Nest attendance patterns in sharp-tailed grouse in western North Dakota

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Introduction

Sharp-tailed grouse (*Tympanuchus phasianellus*) are an important game species in the upper Great Plains and an indicator species of grassland health. Recent land use changes and habitat fragmentation in the region have sparked an interest in understanding the ecology of these ground-nesting birds. In particular, western North Dakota has experienced a variety of disturbances on the landscape relative to gas and oil development. Such landscape alterations can impact grouse behaviors that affect successful survival and reproduction. Nesting behaviors, such as attendance patterns, are one of the least understood aspects of their ecology. Hens must choose how to allocate their time creating a fitness compromise between the health of the hen and the success of the clutch. Recesses are nesting events in which the bird leaves the nest for self-maintenance such as foraging. The ability to accurately assess recess events has been logistically difficult or impossible to evaluate because of the dense vegetation in which they nest and potential negative impacts of human disturbance. Advancements in video technology and the use of 24-hour surveillance cameras have provided researchers with the ability to monitor ground-nesting birds and classify nesting behaviors. Understanding sharp-tailed grouse ecology and constraints in reproduction are important considerations for effective management relative to impacts of gas and oil development.

Objectives

The objective of this study is to examine the potential impacts of gas and oil development on sharp-tailed grouse nesting behaviors including:

1. Number of recess events per day,
   - Hypothesis: Hens at sites with higher oil well densities will leave more frequently during the day due to inadequate forage.
2. Duration in recess events,
   - Hypothesis: Hens at sites with lower oil well densities have shorter recess periods due to adequate forage within close proximity to the nest.
3. Time of day at which recess events occur.
   - Hypothesis: Hens at sites with higher oil well densities will leave around dawn and dusk, with little to no recesses during the afternoon hours.

Field Methods

- Two field sites were selected in Mountrail County in Western North Dakota (Figure 1).
  - Belden: Area inside intense gas and oil development (0.77 oil wells/ km^2).
  - Blaisdell: Area with low gas and oil development (0.006 oil wells/ km^2).
- Female sharp-tailed grouse were captured at the lek and radio-marked (March – May 2012).
- We monitored radio-marked hens during breeding season (May – July 2012) to locate nests.
- We installed miniature 24-hour infrared surveillance cameras (Figure 2) at 63 grouse nests.
  - We reviewed a subset of 27 (Belden= 11, Blaisdell= 16) nests out of 47 nests monitored with cameras from installation until nest succeeded or failed.
  - We recorded the time, duration, and number of recess events per day.
- Recess events defined as:
  - Departure: hen leaves the nest unattended (completely leaves frame)
  - Return: hen sits back down on nest and continues incubation

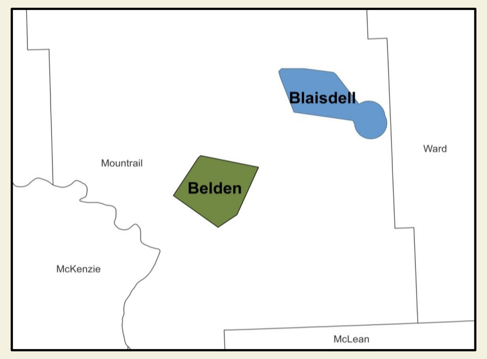

Figure 1: Map of study sites within Mountrail County. Data courtesy of North Dakota Game and Fish. Created by Rebecca Eckroad.

Figure 2: Image of a technician installing surveillance camera on a sharp-tailed grouse nest.

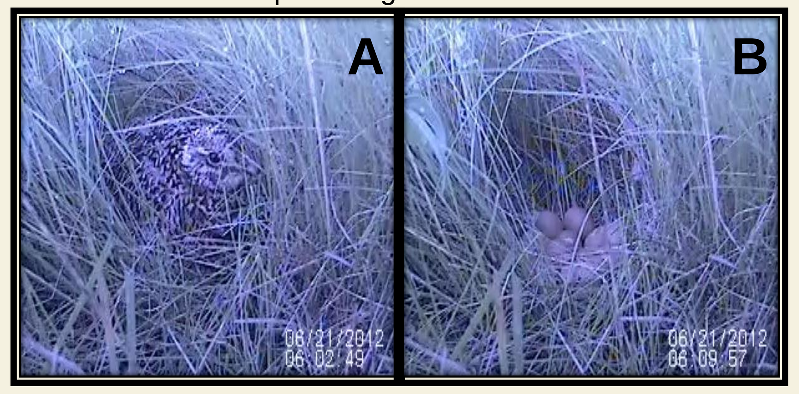

Figure 3: Video images (A) of a sharp-tailed grouse incubating, and (B) of a sharp-tailed grouse nest during a recess event.

Data Analysis

- Summary statistics were calculated for the number of recess events per day and the duration of the event.
- We graphically represent peak times of day in which recess events occurred.

Results

- The duration of incubation recess events appears to be similar between Belden and Blaisdell nests, but recess events at failed nests appeared to be shorter than successful nests (Table 1).
- The number of recess events stay relatively consistent between field sites (Table 2).
- Sharp-tailed grouse hens typically leave the nest for self maintenance and foraging twice per day – once the morning and once in the evening (Figures 1 and 2).

Table 1: Duration of incubation recess events by site and outcome of the nest (n=number of events).

Site	Median	Q1	Q3	n
Belden	**24.98**	**16.60**	**32.97**	**263**
Successful	26.72	18.54	34.43	183
Failed	19.73	6.51	29.65	80
Blaisdell	**26.44**	**17.72**	**34.25**	**210**
Successful	26.75	18.04	33.68	115
Failed	25.83	16.38	34.87	95

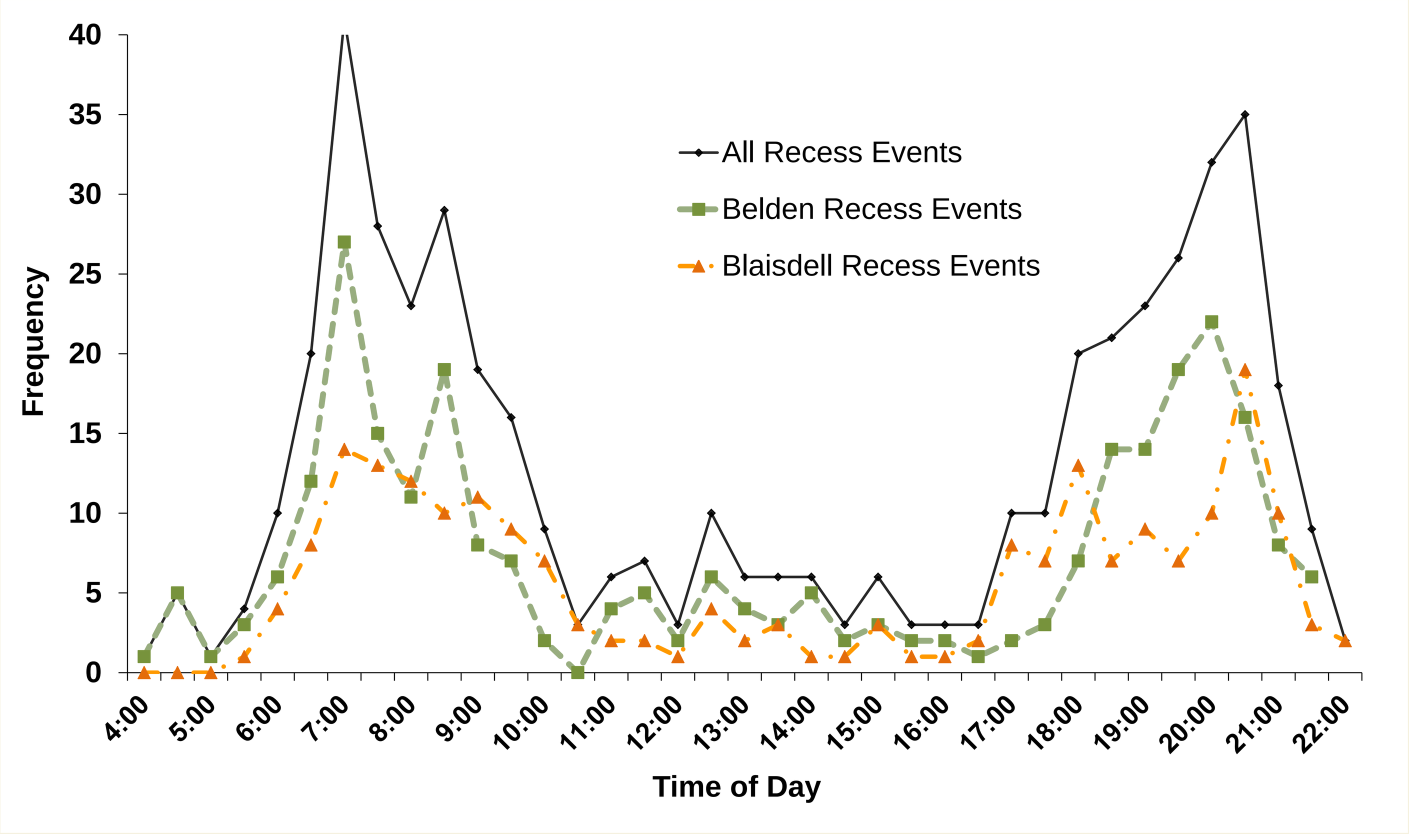

Figure 1: Time of day in which incubation recess events occur for Belden (high intensity gas/oil development; n=285), Blaisdell (low intensity gas/oil development; n=210), and all nests (n=495) (n= number of recess events).

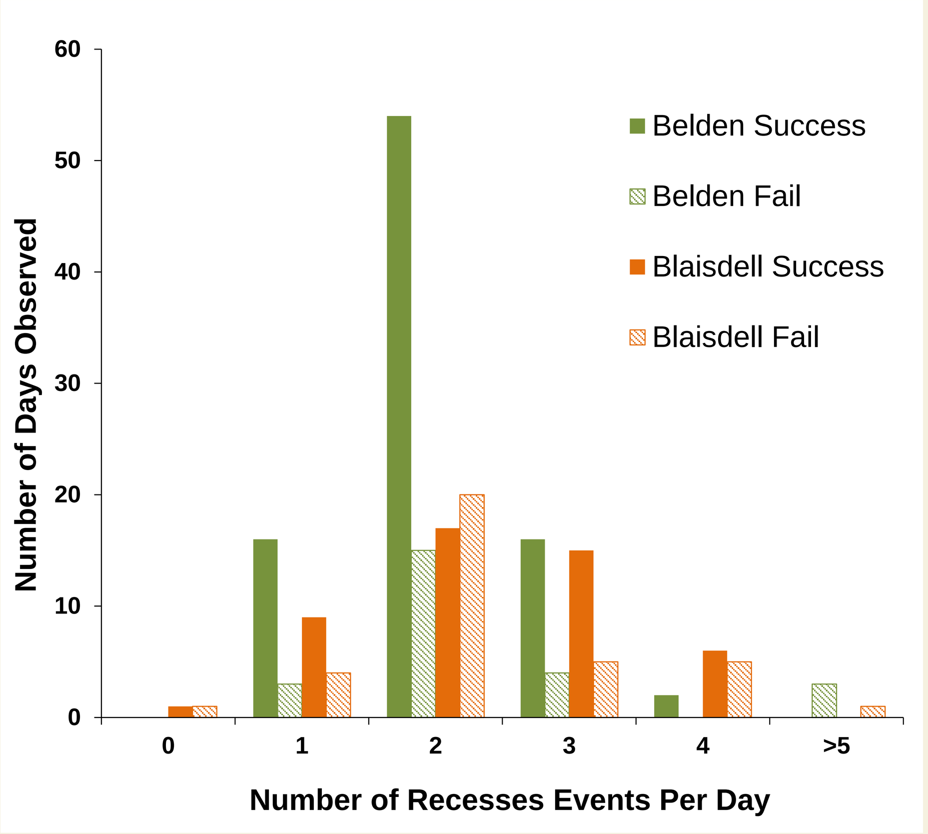

Figure 2: Number of incubation recesses per day by site and nest outcome. Overall: median 2, Q_1= 2, Q_3= 3, n= 197. Belden: median 2, Q_1= 2, Q_3= 2, n= 113. Blaisdell: median 2, Q_1= 2, Q_3= 3, n= 84. (n=incubation days)

Discussion

- At this time, there does not appear to be a difference in incubation recess patterns between field sites with different levels of energy development in western North Dakota.
  - Duration of recess events are very similar between sites with Blaisdell hens taking slightly longer recesses.
- We did not find any apparent differences in the time of day recess events were taken between the two sites.
- Future directions:
  - Continue data collection to increase sample size and include 2013 field season data.
  - Continue evaluation of site-specific factors such as forage quality, predation pressure, landscape composition, and the impact of nest distance to anthropomorphic features (oil wells and pads, roads, etc.).
  - Account for dependence in the data from repeated sampling of a single hen using a formal regression analysis, and evaluate potential spatial dependency between the study sites and among the nests.

Acknowledgements

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