Movements of Pronghorns Translocated to the Trans-Pecos

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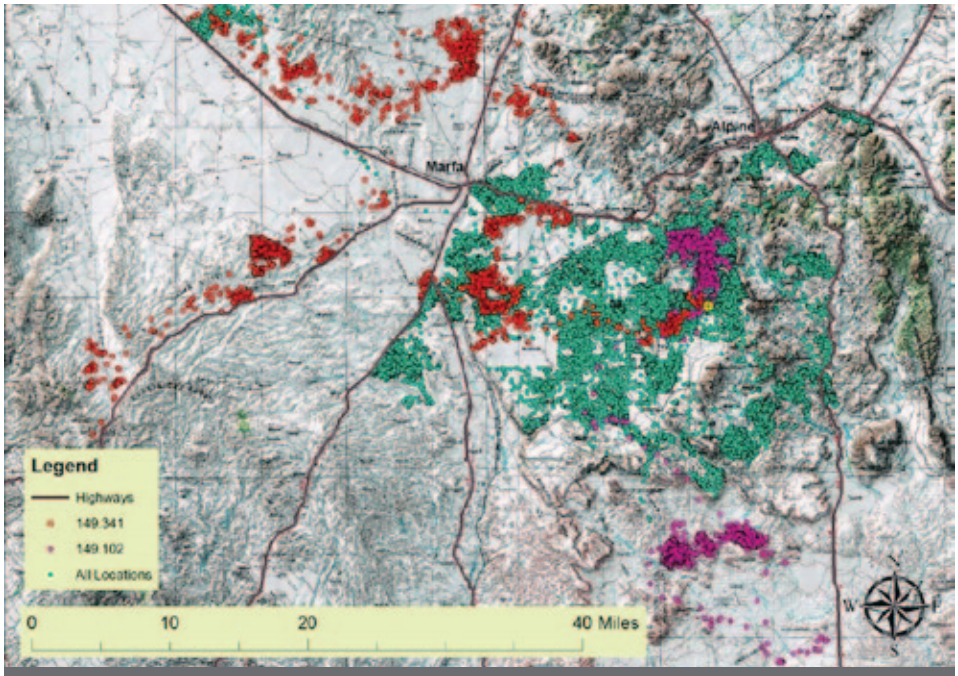
The current distribution of pronghorns in Texas is restricted to regions of the Trans-Pecos, Panhandle, western Edwards Plateau and southern Rolling Plains. Of these four regions, the Trans-Pecos historically supported 70 percent of Texas' pronghorns. In 1987, the number of pronghorns reached a 40-year high with over 17,000 animals occurring in the Trans-Pecos. While the overall trend in the pronghorn population was on the decline, the population had experienced several years of healthy numbers. Unfortunately, since 2008 pronghorn populations in the Trans-Pecos have experienced unprecedented declines, with less than 3,000 animals estimated remaining in the region by 2012. However, using intensive management practices and with the help of Mother Nature, populations are beginning to increase.

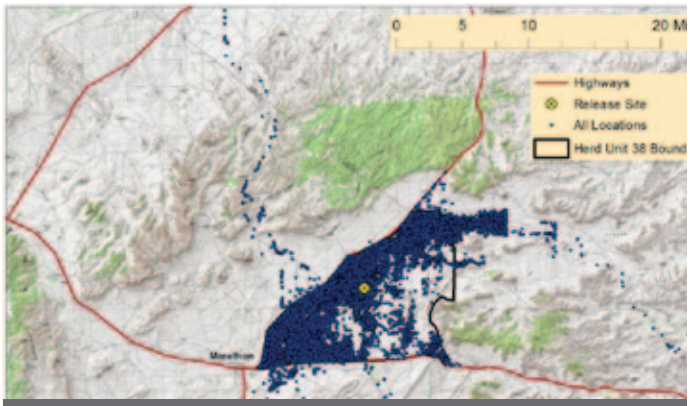
In response to the alarming decline of pronghorns in the Trans-Pecos, the Texas Parks and Wildlife Department, Trans-Pecos Pronghorn Working Group and the Borderlands Research Institute initiated a concerted restoration program. A useful method for restoring depleted animal populations is through relocating individuals from healthy populations. Subsequently, a total of 427 pronghorns have been captured and relocated to the Trans-Pecos from the Texas Panhandle during 2011 (200), 2013 (125) and 2014 (102).

Relocations are however only a small part of the restoration effort. Evaluation of post-release movements is vital to understanding the ability of pronghorns to assimilate to their new environment and survive. Movement information provides valuable insight into post-release behavior and helps assess the restoration effort and determine requirements for future restorations. To evaluate and monitor movements, during capture we fit Global Positioning System (GPS) collars to approximately 50 percent of the relocated pronghorns. These collars are set to obtain a location of the animal every hour for a period of 300 days. During the 2013 relocation we collared 51 pronghorns, and during the 2014 relocation we collared 49 pronghorns.



Hourly locations of GPS collared pronghorns released into the Marfa Plateau region in 2014. The red and purple locations are from individuals which exhibited the most extreme movements of the 2014 cohort.

From these two relocations, we were able to obtain over 550,000 GPS locations of pronghorns during 2013 and 2014. These data yielded some interesting results. Firstly, the average estimated home range size of pronghorns was larger in the 2013 relocation compared to the 2014 relocation. In 2013 the average home range size was 7,846 acres, while in 2014 it was 6,852 acres. We also found pronghorns in 2013 typically remained within 31 miles of the release site in 2013, whereas pronghorns in 2014 traveled up to 50 miles from the release site. The difference in home range size and movements from the release site is likely a result of the habitat quality in the respective release area. Habitat quality was higher in the Marathon Basin in 2013 compared to the Marfa Plateau in 2014; thus, we would expect pronghorns to travel greater distances in 2014 to find suitable food.



Hourly locations of GPS collared pronghorns released into the Marathon Basin region in 2013. Note the exploratory movements of three female pronghorn to the north, east and south of the release site.

But, why then is our estimate of home range larger for the Marathon Basin compared to the Marfa Plateau? The answer is a function of the software used to estimate home range size.

We chose to use relatively new software called Time-Local Convex Hull (T-LoCoH). This software computes home ranges in a similar way to traditional methods such as minimum convex polygons and kernel density estimators but incorporates time as well as space in the estimates. Basically, this program allows us to account for "pockets" of rangeland within the home range that are not used by pronghorns. For example, Figure 1 shows the hourly locations of pronghorns collared during the 2014 relocation to the Marfa Plateau. You will note there are large unused areas within the distribution of points. If we include these areas in our home range estimates, we are very likely to obtain a biased estimate of the area used by pronghorns. Conversely, Figure 2 shows the distribution of the locations from the 2013 release in the Marathon Basin is more uniform with fewer gaps in the distribution. The result is that although it appears that the average home range in the Marfa Plateau is larger, the actual area used by pronghorns is larger in the Marathon Basin.

In both years, we also detected a significant difference in home range size between the wet and dry seasons. In 2013, the average home range contracted from 5,802 acres during the dry season to 2,733 acres in the wet season. Similarly, during 2014 the average home range contracted from 3,652 acres in the dry season to 2,427 acres in the wet season. We validated this observation by analyzing the average distance moved by individual pronghorns each week. On average, individuals traveled less after the onset of the rains. The contraction in home range and weekly movements between the seasons was expected because forb availability increases with the onset of the rains. With more food available across the landscape during the wet season, pronghorns do not have to travel as far to meet their energetic demands; whereas, in the dry season, pronghorns have to travel large distances to find sufficient food to eat.

Using the GPS data collected by our collars, we were also able to detect significant differences in the weekly movements between male and female pronghorns. In both the 2013 and 2014 release areas, males traveled much further than females in any given week. Males in the Marathon Basin (2013 release) traveled an average of 38 miles each week, while females traveled 35 miles. The difference in weekly movements was more pronounced in the Marfa Plateau, where males moved an average of 55 miles/week and females moved just 32 miles weekly. Like deer during the breeding season, the males will compete for females while trying to establish and defend territories. The males will move around their range trying to collect harems of females with which to breed.

Movement data not only allows us to estimate the distances traveled by pronghorns and the home range of these animals, but the data are also able to guide future management actions. For example, these data allow us to determine the specific areas through which pronghorns move, thereby guiding the focus of management. Location data are also able to highlight barriers to movement, such as fences, which allows us to prioritize areas for fence modifications. In addition, available habitats that are used or avoided are highlighted. Those areas that are avoided can then be improved with various habitat management tools such as brush management. Understanding the movements of relocated pronghorns is a vital piece of the restoration puzzle.

A relocated doe and buck (note the GPS collar) in the Marfa Plateau during the summer of 2014.