

## A.27 HOOVER’S SPURGE (*CHAMAESYCE HOOVERI*)

### A.27.1 Legal and Other Status

Hoover’s spurge (*Chamaesyce hooveri*) is federally listed as threatened under the Endangered Species Act throughout its range. Hoover’s spurge has no status under the California Endangered Species Act (DFG 2011). The California Native Plant Society (CNPS) includes Hoover’s spurge on California Rare Plant Rank 1B (formerly List 1B): Plants Rare, Threatened, or Endangered in California and Elsewhere (CNPS 2010).



Critical habitat has been designated for Hoover’s spurge, including one location in Butte County. In the Butte Regional HCP/NCCP Plan Area, 8 acres (3 hectares) of critical habitat have been designated for Hoover’s spurge (Unit 2) (71 FR 7118). This location is on private property south of Chico along Highway 99 and 0.4 mile south of the junction with Pentz Road. This location includes the only reported location for Hoover’s spurge in Butte County.

### A.27.2 Species Distribution and Status



#### A.27.2.1 Range and Status

Hoover’s spurge is found in vernal pools on remnant alluvial fans and depositional stream terraces over a distance of 528 kilometers (km) (240 miles) along the eastern margin of the Central Valley (62 FR 14338).

Historically, Hoover’s spurge was known to occur in Northeastern Sacramento Valley, San Joaquin Valley, Solano-Colusa, and Southern Sierra Foothills Vernal Pool Regions. In the 1930s and 1940s, the species was known from collections in only three locations: Yetem and Visalia in Tulare County, and near Vina in Tehama County. From 1974 through 1987, 21 additional occurrences were reported, most from Tehama County and one to three occurrences were found in each of Butte,

Merced, Stanislaus, and Tulare counties (USFWS 2005). As of October 2006, the California Natural Diversity Database (CNDDDB) lists 30 occurrences of Hoover’s spurge. Of these, one each in Tehama and Tulare counties are classified as extirpated and two, one each in Butte and Tehama counties, are “possibly extirpated” because the species had not been observed for two consecutive years during surveys in the mid-1980s. Of the 26 occurrences presumed to be extant, 14 occur in the Vina Plains of Tehama and Butte counties within the Northeastern Sacramento Valley Vernal Pool Region, with the majority of these (12) in Tehama County. The remaining 12 occurrences are five in vernal pools in Tulare County, three in Glenn County, two in Stanislaus County, one in Merced County, and one other location in Butte County (USFWS 2005, CNDDDB 2006).

### **A.27.2.2 Distribution and Status in the Plan Area**

Four locations of Hoover’s spurge have been recorded in Butte County, three extant and one possibly extirpated (see Figure A.27-1, *Hoover’s Spurge Modeled Habitat and Recorded Occurrences*). In 1987, populations were found at two locations north of Chico. One population contained 500 plants in a heavily grazed area and was located at Vina Plains in a vernal pool bed that had been scraped previously by a bulldozer, northwest of Chico and 0.5 mile (0.8 km) southwest of the intersection of Highway 99 and Cana Highway. The second population was 2.3 miles (3.7 km) south-southwest of the intersection of Highway 99 and Rowles Road and contained at least 10,000 plants within a vernal pool formed in an intermittent drainage. Both of these populations are considered threatened by grazing. The third population is located south of Chico at Pentz vernal pool area, southeast of the junction of Pentz Road and Highway 99. This population contained 1,000–2,000 individuals, and the record noted that, although the population is in a heavily grazed area, it appears to be “large and probably stable” under the current grazing practices (CNDDDB 2006). The trend for these populations was unknown (CNDDDB 2006).

An additional population noted at Wurlitzer Ranch, just south of Haille Road, is believed to be extirpated. Fewer than 20 plants were recorded at this location in 1978, and none were seen in 1986 and 1987. This is a large, isolated vernal pool in a winter grazed pasture that is heavily trampled (CNDDDB 2006).

### **A.27.3 Habitat Requirements and Special Considerations**

Hoover’s spurge is restricted to vernal pools and, in Butte County, occurs in valley and foothill grasslands on volcanic mudflow or clay substrate at 75 to 400 feet (25 to 130 meters) elevation (CNDDDB 2006). Natural pools in which the plant occurs are primarily classified as Northern Hardpan vernal pools and Northern Claypan vernal pools (Sawyer and Keeler-Wolf 1995). In the Northeastern Sacramento Valley Vernal Pool Region, occupied pools are generally on acidic soils over iron-silica cemented hardpan. Previous studies indicated the pools supporting this species varied in size from 0.47 to 600 acres (0.19 to 243 hectares), with a median area of 1.43 acres (0.58 hectares).

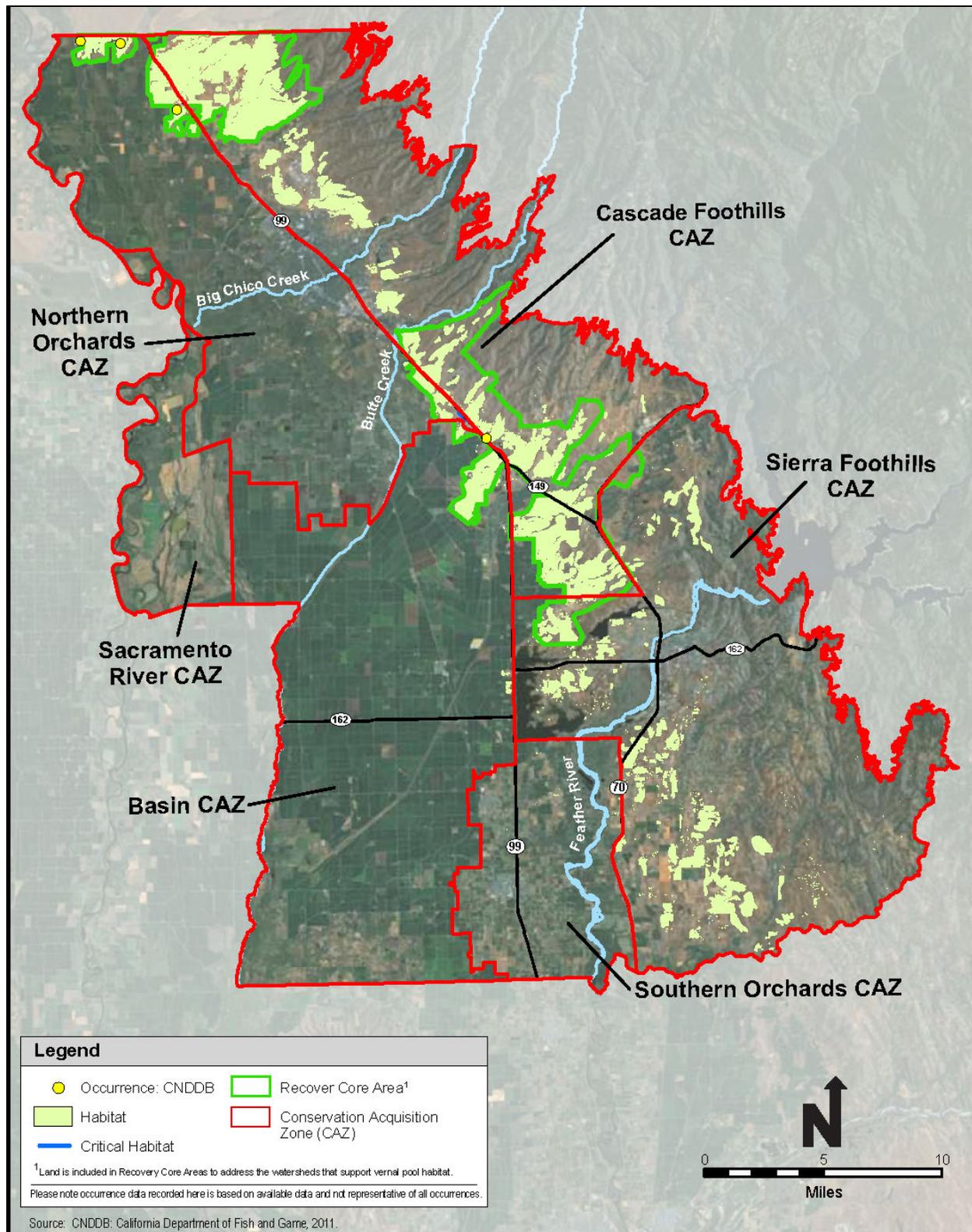


Figure A.27-1. Hoover’s Spurge Modeled Habitat and Recorded Occurrences

The species may occur along the margins or in the deepest portions of the dried pool-bed, although deeper pools seemed to provide better habitat because the duration of inundation is longer and other vegetation would be less likely to establish in the deeper portions, which would limit competition from other plants (USFWS 2005). Two of the most frequent associates of Hoover’s spurge are rare vernal pool grasses, Greene’s tuctoria (*Tuctoria greenei*) and hairy Orcutt grass (*Orcuttia pilosa*), both found in Butte County vernal pools. Other native plant species found growing with Hoover’s spurge in Butte County include water shamrock (*Marsilea vestita*), woolly marbles (*Psilocarpus brevissimus*), dowingia (*Dowlingia* spp.), spike rush (*Eleocharis* spp.), coyote thistle (*Eryngium vaseyi*), annual hair grass (*Deschamsia danthonioides*), adobe allocarya (*Plagiobothryus acanthocarpus*), navarretia (*Navarretia leucocephala*), Tehama navarretia (*Navarretia heteranda*), and clover (*Trifolium variegatum*). Nonnative plants include prickle grass (*Crypsis* spp.), common unicorn plant (*Proboscidea louisianica*), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) (CNDDDB 2006).

### A.27.4 Life History

Hoover’s spurge is an annual, prostrate, spreading, herbaceous plant that forms gray-green mats 2.0 to 39.4 inches (5 to 100 centimeters [cm]) in diameter. The fruit is a spherical capsule 0.08 inch (2 millimeters [mm]) in diameter on a stalk that hangs over the edge of the cup. The capsule typically contains one to two tiny white seeds in each of three locules (capsule chambers). The blooming time for Hoover’s spurge is July to August, with one cyathium located between each pair of leaves (Hickman 1993, USFWS 2005).

Hoover’s spurge is a summer annual, with the seeds germinating after the water evaporates from the pools. The plants cannot grow in standing water. Plants have an indeterminate growth pattern that allows them to continue growing as long as sufficient moisture is available. The proportion of surviving seedlings to reproduction has not been documented, but in years of below-normal rainfall, seedling survival was characterized as low. The flowering time varies among the populations with those in Merced and Tulare counties typically flowering in late May through July, whereas those farther north in Stanislaus County and the Sacramento Valley flower from mid-June into October. Seed set apparently begins soon after flowering and seed production has not been quantified or studied in relation to environmental factors; large plants may produce several hundred seeds, which can remain dormant until the appropriate temperature and moisture conditions occur. Several types of insects were observed visiting the flowers of Hoover’s spurge and may potentially serve as pollinators. Related species in the spurge family are pollinated by flies, and the glands on the cyathium produce nectar, which is attractive to insects. Related species in the genus *Euphorbia* typically are cross-pollinated because the female flowers on each plant mature before the male, although it is not known if this is the case for Hoover’s spurge (USFWS 2005).

### A.27.5 Threats

Threats to vernal pool habitat and species in general, including Hoover’s spurge, are described in the Recovery Plan for Vernal Pool Ecosystems for California and Southern Oregon (Recovery Plan), approved by the USFWS in December 2005 (USFWS 2005) and include the following:

- Habitat loss and fragmentation generally resulting from urbanization, agricultural conversion, mining, and also occurring as a result of habitat alteration and degradation due to changes to natural hydrology, invasive species, incompatible grazing regimes (including insufficient grazing for prolonged periods), infrastructure projects (such as roads and utility projects), recreational activities (such as off-highway vehicles and hiking), erosion, climatic and environmental change, and contamination.
- Conversion of land uses such as from grasslands or pastures to more intensive agricultural uses, such as croplands or from one crop type to another, has contributed and continues to contribute to the decline of vernal pools in general and is identified as a specific threat to Hoover’s spurge, especially in Stanislaus County (USFWS 2005). Three extant locations for Hoover’s spurge in Butte County are located on private property that is used for grazing (CNDDDB 2006). While livestock do not typically graze on this species, as it grows low to the ground and contains toxic milky sap, cattle trampling has been identified as a reason for the decline of this species at two locations, including one of the populations in Butte County.
- Competition from invasive species. In addition, native plant species that occupy the same microhabitat can also compete with Hoover’s spurge. Native competitors of Hoover’s spurge include coyote thistle (*Eryngium* spp.), alkali mallow (*Malvella leprosa*), lippia (*Phyllanodiflora* sp.), hard-stemmed tule (*Scirpus acutus* var. *occidentalis*), alkali bulrush (*Scirpus maritimus*), and cocklebur (*Xanthium strumarium*). Nonnative competitors include bindweed (*Convolvulus arvensis*) and swamp grass (*Crypsis schoenoides*). Competition from invasive native and nonnative plant species is identified as a threat to nine of the extant occurrences of Hoover’s spurge, including eight in Vina Plains in Tehama County and one in Glenn County (CNDDDB 2006). Increasing dominance by competitors may also contribute to changes in hydrology and livestock grazing practices (USFWS 2005).
- Changes in hydrology that result in a change in the timing, frequency, and duration of inundation in vernal pools, creating conditions that render existing vernal pools unsuitable for vernal pool species. Five of the reported occurrences of this species are considered threatened by changed in hydrologic regime; four are in the San Joaquin Valley, in Tulare and Merced counties, and the fifth is in the Vina Plains in Tehama County (CNDDDB 2006). The hydrology in the vicinity of these pools or pool complexes has been altered by construction of flood control structures, such as levees and other water barriers, and changes in runoff, such as irrigation or construction of roads and

culverts. Although no occurrences have been completely extirpated due to hydrologic changes, the species has been eliminated from one or more individual pools at several sites, and a number of the remaining populations appear to be in decline (USFWS 2005).

- The decline of pollinator species due to habitat fragmentation and the loss of upland habitats that support pollinators. Specific insects that pollinate Hoover’s spurge have not yet been identified; therefore, it is not possible at this time to assess their status and determine if protection of pollinators or their habitat is necessary. If essential pollinators are declining through habitat loss, Hoover’s spurge may be declining in response (USFWS 2005).
- At least five of the 30 known occurrences of Hoover’s spurge total fewer than 100 individuals (CNDDDB 2006). Two other occurrences have populations of only a few hundred individuals. Small populations are threatened with extirpation from random events, such as extreme weather and lack of genetic diversity. Small, less genetically diverse populations are less likely to adapt and survive environmental changes, even relatively minor events (USFWS 2005).
- Several other threats to vernal pools and their associated species in general were identified in the Recovery Plan. Water contamination can occur from use of herbicides, fertilizers, and other chemicals commonly used in urban and agricultural settings. Fertilizers may also contribute to the growth of invasive plants (USFWS 2005). Increased human presence may lead to overuse, trampling (by walking or off-road vehicles), vandalism, and dumping (62 FR 14338). Habitat alteration may also occur due to large-scale climate and environmental changes, such as global warming, which lead to changes in the precipitation pattern and atmospheric conditions (USFWS 2005).

### **A.27.6 Relevant Conservation Efforts**

Ten occurrences of Hoover’s spurge are in preserves or on public land. The Vina Plains Preserve, managed by The Nature Conservancy, includes four of the extant occurrences (in Tehama County) and one presumed extirpated occurrence (in Butte County). The California Department of Fish and Game manages two of the extant occurrences in Tulare County as part of the Stone Corral Ecological Reserve complex. Three occurrences are in Glenn County on the Sacramento National Wildlife Refuge (CNDDDB 2006). One additional occurrence in Merced County is on private land (the Bert Crane Ranch) that is protected from development by a conservation easement (USFWS 2005). The three extant occurrences of Hoover’s spurge in Butte County are on private lands (CNDDDB 2006).

## **A.27.7 Species Habitat Suitability Model**

### **A.27.7.1 Habitat**

Hoover’s spurge habitat includes areas with suitable soil type in the following BRCP mapped land cover types:

- Vernal pools;
- Altered vernal pools; and
- Grassland with vernal swale complex.

Vernal pools that may support Hoover’s spurge habitat may also occur as inclusions in mapped grassland, blue oak savanna, ranchettes—open, and disturbed ground land cover types. These inclusions were not mapped because they did not meet the mapping criteria for vernal pool, altered vernal pool, and grassland with vernal swale complex land cover types.

### **A.27.7.2 Assumptions**

Hoover’s spurge is restricted to vernal pools and, in Butte County, occurs in valley and foothill grasslands on volcanic mudflow or clay substrate (CNDDDB 2011). Natural pools in which the plant occurs are primarily classified as Northern Hardpan and Northern Claypan vernal pools within annual grassland (Sawyer and Keeler-Wolf 1995). The species may occur along the margins or in the deepest portions of the dried pool-bed, although deeper pools seem to provide better habitat because the duration of inundation is longer and other vegetation would be less likely to establish in the deeper portions, which would limit competition with other plants (USFWS 2005).

Given these habitat preferences, suitable habitat for the Hoover’s spurge is defined as any mapped vernal pool or altered vernal pool within the Plan Area. Additionally, the grassland with vernal swale complex land cover type is included in the model. This type may include areas that pool in a given year but that were not captured as individual vernal pools in the GIC/SAIC vernal pool mapping effort. Because vernal elements were identified based on photo interpretation of aerial photography from winter 2002 (an average rainfall year), an above average rainfall year may result in more areas of ponded water within the Plan Area.

## **A.27.8 Recovery Plan Goals**

A general statement for recovery of Hoover’s spurge is presented in the Recovery Plan to ensure protection of the full geographic, genetic and ecological extent of this species and to improve the circumstances that caused it to be listed in the first place. Accomplishment of this goal would be achieved by protecting 80 percent of known occurrences throughout its range, including 95 percent of suitable habitat in the Oroville, Vina Plains, Grasslands Ecological Area in San Joaquin Valley, Sacramento NWR, and Merced Core Areas, and 85 percent of suitable habitat in

the Cottonwood Creek, Tulare, and Turlock Core Areas. In addition, seed would be banked from at least one population in each core area. Historical locations would be investigated and the species would be reintroduced where it has been extirpated.

## A.27.9 References

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### Federal Register

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