MOJAVE FRINGE-TOED LIZARD
Uma scoparia

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Management Status: Federal: BLM Sensitive
California: Species of Special Concern (CDFG, 1998)

General Distribution:

The Mojave Fringe-toed Lizard (*Uma scoparia*) is endemic to southern California and a small area of western Arizona, where it is restricted to aeolian sand habitats in the deserts of Los Angeles, Riverside, and San Bernardino Counties in California and La Paz County in Arizona (Van Denburgh, 1922; Smith, 1946; Schmidt, 1953; Norris, 1958; Pough, 1974; Stebbins, 1985). Nearly all localities are associated with present-day and historical drainages and associated sand dune complexes of the Mojave and Amargosa Rivers (Norris, 1958). Along the Amargosa River, this species is found at Ibex Dunes, north of Saratoga Springs, and at Dumont Dunes on the west slope of the Kingston Mountains, San Bernardino County (Norris, 1958). Along the present-day Mojave River it is found at the following localities: Peck's and Wilsona Butte, Los Angeles County; El Mirage Dry Lake, Harper's Dry Lake, Lenwood, Daggett, Yermo, Newberry Springs, Pisgah, Ludlow, the west slope of Alvord Mountain, Cronese Lake, Silver Lake, Crucero, Sands Siding, Devil's Playground, Coyote Lake, and Kelso Dunes, San Bernardino County (Norris, 1958; Mayhew, 1964b; de Queiroz, 1992). Along the Pleistocene discharge channel of the Mojave River, it is found at the following localities: Bristol Dry Lake, Cadiz Dry Lake, and Dale Dry Lake, San Bernardino County; Rice Valley, Pinto Basin, Palen Dry Lake, and Ford Dry Lake, Riverside County; and Bouse Dunes, 15 mi. (24.3 km) southeast of Parker, La Paz County (Norris, 1958; Pough, 1974).

Distribution in the West Mojave Planning Area:

This species is predominately distributed throughout the eastern portions of the WMPA. Localities within the WMPA include from west to east: Peck's and Wilsona Butte, Los Angeles County; El Mirage Dry Lake, Harper's Dry Lake, Lenwood, Daggett, Yermo, Newberry Springs, the west slope of Alvord Mountain, Pisgah, Cronese Lake, Crucero, Ludlow, and Dale Dry Lake, San Bernardino County (Norris, 1958; Mayhew, 1964b; de Queiroz, 1992).

Natural History:

The Mojave Fringe-toed Lizard (MFTL) is a medium-sized lizard (SVL 4.5 in [112 mm]) with a dorsoventrally compressed body and tail, small dorsal head and body scales, pointed snout in lateral profile, countersunk lower jaw, obliquely keeled supralabial scales, large eyelid fringe scales, large anterior auricular scales, large imbricate shoulder and upper arm scales, greatly enlarged lamellar fringes on third and fourth hind-toe, a tail equal to body length, and two large postanal scales in males, which are only slightly enlarged in females. The dorsal ground color is light brown to yellowish, with dark ocelli pattern on the body, limbs and tail. The ventral color is light yellow to white, with one to three dark crescents across the throat region, a dark ventrolateral body blotch between the fore- and hindlimbs, and dark caudal bars on the posterior portion of tail (Van Denburgh, 1922; Heifetz, 1941; Stebbins, 1944, 1985; Smith, 1946; Norris, 1958; Pickwell, 1972; de Queiroz, 1989).

The MFTL is distinguished from all other species of fringe-toed lizards by the presence of crescent-shaped markings on the throat, a nasal process of the premaxilla bone with the lateral crests reduced posteriorly, and a frontonasal fontanelle commonly present in the skull (Cope, 1895; Heifetz, 1941; Schmidt and Bogert, 1947; Norris, 1958; de Queiroz, 1989). It can be further distinguished from the Coachella Valley fringe-toed lizard (*Uma inornata*) by the presence of a dark ventrolateral body blotch between the fore- and hindlimbs, dorsal ocelli that never reticulate to form a lineate pattern, and usually five internasals instead of three (Heifetz, 1941; Smith, 1946; Norris, 1958).

The MFTL has numerous adaptations associated with its highly arenicolous (= sand-dwelling) life style (Cope 1894; Van Denburgh, 1922; Mosauer, 1932, 1935; Stebbins, 1944, 1972; Norris, 1958, 1967; Pough, 1970; Carothers, 1986; Luke, 1986). The most notable, of which, are the enlarged, triangular shaped lamellar fringes on the third and fourth digit of the hindfoot that enable these lizards to achieve considerable speeds on the sand surface (Stebbins, 1944; Norris, 1958; Carothers, 1986). Other adaptations associated with burying in the sand include a countersunk lower jaw, valved nostrils, keeled supralabials, enlarged and imbricate shoulder scales, and a dorsoventrally compressed body (Stebbins, 1944; Smith, 1946; Norris, 1958; Carothers, 1986). In addition, the dorsal network of dark ocelli on a yellowish ground color make these lizards extremely cryptic on the sandy substrate, while their more distinguishing characteristics are concealed ventrally on their throat, sides, and tail (Stebbins, 1944; Smith, 1946; Norris, 1958).

The MFTL is omnivorous, feeding on dried seeds, flowers, grasses, leaves, insects, and scorpions (Van Denburgh, 1922; Miller and Stebbins, 1964; Minnich and Shoemaker, 1970, 1972). It is likely that the food preference shifts seasonally as in the Coachella Valley fringe-toed lizard (*Uma inornata*) where more plant material is consumed in spring when it is available and arthropods later in the year (Durtsche 1992, 1995; see also, Minnich and Shoemaker, 1970). Juveniles eat more arthropods than plants (Minnich and Shoemaker, 1970). In captivity, species of *Uma* have been known to be aggressive towards other lizards and occasionally eat them (Shaw, 1950)

Sexual maturity is reached between 2.5-2.75 in (65-70 mm) SVL, two summers after hatching (Jennings and Hayes, 1994). Adults exhibit a breeding coloration of a yellowish-green ventral wash that becomes pink along the sides between April and July (Mayhew, 1964a, 1964b; Stebbins, 1985). Courtship gestures include head bobbing and rapid, alternate, up and down waving of the front legs and feet (Carpenter, 1963; Mayhew, 1964a). Breeding activity occurs between April and July (Mayhew, 1964b). Females lay 1-5 eggs in hummocks or sandy hills during the months of May through July

(Stebbins, 1954, 1985; Kauffman, 1982). Hatchlings appear in September (Miller and Stebbins, 1964). More young are produced after wet winters (Mayhew, 1964a; Fromer et. al., 1983; Barrows et. al., 1995).

Males actively defend their home range which average 0.25 acres (0.10 ha; Kauffman, 1982). Aggression is displayed through a series of elaborate postures including lateral orientation and compression of the body, extension of the dewlap, and push-up displays (Carpenter, 1963, 1967). Juveniles do not defend territories until they become subadults (Jennings and Hayes, 1994). Seasonal activity occurs between March and October, with hibernation occurring between November and February (Mayhew, 1964a, 1964b). Daily activity patterns are temperature dependent (Miller and Stebbins, 1964). The MFTL has a internal body thermal voluntary maximum of 112.1 F (44.2 C), thermal voluntary minimum of 78.4 F (25.8 C), and thermal preference of 99.5 F (37.5 C; Mayhew, 1964b).

Predators of the MFTL include badgers (*Taxidea taxus*), coyotes (*Canis latrans*), hawks, shrikes, roadrunners (*Geococcyx californianus*), burrowing owls, leopard lizards (*Gambelia wislizenii*), and various snakes (Norris, 1958; Miller and Stebbins, 1964; Gracie and Murphy, 1986).

Habitat Requirements:

Mojave Fringe-toed Lizards are restricted to areas with fine, aeolian sand including both large and small dunes, margins of dry lakebeds and washes, and isolated pockets against hillsides (Stebbins, 1944, 1985; Smith, 1946; Norris, 1958). These areas are generally within creosote scrub desert between elevations of 300-3,000 ft (90-910 m; Norris, 1958; Stebbins, 1985). Sand dune ecosystems, including their source sand and sand corridors, are necessary for the long-term survivorship of aeolian sand specialists, such as, fringe-toed lizards (Barrows, 1996). Specific habitat requirements for the Coachella Valley fringe-toed lizard include access to shaded sand for thermoregulatory burrowing (Muth, 1991) and is likely required for the MFTL as well.

Population Status:

No data on population status and relative density of the MFTL is available. Tanya Trepanier, from the Royal Ontario Museum, Toronto, Canada, is currently conducting general population surveys and is studying the interpopulational relationships through the use of DNA sequence data. At the time of this report, her results have not been completed. Through personal communications, she reports that the MFTL is no longer found at a number of historical localities, while other populations appear to contain only a small numbers of individuals.

Threats Analysis:

The loose wind-blown sand habitat, upon which the MFTL is dependent, is a fragile ecosystem requiring the protection against both direct and indirect disturbances (Weaver, 1981; Beatley, 1994; Barrows, 1996). Potential direct disturbances include habitat loss or damage from urban development, off-highway vehicles (OHV), and agriculture. Potential indirect disturbances are associated with the disruption of the dune ecosystem source sand, wind transport, and sand transport corridors.

The decline of the closely related Coachella Valley fringe-toed lizard (*Uma inornata*) is attributed primarily to the urban development associated with the population increases of that region (Beatley, 1994; Barrows, 1996). Viable, long-term habitat has been reduced to 2% of the original range of the Coachella Valley fringe-toed lizard (Barrows et. al., 1995). For the Coachella Valley fringe-toed lizard , habitat loss is the result of land conversion to agriculture, roads, houses, and golf courses (Weaver, 1981; Beatley, 1994). Off-highway vehicles also have been implicated in habitat degradation (Beatley, 1994). Long-term habitat sustainability is further threatened by the disruption of dune building mechanisms. One such problem is the interruption of sand movement by buildings, railroad windbreaks, roads, and other man-made alterations (Weaver, 1981; Beatley, 1994).

Although there is no published data suggesting a decline in population sizes of the MFTL, similar urban development threats exist in the WMPA to cause concern that populations will be (or have already been) adversely affected.

Biological Standards:

Management efforts should be directed at identifying aeolian sand habitats and assessing the present condition of all known populations. Protected land should contain viable, long-term habitat, encompassing ecosystem-level processes that lead to the formation of these habitats. The physical mechanisms attributed to the formation of sand dunes should be integrated into management plans. Protected land should include areas for source sand, wind and sand corridors, as well as the sand dune habitat and its associated shade plants. Successful Habitat Conservation Plans (HCP) have been developed for the Coachella Valley Fringe-toed Lizard (The Nature Conservancy, 1986; Beatley, 1994; Barrows, 1996). These HCPs incorporated an ecological model to identify habitat with long-term viability, as well as those habitats deemed nonviable because their sand source and/or wind corridor were blocked by previous developments (Beatley, 1994; Barrows, 1996). Further details within the Coachella Valley Fringe-toed Lizard HCP should be consulted. Direct habitat degradation can be further avoided through land use restrictions. Restrictions should prevent the conversion of viable habitat to agriculture and the many forms of urban development and prohibit the use of OHVs.

Because little is known about the population biology of the MFTL, mark and recapture studies should be implemented in as many populations as possible to gather much needed data (see Muth, 1987, 1991). In addition, genetic studies focusing on interpopulational relationships could greatly increase our understanding about population associations and their relative distinctiveness from each other. These studies may prove particularly useful if mitigation of existing populations is needed. Until sand dune ecosystem and population data become available, a management plan and recommendations for long-term population viability are inconclusive.

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