The Effects of Oil Drilling Noise on Reproductive Success of Chestnut-collared Longspur (*Calcarius ornatus*) in Western Canada

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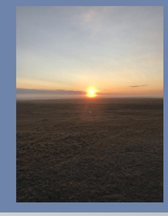


Introduction

- North American songbirds are declining with a > 40% drop in abundance since 1970 [1]. One of the most effected habitats is prairie grasslands [1].
- Chestnut-collared longspurs (*Calcarius ornatus*) are declining in North America by 4.3% per year 1966-2017 [2].
- Causes for the Chestnut-collared Longspur decline include
  - shortgrass prairie habitat conversion to cropland [3].
  - anthropogenic (man-made) noise created by oil wells, drilling and service roads disrupting bird communication thereby decreasing reproductive success [4,5].
- Some birds are better able to adapt to consistent anthropogenic noise rather than inconsistent noise [6]. Drilling noise is inconsistent and at a higher frequency than other sources of noise, possibly leading to lower reproductive success [4]. It is unknown if drilling noise effects Chestnut-collared Longspur reproduction success.
- This research will specifically be looking at whether drilling noise from oil infrastructure affects reproductive success by comparing the amount and quality of parental care given to nestlings from nests in the presence and absence of drilling noise.

Hypothesis

Hypothesis: If the drilling noise is harmful to the reproductive success, then we would predict that nests closer to the drilling noise would have decreased feeding rates, lower quality fledglings, and fewer fledglings compared to nests further from or without drilling noise.

Methods

Study design

- Field research was conducted 50- 70 km outside of Brooks, Alberta, Canada. A total of 9 study sites were used, each site was 800x800 m.
- Study sites were grouped into 3 groups. Each group of 3 contained a control site with no noise and no infrastructure, a silent site with infrastructure and no noise, and a drilling site with infrastructure and drilling noise. The drilling recording was played for 10 days on and then 10 days off [7], repeated three times.

Control Silent Drilling

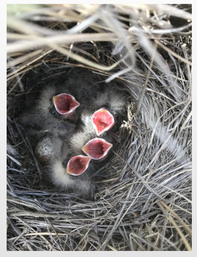
Figure 2. Explanation of plot conditions.

Cameras

- Each site was searched periodically for chestnut-collared longspur nests by using behavioural cues of the parents. Cameras were placed at nests (no closer than 20 cm) with nestlings to measure the parental feeding rate.
- Nests were watched for parental return behavior to ensure the nest did not become abandoned. Camera were taken down on any nests that did not display parental return behaviour [8].
- Nests were checked every 3 days to ensure that the nestlings/eggs were still alive and to check on their development. Any nests that failed because of predation or abandonment were recorded as well as any successful nests.
- Nestlings were temporarily removed on day 7 to be banded and measured.[9]

Video analysis

- Videos of the nests were analysed by recording the duration of visits by parents, number of feedings and the sex of the parent. Videos were analysed in 3-hour periods of the day, one in the morning, afternoon and evening.
- The hours within those periods was determined by a random number generator associated to assigned times. Videos were watched using VLC media player.

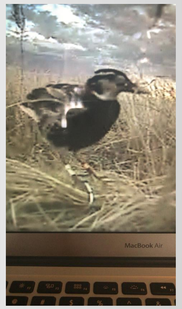


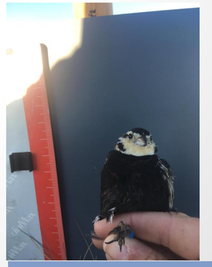
Management Implications

- There are several management implications of this research like:
  - Temporarily placing sound barriers around drilling sites during the breeding season.
  - Refraining from drilling during the breeding season.
  - Relocating drilling sites away from breeding Chestnut-collared longspurs.

Next Steps

- Analyse data
- Create policies to inform oil companies





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