Tulare grasshopper mouse, *Onychomys torridus tularensis*

Paul W. Collins

Description: See the species account for *O. t. ramona* for a general description of the species. The Tulare grasshopper mouse (*O. t. tularensis*) can be distinguished from adjacent subspecies of *O. torridus* by its slightly darker dorsal coloration (pale grayish-drab tinged with dark pinkish-cinnamon), and smaller size (Merriam 1904a, Hollister 1914).

Taxonomic Remarks: The Tulare grasshopper mouse (*O. t. tularensis*) was described by Merriam (1904a), and is currently one of nine recognized subspecies (Wilson and Reeder 1993). There have been several recent taxonomic studies of the southern grasshopper mouse, *O. torridus* (VanCura and Hoffmeister 1966, Matson and Friesen 1978, Hinesley 1979, Sullivan et al. 1986), but there have been no systematic revisions of the species since Hollister (1914). A genetic and morphologic review is warranted.

Distribution: The historic range of the Tulare grasshopper mouse extended along the foothills and floor of the southern San Joaquin Valley from western Merced and eastern San Benito counties, east to Madera County, and south to the foothills of the Tehachapi and San Emigdio mountains (Grinnell 1933, Newman and Duncan 1973, Williams and Kilburn 1992). It also occurs on the Carrizo Plains in eastern San Luis Obispo County, Cuyama Valley, Caliente Creek Wash in southern Kern County, Weldon and Kelso Valley in northeastern Kern County, the Tulare Basin, and the Panoche Valley (Merriam 1904a, Hollister 1914, Grinnell 1933, Williams and Kilburn 1992). The known elevational range extends from ca. 279 ft at Alila (=Earlimart, Tulare County: USNM 126396) to approximately 2650 ft near Weldon (Kern County: MVZ 15187).

Life History: The following information is based on data from other subspecies of *Onychomys torridus* (McCarty 1975, Zeiner et al. 1990). The Tulare grasshopper mouse appears to be primarily nocturnal and is active year-round (Williams unpubl. observ.). Southern grasshopper mice are largely insectivorous (Bailey and Sperry 1929, Chew and Chew 1970, Horner et al. 1964). Typical prey includes grasshoppers, crickets, caterpillars, moths, scorpions, and beetles (Bailey and Sperry 1929). Incidental foods eaten include seeds, small mice, spiders, mites, ants, lizards, salamanders and frogs (Horner et al. 1964, McCarty 1975, Zeiner et al. 1990). Southern grasshopper mice are capable of breeding year-round (Pinter 1970). Following a 27 to 32 day gestation, females give birth from May through July to from two to six young per litter, with up to three litters produced per year (Taylor 1968). Based on laboratory studies, females are generally sexually active for a single breeding season and exhibit a rapid onset of reproductive senility following the first year (Taylor 1968). In the laboratory, southern grasshopper mice survived up to three years, but in the wild they probably live less than 12 months (Horner and Taylor 1968). Although southern grasshopper mice may construct nests in burrows which they excavate, they typically construct nests in burrows which have been abandoned by other rodents (Bailey and Sperry 1929).

Southern grasshopper mice occur in low densities and have larger home ranges than rodents of similar size (McCarty 1975). In desert scrub in Nevada, *O. torridus* densities averaged 1.83 mice/ha (Chew and Chew 1970). In New Mexico, the average home range of *O. torridus* was 3.2 ha (7.8 acres) for males and 2.4 ha (5.9 acres) for females (Blair 1943). In southeastern Arizona, the average home range of adult *O. torridus* was 11.45 ha (Chew and Chew 1970). No data are available on dispersal. Adult male southern grasshopper mice are highly territorial and emit high-pitched calls which apparently function as a territorial advertisement and spacing mechanism (Horner and Taylor 1968, McCarty 1975). These vocalizations may also play a role in mate acquisition (Hafner and Hafner 1979).

Likely predators include barn owls (*Tyto alba*), burrowing owls (*Athene cunicularia*) (Conroy and Chesemore 1992), American badgers (Taxidea taxus), San Joaquin kit foxes (*Vulpes macrotis*), introduced red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*) and long-tailed weasels (*Mustela frenata*). Small mammals which Tulare grasshopper mice are generally associated with include giant (*Dipodomys ingens*), San Joaquin (*D. nitratoides*)and Heermann kangaroo (*D. heermanii*) rats, California ground squirrels (*Spermophilus beecheyi*), San Joaquin antelope squirrels (*Ammospermophilus nelsoni*), San Joaquin (*Perognathus inornatus*) and California pocket mice (*Chetodipus californicus* spp.), deer mice (*Peromyscus* spp.), western harvest mice (*Reithrodontomys megalotis*) and feral house mice (*Mus musculus*) (Hawbecker 1951, D. Williams unpubl. data).

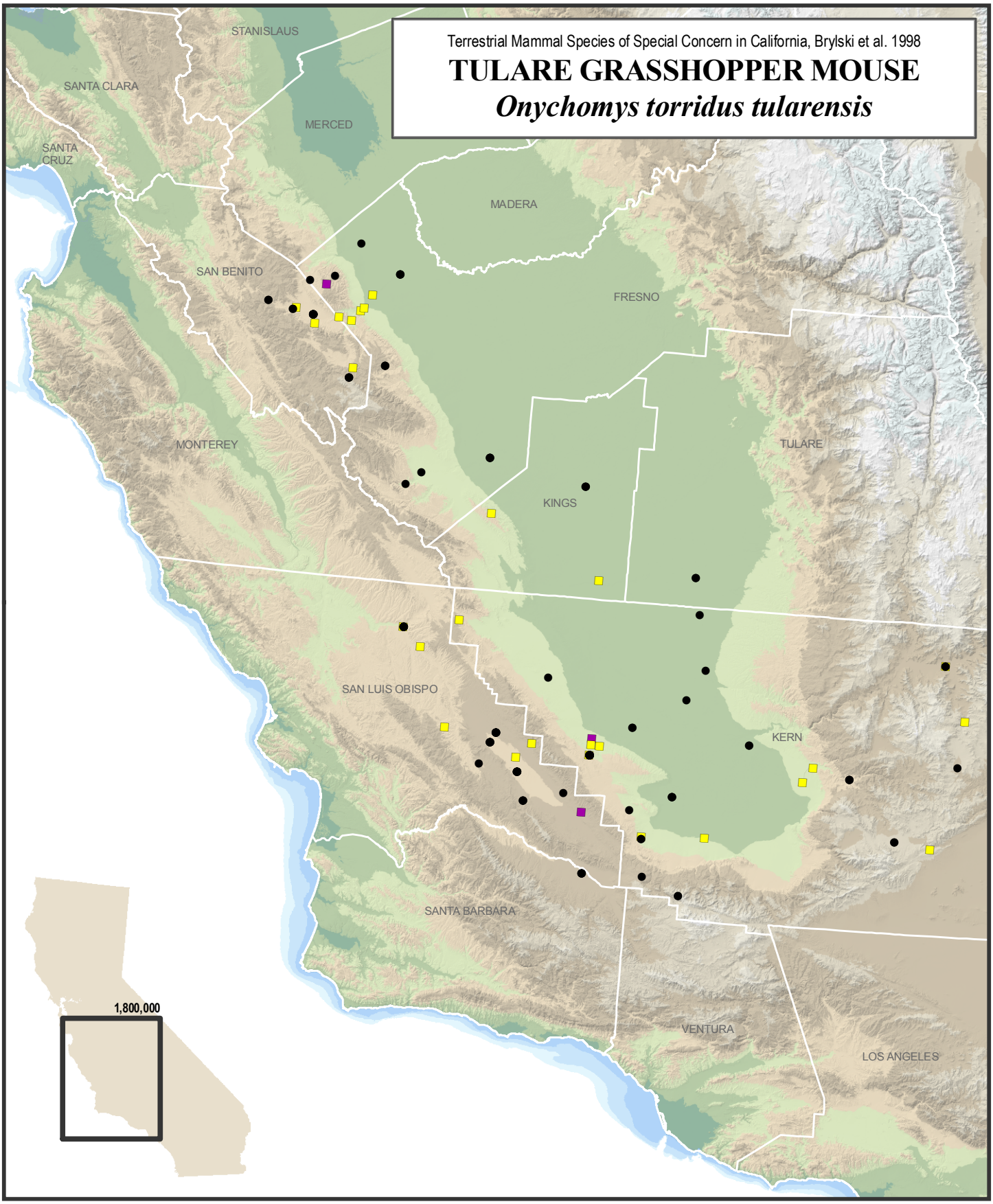
Habitat: *O. torridus* inhabit low, open scrub and semiscrub habitats (e.g., alkali desert scrub and desert scrub) in arid, Lower Sonoran associations (McCarty 1975, Zeiner et al. 1990). Grinnell (1933) reported that *O. t. tularensis* favors "compact soils with a sparse growth of perennial grasses." In the literature, this taxon has been recorded in Blue Oak Savannah, where it is rare (Newman and Duncan 1973), and in desert scrub associations composed of grasses and shrubs such as California ephedra, San Francisco snake weed (*Gutierrezia*), narrowleaf goldenbush (*Ericameria*), and California buckwheat (*Eriogonum*) (Hawbecker 1951). Tulare grasshopper mice have been captured in a variety of Lower Sonoran vegetative associations in the western San Joaquin Valley and on the Carrizo Plain including: Valley Sink and Saltbush Scrub communities dominated by one or more shrubs such as saltbush (*Atriplex*), iodine bush (*Allenrolfea*), shrubby seablite (*Sueda*), alkali heath (*Frakenia*) and alkali goldenbush (*Isocomoa*); Coast Range Saltbush Scrub dominated by all-scale saltbush (*Atriplex*), alkali goldenbush, San Joaquin matchweed (*Gutierrezia*), bladderpod (*Isomeris*), California ephedra (*Ephedra californica*), and Diablo and black locoweeds (*Astragalus*); Great Valley Mesquite Scrub on the valley floor dominated by western honey mesquite (*Prosopis*), all-scale saltbush, and alkali goldenbush; and Valley Grassland dominated by Arabian schismus (*Schismus*) and red brome (*Bromus*) (see Griggs et al. 1992 for community names and plant dominants; Williams and Kilburn 1992).

Status: Class II. The Tulare grasshopper mouse was considered uncommon in the San Joaquin Valley by Stephens (1906) and is now considered to be "the rarest species of rodent in the San Joaquin Mammalian Faunal Region" (Williams and Kilburn 1992). The species' low fecundity and low population density make it vulnerable to threat (Williams and Kilburn 1992). Although it is apparently widespread, nowhere is it locally abundant (Williams and Kilburn 1992). Intensive small mammal trapping during the past fifteen years at a number of sites on the valley floor, such as Alkali Sink Ecological Reserve, Pixley National Wildlife Refuge, Tule Elk State Reserve, Kerman Ecological Reserve, several sites in Madera County, and Lemoore Naval Air Station, have failed to capture a single Tulare grasshopper mouse (Clark et al. 1982, Harrison et al. 1992, D. Williams pers. comm.). Based on these surveys, there are apparently no fragmented islands of native scrub habitat on the valley floor, either large or small, where grasshopper mice still persist (D. Williams, pers. comm.). The Tulare grasshopper mouse continues to be fairly common in western Kern County and at the Carrizo Plain Natural Area in San Luis Obispo County, and is uncommon at a few sites in the Diablo Ranges in Fresno, Kings, and Kern counties (D. Williams pers. comm.). There have been no recent range-wide surveys conducted for this taxon.

Habitat loss and fragmentation and agricultural conversion in the San Joaquin Valley are the principal reasons for the decline of the Tulare grasshopper mouse. The adverse affects of insecticides on natural lands to control beet leafhoppers probably contributed to the disappearance of grasshopper mice from fragmented islands of natural land on the Valley floor (Williams et al. in litt.). Insecticides adversely affect grasshopper mice through direct and indirect poisoning and by

reducing insects, their staple food. Other factors contributing to the extirpation of grasshopper mice from fragmented parcels on the San Joaquin Valley floor include secondary poisoning from rodenticides, used to control California ground squirrels, and pesticide drift from aerial spraying of adjacent farm lands (Williams et al. in litt.). The most serious threats to Tulare grasshopper mice come from the continued fragmentation and loss of native habitats to agriculture, and from inappropriate land management practices on remaining fragments of native habitat (Williams in litt.). In addition, its low fecundity and low population density make it susceptible to local extirpation following even moderate habitat loss and fragmentation (Williams and Kilburn 1992).

Management Recommendations: Since the Tulare grasshopper mouse lives in the same communities as listed species of kangaroo rats (*Dipodomys ingens, D. nitratoides exilis*, and *D. n. nitratoides*), the blunt-nosed leopard lizard (*Gambelia sila*), and the San Joaquin kit fox (*Vulpes macrotis mutica*), its habitat needs are essentially the same as these "umbrella species", and habitat protection measures for the listed species should benefit the grasshopper mouse as well. Measures for these species should be reviewed, however, to ensure the habitat needs of the Tulare grasshopper mouse are not compromised. The draft recovery plan for upland species of the San Joaquin Valley (Williams et al. 1997) lists a number of additional recommended conservation actions for the grasshopper mouse. In summary, they include *i)* determine current distribution and population status of remaining populations of Tulare grasshopper mice, *ii)* analyze the environmental features of inhabited versus uninhabited fragmented islands of natural land, *iii)* establish a range-wide monitoring program at representative sites, *iv)* if habitat on the Valley floor are increased in size by retirement of agricultural land, restore habitat and reintroduce grasshopper mice, *v)* include Tulare grasshopper mice in studies of management and land uses on habitat of other species of the same community associations, and *vi)* reevaluate the status of the grasshopper mouse within three years of recovery plan approval. In addition, the taxonomic status of California populations of the southern grasshopper mouse should be clarified using morphometric and biochemical methods. Finally, remaining large blocks of historical native scrub habitats on the valley floor of the Tulare Basin should be protected from further conversion to agriculture.


Terrestrial Mammal Species of Special Concern in California, Brylski et al. 1998
TULARE GRASSHOPPER MOUSE
Onychomys torridus tularensis
STANISLAUS
SANTA CLARA
MERCED
SANTA CRUZ
MADERA
SAN BENITO
FRESNO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SANTA BARBARA
VENTURA
LOS ANGELES
1,800,000
RESOURCES AGENCY
CALIFORNIA
DEPARTMENT FISH & GAME
Locations verified by authors
(captures, observations, museum records)
CNDDB 1979 - 1998
CNDDB 1978 and before
Wildlife Branch:KFien12109