

Baseline Survey of Mammal Species

of Freeman Ranch

Helen M. Becker and John T. Baccus

From August 1997 to August 1998, a baseline survey of mammal species was conducted at Freeman Ranch. The objectives of this study were 1) to ascertain species present/absent on the ranch; 2) to compare the abundance, richness, and diversity of small rodents across five different vegetative communities found on the ranch; and 3) to describe quantitatively the vegetative composition and structure of these communities.

Bats were sampled from August 1997 to May 1998. A bat detector (a handheld device that detects the frequencies at which bats echolocate) was used to determine presence/absence of bats at various locations on the ranch. Bats were consistently detected at three locations: Laguna (artificial wetland), Crawford Pond (a small natural pothole that usually contains water throughout the year), and the Quail Station, where an outdoor light attracts moths and other insects in warmer months. Bats were sampled using 2 to 5 mistnets on 24 separate nights. At least five species of bats occur on the ranch. Thirty-three cave myotis (*Myotis velifier*), 12 Mexican free-tailed bats (*Tadarida brasiliensis*), 10 hoary bats (*Lasiurus cinereus*), 4 red bats (*L. borealis*), and 1 eastern pipistrelle (*Pipistrellus subflavus*) were netted. Bat activity was concentrated at Laguna, where four of the five species and 95% of captures were netted. This habitat is an important resource for these mammals.

Larger mammals were inventoried incidentally throughout the year using a variety of methods: direct observations, tracks, and skulls. The occurrence of the following mammals was verified on the ranch: white-tailed deer (*Odocoileus virginianus*), black-tailed jackrabbit (*Lepus californicus*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), hog-nosed skunk (*Conepatus mesoleucus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), feral hog (*Sus scrofa*), Virginia opossum (*Didelphis virginiana*), fox squirrel (*Sciurus niger*), rock squirrel (*Spermophilus variegatus*), nine-banded armadillo (*Dasypus novemcinctus*), ringtail (*Bassariscus astutus*), and coyote (*Canis latrans*).

Small rodents were surveyed at five study sites in five distinct vegetative communities. These habitat types included 1) live oak savannah; 2) live oak woodland; 3) mesquite shrubland; 4) riparian forest; and 5) Ashe juniper-live oak forest. From 6 January to 29 March 1998, small rodents were trapped at each study site using Sherman live traps in a grid of 10,000 m² for 1,500 trap nights. A total trap effort of 7,500 trap nights yielded 149 white-ankled mice (*Peromyscus pectoralis*),

44 cotton rats (*Sigmodon hispidus*), 19 pygmy mice (*Baiomys taylori*), and 1 harvest mouse (*Reithrodontomys fulvescens*). Relative abundance of each species (individuals captured/100 trap nights), species richness (number of species), and diversity for each habitat type are summarized in the table below.

Species	Relative Abundance in Habitat Types				
	Live Oak Savannah	Live Oak Woodland	Mesquite Shrubland	Riparian Forest	Juniper-Live Oak Forest
<i>B. taylori</i>	0.67	0.34	0.27		
<i>P. pectoralis</i>	0.87	1.87	1.34	0.60	5.27
<i>R. fulvescens</i>			0.07		
<i>S. hispidus</i>	0.47	0.87	1.27	0.34	
Total abundance	2.00	3.07	2.94	0.94	5.27
Species richness	3.00	3.00	4.00	2.00	1.00
Species diversity	1.369	1.183	1.327	0.783	0.000

The mean total abundance of small rodents for all five vegetative communities was 2.83 individuals per 100 trap nights. Species richness was highest (4.00) in the mesquite shrubland, and lowest in the juniper-live oak forest (1.00), where, as expected, only the white-ankled mouse was caught. The highest diversity of small rodent species occurred in the live oak savannah and mesquite shrubland (1.369 and 1.327, respectively). The juniper-oak forest had the lowest diversity (0.000).

Three species demonstrated habitat selection (χ^2 , $P < 0.005$). As predicted, the white ankled mouse selected for rocky, juniper-oak forest habitat, while all other species avoided this habitat type. Cotton rats and pygmy mice selected for mesquite shrubland and live oak savannah habitats with a higher percent cover of grass.

Analysis of the vegetative characteristics of each habitat type indicated that the overall amount of vegetative cover and the species richness of woody plants are not good predictors of rodent abundance or diversity. Other habitat features play a more important role. The presence of cotton rats in both the mesquite shrubland and live oak savannah communities caused a higher rodent diversity. In both habitat types, the abundance of

thorny shrubs (e.g., tasajillo and prickly pear) provided cover for this larger species. Cattle are unable to graze these plants too closely; thus grass is denser around the base of these plants. The presence of cotton rats in the live oak woodland was localized to large, dense patches of midgrass off the Nature Trail -- an area no longer grazed by livestock.

Although the floral composition and structure of the riparian forest is diverse, small rodent abundance was low and may be explained by the lack of dense vegetation 0.0-0.5 meters above the ground. The live oak woodland site had both a high abundance and a relatively high diversity of rodents. This habitat is characterized by closed woodlands juxtaposed with open grassland areas with transition zones in between at varying stages of seral development. This patchiness may well have contributed to the diversity of small rodents in this habitat type.