

Monitoring the Effects of Natural and Anthropogenic Habitat Disturbance on the Ecology and Behavior of the San Diego Coast Horned Lizard (*Phrynosoma coronatum blainvillei*)¹

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Extended Abstract

The sage scrub communities in which San Diego coast horned lizards (*Phrynosoma coronatum blainvillei*) typically occur are now restricted to only 10 to 15 percent of their former range and are currently subject to rapidly accelerating rates of loss. As a result of urban and agricultural development, pesticide use, collecting for the pet trade, off-road vehicle activity, and other human disturbance, San Diego horned lizards have undergone serious population declines in the last decade. In some areas, introduced exotic ant species have displaced the native harvester ants on which horned lizards depend. Because relatively little is known of the biology of coast horned lizards, basic information on their habitat and resource requirements, as well as their behavior and reproductive physiology, is critical to developing effective management plans for their survival.

Although San Diego coast horned lizards appear able to persist in semi-disturbed habitats, the extent to which these areas can support viable populations over the long term is unknown. To address this information gap, we compared several aspects of the behavioral ecology of the San Diego coast horned lizard between undisturbed Riversidian sage scrub and habitat disturbed by either fire or historic grazing on the Southwestern Riverside County Multi-Species Reserve during 1995 and 1996.

In 1996, we radio-tracked 11 male and 9 female horned lizards. Once located, each lizard's position was recorded to ± 1 m using a GPS (global positioning system) equipped to receive real-time differential corrections. For the 10 males and 4 females for which enough data points were available to measure home range size reliably, home range size was estimated using two methods: the convex polygon method and a grid cell technique that produces a two-dimensional frequency distribution describing

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spatial utilization of the home range. While there was no significant difference in the home range size of adult males and females, there was a tendency for convex polygon home ranges in disturbed habitat to be larger than those in undisturbed habitat ($U=10$, $df=12$, $P=0.15$). Using a grid size of 10 m^2 , differences in the spatial utilization of home ranges in disturbed and undisturbed habitat were significant ($U=5.5$, $df=12$, $P=0.04$). In addition, lizards in disturbed habitat overlapped more conspecifics on average than those in undisturbed habitat ($U=6$, $df=12$, $P=0.04$).

To document foraging preferences of horned lizards, we dissected scat from disturbed and undisturbed habitats on the reserve and identified the species consumed based on head morphology. In both the number of ant species consumed ($T=2.49$, $df=32$, $P=0.02$) and total number of prey types ($T=2.18$, $df=32$, $P=0.04$), horned lizards in undisturbed habitat exhibited richer diets than those in disturbed habitats (fig. 1).

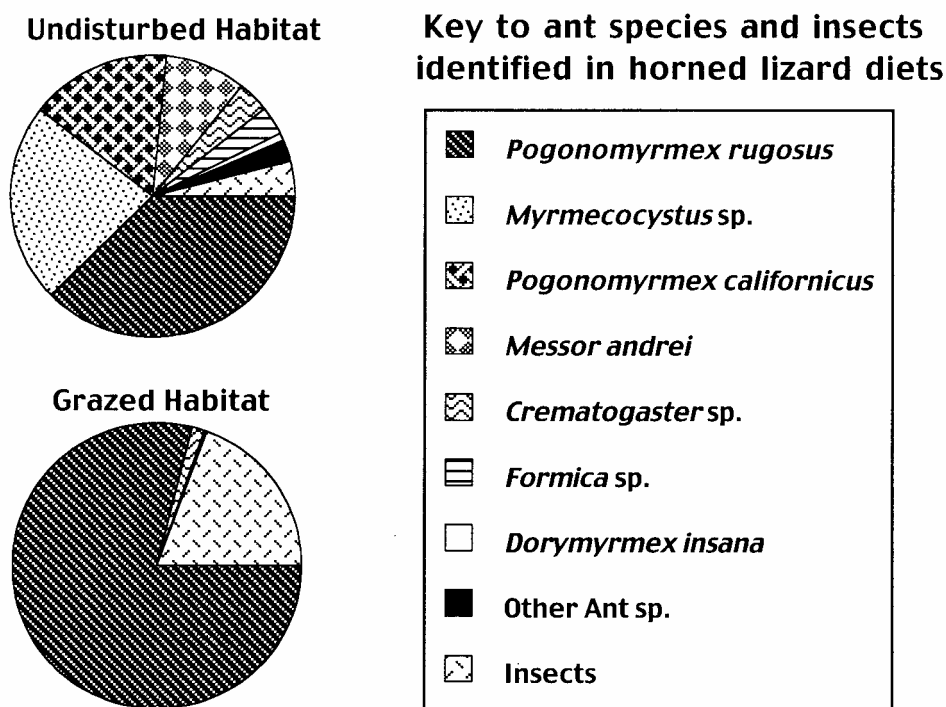


Figure 1.

We measured snout-vent length (SVL) and body mass of 27 adult males, 25 adult females, and 206 juveniles in order to compare morphology of horned lizards in disturbed and undisturbed habitats. Using a two-factor analysis of variance with sex and disturbance level as independent variables, we found that individuals of both sexes from undisturbed habitat were larger in SVL ($F = 13.68$, $df = 1, 48$, $P = 0.0006$) and body mass ($F = 14.03$, $df = 1, 48$, $P = 0.0005$) than those from disturbed habitat. In contrast, analysis of covariance indicated that there were no differences in growth of hatchlings in SVL ($F = 1.40$, $df = 1, 184$, $P = 0.24$) or body mass ($F = 1.59$, $df = 1, 184$, $P = 0.21$) between disturbed and undisturbed habitats.

In summary, horned lizards in disturbed habitats utilize larger home ranges with lower plant diversity and greater overlap among individuals. Increased home range size may represent a compensatory response to the lower species richness of insects, particularly ants, found in disturbed habitats. Horned lizards in disturbed habitats exhibit smaller adult body size than those in undisturbed habitats. That growth rates of hatchlings during their first season are similar across habitats suggests that differences in adult size are not the result of differences in early growth of hatchlings. Rather, these differences may be due to differential growth later in the maturation period or to differences in predation pressure. The initial response of horned lizards to habitat disturbance appears to be behavioral rather than physiological. The greater spatial requirements of horned lizards in disturbed habitats should be considered in determining the area needed to support a viable population over the long term.

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