

Appendix E

Mojave Fringe-toed Lizard Study Proposal

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Research Proposal: Status and ecology of the Mohave Fringe-toed Lizard (*Uma scoparia*) in the Bouse Dunes ecosystem, Arizona, focusing on the significance of peripheral sand-sheet habitat

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BACKGROUND

In Arizona this sand-dwelling lizard occurs only in a restricted area in La Paz County south and east of the town of Parker. It is listed as Wildlife of Special Concern in Arizona by the Arizona Game and Fish Department, a Species of Special Concern by California Department of Fish and Game, and as a Sensitive Species in Arizona and California by the Bureau of Land Management. Almost all ecological studies of this species have been conducted in California where most populations occur. In Arizona, the lizards are most conspicuous on aeolian dunes in the Cactus Plain, but despite very limited surveys are known to occur in the sand sheet habitats peripheral to the dunes that extend tens of kilometers to the south. However, little is known about the extent of use of these sand sheet habitats by this species or the importance of these “sand-sheet” lizards to the persistence of this species in Arizona.

The strong push for renewable energy in this country has greatly increased demand for Southwestern desert sites that are highly suitable for solar and wind energy production. The proposed area for the Quartzsite Solar Energy Project will encompass about 1400 acres, about 11 acres of which is sand dune, with most of the remainder on potential sand-sheet habitats for the Mohave Fringe-toed Lizard. The agencies have deemed the Quartzsite Project to be impacting the Dunes Wildlife Management Area and surrounding habitat although little is known of the relationship between the use of the habitat as a system by the Mohave Fringe-toed Lizard. This study plan was developed in order to develop a better understanding of the extent to which Mohave Fringe-toed Lizards occur in these sand-sheet habitats and the ecological importance of lizards in these extensive dune-periphery habitats to the regional persistence of the species. (i.e., to what extent do these “sand-sheet” lizards reproduce and recruit into the general population? Are some of these peripheral populations possibly self-sustaining?).

Primary objectives of this study are to:

1. Determine the occupancy of sand sheet and dune habitats by *Uma scoparia*.
2. Determine the density of *Uma scoparia* in sand-sheet habitats compared to that on the dunes.
3. Determine home range sizes of lizards living on sand sheets compared to those on dunes.

4. Determine activity patterns of lizards living on sand sheets compared to those on dunes.
5. Investigate the demography (sex ratio, size class distributions) of lizards (to confirm reproduction and recruitment in sand sheet habitat) at selected sites.
6. Provide a base of knowledge from which BLM land managers can make informed management decisions for the dunes habitat management area.

METHODS

OCCUPANCY

The first step will be to acquire orthophotoquads or other remote imagery showing distribution and extent of the sand sheets in relation to dune habitat. Using remote imagery and field visits to the area will allow us to stratify habitats on the dunes and those contained within the sand sheets. Based on our knowledge of where we have seen fringe-toed lizards in that area in the past, we can start the stratification process as soon as the project is authorized and begin the lizard surveys on property within the Dunes Wildlife Management Area but outside the Quartzsite Project disturbance area during the next activity period for the lizards. We will establish a numbered grid (scale to be determined following stratification field visits) for the entire extent of the sand sheets and randomly select grids within each stratum to survey using occupancy, thus providing an area of inference of the entire gridded area. Grids will be surveyed on alternate days by each member of a two-person team for a total of at least four visits (i.e., two visits (one by each team member) on each of two trips). Efficacy of models based on covariates (such as depth of sand, vegetation cover, plant species, etc.) will be compared (MacKenzie et al. 2006).

DENSITIES

Densities of fringe-toed lizards, which are poorly known but may vary with sand qualities (Turner et al. 1984), will be estimated in sand sheet habitats using Line Distance Sampling (Buckland et al. 1993). The relatively flat sand sheet habitats are well suited for this method. Even though the number of lizards observed on a single transect may be small, the total number of transects that will be walked to cover the extensive sand sheets will provide a robust density estimate for lizards across that large area. Estimates of the proportion of lizards active on the surface [$g(0)$] both on dune and sand sheet habitats will be calculated using radio-telemetry. These estimates are necessary to calculate densities using line distance sampling. A removal method (such as Zippin 1958) may be used to estimate densities on the dunes if transects prove inadequate (as they did with *Uma rufopunctata* in the Mohawk Dunes in the 1990s; Turner and Schwalbe 1998).

HOME RANGE AND ACTIVITY

Home range sizes, which are little-studied but apparently small in fringe-toed lizards (Horchar 1992, Kaufman 1982, Turner and Schwalbe 1998), and activity patterns will be

determined using radiotelemetry, visual surveys, and focal animal studies. Results will be used to quantify population density estimates and to understand sand-sheet habitat use by the species in the study region.

DEMOGRAPHY

A number of sites will be established within each stratum to gather demographic data in addition to the line distance density estimates, including sex ratio and size class distributions to determine the extent of reproduction according to habitat type.

PRODUCTS

Reports will provide a detailed evaluation of the importance of sand sheet environments to the Mohave Fringe-toed Lizard in study region. Annual progress reports will be provided to SolarReserve. A hard and electronic copy of the graduate student's master's thesis will be produced as the final project report, including maps of areas surveyed and demographic study sites, and an appendix containing all data collected (and not already reported in tables, figures, and text of the thesis). We will submit appropriate portions of the thesis to a peer reviewed journal such as the Journal of Herpetology or Journal of Wildlife Management.

TIME LINE

Actual Project Start Date will depend on how quickly cooperative agreements can be signed and funding moved to USGS and the University of Arizona. As soon as funding is in place here, we can begin assessing the extent of the sand sheets and dunes using remote sensing and site visits by the Principal Investigator, with the understanding that the extent of the dunes themselves is already well documented by BLM and the AGFD Heritage Data Base. I assume the graduate student will start taking classes spring semester 2012 and initiate field work with the lizards that spring, thus Years 1 and 2 of the project will run from January through December, 2012 and 2013, respectively. Field work will be conducted from April through September.

Annual progress reports: Due to SolarReserve October 15 each year. Thesis will be completed and defended by May 31, 2014. Manuscripts will be submitted for journal publication during 2014.

LITERATURE CITED

- Buckland, S. T., Anderson, D. R., Burnham, K. P., and Laake, J. L. 1993. Distance sampling: estimating abundance of biological populations. Chapman and Hall, London and online at <http://www.colostate.edu/Dept/coopunit/download.html>
- Horchar, V. M. 1992. Home range dynamics of the Coachella Valley fringe-toed lizard. Master's thesis. Fullerton, CA: California State University, Fullerton. 61 p.
- Kaufmann, J. S. 1982. Patterns of habitat resource utilization in a population of *Uma scoparia*, the Mojave fringe-toed lizard. M. S. Thesis, Univ. Illinois, Chicago. 78pp.

MacKenzie, D.I., Nichols, J.D., Royle, J.A., Pollock, K.H., Bailey, L.L. & Hines J.E.. 2006. Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurrence. Academic Press, New York.

Turner, D.S., and C.R. Schwalbe. 1998. Ecology of Cowles fringe-toed lizard. Finalreport to Arizona Game and Fish Department, Heritage Fund Project No. I95042. 78pp.

Turner, F.B., Weaver, D.C. and Rorabaugh, J.C. 1984. Effects of reduction in windblown sand on the abundance of the fringe-toed lizard (*Uma inornata*) in the Coachella Valley, California. *Copeia* 1984: 370-378.

Zippin, C.. 1958. The removal method population and estimation. *Journal of WildlifeManagement*, 22, 82-90.