


### DIETS OF MOUNTAIN LIONS IN SOUTHWESTERN ARIZONA

**Jenny L. Cashman, Matthew Peirce, and Paul R. Krausman**

*School of Renewable Natural Resources, University of Arizona, Tucson, AZ 85721 (JLC, PRK)*

*Arizona Game and Fish Department, Post Office Box 1736, Wickenburg, AZ 85358 (MP)*

The primary diet of mountain lions (*Felis concolor*) is comprised of ungulates (Young and Goldman, 1946; Robinette et al., 1959; Hornocker, 1970; Shaw, 1977; Leopold and Krausman, 1986). However, diets of mountain lions in the Lower Sonoran Desert where ungulate densities are low (<1 deer/km²; P. R. Krausman, pers. obs.) have not been described. The Harquahala Mountains in southwestern Arizona contain high densities of mountain lions (Shaw, pers. obs.). While conducting ungulate studies adjacent to the Harquahala Mountains and monitoring the movements of three mountain lions, we collected scats to determine the diets of lions inhabiting the Lower Sonoran Desert.

Five mountain ranges and surrounding areas were searched for scats from mountain lions: Harcuvar and Harquahala mountains, La Paz Co., 70 km west of Wickenburg, Arizona; and Vulture, Big Horn, and Belmont mountains, Maricopa Co., Arizona, approximately 80 km west of Phoenix, Arizona. Elevations ranged from 426 m on the desert floor to 1,732 m in the Harquahala Mountains. The topography ranged from desert flats to rugged cliffs. Mean yearly precipitation was approximately 20 cm (Sellers and Hill, 1974), occurring in winter and late summer. Summer temperatures often exceeded 45°C. Ranching, mining, agriculture, and hunting were common uses of this area.

When a scat was located, it was placed in a labeled paper bag and stored in a freezer. Scats were air-dried for 1 to 2 weeks prior to analysis. We calculated frequency of occurrence of food items and estimated the volume of food items in each scat with a volumetric cylinder. A reference collection of hair-scale impressions of food items was made following Williamson (1951). Scale photographs of hair (Adorjan and Kolensky, 1969; Moore et al., 1974) were used to confirm species identification of food items. Individual scats were broken apart and sorted into separate piles based on hair type (Krausman and Ables, 1981). Hair mounts were made using representatives from
each of the sorted piles. Mounts were observed and compared to reference slides using a compound microscope. Bone fragments, teeth, claws, and hooves were also used to confirm the identification of food items.

We identified ≥15 vertebrate food items in 159 scats from mountain lions (Table 1). Based upon frequency of occurrence, desert mule deer (Odocoileus hemionus crooki) was the primary food item followed by collared peccary (Tayassu tajacu), cattle, small rodents, lagomorphs, and Mexican mountain sheep (Ovis canadensis mexicana). Grass and leaf remnants were found in 37% of all scats; these items were probably consumed in association with other foods. Remains of Gila monster (Heloderma suspectum) were found in two scats, those of chuckwalla (Sauromalus obesus) in one scat, and beetles (Chrysomelidae family) in three scats (Table 1). Eleven of the 12 scats containing livestock hair came from the Vulture Mountains. Ten of the 11 scats containing pieces of mountain sheep were identified through bone and hoof fragments as lambs or young sheep. Hornocker (1970) stated that mountain sheep do not appear to contribute to the diet of mountain lions in Idaho and that the number of mountain sheep killed by mountain lions is insignificant. In our study, remains of mountain sheep were in 7% of the scats examined. In addition, Krausman et al. (1989) reported two mountain sheep killed by lions in the Harquahala Mountains. In small populations (<100), this level of predation may be significant.

We could not compare temporal differences in food items because we were unable to determine when scats were deposited. Mountain lions from the southwestern desert in Arizona consume ungulates as the major food item in their diet, and their diets did not generally differ from lion diets in other areas (>70% ungulates; Hornocker, 1970; Leopold and Krausman, 1986; Kruuk, 1986). Although the densities of ungulates in the mountain ranges we examined are low (<100 mountain sheep, <1 deer/km²), scattered herds of collared peccaries, limited grazing by cattle) there appears to be sufficient biomass to support a small number of mountain lions.

This study was supported by the United States Bureau of Reclamation, the United States Fish and Wildlife Service, the University of Arizona, and the Arizona Game and Fish Department. T. Boggs, D. Conrad, F. Green, J. J. Hervert, S. Khonki, T. Rickel, H. G. Shaw, and R. Thompson assisted with collection of scats. C. L. Douglas assisted with identification of bone fragments. R. C. Ettchberger, W. B. Ballard, and two anonymous reviewers reviewed an earlier draft of the manuscript.

### Table 1—Frequency of occurrence of prey items and percent volume of prey items in 159 mountain lion scats collected in southwestern Arizona, 1987 to 1990.

<table>
<thead>
<tr>
<th>Prey</th>
<th>% frequency</th>
<th>% volume of scats</th>
</tr>
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<tbody>
<tr>
<td>Mule deer (Odocoileus hemionus crooki)</td>
<td>39</td>
<td>36</td>
</tr>
<tr>
<td>Collared peccary (Tayassu tajacu)</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>Cattle</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Mountain sheep (Ovis canadensis mexicana)</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Unidentified small rodents</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Lagomorphs</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Badger (Taxidea taxus)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Skunk (Spilogale sp. or Mephitis sp.)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Raccoon (Procyon lotor)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Porcupine (Erethizon dorsatum)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Beetle</td>
<td>2</td>
<td>t</td>
</tr>
<tr>
<td>Mountain lion (Felis concolor)</td>
<td>1</td>
<td>t</td>
</tr>
<tr>
<td>Bobcat (Lynx rufus)</td>
<td>1</td>
<td>t</td>
</tr>
<tr>
<td>Canidae</td>
<td>1</td>
<td>t</td>
</tr>
<tr>
<td>Gila monster (Heloderma suspectum)</td>
<td>1</td>
<td>t</td>
</tr>
<tr>
<td>Chuckwalla (Sauromalus obesus)</td>
<td>t</td>
<td>t</td>
</tr>
</tbody>
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1 Less than 1%.

**LITERATURE CITED**


DISTRIBUTIONAL STATUS OF SHORT-TAILED SHREWS (GENUS BLARINA) IN TEXAS

GEORGE D. BAUMGARDNER, NORMAN O. DRONEN, AND DAVID J. SCHMIDLY

Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843

Blarina carolinensis and Blarina hylophaga are cryptic species that are distinguishable from one another only because of previous morphometric comparison of large series of specimens (George et al., 1981) and features of the karyotype (George et al., 1982). Blarina carolinensis occurs in the southeastern United States, and B. hylophaga occurs primarily in the southern Great Plains with a geographically disjunct population on the Gulf coast of Texas (Jones et al., 1984). The ranges of these two species are hypothesized to overlap in extreme northeastern Texas (Jones et al., 1984: 132).

The taxonomic status of these shrews in Texas has been confusing. Originally, both were arranged as a single species, Blarina brevicauda (Davis, 1974). However, Schmidly and Brown (1979), following Genoways and Choate (1972) and Ellis et al. (1978), assigned specimens from Texas to B. carolinensis. Later, it was determined that representatives of both B. carolinensis and B. hylophaga were known from Texas (George et al., 1981), with the former occupying the eastern portion of the state (Schmidly, 1983) and the latter occurring in Montague Co. of northern Texas (Dalquest and Horner, 1984) and in Aransas Co. on the Gulf coast (George et al., 1981).

Recently, specimens of B. carolinensis and B. hylophaga were obtained in close proximity to one another during a survey of amphibians, reptiles, and mammals of Bastrop and Buescher State Parks (ca. 2 miles E Bastrop, Bastrop Co., Texas), in east-central Texas. Initial trapping in this area employed Sherman live traps and one gallon pitfall can-traps. Subsequent sampling was concentrated in sites likely to harbor shrews and included the operation of up to 1,045 pitfall traps for over 143,000 trapnights. Trapping was conducted from January 1989 to February 1991.

Only four specimens of the genus Blarina were obtained, suggesting both species are extremely rare in this area. Trapping effort yielded three specimens (Texas Cooperative Wildlife Collection = TCWC 51207, 51208, 51209). The fourth shrew (TCWC 51797) was recovered from the Bastrop State Park swimming pool in early June 1991 by park personnel. Condition of the specimens precluded examination of karyotypes; however, identification to species was possible on the basis of morphometric features (George et al., 1981). Three specimens were identified based on the discriminant scores for their cranial measurements. One (TCWC 51209) was diagnosed to be B. carolinensis, and the others (TCWC 51208, 51797) were identified as B. hylophaga. The remaining specimen (TCWC 51207) had a broken skull which precluded its identification using discriminant scores, but this specimen was assignable to B. hylophaga on the basis of its large rostrum (S. B. George, in litt.). Comparison of the
