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MAMMALS OF THE GUADALUPE MOUNTAINS
OF WESTERN TEXASBy WILLIAM B. DAVIS¹

As part of the research program of the Texas Cooperative Wildlife Research Unit and the Department of Fish and Game, Agricultural and Mechanical College of Texas, a survey of the wildlife resources of Culberson County, Texas, was begun in August, 1938. The present report is based on a study of a part of that county during the summers of 1938 and 1939. A report on the birds of the Guadalupe Mountains has been prepared by Thos. D. Burleigh and George H. Lowery (see No. 8 of this series, now in press).

COLLECTING STATIONS AND PERSONNEL

Station 1.—McKittrick Canyon, 5,300 to 6,000 feet. Camp was established at the Grisham-Hunter lodge (see U. S. Geol. Survey topographic map of the Guadalupe Quadrangle). Collecting was done by Davis within a 2-mile radius of camp on August 1, and again on November 1, 1938, and by Davis, Milo Cox, H. O. Borgfeld, G. G. Goodrich, C. L. Lehmann, G. Triesch, and E. A. Walker from June 25 to July 10, 1939. At this station the dominant vegetation consists of a mixture of oaks, maples, walnuts, pines, and madrones; at the mouth of the canyon, where it spreads out on top the Delaware Mountains, catclaw, sandbar willow, and juniper predominate.

Conspicuous vegetation² at this station comprises:

*Maiden-hair fern, *Adiantum capillus-veneris* L.

*Spleenwort, *Asplenium resiliens* Kunze

*Yellow pine, *Pinus brachyptera* Engelm.

¹ Contribution from the Texas Cooperative Wildlife Research Unit, College Station, Texas, the Texas Game, Fish, and Oyster Commission, A. & M. College, American Wildlife Institute, and U. S. Biological Survey, cooperating.

² All plants listed from the various collecting stations marked with an asterisk (*) were collected by Davis, Lehmann, Triesch and identified by V. L. Cory of the Texas Agricultural Experiment Station.

- *Juniper, *Juniperus gymnocarpa* (Lemmon) Cory
- *Tall grama, *Bouteloua curtipendula* (Michx.) Torr.
- *Wedge grass, *Sphenopholis obtusata* (Michx.) Scribn.
- *Stink grass, *Eragrostis lugens* Nees
- *Brome grass, *Bromus marginatus* Nees
- *Saw grass, *Cladium jamaicense* Crantz
- *Rush, *Juncus arizonicus* Wiegand
- Datil, *Yucca baccata* Torr.
- Palma, *Yucca macrocarpa* (Torr.) Engelm.
- Sotol, *Dasyllirion leiophyllum* Engelm.
- Lechuguilla, *Agave lecheguilla* Torr.
- *Mountain cottonwood, *Populus angustifolia* James
- *Sandbar willow, *Salix exigua* Nutt., var. *steophylla* (Rhydb.) Schn.
- River walnut, *Juglans rupestris* Engelm.
- *Hop hornbeam, *Ostrya baileyi* Rose
- Mountain white oak, *Quercus grisea* Liebm.
- *Rose, *Rosa mirifica* Greene
- *Cat-claw, *Mimosa biuncifera* Benth.
- *Milkwort, *Polygala rimulicola* Steyermark
Polygala alba Nutt.
- *Dove weed, *Croton fruticulosus* Engelm.
- *Three-seeded mercury, *Acalypha lindheimeri* Muell.
- *Sumac, *Rhus lanceolata* (A. Gray) Britton
- *Mountain maple, *Acer grandidentatum* Nutt
- *Evening primrose, *Oenothera brachycarpa* A. Gray
- *Texas madrone, *Arbutus texana* Buckl.
- *Phlox, *Pblox triovulata* Thurb.
- *Waterleaf, *Nama xylopodum* (Woot & Standl.) C. L. Hitchcock
- *Vervain, *Verbena wrightii* A. Gray
- *Skullcap, *Scutellaria drummondii* Benth.
- *Pennyroyal, *Hedeoma costatum* A. Gray
- *Wild tobacco, *Nicotiana trigonophylla* Dunal
- *Indian paint brush, *Castilleja integra* Gray
- *Bluet, *Houstonia angustifolia* Michx.
- *Honeysuckle, *Lonicera arizonica* Rehder
- *Snowberry, *Symphoricarpos oreophilus* A. Gray
- *Bluebell, *Campanula petiolata* A. DC.

Station 2.—West Dog Canyon. Collecting was done on August 2, 1938, by Davis about 1 mile south of the New Mexico-Texas boundary at an elevation of approximately 6,200 feet. Junipers are the dominant vegetation.

Conspicuous vegetation at this locality comprises nut pine (*Pinus edulis*), juniper (*Juniperus pachyphloea*), and wild plum (*Prunus virens*).

Station 3.—The Bowl, 7,700 to 8,000 feet. Collecting was done by Davis from August 3 to 5, 1938, and by Davis, Cox, Borgfeld, Goodrich, Lehmann, Triesch, and Walker from June 10 to June 22, 1939. Dominant vegetation consists of a mixture of oaks, pines, and firs.

Conspicuous vegetation in The Bowl includes:

- Yellow pine, *Pinus brachyptera* Engelm.
- Limber pine, *Pinus flexilis* James
- Douglas fir, *Pseudotsuga mucronata* (Raf.) Sudw.
- Juniper, *Juniperus gymnocarpa* (Lemmon) Cary
- Brome grass, *Bromus marginatus* Nees
- Mescal, *Agave parryi* Engelm.

- Lechuguilla, *Agave lecheguilla* Torr.
 *Blue-eyed grass, *Sisyrinchium campestre* var. *kansanum* Bicknell
 Hop hornbeam, *Ostrya baileyi* Rose
 *Elm, *Ulmus* sp.
 *Scrub oaks, *Quercus* sp.
 Barberry, *Berberis baematocarpa* (?) Wooton
 Columbine, *Aquilegia longissima* A. Gray
 *Wall flower, *Erysimum alatum* Nutt.
 *Saxifrage, *Fendlera rupicola* A. Gray
 *Saxifrage, *Fendlevella utabensis* (S. Watts) Heller
 Service berry, *Amelanchier florida* (?) Lindl.
 *Apache plume, *Fallugia paradoxa* (D. Don.) Endl.
 *Mountain mahogany, *Cercocarpus montanus* Raf.
 *_____, *Physocarpus monogynus* (Torr.) Coulter
 *Vetch, *Vicia americana* Muhl.
 New Mexican locust, *Robinia neomexicana* A. Gray
 *Buckthorn, *Rhamnus purshiana* DC., var. *betulaefolia* (Greene) Cory
 *Grape, *Vitis arizonica* Engelm.
 *Puccoon, *Lithospermum multiflorum* Torr.
 *Bluebell, *Campanula petiolata* A. DC.

Station 4.—Burned Cabin, 7,200 feet (= Grisham-Hunter camp on U. S. Geol. Survey topographic map). Collecting was done by Davis on August 12 and 14, 1938, and on June 12, 1939. The vegetation is similar to that at station 3, but buckthorn rather than scrub oaks dominates the slopes.

Station 5.—Mouth of Pine Springs Canyon, 5,800 to 6,000 feet. Bear, or Pipe-line, Canyon is about 1 mile north of Pine Springs, hence it is included with this station. Davis collected here August 7 and 15, 1938; Cox and Triesch on June 22, 1939.

Dominant vegetation consists of:

- Juniper, *Juniperus gymnocarpa* (Lemmon) Cory
 Lechuguilla, *Agave lecheguilla* Torr.
 Cat-claw, *Mimosa biuncifera* Benth.
 Texas madrone, *Arbutus texana* Buckl.
 Cane cactus, *Opuntia arborescens* Engelm.
 Greasewood, *Covillea glutinosa* (Engelm.) Rybd.

Station 6.—Frijole, 5,600 feet. Collecting was done by M. G. Greig for the Louisiana State University from May 17 to 21, 1938. All his specimens are labeled as from Frijole, but actually some of them came from The Bowl and other places on top of the mountains. The vegetation near Frijole is dominated by greasewood and catclaw.

PHYSICAL FEATURES OF THE AREA

That part of the Guadalupe Mountains lying in Texas is an indescribably rough mass of faulted and eroded limestone about 45 square miles in area. Much of it consists of exposed rocks, and wherever soil is present it usually is shallow and rocky. In such places as The Bowl, however, the soil is relatively deep.

Elevations vary from 3,600 feet at the western base of the mountains to 8,758 feet at the top of Guadalupe Peak (the highest point in Texas). The mountain range is wedge-shaped, with the apex and high-

est part at the south end, and the Texas part is dissected by four main canyons: Pine Springs, McKittrick, Dog,³ and West Dog, all of which head near the south end of the range. Except for McKittrick, these canyons carry water only during the infrequent periods of heavy rain. Because of the porosity of the soil and the underlying limestone strata, no permanent surface water is found above the 6,500-foot contour, but several natural springs arise at or near the base of the mountains, especially on the eastern side. For the most part, the main springs are fenced off and are not available to the larger native mammals.

SPECIES ACCOUNTS

MYOTIS SP.

Small bats, presumably of this genus, were observed on several occasions in The Bowl, on top of the Guadalupe Mountains, and at a water tank at Pine Springs at the eastern base of the mountains. They were not abroad until well after sunset and repeated attempts to collect specimens were fruitless.

EPTESICUS FUSCUS PALLIDUS YOUNG

PALLID BIG BROWN BAT

1938: 3 ♂, The Bowl, 8,000 feet, August 5; 1 ♂, Burned Cabin, head of McKittrick Canyon, 7,200 feet, August 14; 1 ♂, Pine Springs, 5,800 feet, August 15.

1939: 1 ♂, McKittrick Canyon, 5,200 feet, June 25; 1 ♂, The Bowl, 8,000 feet, June 18.

These bats average considerably paler than specimens of *E. f. fuscus* from eastern Texas (Walker and Trinity counties), and fall within the range of color variation of *pallidus* observed by Engels⁴ in specimens from localities in the Great Basin. Two from The Bowl are light in color, especially on the under parts; one specimen from Pine Springs is nearly as dark as typical *fuscus*.

In size and cranial measurements, however, brown bats from the Guadalupe Mountains are larger than specimens of the species taken in California and Idaho. In fact, in this respect they approach *Eptesicus fuscus miradorensis* (A. Allen) of southern Mexico. They differ from the latter chiefly in lighter coloration. Additional specimens from western Texas and northern Mexico may warrant recognizing the brown bats of that region as subspecifically distinct.

Average and extreme measurements, in millimeters, of our seven specimens are as follows: Total length, 120 (115-125); length of tail,

³ Dog is the same as Big Dog, or East Dog, in this paper; West Dog is synonymous with Little Dog.

⁴ "Distribution of races of the brown bat (*Eptesicus*) in western North America," *Amer. Midland Nat.*, 17, No. 3, 1936: 653-660.

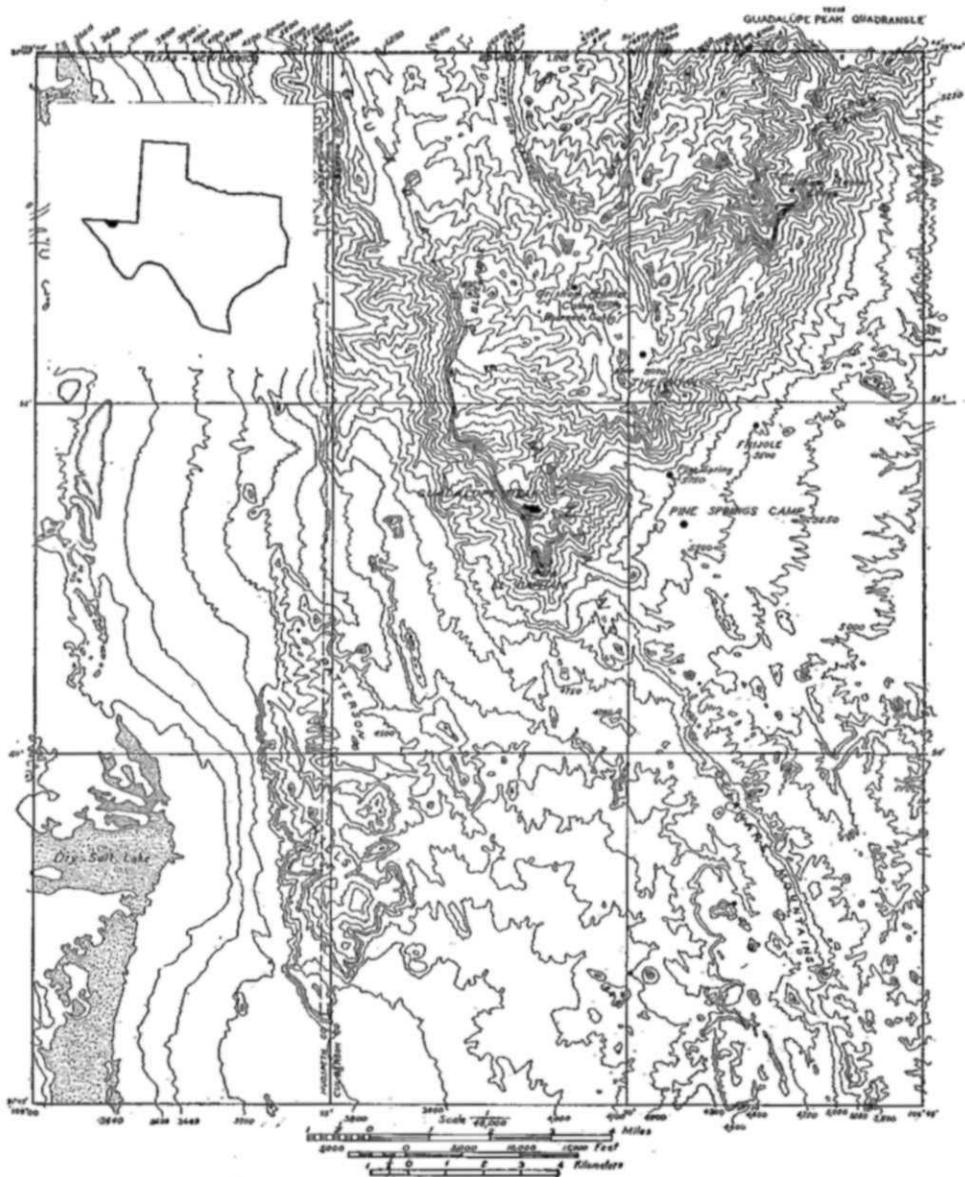


Fig. 1. Map of the Guadalupe Mountain region, adapted from the U. S. Geological Survey topographic chart of the Guadalupe Peak Quadrangle (advanced sheet). Inset shows the relationship of the Guadalupe Mountain region to the remainder of the State of Texas.

46 (44-47); length of hind foot, 12 (11-13); condylobasal length, 17.9 (17.6-18.2); zygomatic breadth, 12.8 (12.5-13.2); greatest cranial breadth, 8.7 (8.4-8.9); least interorbital breadth, 4.5 (4.4-4.7); and width of rostrum (measured between anterior openings of infra-orbital canals), 6.3 (6.2-6.4).

Brown bats were particularly active in The Bowl just at dusk. They seemed to prefer the open timbered meadows for foraging, where they could beat back and forth among the tall pines in search of insects.

CORYNORHINUS RAFINESQUII PALLESCENS MILLER

PALE LUMP-NOSED BAT

1939: 1 ♀, Upper Sloth Cave, west side of mountain, 7,000 feet, August 7.

A group of paleontologists from the University of Nebraska found a small colony of females, each carrying a half-grown young, in the upper of three caves in which is the dung of an extinct sloth. They took three specimens, one of which they kindly presented to me. This is apparently the second record of the occurrence of this bat in Texas. Bailey⁵ records one specimen from East Painted Cave along the Big Bend of the Rio Grande.

ANTROZOUS PALLIDUS PALLIDUS (LECONTE)

PALLID CAVE BAT

Although cave bats have not been taken in the Guadalupe Mountains, the species doubtless occurs at the base of the mountains, particularly on the western side bordering the desert. This bat prefers an arid environment accessible to rocky ledges and caves. I collected one female at a water tank 20 miles east of Van Horn, on July 7; Bailey⁶ reports them as being abundant near Carlsbad, New Mexico, some 30 miles north of our study area.

EUARCTOS AMERICANUS AMBLYCEPS BAIRD

NEW MEXICO BLACK BEAR

1938: 1 skull only (pick-up), The Bowl, 6,000 feet, August 17.

This area is one of the few in Texas in which black bears still remain. According to Elmer Houser, Frijole, Texas, who is familiar with conditions in the Guadalupe Mountains, the number of bears in the area is probably not greater than 25.

In July, 1937, Robert Snow, of the Texas Game, Fish, and Oyster Commission, treed two bears on Blue Ridge, west of The Bowl. One was a black, short-legged, heavy female; the other was a brown, long-legged, rangy male.

In June, 1939, we found numerous signs of bears on the east ridge of

⁵ "Biological survey of Texas," *N. Amer. Fauna*, 25, 1905: 222.

⁶ *Ibid.*, p. 215.

the mountains and in a deep canyon tributary to McKittrick Canyon. Bears are reported to be most abundant in that canyon and on Blue Ridge.

I examined two tanned skins of bears taken at the eastern base of the mountain several years ago. A Mr. Smith, postmaster at Frijole, reported that he killed one bear in 1918 when it was forced off the mountains by a forest fire, and Walter Glover, at Pine Springs, has the second hide which was taken August 19, 1913, on the rim of the mountains about 5 miles southeast of Guadalupe Peak.

BASSARISCUS ASTUTUS FLAVUS RHOADS
RING-TAILED CAT

1939: 1 skeleton only (pick-up), ridge north of The Bowl, 8,300 feet, June 13.

Although we trapped industriously in 1939 for ring-tailed cats, none was taken. Signs—feces and tracks—were abundant on the rocky ledges of the ridges surrounding The Bowl; also, on the cliffs in McKittrick Canyon. Examination of fresh feces revealed that insects constituted a large part of the diet of these cats late in June.

MEPHITIS MEPHITIS VARLANS GRAY
LONG-TAILED TEXAS SKUNK

Although no specimens of the long-tailed Texas skunk were taken, I am reasonably sure that a striped skunk I saw along the creek at the mouth of McKittrick Canyon late in June was of that race. I saw it clearly outlined by the lights of my car. Numerous attempts to find another one failed, although several hog-nosed skunks were observed. Apparently the striped skunk is rare in the Guadalupe.

CONEPATUS MESOLEUCUS MEARNSI MERRIAM
MEARNS HOG-NOSED SKUNK

1939: 1 ♂, Burned Cabin, head of McKittrick Canyon, 7,200 feet, June 12;
2 ♂, 1 ♀, McKittrick Canyon, 5,800 feet, June 20, June 27, and July 6;
3 skulls (pick-ups), The Bowl, 8,000 feet, June.

The hog-nosed is the common skunk of the Guadalupe Mountains. Although it is more abundant at the lower levels, it occurs from the lowest to the highest elevations.

Stomach contents of the specimen taken at Burned Cabin consisted almost entirely of insects, chiefly small brown beetles.

Compared with specimens of *mearnsi* from Kerr County, near the type locality, the Guadalupe Mountains specimens differ in the following respects: *Interorbital breadth* less; *width of rostrum, measured just anterior to the canine teeth*, less; *mastoidal and jugular processes* larger.

UROCYON CINEREOARGENTEUS SCOTTI MEARNS

ARIZONA GRAY FOX

1939: 1 ♀, The Bowl, 8,200 feet, June 22; 1 ♂, Bear (Pipe-line) Canyon, 1 mile south of Frijole, 6,000 feet, June 24; 1 ♂, McKittrick Canyon, 5,300 feet, July 6.

The gray fox apparently is abundant in the Guadalupe Mountains. We observed tracks and feces in practically all the trails, both on top of the mountains and along the eastern base. I saw a gray fox about an hour after dark, July 6, on the road at Pine Springs, and another the same night on the flat about two miles east of the mouth of McKittrick Canyon.

Examination of several droppings indicated that the foxes were feeding largely on rabbits and meadow mice. Triesch shot the specimen taken at Bear Spring early in the morning while it was stalking a cottontail.

LYNX RUFUS BAILEYI MERRIAM

PLATEAU BOBCAT

1939: 1 ♂, The Bowl, 8,200 feet, June 22.

Bobcats occur in limited numbers high in the Guadalupe Mountains; they are common in the foothills and lower canyons. I saw the skins of two bobcats that were killed in the winter of 1938-39 by Robert Snow in an effort to reduce predation on mountain sheep. He reported to me that they were common, even on top of the mountains, in winter.

Cursory examination of droppings indicated that the bobcats in The Bowl were living late in June almost entirely upon small mammals, especially rabbits.

FELIS CONCOLOR AZTECA MERRIAM

MEXICAN MOUNTAIN LION

Mountain lions are of rare occurrence in the Guadalupe Mountains. In the summer of 1938 Robert Snow hunted diligently for lions in this area without finding any indication of their presence. I examined the hide of a mountain lion killed by "Uncle" Joe Plowman several years ago at the Burned Cabin in upper McKittrick Canyon. According to Uncle Joe, who has lived in these mountains for more than twenty years, mountain lions never have occurred in any numbers in the Guadalupe Mountains.

CITELLUS VARIEGATUS GRAMMURUS (SAY)

GRAY ROCK SQUIRREL

1938: 2 ♂, 2 ♀, Frijole, about 5,600 feet, May 17-21 (L.S.U. collection); 1 ♀, McKittrick Canyon, 5,900 feet, August 1; 1 skull only, West Dog Canyon, 5,000 feet, August 3.

1939: 2 ♀, McKittrick Canyon, 5,300 feet, June 27, July 6; 1 ♀, 2 miles east of the mouth of McKittrick Canyon, 5,000 feet, June 27.

Although the gray rock squirrel is more common in the Guadalupe Mountains,

at lower altitudes, I have seen it on top of the north rim of North McKittrick Canyon near the New Mexico-Texas line at an elevation well above 7,000 feet. Also, it occurs above 7,000 feet on the east side of the Guadalupe above Pine Springs. In both instances the habitat was similar to that at the lower altitudes, consisting of broken, jumbled rocks or cliffs, and more or less xerophytic vegetation. I have no record of the occurrence of this rock squirrel on top of the mountains in places where conifers are the dominant vegetation.

The climbing ability of the gray rock squirrel was clearly demonstrated on August 1, 1938, when I saw one ascend the vertical flowering stalk of a century plant (*Agave wislizeni*) and sit on the lowest horizontal limb 15 feet from the ground while it fed on the fruit of the plant. Apparently both the thick "husks" of the pods and the seeds are eaten.

CITELLUS INTERPRES (MERRIAM)
TEXAS ANTELOPE GROUND SQUIRREL

1938: 1 ♀, Frijole, about 5,600 feet, May 20 (L.S.U. collection).

1939: 1 ♂, Pine Springs Camp, 5,300 feet, January 4 (L.S.U. collection); 1 ♀, mouth of McKittrick Canyon, 5,000 feet, June 26.

In the Guadalupe, the Texas antelope ground squirrel is apparently limited to an arid, desert range. At Pine Springs, where it seemed most common, it preferred areas dominated by cholla cactus. The ground squirrels frequently used these plants both as food (flowering and fruiting parts) and lookout stations. In habits, the Texas antelope ground squirrel is much more shy than its western relative, *Citellus leucurus leucurus*. As evidenced by the capture of a specimen at Pine Springs in midwinter (January 4), this ground squirrel is more or less active throughout the year. Howell⁷ records a specimen from the south end of the Guadalupe Mountains.

CYNOMYS LUDOVICIANUS ARIZONENSIS MEARN
ARIZONA PRAIRIE DOG

No specimens of the Arizona prairie dog were collected within the area here reported on, but a small colony was seen at the base of "The Nipple," a conical hill just north of Frijole, and another on the west side of the new highway 3 miles north of "The Nipple." A third colony was found near the entrance to Pine Springs Canyon. These rodents were not observed in the Guadalupe Mountains proper; apparently they are restricted to the lower elevations at the base of the mountains.

In past years prairie dogs were nearly eradicated by means of poison

⁷ "Revision of the North American ground squirrels with a classification of the North American Sciuridae," *N. Amer. Fauna*, 56: 181.

in much of Trans-Pecos Texas, but they are coming back. A group of old burrows was found at the mouth of McKittrick Canyon.

EUTAMIAS CINEREICOLLIS CANIPES BAILEY

GRAY-FOOTED CHIPMUNK

1938: 1 ♀, Guadalupe Mountains, 8,000 feet, May 21 (L.S.U. collection); 1 ♂, Guadalupe Mountains, 8,000 feet, May 18 (L.S.U. collection); 5 ♀, 2 ♂, The Bowl, 8,200 feet, August 3-5; 1 ♀, McKittrick Canyon, 5,900 feet, August 1.

1939: 4 ♀, 9 ♂, The Bowl, 8,000 feet, June 10-20; 1 ♀, McKittrick Canyon, 5,300 feet, July 6.

Chipmunks occur in Texas only in the Guadalupe and Sierra Diablo ranges. In the Guadalupe they are more numerous in areas in which coniferous trees predominate, although they are found sparingly below 7,000 feet, where they are associated chiefly with rocky outcroppings.

The presence of chipmunks and the complete absence of tree squirrels (*Tamiasciurus*) here (even as fossils), are further evidence that red squirrels extended their range southward after desert conditions had become established in the Southwest.⁸ The nearest known locality where red squirrels occur is in the Sacramento Mountains in New Mexico. The "small tree squirrel" to which Bailey⁹ refers, doubtless is the chipmunk, which is as much at home in the trees as it is on the ground.

The chipmunks were most active early in the morning, shortly after sun-up, at which time they did most of their feeding. In The Bowl they showed a definite preference for down timber, often building their nests in cavities in such trees. One nest was under the ground among the roots of a decaying stump.

Specimens indicate that the summer molt takes place in June and July, occurring earlier in males than in females. Specimens taken in August were in fresh pelage.

THOMOMYS BOTTAE GUADALUPENSIS GOLDMAN

GUADALUPE POCKET GOPHER

1938: 3 ♀, 2 ♂, Burned Cabin, head of McKittrick Canyon, 7,500 feet, August 12-14; 1 ♀, mouth of Pine Springs Canyon, 5,800 feet, August 7.

Pocket gophers are by no means common in the Guadalupe Mountains, and their occurrence is extremely scattered. In The Bowl, for example, I searched four days for them in 1938 without finding a single mound. In 1939, two fresh burrows were found, but they were in such stony soil that traps could not be properly set. The largest colony I found was at the Burned Cabin in McKittrick Canyon. A diligent search in 1939 in the same area trapped in 1938 revealed no fresh mounds. Evidently pocket gophers travel about considerably more than

⁸ W. B. Davis. "The recent mammals of Idaho," Caxton Printers, 1939: 1-400.

⁹ "Mammals of New Mexico," *N. Amer. Fauna*, 53, 1931: 80.

they are usually thought to do. In many instances, one can search all day on top of the mountains and find only one or two fresh mounds, and these usually remote from each other. Most of the Guadalupe, except on top, is too rocky for pocket gophers.

The Guadalupe pocket gopher is restricted largely to the poorer, thinner soils on the mountains; the deeper soils at the base of the mountains are occupied by the larger *Cratogeomys*. At Pine Springs both species were found together in a small orchard where the soil is deep. Above Pine Springs only *Thomomys* occurs; below it, only *Cratogeomys*.

The Guadalupe pocket gopher feeds to a large extent on the succulent underground parts of lechuguilla, mescal, sotol, and several cacti. In many instances the pocket gophers consume the entire underground parts, thus causing the death of the plant. Because both deer and elk eat the more tender parts of these same plants, pocket gophers, if abundant, might seriously compete with those animals.

CRATOGEOMYS CASTANOPS LACRIMALIS NELSON AND GOLDMAN
CHESTNUT-FACED POCKET GOPHER

1938: 1 ♀, Mouth of Pine Springs Canyon, 5,800 feet, August 7.

This large pocket gopher, as pointed out in the discussion of *Thomomys bottae guadalupensis*, is restricted entirely to the deep alluvial soils at the base of the mountains. It is the common pocket gopher of the desert areas. The only specimen collected in the area here reported on contained two embryos, 10 mm. in rump-crown length, one in each horn of the uterus.

PEROGNATHUS HISPIDUS PARADOXUS MERRIAM
KANSAS POCKET MOUSE

Bailey¹⁰ records one specimen from the head of Dog Canyon at 6,800 feet, just below the timbered area.

DIPDOMYS SPECTABILIS BAILEYI GOLDMAN
BANNER-TAILED KANGAROO RAT

Several mounds, thought to have been constructed by the banner-tailed kangaroo rat were found on the flats at the mouth of McKittrick Canyon. The animal is far more common, however, at lower elevations, 3,000 to 5,000 feet whence specimens are available.

REITHRODONTOMYS MEGALOTIS MEGALOTIS (BAIRD)
BIG-EARED HARVEST MOUSE

1939: 2 ♂, The Bowl, 8,000 feet, June 11 and 18.

This small harvest mouse is apparently of rare occurrence in the Guadalupe Mountains. Bailey¹¹ reports a single specimen from the "southern part" of the mountains. Persistent trapping in 1939 yielded

only two specimens. One was taken on a rocky hillside beneath a scrub oak; the other was trapped in the runway of a meadow mouse in a meadow. These specimens are grayer than one from Cochise County, Arizona.

PEROMYSCUS LEUCOPUS TORNILLO MEARNS

WHITE-FOOTED MOUSE

1938: 1 ♀, Frijole, about 5,600 feet, May 21 (L.S.U. collection).

In this region this species is apparently restricted to the desert areas abutting the mountains. One hundred trap-nights in McKittrick Canyon, at an elevation of about 5,300 feet, where the vegetation consists largely of deciduous trees and shrubs, yielded only *Peromyscus boylei rowleyi*. *P. l. tornillo* is the common mouse in the desert, and *P. b. rowleyi* of the mountains. No indication of overlapping ranges was noted.

PEROMYSCUS BOYLEI ROWLEYI (ALLEN)

ROWLEY WHITE-FOOTED MOUSE

1938: 3 ♀, 3 ♂, The Bowl, 8,000 feet, August 3; 3 ♀, McKittrick Canyon, 5,300 feet, November 1.

1939: 8 ♀, 9 ♂, The Bowl, 8,000 feet, June 11-22.

In 1938 and 1939 we found these mice in abundance on top of the mountains (8,000 to 8,300 feet) among the pines and firs. In fact, they were exceeded in abundance only by meadow mice. They seemed to be restricted to no particular habitat, although 14 of the 23 specimens taken were trapped beside fallen trees (pines and firs). Four were caught in traps set in a grassy meadow; one was taken under a juniper; and 4 were trapped in a cabin. In McKittrick Canyon they seemed to prefer rocky areas.

The breeding season extends at least from June through August.

Records of pregnancy of females taken in The Bowl are as follows:

Date	Length of embryos (Rump-crown)	Number of embryos
June 20	3
June 22	13 mm.	4
August 3	5 mm.	5
August 3	10 mm.	5
August 3	20 mm.	3

These data suggest at least two breeding seasons a year in this region.

NEOTOMA MEXICANA MEXICANA BAIRD

MEXICAN WOOD RAT

1939: 1 ♂, The Bowl, 8,000 feet, June 19.

Bailey¹² reports the Mexican wood rat to be a common inhabitant of

¹⁰ *Op. cit.*, p. 137.

¹¹ *Ibid.*, p. 106.

¹² *Ibid.*, p. 114.

the higher parts of the Guadalupe Mountains, but we were unable to find many used dens. The only specimen we collected, a young of the year, was taken in a log cabin.

NEOTOMA ALBIGULA ALBIGULA HARTLEY
WHITE-THROATED WOOD RAT

1938: 1 ♂, Frijole, about 5,600 feet, May 19.

In the vicinity of the Guadalupe Mountains the white-throated wood rat seems to be restricted to the middle altitudes. *N. mexicana* is the wood rat of the higher elevations, whereas a third species, *Neotoma micropus canescens* Allen, inhabits the "black brush" deserts. The white-throated wood rat has habits similar to those of *mexicana*; both occur in rocky situations.

MICROTUS MEXICANUS GUADALUPENSIS BAILEY
GUADALUPE MEADOW MOUSE

1938: 5 ♀, 3 ♂, The Bowl, 8,000 feet, August 5.

1939: 16 ♀, 6 ♂, The Bowl, 8,000 feet, June 11-12.

We did not find these small microtines as common in the Guadalupe Mountains as one might expect from reading Bailey's account.¹³ We saw inhabited colonies at only three places. One was in an open grassy meadow in The Bowl, where all our specimens were taken; another was on a grassy slope on the side of a ridge one mile south of The Bowl; and the third was in a grassy flat at the convergence of two creeks below Burned Cabin in the upper part of McKittrick Canyon. I trapped at the last-mentioned place in 1938 without success.

I gained the impression that these meadow mice spend much of their time underground where they have their nests. They showed also a decided preference for meadows in which there was down timber. There they burrow just under the surface of the ground, using the logs for cover and constructing their nests under them. We had considerably more success in trapping the mice by placing traps in runs or at feeding stations near down logs than in runways in the grass. More than 70 percent of our specimens were taken in such places; others were caught in runways in the grass, and one was captured on a hillside among rocks. About half of them were caught during the day, practically all before 10:00 A.M. or after 3:00 P.M. The animals seemed to be inactive during the middle of the day.

Our records indicate at least three litters of young a year. Early in June and also early in August pregnant females and half-grown young were captured in the same areas. Embryo counts ranged from 2 to 4, with 4 as the mode.

¹³ *Ibid.*, p. 118.

ERETHIZON EPIXANTHUM COUESI MEARNES

ARIZONA PORCUPINE

1938: (skin only), Burned Cabin, head of McKittrick Canyon, 7,500 feet, (killed by "Uncle" Joe Plowman about 1929).

1939: 1 ♂, The Bowl, 8,000 feet, June 18.

Porcupines are by no means common in the Guadalupe Mountains, but many of the conifers in The Bowl bore gnawings of these rodents. In McKittrick Canyon I found in the rocks two unoccupied dens that at some time in the past had been used for several months, as evidenced by the abundance of droppings and the porcupine odor.

In June and July, 1938, Robert Snow treed two porcupines in the timber on top of the Guadalupe. In August of the same year one of his dogs "contacted" a porcupine in the bottom of McKittrick Canyon and came into camp with its mouth full of quills. These data and our records of capture indicate that porcupines occur at practically all elevations in these mountains, but apparently in greater numbers above 7,000 feet.

I have not been able to compare our specimens with typical *couesi*, but the small hind foot, the shape and size of the rostrum and nasal bones, the large size of the bullae, and the light yellowish color of the pelage agree with the description of that race.¹⁴ Comparative material is needed, however, before the identity of the western Texas porcupine can be determined with any degree of certainty.

LEPUS CALIFORNICUS TEXIANUS WATERHOUSE

TEXAS JACK RABBIT

1939: 1 ♀, Mouth of McKittrick Canyon, 5,000 feet, June 26.

Jack rabbits were abundant on the "black brush" flats at the base of the Guadalupe, where, it was reported, they constitute the chief food of coyotes and eagles. They are not restricted to the lowlands, however. In June, 1939, several of our party saw jack rabbits in The Bowl, at 8,000 feet, where they lived in association with pines and firs. Efforts to collect a specimen there were unsuccessful.

SYLVILAGUS AUDUBONI CEDROPHILUS NELSON

CEDAR BELT COTTONTAIL

1939: 1 ♀, Mouth of McKittrick Canyon, 5,000 feet, June 26.

Cottontails were abundant in the lower parts of the Guadalupe. I saw dozens of them at Pine Springs, West Dog Canyon, and along the road at the east base of the mountains. In West Dog Canyon they took refuge in thick clumps of juniper and wild plum; near Frijole they

¹⁴ M. H. Swenk. "On a new subspecies of porcupine from Nebraska," *Univ. of Nebr. Studies*, 16, Nos. 1 and 2, 1916: 115-125.

used prairie dog burrows as hiding places. At Bear Spring one of our party (Triesch) watched a fox stalk a cottontail. The female we collected carried three embryos 35 mm. in rump-crown length.

SYLVILAGUS ROBUSTUS (BAILEY)

DAVIS MOUNTAINS COTTONTAIL

1938: 1 ♀, The Bowl, 8,000 feet, May 19 (L.S.U. collection).

1939: 1 young, The Bowl, 8,000 feet, June 11.

This large cottontail is one of the most secretive of rabbits. On numerous occasions I made special efforts to collect a specimen in The Bowl only to be rewarded by the flash of a white rump disappearing among the close-growing young trees. Unlike other cottontails of my acquaintance, this species seems to be restricted to areas in which conifers predominate. In the Guadalupe we found it only in The Bowl, where we estimated the population to be approximately 50 individuals. No explanation comes to mind why they are not so numerous as the lowland species. One of our specimens, collected June 11, was a young of the year.

CERVUS CANADENSIS NELSONI BAILEY

ROCKY MOUNTAIN ELK

The Merriam elk, native to the Guadalupe Mountains, was extirpated before 1900. In 1928 Judge J. C. Hunter and his associates imported 44 elk from the northern Rocky Mountain region and released them in McKittrick Canyon. They multiplied rapidly and have now extended their range to nearly all parts of the mountains. The estimated population in 1938 was 400.

The elk seem partial to the higher parts of the Guadalupe in spite of the scarcity of water at those altitudes. I have observed them in The Bowl, on Blue Ridge, on the north rim of North McKittrick Canyon, at Burned Cabin near the head of McKittrick Canyon, and near the mouth of McKittrick Canyon. Evidence of their presence can be found in nearly every accessible place in the mountains. In a number of instances I found their beds and dung in almost inaccessible caves. Seemingly they are sure-footed as deer.

In August, 1938, I saw several young of the year in The Bowl; in June, 1939, none was seen. Evidently the young are born in July.

We found that elk feed a great deal on the tender, juicy, flowering stalks of sotol (*Dasyllirion leiophyllum*) and on the basal juicy parts of the leaves of mescal (*Agave parryi*). These plants doubtless provide them with water, which compensates in part for the scarcity of available free water. They also feed on the same plants utilized by mule deer (see list under same); hence considerable competition for food will

doubtless arise between these two species if the range becomes heavily populated.

ODOCOILEUS HEMIONUS CANUS MERRIAM
GRAY MULE DEER

1939: 2 ♀, McKittrick Canyon, 5,300 feet, June 27; 1 ♀ (skull only), The Bowl, 8,000 feet, June 13.

Hunters in the Trans-Pecos claim that the mule deer in the Guadalupe Mountains are different from those in the Big Bend region. I have been unable to determine to my satisfaction that this is true, but if they are different, the deer in the Guadalupe probably should be referred to *O. b. macrotis* (Say).

In the Guadalupe the deer occur commonly from the lowest canyons to the highest peaks. At The Bowl we found them in numbers on the surrounding ridges, particularly in places covered with dense growths of scrub oaks, buckthorn, and deer brush.

Cox and Walker studied in some detail the food habits of the gray mule deer in June. Briefly, they found that a large number of plants were utilized, especially the leaves of dwarf oaks, serviceberry, mountain mahogany, buckthorn, and deer brush. Also, they found where deer, and elk as well, had pawed out and eaten the succulent basal parts of the leaves of mesquite. I chewed some of these leaves and was surprised at the high water content. Apparently the presence of this plant on top of the mountains where no free water is available permits elk, deer, and mountain sheep to remain there with little inconvenience.

At the time of our visit—June and July—no fawns were seen. The specimen we collected June 27 contained a nearly full-term fetus.

OVIS CANADENSIS TEXIANUS BAILEY
TEXAS BIGHORN

Not more than 25 bighorns are thought to be in the Guadalupe Mountains. In June, 1939, Garrett saw three rams on the east rim above Frijole; Robert Snow has observed them near El Capitan, on the north rim of McKittrick Canyon, and on the west rim of the mountains near Guadalupe Peak.

Davis and Taylor¹⁵ have reported on the Texas bighorn, to which article the reader is referred for additional information.

Walter Glover, Pine Springs, has the heads of a male and a female taken January 24, 1909, on Guadalupe Peak, both of which I had the privilege of examining.

¹⁵ "The bighorn sheep of Texas," *Jour. Mammal*, 20, 1939: 440-455.