

Chorizanthe orcuttiana
(Orcutt's spineflower)

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

**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92011-4213**

December 2007

FIVE-YEAR REVIEW

Species reviewed: *Chorizanthe orcuttiana* (Orcutt's spineflower)

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I. GENERAL INFORMATION

I.A. Methodology used to complete the review: This review was conducted by Gary D. Wallace in the Carlsbad Fish and Wildlife Office. We relied on our 1996 listing rule, available literature, and reports and information in our files or sent to us during the comment period. The status and threats to the species at the time of listing are compared to current status and threats.

I.B. Reviewers

Lead Regional Office: Diane Elam, Region 8 (California and Nevada), 916-414-6464.

Lead Field Office: Gary D. Wallace, Carlsbad Fish and Wildlife Office, 760-431-9440

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: A notice of review announcing initiation of the five-year review of this species and the opening of a 60-day information request period was published in the Federal Register on March 22, 2006 (71 FR 14538). No information were received during this period.

I.C.2. Listing history

Original Listing

FR notice: Federal Register 61:52370-52384.

Date listed: October 7, 1996.

Entity listed: *Chorizanthe orcuttiana* (Orcutt's spineflower), a plant species.

Classification: Endangered.

State Listing:

California Endangered Species Act: Endangered (1979).

I.C.3. Associated rulemakings: None.

I.C.4. Review History: None.

I.C.5. Species' Recovery Priority Number at start of review: The recovery priority number for this species is "2" according to the 2006 Recovery Data Call for the Carlsbad Fish and Wildlife Office. This number indicates that the taxon is a species that faces a high degree of threat but has a high potential for recovery.

I.C.6. Recovery Plan or Outline: None.

II. REVIEW ANALYSIS

II.A. Application of the 1996 Distinct Population Segment (DPS) policy

II.A.1. Is the species under review listed as a DPS? No. The Endangered Species Act (Act) defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing as DPS to only vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria? No. No recovery plan exists for this species.

II.C. Updated Information and Current Species Status

II.C.1. Biology and Habitat

II.C.1.a. Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends: *Chorizanthe orcuttiana* (Orcutt's spineflower) is a small (1-15 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).

Orcutt's spineflower is extremely rare and was in fact thought to be extinct for a time (Reveal and Hardham 1989). Herbarium specimens (dried pressed museum specimens) comprise a primary source of verifiable information as to the plant's identity and document the occurrence sites. Few collections have been made of this species since it was described in 1884 from a specimen collected on Point Loma, San Diego. Its small stature and naturally dissected range likely contribute to the scant documentation. Most of the herbarium specimens represent old collections of the species from Point Loma where early collectors could reliably find specimens for their personal herbaria and for trade.

The California Department of Fish and Game (CDFG), Natural Diversity Data Base (CNDDDB) compiles information from herbarium specimens and other sources. 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 species is identified as an Element Occurrence (EO) and assigned a consecutive number by CNDDDB. Data from subsequent collections and/or reports referable to a particular EO is used to update the database.

At the time of listing two of the 10 historical occurrences of this species were thought to be extant (U.S. Fish and Wildlife Service (USFWS) 1996). These occurrences were at Oak Crest Park (EO 10) in Encinitas and Torrey Pines State Park (the correct name is Torrey Pines State Reserve and will be used throughout this document) (EO 5). At the time of listing, the occurrence at Torrey Pines State Reserve had not been seen since its discovery in 1987; however, we considered that the habitat was likely still present. Refer to Table 1 for a list of occurrences.

Since it was listed, *Chorizanthe orcuttiana* has been found at three sites on Point Loma in San Diego County on land managed by the U.S. Navy. Two are considered new occurrences designated EO 12 and EO 13 (CNDDDB 2006). The third site has not yet been assigned an EO number. Also, an additional historical occurrence, based on a herbarium specimen collected in the Point Loma area, has been identified (Table 1).

Element occurrence (EO) 12, discovered in 1997, and EO 13 discovered in 1998, are near the north end of Fort Rosecrans National Cemetery on Naval Base Point Loma. The third site is near the northern boundary of Naval Base Point Loma. These may, in fact, represent portions of a single large population that historically or periodically has been contiguous, depending upon vegetation dynamics at the time.

Currently we consider there to be four extant occurrences of *Chorizanthe orcuttiana*, one at Oak Crest Park in Encinitas and three on Point Loma. All known extant and historical occurrences of *Chorizanthe orcuttiana* are listed in Table 1.

Population trend data for an annual plant may be inherently misleading. Usually population numbers of annual plants are related to annual cycles of environmental conditions. For example, the Service concluded in the final rule that, “the number of individuals varies widely from year to year because the success of germination is highly dependent on factors such as rainfall, which often differ significantly from one year to the next in southern California.” Germination usually takes place over a period of time so that more plants may be evident during surveys conducted later in the spring than would be found earlier. Fluctuations in plant counts for different years may be seen in Table 1. The possibility that different surveyors employ different methods of estimating or counting specimens may also lead to differences in plant counts.

At the time of listing we considered that the two sites then thought to be extant, supported fewer than 200 plants. Plant counts for extant occurrences are presented in Table 1. For the four occurrences considered to be currently extant, the highest recorded number of plants for any single occurrence was 2,520 plants in 1998 at Point Loma (EO 12) (Bauder 1998). Recent plant counts for all of the

extant occurrences combined range from a high of about 3,000 to a low of about 470 plants.

This is a small very rare annual plant. Plant numbers are subject to significant fluctuations from year to year. The only known extant EO not on the Point Loma peninsula supported a single individual at last count in 2000 (Table 1). Only about 5,000 specimens have been reported across the entire known range of the species over the past eight years.

II.C.1.b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.): We are not aware of any published information on the genetics or genetic variation of this species or closely related species.

II.C.1.c. Taxonomic classification or changes in nomenclature: No papers have been published since the listing proposing changes in the classification or nomenclature of this species.

II.C.1.d. Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.): At the time of listing, the known historical range of Orcutt's spineflower extended for about 25 miles along coastal San Diego County from Point Loma to Encinitas and inland for about six miles. We considered this species to be extant at two of the ten historically known occurrences. One was at Oak Crest Park in Encinitas, and the other was at Torrey Pines State Reserve.

Orcutt's spineflower has still not been found in Torrey Pines State Reserve despite several surveys (Darin Smith, Environmental Scientist, Torrey Pines State Reserve pers. comm. to G. Wallace October 2006). *Chorizanthe orcuttiana* was not considered extant at this site by Bauder (2000). Because of the lack of recent documentation we do not consider the species to be currently extant at Torrey Pines State Reserve.

The Oak Crest Park occurrence is still considered extant although we have no new information since 2000 when one plant was observed by Bauder (Bauder 2000). Suitable habitat is still present although it may be as small as 35 square feet.

During the course of this five-year review, a specimen of *Chorizanthe orcuttiana* was located at the herbarium of the University of California, Berkeley (UC) that documents a previously unreported historical occurrence. It was collected by Katherine Brandegee in 1905 on a hill northeast of the Brotherhood Grounds. This area is now occupied by the Point Loma Nazarene University. This historical occurrence is farther north than any of the others on the Point Loma peninsula but within the historical range of the species. We will send in a data

base form to CNDDDB referencing this site. This additional site does not significantly alter the range or distribution of the species.

Since it was listed, *Chorizanthe orcuttiana* has been rediscovered at Point Loma. Because this species occurs in naturally dissected habitat, 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 unnoticed occurrence. It is possible that one or more of these extant populations are coincident with those from which the poorly labeled “Point Loma” historical collections were made.

Chorizanthe orcuttiana has the same historical range as when it was listed. All of the known occurrences of this species are within 5 km of the Pacific Ocean at elevations below 100 m above mean sea level (Bauder 2000). At the time of listing the two EOs considered extant, EO 10 and EO 5, were toward the north end of the historical range. Currently four occurrences are considered extant (Table 1). These EOs are situated at opposite ends of the historical range. One, EO 10, still considered extant but wavering at very low numbers of plants, is the northern-most occurrence. The other three extant occurrences are all close to one another on Point Loma at the southern end of the historical range. The remaining 11 occurrences listed in Table 1 are considered to be extirpated/historical, too vague to map reliably, likely misidentified, or were merged with other occurrences by CNDDDB.

II.C.1.e. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem): As it was at the time of listing, *Chorizanthe orcuttiana* is considered to be endemic to south-central and coastal San Diego County and primarily restricted to weathered sandstone bluffs in association with or in microhabitats within southern maritime chaparral (USFWS 1996). The occurrences are small patches often with constricted connectivity to adjacent patches. The habitat was described as loose sandy soils in openings in coastal or maritime chaparral by Bauder (2000, p. 31). Since the listing, the soils have been described in greater detail.

Bauder (2000) described the soil types associated with verified occurrences of *Chorizanthe orcuttiana* in greater detail. All of the soil samples examined were dominated (mean 90 percent), by the sand fraction with moderate acidity, low organic content and nitrate nitrogen. Bauder goes on to state:

“The soils are neutral to slightly acid, drain moderately well, and often contain iron concretions (Table 2) (Bowman 1973). They are derived from ferruginous sandstone. The predominant soil type appears to be consistent with the characteristics of Carlsbad gravelly loamy sand. This soil series (including mapping units significantly altered by urbanization) accounts for 7,480 acres or 0.339 percent of the 2,204,880 acres of land in

San Diego County that have been assigned to a soil series (Bowman 1973). Approximately 12 percent of the County has not been mapped.”

Bauder (2000) identified Carlsbad gravelly loamy sand as the primary soil type supporting Orcutt’s spineflower, 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 *Chorizanthe orcuttiana* are found on or very near to sandy soils in the Carlsbad, Marina, or Corralitos series.

Bauder (2000) attempted to identify suitable habitat to search for additional occurrences of *Chorizanthe orcuttii*, to rediscover populations thought to be extirpated and to locate potential sites to reintroduce the species. She used three criteria: 1) presence of Carlsbad soils within 5 km of the ocean; 2) likelihood of the site to be undeveloped; and 3) public ownership of the sites (Bauder 2000 p. 39). The resulting patchy areas of suitable habitat were identified as the following groups (north to south in San Diego County): Camp Pendleton, Carlsbad, Encinitas, Rancho Santa Fe, Lomas Santa Fe, Del Mar, La Jolla, Miramar, Point Loma, and the South Bay Group. Ten of the sites were surveyed although most were not surveyed (Bauder 2000). A search of sites identified as suitable habitat but not surveyed by Bauder may locate additional occurrences of Orcutt’s spineflower.

The amount and distribution of suitable habitat for this species has likely decreased since the listing. The loss of an additional one third of the remaining southern maritime chaparral under provisions of the regional HCPs is discussed in section II.C.2.a. The loss of habitat by degradation by invasive iceplant is described below. Isolated remnants of habitat may persist in San Diego County. However these areas are likely small and scattered in distribution, and in need of some type of restoration. Based on work on habitat enhancement at Naval Base Point Loma, habitat rehabilitation for this species may be practical if the primary concern is competition from native and invasive non-native plants.

II.C.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

III.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range: In the final listing rule (61 FR 52378), we identified maritime chaparral as the habitat type with which *Chorizanthe orcuttiana* is associated and estimated that at that time there were 1,500 to 3,700 acres of southern maritime chaparral habitat remaining in San Diego County and 150 acres in Orange County. We stated that this represented an estimated loss of between 82 and 93 percent of southern maritime chaparral in San Diego County. In the listing rule the loss of habitat was attributed primarily to urban and agricultural development as well as recreational activities, trampling, and fuel modification activities.

Using imagery of a vegetation classification provided by SANDAG (1995), our GIS staff identified 3,151 acres of southern maritime chaparral in San Diego County. The majority of this acreage lies within the limits of two regional habitat conservation plans. The City of San Diego's Multiple Species Conservation Plan (MSCP) area supported 1,577 acres of southern maritime chaparral and the Multiple Habitat Conservation Plan for northern San Diego County (MHCP) which supported 1,180 acres of this habitat type. An additional 125 acres were identified on Naval Base Point Loma.

The discrepancies in acreages among listing documentation, and our current analysis may be due in part to redeterminations of habitat types or different area calculation methods used.

In the listing rule (61 FR 52378) we estimated that 300 to 450 acres of the remaining southern maritime chaparral was located within approved developments in San Diego County. A comparison of the SANDAG (1995) vegetation data layer with 2005 aerial imagery indicates that about 344 acres have been lost to development or grading since the data were assembled. Of this about 200 acres was within the boundary of the MSCP and the remainder was within MHCP. About 2.6 acres of southern maritime chaparral on the Point Loma Peninsula covered by the Naval Base Point Loma INRMP have been developed since the SANDAG 1995 data were assembled.

According to the MSCP Biological Opinion (USFWS 1997), 1,111 acres (62 percent) of the remaining 1,782 acres of southern maritime chaparral were to be preserved in the planning area. According to the Carlsbad Subarea Plan, MHCP Biological Opinion (USFWS 2004) 748 acres (77 percent) of the remaining 968 acres of southern maritime chaparral will be preserved in the planning area. Provisions of these HCPs preserve about 67 percent of the currently remaining southern maritime chaparral within their plan areas. This represents a further reduction in habitat since the listing. However, there do not appear to be additional direct losses of habitat beyond those permitted under the HCPs. The loss of 2.6 acres of habitat on Naval Base Point Loma may qualify for mitigation under guidelines in the INRMP (RECON 2002).

The MSCP Biological Opinion (USFWS 1997) also states that half of the 236 acres of sandstone soils thought to be required for this species still present within the MSCP boundary would be preserved. These soils are found within the boundaries of the occurrences of southern maritime chaparral. The specific locations and conservation status of these areas is unknown. This would represent about 118 acres of preserved habitat. The MHCP (SANDAG 2003) identifies about 625 acres of potentially suitable habitat in the focused plan area. The distribution of the 453 acres to be preserved is 150 of 238 acres in Carlsbad, 288 of 343 acres in Encinitas, and 15 of 44 acres in Solana Beach. These areas are also defined as sandstone substrates in southern maritime chaparral. The coincidence with preserved areas of southern maritime chaparral is unknown.

The occurrence at Oak Crest Park was fenced in 2000 with money from a section 6 grant through the State to the City of Encinitas. The open rail fence affords the occurrence protection from casual walkers and other recreational activities, noted as threats in the listing rule.

Currently the regional HCPs and the Naval Base Point Loma INRMP affords or will afford protection to 67 percent of the currently remaining southern maritime chaparral habitat often associated with Orcutt's spineflower. Likewise the two HCPs propose to protect 66 percent of the 861 acres of sandstone habitat identified as necessary for the species. Other threats from recreational activities and trampling appear to have been reduced or eliminated by the fencing at Oak Crest Park, Encinitas.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes: At the time of listing, because *Chorizanthe orcuttiana* was geographically restricted and rare, we concluded that the species was vulnerable to over-collection (USFWS 1996). However, a monograph on the annual species of *Chorizanthe* (Reveal and Hardham 1989) that cites collections of each species, does not include any citations of specimens for Orcutt's spineflower collected after 1962. Likewise the Consortium of California Herbaria website, generally considered to be comprehensive for rare California plant taxa, does not include any specimens of this species collected since 1962. It seems unlikely that very many collections were made after the listing. Specimens are usually collected and deposited in an established herbarium to provide verification of the identity and presence of a plant species. Overcollecting since the listing has not been evident as a threat to the species

II.C.2.c. Disease or predation: Consistent with the listing rule, we are not aware of threats to this species attributable to this factor.

II.C.2.d. Inadequacy of existing regulatory mechanisms: At the time of listing we noted that although this species was listed by the State as Endangered in 1979, not all projects comply with State Law. The final listing rule (USFWS 1996) details additional regulatory mechanisms that afford some level of protection to this species (*e.g.* California Endangered Species (CESA) and the California Environmental Quality Act (CEQA) as well as the protections under the regional habitat conservation plan existing at that time. At the time of listing, we determined that existing regulatory mechanisms were inadequate to protect this species and therefore we considered listing to be warranted.

The entire known range of Orcutt's spineflower lies within western portion of San Diego County. Two regional Habitat Conservation Plans (HCPs) encompass the majority of the range of this species. These HCPs, finalized after the listing, are the City of San Diego's Multiple Species Conservation Plan (MSCP) and the Multiple Habitat Conservation Plan in northern San Diego County (MHCP).

Chorizanthe orcuttiana is not a covered species under the County of San Diego's MSCP. At the time the plan was developed we did not think that adequate surveys had been performed for this species in the planning area (USFWS 1997). The MSCP does not impact a known extant occurrence of *Chorizanthe orcuttiana*. However, at least two historical occurrences appear to be within the MSCP area.

Chorizanthe orcuttiana is a covered species under the Multiple Habitat Conservation Plan (MHCP) for north coastal San Diego County cities (SANDAG 2003). The cities included in the plan are Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista. The MHCP is an umbrella document that provides conditions which city subarea plans must adopt to receive coverage for this species. There is only one known extant occurrence of the species within the MHCP. Conditions for coverage for Orcutt's spineflower under the MHCP include conservation of 72 percent of potentially suitable habitat within the focused plan area and 100 percent conservation of the one known critical location at Oak Crest Park in Encinitas (SANDAG 2003 p.4-56).

It is not known whether conservation measures under MSCP or MHCP for southern maritime chaparral include fire management or an effective alternative to promote regeneration of the vegetation and periodic creation of openings suitable for *Chorizanthe*.

Under the City of Carlsbad subarea plan (USFWS 2004), *Chorizanthe orcuttiana* is a narrow endemic, as such new populations found within the Preserve hardline and softline areas will be completely preserved and populations found outside this area will be preserved at a minimum of 80 percent. Conditions of the permit require that there be at least five self-sustaining populations within the species' geographical range before any incidental take is allowed.

The public review draft of the City of Encinitas subarea MHCP (City of Encinitas 2000) identifies 561 acres of southern maritime chaparral in the study area of which 481 acres are in the focused plan area are to be preserved. The plan area includes Oak Crest Park that supports an extant occurrence of *Chorizanthe orcuttiana*. Management of biological resources in the park is limited to fencing and does not include vegetation management measures for the southern maritime chaparral (City of Encinitas 2000 p. 7-17).

Since the listing, this species has been rediscovered at Point Loma on Federal lands administered by the U.S. Navy. The Integrated Natural Resources Management Plan (INRMP) for Naval Base Point Loma (RECON 2002) stated its objective to "Expand and enhance the habitat of Orcutt's spineflower in a manner that does not negatively impact this or other rare species." The INRMP identified five specific tasks to achieve the objective. The occurrences are within the area currently identified as the Point Loma Ecological Reserve (PLER) (RECON 2002). The PLER consists of lands under the jurisdictions U.S. Navy,

Department of Veterans Affairs, City of San Diego, U.S. Coast Guard, and the National Park Service. These property owners have committed to oversee conservation and enhancement of sensitive habitats, including *Chorizanthe orcuttiana* habitat, on Point Loma. Management activities on the Ecological Reserve include the removal of iceplant (see discussion in section II.C.1.e). As yet however, the PLER has not been given official designation status by the Chief of Naval Operations (RECON 2002, p 2-15).

All of the tasks identified in the INRMP are listed in the Implementation Table (RECON 2002) either as funded and ongoing or not currently funded. It is significant that among the funded ongoing projects and activities all of the highest priority tasks were those associated with Orcutt's spineflower. They include monitoring Orcutt's spineflower populations, removal of ice plant from the vicinity of *Chorizanthe orcuttiana*, installation of protective signage, searching for and mapping of additional suitable habitat for Orcutt's spineflower and assessing the feasibility of reintroducing the species to selected areas of Point Loma. Priority was determined on legal requirement, funding, and environmental desirability. All of the tasks listed above were identified as legal requirements derived from existing laws, regulations, and executive orders. Development of an erosion control plan and an invasive exotic plant species control plan are as yet unfunded and are afforded a lower priority (RECON 2002).

Current regulatory mechanisms associated with the MSCP, MHCP, and the Naval Base Point Loma INRMP afford protections to *Chorizanthe orcuttiana* primarily by protection of portions of the remaining southern maritime chaparral. However, there are no known extant occurrences within MSCP and only one small extant occurrence within the MHCP area. Conservation provisions of the INRMP are subject to funding priorities and the PLER has not yet received official designation. Long-term management of southern maritime chaparral is necessary to sustain the vegetation with openings suitable for *Chorizanthe orcuttiana*. Likewise management of encroaching non-native as well as native plants is needed to maintain suitable habitat for the species. The status of *Chorizanthe orcuttiana* as a listed species highlights the conservation needs and facilitates funding to sustain the ongoing management measures necessary for the survival of the species. A break in the continuity of management activities, implemented because of its listing status, could lead extinction of this species over a very brief time period. Therefore, continued protection afforded by the Act is warranted.

II.C.2.e. Other natural or manmade factors affecting its continued existence: In the final listing rule (USFWS 1996 p. 52381) *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. Invasive exotic grass and weed species as well as interruption of the natural fire cycle were also considered threats to this species.

Populations may be naturally small for a variety of reasons (Barrett and Kohn 1991). The 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. The 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, ch. 11, Barrett and Kohn 1991). This may have been the fate of some of some historical occurrences and may pose a serious threat to the occurrence at Oak Crest Park. This occurrence was last known to support a single annual individual and has not been known to support more than 70 individuals.

All of the known extant occurrences on Point Loma are within two kilometers of each other. As noted earlier, these may in fact represent portions of a single large population that historically or periodically has been contiguous depending upon vegetation dynamics at the time. The natural fire cycles in the area have likely been altered. A single natural random event, such as a fire, could jeopardize the continued existence of the species at one or more of the occurrences by killing standing plants, reducing input to the seed bank, or by being intense enough to kill some of the seeds in the seed bank. Such an event could also reduce vegetation cover and result in erosion and loss of habitat.

Since the listing, fencing erected in Oak Crest Park provides some protection to the habitat for Orcutt's spineflower. The population at this site is extremely small and has perhaps been extirpated. The southern maritime chaparral present is not subject to natural fire cycles that would lessen the impact of overstory on the *Chorizanthe orcuttiana*. Likewise, Oak Crest Park is not known to be managed to mimic the results of a natural fire regime. Although not identified as a threat in the listing rule, the unchecked growth of native plants likely due to lack of browsing and fires has likely led to a decrease in open suitable habitat for the species.

Encroaching native plants and invasive, non-natives also pose a threat to Orcutt's spineflower. *Muhlenbergia rigens* (deergrass), a native grass species, was removed from some of the habitat at Oak Crest Park because of its potential to crowd out and shade the *Chorizanthe orcuttiana* (Bauder 2000 p. 21). The lack of a natural fire regime or managed alternative for the associated southern maritime chaparral may pose a threat to *Chorizanthe orcuttiana* by allowing the shrub canopy to cover over the sandy openings favored by the Orcutt's spineflower. 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).

Invasive non-native plants are the greatest known threat to the occurrences of Orcutt's spineflower on Point Loma. The invasive non-native *Carpobrotus edulis* (Hottentot fig; iceplant) covers many of the open sandy areas on Point Loma (Bauder 2000). Iceplant produces thick layers of prostrate, succulent stems and leaves over the soil surface, deposits organic material, and grows back readily after removal (Bauder 2000). *Rhynchelytrum repens* (Natal grass) is another non-native plant that threatens Orcutt's spineflower (Rusev and Zink 2005). A potentially invasive *Acacia* spp. has also been identified at Point Loma (Bauder 2000). These species can prevent expression of the above ground population of Orcutt's spineflower. If this is a long-term condition, presumably the seed bank would eventually be depleted thereby diminishing the range of the species.

We received a draft plan for Orcutt's spineflower habitat enhancement on Naval Base Point Loma. This plan is based on a cooperative agreement between the Soil Ecology and Restoration Group (SERG) and Southwest Division Naval Facilities Engineering Command (SWDiv) (Rusev and Zink 2005). The agreement covers activities to eradicate the invasive non-natives *Carpobrotus edulis* (Hottentot fig; iceplant) and *Rhynchelytrum repens* (Natal grass) and stabilize slopes in *Chorizanthe orcuttiana* habitat. The agreement identifies three areas: "East Slope", "West Slope 1", and "West Slope 2". These coincide with EO 12 (CNDDDB 2006), EO 3 (CNDDDB 2006), and the occurrence noted above that has not yet been assigned an EO number. Habitat enhancement activities will be carried out at times when there are no standing plants. Occupied habitat areas will be marked for hand removal of the iceplant within the perimeters and outward to 15 meters from the perimeters. Control of iceplant farther than 15 meters and down slope from the marked habitat perimeters will be achieved by foliar application of an herbicide. Control of *Rhynchelytrum repens* (Natal grass) will be achieved in the same manner. Erosion control methods will be site-specific. We concurred that the implementation of measures in the plan may affect but is not likely to adversely affect Orcutt's spineflower. In their plan, Rusev and Zink (2005) describe control of non-native plants as an ongoing monthly process.

Bauder (2000) calls for the control of drainage outflow from culverts under Cabrillo Memorial Drive in Point Loma to control erosion. Erosion control was one of the management activities addressed in Rusev and Zink (2005). However, development and implementation of an erosion control plan were not identified as funded projects in the final Naval Base Point Loma INRMP (RECON 2002, Table 6.1).

Small population size, invasive plants, and disruption of natural fire cycles were identified in the listing as threats to *Chorizanthe orcuttiana*. This species still faces significant threats associated with all of these factors. Local populations are still relatively to extremely small. Invasive non-native plants are a significant threat to the species especially at Point Loma and are the focus of a management plan. Because of its proximity to developed areas, fire suppression efforts in

southern maritime chaparral are considerable. This may lead to encroachment of openings in suitable habitat by native shrubs and forbs, as seen at Oak Crest Park.

II.D. Synthesis

Chorizanthe orcuttiana (Orcutt's spineflower) has never been known to be abundant or widespread. It is restricted to small isolated areas of suitable habitat usually in openings within southern maritime chaparral or associated coastal sage scrub. One occurrence counted as extant at the time of listing is now considered extirpated while three other occurrences have been discovered since the species was listed. One or more of the recently discovered occurrences may in fact represent portions of a single large population that historically or periodically has been contiguous. The historical range is the same as it was at the time of listing.

Since the listing, two regional HCPs have and will have a significant impact on protecting areas that support southern maritime chaparral from development. This vegetation was identified as commonly associated with *Chorizanthe orcuttiana* which occupies intervening openings among the chaparral shrubs. However, these HCPs may not provide adequate fire management measures for southern maritime chaparral that provide natural openings for *Chorizanthe orcuttiana* to grow. Likewise, the HCPs may not include adequate long-term control measures for invasive non-native plants or encroaching native species. This may be why so few plants have been found at Oak Crest Park recently, even though the occurrence is protected by fencing.

The Naval Base Point Loma INRMP and associated Point Loma Ecological Reserve afford some level of protection and management of habitat for this species. Control of invasive iceplant adjacent to *Chorizanthe orcuttiana* is one of the five specific tasks identified in the INRMP. Management activities associated with this species are given the highest priority. However, the area is not yet been officially designated an Ecological Reserve, and not all of the tasks (e.g. erosion control) are currently funded.

In summary, *Chorizanthe orcuttiana* currently occupies a small portion of its historical range. Three of the four extant occurrences are close enough to one another that they might represent portions of a larger, historically contiguous population. Habitat Conservation Plans (HCPs) and the Naval Base Point Loma INRMP provide a level of protection to about two-thirds of the included remaining southern maritime chaparral. However, long-term management of this fire adapted vegetation as well as encroaching native and non-native plants is required. Protection and management afforded to this species by its listing status is warranted. All extant occurrences are small enough to be threatened by single stochastic event. Based on the fact that one of the two occurrences considered extant at the time of listing is now extirpated and the other occurrence most recently supported a single plant, this species is still in danger of extinction;

therefore, we recommend that the listing status of *Chorizanthe orcuttiana* remain unchanged, as endangered.

III. RESULTS

III.A. Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (*Indicate reasons for delisting per 50 CFR 424.11*):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No change is needed**

This species is known from only four occurrences in two general areas within its historical range. Numbers of standing plants naturally fluctuate annually but apparently may not be able to sustain an occurrence when numbers of seed producing plants reach a critically low number. Two regional HCPs provide some protection for about two-thirds of the associated habitat but lack management specific to maintenance of openings in southern maritime chaparral for *Chorizanthe*. Although management for invasive non-native plants is under way on Navy lands, the habitat enhancement plan considers removal of non-native plants to be an ongoing need. This species is still subject to some of the threats known at the time of listing.

III.B. New Recovery Priority Number: A change to the recovery priority is proposed at this time. Recovery of this species seems less likely than previously thought, even though an occurrence supporting as many as 2,520 plants was discovered after the listing. A population at one of the two sites presumed extant at the time of listing has not been relocated since 1987 and the other site supported a single plant in the year 2000. Much of the historical habitat for the species is likely gone or degraded to the degree that it may not support the species. The plant community with which *Chorizanthe orcuttiana* is associated is one adapted to a natural fire regime. Natural fire regimes are generally lacking in western San Diego County. Invasive non-native plants continue to be a persistent threat even in otherwise protected areas that support this species. In addition, populations may reach critically low numbers and not be able to recover. One HCP required that there be five self-sustaining populations before incidental take could be considered in the plan area. Given the natural circumstances and continuing urbanization of the region, this may be very difficult to achieve. No programs have, as yet, been developed to reestablish this species in other areas of its historical range or to determine the presence of any genetic barriers to its reproduction. *Chorizanthe orcuttiana* continues to face a high degree of threat and has a low potential for recovery. Therefore, Recovery Priority No. 5 is appropriate for this species.

III.C. If a reclassification is recommended, indicate the Listing and Reclassification Priority Number (FWS only):

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (Removal from list regardless of current classification) Priority Number: _____

IV. RECOMMENDATIONS FOR FUTURE ACTIONS:

Continue to work with the City of Encinitas and the U.S. Navy to protect and enhance habitat for *Chorizanthe orcuttiana*.

Eliminate negative impacts from non-native and native vegetation on the known occurrence of the species in Oak Crest Park, Encinitas.

Determine the presence and location of similar sites in Oak Crest Park, Encinitas and create clearings among the vegetation on suitable soils.

Field-check the historical occurrence sites and suitable habitat identified by Bauder (2000) to verify the presence of suitable habitat and the presence or absence of the species.

Determine the reproductive cycle of the species to include pollen and seed dispersal agents, fecundity of the species in relation to rainfall patterns, and any identifiable bottlenecks to the species survival other than those already known.

Determine the most effective manner to consistently limit the impact of invasive non-native plants on this species. These may have to be site and/or species specific.

Determine and implement an appropriate seed banking strategy for the species.

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Table 1. Occurrences of *Chorizanthe orcuttiana* (Orcutt's spineflower)

Location Reference(s)	CNDDDB EO #	Owner	Plants	Acreage or Radius	Record Date	Reference
Quail Botanical Garden, 1 mi E	1	unknown	-	-	unknown	CNDDDB = EO 10
Point Loma, N of Cemetery W side Cabrillo Mem. Dr.	2	DOD Navy	-	0.9 ac	1884-1962	Historical
Point Loma, old road to newlighthouse	3	DOD Navy	-	1/5 mi rad	1906	Historical
S of Del Mar Race Track S of bridge over slough	4	unknown	-	1/5 mi rad	1981	Too vague
Torrey Pines State Reserve East Grove	5	State DPR	50-100	80 m rad	1987 2006	Extant at listing Considered extirpated/historical
Rancho Santa Fe, hilltop	6	unknown	-	5 mi rad	1981	Too vague
Encinitas, 2 mi E	7	unknown	-	1/5 mi rad	1938	Too vague
Lake Elsinore	8	unknown	-	-	2006	Out of range, likely misidentification
Kearney Mesa	9	DOD Navy	-	1 mi rad	1967	Historical

Oak Crest Park	10	City Encinitas -	80 m rad	1997	Extant at listing
		20	-	1991	CNDDDB
		15-40	-	1991	Hogan (October 2, 1991 petition to list)
		24	-	1996	A. Russell CNDDDB field survey form
		70	-	1997	A. Russell CNDDDB field survey form
		20	-	1999	Bauder (2000 p. 55)
		1	-	2000	Bauder (2000 p. 55)
				2006	Considered extant
[unknown]	11	-	-		CNDDDB = EO 10
Point Loma E of Cabrillo Mem Dr. NNE Bennington Memorial, NE Cemetery [Sub-base population]	12	DOD Navy	130 80 m rad	1997	Identified since listing
			130	1997	A. Russell field survey form
			2,520 35 sq m	1998	Bauder (2000 p. 54) (4 subpops)
			403	1999	Bauder 2000 p. 54
			1,163	2000	Bauder 2000 p. 54
				2002	RECON 2002 p. 2-40
				2006	Considered extant
Point Loma W of Cabrillo Mem Dr & Woodward Dr	13	DOD Navy	31 1.3 ac	1999	Identified since listing
			31 300 sq m	1999	Bauder & Sakrison field survey form
			31	1999	Bauder 2000 p 54 considers = EO 3
			47	2000	Bauder 2000 p. 54 considers = EO 3
				2002	RECON 2002, p. 2-40
				2006	Considered extant
Hill NE from Brotherhood Grounds (now Pt Loma Nazarene College)	-	Pvt	-	1905	Specimen (K. Brandegee Apr. 28 1905, UC) Found during the five-year review
				2006	Identified since listing. Considered historical

Point Loma W of N entrance Ft. Rosecrans	-	DOD Navy 300 pls	-	2005 2006	Identified since listing Considered extant
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Note: **Bold** indicates information available since listing

Number of occurrences reported at listing (1996): 10

Number of occurrences considered extant at time of listing (1996): 2 (EO 5 and EO 10)

Number of occurrences considered extirpated, too vague, merged with other occurrences, or historical at listing (1996): 8

Number of new occurrences identified since listing: 3 (EO 12, 13, unnumbered EO)

Number of occurrences considered extirpated/historical since listing: 1 (EO 5)

Number of occurrences considered extant (2006): 4 (EO 10, 12, 13, unnumbered EO)

Number of occurrences considered extirpated, too vague, merged with other occurrences, or historical (2006): 11

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Chorizanthe orcuttiana* (Orcutt's spineflower)

Current Classification Endangered
Recommendation resulting from the 5-Year Review

 Downlist to Threatened
 Uplist to Endangered
 Delist
 X **No change is needed**

Appropriate Listing/Reclassification Priority Number, if applicable

Review Conducted By Gary D. Wallace

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve Date 1/9/2008

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve Date 1/10/08