



Ruffed Grouse Drumming Survey 2019

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Overview

Ruffed grouse are identified as a Species of Greatest Conservation Need in North Carolina's 2015 Wildlife Action Plan. They are one of only three resident game species with this designation. As such, information about grouse in North Carolina is vitally important and North Carolina Wildlife Resource Commission (NCWRC) staff strive to make the most of our time and resources.

This year, NCWRC biologists and technicians took steps to gain better information about ruffed grouse in western North Carolina. Our goals were to 1) continue to monitor grouse on United States Forest Service and state-owned Game Lands in western North Carolina, 2) increase effort and survey each route twice this year to provide better occupancy data and 3) analyze acoustic recordings from three sites for grouse drumming that could help improve survey methodology.

Since 2002, we have surveyed drumming grouse across all Ranger Districts of the Nantahala and Pisgah National Forests. This survey was initiated in 2002, with the goal to provide precise annual estimates of grouse abundance. In 2018, we expanded the survey to include survey routes on four state-owned Game Lands and a walking survey on Pond Mountain Game Land. Routes are established throughout the region such that they offer reliable and representative data on these areas and lead to a better understanding of regional trends in grouse populations.

Acoustic recordings have been made throughout western North Carolina each spring since 2016 as part of a wild turkey gobbling chronology project. This project used acoustic recorders from March through May at various sites to record turkey gobbling. The recorders are similar to trail cameras, but differ in that they record an audio file rather than take pictures. We learned that three of these recorders happened to be located close to drumming grouse, and the drums could be heard on the recordings. Thus, we reviewed these recordings to determine daily and seasonal patterns in grouse drumming, with the goal of using this information to evaluate our drumming grouse survey methodology.

METHODS

Driving Routes

Driving routes are situated along roads that receive little to no vehicle traffic. Listening stations are established (marked with GPS units and yellow paint) every 0.5 miles. Surveys begin 30 minutes before sunrise and continue for up to 3 hours. Observers listen for drumming grouse at each station for four minutes. In addition to the number of drumming grouse heard, observers make note of the

number of turkeys gobbling and the number of grouse and turkeys sighted while traveling along the route. Basic weather parameters are collected at the beginning and end of the survey. New for 2019, we surveyed each route on two separate mornings, reversing the direction of travel on the second morning for most routes.

Walking Route

The walking route on Pond Mountain Game Land was surveyed by groups of observers, with each observer walking a particular section of approximately two miles each. Surveys began no earlier than 30 minutes before sunrise and continued for up to 3 hours. Observers adjusted their walking pace based on habitat conditions (i.e. walk more slowly in forests and suitable habitat than in open fields) and generally covered 1 – 2 miles per hour. Observers noted locations of drumming males on a map and also noted the time, number of drums heard, and other related information.

Acoustic Recordings

We reviewed audio files from acoustic recorders that were deployed at three different sites. These three locations were all on privately-owned property. One recorder was in Ashe County in 2016 and each day it began recording one hour before sunrise and continued recording for five hours. This Ashe County site was later purchased and became part of Pond Mountain Game Land. The other two sites were in Madison County, with one in 2017 and the other in 2018. At these Madison County sites, the daily recordings began 30 minutes before sunrise and continued for two and a half hours. We then reviewed the recordings with Raven Pro software that allowed us to listen to the audio files and see the accompanying spectrograms for recordings made March 15 through April 30. We did not review the entire morning's recording, but rather reviewed 4-minute sections throughout the mornings. Specifically, we reviewed a single 4-minute recording during every 30-minute period of the day's recording. This effectively simulated surveying the location multiple times on every day through the spring grouse drumming season. We tallied the number of grouse drums that we found by date and by time of day.

Survey period and weather

Our goal is to complete drumming grouse surveys each year in the two-week period immediately prior to the opening of the spring turkey hunting season. Grouse are expected to be drumming at this time and conflicts with hunters are avoided. To the extent possible, surveys are conducted on days with light winds and clear skies. Surveys are not conducted during periods of rain or snow. This year, routes (both driving and walking) the bulk of the routes were surveyed between March 27 and April 12, 2019. The second repetition for 6 routes was completed from April 13 – 18, 2019.

RESULTS

In total, NCWRC biologists and technicians spent 707 hours and drove 9,750 miles conducting grouse surveys this year. Survey locations can be seen in Figure 1 and categorized as follows:

- 1) surveyed 22 driving routes (378 stations) on two mornings on Nantahala - Pisgah National Forests (501 hours / 5,097 miles),
- 2) surveyed four driving routes (64 stations) on two mornings on state-owned Game Lands in the southern mountains (77 hours / 872 miles), and
- 3) surveyed the 10.8-mile walking survey two times over the course of three mornings on Pond Mountain Game Land in the northern mountains (53 hours / 1,110 miles), and
- 4) reviewed audio files from three sites for drumming grouse (76 hours).

Nantahala – Pisgah National Forest

In 2019, ruffed grouse were monitored by counting drumming males at 378 listening stations distributed across 22 routes on the Nantahala - Pisgah National Forests. All stations were surveyed twice, except four stations that were only surveyed once due to a mid-season road closure. These National Forests are distributed throughout the southern mountains and represent a great deal of potential grouse habitat and hunting opportunity. A total of 82 drumming males were heard from the 751 station-surveys yielding an average of 0.11 grouse drumming/station (95% confidence interval 0.08 to 0.14 grouse/station). While this is slightly higher than drumming rates in 2018, the overall trend in the grouse population has been declining for many years. (Fig. 2).

State-owned Game Lands

NCWRC biologists and technicians surveyed routes on Cold Mountain (24 stations), Needmore (12 stations), Sandy Mush (10 stations), and Silver (18 stations) Game Lands. Grouse were heard drumming nine times on Needmore, twice on Sandy Mush, and once on Silver. No grouse were heard at stations on Cold Mountain. Thus, the overall average number of grouse drumming per station on these state-owned Game Lands was 0.09 grouse/station (95% confidence interval 0.04 to 0.14 grouse/station). This is somewhat higher than the previous the drumming rate of 0.05 grouse/station estimated in 2018, though confidence intervals are very wide and so this increase should be interpreted very cautiously. This suggests the grouse population is still low on these areas. We expect future years of drumming data to be important in identifying population trends on these areas.

Occupancy

Surveying the driving routes twice (instead of only once as in previous years) can offer some additional insight into how much of the area is being used by grouse. Of the 438 stations that were surveyed on two separate mornings, 22 stations had drumming grouse the first morning only, 29 stations had drumming grouse the second morning only, 14 stations had drumming grouse both mornings, and 373 stations had no grouse drumming either morning. Thus overall, we detected drumming grouse at 65 different stations, representing 14.8% of the total stations that were surveyed twice. Surveying the stations additional times would almost certainly increase the occupancy rate, but may be logistically difficult.

Pond Mountain Game Land – Walking Route

NCWRC biologists and technicians surveyed the 10.8-mile route on Pond Mountain Game Land in the northern mountains (Figure 3). Assuming that drumming grouse can be heard from 1/8 of a mile, the survey route gives the opportunity to detect grouse on approximately 1,700 acres. However, it is important to note that not all that area is potential grouse habitat. For logistical reasons, the survey

route follows the main ridge and, in some cases, passes through open fields and mature forest. The entire route was surveyed on April 11, and portions of the route, totaling approximately 8.5 miles, were surveyed on April 2 and 4. In total, we spent approximately 18 man-hours walking the route and listening for drumming grouse. We found drumming grouse at six separate locations along the survey route. One of these was at a location where drumming grouse were encountered during the survey in 2018. We plan to continue this survey, with the same methodology, for one more year at which time we will evaluate whether this technique offers worthwhile insight to the grouse population on Pond Mountain Game Land. If results are encouraging, we may establish similar walking routes on other areas.

Acoustic Recordings

We reviewed 819 four-minute periods of acoustic recordings in total across the three sites. During 182 of these time periods substantial wind or rain kept us from accurately verifying grouse drumming and likely affected grouse behavior as well. We therefore included data from the other 632 time periods in our analyses. We found the highest levels of drumming activity in the two week period from March 29 – April 11 (Figure 4). These data also suggest that drumming activity is highest around sunrise and declines throughout the morning, with very little drumming occurring more than two hours after sunrise (Figure 5). In relation to these acoustically collected data, we evaluated the driving route surveys we have conducted since 2002. In examining our long term data set, we had recorded the time when we surveyed 5,335 stations, with 5,041 (94%) of those occurring within two hours of sunrise. Of the total 12,583 stations that have been surveyed since this survey began, 9,859 were surveyed between March 29 and April 11 of the various years. Thus, we feel our data set and methodology is largely appropriate, but we will continue to use this information to refine and improve the survey.

Walking and Driving Grouse Survey Routes

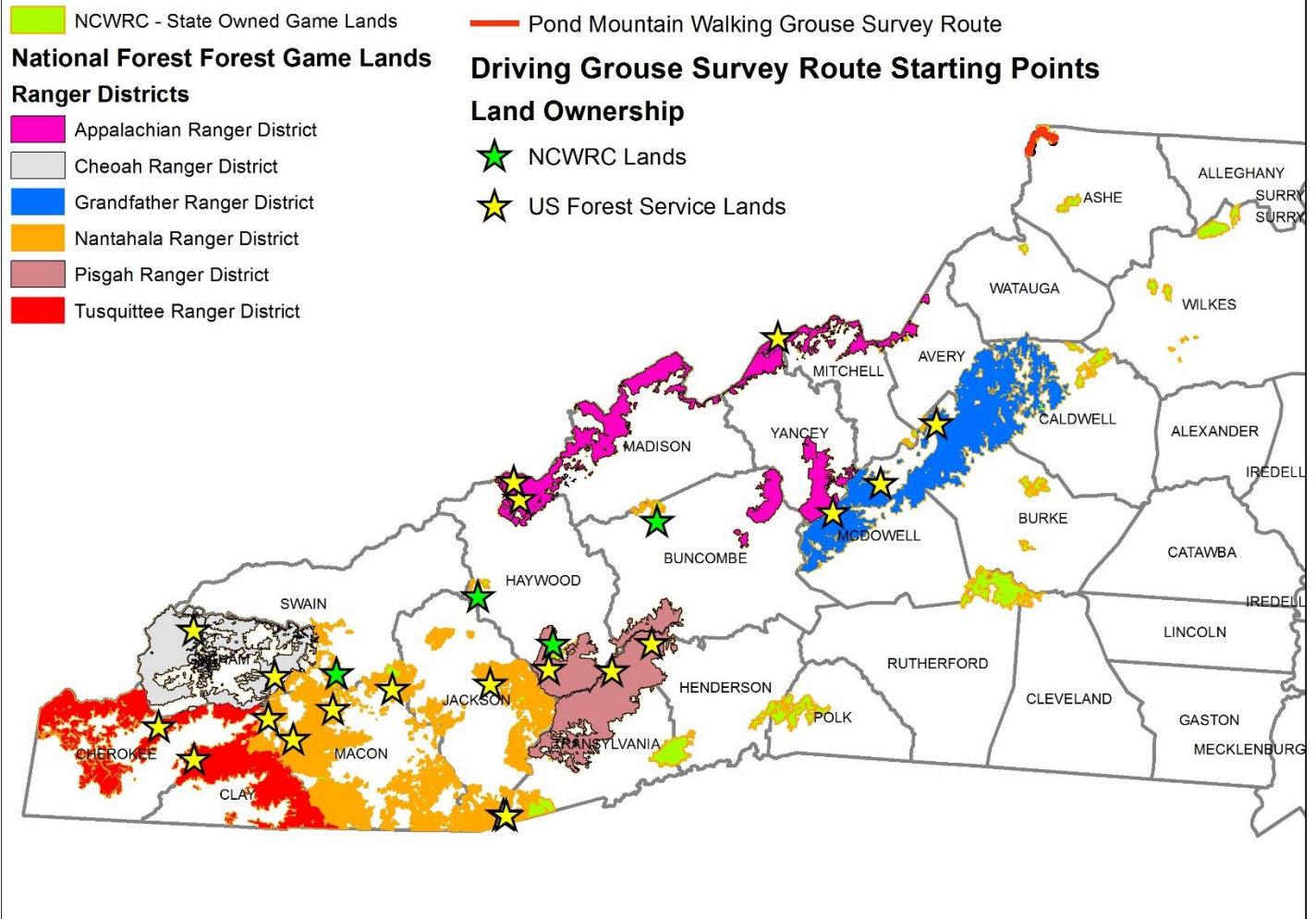


Figure 1. Locations of NCWRC grouse surveys on NCWRC Game Lands and Nantahala – Pisgah National Forests, March 27 – April 18, 2018. (Need to remove Blaze Creek, Rhinehart and add Bent Creek and Horse Cove)

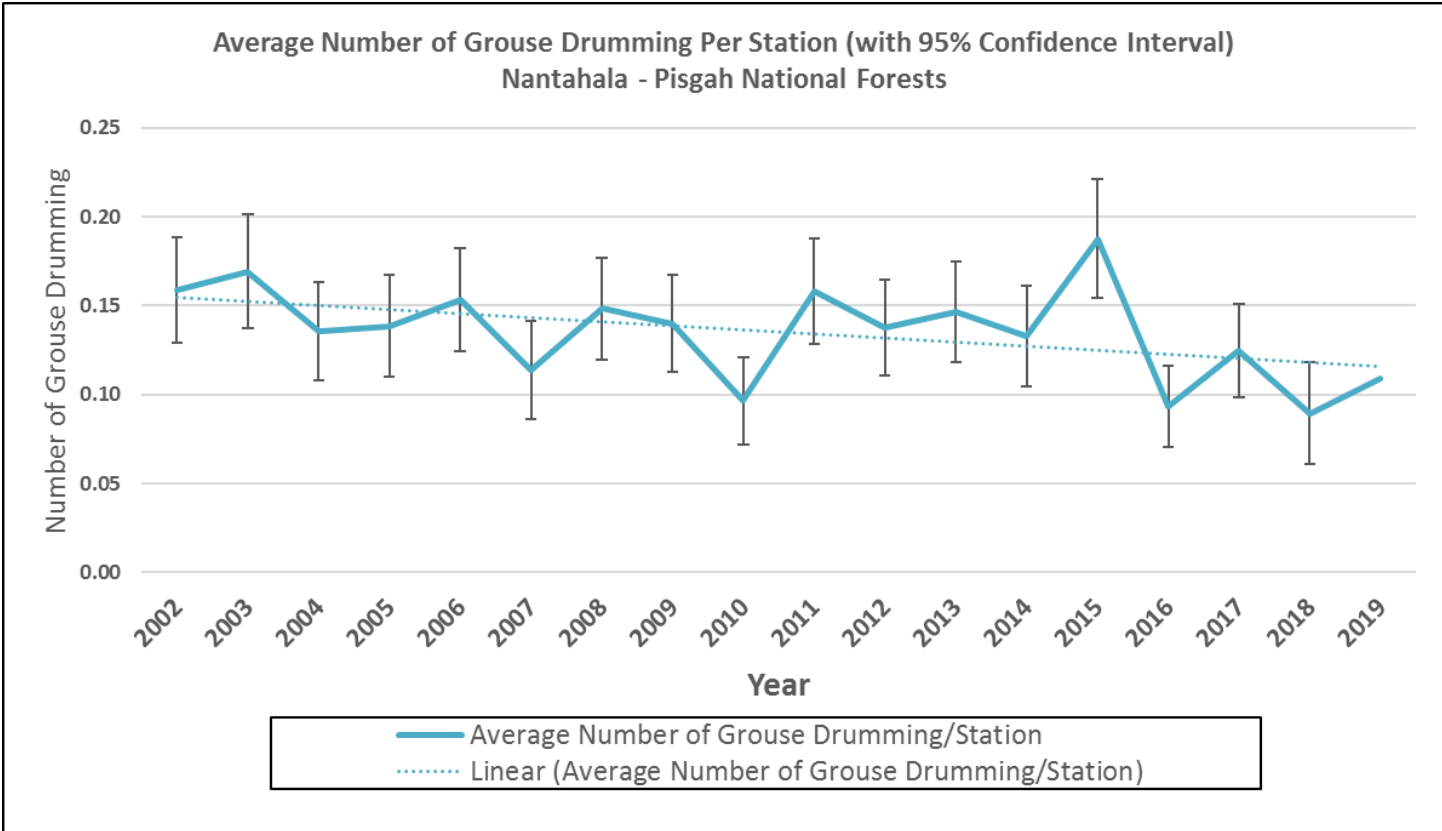


Figure 2. Average Number of Grouse Heard Drumming Per Station on Nantahala – Pisgah National Forests, North Carolina Grouse Drumming Survey, 2002-2019.

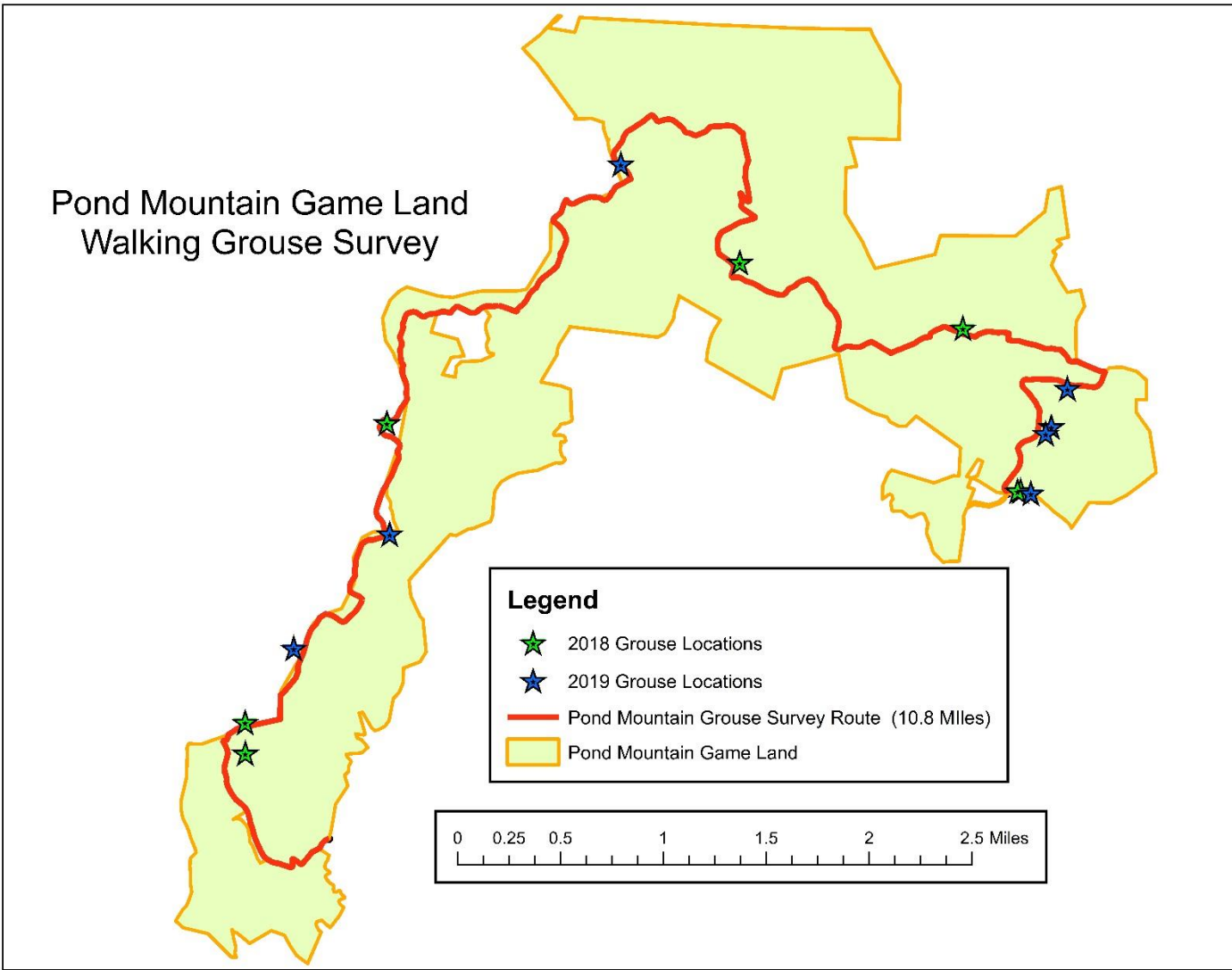


Figure 3. Pond Mountain Game Land grouse survey route and grouse locations, 2018 and 2019.

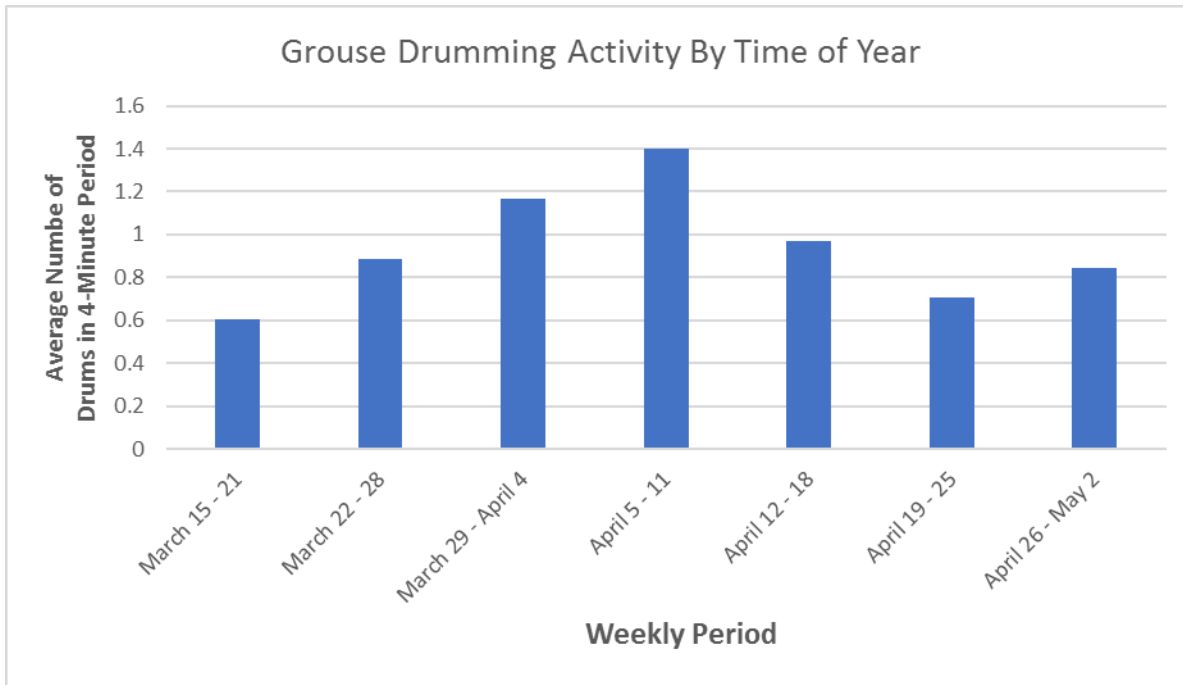


Figure 4. Grouse drumming activity by weekly time periods from acoustic recordings collected at three sites.

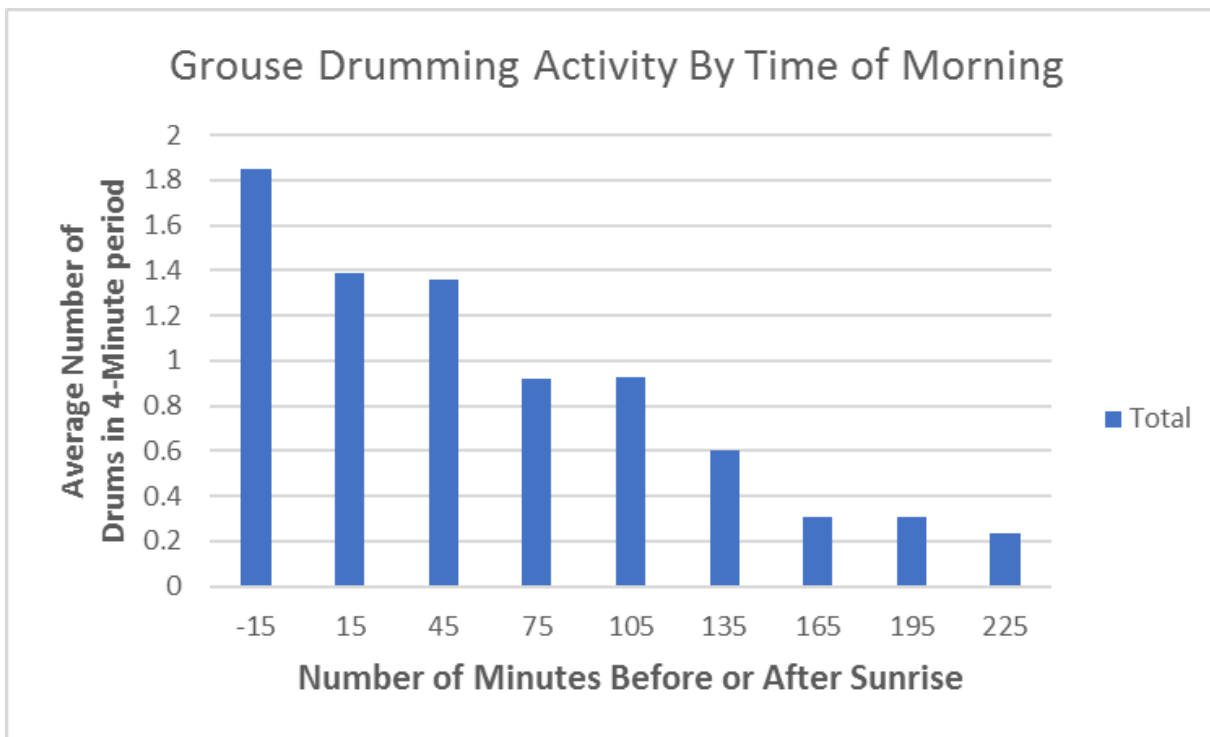


Figure 5. Grouse drumming activity in relation to time of day from acoustic recordings collected at three sites.