

Conservation genetics, evolution and distinct population segments of the Mojave fringe-toed lizard, *Uma scoparia*

R.W. Murphy^{a,*}, T.L. Trépanier^a, D.J. Morafka^{b,✉}

^aCentre for Biodiversity and Conservation Biology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ont., Canada M5S 2C6

^bDepartment of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, CA, USA

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Abstract

Mojave fringe-toed lizards, *Uma scoparia*, occur only on desert sand dunes and associated mosaics of small sand ramps. Consequently, the distribution is naturally discontinuous and geographically complex. Many populations are vulnerable to local extirpation, and some are now gone. We synthesized genealogical and paleoecological data to explain the geographic relationships among populations of *U. scoparia* based on mitochondrial DNA sequence data. The species appears to have arisen from a common ancestor with *U. notata* by a vicariance event, associated with the formation and development of the Lower Colorado River. Within *U. scoparia*, two major maternal lineages are associated with the development of river drainage systems. The northern lineage is from the Amargosa River. The southerly lineage includes the Mojave River basin, Bristol Trough, Clark's Pass, and Colorado River sand transport systems. The northernmost lineage of *U. scoparia*, isolated in the vicinity of Plio-Pleistocene Lake Tecopa, has the greatest amount of DNA sequence divergence. The southern populations exhibit little local genetic differentiation. A small population near Red Pass Lake contains haplotypes from both the northern and southern lineages. We define two distinct population segments (DPSs), one associated with the Amargosa River lineage, and the other with Red Pass Dune.

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*Corresponding author. Tel.: +1 416 586 8099; fax: +1 516 586 5553.

E-mail address: drbob@zoo.utoronto.ca (R.W. Murphy).

✉Deceased.

1. Introduction

Lizards can serve as model organisms in evolutionary studies and be used as flagship species for conservation. They form an important part of the ecosystem, be they large herbivores or fossorial, legless species. The genealogical history of lizards can also be used in the reconstruction of geographic history, especially when their distribution is highly restricted to specific habitats. For example, all species of fringe-toed lizards of the genus *Uma* are associated with paleo-lakes and drainage systems (Norris, 1958; Trépanier and Murphy, 2001). The history of these lizards could reveal much about the development of the hydrologic systems of arid North America. Charismatic *Uma* also have particular adaptations for dune habitats (Pough, 1969; Carothers, 1986). And fringe-toed lizards serve as flagships for the conservation of some dune systems in the American South-west and Mexico.

The Mojave fringe-toed lizard, *Uma scoparia*, is a small heliothermic phrynosomatid and an obligate dune-dweller. It is the northernmost species of *Uma*, ranging in California from extreme southern Inyo County through most of San Bernardino County, barely into the north-eastern corner of Los Angeles County, and southward and eastward through the eastern half of Riverside County to the vicinity of Blythe (Jennings and Hayes, 1994) (Fig. 1). This species also occurs near Parker, La Paz County, Arizona (Elvin, 1960).

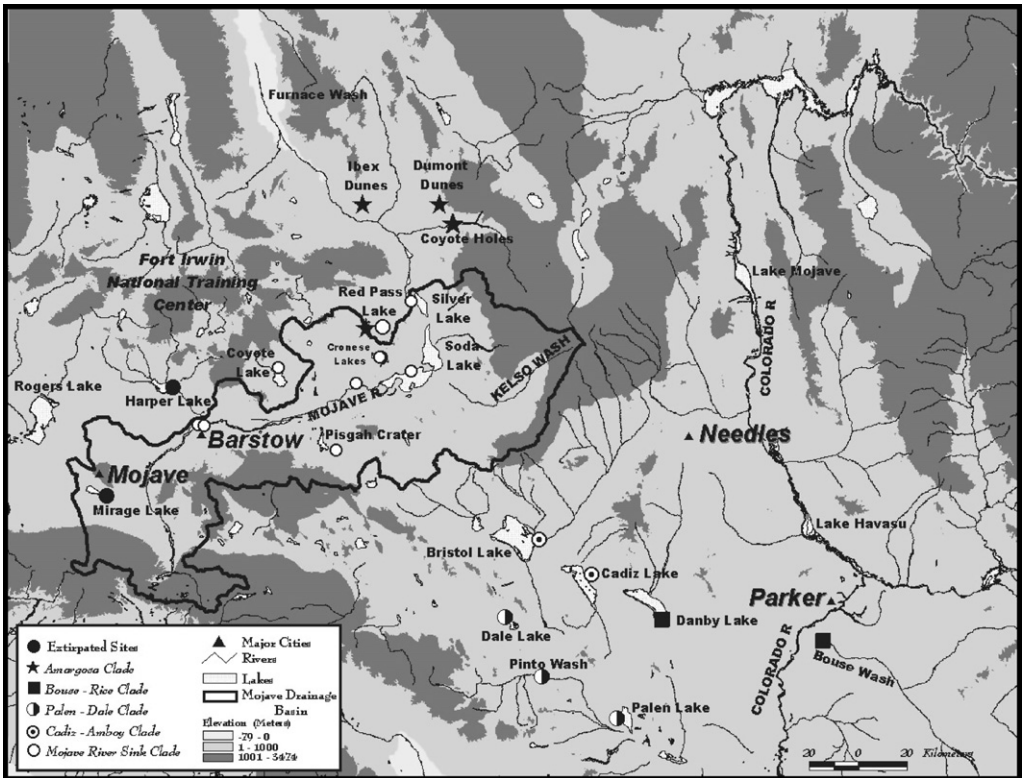


Fig. 1. Distribution of *Uma scoparia* in relation to the modern hydrology of the Mojave Desert and sample sites.

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