

Orcuttia viscida
(Sacramento Orcutt Grass)

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



Photo by Carol Witham

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

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5-YEAR REVIEW
Species reviewed: Sacramento Orcutt Grass (*Orcuttia viscida*)

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5-YEAR REVIEW
Sacramento Orcutt Grass (*Orcuttia viscida*)

I. GENERAL INFORMATION

I.A. Methodology used to complete the review:

This review was prepared by Sacramento Fish and Wildlife Office staff of the U.S. Fish and Wildlife Service (Service) using information from the 2005 *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Recovery Plan) (Service 2005), the California Natural Diversity Database (CNDDDB 2006), and personal communications with biologists with first-hand experience with *Orcuttia viscida*. We interviewed recognized *Orcuttia viscida* experts for their knowledge and suggestions for recommendations to assist in the recovery of the species.

I.B. Contacts

Lead Regional or Headquarters Office – Diane Elam, Deputy Division Chief for Listing, Recovery, and Habitat Conservation Planning, and Jenness McBride, Fish and Wildlife Biologist, Region 8 (California and Nevada), 916-414-6464

Lead Field Office – Kirsten Tarp, Recovery Branch, Sacramento Fish and Wildlife Office, 916-414-6600

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: 71 FR 14538, March 22, 2006

I.C.2. Listing history

Original Listing

FR notice: 62 FR 14338

Date listed: March 26, 1997

Entity listed: Species, *Orcuttia viscida*

Classification: Endangered

I.C.3. Associated rulemakings:

Critical habitat for this species was proposed on September 24, 2002 (67 FR 60033). The final rule to designate critical habitat for the *Orcuttia viscida* was published on August 6, 2003 (68 FR 46684). A re-evaluation of non-economic exclusions from the August 2003 final designation was published on March 8, 2005 (70 FR 11140). An evaluation of economic exclusions from the August 2003 final designation was published on August 11, 2005 (70 FR 46924). Administrative revisions were published on February 10, 2006 (71 FR 7117).

I.C.4. Review History:

We have not conducted any previous 5-year reviews for this species.

I.C.5. Species’ Recovery Priority Number at start of review:

5C (full species, high degree of threat, low recovery potential). The “C” indicates that some degree of conflict exists with urban development.

I.C.6. Recovery Plan or Outline

Name of plan: Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Date issued: December 15, 2005

II. REVIEW ANALYSIS

Species Overview

Orcuttia viscida is a narrowly distributed annual grass in the Orcuttieae tribe of the grass family Poaceae. The range of the species lies in a narrow zone of remnant depositional stream terraces at the base of the Sierran foothills (Stone *et al.* 1988) in Northern Hardpan and Northern Volcanic Mudflow vernal pools. The species was first collected in 1936 near Phoenix Field, northeast of the City of Sacramento, and is now known from nine occurrences, all in eastern Sacramento County. One occurrence, in Phoenix Park, was established by the introduction of seeds from a nearby natural occurrence in 1978 and continues to persist (Stone *et al.* 1988, CNDDDB 2006). The occurrences are found at an elevation of 46 to 82 meters (150 to 270 feet) on high-terrace vernal pools that range in area from 0.1 hectare (0.25 acre) to 0.28 hectare (2.03 acres). Two occurrences have been extirpated, one by urban development and one by conversion of the vernal pool habitat to a stockpond.

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

II.A.1. Is the species under review listed as a DPS?

 Yes
 X *No*

The Endangered Species 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 distinct population segments (DPS) to 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?

Yes
 No

II.B.2. Adequacy of recovery criteria.

II.B.2.a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes
 No

II.B.2.b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

Yes
 No

II.B.3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here. The 5 listing factors are (A) present or threatened destruction, modification, or curtailment of habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; and (E) other natural or human-caused factors.

General recovery criteria for *Orcuttia viscida* and 19 other listed plants and animals are described in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005). This recovery plan uses an ecosystem-level approach because many of the listed species and species of concern addressed in the plan co-occur in the same natural ecosystem and share the same threats. The over-arching recovery strategy for *Orcuttia viscida* is habitat protection and management. The five key elements that comprise this ecosystem-level recovery and conservation strategy are: (1) habitat protection; (2) adaptive management, restoration, and monitoring; (3) status surveys; (4) research; and (5) participation and outreach. Listing factor B is not relevant to this species.

The Recovery Plan describes the geographic distribution of vernal pool taxa according to the vernal pool regions defined by the California Department of Fish and Game (CDFG) (Keeler-Wolf *et al.* 1998). Vernal pool regions are discrete geographic regions identified largely on the basis of endemic species, with soils and geomorphology as secondary elements. Within the

vernal pool regions, the Recovery Plan identifies core areas that support high concentrations of federally listed vernal pool species, are representative of a given species' range, and are generally where recovery actions are focused. Core areas are distinct areas that provide the features, populations, and distinct geographic and/or genetic diversity necessary to the recovery of a species. More than one federally listed vernal pool species may be found within a single core area, and the core areas encompass areas larger than just the location of any single species. Within each core area, the Recovery Plan identifies specific percentages of suitable habitat that should be protected to achieve recovery for listed species. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery, with Zone 1 reflecting the highest priority areas. Protection of the majority of suitable habitat within Zone 1 core areas, and Zone 2 and 3 core areas where appropriate, is recommended to provide corridors and dispersal habitat, support metapopulation dynamics, provide for reintroduction or introduction sites, and to protect currently undiscovered populations. Many of the species covered by the Recovery Plan can be recovered primarily through the protection of Zone 1 core areas.

In this review, most *Orcuttia viscida* occurrences are those reported in the California Natural Diversity Database (CNDDDB). The CNDDDB defines occurrence as any documented collection, observation, or museum specimen of a species that is submitted to CDFG by the public. Each collection or observance may be recorded and mapped separately, but if there are multiple observations or collections within 1/4 mile of each other they may be combined into a single occurrence record. Individual occurrences represent locations where a species has been documented to occur; they do not represent distinct populations as they are observation records of individuals, not population-level records (D. McGriff, CDFG, *in litt.* 2007). For the purposes of this 5-year review, "occurrence" refers to a report contained in the CNDDDB. Places where the species is found but that are unreported to CNDDDB are noted as "sites", "localities", etc., in order to differentiate them from occurrences as reported and defined in the CNDDDB.

Downlisting/delisting criteria for *Orcuttia viscida* include:

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

The Recovery Plan is designed to be implemented in a logical, progressive manner. Core areas are ranked as Zone 1, 2, or 3 in order of their overall priority for recovery. All *Orcuttia viscida* occurrences are found in three Zone 1 core areas. Further implementation of recovery actions in vernal pool habitat outside of the Zone 1 core areas described in the Recovery Plan could be recommended for *Orcuttia viscida* if additional occurrences are found outside the Zone 1 core areas. This criterion (1A-E) addresses listing factor A.

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

Three Zone 1 core areas are identified in the Recovery Plan as supporting occurrences of *Orcuttia viscida* and being important for recovery of the species: 1) Cosumnes/Rancho Seco, 2) Mather, and 3) Phoenix Field and Phoenix Park. The recovery criteria in the Recovery Plan are to protect 100 percent of all occurrences of the species and to protect 95 percent of suitable

habitat rangewide within the three core areas. Currently, there are nine known extant occurrences (CNDDDB 2006) (see Table 1). In 1981 an observation of *Orcuttia viscida* was reported from a property east of Excelsior Road, north of Calvine Road (Klotz Property) in Sacramento County; however, on further investigation the plants were found to be *Orcuttia tenuis* (T. Griggs, River Partners, *in litt.*, 2006). Eight of the occurrences (88 percent) receive some level of protection, as described in section II.C.2.a. The amount of suitable *Orcuttia viscida* habitat that exists rangewide has not yet been estimated; therefore, the percentage that has been protected rangewide is still unknown. This recovery criterion has been partially met; however, one known extant occurrence, located east of Grantline Road on land tentatively proposed for development, remains to be protected. The Service has only recently approved the Recovery Plan and does not yet have sufficient information to quantify either the acreage of suitable habitat within each core area or the acreage of protected habitat that is suitable for *Orcuttia viscida*.

Table 1: *Orcuttia viscida* core recovery areas and extant occurrences.

| Core area (# of occurrences) | Occurrence Name | CNDDDB EO # | Status | Natural/ Introduced | Ownership Type | Protection Type |
|---------------------------------|--|-------------|--------|---------------------|---|---------------------------------|
| Cosumnes/Rancho Seco Lake (1) | Rancho Seco Lake | 16 | extant | natural | Sacramento Municipal Utility District | Temporary conservation easement |
| Mather (6) | Anatolia Conservation Bank (2 occurrences) | 17, 18 | extant | natural | Anatolia Conservation Bank | Conservation easement |
| | Kiefer Landfill Wetland Preserve (2 occurrences) | 1, 6 | extant | natural | County of Sacramento | Conservation easement |
| | East of Grantline Road | 19 | extant | natural | Private | None |
| | Arroyo Seco Conservation Bank | 20 | extant | natural | Arroyo Seco Conservation Bank | Conservation easement |
| Phoenix Park/ Phoenix Field (2) | Phoenix Park | 15 | extant | introduced | City of Fair Oaks – Parks and Recreation Department | City park |
| | Phoenix Field | 5 | extant | natural | CDFG | Ecological Reserve |

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

Orcuttia viscida has only been known historically and currently to occur in Sacramento County within the Southeast Sacramento Valley Vernal Pool Region. This criterion has been partially met because the northernmost occurrences at Phoenix Park and Phoenix Field and the

southernmost occurrence at Rancho Seco Lake have been protected. However, the easternmost occurrence at the proposed Grantline 3250 development project has not been protected.

1C. Reintroductions must be carried out and meet success criteria established in the recovery plan.

The Recovery Plan recommends reintroduction to: (1) the location of the extirpated Orangevale-Folsom occurrence, and (2) Rancho Seco Lake. The Rancho Seco Lake occurrence is currently extant in one vernal pool but may be extirpated from a second previously occupied vernal pool (J. Buck, The Nature Conservancy, *in litt.*, 2006). This recovery criterion has not been met. As of this review, reintroductions of *Orcuttia viscida* have not occurred.

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

Additional occurrences of *Orcuttia viscida* may be found in potential habitat in Sacramento County, particularly on private lands which support suitable habitat and soil types but have not yet been surveyed. At this time, the Service is not aware of surveys of additional areas. No GIS or other analyses to identify areas of potential occurrence are known. This recovery criterion has not been met.

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

Monitoring of hydrology has not occurred at any of the known extant populations; therefore this recovery criterion has not been met.

2. Adaptive Habitat Management and Monitoring

The four listing factors noted in the rule to list the species are addressed in the recovery plan: curtailment of habitat loss (factor A), establishing grazing regimes (factor C), protecting existing occurrences (factor D), and control of invasive, nonnative plant species (factor E).

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

Habitat management and monitoring plans have been developed for six of the nine known extant occurrences. These occurrences are located on lands that are managed under the guidance of management plans. Management plans are in place for the Kiefer Landfill Wetland Preserve, Anatolia Conservation Bank, and Arroyo Seco Conservation Bank. The Rancho Seco

occurrence is now protected under a temporary conservation easement; however, a management plan that specifically addresses *Orcuttia viscida* is not yet in place. A management plan has been written for the Phoenix Park and Phoenix Field occurrences but it has not been implemented (J. Gerlach, ESA Biological Resources, pers. comm., 2006; D. Burmester, CDFG, pers. comm., 2006). The occurrence in eastern Sacramento County is not protected or actively managed for the benefit of the species. Therefore, this criterion has not been met.

2B. Mechanisms are in place to provide for management in perpetuity and long-term monitoring of 1. A-E, as previously discussed (funding, personnel, etc).

Five occurrences of *Orcuttia viscida* have long-term funding for management and monitoring in perpetuity. These are the Kiefer Landfill Wetland Preserve (two occurrences), Anatolia Conservation Bank (two occurrences), and the Arroyo Seco Conservation Bank (one occurrence). SMUD states that their ultimate goal is to establish the Rancho Seco preserve as a wetlands mitigation bank (Sacramento Municipal Utility District 2006). Management and monitoring of the preserve is proposed to occur in the interim period, along with the development of a management plan. The Phoenix Park and Phoenix Field occurrences are protected; however, funding has not been secured for the management and monitoring in perpetuity for these properties (J. Gerlach, pers. comm., 2006). The occurrence in eastern Sacramento County is not protected or actively managed for the benefit of the species. Therefore, this criterion has not been met.

2C. Monitoring indicates that ecosystem function has been maintained in the areas protected under 1A-D for at least one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring.

Eight of the occurrences have received some level of monitoring; however, continuous monitoring of ecosystem function has not occurred during a time period that meets the requirements specified in the 2005 Recovery Plan (one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring). This criterion has not been met.

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

The Recovery Plan recommends collection of seeds from all extant occurrences. No seed has been collected and accessioned to storage facilities from any of the occurrences. This criterion has not been met.

3. Status Surveys:

This recovery criterion addresses listing factor A because surveys help to prioritize which populations should be protected first. Listing factor E is addressed because surveys help alert

land managers to threats to *Orcuttia viscida* from invasive, nonnative plant species and other natural or manmade factors.

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

Although eight of the occurrences have periodically received some level of monitoring, status surveys and monitoring have not occurred over a time period that meets the requirements specified in the 2005 Recovery Plan (one multi-year period that includes above average, average, and below average local rainfall, a multi-year drought, and a minimum of 5 years of post-drought monitoring). This criterion has not been met.

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

Monitoring of *Orcuttia viscida* occurrences shows that the threat of competition from invasive, nonnative plants has increased since the time of listing. For example, *Glyceria declinata* (waxy manna grass), which was not included as a threat in the rule to list the species, is a nonnative, perennial grass that forms dense stands and is able to invade *Orcuttia viscida* habitat and displace the listed plant. In addition, if monitored occurrences are deemed to be threatened, there are no habitat management or rapid response measures planned. Habitat loss from urbanization also continues to be a threat to one of the occurrences. Although eight occurrences are now protected from land conversion, impacts from surrounding land use, adjacent road widening, and other human activities continue to threaten the species, especially if not periodically monitored. This criterion has not been met.

4. Research:

Research addresses the four listing factors discussed in the listing.

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

The Recovery Plan discusses a variety of research that would be beneficial to help refine recovery actions and criteria, and guide overall recovery and long-term conservation efforts

(pages IV-53 to IV-63). The Recovery Plan recommends research on genetics, taxonomy, biology of vernal pool species, the effects of habitat management practices on vernal pool species and their habitat, and threats to vernal pool species and ecosystems.

The majority of information needs discussed in the 2005 Recovery Plan are still outstanding. Currently, this criterion has not been met. However, Dr. Heather Davis, Department of Biology of Sonoma State University, began an investigation in 2007 on the population genetics of *Orcuttia viscida* and four other listed vernal pool plants to determine how pollination ecology interacts with population genetics to control the plant's reproductive success (Sonoma State University 2006). Seeds or plants remaining at the end of the study will be deposited at an appropriate seed storage facility.

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

We are not aware of any genetic research relevant to the recovery criteria that has been conducted on *Orcuttia viscida* since the time of listing. This criterion has not been met.

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

See 4B, above.

5. Participation and outreach:

Participation and outreach addresses the four listing factors described in the threats analysis in the original listing.

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

The Recovery Plan discusses a variety of participation programs to achieve the goal of recovery of the listed species in the plan. An essential component of this collaborative approach is the formation of a single recovery implementation team overseeing the formation and function of multiple working groups formed at the vernal pool region level. The Service is currently in the preliminary stages of organizing both a recovery implementation team and multiple working groups. Service employees have met with various stakeholders to determine interest of stakeholders to be involved in working groups and/or the recovery implementation team.

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

See 5A, above.

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

This has not been initiated.

5D. Vernal pool region working groups have developed and implemented outreach and incentive programs that develop partnerships contributing to achieving recovery criteria 1-4.

This has not been initiated.

II.C. Updated Information and Current Species Status

II.C.1. Biology and Habitat

II.C.1.a. Abundance and population trends:

The current population trend information (numbers of plants) for *Orcuttia viscida* indicates this species appears to be stable at five of the nine occurrences. No quantitative information is available for the other four locations. However, threats to *Orcuttia viscida* from loss of habitat, primarily from urbanization and land conversion to agriculture, continue at the single unprotected occurrence located east of Grantline Road. Competition from nonnative, aggressive plant species, especially *Glyceria declinata* (waxy manna grass), threatens at least five occurrences of *Orcuttia viscida*. *Parentucellia viscosa* (sticky bartsia) has become established at Kiefer Landfill Wetland Preserve and likely threatens the *Orcuttia viscida* occurrences there (C. Witham pers. comm., 2006).

California Natural Diversity Database reports the existence of nine extant occurrences of *Orcuttia viscida*, whereas the recovery plan reported eight occurrences. The location of the most recently recorded occurrence, at Arroyo Seco Conservation Bank, which was not included in the Recovery Plan, is within the known range of the species and is approximately 6.4 kilometers (4 miles) from another extant occurrence (CNDDDB 2006). Therefore, this additional occurrence does not substantially increase the amount of known occupied habitat and is not a range extension. Although the occurrences which have been monitored appear to be stable, many of the occurrences occupy small areas and have a small number of plants. For example, *Orcuttia viscida* at the Rancho Seco occurrence occupied two vernal pools in previous years but only 17 plants in a single pool could be found in 2005 (J. Buck, *in litt.*, 2006).

II.C.1.b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

No new genetic information is available.

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

II.C.2.a. Factor A, Present or threatened destruction, modification or curtailment of its habitat or range:

At the time of listing in 1997, the primary threat to *Orcuttia viscida* was loss of habitat by urban development, the proposed expansion of Kiefer Landfill, and proposed gravel and aggregate mining (62 FR 14338). Currently, eight of the nine known occurrences of *Orcuttia viscida* are protected from development. The proposed expansion of Kiefer Landfill was the subject of a formal consultation under section 7 of the Endangered Species Act between the Service and the U.S. Army Corps of Engineers, for which we developed a biological opinion (Service 2003). Avoidance measures, minimization measures, and compensation for impacts from the landfill expansion to listed species were developed and implemented according to the terms and conditions of the biological opinion; therefore, the impacts to *Orcuttia viscida* from this project are not addressed in the 2005 Recovery Plan. None of the known occurrences of *Orcuttia viscida* are currently threatened by gravel and aggregate mining; therefore, this threat is not addressed further in the Recovery Plan criteria.

Urbanization continues to be the greatest threat to the single, unprotected occurrence, located east of Grantline Road. Urban development has been proposed for the 1,315-hectare (3,250-acre) property on which this occurrence is found. The proponent for the proposed subdivision conducted two pre-application meetings with the U.S. Army Corps of Engineers in 2005; however, he has not submitted an application to the Corps for a permit to fill wetlands (W. Ness, Corps, in. litt., 2006). Sacramento County planning staff are in negotiations with the developer via the South Sacramento Habitat Conservation Plan to ensure that this occurrence will be protected (R. Radmacher, Sacramento County Planning and Community Development Department, pers. comm., 2006). All other known occurrences of the species are found on lands that are currently protected.

Discussion of occurrences within each core area:

1. Cosumnes/Rancho Seco Lake core area: One occurrence of *Orcuttia viscida* is found in this core area. The occurrence is located on property owned by Sacramento Municipal Utility District (SMUD), south of Rancho Seco Lake. The property has been designated as a 486-hectare (1,200-acre) nature preserve and is currently protected under a 30-month temporary conservation easement, recorded on October 18, 2006, and established by a Memorandum of Understanding between SMUD, The Nature Conservancy, and Sacramento Valley Conservancy (SVC) (Aimee Rutledge, SVC, pers. comm., 2006). The nature preserve was established for the protection of “ecological and agricultural resources including seasonal vernal pools that support threatened and endangered species” (Sacramento Municipal Utility District 2006) and is the first step in establishing the site as a conservation bank (A. Rutledge, pers. comm., 2006). As part of the establishment of a conservation bank, the site will be protected under a permanent conservation easement (A. Rutledge, pers. comm., 2006). The occurrence will be managed by SVC (A. Rutledge, pers. comm., 2006) and monitored annually (Carol Witham, biological consultant, pers. comm., 2006).

2. Mather core area: This core area contains six occurrences of *Orcuttia viscida*. The Anatolia Conservation Bank site contains two occurrences of *Orcuttia viscida*. This conservation bank is protected in perpetuity under a conservation easement that requires the site to be managed to benefit *Orcuttia viscida* in addition to other federally listed species. However, because of potential indirect effects to these occurrences from the proposed widening of Sunrise Boulevard (Service file number 1-1-05-F-0291), and because of a past incident of pumping of stormwater into the preserve, these occurrences are still threatened by human activities and alteration of hydrology. The Kiefer Landfill Wetland Preserve, located on land owned by the County of Sacramento (County), supports two extant occurrences and one extirpated occurrence. This Preserve is protected in perpetuity through a conservation easement and is managed to benefit the *Orcuttia viscida* occurrences and other federally listed vernal pool species. These occurrences, which are adjacent to the future expansion site of the Kiefer Landfill, currently receive wind-blown trash from County trucks transporting garbage to the landfill (Jones & Stokes 2005; Carol Witham, pers. comm., 2006). Trash, especially plastic bags, can act as a barrier for rainwater and deter seed germination. An extant occurrence located east of Grantline Road is unprotected and the land is tentatively proposed for development as a subdivision, Grantline 3250. It is unknown whether the subdivision would affect this occurrence of *Orcuttia viscida*. An occurrence located on the Arroyo Seco Conservation Bank is permanently protected by a conservation easement that requires the site to be managed for the benefit of listed vernal pool species.

3. Phoenix Park/Phoenix Field core area: Two occurrences of *Orcuttia viscida* are found in this core area. One occurrence is located in Phoenix Park which is owned and managed by the City of Fair Oaks – Parks and Recreation Department. A nearby occurrence is located in Phoenix Field which is owned by California Department of Fish and Game and designated as an Ecological Reserve. However, because of the proximity of both occurrences to surrounding urban development, runoff, and, particularly in the case of the Phoenix Park occurrence, public foot traffic through the park, these occurrences are still threatened by human activities and alteration of hydrology.

II.C.2.b. Factor B, Overutilization for commercial, recreational, scientific, or educational purposes:

Overutilization for commercial purposes was not known to be a factor in the 1997 final rule and does not appear to be a threat at this time. The 1997 listing rule does state that uncontrolled visits by groups or individuals to vernal pool areas could result in possible trampling of vernal pool plants. Although trampling of the pool containing *Orcuttia viscida* is known to occur at one location (J. Gerlach, ESA, pers. comm., 2006), this factor does not appear to be a large threat and is not addressed in the 2005 Recovery Plan criteria.

II.C.2.c. Factor C, Disease or predation:

The Service is not aware of any new information regarding disease or predation since the listing of *Orcuttia viscida* in 1997. The 1997 listing rule states that disease was not a factor, and grazing was not a factor when moderate grazing regimes on dry pasture are utilized (62 FR 14338). Appropriate grazing regimes are addressed in the 2005 Recovery Plan criteria.

II.C.2.d. Factor D, Inadequacy of existing regulatory mechanisms:

Federal Protections

Endangered Species Act: The Endangered Species Act of 1973, as amended (Act), is the primary Federal law that provides protection for *Orcuttia viscida*. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally-endangered wildlife, however, the take prohibition does not apply to plants. Instead, plants are protected from harm in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e. collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting digging, damage, or destruction of endangered plants on any other area in knowing violation of a state law or regulation, or in the course of any violation of a state criminal trespass law. Section 9 also makes illegal the international and interstate transport, import export and sale or offer for sale of endangered plants and animals. 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 in areas where they co-occur with federally listed wildlife species. In some cases, federally listed plants are included as covered species in habitat conservation plans (HCPs) prepared by non-Federal applicants as part of the terms and conditions for issuance of an incidental take permit for federally listed wildlife under section 10(a)(1)(B).

Clean Water Act: The Section 404 of the Clean Water Act may afford some protection to *Orcuttia viscida*. The U.S. Army Corps of Engineers (USACE or Corps) issues permits for the discharge of dredged or fill material into navigable waters of the United States. The Corps interprets “the waters of the United States” expansively to include not only traditional navigable waters, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. Before issuing a 404 permit to a project applicant that may affect federally listed species, the Corps is required under section 7 of the Endangered Species Act to consult with the Service.

However, recent Supreme Court rulings have called into question the Corps’ definition of Waters of the U.S. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving “isolated” wetlands. Currently, the Corps regulatory oversight of vernal pools is in doubt because of their “isolated” nature. In response to the Supreme Court decision, the Corps and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a “significant nexus” standard that may protect some, but not all, vernal pool habitat (USEPA and USACE 2007). The overall effect of the new permit guidelines on loss of vernal pool habitat is not known at this time. If the Corps loses their regulatory authority over vernal pools, unmitigated destruction of potential habitat for *Orcuttia viscida* may increase over the range of the species.

California State Laws

The State's authority to conserve plants is comprised of four pieces of legislation: The California Endangered Species Act (CESA), the Native Plant Protection Act (NPPA), the California Environmental Quality Act (CEQA), and the Natural Community Conservation Planning Act (NCCPA) (Morey and Ikeda 2001).

Orcuttia viscida was State-listed as endangered in 1979. CESA (California Fish and Game Code, section 2080 *et seq.*) and NPPA (Division 2, Chapter 10, section 1908) prohibit the unauthorized take of State-listed threatened or endangered plant species. Unlike the take prohibition in the Federal Endangered Species Act, the State prohibition includes plants, however, landowners are exempt from this prohibition for plants via habitat modification. As noted in the 1997 Federal rule to list *Orcuttia viscida*, the landowner is required to notify the California Department of Fish and Game 10 days in advance of changing land use in order to allow salvage of listed plants (NPPA Division 2, Chapter 10, section 1913). However, salvaging is unlikely to be beneficial for *Orcuttia viscida*, an annual species, as no evidence exists that the species would survive transplantation.

The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) requires government agencies to consider and disclose environmental impacts of projects and to avoid or mitigate them where possible. Under CEQA, public agencies must prepare environmental documents to disclose environmental impacts of a project and to identify conservation measures and project alternatives. Through this process, the public can review proposed project plans and influence the process through public comment. However, CEQA does not guarantee that such conservation measures will be implemented.

There are currently no completed regional or county-wide Habitat Conservation Plans (HCPs) or Natural Community Conservation Plans (NCCPs) in Sacramento County, thereby leaving populations on private land without protection pursuant to the Endangered Species Act or the Natural Community Conservation Planning Act.

II.C.2.e. Factor E, Other natural or manmade factors affecting its continued existence:

Other natural or manmade threats cited in the 1997 final rule include competition from non-native plants, particularly *Eleocharis macrostachya*. Current threats include the threat of competition discussed in the 1997 final rule, and in addition, drought and climate change.

Nonnative Plants: Two invasive, nonnative plants likely threaten all occurrences of *Orcuttia viscida*. Competition from nonnative, aggressive plant species, especially *Glyceria declinata* and, to an unknown degree, *Parentucellia viscosa* (sticky bartsia), variously threatens at least five occurrences of this species. *Glyceria declinata*, which was not included as a threat in the rule to list the species, is known to co-occur with *Orcuttia viscida* in Phoenix Park and Phoenix Field (John Gerlach, ESA Assoc. *in litt.*, 2006), Rancho Seco Lake (Jennifer Buck, The Nature Conservancy, *in litt.*, 2006), and Kiefer Landfill Wetland Preserve (Rob Preston, Jones & Stokes, *in litt.*, 2006; Jones & Stokes 2005). Because of the rapidity with which the *G. declinata* is

becoming established in *Orcuttia viscida* habitat, *G. declinata* is now an immediate threat to the species.

Glyceria declinata, a native of Europe and Africa, was first identified in California in 1953 by Beecher Crampton from a vernal pool in Stanislaus County (The Nature Conservancy 2006).. During the last twenty years, the grass has spread throughout shallow natural and artificial wetlands along the eastern Central Valley of California. It is now reported to occur in Shasta, Tehama, Butte, Yuba, Placer, Sacramento, San Joaquin, Stanislaus, Fresno, Mendocino, Sonoma, and Alameda Counties (The Nature Conservancy 2006). The plant is adapted to long periods of inundation and typically grows from the high water mark of vernal pools to the bottom of the pools where *Orcuttia viscida* is found. *Glyceria declinata* is capable of establishing dense stands of plants up to 1 meter (3 feet) in height, which can shade-out endemic vernal pool species. Dense *G. declinata* stands appear capable of eliminating or significantly reducing populations of native annual plant species (The Nature Conservancy 2006). For example, in 2001, the cover of *G. declinata* in a large vernal pool in San Joaquin County was estimated as 2 percent; however, by 2006 the cover was greater than 90 percent (The Nature Conservancy 2006). In Phoenix Park in Sacramento County, *G. declinata* is known to have been present since at least 1993 in a vernal pool upstream of an *Orcuttia viscida* occurrence. However, in 2006, *G. declinata* was observed for the first time not only to co-occur with *Orcuttia viscida* in the downstream vernal pool but to be present in an unquantified but visually abundant amount (J. Gerlach, ESA, in litt. 2006). The California Invasive Plant Council describes *G. declinata* as a moderately invasive plant about which little is known but that may be a serious pest in vernal pool habitats (California Invasive Plant Council 2006). Correctly identifying *G. declinata* and determining a control method is complicated by the species' omission in the 1993 Jepson Manual and confusion regarding whether *G. declinata* from the Central Valley is in reality *G. occidentalis* (The Nature Conservancy 2006). Another complication with correctly identifying *Glyceria* species is that the morphological characteristics used to identify them are very similar and variable. Unpublished data from Harald Meimberg and John Gerlach of material from Sacramento County and Stanislaus County, indicates that the only *Glyceria* species present in the Central Valley is *G. declinata* (The Nature Conservancy 2006).

It is estimated that if the *Glyceria declinata* populations in *Orcuttia viscida* habitat grow at the rate of the San Joaquin or Phoenix Park populations, *O. viscida* could be completely displaced by *G. declinata* in 10 years or less (J. Gerlach, ESA, in litt., 2006). Voluntary efforts to remove *G. declinata* at Phoenix Park by handpulling have been the only efforts to control the species in *O. viscida* habitat (J. Gerlach, ESA, in litt., 2006). At Kiefer Landfill Wetland Preserve, sticky bartsia (*Parentucellia viscosa*) is invading the upper edges of the vernal pools that surround the vernal pools supporting *Orcuttia viscida* (Carol Witham, pers. comm., 2006). The effects of this species on *Orcuttia viscida* are currently unknown; however, this species warrants observation.

Drought and Climate Change: *Orcuttia viscida* is an obligate wetland species found only in vernal pools (Stone *et al.* 1988); therefore, maintenance of the pools' natural hydrology is necessary for the survival and recovery of this species. Drought or flood conditions will place additional strains on vernal pool ecosystems. Where occurrences persist on only marginal habitat, the addition of drought conditions is likely to result in higher rates of mortality in the short term with the effects of low reproductive output and survivorship persisting after the

drought has ceased. It is unknown how quickly *Orcuttia viscida* populations may rebound after severe climatic conditions.

Climate is predicted to change in California during the 21st century (Cayan *et al.* 2005, Field *et al.* 1999). Even modest changes in warming could result in a reduction of the spring snowpack, earlier snowmelt, and more runoff in winter with less runoff in spring and summer, more winter flooding, and drier summer soils (Cayan *et al.* 2005, Field *et al.* 1999). Although the specific effects of climate change on *Orcuttia viscida* are unknown, the effects of increased winter flooding and drought conditions in the spring and summer have the potential to adversely affect this species.

An example of the effect of a change in timing of rainfall occurred in spring of 2006. The late spring rains in 2006 resulted in late germination of *Orcuttia viscida* in some vernal pools. These late-blooming plants were not able to reach maturity and set seed before the intense summer heat dried the pools and killed the plants (Carol Witham, pers. comm., 2006).

Small Population Size: Habitat for *Orcuttia viscida* continues to be highly fragmented throughout its range due to conversion of natural habitat for urban and agricultural uses. This fragmentation has resulted in small isolated populations of this species. For example, at least three occurrences are each found in single vernal pools (CNDDDB 2008). Such populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987). If an extirpation event occurs in a population that has been fragmented, the opportunities for recolonization will be greatly reduced due to physical isolation from other source populations.

II.D. Synthesis

There are currently nine known extant occurrences of *Orcuttia viscida* (CNDDDB 2006), an increase from seven when listed in 1997 (CNDDDB 2006). However, only one new occurrence was reported to CNDDDB since 1997. The occurrence at Kiefer Landfill Wetland Preserve noted in CNDDDB in 1997 is now considered by CNDDDB to be two separate occurrences (CNDDDB 2006). Although eight occurrences of *Orcuttia viscida* are now protected from land conversion, impacts from surrounding land use, adjacent road widening, competition with nonnative plant species, potential changes to hydrology, and other human activities continue to threaten the species. Although the occurrences which have been monitored appear to be stable, many occupy a small area and have small numbers of plants, indicating that extirpation is still a threat even on protected sites. In 1997, the major threats to known occurrences of the species were habitat loss and fragmentation from urbanization, and conversion of natural lands to agriculture. Current information suggests that the primary threat is now habitat loss from competitive exclusion by aggressive, nonnative plants. In particular, *Glyceria declinata* has been found in five *Orcuttia viscida* occurrences. Urbanization and agricultural conversion continue to be important threats to the species in at least one location as well as potential habitat in Sacramento County. As potential *Orcuttia viscida* habitat is converted to other land uses without prior surveys for the species, opportunities for discovery of additional populations are lost.

The Recovery Plan recommends that 100 percent of extant occurrences be protected in perpetuity. Currently, eight (89 percent) natural occurrences are protected from the direct affects of land conversion; therefore, this criterion has not been met. In addition to habitat preservation, other criteria discussed within the Recovery Plan have not been met, and in some instances, not initiated. These include research, monitoring of hydrology, management, and participation and outreach. Based on the primary continued threats of habitat loss and degradation, nonnative invasive plants, and small population size, we conclude that *Orcuttia viscida* still meets the Act's definition of endangered, and no status change is recommended at this time

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

III.B. New Recovery Priority Number: 5C (no change)

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

The following recommendations for future actions are from the Recovery Plan and the results of discussions on the status of the species and the species' needs with several recognized *Orcuttia viscida* experts:

1. Conduct a study to identify methods to control the dispersal of the invasive grass, *Glyceria declinata*, in vernal pool habitat.
2. Develop and implement a management plan for control of nonnative, competitive plants, particularly *Glyceria declinata*. Phoenix Park, Phoenix Field, and Kiefer Landfill Wetland Preserve should be targeted for immediate control of *Glyceria declinata*. All remaining *Orcuttia viscida* occurrences should be surveyed for presence of *Glyceria declinata* and managed accordingly.
3. Introduce appropriate levels of grazing at the Rancho Seco site to benefit the *Orcuttia viscida* occurrence.
4. Work with SMUD to permanently protect the *Orcuttia viscida* plants and habitat, facilitate livestock watering improvements, and improve the cattle grazing regime to benefit *Orcuttia viscida*.
5. Conduct genetic research on *Glyceria declinata* to clarify its taxonomy.

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

Current Classification: Endangered
Recommendation resulting from the 5-Year Review

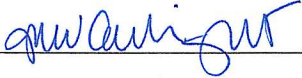
- Downlist to Threatened
 Uplist to Endangered
 Delist
 No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable NA

Review Conducted By Sacramento Fish and Wildlife Office staff

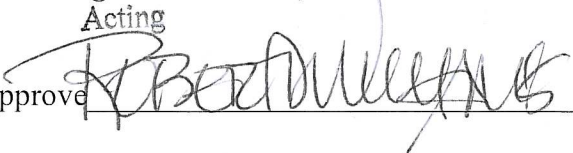
FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 7 July 2008

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Acting
Approve  Date 7/10/08