, overgrazing of Stebbins' morning-glory, El Dorado bedstraw, and Layne's butterweed on rural residential lots, as described in the listing rule, is not occurring. Several occurrences of Layne's butterweed in Tuolumne County are on lands with grazing allotments; however, local botanists do not currently indicate that grazing is negatively impacting the rare plants. At one site, a fire created an opening for cattle to access the habitat; however, BLM staff coordinated with the rancher who subsequently closed the gate to arrest what were ultimately minor grazing impacts (B. Brenneman, *in litt.* 2018b).

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

The State's authority to conserve rare wildlife and plants is comprised of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, the California Environmental Quality Act, and the Natural Community Conservation Planning Act.

California Endangered Species Act and Native Plant Protection Act: The California Endangered Species Act (CESA) (California Fish and Game Code, section 2080 *et seq.*) prohibits the unauthorized take of State-listed threatened or endangered species. The Native Plant Protection Act (NPPA) (Division 2, Chapter 10, section 1908) prohibits the unauthorized take of State-listed rare or endangered plant species. CESA requires State agencies to consult with CDFW on activities that may affect a State-listed species and mitigate for any adverse impacts to the species or its habitat. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities. As the only species listed by the state as endangered or threatened, Stebbins' morning-glory would be the only species protected by CESA; however, all five species would be covered by NPPA.

Furthermore, with regard to prohibitions of unauthorized take under NPPA, landowners are exempt from this prohibition for plants to be taken in the process of habitat modification. Where landowners have been notified by the State that a rare or endangered plant is growing on their land, the landowners are required to notify CDFW 10 days in advance of changing land use in order to allow salvage of listed plants. Since none of these five species has undergone introductions in the wild, it is unknown how successful transplanting of any of them would be should they need to be salvaged.

California Environmental Quality Act: The California Environmental Quality Act (CEQA) requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

Natural Community Conservation Planning Act: The Natural Community Conservation Program is a cooperative effort to protect regional habitats and species. The program helps identify and provide for area wide protection of plants, animals, and their habitats while allowing compatible and appropriate economic activity. Many Natural Community Conservation Plans are developed in conjunction with Habitat Conservation Plans (HCPs), which are prepared pursuant to the Federal Endangered Species Act.

Federal Protections

National Environmental Policy Act: The National Environmental Policy Act (NEPA) (42 U.S.C. 4371 *et seq.*) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects (40 C.F.R. 1502.16). The proposed mitigation alternatives usually provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Endangered Species Act: The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) is the primary Federal law providing protection for these species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects on these species under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 CFR 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect,

or to attempt to engage in any such conduct.” Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 CFR 402.02). For projects without a Federal nexus that would likely result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved HCP that details measures to minimize and mitigate the project’s adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species, and many of these HCPs are coordinated with CDFW’s Natural Community Conservation Planning program.

With regard to federally listed plant species, section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed plant species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally endangered wildlife; however, the take prohibition does not apply to plants. Instead, plants are protected from harm in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e., collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting, digging, damage, or destruction of endangered plants on any other area in knowing violation of a state law or regulation or in the course of any violation of a state criminal trespass law. Federally listed plants may be incidentally protected if they co-occur with federally listed wildlife species.

National Forest Management Act: The National Forest Management Act of 1976 (36 C.F.R. 219.20(b)(i)) (NFMA) has required the USDA Forest Service to incorporate standards and guidelines into Land and Resource Management Plans, including provisions to support and manage plant and animal communities for diversity and for the long-term, range-wide viability of native species. On April 9, 2012, the Forest Service revised their National Forest land management planning rule under NFMA (77 FR 21162), which was subsequently amended on December 15, 2016 (81 FR 90723). The newly amended planning rule provides a three phase framework for each National Forest to follow when developing Land and Resource Management Plans for their lands. The three phases include: 1) the assessment of conditions and stressors; 2) the development, amendment, or revision of land management plans; and 3) a monitoring phase to determine if desired outcomes are being met. The monitoring phase will help evaluate the effectiveness of the plan and will facilitate adaptive management, which is integral to the new planning rule. Several populations of Layne’s butterfly exist on National Forest lands in Placer and El Dorado Counties; however, the National Forests where the species occurs have not begun revising their management plans utilizing the newly amended planning rule, and therefore, the impact of any revisions of those plans on Layne’s butterfly is unknown at this time.

Federal Land Policy and Management Act: The Bureau of Land Management is required to incorporate Federal, State, and local input into their management decisions through Federal law. The Federal Land Policy and Management Act of 1976 (FLPMA) (Public Law 94-579, 43 U.S.C.

1701) was written “to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes.” Section 102(f) of the FLPMA states that “the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures ... to give Federal, State, and local governments, and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands.” Therefore, through management plans, the Bureau of Land Management is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall “give priority to the designation and protection of areas of critical environmental concern” in the development of plans for public lands. Although the Bureau of Land Management has a multiple-use mandate under the FLPMA which allows for grazing, mining, and off-road vehicle use, the Bureau of Land Management also has the ability under the FLPMA to establish and implement special management areas such as Areas of Critical Environmental Concern, wilderness, research areas, etc., that can reduce or eliminate actions that adversely affect species of concern (including listed species). Populations of Stebbins’ morning-glory and Layne’s butterweed exist on BLM lands in Yuba, Nevada, El Dorado, and Tuolumne Counties.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

At the time of listing, these species were threatened by a combination of alteration of the natural fire regime, invasive species competition, herbicide spraying, trash dumping, and overshadowing by native trees and shrubs (vegetative succession). Alteration of the natural fire regime includes fires that occur too frequently, which kill recently germinated plants before they can contribute to the seedbank, and fires that do not occur frequently enough, which fail to provide for seed scarification and the creation of regeneration niches free of shading.

Alteration of the natural fire regime at most sites continues to present Factor E threats, primarily by advancing vegetative succession. Though much habitat now lies in conservation ownership by BLM or CDFW, management of these lands for the benefit of the species has presented unique challenges due to fire suppression policies. In some areas, near urban development, even controlled burns may not be possible. In these areas, the prudence of mechanical disturbance (*e.g.*, mastication) must be considered as an alternative and, as with fire, this can result in loss of mature plants. While this management technique provides for creation of regeneration niches for Stebbins’ morning-glory, El Dorado bedstraw, and Layne’s butterweed, and may provide some scarification benefit, it does not provide the seed germination trigger that fire offers. In areas where controlled burns *are* a management option, creation of fire breaks in order to protect nearby developments and infrastructure for those burns, if not done carefully, can directly destroy the listed taxa and its habitat.

Invasive plants continue to present a minor threat to gabbro plant species. Populations within the Pine Hill Preserve are not significantly threatened by invasive plants and any small infestations identified are largely reduced or eliminated by mechanical means (BLM 2008). However, a population of Layne’s butterweed at BLM’s Red Hills Kanaka Point property in Tuolumne County is threatened by yellow starthistle (*Centaurea solstitialis*) and distaff thistle (*Carthamus lanatus*) (B. Brenneman, *in litt.* 2018b).

A portion of a population of Layne’s butterweed on the Eldorado National Forest (Traverse Creek,

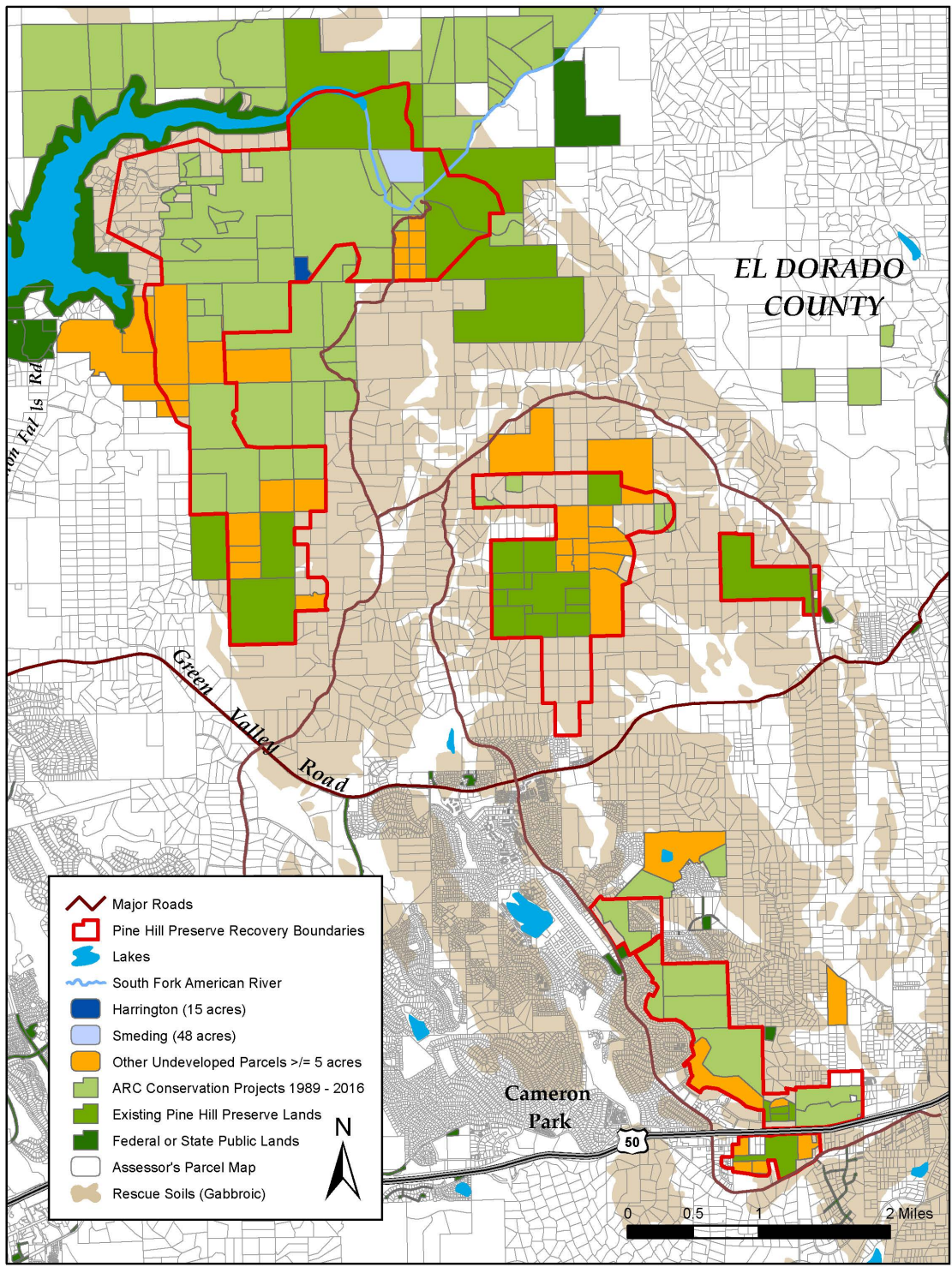
CNDDDB occurrence #14) is now free of the effects of herbicide spraying, as the Department of Transportation has halted spraying along Bear Creek Road, eliminating the risk of accidental spraying of the listed species which grows along the road cut (USFS, *in litt.* 2018). Nothing more is known about changes in the threat of herbicide spraying at any of the gabbro species occurrences since listing. The status of the threat presented by trash dumping at any of the occurrences since listing is also not known.

Whereas at the time of listing, the primary threat was impending development pressure, the primary overall threat at this point in time is encroachment of native vegetation due to succession, even on lands in conservation ownership, in the absence of the natural fire regime. The long fire return interval due to fire suppression is preventing the formation of necessary clearings for Stebbins' morning-glory, El Dorado bedstraw, and Layne's butterweed establishment and possibly the scarification of seeds needed for their germination.

III. RECOVERY CRITERIA

The Service issued the final recovery plan for Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed on August 30, 2002. The recovery plan provides guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust enough, to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

The recovery criteria identified in the Service's 2002 recovery plan included a prescription for the size and location of recommended preserve units within the Pine Hill formation, as well as a table of more-specific recovery criteria, organized by category. As noted above, large strides have been made toward the identification and protection of preserve units since the time of listing. Specifically, El Dorado County, El Dorado Irrigation District, National Fish and Wildlife Foundation, American River Conservancy, and federal and state partners have collectively conserved an additional 1,000 ha (2,471 ac), spanning at least 22 properties, within the Pine Hill Preserve. The protection of this land builds upon the existing protected BLM and CDFW lands within the Pine Hill Preserve (A. Ehrgott, *in litt.* 2018); however, the preserve is still short by roughly 314 ha (776 ac) of the preserve size of 2,023 ha (5,000 ac) recommended in the recovery plan. See **Figure 3** for a visual depiction of conserved lands to date and **Table 2** for a comparison of acreage recommended in the recovery plan and acreage attained to date. As described above, although significant acreage has been acquired, much progress remains to be made in terms of management of preserved lands.



 American River Conservancy
October 2018

Pine Hill Preserve

Figure 3. Current extent of protected lands within the Pine Hill Preserve units.

Table 2. Acreage preserved at the Pine Hill Preserve to date, compared to that recommended in the 2002 recovery plan (Service 2002; G. Hinshaw pers. comm. 2018).

Unit	FWS 2002 RP Recommendation	Currently protected area	Acreage needed to meet goal
Salmon Falls/Martel Creek	1,247 ha (3,082 ac)	1,260 ha (3,114 ac)	0
Pine Hill	395 ha (975 ac)	163 ha (404 ac)	232 ha (571 ac)
Penny Lane	67 ha (166 ac)	67 ha (166 ac)	0
Cameron Park	291 ha (718 ac)	219 ha (540 ac)	72 ha (178 ac)
Specialty El Dorado bedstraw Preserve	24 ha (60 ac)	0	24 ha (60 ac)
Total	2,024 ha (5,001 ac)	1,709 ha (4,224 ac)	315 ha (778 ac)

Note: Due to rounding error, numbers may not be exact.

Table 3 indicates whether each of the other criteria from the recovery plan have been attained and whether they are still relevant to each species' recovery. At the time that the recovery plan was developed, there was not sufficient information available with which to develop delisting criteria for Pine Hill flannelbush and El Dorado bedstraw. Those criteria are currently in development, so **Table 3**, below, does not include them.

As indicated in **Table 3**, most of the criteria for each species have not yet been achieved. Acquisition and protection of habitat within the Pine Hill Preserve, as noted above in **Table 2**, is roughly 315 ha (778 ac) from being achieved. In general, BLM and CDFW have prepared management plans for habitat within their preserves; however, many populations exist on land not owned by these agencies or are in private ownership and so do not have management plans. In addition, management at protected sites is lagging behind the acquisition of those lands as discussed under Factor E. Monitoring criteria have not yet been achieved for any of the species because not enough time has passed (at least one complete fire cycle) indicating stable or increasing numbers. Some research-based criteria have been met, particularly in terms of genetic and fire ecology research (Pine Hill ceanothus, Pine Hill flannelbush, and Layne's butterweed), and sufficient seed has been banked with at least two CPC-certified seed collection facilities for Stebbins' morning-glory, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed. However, reintroductions recommended for Pine Hill flannelbush and El Dorado bedstraw have not been conducted.

One of the criteria from the recovery plan, as reflected in **Table 3** and in more detail in **Table 4**, is the maintenance of a specific metapopulation dynamic for each species. In order to be downlisted or delisted, each species must have a certain number of small, medium, large, and very large populations, with size based not upon the number of individual plants but upon the area of a polygon circumscribing the extant plants. When measured against these criteria, none of the species, whether at Pine Hill Preserve or outside of it, meets the metapopulation dynamic target yet. Layne's butterweed has met the targets in Tuolumne and Yuba Counties, but still needs to have many more small populations established at the Pine Hill Preserve and in areas of El Dorado County outside the preserve to meet this criterion. Most of the El Dorado County populations of Layne's butterweed outside of the Pine Hill preserve lands that have been reported to CNDDDB are in private ownership so their status is unknown. As stated above, we use the term *population* here to refer to any grouping of plants which is separated from the next grouping by at least 0.25 mi (0.4 km).

Table 3. Existing Downlisting and Delisting Criteria for the five listed plant species from the Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
Stebbins' morning-glory (Downlist)	Cameron Park preserve north of Highway 50 Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	For all populations recommended for protection and any adjacent areas identified as necessary for continued survival and recovery Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Populations stable or increasing over one fire cycle (about 30 yrs; subject to modification depending on results of fire mgmt. studies) Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Ameliorate or eliminate threats Downlisting criteria achieved? No Downlisting criteria still relevant? Yes
	Cameron Park preserve south of Highway 50 Downlisting criteria achieved? No Downlisting criteria still relevant? Yes		Habitat monitoring shows a mosaic of multi age-class stands and habitat fragmentation has not appreciably increased (less than 5 percent) within any preserve over 2000 levels. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Conduct fire management studies; conduct demographic studies to determine limiting life stages Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes
	Salmon Falls/Martel Crk preserve Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes		Spatially and temporally, the establishment of occurrences must be greater than the extirpation of occurrences Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Conduct research on genetics of Nevada Co population Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes
	Occurrences in Nevada Co. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes			Store seeds of disjunct populations in at least two Center for Plant Conservation certified facilities Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes Conduct research on propagation techniques if repatriation, enhancement, or restoration are determined to be necessary Downlisting criteria achieved? No Downlisting criteria still relevant? Yes

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
				Maintain metapopulation dynamics of at least 2 very large, 7 medium, and 4 small occurrences throughout the northern and southern Pine Hill formation; and of at least 1 medium and 5 small occurrences near Grass Valley in Nevada Co. ¹ Downlisting criteria achieved? No, See Table 4 Downlisting criteria still relevant? Yes
Stebbins' morning-glory (Delist; all criteria met above, plus)			No population decline after downlisting during two additional fire cycles (about 60 yrs); if declining, determine cause and reverse trend Delisting criteria achieved? No Delisting criteria still relevant? Yes	
Pine Hill ceanothus (Downlist)	Cameron Park preserve north of Highway 50 Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	For preserves and any adjacent occupied or unoccupied habitat identified as necessary for continued survival and recovery Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Populations stable or increasing over one fire cycle (about 30 yrs; subject to modification depending on results of fire mgmt. studies) Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Ameliorate or eliminate threats Downlisting criteria achieved? No Downlisting criteria still relevant? Yes
	Cameron Park preserve south of Highway 50 Downlisting criteria achieved? No Downlisting criteria still relevant? Yes		Habitat monitoring shows a mosaic of multi age-class stands and habitat fragmentation has not appreciably increased (less than 5 percent) within any preserve over 2000 levels. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Conduct fire management studies; conduct demographic studies to determine limiting life stages; conduct systematics and genetics research Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes
	Pine Hill preserve Downlisting criteria achieved? No Downlisting criteria still relevant? Yes		Spatially and temporally, the establishment of occurrences must be greater than the extirpation of occurrences Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Conduct research on propagation techniques if repatriation, enhancement, or restoration are determined as necessary Downlisting criteria achieved? No Downlisting criteria still relevant? Yes

¹ Size of Stebbins' morning-glory population is related to size of the habitat patch, per the recovery plan as such: small= <10 ac (<4 ha), medium= 10-100 ac (4-40 ha), and very large= >315 ac (>127 ha).

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
	Salmon Falls/Martel Crk preserve Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes			Maintain metapopulation dynamics of at least 2 very large, 2 large, 6 medium, and 7 small occurrences throughout the range of the species ² Downlisting criteria achieved? No, See Table 4. Downlisting criteria still relevant? Yes
Pine Hill ceanothus (Delist; all criteria met above, plus)			No population decline after downlisting during two additional fire cycles (about 60 yrs); if declining, determine cause and reverse trend Delisting criteria achieved? No Delisting criteria still relevant? Yes	
Pine Hill flannelbush (Downlist)	Pine Hill preserve Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	For all sites and any adjacent occupied or unoccupied habitat identified as necessary for continued survival. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Stable or increasing over 60 yrs (two fire cycles or longer if suggested by results of demographic monitoring). Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Ameliorate or eliminate threats Downlisting criteria achieved? No Downlisting criteria still relevant? Yes
	The decumbent flannelbush within Nevada and Yuba Counties should be secured and protected unless determined not to be the listed flannelbush. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes		Habitat monitoring of recommended preserves shows a mosaic of multi age class stands and habitat fragmentation has not appreciably increased (less than 5 percent) within any preserves over current (2000) conditions. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Conduct fire management studies; conduct demographic studies to determine limiting life stages of Nevada/Yuba Co flannelbush; conduct genetic studies to determine identification of Nevada/Yuba Co flannelbush. Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes
	Salmon Falls/Martel Crk preserve Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes		Spatially and temporally, the establishment of occurrences must continue to be greater than the extirpation of occurrences. Downlisting criteria achieved? No Downlisting criteria still relevant? Yes	Store seeds in at least two Center for Plant Conservation-certified facilities Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes

² Size of Pine Hill ceanothus population is related to size of the habitat patch, per the recovery plan as such: small= <10 ac (<4 ha), medium= 10-100 ac (4-40 ha), large= 101-200 ac (41-81 ha), and very large= > 200 ac (>81 ha).

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
				<p>Conduct research on seed germination and propagation techniques</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Conduct successful introduction onto Salmon Falls/Martel Creek preserve</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Maintain metapopulation dynamics of at least 1 very large, 3 medium, and 4 small occurrences on the Pine Hill formation³</p> <p>Downlisting criteria achieved? No, See Table 4 Downlisting criteria still relevant? Yes</p>
El Dorado bedstraw (Downlist)	<p>Pine Hill preserve</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Salmon Falls/Martel Crk preserve</p> <p>Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes</p> <p>Cameron Park preserve north of Highway 50</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p>	<p>For all populations and any occupied or unoccupied habitat identified as necessary for survival</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p>	<p>Stable or increasing with evidence of natural recruitment for a period of 60 yrs (two fire cycles or longer if suggested by results of demographic monitoring).</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Habitat monitoring of recommended preserves shows a mosaic of multi age class stands and habitat fragmentation has not appreciably increased (less than five percent) over current (2000) conditions.</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Spatially and temporally, the establishment of occurrences must continue to be greater than the extirpation of occurrences.</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p>	<p>Ameliorate or eliminate threats</p> <p>Downlisting criteria achieved? No Downlisting criteria still relevant? Yes</p> <p>Conduct ecological studies into reproductive biology, genetics and limiting life stages</p> <p>Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes</p> <p>Store seeds in at least two Center for Plant Conservation-certified facilities</p> <p>Downlisting criteria achieved? Yes Downlisting criteria still relevant? Yes</p>

³ Size of Pine Hill flannelbush population is related to size of the habitat patch, per the recovery plan as such: small= <10 ac (<4 ha), medium= 10-100 ac (4-40 ha), and very large= > 320 ac (>129 ha).

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
	Specialty El Dorado bedstraw preserve Downlisting criteria achieved? No Downlisting criteria still relevant? Yes			Conduct research on seed germination and propagation techniques Downlisting criteria achieved? No Downlisting criteria still relevant? Yes Study effects of fire Downlisting criteria achieved? No Downlisting criteria still relevant? Yes Conduct successful enhancement, repatriation, or introduction at Salmon Falls/Martel Creek Downlisting criteria achieved? No Downlisting criteria still relevant? Yes Maintain metapopulation dynamics of at least 1 large, 6 medium and 5 small occurrences at any given time throughout the range of the species Downlisting criteria achieved? No, See Table 4 Downlisting criteria still relevant? Yes
Layne's butterweed (Delist)	Cameron Park preserve north of Highway 50 Delisting criteria achieved? No Delisting criteria still relevant? Yes Cameron Park preserve south of Highway 50 Delisting criteria achieved? No Delisting criteria still relevant? Yes	For all populations and any occupied or unoccupied habitat identified as necessary for survival Delisting criteria achieved? No Delisting criteria still relevant? Yes	Stable or increasing with evidence of natural recruitment for a period of 60 yrs that includes normal disturbance Delisting criteria achieved? No Delisting criteria still relevant? Yes Habitat monitoring of recommended preserves shows a mosaic of multi age class stands and habitat fragmentation has not appreciably increased (less than five percent) over current (2000) conditions. Delisting criteria achieved? No Delisting criteria still relevant? Yes	Ameliorate or eliminate threats Delisting criteria achieved? No Delisting criteria still relevant? Yes Study importance of fire for management; study reproductive biology as it relates to pollinators; conduct genetic studies and determine limiting life stages; study effects of grazing Delisting criteria achieved? Yes Delisting criteria still relevant? Yes

Species	I. Secure and protect specified recovery areas from incompatible uses (along with sufficient adjacent unoccupied habitat for fire management and a 150 m (500 ft) buffer; Factor A; See Table 2 for acreage of preserves)	II. Management Plans approved and implemented for recovery areas, including survival and recovery of the species as the objective (Factors A, C, E)	III. Monitoring in all recommended preserves shows: (Factor E)	IV. Other actions (See also Individual Considerations section III.B.3 in recovery plan; Factor A, E)
	Pine Hill preserve* Delisting criteria achieved? No Delisting criteria still relevant? Yes		Spatially and temporally, the establishment of occurrences must continue to be greater than the extirpation of occurrences. Delisting criteria achieved? Yes Delisting criteria still relevant? Yes	Store seeds of disjunct populations in at least two Center for Plant Conservation certified facilities Delisting criteria achieved? Yes Delisting criteria still relevant? Yes
	Penny Lane preserve Delisting criteria achieved? Yes Delisting criteria still relevant? Yes			Maintain population dynamics of at least 1 very large, 1 large, 7 medium, and 24 small occurrences throughout the Pine Hill formation; of at least 1 large, 2 medium, and 5 small occurrences in western El Dorado Co; of at least 2 medium and 4 small occurrences in Tuolumne Co; and of at least 2 small occurrences in Yuba Co. ⁴ Delisting criteria achieved? No, See Table 4 Delisting criteria still relevant? Yes
	Salmon Falls/Martel Crk preserve Delisting criteria achieved? Yes Delisting criteria still relevant? Yes			
	Occupied habitat on BLM lands in Yuba and Tuolumne Co. Delisting criteria achieved? Yes Delisting criteria still relevant? Yes			
	Occupied habitat on the Eldorado National Forest Delisting criteria achieved? Yes Delisting criteria still relevant? Yes			

⁴ Size of Layne's butterweed population is related to size of the habitat patch, per the recovery plan as such: small= <10 ac (<4 ha), medium= 10-100 ac (4-40 ha), large= 101-200 ac (41-81 ha), and very large= > 200 ac (>81 ha).

Table 4. Recommended and current population size class distribution across sub-regions of each species' range

Sub-region	Small populations		Medium populations		Large populations		Very large populations	
	Recommended in RP	Extant	Recommended in RP	Extant	Recommended in RP	Extant	Recommended in RP	Extant
Stebbins' morning-glory								
El Dorado Co	4	0	7	4	0	0	2	1
Nevada Co	5	2	1	0	0	0	0	0
Pine Hill ceanothus								
El Dorado Co	7	0	6	0	2	2	2	2
Pine Hill flannelbush								
El Dorado Co	4	1	3	1	0	0	1	0
El Dorado bedstraw								
El Dorado Co	5	4	6	4	1	0	0	0
Layne's butterweed								
Yuba Co	2	2	0	0	0	0	0	0
Placer Co	0	0	0	2	0	0	0	0
El Dorado Co	24	4	7	6	1	1	1	1
El Dorado Co (outside Pine Hill Preserve)	5	0	2	2	1	0	0	0
Tuolumne Co	4	4	2	4	0	0	0	0

(B. Brenneman *in litt.* 2018; G. Hinshaw pers. comm. 2018; C. Rowe, *in litt.* 2018; Brown, *in litt.* 2018)
See footnotes for Table 3, above, for population size definitions.

IV. SYNTHESIS

Since the time of listing, the status of Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, El Dorado bedstraw, and Layne's butterweed have not changed substantially in terms of abundance and distribution. However, with the completion of various land protection efforts in recent decades, all five species have an increased level of protection from development threats compared to the time of listing. The Pine Hill Preserve has reached 80% of the size recommended in the recovery plan, which bodes well for the cessation of habitat fragmentation and for future management of the habitat for the benefit of the species in this area of El Dorado County.

Metapopulation targets have not been met for any of the five species, nor has sufficient time passed (one fire cycle for downlisting or two fire cycles for delisting) with populations of each species at stable or increasing levels.

Initially minor threats from herbicide spraying, grazing, and trash dumping are now essentially ameliorated, leaving only threats associated with vegetative succession (overshading, fire break/road construction necessary for controlled burns) and occasional development which threatens to further remove and/or fragment habitat. Focus continues to be on management of the habitat to balance the nuanced fire/disturbance return interval and microhabitat needs of the species.

Due to their limited distribution, current status, and the level of threats currently acting on these plants, we believe that Stebbins' morning-glory, Pine Hill ceanothus, Pine Hill flannelbush, and El Dorado bedstraw remain in danger of extinction in the foreseeable future and should remain classified as endangered. Layne's butterweed, with its slightly less restricted distribution, more robust current status, and present but reduced level of current threats, should remain classified as threatened.

V. RESULTS

Recommended Listing Action:

Stebbins' morning-glory

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reason for delisting according to 50 CFR 424.11):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No Change

Pine Hill ceanothus

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reason for delisting according to 50 CFR 424.11):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No Change

Pine Hill flannelbush

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reason for delisting according to 50 CFR 424.11):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No Change

El Dorado bedstraw

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reason for delisting according to 50 CFR 424.11):
 - Extinction*
 - Recovery*

Original data for classification in error
 No Change

Layne's butterweed

Uplist to Endangered
 Delist (indicate reason for delisting according to 50 CFR 424.11):
 Extinction
 Recovery
 Original data for classification in error
 No Change

New Recovery Priority Number and Brief Rationale:

At the time of initiating this five-year review, the recovery priority number for Stebbins' morning-glory, Pine Hill ceanothus, and Layne's butterweed was 5C and the recovery priority number for Pine Hill flannelbush and El Dorado bedstraw was 6C. We are not recommending a change in any of the recovery priority numbers.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

- 1) Dedicate more resources toward the investigation of best management approaches for the Pine Hill listed plant species, even at the cost of a temporary hiatus in land acquisition efforts. Investigation should be made into fire-related and non-fire related methods of disturbance to maintain listed plant species habitat.
- 2) Once the best management strategy (in terms of technique, frequency, timing, and intensity) is determined at each site, implement these management practices to achieve and maintain a habitat mosaic that enables the attainment of recovery criteria for each species.
- 3) Conduct conclusive genetic research to determine a) whether flannelbush in Yuba and Nevada Counties are truly Pine Hill flannelbush and b) whether Pine Hill flannelbush should be treated as a species (as *Fremontodendron decumbens*).
- 4) Should flannelbush of Yuba and Nevada Counties be determined to be Pine Hill flannelbush, action should be taken immediately to bring those lands under conservation ownership and management.

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW**

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

Stebbins' morning-glory:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Pine Hill ceanothus:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Pine Hill flannelbush:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

El Dorado bedstraw:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

Layne's butterweed:

- Uplist to Endangered
- Delist
- No change needed

Review Conducted By: SFWO Staff

FIELD OFFICE APPROVAL:

Lead Field Supervisor, U.S. Fish and Wildlife Service

Approve  Date 5/2/2019

Appendix A

Known extant and extirpated occurrences of federally listed gabbro soil plants

CNDDDB Occurrence Number	County	Status/Trend	Year Last Observed (# individuals observed)	New Occurrence Since Listing
<i>Stebbins' morning-glory</i>				
2	El Dorado	Presumed Extant	2013 (NA)	-
1	El Dorado	Declining	2016 (1)	-
18	Nevada	Presumed Extant	2012 (NA)	-
22	Nevada	Presumed Extant	2015 (21+)	-
7	El Dorado	Possibly Extirpated	1971 (NA)	-
4	El Dorado	Extirpated	1997 (1)	-
6	El Dorado	Stable	2007 (150)	-
21	Nevada	Possibly Extirpated	1991 (22)	-
26	El Dorado	Presumed Extant	1997 (15)	X
25	Nevada	Presumed Extant	2008 (2)	X
20	Nevada	Possibly Extirpated	1991 (1)	-
28	Nevada	Presumed Extant	2013 (10)	X
13	El Dorado	Presumed Extant	2007 (NA)	-
27	Nevada	Presumed Extant	2013 (10)	X
24	El Dorado	Stable	2006 (60)	-
<i>Pine Hill ceanothus</i>				
1	El Dorado	Increasing	2011 (2,300+)	-
5	El Dorado	Declining	2011 (7)	-
4	El Dorado	Presumed Extant	2011 (NA)	-
23	El Dorado	Presumed Extant	1993 (NA)	-
14	El Dorado	Presumed Extant	1992 (NA)	-
10	El Dorado	Presumed Extant	2009 (10+)	-
19	El Dorado	Presumed Extant	2009 (500+)	-
20	El Dorado	Presumed Extant	1986 (NA)	-
<i>Pine Hill flannelbush</i>				
1	El Dorado	Presumed Extant	2017 (40+)	-
2	El Dorado	Stable	2011 (22)	-
13*	Nevada	Presumed Extant	2016 (NA)	X
8*	Yuba	Presumed Extant	1997 (NA)	-
9*	Yuba	Presumed Extant	1984 (4)	-
4	El Dorado	Stable	2015 (6)	-
6	El Dorado	Presumed Extant	1986 (NA)	-
15*	Nevada	Presumed Extant	2004 (3)	X
12	El Dorado	Presumed Extant	1986 (NA)	-
5	El Dorado	Presumed Extant	1986 (NA)	-
11	El Dorado	Presumed Extant	1986 (NA)	-
14*	Nevada	Presumed Extant	2009 (100)	X
<i>El Dorado bedstraw</i>				
1	El Dorado	Presumed Extant	NA	-
4	El Dorado	Presumed Extant	1958 (NA)	-
2	El Dorado	Presumed Extant	2005 (NA)	-
5	El Dorado	Presumed Extant	1994 (1000)	-
9	El Dorado	Presumed Extant	1992 (NA)	-

14	El Dorado	Presumed Extant	2005 (2,221)	X
7	El Dorado	Presumed Extant	2000 (20,000)	-
12	El Dorado	Presumed Extant	1994 (135)	-
8	El Dorado	Presumed Extant	1990 (50)	-
3	El Dorado	Presumed Extant	2006 (200-300)	X
17	El Dorado	Presumed Extant	2005 (NA)	X
13	El Dorado	Presumed Extant	2006 (200+)	X
15	El Dorado	Presumed Extant	2007(134)	X
16	El Dorado	Presumed Extant	2007 (50)	X
10	El Dorado	Presumed Extant	2008 (81)	-
11	El Dorado	Presumed Extant	2003 (6)	X
<i>Layne's butterweed</i>				
2	El Dorado	Declining	2015 (2)	-
48	El Dorado	Presumed Extant	1962 (NA)	-
13	El Dorado	Increasing	2016 (1,600)	-
1	El Dorado	Declining	2017 (25+)	-
27	El Dorado	Presumed Extant	1984 (50)	-
3	El Dorado	Presumed Extant	1980 (NA)	-
15	El Dorado	Possibly Extirpated	1978 (25)	-
18	El Dorado	Presumed Extant	2008 (1,280)	-
14	El Dorado	Presumed Extant	2016 (379)	-
38	El Dorado	Presumed Extant	2007 (80)	-
63	Placer	Stable	2018 (6,046)	X
40	Tuolumne	Presumed Extant	1987 (100+)	-
44	El Dorado	Stable	2017 (177- western polygon only)	X
4	El Dorado	Presumed Extant	2006 (80)	X
59	El Dorado	Presumed Extant	2013 (2,000+)	X
43	El Dorado	Presumed Extant	2007 (800- 3 NW colonies only)	-
42	El Dorado	Declining	2009 (36- south polygon only)	-
46	Tuolumne	Presumed Extant	2001 (28)	X
11	El Dorado	Presumed Extant	2011 (NA)	-
33	El Dorado	Possibly Extirpated	1986 (200)	-
49	Yuba	Presumed Extant	2011 (60)	X
29	El Dorado	Presumed Extant	1984 (NA)	-
58	El Dorado	Presumed Extant	2015 (10)	-
26	Tuolumne	Presumed Extant	2000 (150 at west colonies)	-
34	El Dorado	Presumed Extant	2007 (43)	-
61	El Dorado	Presumed Extant	2007 (300)	X
30	El Dorado	Presumed Extant	1993 (NA)	-
32	El Dorado	Presumed Extant	1984 (NA)	-
31	El Dorado	Presumed Extant	1984 (NA)	-
12	El Dorado	Possibly Extirpated	1980 (NA)	-
39	El Dorado	Presumed Extant	1986 (NA)	-
51	El Dorado	Presumed Extant	2007 (200- south polygon only)	X
16	El Dorado	Presumed Extant	1994 (50)	-
41	El Dorado	Presumed Extant	2007 (200+- north polygon only)	-
60	El Dorado	Presumed Extant	2007 (12)	X
45	Tuolumne	Presumed Extant	2018 (1,430)	X
50	Yuba	Presumed Extant	2018 (25)	X

24	Tuolumne	Presumed Extant	2012 (total 1,200 plants at occur. 24, 25, 26)	-
52	El Dorado	Presumed Extant	1994 (200)	-
66	El Dorado	Presumed Extant	2015 (744)	X
25	Tuolumne	Presumed Extant	1984 (NA)	-
65	El Dorado	Presumed Extant	2017 (NA)	X
47	El Dorado	Presumed Extant	2000 (120)	X
53	El Dorado	Presumed Extant	1994 (3)	-
62	El Dorado	Presumed Extant	2007 (10)	X
N/A (Sugarpine Reservoir)	Placer	Presumed Extant	2018 (2,728)	X

Source: CNDDDB 2018; B. Brenneman, *in litt.* 2018b (Yuba and Tuolumne County Layne's butterweed occurrences); C. Rowe, *in litt.* 2018 (Placer County Layne's butterweed occurrences).

* Though appearing here in CDNNB, as discussed above, these plants are not yet confirmed to be the listed Pine Hill flannelbush.