

Castilleja campestris ssp. *succulenta*
(Fleshy Owl's-Clover)

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



**U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Service
Sacramento, California**

September 2011

5-YEAR REVIEW

Castilleja campestris ssp. *succulenta* (Fleshy Owl's-Clover)

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 five 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:

Castilleja campestris ssp. *succulenta* is a species included within the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005) (*Recovery Plan*) and the following information is summarized from this document. Fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*), also known as succulent owl's-clover, is an annual herb in the snapdragon family (Scrophulariaceae). The species has rather intricate bright yellow flowers to white flowers that appear in May. The inflorescence may occupy as much as half of the plant's height and be 2.0 to 3.0 cm (0.8 to 1.2 inches) wide.

Like other members of *Castilleja* and related genera, it is hemiparasitic (deriving nutrients for plant growth through a combination of photosynthesis and parasitism on the roots of other plants). It occurs on the margins of vernal pools, swales and some seasonal wetlands. Given its relatively low stature, the species is never dominant and is typically found in only a few pools of a given vernal pool complex. The plant is known from both small and large pools (EIP Associates 1999, J. Stebbins *in litt.* 2000a). Although not all pools occupied by this taxon have been studied in detail, Stebbins et al. (1995) collected data on six occupied pools in Fresno and Madera Counties. Some were typical "bowl-like" pools, whereas others were more similar to swales.

Castilleja campestris ssp. *succulenta* have brittle leaves which are a key characteristic for identification. The most similar taxon is *C. campestris* ssp. *campestris* which has branched stems; thin, flexible, non-fleshy leaves and other physical characteristics that make it easy to tell

the two subspecies apart. Generally, *C. campestris* ssp. *campestris* occurs farther north than fleshy owl's-clover (Hoover 1937, Hoover 1968, Heckard 1977, California Department of Fish and Game (DFG) 1986), though it is noteworthy that the range of these two species overlaps in Stanislaus County.

Castilleja campestris ssp. *succulenta* is found primarily in vernal pools, and only in the lower rolling foothill areas of the eastern San Joaquin Valley in the Southern Sierra Foothills Vernal Pool Region (Service Recovery Plan 2005). Data from the DFG California Natural Diversity Data Base (July 2009 CNDDDB) contained 99 occurrences; nine of the 99 occurrences are extirpated. The CNDDDB defines an occurrence as a location or record for a site which contains an individual, population, nest site, den, or stand of a special status species. A single occurrence can contain multiple distinct sites (i.e., multiple interconnected pools within a single pool complex) where this species occurs. Generally, populations, individuals, or colonies located within a quarter mile of each other constitute a single occurrence (CNDDDB 2001). Over two-thirds (69%) of the occurrences of the *C. campestris* ssp. *succulenta* are located in Merced County. They are catalogued in association with rare plant and wildlife surveys of eastern Merced County grass and ranchlands conducted during 2001 by a team of consultants with funding from DFG and oversight by a multi-agency team to support the new UC Merced campus development (Vollmar 2002).

While *Castilleja campestris* ssp. *succulenta* appears to be associated with acidic soils, association with particular geologic surfaces or soils is less clear. The large majority of locations documented during the Merced County ranchland surveys were identified on three geologic surfaces: Laguna, North Merced Gravels, and Riverbank. This could be due to a preferred association with these landforms. Alternatively, it could be due to the higher densities of vernal pools on these surfaces as compared to other surfaces, and thus a greater abundance of sites providing potential habitat, or that the landform occupies a significantly higher proportion of the total survey area than other landforms (Vollmar 2002).

Methodology Used to Complete This Review:

This review was conducted by staff in the Sacramento Fish and Wildlife Office, Sacramento, California following the Region 8 guidance issued in March 2008. Information from the *Recovery Plan*, and documents generated as part of Sacramento Fish and Wildlife Office section 7 and section 10 consultations were used. Primary sources of information used to update the species status and threats sections of this review include personal communications with experts. We received no information from the public in response to our Federal Notice initiating this 5-year review.

This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all of this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next five years.

Contact Information:

Lead Regional Office: Larry Rabin, Deputy Division Chief for Listing, Recovery, and Environmental Contaminants, Pacific Southwest Region; (916) 414-6464.

Lead Field Office: Josh Hull, Recovery Division Chief, Sacramento Fish and Wildlife Office; (916) 414-6600.

Federal Register (FR) Notice Citation Announcing Initiation of This Review:

A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register (FR) on March 5, 2008. The Service announced the initiation of the 5-year review for *Castilleja campestris* ssp. *succulenta* and asked for information from the public regarding the species' status (73 FR 11945). No information from the public was received in response to this notice.

Listing History:

Original Listing

FR Notice: 62 FR 14338

Date of Final Listing Rule: March 26, 1997

Entity Listed: *Castilleja campestris* ssp. *succulenta*, a plant subspecies (listed as fleshy owl's-clover)

Classification: Threatened

State Listing

Date of Final Listing Rule: January 1990

Entity Listed: *Castilleja campestris* ssp. *succulenta* (listed as succulent owl's-clover)

Classification: Endangered

Associated Rulemakings:

At the time of listing, the designation of critical habitat for this species was deemed to not be a prudent action. However, on September 24, 2002, critical habitat was proposed for this species (67 FR 59884), and on August 6, 2003, the final rule to designate critical habitat for *Castilleja campestris* ssp. *succulenta* was published (68 FR 46684) and became effective on September 5, 2003 (Service 2003). The non-economic exclusions from the August 2003 final designation were confirmed in the Federal Register on March 8, 2005 (70 FR 11140). Administrative revisions were published on February 10, 2006 (71 FR 7118). Clarifications on the economic and non-economic exclusions for the final designation of critical habitat were published on May 31, 2007 (72 FR 30279). In summary, there are six overall critical habitat units dispersed throughout portions of seven counties (units 1, 2A, 2B, 3A, 3B, 4A-4C, 5A, 5B, 6A, 6B).

Review History: There have been no 5-year reviews conducted for this species since the time of listing.

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for *Castilleja campestris* ssp. *succulenta* is a 9 according to the Service's 2010 Recovery Data Call for the Sacramento Field Office, based on a 1-18 ranking system where a 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). This number indicates that the taxon is a subspecies that faces a moderate degree of threat and has a high potential for recovery.

Recovery Plan or Outline

Name of Plan or Outline: *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Recovery Plan)*

Date Issued: December 15, 2005

Dates of Previous Revisions: Not applicable.

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. Since the species under review is *Castilleja campestris* ssp. *succulenta*, 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

Castilleja campestris ssp. *succulenta* is an annual plant. As with many related species, it is a hemiparasite, as it obtains water and nutrients by forming root grafts with other host plants but it manufactures its own food through photosynthesis (Chuang and Heckard 1991). Many different plants can serve as hosts for this plant. Seeds of the *C. campestris* ssp. *succulenta* do not require the presence of a host to germinate, as they form root connections only after reaching a seedling stage.

The conditions necessary for seed germination have not been studied nor has the timing of seed germination been documented. Flowering occurs in April and May (Skinner and Pavlik 1994). The overall importance of pollinating insects is not known. Some aspects of *Castilleja campestris* ssp. *succulenta* biology suggest that it may be self-pollinating, but many species related to this taxa are pollinated by generalist bees (Superfamily Apoidea) (Chuang and Heckard 1991).

Insects may transfer some pollen among individual plants and species occurring in the same area. Self-pollinating species of *Castilleja* typically occur as widely scattered individuals, rather than dense colonies (Atsatt 1970). *Castilleja campestris* ssp. *succulenta* follows the former pattern; often occurring in many pools within a complex but with fewer than 100 plants per pool and is therefore not the dominant species. However, it also may occur in large populations within a single vernal pool (CNDDDB 2003). Little is known about the demography, although the population size can greatly fluctuate from year to year. In the few populations where population size was reported for more than one year, fluctuations of up to two orders of magnitude were noted (CNDDDB 2003).

Spatial Distribution

The *Castilleja campestris* ssp. *succulenta* is found primarily in vernal pools along the lower rolling foothill grasslands in the eastern San Joaquin Valley of the Southern Sierra Foothills Vernal Pool Region.

Historical distribution - The historical distribution between 1937 and 1986 was reported from 33 occurrences (Hoover 1937, 1968, CNDDDB 2005), all in the Southern Sierra Foothills Vernal Pool Region (Keeler-Wolf *et al.* 1998). Sixteen of those occurrences, including the type locality, were in eastern Merced County. Six occurrences each were in Fresno and Madera Counties and five others were in Stanislaus County (CNDDDB 2003).

Distribution at the time of listing - In March 1997, there were 36 extant occurrences of *Castilleja campestris* ssp. *succulenta* nearly half of which were threatened by one or more of the following: Urbanization; agricultural land conversion; discing; trampling; a flood control project; and a proposed highway expansion project. The occurrences were distributed in the San Joaquin Valley region in Merced, Fresno, Madera, Stanislaus, and San Joaquin Counties.

Current distribution - The CNDDDB July 2009 occurrence data contains 99 occurrences, nine of which are extirpated and 90 are presumed extant (Figure 1- CNDDDB Geographic Distributions). The three counties with the largest known occurrences, and their preserved lands, are described below.

Merced County - The majority of the 62 presumed extant occurrences, approximately 69%, occur in the eastern section of Merced County. There are 22 protected occurrences dispersed throughout the following properties.

- The Drayer Ranch Conservation Bank is protected by a conservation easement held by the San Joaquin Valley Conservancy. The Bank was approved by the Service in September 2005.
- As a result of impacts due to the development of U.C. Merced, there are five privately owned ranches and four parcels owned by U.C. Merced that are protected by conservation easements held by either The Nature Conservancy or the California Rangeland Trust (J. Schweitzer, Vollmar Consulting, pers. comm. 2009). The nine protected properties are comprised of 689 acres of suitable habitat for the *Castilleja campestris* ssp. *succulenta*.

- There are 12 protected occurrences which occur on various privately owned properties throughout the county.

Madera County – There are 12 known occurrences, or 13% of the total presumed extant occurrences, located in Madera County. The following known properties protect three out of the 12 total occurrences in the County. Another property, which will formally protect a fourth occurrence in the near future, is the Caltrans Madera Pools Mitigation Site. This site serves as compensation for impacts to the Caltrans’ Highway 41 project and title for this property is expected to be transferred to the DFG in the future which will include language for a conservation easement (V. Strohl, Caltrans, pers. comm. 2009)

- Two occurrences are on the Kennedy Table Mitigation Bank and are protected by a conservation easement held by the Sierra Foothill Conservancy. The Bank was approved by the Service in June 2004.
- A third protected occurrence is located on private land in the Millerton Lake area.

Fresno County – There are 11 occurrences, or 12% of the total presumed extant occurrences, located in the County. There are two protected occurrences on the Table Mountain range near Millerton Lake in Fresno County. This vast area also is known as “tabletop” mountain due this distinguishing topographic feature. The following occurrences on Table Mountain are noted below.

- An occurrence is found on a portion of Table Mountain that is owned by Sierra Foothill Conservancy. The Nature Conservancy holds the conservation easement.
- An occurrence is found on a portion of Table Mountain that is owned by the DFG and is protected by a conservation easement. The Sierra Foothill Conservancy cooperatively manages lands with the DFG. Formal survey data has not been collected but the population is extant (E. Cypher, DFG, pers. comm. 2009).
- An unprotected occurrence is located on a portion of Table Mountain that occurs partly on BLM land and partly on privately-owned land. Historically, the site was overgrazed which led the BLM to erect fences to exclude cattle with variable success (A. Franklin *in litt.* 1993). No conservation easement is known to exist that would protect this population.

Additional occurrences could be located on privately owned properties adjacent to or in close proximity to the portion of Table Mountain owned by DFG; however, no botanical surveys have been conducted due to limited staffing (A. Ferranti, DFG, pers. comm. 2009).

San Joaquin County – There is one occurrence in San Joaquin County located at the Angraves Nature Study area. This area is preserved within the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) area and under this Plan, full avoidance measures are mandatory for this plant (Service 2001). However, no formal conservation easement is known to exist that would protect this population.

Abundance

At the time of the listing in 1997, there were 36 extant occurrences of *Castilleja campestris* ssp. *succulenta* and currently there are 90 presumed extant occurrences. The increase in occurrences is most likely a result of an increased number of surveys. For example, the August 2002 Final Biological Opinion issued by the Service on the Proposed University of California, Merced Campus references that of the 25 new occurrences noted by botanists who had conducted surveys on properties which included the new campus and associated community planning areas, 10 occurrences are in areas proposed for development.

In April 2009, ICF Jones & Stokes resurveyed five extant CNDDDB occurrences located in Merced, Madera and Fresno counties. The purpose of the plant surveys was to comply with requirements of the San Joaquin Valley Habitat Conservation Plan (HCP) for Pacific Gas & Electric's routine operation and maintenance activities on their transmission lines and distribution systems. These occurrences may be resurveyed in the future since the term of the HCP permit is 30-years and maintenance activities most likely will be repeated. Two of these five occurrences surveyed did not support *Castilleja campestris* ssp. *succulenta* which may be the result of poor site conditions, low rainfall or agriculture activities (R. Preston, ICF, pers. comm. 2010).

In April 2008 and 2009, Live Oak Associates (LOA) resurveyed vernal pools at both the Drayer Ranch and Kennedy Table Mitigation Banks. A random sample of vernal pools was surveyed at each Bank. In April 2009, there were 17 pools surveyed at the Kennedy Table Mitigation Bank of which 14 pools supported *Castilleja campestris* ssp. *succulenta*. In April 2008, there were 33 pools sampled at the Drayer Ranch Bank of which 30 supported *C. campestris* ssp. *succulenta* (J. Gurule, LOA, pers. comm. 2009).

Habitat or Ecosystem

The information in this section is from the 2005 *Recovery Plan*. *Castilleja campestris* ssp. *succulenta* occurs in Northern claypan and Northern hardpan vernal pools (Sawyer and Keeler-Wolf 1995) within annual grassland communities (CNDDDB 2009). However, soil types have not been determined for all of the sites where *C. campestris* ssp. *succulenta* occurs. At one site in the Southeastern Sacramento Valley Vernal Pool Region, the soil is San Joaquin sandy loam. Soil series supporting *C. campestris* ssp. *succulenta* in the Southern Sierra Foothills Vernal Pool Region include Amador, Anderson, Corning, Fallbrook, Hideaway, Keyes, Pentz, Ramona, Redding, San Joaquin, Vista, and Yokohl, as well as the Pollasky-Montpellier complex. Soil textures at those sites range from extremely stony loam to loamy clay. At the U.C. Merced site and the surrounding community planning area, 81.4% of the individual pools where this taxon was found were on Redding gravelly loam, 9.5% were on Corning gravelly sandy loam, 6.4% were on Corning gravelly loam, 1.7% were on Keyes gravelly loam, 0.7% was on Keyes gravelly clay loam, and 0.3% was on Pentz loam (EIP Associates 1999).

New information since publication of the *Recovery Plan* adds to the data concerning soil types preferred by *Castilleja campestris* ssp. *succulenta*. Mr. Jeff Gurule, a plant ecologist who surveyed properties in the area during 2009-2010, stated the following: "Based on review of soil

types found at the Drayer Ranch Mitigation Bank in Merced County and Kennedy Table Mitigation Bank in Madera County, plus a 1,000 acre property located south of Millerton Lake in Fresno County, it appears that the *C. campestris* ssp. *succulenta* has an affinity toward loams with some possibility of occurring in clay soils. The loams within this sample set range from sandy to stony and all contain a subsurface duripan, hardpan, or claypan layer. However, further analyses of *C. campestris* ssp. *succulenta* occurrences and associated soil types over larger areas should occur in order to more accurately determine this species' affinity for specific soil types." (J. Gurule, LOA, pers. comm. 2010).

The soil pH, measured for a limited number of special-status species locations, varied considerably among landforms and between *Castilleja campestris* ssp. *succulenta* sites. Although a relatively limited number of samples were collected, evidence suggests that soil pH does not strongly influence the distribution of rare plants across the landscape within the range of pH values represented in the survey area of eastern Merced (Vollmar 2002).

The plant is known to occur in both small and large pools (EIP Associates 1999, J. Stebbins *in litt.* 2000a). Although not all pools occupied by this taxon have been studied in detail, Stebbins et al. (1995) collected data on six occupied pools in Fresno and Madera Counties. Some were typical "bowl-like" pools, whereas others were more similar to swales. Approximate pool areas ranged from 0.03 to 0.65 hectare (0.07 to 1.61 acres), depth from 30.0 to 38.0 centimeters (11.8 to 15.0 inches) (Stebbins et al. 1995). This subspecies has been reported from pools with both long and short inundation periods (EIP Associates 1999) and from both shallow and "abnormally deep" vernal pools, but approximate depth of these pools was not given (CNDDDB 2003).

Populations of *Castilleja campestris* ssp. *succulenta* have been reported from elevations of 24.0 m (80 feet) at the San Joaquin County site to 700.0 m (2,300 feet) at Kennedy Table in Madera County (CNDDDB 2003). Plants most commonly reported as occurring with *C. campestris* ssp. *succulenta* are: *Lasthenia fremontii* (Fremont's goldfields) (EIP Associates 1999); *Downingia* ssp. (*downingia*); *Mimulus tricolor* (three-colored monkey-flower); *Plagiobothrys stipitatus* (vernal pool popcorn flower); and *Eryngium* spp. (coyote thistle) (CNDDDB 2005). Other plants in the *Recovery Plan* that have been reported growing with *C. campestris* ssp. *succulenta* are: *Neostapfia colusana* (Colusa grass); *Orcuttia inaequalis* (San Joaquin Valley Orcutt grass); *O. pilosa* (hairy Orcutt grass); *Gratiola heterosepala* (Boggs Lake hedge-hyssop) (EIP Associates 1999, CNDDDB 2005); and *Eryngium spinosepalum* (spiny-sepaled button-celery) (EIP Associates 1994).

Changes in Taxonomic Classification or Nomenclature

There have been no changes in taxonomic classification or nomenclature since this entity was listed.

Genetics

Genetic relationships have not been investigated for this species.

Species-specific Research and/or Grant-supported Activities

There have been no section 6 grants issued for research on *Castilleja campestris* ssp. *succulenta*. However, there has been a State Wildlife Grant awarded to the DFG for monitoring the Table Mountain Preserve in Fresno County. Also, in March 2010, the Service awarded funding to Vollmar Consulting in Berkeley, California, for a study to be conducted under the Central Valley Project Conservation Program (CVPCP) Habitat Restoration Program (HRP). One of the primary objectives is to field sample and map extant vernal pool habitat in three counties, which includes the Madera Core Recovery Area which covers eastern Merced County, an area with the highest number of presumed extant CNDDDB occurrences for this species.

The funding has been allocated in September 2010, through the CVPCP Habitat Restoration Program, to acquire a conservation easement on a 1,409 acre ranch in Merced County. The program lead for this project is the U.S. Bureau of Reclamation with the California Rangeland Trust as a partner. This ranch has known occurrences of the *Castilleja campestris* ssp. *succulenta* that will be protected in perpetuity.

No other species-specific research or grant supported activities are taking place at this time.

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. The primary listing factor for *Castilleja campestris* ssp. *succulenta* is Listing Factor E which is “natural or manmade factors affecting its continued existence”.

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

The 1997 final rule stated that nearly half of the extant *Castilleja campestris* ssp. *succulenta* occurrences are threatened by man-made activities such as urbanization, agricultural land conversion, discing, trampling due to overgrazing, mining, and a proposed road expansion project. The threats presented in the listing rule are still relevant. The habitat of this species has been reduced and fragmented throughout its range and vernal pools continue to be removed by the factors previously noted. Lands on the Central Valley floor are closer to existing cities and agricultural lands than the valley rim, which is steeper, less fertile and more removed from cities. As a result, valley floor vernal pools, along with open rangeland, have been and continue to be favored for urban and agricultural development. Agricultural land conversion was known to threaten one population in Madera County and one in Fresno County (Service 1997). However, there is no current survey data available to confirm if these populations are extant. Urban development currently threatens one population in Fresno County (personal observation by Kellie Berry, Service 2009). In Merced County, the U.S. Army Corps of Engineers’ (Corps) Merced County Stream Channel Project was recognized as a threat to four populations of *C. campestris* ssp. *succulenta* (CNDDDB 1996). No new information on the impact of this project is available.

The Service has written several biological opinions for projects evaluated under section 7 of the Act through consultation with the Corps. Twenty-two occurrences are now protected in perpetuity in eastern Merced County and ten occurrences were impacted by the construction of the University of California, Merced project. The biological opinions authorized activities such as construction of a new university, road work, and urban development. Given the rate of development in Merced County, the Service anticipates future consultations to include transportation and housing projects which also may require a permit by the Corps for impacts to waters and/or wetlands. The County of Merced has a population of 273,935 people according to the Merced County General Plan adopted June 22, 2010 which includes 80,542 people within the City of Merced (City of Merced, 2010). By 2020, population growth in the County is estimated to be 348,690 people, an increase of 74,755 people in 10 years.

The Service issued a section 10(a)(1)(B) incidental take permit (permit) for the Pacific Gas & Electric Company's San Joaquin Valley Operation and Maintenance Habitat Conservation Plan (Plan) in December 2007. The term of the permit is 30-years and covers 23 wildlife species and 42 plant species including the *Castilleja campestris* ssp. *succulenta*. Under the Plan, there are avoidance and minimization measures to reduce the potential for direct and indirect effects to *C. campestris* ssp. *succulenta*. It is anticipated that disturbance of 1.82 acres of occupied habitat is likely to occur over the term of the permit; however, no permanent removal of occupied habitat is expected to occur.

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

Overutilization for commercial purposes was not known to be a factor in the 1997 final listing rule (62 FR 14338). Overutilization for any purpose does not appear to be a threat at this time. However, collecting for scientific or horticultural purposes or uncontrolled site visits by groups or individuals could result in trampling of vernal pool plants.

FACTOR C: Disease or Predation

Disease or predation was not known to be a factor in the 1997 final listing rule (62 FR 14338). Livestock grazing and associated trampling may or may not adversely affect vernal pool plants depending on, among other things, the kind of livestock, stocking level, season-of-use and grazing duration. The intensity, and more importantly the timing, also effects how livestock grazing may adversely impact vernal pool plants (Stone et al. 1988).

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

There are several State and Federal laws and regulations that are pertinent to listed species, each of which may contribute in varying degrees to the conservation of the species. These State and Federal laws, most of which have been enacted in the past 30 to 40 years, have greatly reduced the threat of wholesale habitat destruction. The Act can incidentally afford protection to these plants if they co-exist with species already listed as threatened or endangered. Four other listed species which may occur with this plant in vernal pools are: Vernal pool tadpole shrimp (*Lepidurus packardi*); conservancy fairy shrimp (*Branchinecta conservatio*); longhorn fairy

shrimp (*Branchinecta longiantenna*); and vernal pool fairy shrimp (*Branchinecta lynchi*). However, these invertebrate species are only rarely and sporadically found in the same vernal pools or vernal pool complexes.

Federal Laws and Regulations

Endangered Species Act: With regard to federally-listed plant species, section 7(a)(2) of the Act 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.

Clean Water Act: Under section 404 of the Clean Water Act, the Corps regulates the discharge of fill into wetlands and waters of the United States which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). In general, the term “wetland” refers to areas meeting the Corps’ criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any action with the potential to impact waters of the United States must be reviewed under the Clean Water Act, National Environmental Policy Act, and the Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for compensation of significant impacts.

The Corps interprets “the waters of the United States” expansively to include not only traditional navigable waters and wetlands, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. However, recent Supreme Court rulings have called into question this definition. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving “isolated” wetlands. Currently, Corps regulatory oversight of such wetlands (e.g., vernal pools) is in doubt because of their “isolated” nature. In response to the Supreme Court decision, the Corps and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a “significant nexus” standard that may protect some, but not all, isolated wetland habitat (USEPA and Corps 2007). The overall effect of the new permit guidelines on loss of isolated wetlands, such as vernal pool habitat, is not known at this time. Therefore, with the Corps having potentially less regulatory authority over vernal pools, impacts to potential habitat for *Castilleja campestris* ssp. *succulenta* may increase over the range of the species. Equally important are the upland watersheds of vernal pools which are not provided protection in most cases.

State Laws and Regulations

California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA): *Castilleja campestris* ssp. *succulenta* was State-listed as endangered in 1990. The CESA (California Fish and Game Code, Section 2080 *et seq.*) prohibits the unauthorized take of State-listed threatened or endangered species. The NPPA (Division 2, chapter 10, section 1908) prohibits the unauthorized take of State-listed threatened or endangered plant species. The CESA requires State agencies to consult with the California Department of Fish and Game (DFG) 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.

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 the DFG 10 days in advance of changing land use in order to allow salvage of listed plants.

California Environmental Quality Act (CEQA): The CEQA requires full public disclosure of the potential environmental impact of proposed projects. The public agency with primary authority or jurisdiction over the project is designated as the lead agency and is responsible for conducting a review of the project and consulting with other agencies concerned with resources affected by the project. Section 15065 of CEQA guidelines requires a finding of significance if a project has the potential to “reduce the number or restrict the range of a rare or endangered plant or animal.” Species that are eligible for listing as rare, threatened, or endangered but are not so listed are given the same protection as those species that are officially listed with the State. Once significant impacts are identified, the lead agency has the option to require mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible. In the later case, projects may be approved that cause significant environmental damage, such as destruction of endangered species. Protection of listed species through CEQA is, therefore, at the discretion of the lead agency. CEQA provides that, when overriding social and economic considerations can be demonstrated, project proposals may go forward, even in cases where the continued existence of the species may be jeopardized, or where adverse impacts are not mitigated to the point of insignificance.

Summary

In summary, the Act is the primary Federal law that provides protection for *Castilleja campestris* ssp. *succulenta* since its listing as threatened in 1997. Other Federal and State regulatory mechanisms provide discretionary protections based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Act.

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

According to a University of California, Berkeley study, the native plants unique to California are vulnerable to global climate change and that two-thirds of these endemics could suffer more than an 80% reduction in geographic range by the end of the century (U.C. Berkeley Press Release, June 2008). Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, IPCC 2007). It is unknown at this time if climate change in California specifically will result in a warmer trend with localized drying, higher precipitation events, or other effects. The Service recognizes that climate change is an important issue with potential effects to listed species and their habitat, but we lack adequate information to make accurate predictions regarding its effects to *Castilleja campestris* ssp. *succulenta* at this time.

Since the final listing rule, an additional threat to *Castilleja campestris* ssp. *succulenta* is that many of its populations are small in number. A small population size makes a population more vulnerable to extirpation from chance events as noted in the 2005 *Recovery Plan*. Among the 24 occurrences of *C. campestris* ssp. *succulenta* for which size estimates had been documented, ten consisted of fewer than 100 plants each at their peak size (J. Stebbins in litt. 2000b, CNDDDB 2003). According to the 2009 CNDDDB occurrences, 35 have population size estimates documented with approximately 16 occurrences with fewer than 100 plants and approximately 17 occurrences with more than 100 plants. However, the definitive number of plants found during field surveys was not always recorded and if recorded, estimates were often noted. Factors in the fluctuation of populations which may affect the continued existence of this species are: Active agriculture operations; low rainfall; potential off-road vehicle use; development; and overgrazing. This taxon is very cyclical and is somewhat scarce in normal or below normal rainfall years but large populations may be evident in wet years at the known sites (J. Stebbins, pers. comm. 2009). Livestock grazing and associated trampling may or may not adversely affect vernal pool plants depending on, among other things, the kind of livestock, stocking level, season-of-use, and grazing duration (Stone et al. 1988). In summary, data from the 2009 CNDDDB can not be utilized to determine plant population trends as they were not always analyzed during the surveys and when data on the plant population was noted, it fluctuated from year to year.

III. RECOVERY CRITERIA

General recovery criteria for all vernal pool floral species are outlined in the *Recovery Plan* (Service Recovery Plan 2005). Recovery plans provide 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 accomplish the recovery of a species and it may be achieved without fully meeting all of the *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 provide 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 Plan* describes the geographic distribution of vernal pool taxa according to the vernal pool regions defined by the DFG (Keeler-Wolf et al. 1998). Vernal pool regions are discrete geographic regions identified largely on the basis of endemic species, with soils and geomorphology as secondary elements, although there is some overlap of these features among vernal pool regions. The DFG has identified 17 distinct vernal pool regions. *Castilleja campestris* ssp. *succulenta* is found in two distinct regions, the Southeastern Sacramento Valley Vernal Pool Region and the Southern Sierra Foothills Vernal Pool Region. The five core areas within these two regions are: Fresno; Madera; Merced; Table Mountain; and the Southeast Sacramento Valley. Within each core area, the *Recovery Plan* identifies specific percentages of suitable habitat that should be protected to achieve recovery. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery. Zone 1 reflects the highest priority areas. Table 1 (Core Area Priorities) identifies the recovery priority according to the Zone and the number of *C. campestris* ssp. *succulenta* occurrences within each core area. In summary, there are a total of 82 occurrences documented within five core areas and the highest number of occurrences is in the Madera core area. The Madera core area traverses both Merced and Madera Counties. The Table Mountain core area traverses both Fresno and Madera Counties. Twenty-eight of the 90 presumed extant occurrences are on protected properties and eight occurrences are not found within any core areas.

Table 1. Core Area Priorities

Core Areas	Priority Zone	Percent of Suitable Habitat Within Each Zone to be Protected for Delisting	Number of Reported Extant Occurrences in Core Areas (82 total)	Number of Protected Occurrences in Core Areas (28 total)
Southeast Sacramento Valley	2	85	1	1
Fresno	2	85	6	---
Madera	1	95	62	22
Merced	1	95	7	---
Table Mountain	1	95	6	5

The *Recovery Plan* discusses a variety of research that would be beneficial to help refine recovery actions and criteria, and guide overall recovery and long-term conservation efforts. Listing factors B and C (overutilization for commercial, recreational, scientific, or educational purposes) are not relevant to this species and therefore is not addressed below.

The relevant listing factors are:

- A. The present or threatened destruction, modification, or curtailment of its habitat or range;
- D. The inadequacy of existing regulatory mechanisms; or
- E. Other natural or manmade factors affecting its continued existence.

The *Recovery Plan* recommends the following criteria to aid in the implementation of the recovery and downlisting/delisting of *Castilleja campestris* ssp. *succulenta*.

1. Habitat protection - Accomplish habitat protection that promotes vernal pool ecosystem function sufficient to contribute to population viability of the covered species.

This criterion addresses listing Factor A and this criterion is still valid.

1A. Suitable vernal pool habitat within each prioritized core area for the species is protected.

The *Recovery Plan* identifies specific percentages of suitable habitat to be protected in each of the five core areas, which are: Southeastern Sacramento Valley, Fresno, Madera, Merced, and Table Mountain. A number of species may be recovered primarily through the protection of core areas in Zone 1. Table 1 depicts the core areas for this species, the priorities and the number of occurrences in each core area. More than one federally-listed vernal pool species may be found within a single core area as the core areas incorporate areas larger than just the *Castilleja campestris* ssp. *succulenta* occurrences.

To delist the *Castilleja campestris* ssp. *succulenta*, the *Recovery Plan* recommends that 95% of suitable habitat in priority Zone 1 and 85% of suitable habitat in priority Zone 2 core recovery areas be protected. The *Recovery Plan* also recommends protecting 90% of the occurrences. There are 28 protected occurrences within three core areas. The core areas which support protected occurrences of this species are depicted on Table 1.

This criterion has not been met and is still valid.

1B. Species occurrences distributed across the species geographic range and genetic range are protected. Protection of extreme edges of populations protects the genetic differences that occur there.

This criterion has been partially met and is still valid. The species is restricted to the northeastern San Joaquin Valley with the eastern Merced County area representing a very important geographical region for the conservation of this species. There have been 22 occurrences preserved in Merced County primarily within the Madera core area. However, there

have been nine occurrences of *Castilleja campestris* ssp. *succulenta* that have been extirpated from the overall geographic range of this species since the listing in 1997 (CNDDDB 2009).

The extreme edges of this species range are not protected. There is one protected occurrence in the northern edge of the range at the Angraves Nature Study Area in San Joaquin County. The occurrences in the southern edge of the range, just east of Clovis in Fresno County, are on private property and are not known to be protected.

1C. Reintroductions must be carried out and meet success criteria established in the *Recovery Plan*.

This recovery criterion has not been met and is still valid. The *Recovery Plan* recommends reintroduction to vernal pool regions and soil types from which the status surveys indicate the species has been extirpated.

1D. Additional occurrences identified through future site assessments, GIS and other analyses, and status surveys that are determined essential to the recovery are protected. Any newly found occurrences may count towards recovery goals if the occurrences are permanently protected as described in the *Recovery Plan*.

This recovery criterion has been partially met and is still valid. At this time, the Service is aware of additional occurrences in Fresno, Madera and Merced Counties that have been discovered since the species was listed in 1997. Future surveys may locate additional occurrences of this species, particularly on private lands that support suitable habitat and soil types.

These additional occurrences include 46 in Merced County, five in Fresno County and five in Madera County. These occurrences are essential to the recovery goals of this species and should be permanently protected. Also in March 2010, the Service awarded a contract to Vollmar Consulting with a primary objective to remap vernal pool habitat in Sacramento, Placer and Merced Counties. The focus will be on areas which may not have been identified during previous mapping efforts in order to create a consistent baseline, a product that will enhance future recovery efforts. A second objective will be to utilize finer scale GIS data and ground-truth areas predicted to hold one or more of the target species, but in which no known occurrences have been recorded. *Castilleja campestris* ssp. *succulenta* is the only selected plant species to be surveyed for this contract. The three remaining targeted species are branchiopods.

1E. Habitat protection results in protection of hydrology essential to vernal pool ecosystem function, and monitoring indicates that hydrology that contributes to population viability has been maintained through at least one multi-year period that includes above average, average, and below average local rainfall as defined above, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

This criterion has not been met and is still valid. Hydrology monitoring has not occurred at any of the known extant populations. Therefore, the Service is unable to determine whether the hydrology of extant locations has supported viable populations through a variety of hydrologic conditions.

2. Adaptive Habitat Management and Monitoring

This criteria addresses listing Factors A, D, and E.

2A. Habitat management and monitoring plans that ensure maintenance of vernal pool ecosystem function and population viability have been developed and implemented for all habitat protected, as previously discussed in sections 1A-E.

This criterion has been partially met and is still valid. There are management and monitoring plans for the Kennedy Table Mitigation Bank and the Drayer Ranch Conservation Bank. The Kennedy Table Mitigation Bank is managed under the March 2004 *Conservation Bank Management Plan*. The Drayer Ranch Conservation Bank is managed under the May 2005 *Drayer Ranch Conservation Bank Management Plan*.

According to the October 2008 U.C. Merced *Compensatory Wetland Mitigation and Monitoring Plan* prepared by Gibson & Skordal, there will be monitoring programs on the preservation lands acquired as compensation for the U.C. Merced project. The monitoring will vary in intensity due to differences in ownership and varying degrees of management.

Monitoring and management plans will be assessed individually as land is bought, placed under a conservation easement or deed restriction, or otherwise protected for assurance that recovery goals are met. Funding assurances will be required for monitoring and/or management in perpetuity. The DFG stated there is a draft management plan for the DFG Table Mountain Preserve which calls for monitoring, grazing and invasive species control (A. Ferranti, DFG, pers. comm. 2009).

2B. Mechanisms are in place to provide for long-term management and monitoring.

This criterion has been partially met and is still valid. Five of the properties preserved in perpetuity to offset the effects of the U.C. Merced Campus project have endowment accounts. The two mitigation banks, Drayer Ranch and Kennedy Table, have endowment accounts to ensure long-term management and monitoring in perpetuity. The DFG collaborates with the Sierra Foothill Conservancy to help manage the Big Table Mountain Preserve since there is a State Wildlife grant to conduct monitoring; however, there is not a formal established endowment account. The funds for the Caltrans' Madera Pools Mitigation Site endowment account have been submitted to the DFG.

Funding for these monitoring plans should be sufficient to assure long-term monitoring and management with inclusion of years with normal, above, and below average rainfall conditions, a multi-year drought, and a minimum of five years of post-drought monitoring. A multi-year drought is defined in the *Recovery Plan* as a period of five or more years of below average local rainfall. All endowment accounts for Service-approved banks include adequate funds to cover these factors.

2C. Monitoring indicates ecosystem function has been maintained in the areas protected.

This criterion has not been met and is still valid. The occurrences have been monitored on preserves previously noted. However, continuous monitoring of ecosystem function has not occurred for any duration of time that meets the requirements specified in the *Recovery Plan* (one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of five years of post-drought monitoring.)

2D. Seed banking actions have been completed for species that would require it as insurance against risk of stochastic extirpations or that will require reintroductions or introductions to contribute to meeting recover criteria.

The Recovery Plan recommends collection of seeds from each core area. This is a number two priority due to the disjunctive populations of this plant that occur in more than two locations. Seeds have not been collected from any occurrence. This criterion has not been met and is still valid.

3. Status Surveys

This criteria address listing Factors A, D, and E.

3A. Status surveys, 5-year status reviews, and population monitoring show populations within each vernal pool region where the species occur are viable (e.g., evidence of reproduction and recruitment) and have been maintained (stable or increasing) for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

Population monitoring has not occurred during a time period that meets the requirements specified in the Recovery Plan. Therefore, this criterion has not been met and is still valid.

In regards to status surveys, in April 2009, surveys were conducted on five 2009 CNDDDB occurrences collectively located in Fresno, Madera and Merced Counties. Two of the five occurrences did not support *Castilleja campestris* ssp. *succulenta* as previously addressed under the Abundance section of this review.

Vernal pool regional working groups will be important for tracking the progress of recovery efforts, including monitoring the status of populations of this species, particularly on private lands that are not currently monitored.

3B. Status surveys, status reviews, and habitat monitoring show that threats identified during and since the listing process have been ameliorated or eliminated. Site-specific threats identified through standardized site assessments and habitat management planning also must be ameliorated or eliminated.

This criterion has not been met, but efforts are underway to address this through the Recovery Implementation Team, the Vernal Pool Regional working groups, and coordination with species

experts. Extirpation of occurrences and modification of habitat on private lands, due to development pressure, remain an existing threat. This criterion is still valid.

4. Research

Research addresses listing Factors A, C – E.

4A. Research actions necessary for recovery and conservation of the covered species have been identified (these are research actions that have not been specifically identified in the recovery actions but for which a process to develop them has been identified). Research actions (both specifically identified in the recovery actions and determined through the process) on species biology and ecology, habitat management and restoration, and methods to eliminate or ameliorate threats have been completed and incorporated into habitat protection, habitat management and monitoring, and species monitoring plans, and refinement of recovery criteria and actions.

This criterion has not been met and is still valid, but efforts that will aid in reaching this goal are addressed in recovery criteria 5A-5B.

4B. Research on genetic structure has been completed (for species where necessary – for reintroduction and introduction, seed banking) and results incorporated into habitat protection plans to ensure that within and among population genetic variation is fully represented by populations protected in the Habitat Protection section previously described above in sections 1A-E.

No genetic work has been completed for this species and this criterion is still valid.

4C. Research necessary to determine appropriate parameters to measure population viability for each species has been completed.

No research on this topic has been completed and this criterion is still valid.

5. Participation and Outreach

Participation and outreach affect all listing factors and this criterion remains valid.

5A. Recovery Implementation Team is established and functioning to oversee rangewide recovery efforts.

The criterion has been met by the establishment of a Recovery Implementation Team in June 2009. The team meets quarterly.

5B. Vernal Pool Regional working groups are established and functioning to oversee regional recovery efforts.

This criterion has not been met and is still valid. However, selection of members to serve in two working groups is underway and establishment of the groups is expected in 2012. The groups will consist of representatives from the agencies, landowners/stakeholders, and species experts.

5C. Participation plans for each vernal pool region have been completed and implemented.

This criterion has not been met and it remains valid.

5D. Vernal Pool Regional working groups have developed and implemented outreach and incentive programs that develop partnerships.

This criterion has not been met and it remains valid.

IV. SYNTHESIS

At the time of the listing in 1997, there were 36 known occurrences of *Castilleja campestris* ssp. *succulenta*; currently there are 90 extant occurrences. *Castilleja campestris* ssp. *succulenta* often occurs in many pools within a vernal pool complex but with fewer than 100 plants per pool and is therefore not a dominant species. Since the late 1990s, field surveys have increased as a result of new growth pressures, in particular in eastern Merced County due to the development of the U.C. Merced campus and the affiliated infrastructure. There were fewer occurrences from historical populations compared with those known at the time of listing in 1997 and current data (CNDDDB 2009). In summary, the number of *C. campestris* ssp. *succulenta* occurrences has increased since the listing, most likely as a result of the increased number of surveys.

However, until surveys are complete in large areas of highly suitable habitat, occurrence numbers considered alone are misleading. For example, in very dense vernal pool complexes, not only will presently defined *Castilleja campestris* ssp. *succulenta* occurrence boundaries change as future surveys record additional locations, the occurrence numbers will actually decline as measured regional abundance increases. Similarly, direct comparison of numbers gives equal weight to any two single occurrences without regard to the number of their respective individually mapped locations. Widely distributed occurrences that overlap multiple geological surfaces further complicate presentation, comparison and interpretation of results. Finally, since there is such unequal distribution of rare species diversity and abundance between landforms and the habitats they support, generalities need to be further qualified (Vollmar 2002). Significant areas of suitable habitat remain unsurveyed, particularly in northern Merced County (EIP Associates 1999) and between the northern Stanislaus County and northern San Joaquin County sites (J. Stebbins *in litt.* 2000b). Thus, additional occurrences may be found if further surveys similar to those reported by Vollmar (2002) are conducted.

Despite an increase in the number of preserved properties to protect this species, it remains threatened due to ongoing urban and infrastructure development and conversion of agriculture lands and the low number of individuals in extant populations. Therefore, we believe *Castilleja campestris* ssp. *succulenta* still meets the definition of threatened and recommend no status change at this time.

V. RESULTS

Recommended Listing Action:

- 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

New Recovery Priority Number and Brief Rationale:

There is no change.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

1. Conduct standardized vernal pool habitat site assessments for both the Southeastern Sacramento Valley and Southern Sierra Foothills vernal pool regions.
2. Establish management and monitoring plans which include criteria for frequent surveys in order to capture the blooming period for this species. The *Castilleja campestris* ssp. *succulenta* population numbers vary widely from year to year depending on habitat conditions and rainfall (Vollmar 2002). Therefore, the Service should encourage bank owners and preserve managers to perform surveys on a frequent schedule in order to gather additional data which will increase knowledge. The additional information will be utilized for future 5-year reviews.
3. The Vernal Pool Regional working group should formulate a plan to reach out and educate private landowners as to the value of federally-listed species on their lands, with a particular focus on plants. The Vernal Pool Regional group also should provide guidance to assist landowners on how to better manage their lands for the overall benefit of this species.
4. The Service should encourage collection of seeds and storage in approved seed banks from extant occurrences, in each core area, to aid in the establishment of a seed bank.
5. The Service should encourage County and local governments to consider developing Habitat Conservation Plans (HCPs) to include vernal pool species. Take of a federally-listed invertebrate species would be permitted on private land, and any habitat acquisition to compensate for invertebrate species could include the *Castilleja campestris* ssp. *succulenta* if appropriate. Fresno County has been awarded Federal funds for the development of an HCP and additional funds may be available in the future for counties who apply for them.

6. Efforts to protect vernal pool species should include conservation efforts on a landscape scale (Vollmar 2002). Landscape Conservation Cooperatives provide Federal scientific and technical support for conservation on a landscape scale which is the entire range of an identified priority species. These cooperatives also have a role in helping partners identify common goals and priorities to target the right science for efficient and effective conservation.

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

Castilleja campestris ssp. succulenta (Fleshy Owl's-Clover)

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

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

Review Conducted By: Kellie Berry, Sacramento Fish and Wildlife Office Staff

FIELD OFFICE APPROVAL:

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

Approve  Date 8 Sept 2011