



Small Mammal Community Recovery after Fire

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On April 9, 2011, the largest grassland fire in recorded Texas history (the Rockhouse Fire) began. It burned for 34 straight days and covered 314,444 acres. With the fire came damage to houses, fences and livestock. Though the fire was not widely viewed as beneficial at the time, the Rockhouse Fire had the potential to benefit the landscape by hitting the ecological reset button and instigating new growth. We at the Borderlands Research Institute (BRI), along with the Dixon Water Foundation (DWF), recognized this potential and sought out ways to research the impact of the fire on the landscape and the response of some of the organisms in the ecosystem. One project being conducted in this area is seeking to better understand small mammal response to grassland fire. While there is not a designated definition for “small mammals,” in this project we define them as members of the order Rodentia (rats, mice and others) found in the Trans- Pecos region of Texas.

Now you might question, “Why study mice?” While small mammals are not necessarily the most charismatic group of animals, there are numerous reasons for learning about their responses to ecological events.

When most people think about mice the first thing that comes to mind is disease. Rodents can be carriers of diseases such as Hantavirus, rabies and bubonic plague. Understanding these animals can help us better understand disease risks for humans, however, the mice

such as bobcats (*Lynx rufus*), coyotes (*Canis latrans*) and raptors. Small mammals occupy most of the diet for these predators and help keep the pressure off of other animals like pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). Truly

rodents are a critical component of a functioning ecosystem and are considered good indicators of ecosystem health.

Our effort to monitor small mammal populations has taken place since the summer of 2011, and has been conducted on two ranches just north of Marfa. The Mimms ranch (owned by DWF) was almost completely burned while the other ranch was untouched by the fire. The first two years of this effort took place only on the Mimms

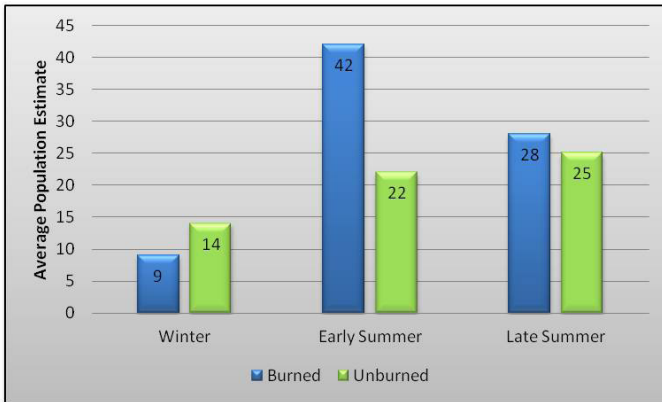


Silky pocket mice are some of the most common small mammals on the semi-arid grasslands of Marfa, TX. This one has been measured, marked, and released back onto the landscape.

we are studying aren't the ones running between your walls at night. The rodents of this study are important members of their ecosystem and are the dominant mammal group on semi-arid grasslands. They feed on a variety of features of the landscape including: forbs, grasses, insects and other invertebrates. By what they choose to eat, rodents can change plant communities, and by what eats them they impact other animals. Small mammals are a vital prey base for predators in the area

ranch and linear trapping transects were primarily used. Starting in January of 2013, a total of 24 trapping points were randomly and evenly placed on both ranches to assess differences in burned and unburned areas. At each point, three sets of 3x3 trapping grids (10 m between traps) were laid out and set for six consecutive nights. We used Sherman live traps baited with a mixture of bird seed and peanuts. Those that were captured were marked by removing a patch of fur with a hair





The bar graph shows the average population estimate per trapping site for both burned and unburned areas in 2013.

trimmer. They were released back into the population with their new hair cut. The mark was to make sure we knew if an animal had previously been captured. We recorded the number of recaptured and new animals every day to allow for population estimations. This process occurred three times a year to coincide with the cold, dry (winter); warm, dry (early summer); and warm, wet (late summer) seasons of the region.

There was not much success during the first two years of the study. Over those two years, only 101 animals were captured. Though a decline in numbers is expected after a fire, trap success was still lower than expected. The suspected reason for these low numbers is the historical drought that plagued Texas during this period. There was no recordable precipitation on the study area from October 2010 to June 2011, and hardly any significant rainfall events were reported until May of 2012. This drought had a large impact on landowners, mice and the landscape; but now we are a little bit further down the road to recovery. The precipitation gained in 2012 likely led to the dramatic increase in numbers we recorded in 2013. In that year alone, we captured 1,052 animals with 567 of those coming from burned areas. Just looking at this drastic increase in numbers, we can tell small mammals are coming back strong on the Marfa grasslands.

To give us a better idea of how the populations are changing, we estimated population size using the mark-recapture data we col-

lected. Data from the winter season of 2013 showed that population estimates in burned areas were lower than those in unburned areas. This was an expected result; however, what was recorded over the next season was not. During the early summer we found an increase in population sizes at both burned and unburned sites, but the populations in burned areas far exceeded those in unburned areas. The wet season population estimates for burned areas were still higher, but the disparity between burned and unburned populations shrank. The estimates indicate a spike in small mammal numbers in burned areas during early summer, followed by a decrease in late summer. This suggests the recovery and eventual stabilization of population numbers over time. We suspect the spike in numbers was largely due to the precipitation gained from late 2012 through early 2013. As we continue to monitor this trend, we seek to construct an estimated timeline for small mammal recovery on the Marfa Grasslands.

So far we have caught 13 different species over the course of this project. All 13 of them have been found on the unburned ranch. The silky pocket mouse (*Perognathus flavus*) has been captured the most frequently followed by the hispid pocket mouse (*Chaetodipus hispidus*). The "pocket" part of their names refers to pockets on the sides of their mouths where they store seeds before eating them. The small mammals that have been caught the least are the eastern white-throated woodrat (*Neotoma leucodon*) and the banner tailed kangaroo rat (*Dipodomys spectabilis*). In total, three woodrats and only one banner tailed kangaroo rat have been captured, and all four have been captured in unburned areas. Even though these species are not captured frequently, their presence lets us know the habitat can support them.

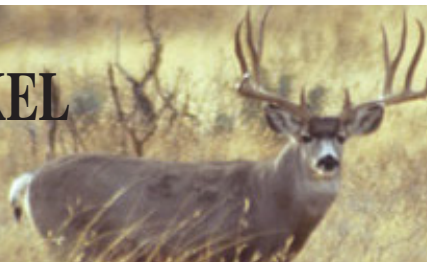
Trapping efforts in burned areas have shown different results. We have captured 11 species on the burned ranch. Silky pocket mice are still the most frequently captured species, but the North American deer mouse (*Peromyscus maniculatus*) comes in second. Deer mice inhabit a variety of habitats, and it is likely the burned landscape does not hinder them as much as it might hispid pocket mice. The lower number of species on the burned ranch suggests the habitat is not suitable for the missing species, but there is evidence that the habitat is improving. Species such as the fulvous harvest mouse (*Reithrodontomys fulvescens*) and the hispid cotton rat (*Sigmodon hispidus*) have both been present in unburned sites, but have only recently been captured in burned areas. The number of species is expected to increase with time as burned



areas continue to recover.

Small mammal numbers will continue to be evaluated through September 2014. Differences and trends concerning populations in burned and unburned areas will be observed and evaluated using statistical methods. In the end, this research will lead to a better understanding of not only the group of animals in question, but also semi-arid grassland ecosystems. Rodents are such an integral part of their ecosystems that management plans for a landscape, or a species, should take into account the potential state of the small mammal population. The research being conducted here will help landowners and wildlife professionals make more informed decisions and develop better strategies to achieve their goals. 🐭

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