## Short-nosed kangaroo rat, Dipodomys nitratoides brevinasus Philip V. Brylski

**Description**: The short-nosed kangaroo rat is one of three subspecies of *D. nitratoides*, the San Joaquin kangaroo rat, the only four-toed kangaroo rat in the San Joaquin Valley. TL averages 237 mm, BL 102 mm and weight is about 44 g. The short-nosed kangaroo rat is larger and has paler dorsal coloration than the other species of *D. nitratoides* in the San Joaquin Valley (*D. nitratoides nitratoides*, the Tipton kangaroo rat, and *D. n. exilis*, the Fresno kangaroo rat), which generally occur in more eastern parts of the valley (Williams et al. 1993, Williams et al. 1997). Distinguishing the short-nosed kangaroo rat from these closely related subspecies is based on statistical measurements of a series of individuals using morphologic (Hafner 1979) or genetic (J. Patton and D. Williams unpubl. data) data. For practical purposes, identification of the subspecies is based on the locality of capture.

**Taxonomic Remarks**: *D. n. brevinasus* is one of three subspecies of the San Joaquin kangaroo rat, *D. nitratoides*. Grinnell (1920, 1922) described this subspecies on the basis of pelage coloration and skull dimensions. Although Hoffmann (1974) considered specimens of the short-nosed kangaroo rat from Cuyama Valley morphologically more similar to *D. merriami* than are other *brevinasus*, they are considered *brevinasus*.

**Distribution**: Historically, *brevinasus* occurred on the western, southern, and extreme southeastern side of the San Joaquin Valley, generally above the valley floor. Grinnell (1922) recorded the distribution as from the floor of the west side of the San Joaquin Valley from near the mouth of Panoche Creek in western Fresno County, south to near the mouth of San Emigdio Creek, in southwestern Kern County, and to the northeast of Bakersfield. It also occurs in Panoche Valley in eastern San Benito Valley, on the Carrizo Plain, in San Luis Obispo County, and the Cuyama Valley in San Luis Obispo and Santa Barbara counties (Williams et al. 1993). The elevational range of museum records ranges from 45 m at Mendota to 735 m in the Cuyama Valley. The northernmost records are from Livingston in 1893 (USNM 54869-72), and from Los Banos in 1894 (USNM 57896-57897). The southernmost records are from San Emigdio Creek, collected in 1918 (MVZ 28576-79).

The outline of the current range of the short-nosed kangaroo rat approximates its historic range, but the number of localities has diminished as a result of habitat loss, fragmentation, and degradation. Estimates of extant occupied area represent only about 1.5% to 3.75% of *D. n. brevinasus* ' estimated historical habitat (Williams et al. 1997). Small, fragmented populations are still found near Los Banos; animals here construct their burrows on dikes and seasonally move into iodine brush shrublands (Johnson and Clifton in press *in* Williams et al. 1993). Although populations are known to occur or potentially occur in the following areas (listed from north to south), extensive cultivation has resulted in restricted and disjunct distributions within them: Panoche and San Joaquin valleys, Kettleman Hills, Antelope and Carrizo plains, and Cuyama Valley. Field surveys conducted in the Salt Creek/Tecuya Creek region (elevation approximately 400 m) in June 1991 resulted in no captures of short-nosed kangaroo rats and numerous captures of *D. heermanni* (P. Brylski unpubl. data).

Life History: Like all kangaroo rats, this species is active year-round and seeds form the majority of its diet. According to Williams et al. (1993), seeds of various genera of annual grasses such as *Avena, Bromus, Hordeum*, and *Vulpia* and the annual forbs *Filarea* sp. and *Capsella buras-pastoris* are also important in its diet. Although there have been numerous trapping surveys for *brevinasus*, few of these provide information on the species' movements, life history, densities, and home range.

Substantial new information on these topics was obtained by Williams et al. (1993) in a five-year study of the *brevinasus* population in the Carrizo Plain Natural Area in San Luis Obispo County, and forms the basis for the following information. Numbers of short-nosed kangaroo rats in the population studied declined over the 5-year study, principally due to the lack of successful reproduction. Densities ranged from 8.7 to 22.6/ha in 1987 and 1988, followed by dramatic declines in 1990 and 1991. The lowest densities of 1991 were about 6% of the highest densities recorded in 1987. These densities are comparable to those reported for other subspecies of *nitratoides* (range: from 3 to 25 individuals/ha; Hoffmann 1974, Koos 1977, Williams and Germano 1991, 1994). In the populations studied by Williams et al. (1993), the proportion of young of the year recruits declined from 33.3% in 1987-8 to 0% in 1989-91, and averaged 13.5%. No reproduction was observed in these populations in 1990. Females entered estrus in January and February, were pregnant in February and March, and weaned their young in April. Females bred once per year and juveniles were not reproductive. The period of reproduction for other races of *D. nitratoides* and with *D. merriami*, is largely from March to June. The gestation period is 32 days and litter size averages 2.3 (mode, 2) (Best 1991).

The maximum duration between the first and last capture of *brevinasus* in the Carrizo Plains Natural Area was 766 days for one male and 727 days for one female. Birth dates of these animals were unknown, but the assumption that they were born in mid-March, 1987 (based on the pattern of reproduction described above for the same population) yields an estimated minimum age of 3.4 years.

**Habitat**: Short-nosed kangaroo rats are generally found on friable soils on flat or gently rolling terrain in grassland and desert-shrub vegetation (primarily *Atriplex* sp. and *Ephedra californica*). In the Soda Lake area of the Carrizo Plains, they also occur on alkaline soils. Burrows are located in friable soils in slightly elevated areas to reduce likelihood of seasonal flooding, including the berms of roads, canal embankments, railroad beds, and the bases of shrubs and fences where wind-blown soils accumulate above the level of surrounding terrain (Williams 1986; Williams et al. 1993). In the Elkhorn Plain, burrows have been observed on rocky hillsides. In most of their current range, shortnosed kangaroo rats are usually more numerous in lighter, friable soils such as the sandy bottoms and banks of arroyos and other sandy areas (Williams et al. 1997).

**Status: Class II**. There has been extensive loss of habitat for the short-nosed kangaroo rat, particularly in the agriculturally productive and flatter lands of the San Joaquin, Panoche, and Cuyama valleys, and on the Antelope and Carrizo plains. The major cause of restriction of the species range and abundance is conversion of native habitats to agricultural use. The largest existing population of *brevinasus* occurs in the Lokern and Elk Hills regions in western Kern County. The only other sizeable population is in the Carrizo Plain Natural Area (Williams et al. 1997). The Carrizo Plain Natural Area consists of about 73,000 ha of remnant valley arid wildlands from the north end of Soda Lake to the southern end of the Carrizo Plain. Within this area, *brevinasus* habitat is concentrated on the floor and lower slopes of the smaller Carrizo Basin (Williams et al. 1993). The amount of *brevinasus*-occupied habitat within this area has not been estimated, but up to 35% of the habitat has been dry-farmed in the past and probably provides little or no habitat for the species. Elsewhere, within its historic distribution, it may now be restricted to islands of remaining natural habitat as a result of agricultural conversion of native arid scrub habitats.

**Management Recommendations**: Detailed components of a conservation strategy and (prioritized) conservation actions needed to conserve short-nosed kangaroo rats appear in the draft recovery plan for upland species of the San Joaquin Valley (Williams et al. 1997). In summary, the following actions are recommended: *i*) initiate and coordinate habitat management studies at sites representing

the range of existing habitat conditions for the species, *ii*) protect existing habitat, *iii*) design and implement a range-wide population monitoring program that measures population and environmental fluctuations at representative sites, *iv*) inventory and assess existing natural land within the historical range, *v*) develop and implement research on restoration of habitat on retired irrigated land, *vi*) include habitat needs in any government plans related to drainage problems, *vii*) restore habitat on retired agricultural lands as needed, and reevaluate the status of the short-nosed kangaroo rat within three years of recovery plan approval. [Editor's note: The final Recovery Plan for Upland Species of the San Joaquin Valley, California was approved September 30, 1998.] In addition, research underway on the systematics of *D. nitratoides* will clarify the taxonomy of the species, and could assist in redefining the conservation priorities for preserving the species' phylogeographic units. Field research on the habitat relations of *D. n. brevinasus* and the impact of grazing and other land uses on its habitat should be undertaken.



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