

can also help identify this species (Taylor and Davilla 1986).

The seed of *Eriastrum hooveri* is small and dust-like, and dispersed by the wind. The stems of dead plants often break at the soil surface and the plants are conical-shaped, characteristic of a seed that disperses via the "tumbleweed" strategy. Laboratory germination of seeds was achieved by wetting seed on filter paper, and there was rapid and complete germination of new seed (Taylor and Davilla 1986). The small flowers of *E. hooveri* might suggest self-pollination (Taylor and Davilla 1986).

*Eriastrum hooveri* was originally thought to have a range that was mostly east of the Coastal Range in San Joaquin Valley, California, and distributed in a discontinuous fashion within valley saltbush scrub and valley sink scrub from Fresno County in the north, south to the Temblor Range (Kern and San Luis Obispo Counties), with very limited distribution south of the Temblor Range, in the Cuyama Valley (San Luis Obispo and Santa Barbara Counties) (Taylor and Davilla 1986). The San Joaquin Valley lies between the Coast Ranges and the Sierra Nevada, and on the southern end is bordered by the Transverse Ranges. The climate of the San Joaquin Valley is a product of these surrounding mountain ranges. Precipitation in the San Joaquin Valley is low; it averages less than 25 cm (10 in) per year, with localized areas averaging far less. As a result, the San Joaquin Valley climate can be classified as arid or desertic. The San Joaquin Valley floor is composed of thousands of feet of sediments deposited by runoff from the surrounding mountains. Below these sediments lie important petroleum and natural gas deposits (Schoenherr 1992). The extraction of these resources accounts for some of the native habitat loss and degradation in the San Joaquin Valley and adjacent foothills. Conversion of this arid land to pastures and agricultural farmland also has replaced native habitat and introduced nonnative grasses and shrubs.

Prior to 1986, *Eriastrum hooveri* was known from 19 sites (sites are clusters of plants that may be part of a larger population as documented by BLM) in San Luis Obispo, Kern, Fresno, and Santa Barbara Counties in California. Most of these sites occurred on private property on the San Joaquin and Cuyama valley floors or on public land located in the foothills of the southern part of the San Joaquin Valley (the Naval Petroleum Reserve (NPR-1 and NPR-2) administered by the U.S. Department of Energy, later turned over

to a private interest, Occidental Petroleum Corporation).

A status survey of *Eriastrum hooveri* conducted in 1986 identified 10 historical populations as extirpated, 2 others as presumed extirpated, and approximately 40 percent of the historically reported populations as remaining (Taylor and Davilla 1986). At the time of the status survey, the majority of the *E. hooveri* known populations were from alluvial valleys. Hilly terrain was only documented in three instances, from the Temblor Range, and the authors were unable to gain access to this area during the status survey. Taylor and Davilla (1986) reported that most remaining populations were situated on "islands" of native habitat in an otherwise "sea" of intensively managed agricultural lands, thereby leaving the remaining populations vulnerable to destruction. Our subsequent listing of *E. hooveri* as a threatened species in 1990 relied heavily on the data and the threats assessment presented in the Taylor and Davilla 1986 status report, as well as on additional surveys conducted between 1986 and 1990 (55 FR 29361). The listing noted that 118 populations existed, only 9 of which occurred on public lands or in undeveloped foothills. The remaining 109 populations (92 percent) were considered to be threatened by conversion of valley floor native habitat to agricultural land, oil and gas development, urbanization, reservoir construction, uncontrolled heavy sheep grazing, disposal of nutrient-laden agricultural effluent, and nonnative invasive plants (55 FR 29361). Based on these threats, we listed *E. hooveri* as a threatened species under the Act on July 19, 1990 (55 FR 29361).

In 1990, we initiated recovery planning for 11 listed species, including *Eriastrum hooveri*, and 23 candidates or species of concern that share the same ecosystem (USFWS 1998). While the development of the final Recovery Plan was being accomplished, the recovery needs of listed species were simultaneously being addressed. During the 8 years of planning, Federal and State agencies conducted extensive surveys and research and learned new information about *E. hooveri* biology, including its abundance and distribution and its response to disturbance. The recovery strategy in the final Recovery Plan reflects pre-plan recovery efforts.

The recovery strategy, put forth in the 1998 Recovery Plan, stated that recovery for *Eriastrum hooveri* could be accomplished within four metapopulations (defined as a larger

population clusters by BLM), by using existing public lands and other areas already dedicated to conservation. The four metapopulations from largest to smallest are: (1) The Kettleman Hills area in Fresno and Kings Counties; (2) the Carrizo Plain-Elkhorn Plain-Temblor Range-Caliente Mountains-Cuyama Valley-Sierra Madre Mountains area in San Luis Obispo, Santa Barbara, and extreme western Kern Counties; (3) the Lokern-Elk Hills-Buena Vista Hills-Coles Levee-Maricopa-Taft area in Kern County; and (4) the Antelope Plain-Lost Hills-Semitropic area in Kern County. Recovery goals included protecting populations throughout the species' geographic range (at the time thought to be from San Benito and Fresno Counties in the north, south to the Cuyama Valley), representing a variety of topographic positions (valley floor, slopes) and community types (chenopod scrub and grasslands), at elevations ranging from 50 to 915 meters (m) (165 to 3,000 feet (ft)). Because public lands have varying multi-use mandates, and therefore may or may not afford "protection" to plants under threat, specific commitments were needed to protect the populations from incompatible uses such as heavy oilfield development, commercial development, flooding or rising groundwater levels, and dense vegetation due to proliferation of nonnative plants or suppression of fires. Low and moderate oilfield development and grazing were not considered incompatible uses. The Recovery Plan recommended a minimum acreage and plant density for *E. hooveri* and continuation of the monitoring of trends at representative sites within each of the four recognized metapopulations. As 33 other species were also covered in this multispecies Recovery Plan, the ecosystem-level strategy recommended a network of large-scale preserves and conservation areas that represented all natural communities in the San Joaquin Valley upland ecosystems. The Recovery Plan stated that, within this network, habitat management would be compatible with traditional and ongoing land uses such as grazing and oil exploration. Prior to the completion of the Recovery Plan, it was discovered that *E. hooveri* could tolerate a certain amount of natural and man-made disturbances.

The listing and subsequent recovery planning efforts resulted in increased inventory activities for *Eriastrum hooveri* throughout its range. Surveys in the Mojave Desert area resulted in the discovery of *E. hooveri* more than 140 kilometers (km) (87 miles mi) southeast of the previously known range. Surveys