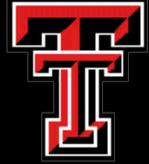




THE

QUAIL-TECH

ALLIANCE



NEW TRACKING TECHNOLOGY: GLOBAL POSITIONING SYSTEM RADIO FOR QUAIL PROVIDES 400 LOCATIONS IN A 6.5 G ULTRALIGHT PACKAGE

As we at the Quail-Tech Alliance move forward with ongoing research (see previous Quail-Tech newsletters), we are also moving forward with the development and use of cutting edge technology to increase our understanding of quail ecology (see August 2014 E-Bulletin). From our inception, we have made every effort to put forward the best possible and most accurate data available for quail management. Keeping with our mission statement we are striving to increase our knowledge of quail and their use of habitat with some of the latest equipment available.

For the past 50 + years, quail biologists have used very high frequency (VHF 148 to 152 MHz) transmitters (Figure 1) to monitor the survival, habitat use, and movements of various species of quail and other birds. VHF transmitters have been the best possible option to monitor quail because of the bird's elusive nature. However, there are potential biases which can arise when using this VHF equipment. For example, in most instances there must be a human presence (the observer) to obtain locations for the birds. This presence could cause the animal to alter its behavior if the observer is detected by the bird. Observers go to great lengths to insure the animals do not detect them, however, no one is perfect. Further, data collection generally only occurs as long as the observer is in the field tracking the bird. This requirement means that if you want to obtain detailed movement data, you would have to stay with a single bird for the entire monitoring period. This limitation is problematic because we as researchers want to base our analysis on as many different birds as possible. It is true that there are unmanned VHF signal recording stations that can be harnessed together to monitor VHF transmitters. However, these stations suffer the same drawbacks of only being able to monitor a limited number of animals, because they are in fixed locations. Additionally, there is significant error in their ability to provide the location (through triangulation) of the animals that they are monitoring. Nevertheless, VHF transmitters are still the best option for long-term monitoring aimed at measuring survival or reproductive rates. Don't misunderstand our criticism of VHF transmitters. We have used thousands of them over the years and they have been, and continue to be, an invaluable tool. However, technology has progressed to the point that we can remove the observer from the equation (save for trapping the bird) and record up to the minute locations with unprecedented accuracy.



Figure 1: VHF transmitter attached to a female bobwhite before being release back into the wild. VHF transmitters emit a specific radio frequency only, and have to be monitored by observers frequently with hand held equipment.

We have been testing a new monitoring system for quail which will greatly reduce (but not eliminate) the need for an observer. We are currently utilizing Global Positioning System (GPS) technology (Figure 2, next page) to monitor bobwhites in the Rolling Plains of Texas. We have successfully deployed several units on bobwhites over the last few months (and will be deploying many more). GPS monitoring systems have been used for several years on various large mammals and large birds, however, the technology has moved forward to the point that it can be placed in units small enough to monitor quail without overloading them.

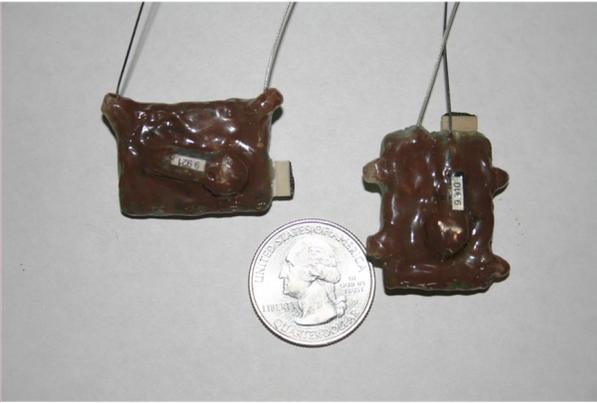


Figure 2: Ultra-light GPS units with a US quarter for size

We are using ultra-light weight GPS units that weigh 6.5g. These units still contain a small VHF component that allows us to keep track of the bird (from a distance) and recapture it at the end of the monitoring period. However, just like your phone or navigation system, the GPS units track and record their geographic location and speed. We can attach them using a backpack or necklace method (Figures 3 and 4). The necklace and backpack transmitter styles have been used on various other bird species for decades and these attachments do not impede flight or the bird's ability to squeeze into small spaces (Figure 5). We can recharge each unit once we retrieve it and download the data. These units can be redeployed indefinitely or until the VHF transmitter dies and must be replaced.



Figure 3: Necklace style ultra-light GPS unit attached to a female bobwhite prior to deployment.



Figure 4: Backpack attachment style for the ultra-light GPS units placed on a male bobwhite prior to deployment.



Figure 5: Quail with an ultra-light necklace style transmitter that ran into a rat burrow. We had to dig the quail out to retrieve the collar before we let the hen go unharmed.

GPS units reduce the need for an observer; however they have not eliminated the need for monitoring entirely. We still need to keep “loose contact” (i.e., 100 meters or more) every other day with the birds because of the potential for them to make large movements beyond the range of the VHF component. We assume that birds will not detect the observers 100m away. The units can be set to record their location at any time interval and are able to store a significant amount of data (4 GB) in a small amount of space. We have been able to have the unit record its location every 10 mins for 4 days and only fill up 6% of the storage space (Figure 6). Before these units, researchers wanting to record the locations of a sample of 30 birds each day would have to move around their study site each day and use the VHF signal to locate each of the 30 birds, flushing them individually to be sure of their locations. Using this conventional approach a researcher would hope to obtain 30 locations for each bird spread across thirty days. The locations for each bird would be scattered throughout the hours of a 24 hour day, because of the time required to travel between and locate each bird. With GPS units, 400 locations (timing programmed by the researcher) can be obtained for each bird by simply releasing and then recapturing the bird. We are able to obtain 9 meter or less accuracy with these units and are in the process of ground truthing the units for accuracy in various vegetation types. When we examine the data collected a little closer we were able to detect significant movements obtained by the units when we flushed the quail on purpose for ground truthing (Figure 7). We are still measuring other various data being recorded with these units such as speed and elevation. This technology will move us light years ahead in our understanding of fine scale movements of quail in their habitat.

We are very excited by the potential of these units and are currently implementing a wide array of studies that can be aided by this technology. We will be bringing you more information on the studies being conducted with these units and look forward to the data we will receive from them as well.

We would like to thank Mr. Bill Goddard, the Burnett Foundation, and the Parks Cities Quail Foundation for their Support of this work.



Figure 6: Waypoints (379 total) from an ultra-light GPS unit attached to a female bobwhite for 4 days.

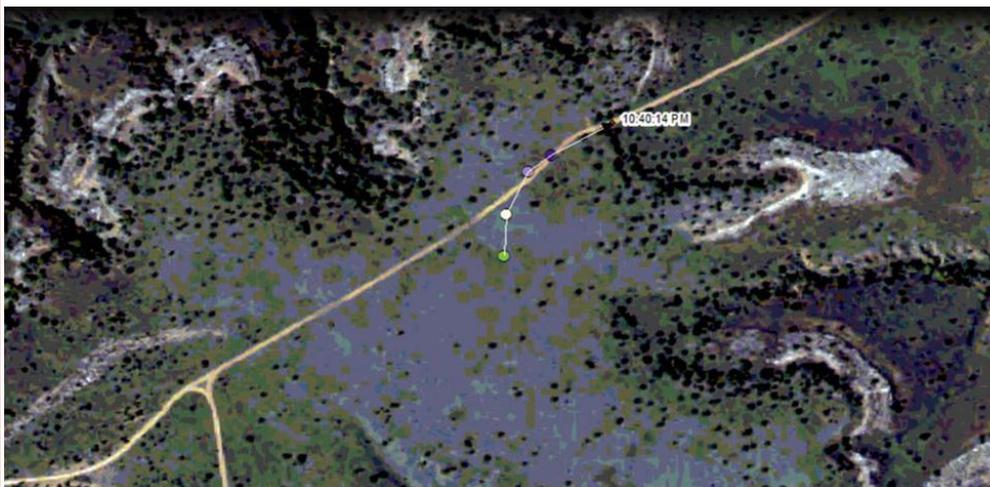


Figure 7: A 50 minute movement period from a female bobwhite with an ultra-light GPS unit attached. Each dot is a ten minute interval. The bobwhite was moving away from an observer who flushed the quail on purpose for ground truthing the GPS units.

For a video of the units attached to the quail and the movements being recorded please see: <http://youtu.be/e4PmQcBjDSs>