Chorizanthe orcuttiana
(Orcutt's Spineflower)

5-Year Review:
Summary and Evaluation

Chorizanthe orcuttiana (Orcutt's spineflower). Photocredit: Andrew Wastell (Navy)

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California

June 26, 2014

5-YEAR REVIEW
***Chorizanthe orcuttiana* (Orcutt's Spineflower)**

I. GENERAL INFORMATION

Purpose of 5-year Review:

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. 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 listing of a species as endangered or threatened is based on an assessment of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act. We must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In a 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 as defined in section 4 of the Act which includes provisions for public review and comment.

Species Overview:

Chorizanthe orcuttiana (Orcutt's spineflower) is a small annual plant endemic to San Diego County, California. This species was listed as endangered under the California Endangered Species Act in 1979 and under the Endangered Species Act in 1996. Threats to *C. orcuttiana* and its habitat identified at the time of listing included trampling, nonnative plants, development, lack of a natural fire regime, and limited numbers. At the time of listing, *C. orcuttiana* was reported as extant at one occurrence, Oak Crest Park, Encinitas. An occurrence at Torrey Pines (State Reserve east grove) was presumed extirpated, but additional occurrences have been reported since listing. Currently, 5 of the 14 historical occurrences are considered extant. Three of these are located on Federal land, which provides protection to *C. orcuttiana* through section 7. The species is restricted to a narrow habitat naturally dissected across its range. The species is vulnerable because of its narrow habitat preferences, restricted geographical distribution, and susceptibility to encroachment from surrounding vegetation. While considerable progress has been made to learn about its distribution and habitat preferences, it is important to continue to manage this species where it currently occurs.

Methodology Used to Complete This Review:

This review was conducted by Gary D. Wallace of the Carlsbad Fish and Wildlife Office, following the Region 8 guidance issued in March 2008. We used information in the 1996 listing rule, available literature, reports and information in our files, and information provided by experts familiar with the species, its habitat, and the associated processes. We received no

information from the public in response to our notice in the **Federal Register** 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 and the previous 5-year review. We focus on current threats to the species attributable to any of the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. We evaluated the current status of the species and threats to it, compared to those evident in the previous 5-year review. Based on our synthesis of this evaluation, we recommend a listing status and a prioritized list of conservation actions recommended for initiation and/or completion over the next 5 years.

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Recommended Citation:

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Federal Register 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 was published in the **Federal Register** on May 25, 2011 (USFWS 2011, pp. 30377–30382). No information relevant to *Chorizanthe orcuttiana* was received.

Listing History:

Federal Listing
FR Notice: 61 FR 52370 (USFWS 1996)
Date of Final Rule: October 7, 1996
Entity Listed: *Chorizanthe orcuttiana* (Orcutt's spineflower), a plant species.
Classification: Endangered
Critical Habitat: Critical habitat has not been designated for this species.

State Listing
Chorizanthe orcuttiana (Orcutt's spineflower) was listed as endangered by the State of California in 1979.

Associated Rulemakings: None

Review History:

The Service initiated a status review for *Chorizanthe orcuttiana* on March 22, 2006 (USFWS 2006). We completed the 5-year review on January 10, 2008, and recommended no change in status for this species (USFWS 2008, pp. 1–18).

Species' Recovery Priority Number at Start of this 5-year Review:

The recovery priority number for *Chorizanthe orcuttiana* is 5, based on a 1–18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (USFWS 1983a, pp. 43098–43105; USFWS 1983b, p. 51985). This number indicates that the taxon is a species that faces a high degree of threat, has a low potential for recovery.

Recovery Plan or Recovery Outline:

We have not completed a recovery outline or recovery plan for *Chorizanthe orcuttiana*.

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The 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 is a plant, 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 Description

Chorizanthe orcuttiana (Orcutt's spineflower) is a small, 0.5–6 inches (in) (1–15 centimeters (cm)), annual plant species known only from San Diego County, California. The clustered flowers are small and each produces a single seed. This species is a member of the Polygonaceae (Buckwheat family).

Species Biology and Life History

This species is likely a winter annual, germinating after first significant fall rains (Kluse & Doak 1999, p. 246). The vegetative plants form a small rosette of leaves from which the flower stalks develop in the spring. *Chorizanthe orcuttiana* may be a predominantly selfing species with some low level of outcrossing based on genetic assessments of material from Point Loma (Truesdale 2010, p. 28). Flowering and fruiting occur by late April. Seeds do not appear to have any specialized dispersal mechanism although the involucres surrounding groups of flowers could be carried by an animal. A portion of the seeds produced in a given year do not germinate the

following winter and become part of the soil seed bank. Seed viability remained high (84 percent) after 8 years in storage (cold storage and room temperature regimes gave similar results) for a rare relative *Chorizanthe parryi* var. *fernandina* (E. Meyer, Seed Program Manager, Rancho Santa Ana Botanic Garden, 2013, pers. comm.). Although the extent and longevity of the soil seed bank of *C. orcuttiana* is unknown, plants have appeared after restoration efforts removed extensive *Carpobrotus edulis* (iceplant) thatch from the area (Bauder *et al*. 2010b, p. 4). This differs from an interpretation put forward by Fox *et al*. (2006, p. 167) that numbers of standing plants of the related taxon *C. pungens* subsp. *pungens* are directly related to the previous year's seed set rather than environmental conditions or a long-lived seed bank (Fox *et al.* 2006, p. 166).

Habitat or Ecosystem

Chorizanthe orcuttiana is endemic to San Diego County and is primarily restricted to weathered sandstone bluffs or loose sandy soils in association vegetation described historically as coastal or southern maritime chaparral (Hogan *et al.* 1996, p. 6; USFWS 1996, pp. 52370 and 52378; Bauder 2000, p. 31). Coastal stands of chaparral with *Adenostoma fasciculata* var. *obtusifolium* (chamise), *Ceanothus verrucosus* (wart-stemmed ceanothus), *Arctostaphylos glandulosa* subsp. *crassifolia* (Del Mar manzanita), *Quercus dumosa* (Nuttall's scrub oak), *Baccharis vanessae* (Encinitas Baccharis), and *Comarostaphylis diversifolia* subsp. *diversifolia* (summer holly) were indicative of southern maritime chaparral (Hogan *et al.* 1996, pp. 4–5).

There are 3,049 acres (ac) (1,234 hectares (ha)) of habitat identified as southern maritime chaparral in San Diego County (USFWS 2013, GIS data). Currently 1,969 ac (796 ha) are conserved. Most of this acreage is not known to be occupied by *Chorizanthe orcuttiana* but may support as yet undetected occurrences or be suitable for recovery actions. The historical extent of occupancy of the habitat by *C. orcuttiana* is unknown. The occurrences are small patches often with constricted connectivity to adjacent patches.

Several different vegetation classification systems have been developed since *Chorizanthe orcuttiana* was listed. The recent vegetation classification system of Sawyer *et al.* (2009) has the advantage that each alliance has levels of composition for key species, lists of associated perennial plants, as well as maps showing the location and extent of the vegetation described. The vegetation associated with *C. orcuttiana* previously identified as southern maritime chaparral is now included in the more broadly defined Chamise chaparral (Sawyer *et al.* 2009, p. 317). One of the regional components of Chamise chaparral, Chamise-mission manzanita chaparral, is the current designation for the vegetation that commonly supports *Chorizanthe orcuttiana* (Sawyer *et al*. 2009, p. 327). Chamise-mission manzanita chaparral is described as having 10 to 30 percent relative cover of *Adenostoma fasciculatum* and *Xylococcus bicolor* in the shrub layer that may include *Ceanothus crassifolius, C. verrucosus, Cneoridium dumosum, Heteromeles arbutifolia, Malosma laurina, Rhus integrifolia* (lemonade berry), and *Salvia mellifera* among other taxa (Sawyer *et al.* 2009, p. 327). This vegetation is called the *Adenostoma fasciculatum-Xylococcus bicolor* Association in a recent more local vegetation classification (SANDAG 2011, p. 4-13). Naturally occurring openings in these habitats are susceptible to invasion by nonnative plants. *Carpobrotus edulis* is an example of one of these invasive species that covers sandy soils otherwise suitable for *C. orcuttiana.*

The soil types examined from verified occurrences of *Chorizanthe orcuttiana* were dominated (mean 90 percent), by the sand fraction with moderate acidity, low organic content, and nitrate nitrogen (Bauder 2000, p. 28). The predominant soil type appears to be consistent with the characteristics of Carlsbad Series gravelly loamy sand (Bowman 1973, pp. 19, 34–36). The soils are moderately well drained to well drained, slightly acid, derived from ferruginous sandstone, and often contain iron concretions (Bowman 1973, pp. 34–36). This soil series (including mapping units significantly altered by urbanization) accounts for 7,480 ac (3,027 ha) or 0.3 percent of the 2,204,880 ac (892,287 ha) of land in San Diego County that have been assigned to a soil series (Bowman 1973, p. 19).

Bauder (2000, p. 23) identified Carlsbad gravelly loamy sand as the primary soil type supporting *Chorizanthe orcuttiana*, and other associated soils as the Marina soil series, which includes small areas of Chesterton and Corralitos soils. All of the known extant occurrences of *C. orcuttiana* are found on or very near to sandy soils in the Carlsbad, Marina, or Corralitos series.

The amount and distribution of suitable habitat for this species has likely decreased or has been degraded since listing. On lands managed by the U.S. Navy, habitat losses are being mitigated through an active program of habitat restoration and management. Likewise, impacts to suitable habitat from urban development are being mitigated by the conservation of southern maritime chaparral under provisions of State and Federal regional habitat conservation plans, which are discussed below in our Five-Factor Analysis.

The extent and pattern of historical habitat occupancy by *Chorizanthe orcuttiana* is unknown, but it is likely that some portion of the historical extent of this species' range has been lost. For a related taxon, *C. pungens* subsp. *pungens*, fewer plants were found in disturbed habitat, and although the plants persisted they produced fewer seeds per plant and per sample plot than more intact habitat (Fox *et al*. 2006, p. 163). Isolated remnants of occupied habitat may persist in San Diego County. However, these areas are likely small and naturally scattered in distribution, and in need of some type of restoration. Based on work on habitat enhancement at Naval Base Point Loma (NBPL), habitat rehabilitation for this species may be practical if the primary concern is competition from native and invasive nonnative plants. Restoration of habitat by removal of nonnative invasive plants (e.g., *Carpobrotus edulis*) has been successful (Bauder *et al*. 2010b, p. 4) and is suggested as a first step to allow expression of any available seed bank prior to any effort to introduce seeds into an area (Bauder *et al*. 2010, p. 19).

Spatial Distribution

At the time of listing, the historical range of *Chorizanthe orcuttiana* extended for 25 miles (mi) (40 kilometers (km)) along coastal San Diego County from Point Loma to Encinitas and inland for about 6 mi (10 km). However, we considered only 1 of the 10 historical occurrences known at the time to be extant at Oak Crest Park in Encinitas (CNDDB EO 10). At the time of the last 5-year review (USFWS 2008), we considered *C. orcuttiana* to be extant at four occurrences (CNDDB EOs 10, 12, 13, and an unnumbered occurrence at Point Loma near the north end of Fort Rosecrans) (Appendix 1). This latter occurrence was subsequently designated EO 14 by the CNDDB (Appendix 1). One additional occurrence was reported in 2008 at the Torrey Pines Natural Reserve (Fillius and Jacobson 2008, EO 16). *Chorizanthe orcuttiana* is currently extant

or presumed to be extant at five occurrences at Oak Crest Park (EO 10), Torrey Pines State Natural Reserve (EO 16), and on NBPL (EOs 12, 13, 14). The current distribution of historical and extant occurrences of *C. orcuttiana* is depicted in Figure 1.

The California Department of Fish and Wildlife (CDFW), California Natural Diversity Data Base (CNDDB) compiles information on plant taxa from herbarium specimens, other sources, and reports submitted to them. The database includes the geographical location of the plants observed, a site description, the numbers of plants seen, and other useful data. Each separate location for a taxon is identified as an Element Occurrence (EO) and assigned a consecutive number by CNDDB as new element occurrences are recorded in the database. Data from subsequent surveys, collections, and reports are added consecutively to existing element occurrences if they fall within 0.25 mi (0.4 km) of that element occurrence referable to a particular EO. The element occurrences provide a convenient framework to discuss the status and distribution of this species. All of the numbered element occurrences cited below were accessed electronically in August of 2012 (CNDDB 2012, EOs 2, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, and 18).

The CNDDB EO designations, associated herbarium records, status at listing, status at the last 5-year review, and current 5-year review, as well as ownership are provided in Appendix 1. Entries in Appendix 1 are listed geographically generally from north to south as depicted in Figure 1. The CNDDB EOs 4, 6, and 7 are considered too vague to locate or are otherwise treated as extirpated.

The northernmost occurrence of *Chorizanthe orcuttiana* located at Oak Crest Park in the city of Encinitas (CNDDB EO 10) is presumed to be extant; however, the last time plants were found at this location was 2005. Oak Crest Park has a substantial open space component, and the area where *C. orcuttiana* has been seen in the past is protected from visitors. This occurrence has always been reported to be small (under 10 feet squared) (0.9 meters squared), but over the years that it has been monitored, native *Muhlenbergia rigens* (deergrass) and *Pinus torreyana* (Torrey pine) have been encroaching on the small open area where *C. orcuttiana* grows. We have no new survey information since 2009 when no plants were detected (Bauder and Sakrison 2010, p. 8), although there may still be viable seeds in the soil that could respond to management actions (similarly to the occurrence at Point Loma where viable seed has produced new plants after ice plant was removed). Plant numbers at the Oak Crest Park site were 30 (in 1999), 1 (in 2000), 0 (in 2002), 5 (in 2004), 6 (in 2005), and 0 (in 2007, 2008, and 2009); no surveys were conducted in 2001, 2003, or 2006) (Bauder and Sakrison 2010, p. 8). Because suitable habitat for *C. orcuttiana* is available and records report its presence within the past 10 years, we presume that it is still extant at this location.

Chorizanthe orcuttiana was collected for the first time in a disjunct northern segment of Torrey Pines State Nature Reserve after the 2008 5-year review had been prepared (Fillius and Jacobson 2008) (Figure 1). This occurrence has assigned the CNDDB EO number16, and is considered here to be extant.

Chorizanthe orcuttiana was considered extirpated at the time of listing at EO 5, located at the Torrey Pines State Nature Reserve. This taxon was last reported in 1987 at this location and,

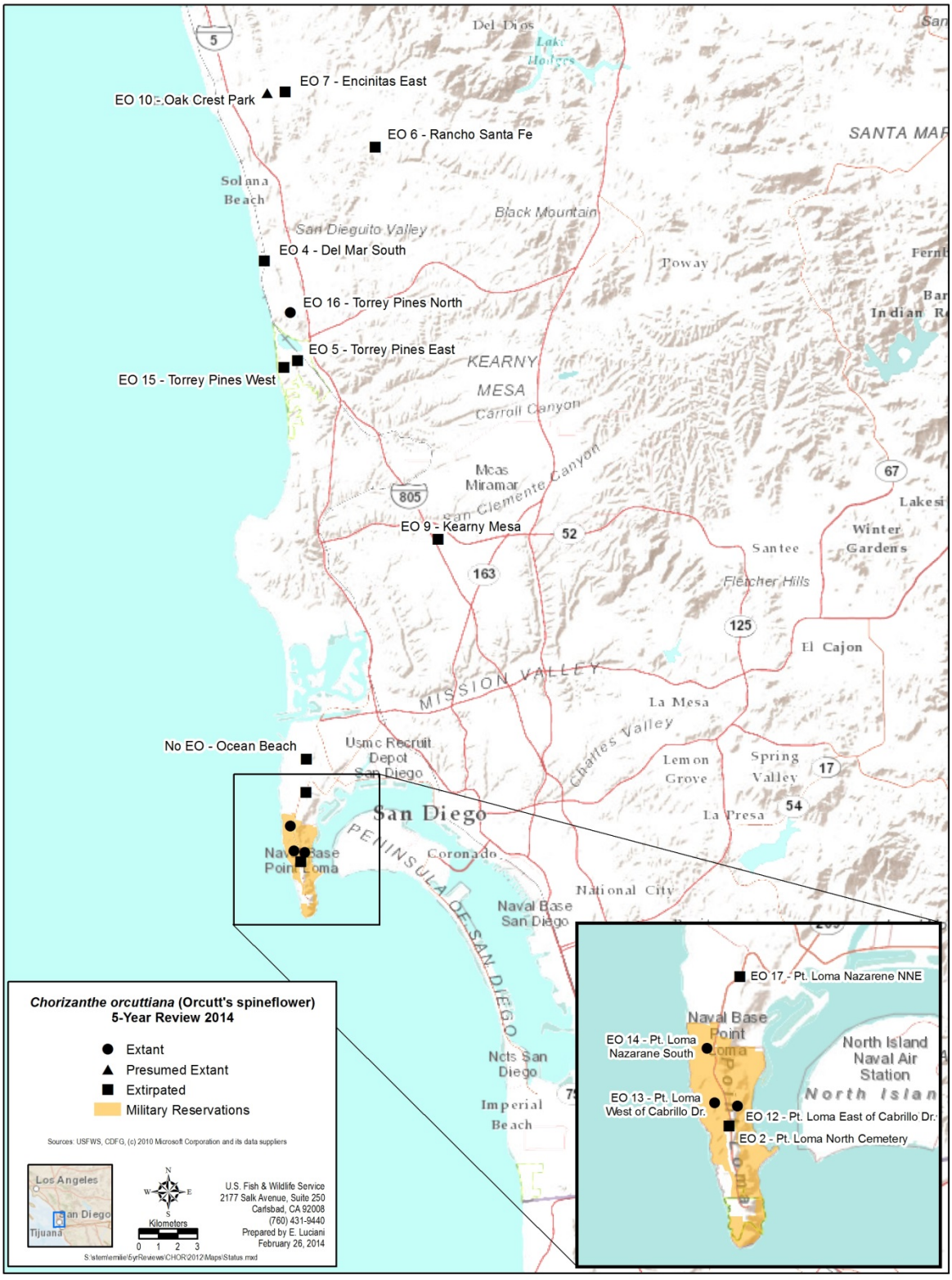

Figure 1. Distribution of *Chorizanthe orcuttiana* (Orcutt's spineflower); prepared for the 2014 5-year review.

despite subsequent surveys, has not been observed since. The species was also considered extirpated at this site in our previous 5-year review (USFWS 2008, p. 4) and remains so now. The CNDDB also reports EO 15 to be in Torrey Pines State Nature Reserve on the west side of North Torrey Pines Road. This EO is based on a general map prepared by Hardham in 1981. No verification of the occurrence by voucher specimens or sightings is known. Therefore, we consider this occurrence too vague or otherwise extirpated (Appendix 1).

An occurrence of *Chorizanthe orcuttiana* on Del Mar Mesa, CNDDB EO 18, is based on an herbarium specimen (Garrett 1986). The reference and associated species at the site did not seem indicative of typical habitat for *C. orcuttiana.* In response to a request for confirmation, Dr. Michael G. Simpson of San Diego State University determined that the specimen represented *C. polygonoides* not *C. orcuttiana* (Simpson 2013, pers. comm.). He annotated the specimen and a note of correction will be sent to the CNDDB. This occurrence is, therefore, not be discussed further in this review, and an entry for EO 18 is not included in Appendix 1.

The historical occurrence of *Chorizanthe orcuttiana* on Kearney Mesa (EO 9) is based on a collection that gave a general location (Gander 1935) and is considered too vague or otherwise extirpated (Appendix 1).

An occurrence at Ocean Beach, a site historically referred to as Mussel Beds or Mussel Beach, (Cleveland and Orcutt 1884) is considered extirpated. This occurrence has not yet been assigned an EO number and is mapped in Figure 1, just north of EO 17 (Appendix 1). During the course of the previous 5-year review, a specimen of *Chorizanthe orcuttiana* was located at the herbarium of the University of California, Berkeley that documented a previously unreported historical occurrence. The specimen was collected by Katherine Brandegee in 1905 on a hill northeast of the Brotherhood Grounds. The Brotherhood Grounds is now occupied by the Point Loma Nazarene University (Brandegee 1905) (Figure 1). This occurrence, considered extirpated, has been assigned EO number 17 (CNDDB 2012, EO17) (Appendix 1).

Chorizanthe orcuttiana was rediscovered at Point Loma after the species was listed. It is difficult to judge the extent to which the rediscovered occurrences represent portions of a contiguous population or even rediscovery of a persistent but undetected occurrence. It is possible that one or more of these extant populations are coincident with those from which the historical herbarium collections poorly labeled as “Point Loma” were made.

Element occurrence 14 is located south of the Point Loma Nazarene University. This occurrence is documented by a collection made in 2003 (Estrella and Lauri 2003). The annual monitoring report of restoration efforts identifies this occurrence as “West Slope North” (U.S. Navy 2012a, p. 12). We consider this occurrence extant.

Bauder (2000, p. 7) revised the location of EO 3, originally based on a Brandegee collection (Brandegee 1906), following reinterpretation of the collection label and period maps of Point Loma. A collection made nearby in 1999 serves as a basis for CNDDB EO 13. The CNDDB has merged EO 3 with EO 13, under the designation EO 13 (Appendix 1). The annual monitoring report identifies this occurrence as “West Slope South” (U.S. Navy 2012a, p. 12). We consider this occurrence extant.

Element Occurrence 12 is located on the east side of Cabrillo Memorial Drive, NNE of Bennington Memorial at Point Loma. This occurrence is documented by several collections (Eliason and Russell 1997; Russell 1998). The Navy's annual monitoring report identifies this occurrence as "East Slope" (U.S. Navy 2012a, p. 12). This occurrence is considered extant.

The CNDDB EO 2 at Point Loma (Figure 1) has been considered extirpated since prior to the species listing.

The known historical range of *Chorizanthe orcuttiana* remains the same as it was at the time of listing. We currently consider there to be five extant occurrences (one of these is presumed extant) and nine extirpated occurrences (four of these are presumed extirpated or too vague to map) (Appendix1). However, no surveys have been reported for 10 years or more for several occurrences. All of the known occurrences of this species are within 6 mi (10 km) of the Pacific Ocean at elevations less than 328 feet (100 meters) above mean sea level. Thus, EO 10, presumed extant, is the northern-most occurrence. Appendix 1 does not include references to EOs that were likely based on misidentified specimens or those that were merged by CNDDB with other occurrences. The historical range remains the same as it was in the previous 5-year review. Since that review an additional extant occurrence has been detected. Several herbarium specimens, found since the previous review, document additional historical occurrences within the current known historical range.

Abundance

At the time of listing we considered that the single site then thought to be extant, supported fewer than 40 plants. Population trend data for an annual plant may be misleading, and *Chorizanthe orcuttiana* is a naturally rare species. Differences in plant numbers of *C. orcuttiana* fluctuate within years and differ between years due to total seasonal precipitation, and likely the pattern of rainfall (Bauder *et al.* 2010b, p. 9). Plant numbers detected at three occurrences on NBPL ranged between 73 and 3,955 (EO 12), 0 and 832 (EO 13), 0 and 3,148 (EO 14), and plant numbers detected at the occurrence at Oak Crest Park (EO 10) ranged between 0 and 30 (Bauder and Sakrison 2010, p. 8). Germination usually takes place over a period of time and seasonal weather patterns could lead to two or more germination events (Bauder *et al.* 2010b, p. 9). More plants may be evident during surveys conducted later in the spring than would be found earlier. The percentage of "0" count surveys was 30 percent or greater if the population or subpopulation plant count was lower than 50 plants. This would seem to indicate that such populations or subpopulations might be extant as a persistent soil seed bank, even though standing plants were not seen during a particular survey.

Plant abundance cannot be assumed to be a measure of reproductive success or an indicator of seed numbers available for subsequent year's germination or soil seed bank. Bauder *et al.* (2010b, p. 7) stated that although they reported the most plants in 2009 for three occurrences at Point Loma, the plants were very small and many seeds did not "fill" (failed to be pollinated or if pollinated had insufficient resources to develop and mature). No specifics on relative numbers or measures of seeds not "filled" were provided in the report, nor did it include an explanation for the plant condition or alternative measures of reproductive success.

Changes in Taxonomic Classification or Nomenclature

The taxonomic classification and nomenclature of *Chorizanthe orcuttiana* have not changed since the taxon was described in 1884 (Parry 1884, pp. 54, 63).

Genetics

Allozyme analysis of leaf material collected from sites at Point Loma indicate that *Chorizanthe orcuttiana* may be predominately selfing, but did not indicate whether this was within a single flower or among the flowers on a single plant (Truesdale 2010, p. 28). Truesdale (2010, pp. 32–39) used analysis of DNA using ISSRs (Intersimple Sequence Repeats) to assess genetic differences among closely related and located individuals. He found that there was higher genetic diversity within the patches of plants than among patches or localities (Truesdale 2010, p. 38). This indicates that each local occurrence has high conservation value if maintenance of genetic diversity is the desired outcome.

Species-specific Research and/or Grant-supported Activities

Various State and Federal funds have supported species-specific research on *Chorizanthe orcuttiana* and yielded valuable information to inform conservation and management decisions. Activities listed below have been variously addressed by one or more reports authored by Bauder. Some aspects of these final reports are based on work carried out in previous years or are reiterative and thus should not imply multiple efforts.

- Surveys and monitoring of extant and historical occurrences have been conducted (Bauder 2000, pp. 5–21; Bauder *et al.* 2010a, pp. 3–18).
- Suitable habitat including soil preferences has been described (Bauder 2000, pp. 23–48; Bauder *et al.* 2010a, pp. 19–35).
- Seed germination requirements have been identified although numbers and provenance of seeds collected, descriptions of storage parameters, and their fates is lacking in some cases (Bauder 2000, pp. 60–68; Bauder *et al.* 2010a, pp. 42–58; Bauder *et al.* 2010b, pp. 11–17).
- Other aspects of reproductive biology (e.g., pollinators) have been assessed (Bauder 2000, pp. 57–61; Bauder *et al.* 2010a, pp. 37–42).
- Based on species and occurrence assessments, management recommendations have been presented (Bauder *et al.* 2010a, pp. 64–65; Bauder *et al.* 2010b, pp. 18–20).
- Population census data were gathered as part of this research (Bauder *et al.* 2010a, pp. 58–63; Bauder *et al.* 2010b, pp. 4–10)
- The distribution of genetic diversity within and among populations and localities has been assessed (Bauder and Sakrison 2010, pp. 11–12, Appendix A and B: Truesdale 2010, pp. 22–39).

Lawson (2011, p. 83) developed a stochastic age and stage based population model for *Chorizanthe orcuttiana* that shows suitable habitat increasing or decreasing depending upon the climate change scenario (+27 percent in hotter and slightly wetter conditions or –64 percent in much hotter and drier scenario respectively).

The most recent report on monitoring efforts for *Chorizanthe orcuttiana* is that by Cloud-Hughes and Zink (U.S. Navy 2012a). This was focused on habitat maintenance and enhancement and monitoring of the species at Point Loma. The results included assessments of associated species, removal of invasive plant taxa, outplanting of native plants, and erosion monitoring.

The studies noted above have contributed valuable information on habitat preferences, efficacy of restoration efforts, germination requirements, and population fluctuations over time. Information on the likely breeding system of the species and potential changes in the amount of suitable habitat has also been developed.

Vulnerability Factors

Species may be vulnerable to threats for a variety of reasons. Primack (2006, p. 159) outlined five categories of species considered most vulnerable to extinction as:

1) Species with a very narrow geographical ranges;
2) species with only one or a few populations;
3) species in which population size is small (identified as one of the best predictors of species extinction rate);
4) species in which population size is declining; and
5) species that are hunted or harvested by people.

Consideration of these categories and its life history traits can provide a vulnerability profile for *Chorizanthe orcuttiana.* Fiedler and Ahouse (1992, p. 32) consider ecology, biotic competition, population dynamics, reproductive biology, and genetics among the factors affecting the rarity of a plant taxon that would be reflected in numbers 2 and 3 above (few and small populations).

Chorizanthe orcuttiana exhibits several attributes that might limit its distribution and population growth, rendering it more vulnerable to extinction including:

1) The species is restricted to a narrow range of suitable habitat subject to degradation by encroaching nonnative and native vegetation, or erosion.
2) Occurrences are spatially small or support relatively few individuals.
3) Establishment of seedlings may be hampered by habitat limitations or conditions and lack of natural fire cycles to clear the habitat of encroaching nonnative and native vegetation.

These vulnerabilities may separately or in concert exacerbate any of the threats described below in the Five-Factor Analysis.

Five-factor Analysis

Threats to *Chorizanthe orcuttiana* identified at the time of listing included: development, trampling, fuel modification activities, over-collection, inadequacy of existing regulatory mechanisms, restricted distribution and small population size, and nonnative plants (USFWS 1996, pp. 52377–52381). In the previous 5-year review of this species, we indicated that over 65 percent of the remaining southern maritime chaparral habitat was afforded protection, that trampling was reduced or eliminated, that there was no evidence that over-collection was a threat

to the species, and that regulatory mechanisms, including the Act, were adequate if funded (USFWS 2008, pp. 7–8). The previous 5-year review also determined that the species was still threatened by restricted distribution, small population size, lack of a natural fire regime or substitute, and competition from nonnative plants. In that review, we added the threat from erosion and encroaching native plants. The latter threat from encroaching native plants may be attributed to a lack of a natural fire regime or suitable management alternative. The following five-factor analysis describes and evaluates the current threats to *C. orcuttiana* attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act and differences from the previous 5-year review. The status and threats to *C. orcuttiana* at listing, in the previous 5-year review, and currently, are outlined in Appendix 1. Threats to each extant occurrence are identified in Appendix 1 by the factor designation under which they were discussed at the time.

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

At the time of listing, habitat supporting *Chorizanthe orcuttiana* was threatened by proposed recreational development at the only known occurrence at Oak Crest Park in Encinitas. This threat was considered reduced or eliminated in the previous 5-year review (USFWS 2008, p. 7). Since listing, some suitable habitat has been degraded or destroyed while other habitat areas have been protected as part of approved Habitat Conservation Plans (HCPs) or Integrated Natural Resource Management Plans (INRMPs) as discussed below under Factor D.

The threat from erosion discussed under Factor E in the previous 5-year review is also included here because it primarily impacts habitat. Invasive nonnative plants identified at the time of listing was discussed under Factor E in the listing final rule as well as our previous 5-year review. Impacts to the habitat from this threat are discussed here under Factor A because encroaching nonnative and native plants curtail or modify habitat otherwise suitable for *Chorizanthe orcuttiana.* Likewise, the threat to *C. orcuttiana* from interruption of the natural fire cycle discussed under Factor E in the listing rule and previous 5-year review is included here under Factor A, Fire Regime, as a threat to the species habitat.

Erosion

Erosion was not noted as a threat in the listing final rule, however, it was identified in the 2008 5-year review. Bauder indicated that drainage outflow from culverts under Cabrillo Memorial Drive on Point Loma, needs to be controlled (Bauder 2000, p. 76). Erosion was also one of the management activities addressed in Rusev and Zink (2005). Erosion control measures and outplantings of native plants for erosion control have occurred at all three of the known extant occurrences on NBPL and are described as effective (U.S. Navy 2012a, pp. 10–15). If the slightly wetter scenario described below under Climate Change occurs, additional erosion from increased rainfall or untimely rainfall events could increase the likelihood of habitat loss or degradation. The Erosion Control Plan, developed in 2008, for NBPL is included in the Navy's current management for native habitats and special status natural communities (U.S. Navy 2012b, pp. 4-6 and 4-13). Erosion should pose a minimal long-term threat for these three occurrences.

Invasive Plants, nonnative and native

Here, as in our previous 5-year review of *Chorizanthe orcuttiana*, we discuss plants identified as invasive grasses and weeds in the listing final rule under the heading of invasive nonnative plants. Invasive nonnative plants are the greatest known threat to the three extant occurrences of *Chorizanthe orcuttiana* on NBPL. The invasive nonnative *Carpobrotus edulis* (iceplant) covers many of the open sandy areas on NBPL (Bauder 2000, p. 21; U.S. Navy 2012a, pp. 36–37). *Carpobrotus edulis* produces thick layers of prostrate, succulent stems, and leaves over the soil surface; deposits organic material; and grows back readily after removal (Bauder 2000; U.S. Navy 2012a, p. 36). *Melinis repens* (Natal grass) is another nonnative plant that threatens *C. orcuttiana* on NBPL (Rusev and Zink 2005; U.S. Navy 2012a, p. 34); the potentially invasive *Acacia cyclops* has also been identified (Bauder 2000; U.S. Navy 2012a, p. 30). These species can preclude expression of the above ground population of *C. orcuttiana* by covering the otherwise suitable habitat with biomass and shade. If this is a long-term condition, presumably the seed bank would eventually be depleted thereby diminishing the range of the species. These invasive nonnatives were present at the time of our previous 5-year review and continue to threaten the known extant occurrences on NBPL (Appendix 1).

We cite a draft plan for *Chorizanthe orcuttiana* habitat enhancement on NBPL in our 2008 5-year review of *C. orcuttiana*. This plan is based on a cooperative agreement between the Soil Ecology and Restoration Group (SERG) and Southwest Division Naval Facilities Engineering Command (Rusev and Zink 2005). The plan covers activities to eradicate the invasive nonnatives *Carpobrotus edulis* and *Melinis* (as *Rhynchelytrum*) *repens* (Natal grass) and stabilize slopes prone to erosion in *C. orcuttiana* habitat. The agreement identified three areas: "East Slope," "West Slope 1," and "West Slope 2." These coincide with the known extant occurrences, EO 12 (CNDDB 2012; East Slope (U.S. Navy 2012a, p. 12)), EO 13 (CNDDB 2012; West Slope South (U.S. Navy 2012a, p. 14)), and the occurrence noted above now assigned as EO 14 (CNDDB 2012; West Slope North (U.S. Navy 2012a, p. 17) (Appendix 1). Habitat enhancement activities were carried out at times when there were no standing plants. Occupied habitat areas were marked for hand removal of the *C. edulis* within the perimeters and outward to 49 feet (15 meters) from the perimeters. Control of *C. edulis* farther than 49 feet (15 meters) and down slope from the marked habitat perimeters will be achieved by foliar application of a post-emergence herbicide that is inactivated upon contact with the soil (Rusev and Zink 2005, p. 14). Dead mats and underlying litter will remain in the herbicide-treated section to function as temporary erosion control (Rusev and Zink 2005, p. 14). Control of *Melinis repens* will be achieved in the same manner. Erosion control methods were site specific. We concurred that the implementation of measures in the plan may affect but were not likely to adversely affect *C. orcuttiana*. In their plan, Rusev and Zink (2005) describe control of nonnative plants as an ongoing monthly process.

Eradication of nonnative plants, especially *Carpobrotus edulis*, has been the focus of the native habitat enhancement for *Chorizanthe orcuttiana* on NBPL (U.S. Navy 2012a, p. 9). Activities cover all three known extant occurrences of *Chorizanthe orcuttiana* on NBPL. The annual monitoring report describes the ongoing nonnative plant eradication efforts at the three known extant occurrences (EO 12, 13, and 14) as well as measures taken to control erosion after the nonnative plant cover is removed. Successful control of nonnatives at EO 12 but slow

recruitment of native species was reported (U.S. Navy 2012a, p. 27). Similar results were reported for EO 13 after the removal of *C. edulis*, and *C. orcuttiana* has germinated here every year since 2005 (Bauder *et al.* 2010b, pp. 4 and 8; U.S. Navy 2012a, p. 31). Recruitment of smaller native shrubs has also occurred at this site. For the EO 14 site, nonnative plant cover was reduced from a high of 47.5 to 1.2 percent. However, there was an associated increase of nonnative annuals (U.S. Navy 2012a, p. 35).

Although not identified as a threat in the listing rule, the unchecked invasive growth of native plants likely due to lack of browsing and natural fire regimes has likely led to a decrease in open, suitable habitat for the species. Encroaching native plants and invasive nonnative plants both pose threats to *Chorizanthe orcuttiana*. *Muhlenbergia rigens* (deergrass), a native grass, was removed from some of the habitat at Oak Crest Park because of its potential to crowd out and shade otherwise suitable habitat for *C. orcuttiana* (Bauder 2000 p. 21). This threat was mentioned in our 2008 5-year review of the species and is likely still a threat to all five of the extant occurrences.

Fire Regime

The suitable habitat of Chamise chaparral present at Oak Crest Park and other native occurrences is not subject to natural fire regime that would include periodic fires that would tend to reduce and lessen the impact of overstory encroachment on *Chorizanthe orcuttiana* and its habitat. Likewise, extant occurrence areas are not known to be managed to mimic the results of a natural fire regime. The lack of a natural fire regime or managed alternative for the southern maritime chaparral may pose a threat to *C. orcuttiana* by allowing the shrub canopy to cover over the sandy openings favored by the *C. orcuttiana* precluding germination of the soil seed bank and reproduction. Another similar annual *Chorizanthe* species, restricted to open patches of low nutrient soils in sand hills of Santa Cruz Mountains, was found to exhibit low survivorship, growth and reproduction under conditions of dense shade as would be encountered in areas that had become overgrown with native vegetation (McGraw and Levin 1998). A natural fire regime can contribute to holding in check encroaching vegetation; consequently its lack, or the lack of an effective substitute, may be considered to have potential impacts to the suitable *C. orcuttiana* habitat. Fire likely contributes to maintenance of natural open spaces for annual and herbaceous perennial plants associated with these habitats, but it is not likely to be the only factor in maintenance of suitable habitat for *C. orcuttiana*.

While there is potential for fire, “a wildland fire has not occurred on NBPL through most of the 20th century” (Navy 2012b). “There is evidence that the plant communities of Point Loma are changing due to an extended fire-free period, but it is not known if the current fire-free interval is outside the norms of the "natural" fire regime, and if any animal or plant has been permanently lost from the peninsula as a result” (Navy 2012b). A truly natural fire regime has likely been precluded in much of San Diego County for some time and has been replaced by an anthropogenic regime of periodic fires.

Summary of Factor A

Threats to *Chorizanthe orcuttiana* attributable to Factor A are essentially the same as those identified in our last 5-year review (USFWS 2008, pp. 6–8) in extent, and immediacy. Specific threats from erosion identified for the three extant occurrences on NBPL are largely controlled. Erosion has not been identified as a specific threat to the other two known extant occurrences. Encroaching invasive plants, native and nonnative, pose a persistent threat to the five extant occurrences as well as constitute a rangewide threat to the open sites in vegetation likely to support additional, undetected occurrences of the species. The lack of control of invasive plants by a natural fire regime or effective substitute is also a rangewide threat.

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

Chorizanthe orcuttiana was considered vulnerable to over-collection at the time it was listed (USFWS 1996, p. 52379). However, based on collections cited in a monograph on the annual species of *Chorizanthe* (Reveal and Hardham 1989, p. 183) and those listed on the Consortium of California Herbaria website, overutilization was no longer considered a threat to the species in our previous 5-year review (USFWS 2008, p. 8). The available specimens are vouchers for documentation of occurrences. Few collections have been made since the species was listed. Over-collecting as a form of overutilization is not considered a threat to the species at this time.

FACTOR C: Disease or Predation

Consistent with the listing final rule and previous 5-year review, we do not consider disease or predation a threat to *Chorizanthe orcuttiana* at this time.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

When *Chorizanthe orcuttiana* was listed as endangered under the Act in 1996, it was already listed as endangered under the California Endangered Species Act (CESA). In the previous 5-year review, we outlined regulatory mechanisms that afforded some level of protection to the species (USFWS 2008, p. 8).

At the time of listing, regulatory mechanisms considered to potentially provide some protection for *Chorizanthe orcuttiana* included: (1) State laws, including the Native Plant Protection Act (NPPA), California Endangered Species Act (CESA), California Environmental Quality Act (CEQA), and California Natural Community Conservation Planning (NCCP) Program, which included the City of San Diego's Multiple Species Conservation Plan (MSCP) and the Multiple Habitat Conservation Plan (MHCP) in northern San Diego County; (2) Federal laws and regulations including the Endangered Species Act (Act) and Sikes Act. Land acquisition and management by Federal, State, or local government agencies or by private conservation organizations was also evaluated. The regulatory mechanisms are reordered for clarity, and those applicable to *C. orcuttiana* are discussed below.

State Regulatory Mechanisms

State laws providing protection to *Chorizanthe orcuttiana* include the NPPA enacted in 1977, CESA enacted in 1984, CEQA enacted in 1970, and the NCCP Act enacted in 1991.

California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA)

Protections have been afforded to *Chorizanthe orcuttiana* since the species was listed as endangered by the State in 1979. Both the NPPA and CESA forbid the "take" of State-listed species (Chapter 10, Section 1908 and Chapter 1.5, Section 2080, CFG code). 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 are 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. Sections 2081(b) and (c) of CESA allow CDFW to issue incidental take permits for State-listed threatened and endangered species if: (1) the authorized take is incidental to an otherwise lawful activity; (2) the impacts of the authorized take are minimized and fully mitigated; (3) the measures required to minimize and fully mitigate the impacts of the authorized take are roughly proportional in extent to the impact of the taking of the species, maintain the applicant's objectives to the greatest extent possible, and are capable of successful implementation; (4) adequate funding is provided to implement the required minimization and mitigation measures and to monitor compliance with and the effectiveness of the measures; and (5) issuance of the permit will not jeopardize the continued existence of a State-listed species.

Because *Chorizanthe orcuttiana* is both a federally and State-listed species, consultation under CESA requires that a project (or activity) proponent submit a letter to CDFW describing the project, the species potentially affected, proposed avoidance and minimization measures for the species, and request concurrence from CDFW that the project would not result in take of the State-listed species (California Code of Regulations § 783.2; Title 14, Subdivision 3, Chapter 6, Article 1 of the CFG Code). If CDFW determines that take will not occur, their letter of concurrence represents their CESA determination. If CDFW determines that take will occur, then a consistency determination (pursuant to Fish and Game Code 2080.1) or application for a take permit (pursuant to Fish and Game Code 2081) is required. The CDFW can also permit take or possession of State threatened, endangered, or candidate species for scientific, educational, or management purposes.

California Environmental Quality Act (CEQA)

CEQA (California Public Resources Code 21000–21177) is the principal statute mandating environmental assessment of projects in California. The purpose of CEQA is to evaluate whether a proposed project may have an adverse effect on the environment and, if so, to determine whether that effect can be reduced or eliminated by pursuing an alternative course of action or through mitigation. CEQA applies to projects proposed to be undertaken or requiring approval by State and local public agencies (*http://www.ceres.ca.gov/topic/env_law/ceqa/summary.html*). CEQA requires disclosure of potential environmental impacts and a determination of "significant" if a project has the potential

to reduce the number or restrict the range of a rare or endangered plant, including *Chorizanthe orcuttiana*. However, projects may move forward if there is a statement of overriding consideration. 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 (California Public Resources Code 21000; CEQA Guidelines at California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000–15387).

The California Native Plant Society (CNPS) works in collaboration with CDFW to manage botanical experts throughout the State who constitute the Rare Plant Status Review groups. Using this information, CNPS maintains the *Inventory of Rare and Endangered Plants*. In the current *Inventory*, *Chorizanthe orcuttiana* is afforded the rare plant rank of 1B.1, rare, threatened, or endangered in California and elsewhere, and seriously endangered in California (CNPS 2013). This species has a state rank of S1: Critically imperiled and a Global rank of G1: Critically imperiled (CNPS 2013). For their part, CDFW maintains the *Special Vascular Plants, Bryophytes, and Lichens List*. All plants afforded California Rare Plant Ranks 1, 1A, 1B, 2, 3, and 4 by CNPS may fall under Section 15380 of CEQA (CDFW 2013, p. iii). In addition, CDFW is the trustee agency for wildlife of California under CEQA (Section 15386), including plants, ecological communities, and the habitat upon which they depend, and the agency provides expertise in reviewing and commenting on environmental documents during the CEQA process regarding potential negative impacts to these resources (CDFW 2013, p. viii).

The Natural Community Conservation Planning (NCCP) Act

The NCCP program is a cooperative effort between the State of California and numerous private and public partners with the goal of protecting habitats and species. An NCCP program identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The program began in 1991 under the State's NCCP Act (CFG Code 2800–2835). The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land uses (*http://www.dfg.ca.gov/nccp/*).

Many NCCPs are developed in conjunction with HCPs prepared pursuant to the Act. Thus, regional NCCPs may provide protection to federally listed species, such as *Chorizanthe orcuttiana*, by conserving native habitats upon which the species depend. State regulatory mechanisms affecting this species are adequate, but may not apply to all occurrences. The specific measures under joint NCCP/HCPS in San Diego County that afford protection to *C. orcuttiana* are discussed below under the Act in the **Federal Regulatory Protections** section.

Federal Regulatory Mechanisms

National Environmental Policy Act (NEPA)

All Federal agencies are required to adhere to the NEPA of 1970 (42 U.S.C. 4321 *et seq.*) for projects they fund, authorize, or carry out. 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. The Council on Environmental Quality's

regulations for implementing NEPA state that agencies shall include a discussion on the environmental impacts of the various project alternatives (including the proposed action), any adverse environmental effects that cannot be avoided, and any irreversible or irretrievable commitments of resources involved (40 CFR part 1502). NEPA does not impose substantive environmental obligations on Federal agencies—it merely prohibits an uninformed agency action. However, if an Environmental Impact Statement is prepared for an agency action, the agency must take a "hard look" at the consequences of this action and must consider all potentially significant environmental impacts. Effects on threatened and endangered species is an important element for determining the significance of an impact of an agency action (40 CFR § 1508.27). Thus, although NEPA does not itself regulate activities that might affect *Chorizanthe orcuttiana*, it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on sensitive species and their habitats. Federal agencies may also include mitigation measures in the final Environmental Impact Statement as a result of the NEPA process that help to conserve *C. orcuttiana* and its habitat, and these may include measures that are different than those required under the Act through the section 7 consultation process described below.

Endangered Species Act of 1973, as amended (Act)

The Act is the primary Federal law that provides protection for *Chorizanthe orcuttiana*. The Service is responsible for administering the Act, including sections 6, 7, 9, and 10.

The Cooperative Endangered Species Conservation Fund (Conservation Fund), under section 6 of the Act, provides grants to States and Territories to participate in voluntary conservation projects for candidate, proposed, and listed species. The program provides funding to States and Territories for species and habitat conservation actions on non-Federal lands. Four grant programs are available through this Conservation Fund: (1) Conservation Grants, (2) HCP Assistance Grants, (3) HCP Land Acquisition Grants, and (4) Recovery Land Acquisition Grants. The State is processing a Conservation Grant titled: Orcutt's Spineflower (*Chorizanthe orcuttiana*) Restoration and Enhancement Project for which funding is anticipated in 2014.

Section 7(a)(1) of the Act requires all Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat.

The section 7(a)(2) prohibition against jeopardy applies to listed plants as well as animals, but other protections of the Act are more limited for plants. There is no prohibition against the taking of a protected plant under section 7(a)(2), thus no incidental take statement is prepared in the analysis of effects associated with a project. A non-jeopardy opinion for plants therefore would not include reasonable and prudent measures to minimize incidental take. However, voluntary conservation recommendations may be included, which are discretionary actions the action agency can implement relevant to the proposed action and consistent with their section 7(a)(1) authority to minimize or avoid adverse effects of an action on listed species or critical

habitat, to help implement recovery plans, or develop information; however, they are not a precondition for a finding of no jeopardy (or adverse modification).

Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement. Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species because take of plants in not prohibited. However, limited protection of listed plants from take is provided to the extent that the Act and the implementing regulations prohibit the removal and reduction to possession of federally listed threatened or endangered plants or the malicious damage of endangered plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas when in violation of State law or regulation or in the course of any violation of a State criminal trespass law. This would apply to the three known extant occurrences on military lands.

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the "take" of federally listed wildlife; however, plants are not protected against take. Instead, plants are protected from harm in two particular circumstances. Section 9(a)(2) of the Act 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 any State law or regulation or in the course of violation of a State criminal trespass law. The protection of section 9 afforded to endangered species is extended to threatened wildlife and plants by regulation. Federally listed plants may be incidentally protected if they co-occur with federally listed wildlife species.

Section 10(a)(1)(A) of the Act includes provisions to permit any act otherwise prohibited under section 9 for scientific purposes or to enhance the propagation and survival of the affected species. Occurrences of *Chorizanthe orcuttiana* on Federal lands would be covered under these provisions, and these activities would require consultation and coordination with the Service.

For projects without a Federal nexus that would likely result in incidental take of listed animal species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B) of the Act. To qualify for an incidental take permit, applicants must develop, fund, and implement an HCP that details measures to minimize and mitigate the project's adverse impacts to the species addressed or "covered" by the plan, which may include State-listed and other sensitive animals and plants in addition to federally listed species. Also, under section 7(a)(2) of the Act, the Service must determine that issuance of the incidental take permit will not appreciably reduce the likelihood of the survival and recovery of any listed species, whether plant or animal, in the wild. Therefore, HCPs can provide an additional layer of regulatory protection to listed plants as well as animals. The Multiple Species Conservation Program and the Multiple Habitat Conservation Program are large-scale, multi-jurisdictional NCCP/HCPs in San Diego County for which the Service has issued incidental take permits under section 10(a)(1)(B) of the Act. These two major NCCP/HCPs include the range of *Chorizanthe orcuttiana*.

Multiple Species Conservation Program (MSCP)

The MSCP (City of San Diego 1998) is a comprehensive habitat conservation planning program that is designed to balance urban growth in southwestern San Diego County with the protection of fish, wildlife, and plants. There are four known extant occurrences of *Chorizanthe orcuttiana* within the MSCP plan area; three of these are on military lands. Seven other historical occurrences of *Chorizanthe orcuttiana* are within the plan area of the MSCP (Appendix 1).

Chorizanthe orcuttiana is not a covered species under the MSCP (City of San Diego 1998, Table 3–5, p. 3-41); however, the plan emphasizes avoidance of impacts to biologically sensitive resources, including habitat known to support *C. orcuttiana* identified as southern maritime chaparral. The conservation target for southern maritime chaparral under the MSCP is 1,137 ac (460 ha), and to date, the plan has achieved 952 ac (385 ha) or approximately 84 percent of the conservation goal for this vegetation community (CDFW 2014; https://nrm.dfg.ca.gov/habitrak/Reports.aspx; accessed on February 5, 2014). Provisions of this conservation are not predicated on any specific potential for the conserved sites to support *C. orcuttiana*. However, conserved habitat may support undetected occurrences of the species or provide opportunities for restoration.

Multiple Habitat Conservation Plan (MHCP)

The MHCP is a comprehensive, multi-jurisdictional planning program designed to create, manage, and monitor an ecosystem preserve among seven cities (Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Vista, and Solano Beach) in northwestern San Diego County (SANDAG 2003). The overall goal of the MHCP is to maintain biodiversity and ecosystem health in the region while maintaining quality of life and economic growth opportunities (SANDAG 2003).

The MHCP establishes overall conservation goals for species and habitats covered by the plan, with each local jurisdiction responsible for implementing their respective portion of the overall plan through individual "subarea plan" development. To date, only the City of Carlsbad has been issued an incidental take permit under section 10 of the Act for completing a subarea plan under the MHCP (City of Carlsbad 2004).

The MHCP targets 837 ac (339 ha) of southern maritime chaparral for conservation within the overall plan area, and 342 ac (138 ha) specifically within the City of Carlsbad (CDFW 2014; https://nrm.dfg.ca.gov/habitrak/Reports.aspx; accessed on February 5, 2014). To date, 381 ac (154 ha) of southern maritime chaparral has been conserved under the overall MHCP, most (345 ac (140 ha)) of which is within the City of Carlsbad. Under the City of Carlsbad's subarea plan, management measures designed to protect the constituent species of this vegetation include minimizing edge effects associated with urban development and protecting the species against fires by using controlled burns or other fuel modification methods to preclude catastrophic fire events and stimulate regeneration of the population (City of Carlsbad 2004, Appendix C, p. C-11).

Chorizanthe orcuttiana is a covered, narrow endemic species under the MHCP (SANDAG 2003, vol. 1, pp. 2-15–2-16; p. 3-9) and will be considered adequately conserved when 72 percent of its

potential habitat and 100 percent of the one known critical location and major population in the City of Encinitas is conserved. The MHCP also includes species-specific conditions that must be met by individual subarea plans to adequately conserve *C. orcuttiana* (SANDAG, vol. 2, pp. 4-56–4-57). One of these conditions requires adherence to the Narrow Endemics Species Policy, which applies to any populations of *C. orcuttiana*, including those already known and any found in the future.

For populations of narrow endemic species within Focused Planning Areas (FPA) from which the overall MHCP preserve will be assembled, the Narrow Endemic Species Policy requires, in priority order, maximum avoidance of project impacts, minimization of impacts, and species-specific mitigation for unavoidable impacts. The mitigation must be designed to achieve no net loss of narrow endemic populations, occupied acreage, or population viability within the FPA. In addition, individual subarea plans may allow no more than 5 percent gross cumulative loss of narrow endemic populations or occupied acreage with the FPA (SANDAG 2003, vol 2, Appendix D, p. D-1).

For populations outside the FPA, this policy requires maximum avoidance of impacts to critical and major populations and, in priority order, avoidance, minimization, and mitigation for impacts to any populations. Mitigation must be designed to minimize adverse effects to the species viability and contribute to the species recovery and to achieve no let loss of narrow endemic population locations, occupied acreage, or population viability in the MHCP subregion, and preferably, within each subarea. Individual subarea plans may allow no more than 20 percent gross cumulative loss of narrow endemic locations, population numbers or occupied acreage (SANDAG 2003, vol 2, Appendix D, p. D-1).

Under the City of Carlsbad's subarea plan, narrow endemic species are populations of native species that occur in the City and have restricted geographic distribution, soil affinities, and/or habitats and for which the substantial loss might jeopardize the long-term survival of the species (City of Carlsbad 2004, p. D-90). The City's subarea plan complies with the overall MHCP Narrow Endemics Species Policy by requiring 100 percent conservation of narrow endemic populations within the City's preserve system and at least 80 percent conservation of these populations outside the City's preserve system (City of Carlsbad 2004, D-90).

Conservation provisions of the umbrella MHCP that could benefit the occurrence of *Chorizanthe orcuttiana* at Oak Crest Park and other areas of suitable habitat for the species in Encinitas are not enforceable unless the City of Encinitas completes development of a subarea plan, which is approved under the NCCP Act and/or Act.

Sikes Act

The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans with the Secretaries of Agriculture and the Interior for natural resources on public lands. The Sikes Act Improvement Act of 1997 requires Department of Defense (DOD) installations to prepare INRMPs that provide for the conservation and rehabilitation of natural resources on military lands consistent with the use of military installations to ensure the readiness of the Armed Forces. The INRMPs incorporate, to the maximum extent practicable, ecosystem

management principles and provide the landscape necessary to sustain military land uses. INRMPs are developed in coordination with the State and the Service, and are generally updated every 5 years. Although INRMP implementation is subject to funding availability, it is an important guiding document that helps to integrate natural resource protection with military readiness and training.

The Navy issued the revised Final INRMP for NBPL in 2012 (U.S. Navy 2012b). Under the INRMP, the Navy recognizes *Chorizanthe orcuttiana* as a target species and plans to manage the species to promote survival of viable populations on the installation. Management activities to promote the conservation of federally listed species are prioritized, although implementation is subject to available funding. Management activities identified within the INRMP that will benefit *C. orcuttiana* include: species surveys and monitoring (U.S. Navy 2012b, p. 4-41); removal of invasive species, particularly *Acacia* spp. and *Carpobrotus edulis*; and removal of invasive species from areas with open sandy sites where there is thought to be a viable seed bank of *C. orcuttiana* (U.S. Navy 2012b, p. 4-43).

The INRMP also outlines the Navy's participation in the Point Loma Ecological Conservation Area (PLECA). The PLECA consists of specific lands under the jurisdictions of the Navy, Department of Veterans Affairs, City of San Diego, U.S. Coast Guard, and the National Park Service, which are managed under a voluntary conservation agreement. Biological objectives for the PLECA include maintenance of functional ecosystems and habitat linkages, viable populations of the target plant and animal taxa, and the full range of native vegetation communities and successional phases in ecologically significant areas (U.S. Navy 2012b, p. 4-27). Two of the three extant occurrences of *Chorizanthe orcuttiana* at Point Loma are located on NBPL within the PLECA (U.S. Navy 2012b, p. 4-42), and one occurrence (EO 12) is projected to be added to the PLECA (U.S. Navy 2012b, pp. 4-26, 4-28). The legend within the NBPL INRMP for Figure 4-7 on page 4-26 erroneously indicates that the area was already added to the PLECA since 1995 (A. Wastell, U.S. Navy, 2013, pers. comm.). The annual monitoring report (U.S. Navy 2012b) describes the conditions and management activities that have taken place at the extant occurrences on NBPL under the control of the Navy.

Summary of Factor D

The above laws and regulations, as noted in our previous 5-year review (USFWS 2008, pp. 8–10) have greatly reduced the threats to *Chorizanthe orcuttiana* and the habitat where it occurs. The Act provides protections to the species through consultation, by providing a mechanism for protection and management on occupied Federal lands. The majority of extant occurrences occur on Federal land, which provides good opportunities for management and conservation of *C. orcuttiana* through existing regulatory mechanisms. The laws, regulations, and planning efforts mentioned here have largely eliminated major habitat loss and alteration, though we will continue to work with our partners to monitor and prevent small-scale losses.

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

In the listing final rule, *Chorizanthe orcuttiana* was considered threatened by naturally occurring random events exacerbated by drought or fire because of the species' restricted distribution and

the small size of the known population (USFWS 1996, p. 52381). Invasive nonnative grass and weed species as well as, trampling and interruption of the natural fire cycle were also considered threats to this species (USFWS 1996, p. 52381). Threats associated with invasive plants and disruption of the natural fire regime are discussed under Invasive Plants and Fire Regime in FACTOR A because they impact the habitat of *C. orcuttiana*. Threats not identified in our previous 5-year review associated with climate change are addressed here.

Naturally Occurring Random Events

Chorizanthe orcuttiana is not known to have ever had an extensive or continuous distribution. There are only 14 known historical occurrences of the species. These are all near the coast in San Diego County, California, extending for 24 mi (38.7 km). Currently there are five extant occurrences distributed along 17.6 mi (28.4 km) of the coast of San Diego County. The distribution of known extant occurrences is considerably less than the historical range and distribution (Figure 1). Consequently, considering the importance of the genetic diversity represented in each population (refer to Genetics section above) any naturally occurring random chance event that eliminates or severely impairs one of the known occurrences or its connectivity with other occurrences could impact a large portion of the range of this species.

All of the known extant occurrences of the species on NBPL are within 1 mi (1.6 km) of each other. These may in fact represent remnant portions of a single historically larger dissected population. Although a single random fire event could be essentially a range wide threat at Point Loma, the likelihood is currently low. At any of the isolated occurrences, a random natural event, such as a fire, may kill standing plants, reducing input to the seed bank, or may be intense enough to kill seeds in the seed bank and thereby jeopardize the continued existence of the species at one or more of the occurrences. Such an event could also reduce vegetation cover resulting in erosion, associated loss of the soil seed bank, and loss of habitat. Positive impacts of a fire event of suitable intensity and timing could include improvement of habitat conditions for *C. orcuttiana* by removing encroaching native and nonnative vegetation.

Small Population Size

Populations may be naturally small for a variety of reasons (Barrett and Kohn 1991, p. 5). Conservation biology literature commonly notes the vulnerability of taxa known from one or very few locations and/or from small populations (Primack 2006). *Chorizanthe orcuttiana* satisfies both of these criteria. A greater rate of extinction of small populations is generally attributed to loss of genetic variability and related problems of inbreeding depression and genetic drift, demographic fluctuations, and environmental variation or natural catastrophes (Primack 2006, pp. 245–269). The locally restricted nature of the occurrences of *C. orcuttiana* coupled with the highest genetic diversity expressed within patches, likely low dispersal potential and high rate of selfing reported indicate that conservation of the genetic diversity within a population should be a prime consideration in conservation and management of populations. An example cited is to ensure that seed stocks are representative of extant genetic variation and that genetic information should be considered in decisions regarding location and size of areas for preservation (Truesdale 2010, p. 24). Small population size is considered a rangewide threat

primarily in terms of distribution or relatively small populations across the species current range when suitable habitat is extant.

Trampling

Since listing, fencing erected in Oak Crest Park provides some protection from trampling to *Chorizanthe orcuttiana*. This fencing is still in place and trampling is not known to be a persistent ongoing threat to the species at this occurrence. However, trampling due to proximity to a trail was noted as a threat to this species at EO 16 in Torrey Pines State Natural Preserve (CNDDB EO 16) (Appendix 1).

Climate Change

Our analyses under the Endangered Species Act include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). The term "climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a, p. 30; and Solomon *et al*. 2007, pp. 35–54, 82–85). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is "very likely" (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a, pp. 5-6 and figures SPM.3 and SPM.4; Solomon *et al*. 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al*. 2007, entire; Ganguly *et al*. 2009, pp. 11555, 15558; Prinn *et al*. 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for

the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al*. 2007, pp. 760–764 and 797–811; Ganguly *et al*. 2009, pp. 15555–15558; Prinn *et al*. 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011(entire) for a summary of observations and projections of extreme climate events.)

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Although many species already listed as endangered or threatened may be particularly vulnerable to negative effects related to changes in climate, we also recognize that, for some listed species, the likely effects may be positive or neutral. In any case, the identification of effective recovery strategies and actions for recovery plans, as well as assessment of their results in 5-year reviews, should include consideration of climate-related changes and interactions of climate and other variables. These analyses also may contribute to evaluating whether an endangered species can be reclassified as threatened, or whether a threatened species can be delisted.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (e.g., IPCC 2007a, pp. 8–12). Therefore, we use "downscaled" projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al*. 2011, pp. 58–61, for a discussion of downscaling).

Chorizanthe orcuttiana was one of the target species in a study of regional multi-species conservation in the context of climate change (Lawson 2011, pp. 66–97). The climate change models and downscaling methods are described by Lawson (2011, pp. 71–72). The Parallel Climate Model developed by the National Center for Atmospheric Research and the Department of Energy projects a slightly wetter and hotter climate (+2.5 degrees C and 8 percent increase in precipitation), while the Geophysical Fluid Dynamics Laboratory CM2.1 model developed by the National Oceanic and Atmospheric Administration, projects a much hotter and drier climate (+4.4 degrees C and 26 percent decrease in precipitation (Lawson 2011, p. 41). Under the

slightly wetter hotter climate Parallel Climate Model scenario, suitable habitat is predicted to increase by 27 percent (Lawson 2011, p. 83). Under the drier much hotter Geophysical Fluid Dynamics Laboratory scenario suitable habitat is predicted to decline by 64 percent. Climate change is considered a rangewide threat to *C. orcuttiana* and potentially to restorable habitat.

Projections of climate change impacts to *Chorizanthe orcuttiana* likely cannot adequately or reliably address impacts to or responses of associated biota such as pollen and seed vectors, herbivores, or associated vegetation.

Summary of Factor E

Naturally occurring random events associated with small population size and restricted distribution, as well as, invasive plants, trampling, and disruption of natural fire cycles were identified as threats to *Chorizanthe orcuttiana* in the listing rule. The threat posed by naturally occurring random events is exacerbated by the threats associated with small scattered populations. These are likely persistent rangewide threats. Trampling, identified as a possible threat to one of the five known extant occurrences, is likely manageable at the site. The impact of climate change on *C. orcuttiana* seems to be equivocal depending upon the outcome of one or the other of the projected scenarios for the region.

III. RECOVERY CRITERIA

A recovery plan has not been completed for *Chorizanthe orcuttiana*.

IV. SYNTHESIS

At the time of listing, *Chorizanthe orcuttiana* was reported as extant at one occurrence, Oak Crest Park, and threats impacting this taxon and its habitat included trampling, nonnative plants, development, lack of a natural fire regime, and limited numbers. We now consider *C. orcuttiana* to be extant at 5 of 14 historical locations (3 occurrence on NBPL, 1 occurrence at Torrey Pines, and 1 presumed to be extant at Oak Crest Park). The species has not been recently detected at the latter site but no surveys have been performed in recent years. The site supports seemingly suitable habitat and the species likely has a resilient seed bank.

Chorizanthe orcuttiana continues to face the rangewide threat from nonnative plants and a lack of a natural fire regime, or effective equivalent, to control encroaching native and nonnative vegetation that renders the habitat unsuitable for *C. orcuttiana.* The Navy has made significant progress in controlling nonnative plants at three of the five extant occurrences. However, invasive nonnative plants will likely pose a persistent threat to all of the known extant occurrences.

The three extant occurrences on NBPL are close enough together that a single fire could impact all three occurrences. Populations of *Chorizanthe orcuttiana* are nearly always small, isolated across much of the species' range, and likely subject to local stochastic events. Two of the five

known extant occurrences are relatively small and geographically isolated from the other three at Point Loma. Two regional HCPs also provide some protection for the chaparral habitat that may harbor as yet undetected occurrences.

The historical range remains the same as in the previous review although the extant distribution within that range has increased somewhat. Considerable progress has been made in studies of the germination requirements, habitat preferences, annual population differences, and distribution of genetic diversity of the species at Point Loma. This information will be useful in consideration of habitat restoration and consideration of reintroduction of the species into proven unoccupied but historically suitable habitat. In recognition of the magnitude of the current threats, we recommend no change in the endangered status of *Chorizanthe orcuttiana* 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*
__X__ No Change

New Recovery Priority Number and Brief Rationale: No Change

VI. RECOMMENDATIONS FOR FUTURE ACTIONS

The actions listed below are recommendations to be completed over the next 5 years. These will help guide recovery of *Chorizanthe orcuttiana* by protecting and enhancing habitat. Conservation of *C. orcuttiana* is dependent on continued cooperation with our partners (i.e., Federal, State, and local agencies) to protect this taxon where it currently occurs. However, we will also work with Service programs, such as the Service's Partners for Fish and Wildlife Program, to identify opportunities for establishment of new self-sustaining occurrences on private lands. Property easements or purchases of parcels could also be made through the Act's section 6 funding. We recognize that the conservation of *C. orcuttiana* will require continued cooperation and coordination with partners (e.g., U.S. Navy) to minimize impacts from current threats and aid future restoration.

1) Continue to monitor and manage all extant occurrences of *Chorizanthe orcuttiana*.

    a) Work with the Navy to procure funding for monitoring of *Chorizanthe orcuttiana* occurrences and habitat, management of encroaching vegetation on NBPL

occurrences (i.e. removal of *Carpobrotus edulis* and *Acacia* spp.), and continued erosion control.

b) Work with the City of Encinitas to protect and enhance habitat at the Oak Crest Park occurrence. Conduct monitoring at this location to verify the status of *Chorizanthe orcuttiana* at this occurrence.

c) Protect *Chorizanthe orcuttiana* at the Torrey Pines State Natural Reserve occurrence (e.g., fencing, signage, or other stewardship measure).

2) Field-check historically occupied occurrences to verify the presence of suitable habitat and the presence or absence of the species.

3) Consider the means and efficacy of expanding the extant range of *Chorizanthe orcuttiana*:

   a) Conduct restoration efforts at locations identified to support *Chorizanthe orcuttiana* (e.g., remove encroaching vegetation as well as associated duff and slash and erosion control) and maintain the habitat for a suitable length of time for expression of any remaining seed bank (coincident with recommendation in Bauder *et al.* 2010b, p. 19).

   b) Identify sites of suitable or restored habitat for consideration in a future augmentation or reintroduction effort.

4) Establish a seed bank for *Chorizanthe orcuttiana* especially focused on isolated occurrences (e.g., Oak Crest Park and Torrey Pines State Natural Reserve) consistent with Center for Plant Conservation guidelines and applicable impact assessments outlined in the policy regarding controlled propagation (USFWS and NMFS 2000, pp. 56916–56922).

5) Determine the suitability and likely efficacy of outplanting to expand the extant range of the species. Several years of observations should be undertaken at restored sites prior to consideration of the artificial introduction of seeds to determine whether dormant seeds might be present. If deemed appropriate, develop and implement a plan for reintroductions that includes monitoring and success criteria.

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Appendix 1. Occurrences of *Chorizanthe orcuttiana* (Orcutt's spineflower); prepared for the 2014 5-year review.

Location (north to south)	**Occurrence CNDDB EO No.; cross reference; herbarium record**	**Ownership; Conservation measures**	**Status and threats, at listing**	**Status and threats, 2008 review**	**Status and threats, Current (attributed to Factors A–E)**
Encinitas, 2.5 miles east	EO 7; Gander 5479, in 1938 (SD)	Unknown; MHCP but not in approved subarea	Extirpated	Extirpated & too vague	Extirpated & too vague
Oak Crest Park	EO 10 (includes EO 1 & 11); Reiser s.n., in 1995 (SD)	City of Encinitas; Draft Encinitas subarea, MHCP; MHPA, conserved	Extant A: Habitat destruction B: Over-collection E: Few, small populations, trampling, nonnatives, fuel modification activities	Extant E: Few, small populations, nonnatives, lack of natural fire cycle	Presumed extant A: Invasive plants, fire regime E: Stochastic events, small population size, climate change
Rancho Santa Fe, hilltop	EO 6	Unknown; Draft North County subarea MSCP	Extirpated	Extirpated & too vague	Extirpated & too vague
S. of Del Mar race track	EO 4; Hardham 8941, in 1962 (RSA, SBBG, SD)	Unknown; MSCP but not in approved subarea	Extirpated	Extirpated & too vague	Extirpated & too vague
Torrey Pines State Natural Reserve, north grove	EO 16; Fillius and Jacobson 207, in 2008 (SD)	California Dept. Parks and Recreation; conserved	Unknown	Unknown	Extant A: Invasive plants, fire regime E: Stochastic events, small populations, climate change

Torrey Pines State Reserve, east grove	EO 5	California Dept. Parks and Recreation; conserved	Extirpated (Last reported in 1987 by L. Allen).	Extirpated	Extirpated
Torrey Pines State Reserve, west	EO 15; C. Hardham map from 1981	California Dept. of Parks and Recreation	Unknown	Unknown	Extirpated and too vague
Kearny Mesa	EO 9; Gander 14011, in 1935 (SD)	MCAS Miramar	Extirpated	Extirpated	Extirpated
Ocean Beach (Mussel Beds)	No EO #; Cleveland & Orcutt s.n., in 1884 (SD)	Unknown; City of San Diego subarea MSCP, not conserved	Unknown	Unknown	Extirpated
Hill NNE of Pt. Loma Nazarene Univ. (Brotherhood Grounds)	EO 17; Brandegee s.n., in 1905 (UC)	Unknown; City of San Diego subarea MSCP, not conserved	Unknown	Unknown	Extirpated
Point Loma, 0.6 mi S. of Pt. Loma Nazarene College	EO 14; = West Slope North, and "pending" (U.S. Navy 2012a, p. 17); Estrella & Lauri 149, in 2003 (SDSU)	U.S. Naval Base Point Loma; Point Loma Ecological Conservation Area	Unknown	Extant E: Few, small populations, natural fire cycle, nonnatives, erosion	Extant A: Invasive plants, fire regime E: Stochastic events, small populations, climate change

Pt. Loma, junction with old road to lighthouse	EO 13 (incl. EO 3); =West Slope South & EO 3 (U.S. Navy 2012a, p. 14); Brangegee 218, in 1906 (US)	U.S. Naval Base Point Loma; Point Loma Ecological Conservation Area	Extirpated	Extant (as EO 13) E: Few, small populations, natural fire cycle, nonnatives, erosion	Extant A: Invasive plants, fire regime E: Stochastic events, small populations, climate change
Pt. Loma, E. of Cabrillo Memorial Dr.	EO 12; =East Slope & EO 12 (U.S. Navy 2012a, p. 12); Eliason & Russell 97-001 (SDSU)	U.S. Naval Base Point Loma.	Unknown	Extant E: Few small populations E: Natural fire cycle E: Nonnatives E: Erosion	Extant A: Invasive plants, fire regime E: Stochastic events, small populations, climate change
Pt. Loma, N. of Cemetery	EO 2; Hardham 8945, in 1962 (SBBG, SD)	U.S. Naval Base Point Loma	Extirpated	Extirpated	Extirpated

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

***Chorizanthe orcuttiana* (Orcutt's Spineflower)**

Current Classification: Threatened

Recommendation Resulting from the 5-year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X__ No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

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

Approve _____ Scott A. Sobiech Date JUN 26 2014