

Mammals of El Chicote in the Sierra de los Ajos, Sonora, Mexico

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Abstract--The Area de Protección de Flora y Fauna (APFF) Bavispe is one of the oldest protected areas in Mexico (decreed in 1936-39). It was created to protect eight sky island mountain ranges, of great biological diversity in high elevation areas, separated by lowland valleys with desert grasslands and foothills thornscrub in northeastern Sonora. Sierra Los Ajos is part of APFF Bavispe Division 4. El Chicote is in the middle of the Sierra Los Ajos at 35.2 airline kilometers west-northwest of Fronteras. Elevations range from 1,928 to 2,206 m. Three old mine pits in the area have a high probability of being exploited in the future. This project described the current ecology of the site. The site was visited in June, July, September, and November 2017. The vegetation is pine-oak forest on rocky mountain sides and in canyons, the runoff from this site feed the Bavispe river basin. The flora was studied on seven strategically located vegetation quadrants and through photography. Wildlife cameras were used to document nocturnal mammals. A total of 50 species of animals were identified from camera images and field observations. Six of them have protected status in the NOM-059-SEMARNAT-2010, the Mexican endangered species law, including the mammals *Choeronycteris mexicana*, *Leopardus pardalis*, *Sciurus arizonensis*, and *Ursus americanus*.

INTRODUCTION

The Madrean Archipelago between the Sierra Madre Occidental and the Mogollon Rim in central Arizona contains 55 isolated island mountain ranges or complexes of several ranges connected by oak woodland corridors (Van Devender et al. 2013a). These Sky Islands crowned with oak woodland or pine-oak forest emerge from lowland 'seas' of desert grassland, foothills thornscrub, or tropical deciduous forest. Since 2009, the Madrean Archipelago Biodiversity Assessment program at Sky Island Alliance, and the Madrean Discovery Expeditions program at GreaterGood.org have documented the biodiversity of 15 Sky Islands Region in Sonora. In this paper, we summarize the mammal fauna documented by wildlife camera images in the *El Chicote* area in Sierra Los Ajos, Fronteras, Sonora.

Protection for the Sierras Los Ajos, Buenos Aires, and la Púrica began with a presidential decree in 1936. In 1939, it was re-enacted and expanded by President Lázaro Cárdenas under the name of Reserva Forestal Nacional y Refugio de Fauna Silvestre Ajos - Bavispe. Biotic communities in Sierra Los Ajos include mixed-conifer forest, pine-oak forest, montane meadows and grasslands, chaparral, oak woodland, and riparian forest. (Fishbein et al. 1995). In May 2017, the protected area was recategorized and renamed as Área de Protección de Flora y Fauna APFF Bavispe (DOF 2017).

STUDY AREA

The *El Chicote* (30.93528°N -109.92389°W) study area in the Sierra los Ajos is ca. 35.2 km (56.3 mi) by air northwest of Fronteras (Figure 1). There are three old mine shafts, which currently have a high probability of being exploited.

The vegetation of *El Chicote* is a second-generation pine-oak forest recovering from a 2013 forest fire on rocky slopes and in canyons at 1,928 to 2,206 m [6,555-7,237 ft.] elevation. The east slope of the Sierra Los Ajos drains into Arroyo Coquiárichi and the Río Cabullona, northern tributaries of the Río Bavispe-Yaqui system.

METHODS

El Chicote was visited in June, July, September, and November 2017. Wildlife cameras were placed at ten stations in the area, six in June and four in July. Both still image and video cameras were placed at each station. Scoutguard and Bushnell cameras were used. No type of bait was used during the procedure. In September, batteries and SD memory

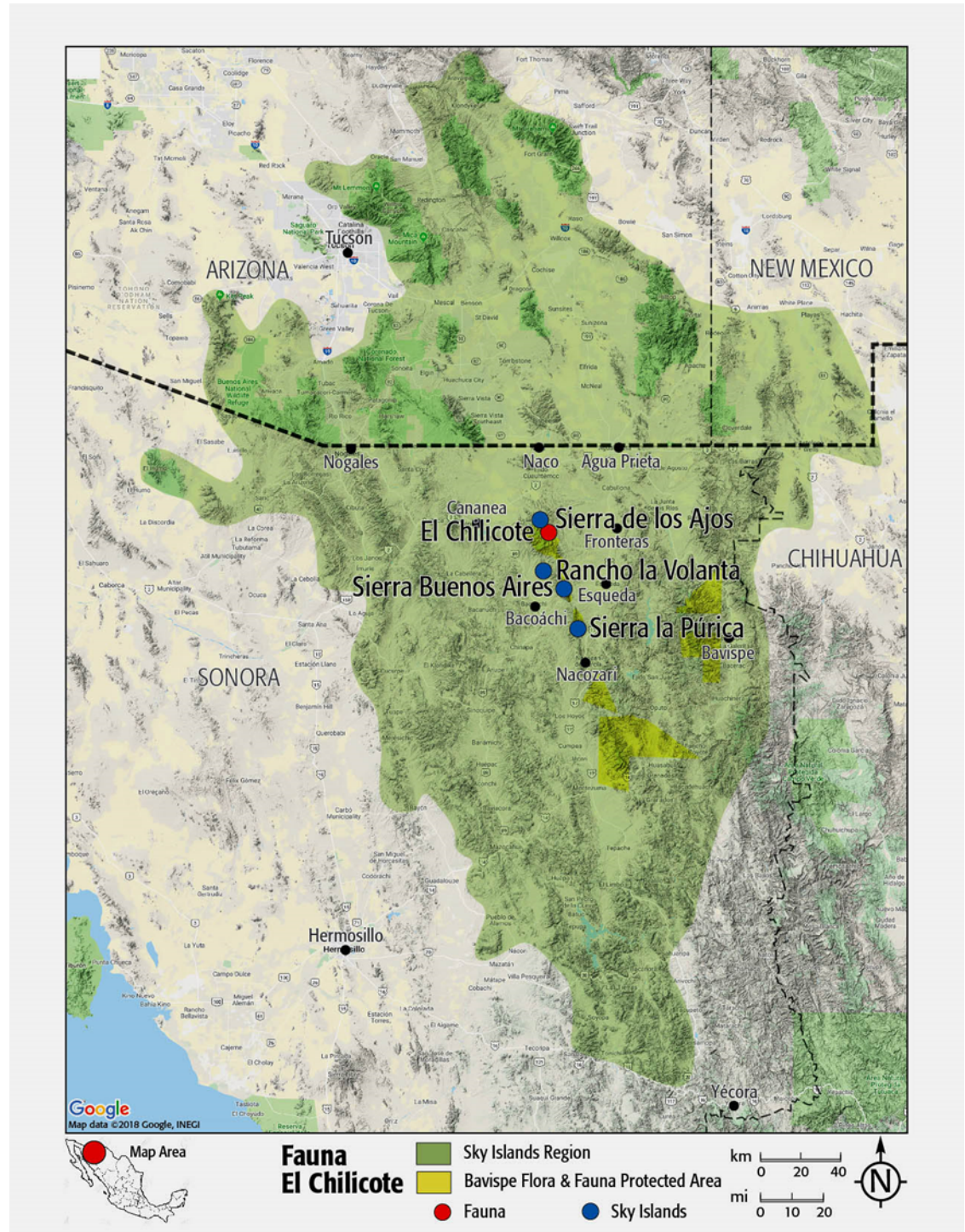


Figure 1. Map of El Chicote, Sonora, Mexico, with relevant localities.

cards were replaced for every camera. The cameras were removed in November. Animals were also observed and photographed during the field trips.

Records and species identified from the camera images and observed are publicly available online in the Madrean Discovery Expeditions database (madreandiscovery.org). Wildlife monitoring records from APFF Bavispe-Sierra de los Ajos are in the Bavispe National Flora and Fauna Protected Area database (accessible in the MDE database, madreandiscovery.org).

RESULTS

To the date, a total of 48 species of fauna has been identified in the area, from wildlife camera images and field observations. This includes 16 mammals, 10 birds, 5 reptiles, and an amphibian and 16 invertebrates. With the use of wildlife cameras, 73 fauna records were described (considering for each station only one record per species) from 20 species including 14 mammals, 5 birds, and a butterfly. The mammals include one marsupial and 15 placental mammals in 11 families and 16 genera and species (Tables 1a and 1b). Felidae (cats) was represented by three species, followed by Mephitidae (skunks) and Procyonidae (ringtail, coatimundi) with two species. The cameras are efficient at capturing medium to large mammals. Most of the species recorded were medium-sized, with white-tailed deer (*Odocoileus virginianus*), mountain lion (*Puma concolor*), black bear (*Ursus americanus*) and collared peccary (*Pecari tajacu*) being the larger taxa while; North American opossum (*Didelphis virginiana*), Arizona gray squirrel (*Sciurus arizonensis*), Mexican long-nosed bat (*Choeronycteris mexicana*), and Townsend's big-eared bat (*Corynorhinus townsendii*) were the smaller mammals registered. Two bat species, from different families (Phyllostomidae, Vespertilionidae) were the only flying mammals identified.

The most common species photographed were white-tailed deer, gray fox, Arizona gray squirrel, eastern cottontail (*Sylvilagus floridanus*), and skunks (*Conepatus leuconotus* and *Mephitis mephitis*). Black bear was photographed at five of the ten stations, including solitary individuals and females with cubs. Native cats included mountain lion (four stations), bobcat (*Lynx rufus*; three stations), and a single ocelot (*Leopardus pardalis*).

Mammals in the fauna are mostly omnivorous (eight species), three herbivores, one insectivore and one nectarivore. Cats (Felidae) are the only relatively strict carnivores. The only photographs (2) of mammals feeding on prey were gray foxes eating eastern cottontails. Ringtails and opossums were rarely photographed. Jaguars (*Panthera onca*) were photographed in 2009, 2012, and 2013, less than 3 km [1.9 mi] south of El Chilicote in the APFF Bavispe monitoring program (Madrean Discovery Expedition Database).

DISCUSSION

The *El Chilicote* mammal fauna with 16 species is 13% of the mammal fauna of Sonora (Castillo-Gómez et al. 2010). All of the species also occur in Arizona. We consider the fauna to be a typical of the upland Sky Island mountain ranges. Four species have protected status in the NOM-059-SEMARNAT (2010), the Mexican endangered species law, including *Leopardus pardalis* (Figure 2), and *Ursus americanus* (Peligro de extinción [Endangered]) (Figure 3), and *Choeronycteris mexicana* (Figure 4) and *Sciurus arizonensis* (Amenazada [Threatened]) (Figure 5). Ocelot also has Endangered protection status under the Endangered Species Act in the United States.

Biological inventories help assess natural resources for sustainable use and establish a basis for selecting indicator species that determine the health of the natural area to carry out monitoring programs (Kremen et al. 1993). Based on our results we conclude that the *El Chilicote* area is in good condition and recovering well from the 2013 forest fire. Attempts to explore and begin new mineral extraction are important potential environmental threats to the diverse fauna presently using the habitat.



Figure 2. *Leopardus pardalis* - Peligro de extinción [Endangered] – STATION 5



Figure 3. *Ursus americanus* - Peligro de extinción [Endangered] – STATION 5



Figure 4. *Choeronycteris mexicana* - Amenazada [Threatened] – I.Ochoa – El Chilicote - 10-Sept-17



Figure 5. *Sciurus arizonensis* - Amenazada [Threatened] – STATION 5

Table 1a. Mammals observed and identified from wildlife camera images and field observations in the Sierra de los Ajos, Sonora, Mexico.

Family	Scientific Name	Common name	Nombre Español
Canidae	<i>Urocyon cinereoargenteus</i>	gray fox	zorrita gris
Cervidae	<i>Odocoileus virginianus</i>	white-tailed deer	venado cola blanca
Didelphidae	<i>Didelphis virginiana</i>	North American opossum	tlacuache, zarigüeya
Felidae	<i>Leopardus pardalis</i>	ocelot	ocelote, tigrillo
Felidae	<i>Lynx rufus</i>	bobcat	gato montés, cola pochi
Felidae	<i>Puma concolor</i>	mountain lion,	puma
Leporidae	<i>Sylvilagus floridanus</i>	eastern cottontail	conejo serrano
Mustelidae	<i>Conepatus leuconotus</i>	hog-nosed skunk	zorrillo espalda blanca
Mustelidae	<i>Mephitis mephitis</i>	striped skunk	zorrillo rallado
Phyllostomatidae	<i>Choeronycteris mexicana</i>	Mexican long-tongued bat	murciélago trompudo
Procyonidae	<i>Bassariscus astutus</i>	ringtail	cacomixtle
Procyonidae	<i>Nasua narica</i>	coatimundi	chulo, cholugo, solitario
Sciuridae	<i>Sciurus arizonensis</i>	Arizona gray squirrel	ardilla gris
Tayasuidae	<i>Pecari tajacu</i>	collared peccary	jabalí
Ursidae	<i>Ursus americanus</i>	black bear	oso negro
Vespertilionidae	<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	murciélago orejón de Townsend

There are several basic references for the mammals of Sonora, beginning with William Caire's 1978 doctoral dissertation at the University of New Mexico on 'The Distribution and Zoogeography of Mammals of Sonora, Mexico'. Caire's (1997) state mammal checklist was updated by Castillo-Gómez et al. (2010). Ceballos and Oliva's (2005) book "Los Mamíferos Silvestres de México" contains extensive descriptions on the mammal species in Sonora. Schwalbe and Lowe (2000) provided a list of the mammals in their paper on the amphibian and reptiles of the Sierra de Álamos and vicinity in southern Sonora. The vegetation in this area is tropical deciduous forest below oak woodland and pine-oak forest. General biotic inventories were reported in the Sierra de los Ajos (Alberti et al. 1998) and the Ciénega de Saracachi (Van Devender et al. 2013b), but wildlife cameras were not used, limiting mammal observations. Alberti et al. (1998) documented 13 mammal species, from which eight are listed in this paper, including Arizona gray squirrel, black bear, collared peccary, cottontail rabbit, gray fox, mountain lion, striped skunk, and white-tailed deer. Coronel-Arellano et al. (2016) summarized wildlife camera results from the Sierras Los Ajos, La Madera, and El Tigre in APFF Bavispe and Sierra

San Luis. In the Sierra Los Ajos they reported 15 species of mammals from 28 cameras left in the field for 39 days. They did not report the collared peccary nor North American opossum from Sierra de Los Ajos.

Table 1b. Mammals observed and identified from wildlife camera images and field observations
Elsewhere in the Sierra de los Ajos (12)

Family	Scientific Name	Common name	Nombre Español
Canidae	<i>Canis latrans</i>	coyote	Coyote
Cricetidae	<i>Neotoma albigula</i>	white-throated, packrat	tori, rata- cambalachera garganta blanca
Cricetidae	<i>Peromyscus eremicus</i>	cactus mouse	ratón de cactus
Felidae	<i>Panthera onca</i>	jaguar	tigre, jaguar
Leporidae	<i>Lepus alleni</i>	antelope jackrabbit	liebre antílope
Mustelidae	<i>Mephitis macroura</i>	hooded skunk	zorillo encapuchado
Mustelidae	<i>Spilogale gracilis</i>	spotted skunk	zorillo moteado
Procyonidae	<i>Procyon lotor</i>	raccoon	mapache, batepí
Sciuridae	<i>Otospermophilus variegatus</i>	rock squirrel	ardilla de roca
Vespertilionidae	<i>Eptesicus fuscus</i>	big brown bat	murciélago-moreno Norteamericano
Vespertilionidae	<i>Lasiurus blossevillii</i>	desert red bat	murciélago cola peluda de Blossevil
Vespertilionidae	<i>Lasiurus cinereus</i>	hoary bat	murciélago cola peluda canoso

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