

## 11. *ORCUTTIA TENUIS* (SLENDER ORCUTT GRASS)

### a. Description and Taxonomy

**Taxonomy.**—Slender Orcutt grass is a member of the tribe Orcuttieae in the grass family Poaceae (Reeder 1965). Hitchcock (1934) first published the name *Orcuttia tenuis* for slender Orcutt grass, and this name has remained unchanged. Nonetheless, some confusion surrounds the taxonomy of the species. The type specimen of *Orcuttia tenuis* was collected in Goose Valley, Shasta County, in 1912. Before the initial collections had been recognized as a new species, they were mistakenly identified as *Orcuttia californica* and were used as the basis for illustrating the latter species in a 1920 publication (Hitchcock 1934). Another common name is slender orcuttia (Smith *et al.* 1980).

**Description and Identification.**—The *Neostapfia colusana* account provided above describes characteristics common to all members of the tribe, and the *Orcuttia inaequalis* account describes features shared among *Orcuttia* species. *Orcuttia tenuis* grows as single stems or in small tufts consisting of a few stems. The plants are sparsely hairy and branch only from the upper half of the stem. Although the stems typically are erect, they may become decumbent if many branches form near the stem tip (Reeder 1982). The stems range from 5 to 20 centimeters (2.0 to 7.9 inches) in height (G. Schoolcraft *in litt.* 2000) and are about 0.5 millimeter (0.02 inch) in diameter. The terrestrial leaves are 1.5 to 2 millimeters (0.06 to 0.08 inch) wide. In *O. tenuis*, the inflorescence comprises more than half of the plant's height, and the spikelets are more or less evenly spaced throughout the inflorescence. Each spikelet contains from 5 to 20 florets. The grains are about 3 millimeters (0.12 inch) long (Hitchcock 1934, Reeder 1982, Stone *et al.* 1988, Reeder 1993). In one study, seed weight ranged from 0.32 to 0.81 milligram (1.1 to  $2.8 \times 10^{-5}$  ounce) (Griggs 1980). The diploid chromosome number of *O. tenuis* is 26 (Reeder 1982).

*Orcuttia tenuis* is most similar to *O. pilosa*, but the former has narrower stems and leaves, branches at the upper nodes, larger spikelets that are not crowded on the rachis, larger seeds, a different chromosome number, and it flowers earlier (Reeder 1982). Other *Orcuttia* species have unequal lemma teeth and also differ in seed size and chromosome number (Reeder 1982).

## b. Historical and Current Distribution

**Historical Distribution.**—As of the mid-1980s, *Orcuttia tenuis* was known from only 18 localities in Lake, Sacramento, Shasta, and Tehama Counties (Reeder 1982, Stone *et al.* 1988) (**Figure II-15**). During the late 1980s, Stone *et al.* (1988) and others (California Natural Diversity Data Base 2003) discovered 34 additional occurrences of *O. tenuis*. Of these 52 occurrences reported prior to 1990, the majority (29 occurrences, 55.8 percent) were in the Northeastern Sacramento Valley Vernal Pool Region of Tehama County, mostly in the vicinity of Dales, except for 4 occurrences on the Vina Plains. Another 14 occurrences (26.9 percent) were in the Northwestern Sacramento Valley Vernal Pool Region, on the Stillwater and Millville Plains of Shasta County. The Modoc Plateau Vernal Pool Region accounted for another six occurrences (11.5 percent), including four in Shasta County and two in Siskiyou County. The remaining three occurrences included two in Lake County, which was in the Lake-Napa Vernal Pool Region, and one in Sacramento County, in the Southeastern Sacramento Valley Vernal Pool Region (Griggs and Jain 1983, Stone *et al.* 1988, California Natural Diversity Data Base 2003).

**Current Distribution.**—A total of 82 occurrences are known, of which 76 are presumed extant, 2 are possibly extirpated, and 4 are extirpated (K. Fuller *in litt.* 2004, California Natural Diversity Data Base 2005). Occurrences are presumed to be extant until the California Natural Diversity Data Base receives documentation that they have been extirpated. In addition to the counties where it was reported historically, *O. tenuis* is also known from Lassen, Modoc, Butte, and Plumas Counties. The primary area of concentration for *O. tenuis* is still in the vicinity of Dales, Tehama County, where 27 natural occurrences and the three introduced populations apparently remain extant (36 percent of occurrences). Those 30 occurrences and the four in the Vina Plains of Tehama County are all in the Northeastern Sacramento Valley Vernal Pool Region (Keeler-Wolf *et al.* 1998). A secondary area of concentration is the Modoc Plateau Vernal Pool Region in Lassen, Plumas, Shasta, and Siskiyou Counties, with 25 extant occurrences (33 percent). The portion of Shasta County that is in the Northwestern Sacramento Valley Vernal Pool Region has 12 extant occurrences (16 percent). The Lake-Napa Vernal Pool Region accounts for two extant occurrences, both in Lake County; three occurrences are in Sacramento County, in the Southeastern Sacramento Valley Vernal Pool Region; and the one remaining occurrence, in Shasta County (California Natural Diversity Data Base Element Occurrence 69), is outside of mapped vernal pool regions (Stone *et al.* 1988, Corbin and Schoolcraft 1989, B. Corbin *in litt.* 1999, California Natural Diversity Data Base 2005, K. Fuller *in litt.* 2005).

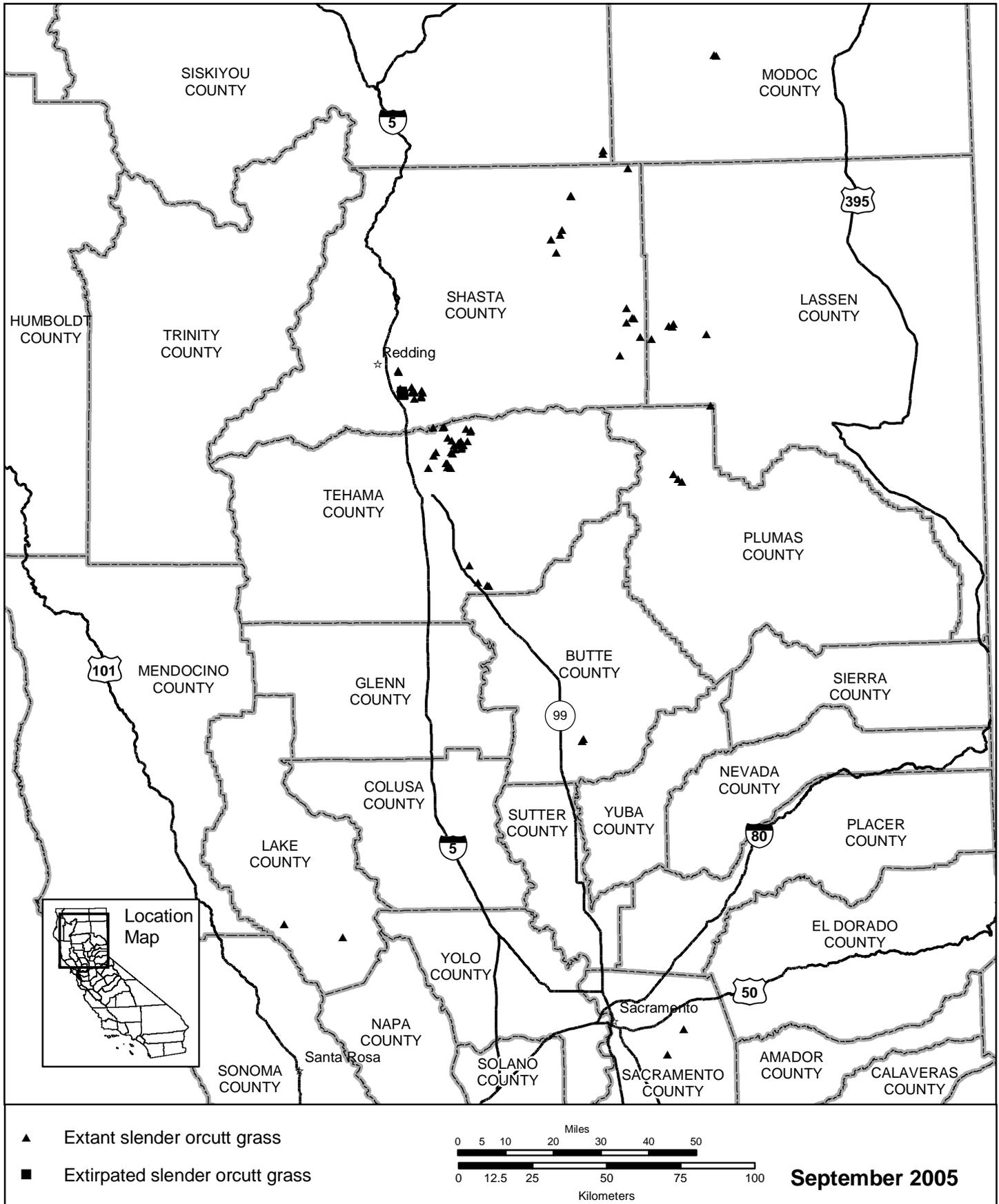


Figure II-15. Distribution of *Orcuttia tenuis* (slender Orcutt grass).

### c. Life History and Habitat

The general life history of *Orcuttia tenuis* is similar to that of *O. inaequalis* and *Neostapfia colusana*, as discussed previously in this recovery plan.

**Reproduction and Demography.**—Optimal germination of *Orcuttia tenuis* is achieved through stratification followed by warm days and mild nights (Griggs 1974 as cited in Stone *et al.* 1988). Peak flowering of this species typically occurs in May in the Central Valley (Griggs 1981, Reeder 1982), but not until June or July on the Modoc Plateau (B. Corbin *in litt.* 2000, G. Schoolcraft *in litt.* 2000). Unlike *O. pilosa* and *Tuctoria greenei*, *O. tenuis* is not likely to die when pools are flooded by late spring or summer rains. At two sites near Dales that were inundated by rains in May 1977, *O. tenuis* plants dropped their existing inflorescences, but resprouted and flowered again within 1 month (Griggs 1980, Griggs and Jain 1983). Moreover, the population at the Vina Plains Preserve in Tehama County experienced a second pulse of germination after summer rains in 1982 (Broyles 1983, cited in Alexander and Schlising 1997). Conversely, drought has been known to cause 100 percent mortality of local populations (Griggs 1980, Griggs and Jain 1983).

Similar to other vernal pool annuals, *Orcuttia tenuis* populations can vary greatly in size from year to year. Fluctuations of up to four orders of magnitude have been documented in Lake and Shasta Counties (Griggs 1980, Griggs and Jain 1983). At the Vina Plains Preserve, the single population ranged in size from 1,000 to 147,700 estimated individuals during the 5 times it was reported over a 13-year period (Stone *et al.* 1988, Alexander and Schlising 1997). However, *O. tenuis* populations do not always fluctuate in size. Among five populations of *O. tenuis* that Griggs tracked from 1973 to 1979, two remained at the same order of magnitude for the entire period; both were in the Dales area. None of the other five species of *Orcuttieae* included in the study remained stable for the full 7 years (Griggs 1980, Griggs and Jain 1983).

Seeds of *Orcuttia tenuis* germinate even in dry years, but the proportion of plants surviving to maturity varies. In a 1977 demographic study of two *O. tenuis* populations near Dales and a third near Redding (Griggs 1980, Griggs and Jain 1983), survivorship ranged from 0 to 75 percent, averaging 40 percent. At the two sites near Dales, densities of *O. tenuis* were 694 and 1,530 plants per square meter (64.5 and 142.1 plants per square foot, respectively) in 1977 (Griggs 1980, Griggs and Jain 1983). At the Vina Plains Preserve, the single occupied pool had a density of 71 plants per square meter (6.6 plants per square foot) in 1995 (Alexander and Schlising 1997). *Orcuttia tenuis* produced an average of 58 seeds per plant in 1977, ranging from 11.3 to 163.9 among the populations studied. At

one Dales-area site, the soil seed bank was estimated to be more than 14 times greater than the population of growing plants in 1977 (Griggs 1980, Griggs and Jain 1983).

Griggs (1980, Griggs and Jain 1983) reported that most of the genetic diversity in *Orcuttia tenuis* occurred among individuals with the same seed parent. He found nearly as much genetic diversity within a single population, but little difference between populations. However, his study included only two populations from Tehama County, which were in close proximity. One of the Sacramento County populations differs considerably from other occurrences in outward appearance, suggesting that it may differ in genetic makeup (S. Cochrane *in litt.* 1995a).

***Habitat and Community Associations.***—*Orcuttia tenuis* is found primarily on substrates of volcanic origin (Crampton 1959, Corbin and Schoolcraft 1989). Natural pools in which *O. tenuis* grows are classified as Northern Volcanic Ashflow and Northern Volcanic Mudflow vernal pools (Sawyer and Keeler-Wolf 1995). However, this species has also been reported from other natural and artificially-created seasonal wetlands such as creek floodplains, stock ponds, and borrow pits. Impervious layers range from iron-silica hardpan to bedrock (Stone *et al.* 1988, Corbin and Schoolcraft 1989, California Natural Diversity Data Base 2003). Among the populations studied by Stone *et al.* (1988), the median area of pools occupied by *O. tenuis* was 0.65 hectare (1.6 acres) and ranged from 0.08 to 45 hectares (0.2 to 111 acres). On the Modoc Plateau, occupied pools known as of 1989 ranged in size from 2 to 40 hectares (5 to 100 acres) and were typically at least 30 centimeters (11.8 inches) deep; this species was restricted to the deepest areas of these pools (Corbin and Schoolcraft 1989). *Orcuttia tenuis* occurs across a wide range of elevations corresponding to its broad geographical range. The lowest reported elevation is 27 meters (90 feet) in Sacramento County (Stone *et al.* 1988) and the highest is 1,756 meters (5,761 feet) in Plumas County (B. Corbin *in litt.* 1999).

Soil types supporting *Orcuttia tenuis* are similarly diverse, ranging from slightly to strongly acidic (Stone *et al.* 1988) and from clay to sandy, silty, or cobbly loam (Corbin and Schoolcraft 1989, California Natural Diversity Data Base 2003 and unprocessed data). The soil series has not been reported for all *O. tenuis* sites, but includes at least the following, by region: In the Lake-Napa Vernal Pool Region, this species occurs on the Collayomi-Aiken-Whispering complex and the Konocti-Hambright complex; Modoc Plateau populations occur on the Gooval, Lasvar, Lasvar-Pitvar complex, and Nosoni soil series; and those in the Northeastern Sacramento Valley are on the Anita, Guenon, Inks, Inskip, Laniger, Moda, Redding, Toomes, and Tuscan soil series. The Redding soil series also supports *O. tenuis* in the Southeastern Sacramento Valley Vernal Pool Region (Stone *et al.* 1988, California Natural Diversity Data Base 2003).

Vegetation types in which the occupied pools occur are diverse, ranging from grassland and oak woodland to mixed conifer forest, *Artemisia cana* (silver sagebrush) flats, and sedge meadows (Crampton 1959, California Natural Diversity Data Base 2003). Associated species vary throughout the range of *Orcuttia tenuis*. Among the most common associates in the Sacramento Valley are *Plagiobothrys stipitatus*, *Eleocharis macrostachya* (pale spikerush), *Eryngium* spp., *Navarretia leucocephala*, and *Marsilea vestita*. At other locations throughout northern California, *O. tenuis* occurs with a wide variety of plants, including various species of *Downingia*, *Eryngium*, and *Navarretia* (Stone *et al.* 1988, Corbin and Schoolcraft 1989, Alexander and Schlising 1997, California Natural Diversity Data Base 2003). *Orcuttia tenuis* also co-occurs with several of the other species addressed in this recovery plan, including *Navarretia leucocephala* ssp. *plieantha* and *Gratiola heterosepala* at Boggs Lake in Lake County (California Natural Diversity Data Base 2003), *G. heterosepala* and *Legenere limosa* at Dales Lake Ecological Reserve and Hog Lake in Tehama County (C. Witham *in litt.* 2000a), *Tuctoria greenei* at Laniger Lakes in Tehama County, and *G. heterosepala* at nine other sites in Tehama County and four sites in Shasta County (Stone *et al.* 1988, B. Corbin *in litt.* 2000, California Natural Diversity Data Base 2003). Although *O. tenuis* grows in the same vernal pool complexes as *O. pilosa* in Tehama County (including the Vina Plains Preserve) and *O. viscida* in Sacramento County, it has not been found to share any pools with either of these two species (Stone *et al.* 1988, S. Cochrane *in litt.* 1995a, Alexander and Schlising 1997, California Natural Diversity Data Base 2003).

#### **d. Reasons for Decline and Threats to Survival**

Most species addressed in this recovery plan are threatened by similar factors because they occupy the same vernal pool ecosystems. These general threats, faced by all the covered species, are discussed in greater detail in the Introduction section of this recovery plan. Additional, specific threats to *Orcuttia tenuis* are described below.

A number of specific threats are continuing for this species. In particular, urbanization is a continuing threat to *Orcuttia tenuis* populations in the vicinity of Redding and Sacramento. Off-road vehicle use is a particular problem near Redding and in forested areas of the Modoc Plateau. Despite the comparatively wide range of *O. tenuis*, small population size is of concern in the Lake-Napa Vernal Pool Region and the Millville Plains-Stillwater Plains area of the Northeastern and Northwestern Sacramento Valley Vernal Pool Regions.

### e. Conservation Efforts

*Orcuttia tenuis* was federally listed as threatened on March 26, 1997 (U.S. Fish and Wildlife Service 1997a) and has been State listed as endangered since 1979 (California Department of Fish and Game 1991). This species was recognized as rare and endangered by the California Native Plant Society as early as 1974 (Powell 1974) and is now included on List 1B and is considered to be “endangered throughout its range” (California Native Plant Society 2001). In 2005, critical habitat was designated for *O. tenuis* and several other vernal pool species in *Final Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon; Evaluation of Economic Exclusions From August 2003 Final Designation; Final Rule* (U.S. Fish and Wildlife Service 2005).

Four natural occurrences of *Orcuttia tenuis* are in designated preserves. These include the Trust for Wildland Communities’ Boggs Lake Preserve in Lake County, The Nature Conservancy’s Vina Plains Preserve in Tehama County, and two occurrences on the California Department of Fish and Game’s Dales Lake Ecological Reserve in Tehama County (Broyles 1987, Stone *et al.* 1988, California Natural Diversity Data Base 2003). All four populations are monitored annually (Baldwin and Baldwin 1989a, 1989b, 1991; D. Alexander pers. comm. 1997; California Natural Diversity Data Base 2003). Also, a conservation area containing a population of *O. tenuis* was recently established in Sacramento County to compensate for impacts to vernal pools (K. Fuller *in litt.* 2000). An unknown number of additional occurrences are protected from development by conservation easements; one is in Shasta County (California Natural Diversity Data Base 2003), and the others are in the Dales Lake area of Tehama County, where a private landowner put more than 16,188 hectares (40,000 acres) of ranch land into a conservation easement in cooperation with The Nature Conservancy (C. Witham *in litt.* 2000a).

Introductions of *Orcuttia tenuis* have been attempted at two privately-owned sites. In 1978, *O. tenuis* was seeded into two adjacent “ponds” in Chico, Butte County. Fewer than 100 plants grew in the 2 ponds that year or in 1979 (Griggs 1980), which was the last time the population size was reported. The other introduction was in 1982, when *O. tenuis* was seeded into an artificial pool in Shasta County. As of 1987, the population was thriving (California Natural Diversity Data Base 2003), but its current size is not known. An unintentional introduction may have taken place at the Dales Lake Ecological Reserve. In 1995, *O. tenuis* appeared in 11 of 21 artificially-created vernal pools there, possibly because its seeds were contained in plant litter from nearby natural pools that was spread on the surface of the created pool (C. Witham *in litt.* 2000a). The California Natural Diversity Data Base (2003) considers those 11 pools to

comprise 3 Element Occurrences, but the populations may not be viable; very few plants were found in 1995 and only 1 of the pools still supported *O. tenuis* in 1999 (C. Witham *in litt.* 2000a).

Twenty-seven of the 76 (36 percent) extant occurrences of *Orcuttia tenuis* are wholly or partially on Federal land. Seventeen of these are managed by the U.S. Forest Service, primarily the Lassen National Forest, although one is on the Shasta-Trinity National Forest. The other 10 are on lands controlled by the U.S. Bureau of Land Management; 9 of these are in the Redding Resource Area and the other is in the Alturas Resource Area. Two of the occurrences on the Lassen National Forest, Adobe North and South Vernal Pools, are within an area that has been proposed as a Research Natural Area (B. Corbin *in litt.* 2000). The Green Place Reservoir occurrence in Shasta County is within a Wilderness Study Area and has been jointly proposed by the U.S. Bureau of Land Management and the Lassen National Forest as a Research Natural Area (G. Schoolcraft *in litt.* 2000).

The Lassen National Forest and Susanville District of the U.S. Bureau of Land Management jointly prepared a management plan for *Orcuttia tenuis* sites under their administration (including those in the Shasta-Trinity National Forest) in order to ensure the long-term survival of the species (Corbin and Schoolcraft 1989). Actions identified in that plan included avoidance of known populations, maintenance of natural hydrology, monitoring selected populations, and surveys in suitable habitats. As a result of the plan, several areas have been fenced to exclude livestock and a considerable number of additional populations have been discovered (B. Corbin *in litt.* 1999, B. Corbin *in litt.* 2000, G. Schoolcraft *in litt.* 2000, California Natural Diversity Data Base 2003).

Substantial information on the demography, ecology, and genetics of *Orcuttia tenuis* was provided by Griggs (1980) through his doctoral research. Also, a status survey funded by us led to the discovery of 18 new *O. tenuis* occurrences (Stone *et al.* 1988). In addition, U.S. Forest Service personnel subsequently discovered 16 additional occurrences on public land (California Natural Diversity Data Base 2003). In 1995, the California Department of Fish and Game sponsored a workshop focusing on recovery strategies for *Orcuttia* species in Sacramento County (S. Cochrane *in litt.* 1995a, *in litt.* 1995b). A study of vernal pools on the Vina Plains preserve that was conducted in 1995 provided additional ecological information and management recommendations; we supported this research through section 6 funding (Alexander and Schlising 1997).