



## TECHNICAL MEMORANDUM

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**Date:** June 20, 2022

**To:** Crowned Ridge Wind I, LLC  
Crowned Ridge Wind II, LLC

**From:** Kurt Smith, Carly Stumpner, and Chad LeBeau, Western EcoSystems Technology, Inc.

**Subject:** Crowned Ridge I and II Sharp-Tailed Grouse Lek Survey and Capture Report

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### INTRODUCTION

Crowned Ridge Wind I, LLC (CRI), an indirect, wholly owned subsidiary of NextEra Energy Resources, LLC (NEER), constructed the Crowned Ridge I Wind Project (CRI) in Grant and Codington counties, South Dakota. Construction began on 200 megawatts (MW) of the permitted 300 MW in August 2019 and began commercial operations in December 2019. Crowned Ridge Wind II, LLC (CRII), a wholly owned, indirect subsidiary of NEER, began constructing the Crowned Ridge II Wind Project (CRII) immediately to the south of the CRI boundary in May 2020 and began commercial operations in December 2020. Shortly after CRII began commercial operation, ownership of CRII was transferred from NEER to Northern States Power Company. CRI worked collaboratively with South Dakota Game, Fish and Parks (SDGFP) to develop a Grouse In Lieu Mitigation Plan (Mitigation Plan; Crowned Ridge Wind, LLC 2019a, 2019b). The Mitigation Plan incorporated the approved lek monitoring study plan and a robust telemetry study to better understand the effects of wind energy on prairie grouse populations, with the overall goal of informing future siting and permitting decisions.

While some information exists on the potential impacts of wind energy development, no studies have directly measured potential impacts to plains sharp-tailed grouse (STGR; *Tympanuchus phasianellus jamesi*) from wind energy infrastructure. The presence of known STGR within CRI and CRII (hereafter, Projects) and the high probability of lek occurrence surrounding the Projects (Runia et al. 2021), provides a valuable opportunity to evaluate the potential effects of wind energy development on STGR. Understanding how STGR respond to wind energy projects could lead to the development of focused avoidance, minimization, and mitigation measures that benefit all stakeholders and the conservation of these prairie grouse.

### Objectives

The overall goal of this study is to quantify the effects of wind energy development on STGR seasonal habitat selection and demography over a 3-year period. Specifically, the study will analyze spatial and demographic data collected from lek trends and marked individuals. The study

was designed to collect pre- and post- construction data along a gradient from wind turbines over a period that includes construction and operations for multiple STGR breeding cycles. Specifically, the objectives are:

- 1) Predict the relative probability of habitat selection to estimate potential displacement effects and impacts to habitat connectivity associated with the Projects using prairie grouse use locations and habitat data.
- 2) Predict nest, brood, and annual adult survival relative to the Project's infrastructure.
- 3) Investigate the possibility of estimating population growth rates relative to the Project's infrastructure by incorporating the results from the displacement, survival, and lek trend analyses to provide an overall understanding of the effects on population viability.

These objectives necessitated capturing and marking of STGR from leks observed in and around the Projects, and monitoring marked STGR using Global Positioning System (GPS) technology. An important component of these objectives includes monitoring historic leks and surveying for previously unknown leks within six miles (mi; 10 kilometers [km]) of the Projects. The data collected will provide detailed information on STGR habitat selection, survival, and movements in and around the Projects and associated infrastructure that can be used to achieve the objectives stated above. The purpose of this report is to summarize the lek survey and capture efforts during the 2022 breeding season at the Projects, in accordance with the Mitigation Plan.

## **METHODS**

To meet the objectives of the study plan and Mitigation Plan, lek monitoring occurred at historical leks identified within the Projects, searches for previously undocumented leks occurred within and outside the Projects, and captures occurred at active leks identified within and outside the Projects where landowner permission was granted. The methods followed the methods outlined in the lek monitoring study plan and Mitigation Plan (Crowned Ridge Wind, LLC 2019a, 2019b).

### **Lek Counts and Surveys**

Pre-construction lek surveys, along with historic lek locations provided by the SDGFP, revealed eight STGR leks inside the Projects boundaries and 11 leks within six mi of the Project boundaries (19 total leks). In addition, biologists located 12 previously undocumented leks using ground-based and helicopter surveys. Biologists conducted ground-based lek counts during three to four occasions at all known leks during the 2022 lekking period. Counts were spaced approximately seven days apart and occurred between 30 minutes (min) before sunrise and 90 min after sunrise. Observers scanned each lek for a minimum of 10 min and counted the total number of individuals and species attending the lek. In the event a known lek was not located, observers searched within 1.2 mi (1.9 km; when landowner access was possible) to determine if the lek moved. The 1.2-mi search area was based on inter-annual movement of lek locations documented in prairie grouse populations (Hovick et al. 2015). Lek counts were only conducted when conditions included clear to partly cloudy skies, wind speeds less than 20 mi (32 km) per hour, and no moderate or heavy precipitation.

### **Sharp-tailed Grouse Capture**

STGR were captured on and near leks using walk-in drift traps during the spring lekking period, March – late April (Haukos et al. 1990). All STGR were sexed, aged, and fitted with a GPS-Ultra High Frequency (UHF) solar-powered telemetry unit with a modified rump-mounting harness (Bedrosian and Craighead 2009). Our goal was to maintain a sample size of 60 individuals entering the 2022 field season. Female STGR were targeted for captures, and males were targeted after peak female lek attendance passed. We used Ecotone Harrier GPS-UHF units (Saker GPS-GSM model L) that were approximately 0.6 ounces (17.0 grams) in mass (less than 3% of STGR body weight; Figure 1). Travis Runia, the senior upland game biologist with the SDGFP, reviewed and approved all capture and handling procedures and collection under a scientific collection permit (Permit No. 14).



**Figure 1. A Female sharp-tailed grouse (STGR) fitted with a Global Positioning System unit. Photo credit: Hilary Morey, South Dakota Game, Fish and Parks.**

## RESULTS

### Lek Counts and Surveys

Biologists located one previously unknown lek while conducting ground-based surveys in 2022. We obtained landowner permission to survey 26 of the 31 historic leks and leks identified in 2020, 2021, and 2022 (Table 1, Figure 2). Lek counts occurred between March 22 and April 25, 2022. Of the 26 leks where landowners granted access in 2022, 20 were active during at least one visit. The mean count of STGR at leks was nine individuals (Figure 3; range: 1–29).

**Table 1. Summary of sharp-tailed grouse (STGR) lek attendance near the Crowned Ridge I and Crowned Ridge II Wind Projects during the 2020, 2021, and 2022 breeding seasons.**

Lek Number	Status	Max Count 2020 <sup>a</sup>	Max Count 2021 <sup>a</sup>	Max Count 2022 <sup>a</sup>
1	Historic	2 (0–2)	6 (0-6)	2 (0-2)
2	Historic	NA <sup>c</sup>	NA <sup>c</sup>	NA <sup>c</sup>
3	Historic	0	0	10 (0-10)
4	Historic	2 (0–2)	7 (0-7)	3 (0-3)
5	Historic	22 (18–22)	22 (14-22)	17 (10-17)
6	Historic	2 (0–2)	0	6 (0-6)
7	Historic	0	0	0
8	Historic	NA <sup>c</sup>	NA <sup>c</sup>	0
9	Historic	5 (1–5)	12 (7-12)	10 (0-10)
10	Historic	0	2 (0-2)	4 (0-4)
11	Historic	12 (0–12)	26 (19-26)	7 (6-7)
12	Historic	NA <sup>c</sup>	NA <sup>c</sup>	NA <sup>c</sup>
13	Historic	0	0	0
14	Historic	3 (0–3)	8 (0-8)	0
15	Historic	NA <sup>c</sup>	NA <sup>c</sup>	29 (12-29)
16	Historic	11 (8–11)	13 (12-13)	13 (7-13)
17	Historic	0	6 (0-6)	0
18	Historic	NA <sup>c</sup>	4 (2-4)	6 (0-6)
19	Historic	NA <sup>c</sup>	NA <sup>c</sup>	1 (0-1)
20	Located in 2020	7 (5–7)	1 (0-1)	5 (0-5)
21	Located in 2020	23 (18–23)	31 (24-31)	17 (13-17)
22	Located in 2020	5 (3–5)	NA <sup>c</sup>	NA <sup>c</sup>
23	Located in 2020	6 (1–6)	2 (0-3)	0
24	Located in 2020	5 <sup>b</sup>	6 (0-6)	7 (0-7)
25	Located in 2020	9 <sup>b</sup>	NA <sup>c</sup>	NA <sup>c</sup>
26	Located in 2020	5 <sup>b</sup>	NA <sup>c</sup>	29 (5-29)
27	Located in 2020	4 <sup>b</sup>	13 (0-13)	10 (0-10)
28	Located in 2020	9 <sup>b</sup>	NA <sup>c</sup>	14 (14-17)
29	Located in 2020	5 (1–5)	NA <sup>c</sup>	NA <sup>c</sup>
30	Located in 2020	16 (12–16)	8 (5-8)	9 (5-9)
32	Located in 2022	NA	NA	28 (18-28)

<sup>a</sup> Range of counts in parenthesis.

<sup>b</sup> Located via helicopter survey and WEST was unable to obtain landowner permission for subsequent visits

<sup>c</sup> No landowner permission

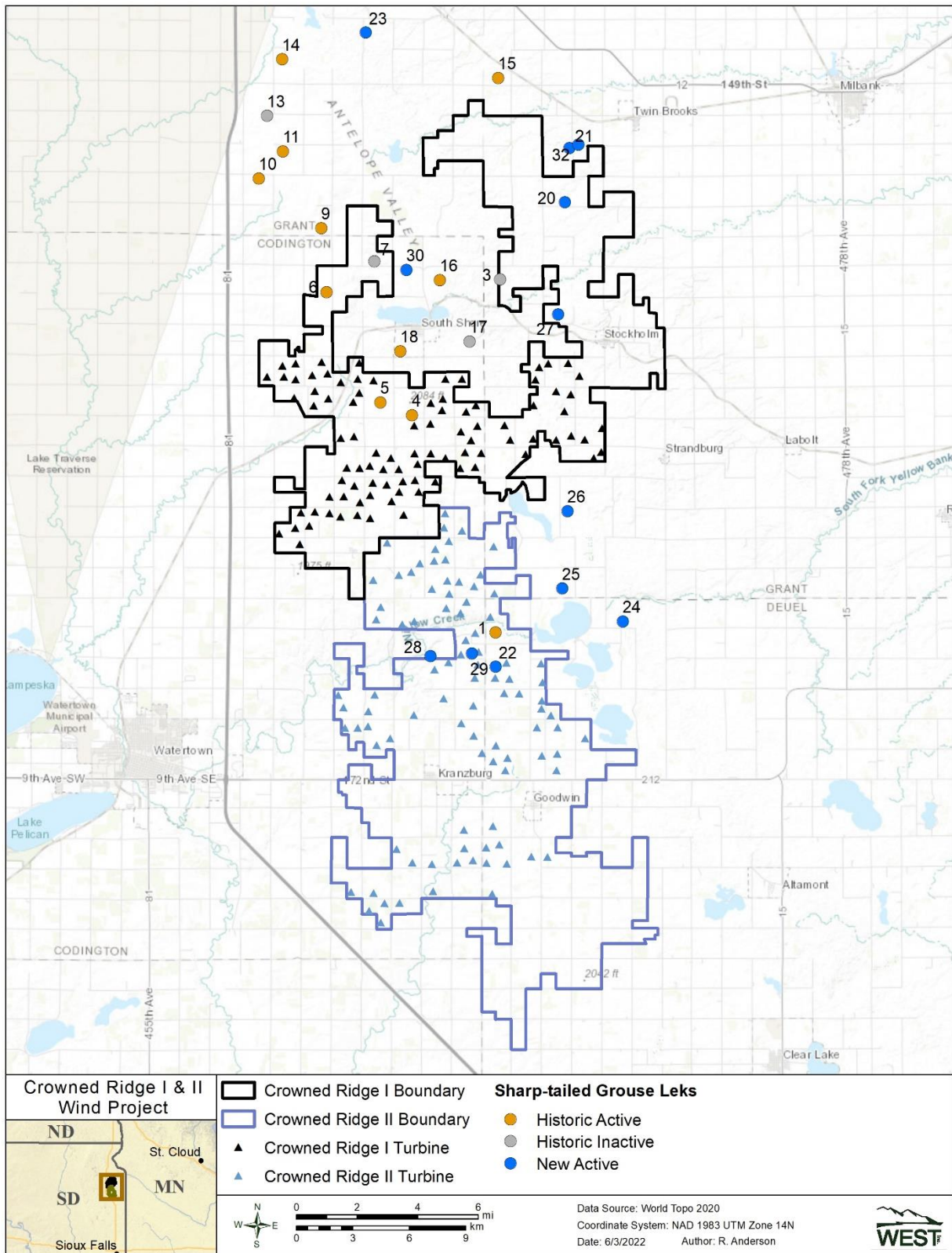


Figure 2. Known historic active (orange circles), historic inactive (grey circles), and identified in 2020 – 2022 (blue circles) sharp-tailed grouse leks near the Crowned Ridge I and Crowned Ridge II Wind Projects surveyed during the 2022 breeding season.



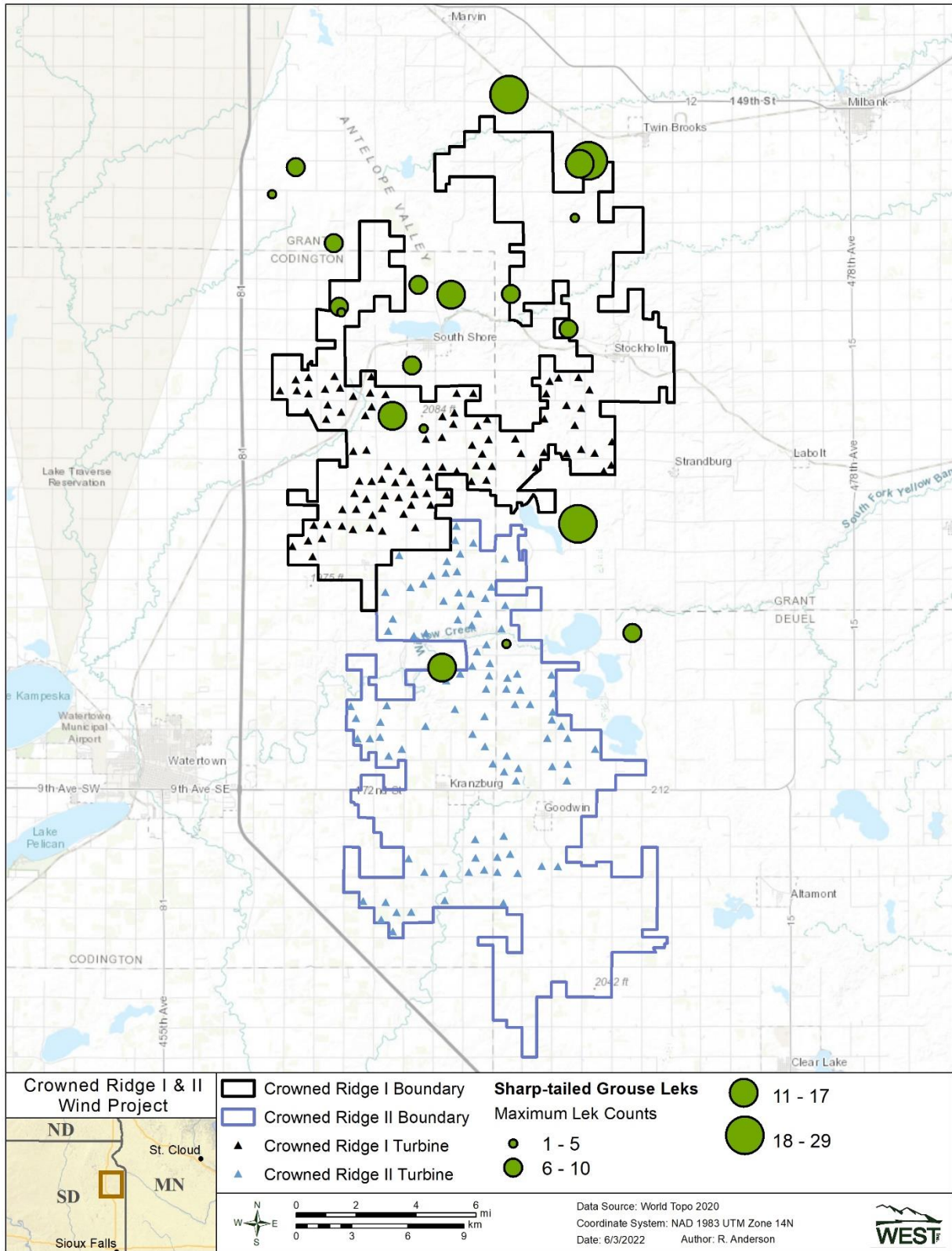


Figure 3. Maximum lek counts at sharp-tailed grouse leks for the Crowned Ridge I and Crowned Ridge II Wind Projects surveyed during the 2022 breeding season.

### Sharp-tailed Grouse Captures

We captured STGR at six leks between April 3 and April 27, 2022 (Table 2). We captured the majority of STGR at Lek 5 and Lek 32, located in the south central portion of CRI and northeast of CRI, respectively. Overall, we placed 42 telemetry units on 26 females and 16 males (Table 2).

**Table 2. Summary of sharp-tailed grouse (STGR) captures during the 2020, 2021 and 2022 breeding seasons at the Crowned Ridge I and Crowned Ridge II Wind Projects.**

Lek Number	# Females	# Males	Capture Dates
<b>2020</b>			
5	15	5	3/29/2020 – 4/22/2020
9	1	2	4/22/2020 – 4/24/2020
16	3	0	3/30/2020 – 4/21/2020
20	4	0	3/30/2020 – 4/4/2020
21	21	0	3/30/2020 – 4/17/2020
30	7	3	4/13/2020 – 4/24/2020
<b>2021</b>			
5	15	1	4/3/2021 – 4/18/2021
11	9	2	4/3/2021 – 4/19/2021
16	10	1	4/4/2021 – 4/17/2021
21	15	0	4/3/2021 – 4/11/2021
<b>2022</b>			
5	17	2	4/4/2022 - 4/26/2022
11	1	3	4/3/2022 - 4/26/2022
16	1	1	4/9/2022 - 4/24/2022
21	0	0	4/6/2022 - 4/21/2022
30	1	2	4/17/2022 - 4/24/2022
32	6	8	4/19/2022 - 4/27/2022

### CONTINUING EFFORTS

This report is intended to provide a progress update and satisfy reporting requirements outlined in the Mitigation Plan for the Projects. This report has addressed 2022 lek survey and capture efforts, and ongoing field efforts are underway to continue to address objectives of the Mitigation Plan. Since our initial 2020 capture effort, we have continued to monitor individuals marked with GPS-UHF solar-powered units. To date, nine nest have been identified in 2022. We will continue to closely monitor marked individuals, especially females, to monitor nest initiation, nest fate, and fate of broods from females with successfully hatched nests through the breeding season. An additional report summarizing breeding metrics (nesting, brooding, and survival) and telemetry statistical analyses will be provided by January 31, 2023.

## REFERENCES

- Bedrosian, B. and D. Craighead. 2009. Solar Powered GPS Transmitter Use on Sage Grouse: Methods of Attachment, Influences of Survival, and Success Rates of the Transmitters. July 22, 2009. Craighead Beringia South, Kelly, Wyoming. Available online: [https://www.fs.fed.us/t-d/programs/im/satellite\\_gps\\_telemetry/assets/Grouse%20GPS%20Attachment\\_Craighead%20Beringia%20South.pdf](https://www.fs.fed.us/t-d/programs/im/satellite_gps_telemetry/assets/Grouse%20GPS%20Attachment_Craighead%20Beringia%20South.pdf)
- Crowned Ridge Wind, LLC. 2019a. Technical Memorandum: Crowned Ridge I Grouse Lek Monitoring Study Plan. Prepared for South Dakota Public Utilities Commission. Prepared by Crowned Ridge Wind, LLC; South Dakota Game, Fish, and Parks; SWCA Environmental Consultants; and Western Ecosystems Technology, Inc. October 29, 2019. Available online: <https://puc.sd.gov/commission/dockets/electric/2019/EL19-003/grouse.pdf>
- Crowned Ridge Wind, LLC. 2019b. Technical Memorandum: Permit Condition 45 Crowned Ridge I: In Lieu Mitigation Plan. Prepared for South Dakota Public Utilities Commission. Prepared by Crowned Ridge Wind, LLC; South Dakota Game, Fish, and Parks; and Western Ecosystems Technology, Inc. December 6, 2019. Available online: <https://puc.sd.gov/commission/dockets/electric/2019/el19-003/grousemig.pdf>
- Esri. 2022 World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software. Redlands, California. Available online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- Haukos, D. A., L. M. Smith, and G. S. Broda. 1990. Spring Trapping of Lesser Prairie-Chickens. *Journal of Field Ornithology* 61(1): 20-25.
- Hovick, T. J., B. W. Allred, R. D. Elmore, S. D. Fuhlendorf, R. G. Hamilton, and A. Breland. 2015. Dynamic Disturbance Processes Create Dynamic Lek Site Selection in a Prairie Grouse. *PLoS ONE* 10(9):e0137882.
- Runia, T. J., A. J. Solem, N. D. Niemuth, and K. W. Barnes. 2021. Spatially Explicit Habitat Models for Prairie Grouse: Implications for Improved Population Monitoring and Targeted Conservation. *Wildlife Society Bulletin* 45(1):36–54.