

a Natural Resource Management Area, which will increase the chances of the habitat and population persisting over time (criterion 4). Population sizes of *Lasthenia conjugens* at two locations within the Fort Ord Unit are monitored and have been found to vary on an annual basis. These differences may be due to variations in annual rainfall and duration of ponded water (Harding Lawson Associates 2001). The combined population estimates for both areas where monitoring occurred in 1998, 1999, and 2000 were 500–1500; 56,000; and 162,500 individuals, respectively. The Federal government owns 6,874 ac (2,782 ha), the State owns 4 ac (2 ha), and the rest is privately owned.

Chamaesyce hooveri

Hoover's spurge is found in naturally occurring widely scattered vernal pool complexes in a narrow zone of rolling topography and remnant alluvial fans and stream terraces at the base of the Sierra Nevada foothills and two locations in alkali sink areas at the Sacramento National Wildlife Refuge and San Luis National Wildlife Refuge Complex in three general areas of concentration in Tehama, Butte, Glenn, Colusa, Stanislaus, Merced, and Tulare Counties in the Sacramento and San Joaquin Valleys (CNDDDB 2002, Stone *et al.* 1988). The elevation of these areas of concentration varies from near 15 m (50 ft) to near 150 m (500 ft). Conserving a broad geographic range of Hoover's spurge across its geographical and elevational distribution protects the natural environmental processes for the species and provides the best chance for retaining the species across the full extent of the species' range. The vernal pool types and soils associated with the six areas of concentration of Hoover's spurge differ greatly across the geographic range of the species; these differences lead to different species compositions and environmental conditions between Hoover's spurge occurrences. Providing for a mosaic of habitat types both between and among vernal pool species occurrences is essential to the species' conservation because it would include the full extent of the physical and environmental conditions for the species (Fugate 1992; Fugate 1998; Gonzales *et al.* 1996; Ikeda and Schlising 1990; Noss *et al.* 2002a; Platenkamp 1998; Zedler *et al.* 1979).

The distribution of Hoover's spurge reflects a diversity of vernal pool habitat types that provide habitat for the species on the alluvial fans and old stream terraces of the Sierra Nevada foothills. Vernal pool complexes that provide suitable habitat for this species include three different physiographic and

edaphic settings—old high and lower old stream terrace areas with soils having an iron-silica hardpan and sites with shallow soils underlain by cemented tufaceous alluvium. The Tehama County occurrences of Hoover's spurge are associated with slightly to medium acid soils of the Tuscan and Anita soil series that are underlain by an iron-silica cemented hardpan (Broyles 1987). The Glenn and Colusa County occurrences at the Sacramento National Wildlife Refuge are associated with alkaline vernal pools on Willows and Riz soil types (Holland 1998; Silveira 2000; CNDDDB 2002). The Stanislaus County occurrences are associated with neutral to slightly alkaline claypan soils of the Meikle series that formed in small drainages of Pleistocene alluvium. The Merced County occurrences in the Arena Plains are within saline-alkaline vernal pools on Lewis soils (USDA 2001; CNDDDB 2002). The Tulare County occurrences are associated with lime-silica cemented hardpan and low-terrace neutral to slightly alkaline soils of the Madera soil series. Not all areas of Hoover's spurge have been identified as to the specific soil series or soil mapping units on which they occur. Many of the occupied vernal pools vary in size from 1,900 m² (20,520 ft²) to 250 ha (618 ac). A vernal pool's parent material greatly influences the pool's species composition and hydrologic functioning (Hanes and Stromberg 1998; Holland and Jain 1981, 1988). Soils beneath vernal pools are extremely variable and are not the same as soils mapped by soil surveys, but are usually undescribed hydric inclusions that vary upon location (Holland and Dain 1990). Field observations suggest that Hoover's spurge is restricted to specific microsites within the vernal pools and may behave somewhat independently, depending on environmental and edaphic conditions and are likely locally adapted (Alexander and Schlising 1997; Stone *et al.* 1988; Vollmar 2002). The primary constituent elements of critical habitat for *Chamaesyce hooveri* are the habitat components that provide:

(i) Vernal pools, swales, and other ephemeral wetlands and depressions of appropriate sizes and depths and the adjacent upland margins of these depressions that sustain *Chamaesyce hooveri* germination, growth, and reproduction, including but not limited to, vernal pools formed on neutral to saline-alkaline soils over lime-silica cemented hardpan or claypan, or on acidic soils over iron-silica cemented hardpan, that typically become inundated during winter rains, but are

dry during the summer and do not necessarily fill with water every year; and

(ii) The associated watershed(s) and hydrologic features, including the pool basin, swales, and surrounding uplands (which may vary in extent depending on pool size and depth, soil type and depth, hardpan or claypan type and extent, topography, and climate) that contribute to the filling and drying of the vernal pool or ephemeral wetland, and that maintain suitable periods of pool inundation, water quality, and soil moisture for *Chamaesyce hooveri* germination, growth and reproduction, and dispersal, but not necessarily every year.

Unit 1, Vina Plains Unit, Tehama and Butte Counties (25,102 ac (10,159 ha))

This unit, along with Unit 2, is ecologically unusual (criterion 2) in that it supports numerous occurrences of the species within vernal pools on acidic soils over iron-silica cemented hardpan, including Anita and Tuscan soils (Holland 1998; USDA 2001; CNDDDB 2002). The Vina Plains Unit is also geographically important (criterion 1) because it contains over 50 percent of the known occurrences of *Chamaesyce hooveri*, including several large, stable occurrences (CNDDDB 2002), and because it represents the northern extent of the species' range.

The unit for *Chamaesyce hooveri* occupies the area south of Toomes Creek and north of Pine Creek to near Cana Highway in southeast Tehama County and northwest Butte County. State Route 99 bisects this unit and the western boundary generally parallels the Southern Pacific Railway line. This unit contains TNC's 4,600 (1,862 ha) Vina Plains preserve, making occurrences in the unit more likely to persist over time (criterion 4). The majority of the lands included within this unit are privately owned. Property ownership and protection within this unit includes CDFG (0.4 ha (1 ac)), CDFG administration (1 ac (0.4 ha)), TNC (5,738 (2,295 ha)), TNC easements (11,653 ac (4,661 ha)), and WRP easements and agreements (142 ac (57 ha)).

Unit 4, Waterford Unit, Stanislaus and Tuolumne Counties (39,038 ac (15,799 ha))

This unit supports *Chamaesyce hooveri* occurrences within vernal pools on Whitney sandy loam soils (USDA 2001; CNDDDB 2002), which are not otherwise well represented (criterion 2). These soils are typically older than those of the alluvial terraces in the Sacramento area, which are estimated to