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Guide to Abundance Estimation Techniques for Rio Grande Wild Turkey

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Interest in habitat and population management for wild turkeys (*Meleagris gallopavo*) has grown in recent times, as landowners, hunters, and wildlife viewers recognize their actions have direct impacts on natural resources and wildlife populations.

Guide to Abundance Estimation Techniques for Rio Grande Wild Turkey

Although there is a long tradition of managing solely for livestock, active management by private landowners to enhance wildlife habitat and populations has gained momentum. Integrating wildlife management with farm and ranch operations is now common place. Interest in habitat and population management for wild turkeys (*Meleagris gallopavo*) has grown in recent times, as landowners, hunters, and wildlife viewers recognize their actions have direct impacts on natural resources and wildlife populations. Focus on intensive, local-scale management of upland game birds in Texas has renewed interest for private landowners managing Rio Grande wild turkey (*M. g. intermedia*; RGWT) populations and their habitat.

Management of most species requires accurate abundance estimates (Bowden et al. 2003), and a survey is an important factor in determining the population size of a species, habitat requirements, reasons for species decline, whether habitat management has improved site conditions, or to understand other aspects of population dynamics (Sutherland 1996). Game populations are often managed at levels which provide a harvestable surplus of animals without affecting the population's health or growth potential (Miller and Wentworth 2000). Thus, reliable and unbiased abundance estimates are necessary for management purposes.

Obtaining accurate and reliable estimates of abundance, however, can be difficult for species that are highly mobile, wide ranging, and secretive (Lewis 1967, Bull 1981, Williams and Austin 1988). This is especially true of wild turkeys. Methods for accurately determining wild turkey abundance have long been desired (Cook 1973, DeYoung and Priebe 1987, Dickson 1992). Although several different methods have been examined the majority have had limited success (Weinstein et al. 1995, Cobb et al. 2001) because of low observability and the difficulty in obtaining an adequate sample size (Healy and Powell 1999). For the purpose of managing RGWTs at the ranch level though, a few methods may be satisfactory and generate estimates upon which management decisions can be soundly based.

In this article, we discuss 3 methods for estimating RGWT abundance at the local or ranch scale. Our goal is to provide landowners and managers with the information necessary to understand each of the methods, as well as incorporate an abundance estimation procedure into their management operation.

Methods for Estimating Rio Grande Wild Turkey Population Size

Overview

We must first point out that none of the methods discussed here are perfect. Each method has pros and cons which we attempt to make clear. However, providing annual estimates of turkey abundance on your ranch is beneficial in determining the harvestable surplus, impact of habitat management, and overall health of the population.

A traditional roost site can be defined as a location where birds from many different flocks congregate on a regular interval during the fall and winter season as a mixed-group flock.

Roost Counts

A traditional roost site can be defined as a location where birds from many different flocks congregate on a regular interval during the fall and winter season as a mixed-group flock. A satellite roost site can be defined as a location that is occasionally used by a specific individual or specific group of birds at an irregular interval. Historically, traditional winter roost sites contained several hundred or even thousands of turkeys. Most landowners are aware of traditional roost site locations on their property where as satellite roosts are less known.

In 1966, Thomas et al. suggested that RGWTs may be successfully surveyed using roost counts because of their habit of forming large winter flocks and returning to traditional roost sites. Cook (1973) evaluated this technique comparing landowner and biologist roost counts in the Edwards Plateau ecoregion of Texas. Landowners tended to overestimate turkey numbers where roost sites were unstable, which suggested double counting due to flock movement. However, where roost sites were stable, landowner counts were similar to biologist counts (within 7%). Cook (1973) concluded that estimates made by landowners can be used to estimate populations and determine RGWT trends where there is little movement among roost sites. Using a short survey period (less than a week) can minimize the problem of double counting where turkey movements are considerable (Weinrich et al. 1985, Healy and Powell 1999). Smith (1975) also reported variable roosting patterns of turkeys in south Texas decreased the reliability of roost counts. During boom years, roost counts may be less reliable due to the increased use of satellite roosts.

More recently, Caveny (2009) evaluated independent, double observer roost counts for RGWTs in the south Texas Coastal Sand Plain. Using two independent observers at each roost site, Caveny found roost counts to be an inexpensive and accurate method for estimating RGWTs. Just as Smith (1975) reported though, Caveny (2009) reported turkeys did not always return to the same roost each night.

Roost counts should be conducted in February, while flocks are still congregating at traditional winter roost sites.

Roost Count Protocol

A roost count when done at the spatial scale of an individual ranch is an effective method for enumerating RGWTs. Roost counts should be conducted in February, while flocks are still congregating at traditional winter roost sites. We do not encourage counting satellite roosts as they can be extremely unreliable. Winter roost sites are generally located around water where large trees exist and can be pinpointed at night using an owl call. Turkeys will typically respond to the owl call giving away their location. Roost site coordinates (latitude/longitude or universal transverse mercator [UTM]) from a GPS unit aids in locating areas on an annual basis.

Conduct counts from a blind established near the roost site. A blind may be a box blind used for deer hunting, a portable tent blind, or an area of dense brush cut to conceal your presence.

Counts can be conducted in the mornings and evenings although research suggests morning counts may be better (Butler et al. 2006). Conduct counts from a blind established near the roost site. A blind may be a box blind used for deer hunting, a portable tent blind, or an area of dense brush cut to conceal your presence. We suggest establishing the blind weeks even months prior to conducting a roost count to allow turkeys to acclimate to it. The blind should be positioned such that the observer has full view of the roost site and take advantage of the terrain if possible. For example, a high vantage point may help to look down on turkeys or a low vantage point may illuminate roosting turkeys in the sky. Binoculars can aid in viewing and counting turkeys.

Arrive in the blind at least an hour prior to turkeys arriving or departing the roost. It is best to conduct counts within a short period of time (within one week) to prevent double counting. Counting the same roost multiple times and taking the average of the counts provides a good estimate because large numbers of birds are difficult to count accurately. Appendix A provides an example data card for collecting roost counts. Roost counts provide a near total enumeration of the turkeys and make good indicators of population trends and flock composition.

Aerial Surveys

Helicopters have been used to survey several species of wildlife including ground-dwelling birds such as quail, grouse and turkeys (Shupe et al. 1987, Schroeder et al. 1992, Kubisiak et al. 1997, Butler et al. 2008). Shupe et al. (1987) counted the number of northern bobwhite (*Colinus virginianus*) within 110 yards of each side of the helicopter in south Texas. Based on the distance of transects flown, a density of birds/acre was calculated and compared to ground transects which were similar. More recently, DeMaso et al. (2010) established a practical and efficient helicopter survey technique for estimating bobwhite abundance on Texas rangelands.

Kubisiak et al. (1997) compared helicopter counts to ground counts of eastern wild turkeys (*M. g. sylvestris*) in Wisconsin and found 84.1% of the flock can be detected from helicopters. However, surveys were conducted in the winter when flocks had limited movement due to deep snow. Butler et al. (2008) estimated turkey flock detectability from a helicopter in the Texas panhandle and found that near 100% were detectable. They also reported that surveying 242,000-484,000 acres would be necessary to provide sufficient power to detect a 10-25% change in abundance over a 4-5 year period. Most ranches in Texas are considerably smaller.

Counting the same roost multiple times and taking the average of the counts provides a good estimate because large numbers of birds are difficult to count accurately.

Using helicopters to survey turkey abundance can be expensive (~ $500/hour) and may only be practical on large properties. However, in some parts of Texas it is common to conduct white-tailed deer (*Odocoileus virginianus*) surveys using transects flown in helicopters. If conducted simultaneously, deer and turkeys could be counted using helicopter surveys. This would yield a density estimate for both species, as well as yield a cost effective method for estimating turkeys. Cooperative landowner efforts may be beneficial for smaller properties. Groups of landowners may opt to share the costs to conduct aerial surveys for their collective properties.

In our experience, we feel traditional roost counts are the most efficient and cost effective method for estimating the number of RGWTs. Roost counts conducted annually provide a good indication of population trends and flock composition.

Aerial Survey Protocol

To conduct a helicopter survey, transects should be established approximately 0.25 miles apart from each other and distributed evenly across the property. A few long transects are better than numerous short ones so establish transects according to the shape of the property. At least 2 observers in addition to the pilot are necessary for counting. Each observer is responsible for one side of the aircraft out to 600 ft and turkeys are tallied as they are observed. Surveys are typically flown at an altitude of 100–150 ft above ground level and at a speed of 40–50 mph. Altitude and speed may vary depending on terrain and ground cover. Surveys should be conducted in the mornings (8-10 am) when turkeys are active. Avoid doing surveys late in the day when shadows are long and/or ambient temperatures are high.

Once data have been collected a density estimate is calculated. First, total the length of transect flown for 1 survey in feet. Then, multiply transect length (ft) by transect width (ft) to determine the total area surveyed (ft^2). Area can then be converted to acres dividing by 43,560 ft^2/ac. Finally, divide the number of turkey recorded by the acres surveyed and this is the density estimate (turkeys/acre).

EXAMPLE:
Transect length: 2 miles or 10,560 ft
Transect width: 600 ft x 2 = 1,200 ft
Area surveyed = 10,560 ft x 1,200 ft = 12,672,000 ft^2
Area surveyed = 12,672,000 ft^2 ÷ 43,560 ft^2/ac = 291 acres
Density = 30 turkeys counted ÷ 291 acres = 0.103 turkeys/ac
Density = 0.103 turkeys/ac x 10 = 1 turkey/10 acres

Trail Cameras/Bait Stations

Trail cameras at bait stations are considered a derivative of a mark-resight method to estimate abundance, and has been used to estimate the population size of white-tailed deer (Jacobson et al. 1997), wild pigs (*Sus scrofa; Sweitzer* et al. 2000), black bears (*Ursus americanus*; Martorello et al. 2001), as well as wild turkeys (Cobb et al. 1996, Cobb et al. 1997). However, there has not been a well-designed, scientific study verifying the accuracy of this technique for Rio Grande wild turkeys; therefore, results of a trail camera, mark-recapture estimates should be viewed with caution.

Nevertheless, trail cameras have become an increasingly popular tool for viewing and scouting wildlife. Few recognize the power of trail cameras as a management tool for collecting biological

and population data that can lead to management decisions (Dreibelbis et al. 2009). Trail cameras established at bait stations near roost sites may be used to estimate abundance of RGWTs and monitor annual trends in abundance.

Mount a trail camera to a post or tree approximately 6-10 feet off the ground and placed such that the line of bait is completely visible within the camera's field of view.

Trail Camera Survey Protocol

To conduct a trail camera survey, first locate roost sites throughout the property. Surveys are best conducted during the winter months (December–February) to take advantage of the large congregations of RGWTs. However, we suggest that the actual survey be conducted over a shorter period of time such as a week. Once roost sites are located, bait stations within proximity of each roost site can be established. Create bait stations in an open area and place feed linearly to spread flock out when feeding; this will aid accurate counting. Several different models of trail cameras are currently available; all which have different features and settings (e.g., time delays, flash, camera speed). We suggest being consistent with your camera settings and keeping them the same for the purpose of these counts annually. Mount a trail camera to a post or tree approximately 6-10 feet off the ground and placed such that the line of bait is completely visible within the camera's field of view. If the cameras are placed too low, turkeys will be obscured by those closest to the camera preventing an accurate count. After photos are acquired, counts can be made based on turkey visits, which can be established using the date and time stamp of each photo. An average of turkeys counted for each bait station can provide a reasonable estimate.

Potential biases of this method include flock mixing and multiple flocks visiting multiple bait stations. Rio Grande wild turkey flocks are not fixed in number of birds and birds will assimilate into other flocks; therefore, flock size may vary over time. Depending on the distance between roost sites, some flocks may frequent the same bait station, thereby causing some disparity in counts. An aerial photo with roost sites mapped on it can provide the spatial distribution of flocks and roosts and aid in placement of bait stations to provide the most accurate counts.

After photos are acquired, counts can be made based on turkey visits, which can be established using the date and time stamp of each photo.

Conclusions

Estimating abundance of wildlife including RGWTs is difficult and each method is not without inherent biases. However, the 3 methods presented here offer landowners and managers the opportunity to generate reasonable estimates of RGWTs on their property for better management of the species. In our experience, we feel traditional roost counts are the most efficient and cost effective method for estimating the number of RGWTs. Roost counts conducted annually provide a good indication of population trends and flock composition.

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Appendix A. Roost count survey example data card.

Ranch:	Date:	
Time:	Weather:	
GPS Location:		
Roost Tree Species:		
Artificial Roost:		
Flock Composition	Tally of Each	Totals
Adult Males		
Jakes		
Females		
Unknown		
Notes:		

— FRONT —

Roost Count Protocol

- Locate roost site in the evening using an owl call or other call.
- Be careful not to disturb roost by getting too close.
- Record roost site location with a GPS unit.
- Return to the roost at least an hour before sunrise the next morning.
- Conceal yourself in a position to view turkeys in the roost.
- Count turkeys within the roost or as they descend from roost.
- Tally adult males, jakes, females and unknowns on the data card.
- Allow turkeys to leave the area before showing yourself to prevent disturbing turkeys.

— BACK —

— NOTES —



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