



**ECOLOGY OF MOUNTAIN LIONS  
IN THE DAVIS MOUNTAINS:  
ASSESSING IMPACTS ON  
PREY POPULATIONS**

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# MOUNTAIN LIONS IN TEXAS

**W**hether you call them mountain lions, cougars, panthers, or pumas, you can't help but respect them.

That admiration stems from the fact that mountain lions are extremely elusive, have the ability to take prey up to 5 times their weight, occur at extremely low densities, and are solitary animals.

Mountain lions once occurred throughout Texas, but today their distribution is limited to the southern and western portions of the state. Mountain lions are classified as nongame animals with no restrictions on harvest in Texas.



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**Mountain lions once occurred throughout Texas. Our understanding of the role mountain lions play in regulating prey populations and their general population dynamics is incomplete.**

Because of their elusive behavior, our knowledge on mountain lion ecology is still lacking. Most information on mountain lions comes from studies conducted in western states or from federal and state lands, where harvest restrictions are in place.

We designed a project to address 2 fundamental questions: (1) "Is mountain lion predation a limiting factor for prey in the Davis Mountains?" and (2) "Are demographic patterns for mountain lions on private lands different from previous studies on public lands?"

Our goal is to investigate the ecology of mountain lions in the Davis Mountains as it relates to the questions outlined above. To meet this goal, we are researching the following objectives:

- Collect baseline demographic data (survival, mortality factors, reproduction, movements, diets, density) from a mountain lion population that occurs on private lands;
- Estimate prey availability and abundance;
- Estimate the impact mountain lions have on prey populations in the Davis Mountains; and
- Construct a predator-prey model to evaluate management scenarios.

## SPONSORS

This project is being supported by the Shield-Ayres Foundation, Summerlee Foundation, Mule Deer Foundation, the Borderlands Research Institute, Sul Ross State University, Primero Conservation, and various private landowners of west Texas.

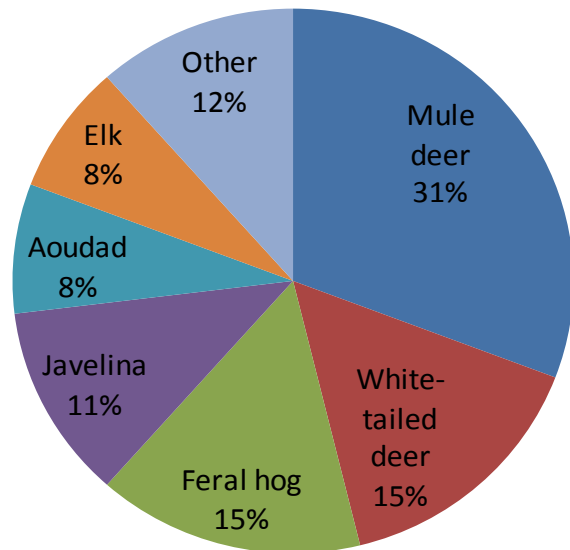
## PREDATOR-PREY RELATIONSHIPS

Unlike coyote, fox, and black bear, mountain lion are strict carnivores; they consume meat exclusively. Throughout their distribution, their primary prey is deer. Although deer specialists, they are also prey generalists, in that they compliment their deer diet with other ungulates and a variety of small prey. In some ecosystems, small prey (e.g., rabbits, rodents, skunks, etc...) represent up to 35% of their diet.

The Trans-Pecos hosts a wealth of big game animals including mule deer, elk, white-tailed deer, aoudad, feral hogs, javelina, and bighorn sheep. To understand what impact mountain lions have on prey populations, we captured mountain lions, attached GPS radiocollars, and monitored their activity. The GPS collars allow us to monitor the mountain lions daily via satellites that download 6 locations to our email account.



Using GPS and satellite technology, we have investigated 138 potential kill sites of mountain lions, revealing 104 kill sites and 5 scavenged sites. This mountain lion has returned to a feral hog it killed 3 days earlier.



The diet of mountain lions as determined by 104 verified kill sites of radiocollared mountain lions in the Davis Mountains. The "other" category is represented by 4 coyotes, 4 skunks, 2 fox, 1 porcupine, and 1 coati.

Locations are then imported into mapping software so that we can evaluate if mountain lions might be at a kill site. Clusters of locations in the same area (<200 yards) are a good indicator that a mountain lion has made a kill. Once cluster sites are identified and the mountain lion leaves the vicinity, we seek landowner access to investigate the kill sites.

In the past year, we have identified 172 possible kill sites and have been permitted to investigate 138 of the clusters. Of the 138 we have discovered 104 verified kill sites by mountain lions (see pie chart above).

In addition to the kill sites, we also documented 5 scavenged sites that were used by radiocollared mountain lions. During our first year of study, mountain lions scavenged 3 feral hogs and 2 elk that had died from other causes.

## HOME RANGES

**H**ome ranges, or the area an animal uses day-to-day to survive, must provide all of its habitat requirements including food, cover, and water. Home ranges are commonly measured to better understand how much space an animal needs.



Mountain lions are captured with foot-hold snares or treed using trained hounds. Once captured, researchers use a tranquilizer gun to sedate the mountain lion, as shown here.

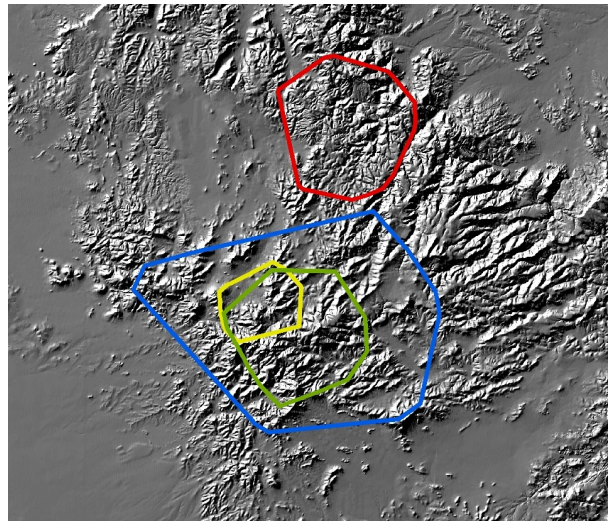
Solitary carnivores, like mountain lions, require a tremendous amount of space to survive. The number of carnivores a habitat can sustain are limited by the amount of prey that are available. Areas with low prey support fewer

predators and areas with more prey support higher levels of predators.

Since April 2011, we have caught and radioed 11 mountain lions in the Davis Mountains including 4 kittens (1 litter with 1 F, 1 M; and 2 older dependent young [1 F, 1 M]), 3 subadults (2 M, 1 F), and 4 adults (3 F, 1 M).

Using over 4,000 GPS data points that have been downloaded via the satellite collars, we estimated the home ranges of adult mountain lions using mapping software and standard analysis (95% MCP). Home ranges of adult females varied from 13,195 to 40,806 acres and averaged 30,822 acres. The home range of the adult male was considerably larger at 128,915 acres.

Although our sample size is small, the home ranges of mountain lions in the Davis Mountains are similar to those reported for the Big Bend Ranch study conducted in the 1990s. In that study, home ranges averaged 51,000 acres for females and 86,000 acres for males.



Home ranges of adult female mountain lions (yellow, red, and green) in the Davis Mountains averaged 30,822 acres and the male home range (blue) was 128,915 acres.

## MOVEMENTS AND DISPERSAL

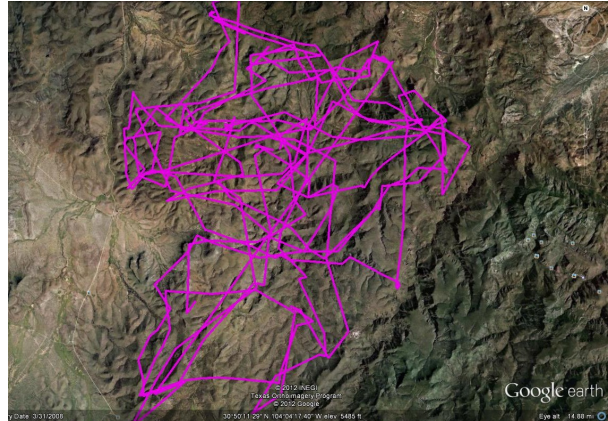
The Trans-Pecos landscape has been referred to as “sky islands surrounded by a sea of desert.” Despite this naturally fragmented landscape, wildlife have been able to maneuver from mountain range to mountain range using natural corridors and their innate ability to pioneer new habitats.

Using the combination of GPS and satellite technology we are currently monitoring mountain lions to determine how often they frequent water, use kill sites, socialize, and travel along corridors.



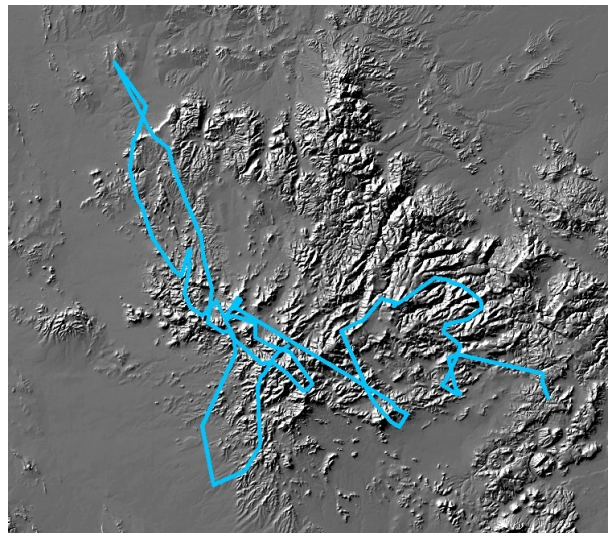
GPS radiocollars are affixed to sedated mountain lions prior to being released. GPS data are downloaded daily via satellites to monitor movements and behavior of mountain lions.

Movements vary considerably depending on age and gender. Adult mountain lions show an affinity to a specific home range, but still travel long distances within their range in a given day. Subadults typically disperse at 1-3 years of age. Dispersal is defined as the one-way movement of a young animal from its natal range. Dispersal distances can be tremendous (up to 663 miles documented in previous studies). Most males will disperse entirely from their natal range, whereas about half of females will establish residency adjacent to their natal range.



Within a home range, mountain lions may move up to 10 miles in a 24-hour period as they search for food, water, and cover. The sequence of movements above spans a 3-month period.

We have documented 2 dispersal events to date including that of a 2-year old female and a 2-year old male of different litters. The male began his dispersal by heading south of the Davis Mountains taking him near Mitre Peak, through Paisano Pass, on to Del Norte Mountains, and then to the Glass Mountains. The time frame for this dispersal spanned 3 weeks.



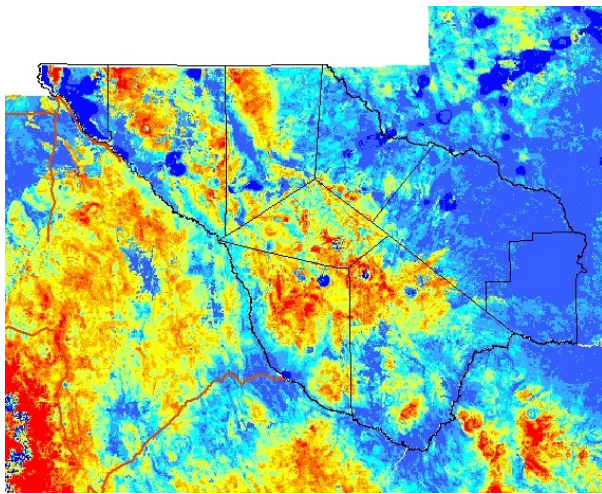
A 2-year old female mountain lion dispersed from her natal range until she found a formidable barrier (Interstate 10). After stopping at the highway, she returned to her natal range and then proceeded in a southeastern direction.

## HABITAT USE

Mountain lions are known to use a variety of habitats ranging from coastal prairies to rolling hills to forested mountains. They require habitat that has water, provides adequate prey, and contains screening cover. Screening cover can come in the form of thick brush, steep terrain, rocks/boulders, or a combination thereof.

The Trans-Pecos epitomizes typical mountain lion habitat with its rough mountainous terrain, high prey diversity and availability, and the variety of natural and man-made water sources. The Trans-Pecos is also an important location for mountain lions because it lies between 2 vital sources of mountain lions: the Rocky Mountains of the western United States and the Sierra Madres of Mexico.

Using data from Big Bend National Park and Big Bend Ranch State Park, we developed a preliminary habitat model for mountain lions in the Trans-Pecos. We used over 2,700 radio-locations from 16 mountain lions monitored from those areas. We extracted geographic



A preliminary habitat model for mountain lion in the Trans-Pecos. High habitat quality is noted in red with low habitat quality noted in blue. The model illustrates the vast amount of high quality habitat in west Texas.

data from each point relative to elevation, vegetation types, and distance to water to predict mountain lion habitat for west Texas.

Based on our data, the model had good predictability. However, most of the data came from the southern distribution of the Trans-Pecos and may not be representative of other mountain ranges in Texas.



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Although little data is available on how often mountain lions use water, recent data suggests that water may be a limiting factor for mountain lions.

We will be refining the habitat model by using data collected from the Davis Mountains. With each satellite collar collecting 6 locations per day, we will be able to better understand how mountain lions maneuver through the landscape. This is especially important as land fragmentation has been increasing across the state and more barriers are proposed across international boundaries.

Natural corridors are also relevant as we try to understand the genetic isolation that has occurred in south Texas as well as the importance of New Mexico and Mexico to mountain lion populations in the Trans-Pecos.

## POPULATION CHARACTERISTICS

As one of the most elusive wildlife species in North America, mountain lions pose a challenge for biologists to understand their population dynamics. To understand how mountain lion populations will respond to differing levels of management, we are gathering data on birth rates, survival, mortality factors, immigration, emigration, age and gender composition, and population density.

We will assess birth rates by monitoring productivity of radioed females. Once dens sites are located, kittens will be radioed and monitored with lightweight, expandable radiocollars. Survival rates and mortality factors will be estimated for the radiocollared mountain lions. Mountain lion immigration/emigration will be determined based on movements to and from the study site. We will garner age and gender data from our trapped samples, depredation reports, and from camera traps throughout the



Remote cameras allow us to detect mountain lions in our study site. The proportion of marked (radioed) to unmarked mountain lions will enable us to estimate their population size.



Wildlife populations gain members through birth and immigration and lose members through death and emigration. By monitoring adult female mountain lions and their young we are able to document birth rates, kitten survival, and recruitment.

study area. We will use camera traps, genetic techniques, and capture data to compare population estimates of mountain lions in the Davis Mountains.

Although only in our first year, we have been able to catch and radio 11 mountain lions in the Davis Mountains. We have caught 4 kittens, 3 subadults, and 4 adults.

From that radioed sample, we have accumulated almost 10,000 radiolocations and documented 2 mortalities of radioed animals, both of dispersing subadults.

# FUTURE RESEARCH

Research on mountain lions is an ongoing effort by the Borderlands Research Institute. Our goal is to better understand their role in the Chihuahuan Desert Ecosystem. In addition to the preliminary results provided in this report, we will continue our study as follows:

- Gather movement data from mountain lions in west Texas;
- Refine the habitat-use model for mountain lions in Texas;
- Collect genetic material from mountain lions to help document potential dispersal corridors between west Texas and Mexico, New Mexico, and the rest of Texas;
- Identify landscape features including natural corridors, barriers to dispersal, and other fragmentation/connectivity metrics; and
- Continue to gather predator-prey data on mountain lions in the Trans-Pecos including diets, kill rates, predator density, and prey densities to evaluate the impact mountain lions have on prey populations.



**For more information about the mountain lion research projects in Texas, please contact:**

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