

**ATTACHMENT H**

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**PROFILES OF FEDERAL SPECIAL-STATUS  
PLANT SPECIES**

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## Attachment H

### PROFILES OF FEDERAL SPECIAL-STATUS PLANT SPECIES

#### RAWHIDE HILL ONION (*Allium tuolumnense*)

##### HISTORICAL AND CURRENT DISTRIBUTION

Rawhide Hill onion is a small perennial herb known only from serpentine outcrops near Jamestown and the Red Hills south and west of Chinese Camp of Tuolumne County (Denison and McNeal, 1989; Natural Diversity Data Base [NDDB], 1996).

##### HABITAT REQUIREMENTS AND REASONS FOR DECLINE

Rawhide Hill onion occurs in woodland on serpentine soil at elevations between 1,200 and 1,800 feet. Development, mining activities, and recreational use of its habitat has probably led to its decline (Denison and McNeal, 1989; NDDB, 1996).

##### RECOVERY EFFORTS

Rawhide Hill onion is proposed for federal listing as threatened. U. S. Bureau of Land Management (BLM) lands in the Red Hills where the plant occurs are managed to minimize the risk of impacts.

#### LARGE-FLOWERED FIDDLENECK (*Amsinckia grandiflora*)

##### HISTORICAL AND CURRENT DISTRIBUTION

Large-flowered fiddleneck is an annual herb endemic to the eastern slopes of central California's Diablo Range. Its historical range was probably limited to the dry inland hills of Alameda, Contra Costa, and San Joaquin counties. It is currently known from only three sites: one at a Lawrence Livermore National Laboratory (LLNL) facility southeast of Livermore, another on private property in western San Joaquin County, and a third established from seed at Black Diamond Mines Regional Preserve in Contra Costa County as part of a recovery effort for the species (California Department of Fish and Game [DFG], 1992).

##### HABITAT REQUIREMENTS AND REASONS FOR DECLINE

Large-flowered fiddleneck occurs on grassy hillsides in oak woodlands. Historically, it may have occurred in a variety of grassland habitats. Its decline probably resulted primarily from competition from non-native annual grasses and forbs, habitat disturbance and herbivory by cattle, and accelerated depletion of seed sources during prolonged droughts. The population at LLNL has declined precipitously since the 1960s (DFG, 1992).

## RECOVERY EFFORTS

Large-flowered fiddleneck is federally listed as endangered. The U.S. Fish and Wildlife Service (Service) prepared a recovery plan that recommends enhancing the LLNL population and establishing at least four other populations from seed within the species' historical range. DFG has been working on a recovery project for the fiddleneck at Black Diamond Mines Regional Preserve since 1987 (DFG, 1992).

## IONE MANZANITA (*Arctostaphylos myrtifolia*)

### HISTORICAL AND CURRENT DISTRIBUTION

Ione manzanita is a low, perennial shrub endemic to Amador and Calaveras counties (NDDDB, 1996). Historically, its distribution has probably always been limited to soils of the Ione Formation in these counties.

### HABITAT REQUIREMENTS AND REASONS FOR DECLINE

Ione manzanita occurs on acidic Ione clay or sandy soils in chaparral and woodland. Mature plants are killed by fire, but seed germination is stimulated by fire. Strip mining for clay and sand in the Ione and Carbondale areas has substantially decreased the size of populations in these areas. Further declines are attributed to increasing urbanization and the clearing of vegetation for agriculture, fire protection, and off-road vehicle (ORV) recreation.

### RECOVERY EFFORTS

Ione manzanita is a candidate for federal listing. A small portion of one population is protected at DFG's Apricum Hill Ecological Reserve. Soil conservation personnel have studied reclamation of mine sites with this species (Gankin, 1977).

## CLARA HUNT'S MILKVETCH (*Astragalus clarianus*)

### HISTORICAL AND CURRENT DISTRIBUTION

Clara Hunt's milkvetch is an annual herb that occurs in four small populations in Napa and Sonoma counties. A historical population near St. Helena in Napa County was recently eliminated. Only several hundred individuals remain on approximately 2 acres of habitat (DFG, 1992).

### HABITAT REQUIREMENTS AND REASONS FOR DECLINE

This species occurs on rocky clay soils in sparsely vegetated openings within blue oak woodland and grassland communities. The main reasons for decline are habitat modification and

destruction. Populations could be eliminated by random fluctuations in population size because of the species' annual lifestyle and small population sizes (DFG, 1992).

## **RECOVERY EFFORTS**

Clara Hunt's milkvetch is state listed as threatened and is proposed for federal listing as endangered. Habitat restoration began near Lake Hennesey in Napa County after the population there was severely damaged by inadvertent dumping of dredge material from the lake in 1990. In 1991, less than 10 plants occurred adjacent to the damaged area (DFG, 1992).

### **CHINESE CAMP BRODIAEA (*Brodiaea pallida*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Chinese Camp brodiaea is a perennial herb known from only one location southwest of Chinese Camp in Tuolumne County. Most of the population is in private ownership (DFG, 1992). Because of its specific habitat requirements, the historical distribution of the species was probably not much more extensive than the current distribution.

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Chinese Camp brodiaea occurs along a shallow, intermittent stream on clay derived from serpentine. Cattle grazing and alteration of the existing hydrological conditions are possible reasons for decline (DFG, 1992).

## **RECOVERY EFFORTS**

Chinese Camp brodiaea is state listed as endangered and is proposed for federal listing as endangered. DFG developed an acquisition proposal for land where the species occurs in 1985, but the landowners were not willing to sell to the state. The Nature Conservancy (TNC) arranged a voluntary protection agreement with an owner in 1991. CNPS began leasing a parcel in 1991 to protect plants. However, the majority of the population remains unprotected.

### **MARIPOSA PUSSYPAWS (*Calyptridium pulchellum*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Mariposa pussypaws is an annual herb endemic to the central Sierra Nevada foothills of Mariposa, Merced, and Fresno counties (NDDB, 1996). The species appears to always have been uncommon and limited in distribution. Seven populations are known, six on private lands and one in the Sierra National Forest (NDDB, 1996).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Mariposa pussypaws grows in decomposing granite or sandy soils in blue oak-foothill pine woodland. Potential threats to the species include residential developments and road construction. (NDDB, 1996)

## **RECOVERY EFFORTS**

Mariposa pussypaws has been proposed for federal listing as endangered.

### **STEBBINS' MORNING-GLORY (*Calystegia stebbinsii*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

Stebbins' morning-glory is a perennial herb endemic to the northern Sierra Nevada foothills. The species appears always to have been uncommon and limited in distribution. Only 16 occurrences are known, all from El Dorado and Nevada counties (NDDB, 1996).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Stebbins' morning-glory occurs in openings in chaparral and blue oak-foothill pine on soils derived from gabbro and serpentine (NDDB, 1996). Habitat for this species has been reduced by residential and commercial development, and several of the known occurrences have been extirpated (NDDB, 1996). Additional threats to the species include road maintenance and ORVs (Skinner and Pavlik, 1994).

## **RECOVERY EFFORTS**

Stebbins' morning-glory is federally listed as endangered. Most populations are on private land, but several populations occur with the Folsom Resource Area, which is owned by the BLM and managed to protect sensitive plant species (NDDB, 1996).

### **TIBURON PAINTBRUSH (*Castilleja affinis* ssp. *neglecta*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

Tiburon paintbrush is a semi-woody perennial that occurs on serpentine soils in Marin and Napa counties. Its historical distribution may have been limited to serpentine soils in the north bay area. Currently, it is known from four populations in Marin County, three of which occur on the Tiburon Peninsula, and one population in Napa County. Population sizes are small. A total of approximately 1,500 plants are known to exist as of 1992 (FR 60:6684; February 3, 1995).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Tiburon paintbrush occurs on north to west facing slopes in serpentine bunchgrass communities. The remaining populations are threatened by residential development, foot traffic, grazing, soil slumping, and gravel mining (FR 60:6684; February 3, 1995).

## **RECOVERY EFFORTS**

Tiburon pointbrush has been federally listed as endangered (FR 60:6684; February 3, 1995) and state listed as threatened.

### **TREE-ANEMONE (*Carpenteria californica*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

Tree-anemone is a woody shrub found only in eastern Fresno County, about 30 miles northeast of Fresno. The range of the species covers an area of approximately 225 square miles, with fewer than 10 native populations. Approximately 40 percent of the range occurs on U. S. Forest Service (USFS) land, the rest of the land being in private ownership (DFG, 1992).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Tree-anemone occurs on well-drained granitic soils and is most abundant on north-facing ravines and drainages in chaparral and woodland communities. Fire appears to be necessary for successful germination and seedling establishment. Highway construction, ORV use, illegal dumping, hydroelectric development, logging, cattle trampling and grazing, and fire suppression may have contributed to the decline of this species (DFG, 1992).

## **RECOVERY EFFORTS**

Tree-anemone is state listed as threatened and is proposed for federal listing as threatened. The landowners of one occurrence have entered into a voluntary protection agreement with TNC. A portion of the largest occurrence is protected in the *Carpenteria* Botanical Area established by the USFS. Another population is protected in the Backbone Creek Research Natural Area, where a portion of the area was fenced in 1990 to prevent access by cattle. USFS prepared a species management plan and monitored survival in the two protected areas in 1990 and 1991. In 1991, a new population was discovered during a survey for a large salvage timber sale on the Sierra National Forest. The national forest prevented logging in this population and a wide buffer of forest around it (DFG, 1992).

## **SUCCULENT OWL'S-CLOVER (*Castilleja campestris* ssp. *succulenta*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Succulent owl's-clover is an annual herb endemic to the eastern edge of the central San Joaquin Valley, from Stanislaus County to Fresno County. Most of the populations occur on private property (NDDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Succulent owl's-clover inhabits vernal pools in grasslands. Reasons for the species' decline include livestock grazing and loss of habitat to urban development, agriculture, flood control projects, and road widening (NDDDB, 1996).

### **RECOVERY EFFORTS**

Succulent owl's-clover is federally listed as threatened. Two populations occur on lands managed by federal agencies, and seven populations on private lands are protected through conservation easements to TNC (58 FR 41700, August 5, 1996).

## **CALIFORNIA JEWELFLOWER (*Caulanthus californicus*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

California jewelflower is an annual herb that is endemic to the southern San Joaquin Valley region. It originally occurred throughout much of the Tulare Basin south of Coalinga and Fresno and westward to Cuyama Valley (Taylor and Davilla, 1986). Today it occurs mostly in the Carrizo and Elkhorn Plains and Cuyama Valley. Since 1990, when only 10 populations were known, several more have been discovered following wet winters. A small planted population persists in Kern County (Skinner and Pavlik 1994, NDDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

California jewelflower occurs in grassland and mixed grassland-scrub habitats. All of the previously known and recently discovered populations occur in remnants of mixed native/non-native grassland habitat. Factors contributing to its decline include competition with aggressive non-native annual grasses; increased grazing pressure associated with the development of summer water sources; and habitat loss in areas of oil and gas development, especially agricultural development (Taylor and Davilla, 1986).

### **RECOVERY EFFORTS**

California jewelflower is federally listed as endangered. Several populations are protected at the Carrizo Plain Natural Area, a cooperative effort between the DFG, BLM, and TNC. DFG has entered into a memorandum of understanding with the University of California at Berkeley to

study the taxonomy of the plant (DFG, 1992). The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

### **PINE HILL CEANOTHUS (*Ceanothus roderickii*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Pine Hill ceanothus is a woody shrub that occurs in the Sierra foothills of El Dorado County. Fewer than 10 occurrences are known, most on private land, but a small portion of the habitat is part of DFG's Pine Hill Ecological Reserve. Due to its specific habitat requirements, the historical range of the ceanothus was probably limited to the current range, although populations were most likely larger and more continuous than they are presently (DFG, 1992).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Pine Hill ceanothus is endemic to the red clay soils of the Pine Hill gabbro formation within openings in chaparral and oak woodland. It is associated with several other rare endemic plant species, including Stebbins' morning-glory, Pine Hill flannel bush, El Dorado bedstraw, and Layne's butterweed. Residential development is the main reason for decline (DFG, 1992).

#### **RECOVERY EFFORTS**

Pine Hill ceanothus is state listed as rare and is federally listed as endangered. High-priority areas for protection and effective means for protection are being identified by DFG in cooperation with the El Dorado County Planning Department. DFG has proposed an Ecological Reserve near Salmon Falls, which is also a DFG Significant Natural Area. In 1990, DFG's Wildlife Conservation Board approved the purchase of a 40-acre parcel by the state. Another 40 acres were acquired in 1991. A Memorandum of Understanding (MOU) is being developed between DFG, BLM, and Reclamation to cooperatively acquire and manage lands along the South Fork of the American River to protect rare plant habitat (DFG, 1992).

### **HOOVER'S SPURGE (*Chamaesyce hooveri*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Hoover's spurge is a small, annual herb that is endemic to the Central Valley. Its historical distribution is not well documented, but presumably it was more common than at present among the vernal pools of the eastern Sacramento and San Joaquin valleys. The 15 extant populations occur in three clusters: one in Tehama, Butte, and Glenn counties; another in Stanislaus County; and another in Tulare County (Stone et al., 1988, NDDDB, 1996).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Hoover's spurge occurs in relatively large, deep vernal pools among the rolling hills, remnant alluvial fans, and stream terraces at the base of the Sierra Nevada foothills. It tends to occur where competition from other species has been reduced by prolonged inundation or other factors (Stone et al., 1988). Loss of vernal pool habitat to irrigated agriculture has probably caused most of the decline in this species. Continued expansion of agricultural development threatens some remaining populations. Moderate intensities of livestock grazing appear not to threaten the plant; however, intensive grazing and trampling of vernal pools could harm this species (Stone et al., 1988).

## **RECOVERY EFFORTS**

Hoover's spurge has been federally listed as threatened. A few populations are protected at TNC's Vina Plains Preserve.

### **SUISUN THISTLE (*Cirsium hydrophilum* var. *hydrophilum*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

Suisun thistle is an annual herb that is known only from Grizzly Island in Solano County (Skinner and Pavlik, 1994). It is likely that this species was more widespread in the past because its salt marsh habitat has been extremely reduced during this century (Macdonald, 1977).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Suisun thistle occurs on edges of salt and brackish marshes that are periodically inundated during high tides. Drainage or filling of salt marsh, and possibly water pollution, may have contributed to its decline (Niehaus, 1977).

## **RECOVERY EFFORTS**

Suisun thistle is proposed for federal listing as endangered. It is partially protected from disturbance in DFG's Grizzly Island Wildlife Area and Peytonia Slough Ecological Reserve (Skinner and Pavlik, 1994).

### **MERCED CLARKIA (*Clarkia lingulata*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

Merced clarkia is an annual herb that occurs exclusively in two populations (approximately 2 miles apart) along Highway 140 in the Merced River Canyon in Mariposa County. The populations are on land administered by the Sierra National Forest, but the roadside habitat is

maintained by Caltrans (DFG, 1992). Its historical distribution was probably not much greater than its current distribution.

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Merced clarkia occurs in open chaparral on steep north-facing slopes (Hickman 1993). One population was reduced by roadside herbicide spraying in 1984. Other reasons for decline may have included soil erosion and slippage in its steep habitat (DFG, 1992).

## **RECOVERY EFFORTS**

Merced clarkia is state listed as a endangered and is candidate for federal listing. "No Spray" road markers have been installed near the populations to avoid herbicide spraying in the future. The USFS has developed a species management guide for Merced clarkia in 1989. The plan recommends protecting essential habitat for the species, establishing an interagency MOU, and monitoring the populations annually. In 1990, a draft interagency MOU was developed to protect this and other sensitive species in the Merced River Canyon. The Sierra National Forest has been attempting to establish new populations since 1991 (DFG, 1992).

## **SPRINGVILLE CLARKIA (*Clarkia springvillensis*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Springville clarkia is an annual herb that occurs mostly within a 6-mile radius near the Tule River in the Sierra Nevada foothills of Tulare County. Another population is near Three Rivers in Tulare County (DFG, 1992).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Springville clarkia occurs in grassland areas within oak woodland. Residential development, overgrazing, roadside herbicide spraying and early season mowing of annual grasses for fire protection have been responsible for its decline (DFG, 1992).

### **RECOVERY EFFORTS**

Springville clarkia is state listed as endangered and is proposed for federal listing as threatened. Four populations are on USFS land, one site is protected by DFG, and two sites are privately owned. The DFG site is the Springville Clarkia Ecological Reserve, where the population has been monitored since 1987 to establish baseline population data. DFG produced a report in 1991 that summarizes current population data and management strategies for Springville clarkia populations (DFG, 1992).

## **SOFT BIRD'S-BEAK (*Cordylanthus mollis* ssp. *mollis*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Soft bird's-beak is an annual herb endemic to the northern shores of the San Francisco Bay. A dozen historical occurrences were known from Marin to Contra Costa counties, where the counties border San Francisco Bay. In 1991, the species was known to be extant at only three sites: Benecia State Recreation Area, DFG land along the Napa River at Fagan Slough, and Point Pinole Regional Shoreline (DFG, 1992). Recently, several new populations have been discovered at salt marshes near Martinez and at Suisun Marsh (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Soft bird's-beak occurs in coastal salt marshes; specifics about the microhabitat requirements of the species are not known. Reasons for historical declines have not been documented but are probably related to urban development and pollution coupled with the relative sensitivity of the species to changes in environmental conditions as evidenced by the extreme fluctuations in annual population size (DFG, 1992).

### **RECOVERY EFFORTS**

Soft bird's-beak is proposed for federal listing as endangered. The only population receiving active protection is at the Benecia State Recreation Area, for which a park management plan is being developed (DFG, 1992).

## **PALMATE-BRACTED BIRD'S-BEAK (*Cordylanthus palmatus*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Palmate-bracted bird's-beak is an annual herb endemic to moist lowlands in the Central and Livermore valleys. Its original range was probably similar to its current range, but with more numerous populations. Today it occurs at Delevan National Wildlife Refuge, at Colusa National Wildlife Refuge, near the City of Woodland, in the Springtown alkali sink north of Livermore, at DFG's Alkali Sink Ecological Reserve in Fresno County (DFG, 1992), in western Madera County, and at Sacramento National Wildlife Refuge in Glenn County.

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Palmate-bracted bird's-beak is restricted to saline-alkali soils in relatively undisturbed, seasonally flooded, alkali sink scrub habitats, at elevations below 500 feet. Habitat for the species has been eliminated and degraded by conversion to agricultural and urban development, draining of seasonal wetlands, grazing, ORV use, and trash dumping (DFG, 1992).

## RECOVERY EFFORTS

Palmate-bracted bird's-beak is federally listed as endangered. It is protected at the two national wildlife refuges and DFG's ecological reserve mentioned above. The City of Woodland has agreed to protect its population and has prepared a management plan. An interagency task force and researchers from Stanford University are working toward protection for the Springtown wetland population (largest of the five). Management goals focus on protection of all remaining habitat, restoration of seasonal wetland hydrology, and establishment of a habitat mitigation bank (DFG, 1992). The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

### **KERN MALLOW (*Eremalche kernensis*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Kern mallow is an annual herb endemic to a small portion of western Kern County in the Tulare Basin. Its original range is presumed to have been about the same as its current range on the low north and east slopes of the Elk Hills (Taylor and Davilla, 1986). Only 10 populations are currently known to exist (NDDDB, 1996). Reports of the plant in other counties have been based on misidentifications of the similar, but more common, Parry's mallow (Taylor and Davilla, 1986).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Kern mallow occurs in level areas among scrub-grassland vegetation with moderate cover of saltbush. It is not found on heavily alkaline soils and appears not to occur on less alkaline soils used for agriculture (Taylor and Davilla, 1986). It occurs at elevations ranging from 35 to 900 feet. The extent and causes of past declines in this species are unknown, but the introduction of aggressive annual grasses may have had adverse effects. The remaining populations are at risk because of their small number, very restricted distribution, disturbance in oil and gas fields, and potential for heavy grazing and trampling by sheep (Taylor and Davilla, 1986).

#### **RECOVERY EFFORTS**

Kern mallow is federally listed as endangered. The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

### **HOOVER'S ERIASTRUM (*Eriastrum hooveri*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Hoover's eriastrum is an annual herb endemic to the southern San Joaquin Valley, Temblor Range, Carrizo Plain, and Cuyama Valley. Its original distribution was probably throughout this area, excluding the vicinity of Tulare Lake. The present distribution still extends from Bridge

Road west of Fresno to near Cuyama (Taylor and Davilla, 1986). About 40 extant populations are known (NDDDB, 1996), and others may yet be found.

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Hoover's eriastrum grows in scrub-grassland habitats with moderate cover of saltbush. It often grows among cryptogamic soil crusts (i.e., mats of moss, lichen, and algae) that reduce competition from annual grasses (Taylor and Davilla, 1986). Hoover's eriastrum has declined as a result of habitat conversion to agricultural uses. Many of the remaining populations may be threatened by future conversions to agricultural use, groundwater recharge basins, and oil and gas development (Taylor and Davilla, 1986).

### **RECOVERY EFFORTS**

Hoover's eriastrum is federally listed as threatened. The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

### **IONE BUCKWHEAT (*Eriogonum apricum* var. *apricum*) IRISH HILL BUCKWHEAT (*Eriogonum apricum* var. *prostratum*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Ione buckwheat and Irish Hill buckwheat are perennial herbs endemic to the Ione region of Amador County. These plants have probably always had limited distributions because they occur only on unusual soils of the Ione Formation. Only 10 extant occurrences of Ione buckwheat and only two of Irish Hill buckwheat exist (DFG, 1992).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Ione buckwheat and Irish Hill buckwheat occur strictly in the openings of Ione chaparral. The species have adapted to the unique clay soils that characterize this community. The buckwheats, always limited in extent by the distribution of their habitat, probably experienced severe reductions in the early part of this century during a period of extensive clay mining. Further declines are attributed to increasing urbanization and the clearing of vegetation for agriculture and fire protection. Active clay mining is reducing potential habitat that is suitable for these species. In addition, ORV use in the Carbondale Mesa area and proposals to initiate more clay mining threaten Irish Hills buckwheat (DFG, 1992).

### **RECOVERY EFFORTS**

Ione buckwheat and Irish Hill buckwheat are candidates for federal listing. They receive limited, indirect protection under the Amador County General Plan, which restricts development in their habitat to one home per 40 acres. One small population of Ione buckwheat is protected and managed by DFG at its Apricum Hill Ecological Reserve. Two additional populations of Ione buckwheat occur in highway rights-of-way managed by California Department of Transportation

(Caltrans), and one population occurs on BLM land. Both Ione buckwheat and Irish Hills buckwheat should benefit from the habitat management study of Ione chaparral being conducted at the Apricum Hill Ecological Reserve (DFG, 1992).

### **CONTRA COSTA WALLFLOWER (*Erysimum capitatum* ssp. *angustum*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Contra Costa wallflower is an annual herb endemic to Antioch Dunes, near the confluence of the Sacramento and San Joaquin rivers. Its historical range may not have been much greater than its current range, a 70-acre area of sandy bluffs overlooking the San Joaquin River (NDDDB, 1996).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Contra Costa wallflower grows in sand among other forbs, grasses, and shrubs on remnants of stabilized interior dunes. This habitat has been reduced to a fragment of its original extent by industrial development and sand mining. The remaining habitat has been disturbed and degraded by rototilling for fire control, ORV activity, and the establishment of aggressive non-native plants (DFG, 1992).

#### **RECOVERY EFFORTS**

Contra Costa wallflower is state and federally listed as endangered. All remaining populations of Contra Costa wallflower are protected by the Service at its Antioch Dunes National Wildlife Refuge and by Pacific Gas and Electric Company (PG&E) on the adjoining property. The Service has prepared a recovery plan that calls for enhancement of existing populations and establishment of new populations within its existing range (Knight, pers. comm.). The Service and PG&E have collaborated on habitat restoration projects at Antioch Dunes (DFG, 1992).

### **PINE HILL FLANNEL BUSH (*Fremontodendron decumbens*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Pine Hill flannel bush is a shrub endemic to Pine Hill and the nearby foothills of the Sierra Nevada in El Dorado County. Since it was first described in 1965, six sightings have been reported. The largest population is found on the DFG Pine Hill Ecological Reserve, and occurrences also exist nearby on private lands (DFG, 1992).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Pine Hill flannel bush occurs in chaparral and oak woodlands on reddish-brown clay soil derived from gabbro, a type of igneous rock. It is typically found on rocky ridges in association with chamise and manzanitas (Boyd, 1985). Its decline may be attributed to the clearing of vegetation along ridges for firebreaks and fire suppression. It is believed that the species depends on fire to stimulate seed germination and for resprouting. Residential development continues to threaten remaining populations (DFG, 1992).

## **RECOVERY EFFORTS**

Pine Hill flannel bush is federally listed as endangered and is protected at DFG's Pine Hill Ecological Reserve. To further protect the species, DFG and the El Dorado County Planning Department are identifying high-quality habitat areas and developing means for their acquisition. In addition, DFG, BLM, and Reclamation are working together to acquire Pine Hill flannel bush habitat near the South Fork of the American River (DFG, 1992).

## **STRIPED ADOBE-LILY (*Fritillaria striata*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Striped adobe-lily is a perennial herb endemic to the southeastern San Joaquin Valley and the southern Sierra Nevada foothills. Only 18 occurrences are known, mostly in Kern County; 2 other occurrences are reported to be extirpated. (NDDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Striped adobe-lily grows in heavy clay soils in annual grasslands and blue oak woodland (NDDDB, 1996). Reasons for the species' decline include livestock grazing, competition from introduced species, and habitat loss from residential development, agriculture, and road construction (59 FR 50540, October 4, 1994).

### **RECOVERY EFFORTS**

Striped adobe-lily has been proposed for federal listing as threatened.

## **EL DORADO BEDSTRAW (*Galium californicum* ssp. *sierrae*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

El Dorado bedstraw is a perennial herb endemic to Pine Hill and nearby ridges in El Dorado County. The species appears always to have been uncommon and limited in distribution. Nine occurrence are known, most of which are on private lands (NDDDB, 1996).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

El Dorado bedstraw occurs in pine-oak woodlands and chaparral, on soils derived from gabbro (NDDB, 1996). Development, ORVs, and recreation activities have contributed to this species' decline (Skinner and Pavlik, 1994).

## **RECOVERY EFFORTS**

El Dorado bedstraw is federally listed as endangered. One population is protected on the Pine Hill Ecological Preserve, managed by CDF and DFG (NDDB, 1996).

## **CONTRA COSTA GOLDFIELDS (*Lasthenia conjugens*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

The historical distribution of Contra Costa goldfields was considerably greater than at present, extending from Mendocino to Santa Barbara counties. Most known populations of this annual herb were concentrated in the Delta region of the Sacramento Valley. It now occurs at only a few locations in Solano and Napa counties (EDAW and WESCO, 1981).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Contra Costa goldfields inhabits vernal pools and seasonally moist grassy areas. In the past, the species may have also occurred in coastal prairies (Ornduff, 1979). Declines in this species are associated with the loss of vernal pools in California, which is primarily attributed to development and agriculture. Remaining threats include continued urbanization and grazing.

### **RECOVERY EFFORTS**

Contra Costa goldfields is proposed for federal listing as endangered. No recovery efforts have been developed.

## **SAN JOAQUIN WOOLLY-THREADS (*Lembertia congdonii*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

San Joaquin woolly-threads is an annual herb endemic to the southern San Joaquin Valley and surrounding hills. Its original range extended from southern Fresno and Tulare counties (excluding the Tulare Lake bed) to Bakersfield and Cuyama Valley. Extant populations are scattered throughout all but the eastern portion of this area (Taylor, 1987). Most of the 20 extant populations are in the area of the Carrizo Plain (NDDB, 1996).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

San Joaquin woolly-threads grows in annual grasslands with sparse cover of saltbush on alluvial fans, often with sandy soil. Throughout its range, most of its habitat has been eliminated by conversion to agriculture. Threats to remaining unprotected populations include heavy grazing (especially by sheep), oil field development, and possibly air pollution (Taylor, 1987).

## **RECOVERY EFFORTS**

San Joaquin woolly-threads is federally listed as endangered. Several populations are under protective management at the Carrizo Plain Natural Area. Another population is protected at TNC's Sand Ridge Preserve east of Bakersfield. The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

## **BUTTE COUNTY MEADOWFOAM (*Limnanthes floccosa* ssp. *californica*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Butte County meadowfoam is an annual herb endemic to a small portion of the eastern Sacramento Valley. Its historical distribution was probably similar to its current distribution, which is a narrow 25-mile strip from Chico to near Shippee Road north of Oroville (Jones & Stokes Associates, 1989).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Butte County meadowfoam occurs in vernal pools and ephemerally wet drainages among annual grassland on level to gently sloping soils, especially the shallow Tuscan soils derived from volcanic mudflows. Major factors contributing to loss and degradation of Butte County meadowfoam populations include urban development, alteration of watershed size or runoff patterns, and livestock grazing. Impacts from development and grazing continue to threaten some of the remaining populations (Jones & Stokes Associates, 1989).

### **RECOVERY EFFORTS**

Butte County meadowfoam is federally listed as endangered. Some populations are being protected through mitigation plans for impacts on wetlands from development projects. An interagency task force has been convened to develop a comprehensive protection plan for the meadowfoam. The Service has not prepared a recovery plan for this species.

## **SEBASTOPOL MEADOWFOAM (*Limnanthes vinculans*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Sebastopol meadowfoam is an annual herb endemic to low valleys at the southern end of the North Coast Ranges (NDDB, 1996). The species is known only from Sonoma County, except for one population in Napa County, which may be introduced (Skinner and Pavlik, 1994). Of 29 known occurrences, all but 6 are on private land (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Sebastopol meadowfoam grows in vernal pools and wet meadows (Skinner and Pavlik, 1994). Reasons for the species' decline are numerous and include habitat loss from commercial and residential development; agricultural practices, including grazing, disking, and mowing; hydrologic changes, including drainage of wetlands and irrigation; road maintenance; ORV traffic; trash dumping; and competition from invasive exotic plant species (NDDB, 1996).

### **RECOVERY EFFORTS**

Sebastopol meadowfoam is state and federally listed as endangered. Critical habitat for this species has not been designated, and no recovery plan has been prepared. One population in Sonoma County and the population in Napa County are protected in ecological reserves managed by DFG (NDDB, 1996).

## **MARIPOSA LUPINE (*Lupinus citrinus* var. *deflexus*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Mariposa lupine is an annual herb endemic to the central Sierra Nevada foothills of Mariposa County (NDDB, 1996). The species appears to have always been uncommon and limited in distribution. Four populations are known, all on private lands (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Mariposa lupine grows in decomposing granite soils on hilltops and hillsides in blue oak-foothill pine woodland (NDDB, 1996). Potential threats to the species include residential developments and grazing (Skinner and Pavlik, 1994).

### **RECOVERY EFFORTS**

Mariposa lupine is state listed as threatened and has been proposed for federal listing as endangered. One population has been protected by the landowners through an agreement with TNC (NDDB, 1996).

## **KELSO CREEK MONKEYFLOWER (*Mimulus shevockii*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Kelso Creek monkeyflower is an annual herb endemic to the southern Sierra Nevada of Kern County. It has an extremely limited distribution and is known from only eight occurrences, one of which is historical. All populations are located in the Lake Isabella region of the Kern River drainage (NDDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Kelso Creek monkeyflower occurs in Joshua tree or California juniper woodlands. Within these habitats, it grows in loamy, coarse sands on alluvial fans and deposits of granitic origin (Heckard and Bacigalupi, 1986). Current threats include mobile home development, ORV use, and conversion of natural habitat to orchard (Shevock, pers. comm.). Because it grows in flat areas in a relatively scenic region, it is particularly susceptible to residential development.

### **RECOVERY EFFORTS**

Kelso Creek monkeyflower is proposed for federal listing as endangered. No recovery efforts have been attempted to preserve its habitat.

## **FEW-FLOWERED NAVARRETIA (*Navarretia leucocephala* ssp. *pauciflora*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Few-flowered navarretia is an annual herb endemic to the inner North Coast Ranges of Lake and Napa counties (NDDDB, 1996). Six populations are known, five of which occur on private lands (NDDDB, 1996). The limited range and specific substrate preference indicate that the species has always been uncommon.

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Few-flowered navarretia grows in vernal pools occurring on volcanic ash deposits (Skinner and Pavlik, 1994). Threats to the species include recreational activities, grazing, and habitat loss resulting from wetland drainage (NDDDB, 1996).

### **RECOVERY EFFORTS**

Few-flowered navarretia is state listed as threatened and federally listed as endangered. Critical habitat for this species has not been designated, and no recovery plan has been prepared. One population occurs in the Loch Lomond vernal pool ecological reserve, which is managed by DFG.

## **PIUTE MOUNTAINS NAVARRETIA (*Navarretia setiloba*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Piute Mountains navarretia is an annual herb endemic to the Tehachapi Mountains and the Piute Mountains of the southern Sierra Nevada. It occurs primarily in Kern County, although one historical occurrence is documented from Tulare County. Efforts to relocate the historical population have been unsuccessful. Approximately 10 occurrences of the species are presumed to be extant (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Piute Mountains navarretia grows in depressions on clays (typically red clay) or gravelly loams of foothill grasslands and cismontane and juniper woodlands (Hickman, 1993, NDDB, 1996). Declines in this species are attributed to mobile home development, ORV use, and trampling (NDDB, 1996). The species is currently threatened by residential development at Bodfish (Skinner and Pavlik, 1994).

### **RECOVERY EFFORTS**

Piute Mountains navarretia is proposal for federal listing as threatened. No recovery efforts are currently underway for furthering the protection of this species. One population in Kern County is voluntarily protected by the landowner (NDDB, 1996).

## **COLUSA GRASS (*Neostapfia colusana*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Colusa grass is endemic to the Sacramento and San Joaquin valleys. Its historical distribution included Merced, Stanislaus, Solano, and Colusa counties. Forty populations are currently known from Merced, Stanislaus, and Solano counties; however, none remain in Colusa County (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Colusa grass occurs in large or deep vernal pools with substrates of adobe mud. The primary reasons for decline in this species include the conversion of vernal pools to agricultural and developed lands, heavy grazing by cattle, and competition from introduced weedy species that tend to displace Colusa grass.

## RECOVERY EFFORTS

Colusa grass is federally listed as threatened. Two occurrences are currently protected: the Solano County occurrence at TNC's Jepson Prairie Preserve, and the Flying M Ranch in Merced County, where conservation easements protect some of the large vernal pools.

### **ANTIOCH DUNES EVENING-PRIMROSE (*Oenothera deltooides* ssp. *howellii*)**

#### HISTORICAL AND CURRENT DISTRIBUTION

Antioch Dunes evening-primrose is a perennial herb endemic to the Antioch Dunes, south of the confluence of the Sacramento and San Joaquin rivers. Its historical distribution was not much more extensive than its present distribution in 70 acres of remnant dunes at Antioch. In 1970, the primrose was introduced to the Brannan Island State Recreation Area; in 1988, one small population remained (DFG, 1992).

#### HABITAT REQUIREMENTS AND REASONS FOR DECLINE

Antioch Dunes evening-primrose grows in loose or semi-stabilized sand. Industrial development, sand mining, and agricultural conversion have resulted in loss of its habitat. Fire control activities, ORV use, and the invasion of exotic species have further degraded its remaining habitat (DFG, 1992).

#### RECOVERY EFFORTS

Antioch Dunes evening-primrose is federally listed as endangered. Its remaining habitat is protected by the Antioch Dunes National Wildlife Refuge and PG&E. Management techniques and establishment methods are being studied, and long-term monitoring has begun. PG&E has developed an enhancement program for the dunes under its ownership (DFG, 1992). A recovery plan for the species has been prepared by the Service that focuses on protecting and restoring the Antioch Dunes ecosystem and increasing the numbers of Antioch Dunes evening-primrose plants in the wild (Knight, pers. comm.).

### **BAKERSFIELD CACTUS (*Opuntia basilaris* var. *treleasei*)**

#### HISTORICAL AND CURRENT DISTRIBUTION

Bakersfield cactus is endemic to Kern County. It once formed extensive colonies around Bakersfield, extending up the Kern River Canyon, down the Caliente Creek drainage, and to the Tejon Hills. Its current distribution is much reduced, with concentrations near TNC's Paine Preserve and the town of Buttonwillow.

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Bakersfield cactus occurs in grassland on bluffs, low hills, and flats and in saltbush scrub, blue oak woodland, and riparian habitats. It prefers substrates of coarse cobble and well-drained sand. Substantial decline has resulted from urbanization, agricultural conversion, oil field development, overgrazing, ORV use, dumping, sand mining, and invasion of weedy grasses (DFG, 1992).

## **RECOVERY EFFORTS**

Bakersfield cactus is federally listed as endangered. The Service is preparing a draft recovery plan for this and other arid upland and riparian species of the San Joaquin River and Tulare Lake regions.

### **SAN JOAQUIN VALLEY ORCUTT GRASS (*Orcuttia inaequalis*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

San Joaquin Valley Orcutt grass is the only Orcutt grass restricted to the San Joaquin Valley. Historically, its range included the eastern margin of the valley from Stanislaus County to Tulare County. At least half of these populations have been extirpated, including all occurrences in Stanislaus and Tulare counties. Eastern Merced County supports the highest concentration of the remaining populations (Stone et al., 1988).

## **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

San Joaquin Valley Orcutt grass occurs in vernal pools. Conversion of grasslands to urban and agricultural uses has eliminated much of its habitat. Hydrologic modifications, overgrazing, and competition from non-native weeds also contributed to its decline (Stone et al., 1988).

## **RECOVERY EFFORTS**

San Joaquin Valley Orcutt grass is federally listed as threatened. Many populations occur on private lands; however, those on the Flying M Ranch in Merced County are protected through conservation easements with TNC. TNC also protects the Table Mountain site in Fresno County. BLM protects and monitors another population in Fresno County (NDDB, 1996).

### **HAIRY ORCUTT GRASS (*Orcuttia pilosa*)**

## **HISTORICAL AND CURRENT DISTRIBUTION**

The historical range of hairy Orcutt grass includes the eastern margins of Sacramento and San Joaquin valleys. Approximately 60 percent of the 30 known historical occurrences still exist, but

none remain in Merced County. Most of the remaining populations are on the Vina Plains in Tehama County (Stone et al., 1988).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Hairy Orcutt grass inhabits vernal pools in rolling topography on remnant alluvial fans and stream terraces. Conversion of vernal pool habitat to irrigated agriculture has been the primary factor leading to decline in this species. Overgrazing, discing, and competition from non-native weeds continue to threaten its habitat (Stone et al., 1988).

### **RECOVERY EFFORTS**

Hairy Orcutt grass is federally listed as endangered. Populations at TNC's Vina Plains Preserve are protected from disturbance. They were monitored during a baseline survey and weeded to reduce competition with non-native species (Stone et al., 1988).

## **SLENDER ORCUTT GRASS (*Orcuttia tenuis*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Slender Orcutt grass is known from numerous widely distributed, disjunct populations in Lake, Sacramento, Shasta, Siskiyou, and Tehama counties. Of the approximately 45 known occurrences, about 40 are still extant. Most of the remaining populations are in Shasta and Tehama counties (Stone et al., 1988).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Slender Orcutt grass occurs in vernal pools within valley grassland and blue oak woodland. It has also shown an ability to colonize artificial habitats, such as the margins of stockponds. Many undocumented populations were probably lost during the intensive agricultural development that resulted in extensive losses of vernal pools in the Central Valley. Nearly one-third of the remaining occurrences have been degraded by agriculture, grazing, and other disturbances (Stone et al., 1988).

### **RECOVERY EFFORTS**

Slender Orcutt grass is federally listed as threatened. Populations are protected at TNC's Boggs Lake Preserve (Lake County) and Vina Plains Preserve (Tehama County). The USFS and BLM manage and protect additional populations on federal lands. About 88 percent of extant occurrences are under private ownership, where protection is rarely provided.

## **SACRAMENTO ORCUTT GRASS (*Orcuttia viscida*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Sacramento Orcutt grass is endemic to Sacramento County. Only nine historical and recent occurrences are documented, all in the eastern part of the county. The species remains at about seven known sites, one of which was established by seeding a vernal pool near a naturally occurring population (Stone et al., 1988).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Sacramento Orcutt grass also occurs in vernal pools in grassland and blue oak woodland communities. Some historical populations were probably eliminated by agricultural and urban development and placer mining. Overgrazing and human disturbance currently threaten the remaining populations (Stone et al., 1988).

### **RECOVERY EFFORTS**

Sacramento Orcutt grass is federally listed as endangered. DFG protects one population in Fair Oaks, and another is on land protected by the Sacramento Municipal Utility District. The remaining populations occur on unprotected private and county lands.

## **CALISTOGA POPCORNFLOWER (*Plagiobothrys strictus*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Calistoga popcornflower is an annual herb known from only three occurrences in the vicinity of Calistoga, in Napa County (Skinner and Pavlik, 1994). Two of these occurrences are on private property, and the third occurrence has not been relocated since 1903 (NDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Calistoga popcornflower grows on alkaline sites near thermal springs and on vernal pool margins in heavy, dark, adobe-like clay (NDDB, 1996). Both known populations are threatened by habitat loss, one from airport construction and the other from a proposed construction of a resort (NDDB, 1996).

### **RECOVERY EFFORTS**

Calistoga popcornflower is state listed as threatened and is proposed for federal listing as endangered.

## **NAPA BLUE GRASS (*Poa napensis*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Napa blue grass is restricted to two occurrences near Calistoga, in Napa County (Skinner and Pavlik, 1994).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Napa blue grass grows in moist alkaline meadows fed by runoff from nearby hot springs (NDDB, 1996). Both known populations are threatened by habitat loss, one from airport construction and the other from proposed construction of a resort (NDDB, 1996).

### **RECOVERY EFFORTS**

Napa blue grass is state listed as endangered and is proposed for federal listing as endangered.

## **HARTWEG'S PSEUDOBALIA (*Pseudobalia bahiifolia*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Hartweg's pseudobalia is endemic to the Central Valley. Historically, it was widely distributed but only locally abundant. Today it is limited to 16 populations on the east side of the San Joaquin Valley, in Stanislaus County, and at the border of Madera and Fresno counties (DFG, 1992).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Hartweg's pseudobalia occurs on the grassy slopes or gravelly soils of valley and foothill grasslands. Its decline has resulted from agricultural development, overgrazing by cattle, competition with non-native weeds, and levee construction (DFG, 1992).

### **RECOVERY EFFORTS**

Hartweg's pseudobalia is federally listed as endangered. One population is protected under a conservation agreement between TNC and Reclamation (DFG, 1992). The Service has not prepared a recovery plan for this species.

## **TULARE PSEUDOBALIA (*Pseudobahia peirsonii*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Tulare pseudobahia is an annual herb endemic to the eastern San Joaquin Valley. Historical occurrences were scattered from northern Kern County to Tulare and Fresno counties. At present, approximately two-thirds of these populations remain (DFG, 1992).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Tulare pseudobahia grows on clay soils in valley and foothill grasslands. Agricultural development, urbanization, heavy grazing by cattle and sheep, competition with non-native weeds, and flood control projects are the primary causes of decline in this species (DFG, 1992).

### **RECOVERY EFFORTS**

Tulare pseudobahia is federally listed as threatened. DFG developed a management plan for this plant in 1989, with recommendations to study and protect the remaining populations. TNC and DFG are seeking cooperation from landowners in Tulare and Fresno counties to protect populations on private land. (DFG, 1992). The Service has not prepared a recovery plan for this species.

## **LAYNE'S RAGWORT (*Senecio layneae*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

Layne's ragwort is a perennial herb endemic to the Sierra Nevada foothills. Most of the 40 known occurrences are in western El Dorado County, but four occurrences are known from the Red Hills in Tuolumne County (NDDB, 1996). Populations at three of the known occurrences are believed to have been extirpated (NDDB, 1996). Most of the populations occur on private lands.

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Layne's ragwort occurs in chaparral and oak-pine woodlands, generally on soils derived from serpentinite or gabbro (NDDB, 1996). It often is found in disturbed habitats, such as along roads, and occasionally is found along streams. Many factors are likely to be responsible for the species' decline, including habitat loss by development, road maintenance, ORV traffic, erosion, livestock grazing and trampling, and competition from non-native plant species (NDDB, 1996).

### **RECOVERY EFFORTS**

Layne's ragwort is federally listed as threatened. Several populations are on state or federal lands managed for the protection of sensitive plant species, including the Pine Hill Ecological Reserve, managed by California Department of Forestry and Fire Protection (DFF) and DFG; the Traverse

Botanical Area, managed by USFS; and the Folsom Resource Area and Red Hills Management Area, managed by BLM.

### **KECK'S CHECKERBLOOM (*Sidalcea keckii*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Keck's checkerbloom is an annual herb endemic to the southern Sierra Nevada foothills. Only two historical occurrences of the species are known. The first, identified in 1935 and then relocated in 1939, is near Glennville in Tulare County. The second collection was made in 1939 in Fresno County. The species was recently rediscovered near Mine Hill (near Porterville) in Tulare County (Kirkpatrick, 1992).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

The known populations of Keck's checkerbloom grow on a serpentine rock outcrop on a south-facing slope. Associated species include those typical of annual grasslands. Reasons leading to extirpation of the historical populations are unknown. Potential threats to the known occurrence include grazing and development (Kirkpatrick, 1992).

#### **RECOVERY EFFORTS**

Keck's checkerbloom is federally proposed as endangered. The Service has not yet developed a recovery plan for this species.

### **SHOWY INDIAN CLOVER (*Trifolium amoenum*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Showy Indian clover is an annual herb historically known from the Coast Range foothills north and east of San Francisco Bay (NDDDB, 1996). The species was believed to be extinct, not having been seen in the wild since 1969 (Smith and York, 1984). A single plant was discovered in Sonoma County in 1993, from which a greenhouse culture is being maintained (Connors, 1994).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Habitat requirements for showy Indian clover are unknown, but specimens have generally been collected from low-elevation grasslands, including swales and disturbed areas (NDDDB, 1996). Factors believed responsible for the species' decline include livestock grazing, competition from non-native annual plants, and loss of habitat as a result of urbanization and agriculture (Connors, 1994; Pavlik and Skinner, 1994).

## **RECOVERY EFFORTS**

Showy Indian clover has been proposed for federal listing as endangered. All of the historically known populations are extinct, but the greenhouse culture may serve as a source for reestablishing populations in the wild (Connors, 1994).

### **GREENE'S ORCUTT GRASS (*Tuctoria greenei*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Greene's Orcutt grass is endemic to the Central Valley. Its historical range included parts of Shasta, Tehama, and Butte counties in the northern and eastern Central Valley and from San Joaquin County to Tulare County in the San Joaquin Valley. It still occurs in Shasta, southern Tehama, Butte, and eastern Merced counties (DFG, 1992). Half of the 40 documented occurrences remain (NDDB, 1996).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Greene's Orcutt grass occurs in small or shallow vernal pools or the early drying sections of large, deep vernal pools. The primary factors causing the decline in this species are conversion of habitat to irrigated agriculture; overgrazing by cattle; and more recently, residential development (DFG, 1992).

#### **RECOVERY EFFORTS**

Greene's Orcutt grass is federally listed as endangered. All populations occur on private land. Of the four occurrences at TNC's Vina Plains Preserve, only one is not grazed by cattle (DFG, 1992).

### **CRAMPTON'S TUCTORIA OR SOLANO GRASS (*Tuctoria mucronata*)**

#### **HISTORICAL AND CURRENT DISTRIBUTION**

Crampton's tuctoria is an annual grass endemic to the western Sacramento Valley. Its historical range was likely limited to this area. Much of its potential habitat was eliminated before the species was recognized. It is presently known from only two locations, both of which are south of Dixon in Solano County (Stone et al., 1988).

#### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

Crampton's tuctoria occurs in the clay bottoms of drying vernal pools and lakes surrounded by grassland. The species may have declined precipitously when intense agricultural development took place in the Sacramento Valley. Threats to the remaining populations include ORV use, farming operations, trampling by livestock, and hydrologic alterations (Stone et al., 1988).

## **RECOVERY EFFORTS**

Crampton's tuctoria is federally listed as endangered. Part of its habitat and one population are at TNC's Jepson Prairie Preserve. The Service has prepared a recovery plan for Crampton's tuctoria. The goal of the plan is to establish two secure populations in two protected large vernal lakes and their watershed, in addition to Olcott Lake in the vicinity of Jepson Prairie Reserve (Knight, pers. comm.).

## **CALIFORNIA VERVAIN (*Verbena californica*)**

### **HISTORICAL AND CURRENT DISTRIBUTION**

California vervain is a perennial herb endemic to the Red Hills in Tuolumne County (Skinner and Pavlik, 1994). The species appears always to have been uncommon and limited in distribution. It is known from nine occurrences on public and private lands in the Red Hills Resource Area (NDDDB, 1996).

### **HABITAT REQUIREMENTS AND REASONS FOR DECLINE**

California vervain grows in soils derived from serpentinite, on streambanks in foothill pine woodland (NDDDB, 1996). Reasons for its decline include grazing, mining, ORV use, and residential development (Skinner and Pavlik, 1994).

### **RECOVERY EFFORTS**

California vervain is a candidate for state listing and has been proposed for federal listing as threatened. Occurrences in the Red Hills Resource Area are managed to protect the populations (Skinner and Pavlik, 1994).