

Berry, K.H., et al. 2012. Final Report. A comparison of desert tortoise populations and habitat on three types of managed lands in the Western Mojave Desert in Spring 2011: the Rand Mountains/Fremont Valley, Desert Tortoise Research Natural Area, and private parcels.

## **A Comparison of Desert Tortoise Populations and Habitat on Three Types of Managed Lands in the Western Mojave Desert in Spring 2011: the Rand Mountains/Fremont Valley, Desert Tortoise Research Natural Area, and Private Parcels**

### **FINAL REPORT**

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**Abstract:** We surveyed an area of ~260 km<sup>2</sup> in the western Mojave Desert to evaluate relationships between condition of Agassiz's desert tortoise populations (*Gopherus agassizii*) and habitat on lands that have received different types of management. The land management was of three types: public lands administered by the Bureau of Land Management (BLM) in the Rand Mountains and Fremont Valley on desert tortoise critical habitat, the federally designated and fenced Desert Tortoise Research Natural Area (DTRNA), and undeveloped and unoccupied privately-owned lands adjacent to the DTRNA recently acquired by a non-profit organization. We established 240 one-hectare plots using random sampling, with 80 plots in each of the three types of managed lands for a 0.92% sample. Surveys were conducted in spring 2011, and data were collected on live tortoises, shell-skeletal remains, other signs of tortoises, perennial vegetation, predators, and evidence of human use. The density for subadult and adult tortoises on all 240 plots was 5.46/km<sup>2</sup> (95% CI = 5.4–5.6). Densities for subadults and adults differed significantly by management area: 10.2/km<sup>2</sup> (95% CI = 9.9–10.4) for the DTRNA plots, 2.4/km<sup>2</sup> (95% CI=2.3–2.6) for the Rand Mountains and Fremont Valley; and 3.7/km<sup>2</sup> (95% CI=3.6–3.8) for plots on private lands. Juvenile and immature tortoises were found only on the plots within the DTRNA. Counts of tortoise sign were highest on the DTRNA and lowest on private lands.

Logistic regression models indicated that presence of tortoise sign (live and dead tortoises, burrows, scat, etc.) was significantly and negatively correlated with anthropogenic disturbances measured by counts of sheep scat, vehicle tracks, trash, and total disturbed surface area. Private lands had higher counts of vehicle tracks, sheep scat, and trash, as well as total amount of land with surface disturbances. The Rand Mountains/Fremont Valley management area was intermediate in terms of counts of vehicle tracks and total disturbed surface area, and lowest in counts of trash and evidence of shooting. The DTRNA had lower counts of vehicle tracks and total disturbed areas than the other two management areas but higher counts of common ravens and sign of mammalian predators. Neither the Rand Mountains/Fremont Valley nor the DTRNA had appreciable evidence of sheep grazing. Factors potentially affecting recovery of tortoises varied by management area, and include sheep grazing, vehicle use, trash, the total of disturbed areas, and subsidized predators.

**Key words:** desert tortoise, *Gopherus agassizii*, Desert Tortoise Research Natural Area, human uses, recreation, sheep grazing, trash, Mojave Desert