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TECHNICAL MEMORANDUM

Date: June 15, 2021

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

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

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

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 Crowned Ridge II Wind Project (CRII) immediately to the south of the CRI project boundary during the study period 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 the 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 three-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 include:

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 infrastructure.
3) Investigate the possibility of estimating population growth rates relative to the Project 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, marking, and monitoring of approximately 60 STGR from leks observed in and around the Projects 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 2021 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 11 previously undocumented leks with ground-based and helicopter surveys during the 2020 field season. Biologists conducted ground-based lek counts during three to four occasions at all known leks during the 2021 lekking period. Counts were spaced approximately seven days apart and occurred between 30 minutes before sunrise and 90 minutes after sunrise. Observers scanned each lek for a minimum of 10 minutes 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/hour (32 km/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 2021 field season. Female STGR were targeted for captures. 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% body weight; Figure 1). Travis Runia, the senior upland game biologist with SDGFP, reviewed and approved all capture and handling procedures and collection under a scientific collection permit (Permit No. 14).

RESULTS

Lek Counts and Surveys

We obtained landowner permission to survey 20 of the 30 historic leks and leks identified in 2020 (Table 1, Figure 2). Lek counts occurred between March 24 and April 23, 2021. Of the 20 leks where landowners granted access, 17 were active during at least one visit. The mean count of STGR at leks was eight individuals (Figure 3; range = 1–31). Leks 4 and 5, two historic leks within CRI (Figure 2) were active during the 2021 lekking period.

Sharp-tailed Grouse Captures

We captured STGR at four leks between April 3 and April 19, 2021 (Table 2). We captured the majority of STGR at Lek 5 and Lek 21 located in the south central portion of CRI and northeast of CRI, respectively. Overall, we placed 53 telemetry units on 49 females and four males (Table 2).

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 2021 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, we have identified 24 nests in 2021. 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. In July 2021, we will conduct an aerial telemetry flight to locate and determine the status of any birds we have lost a signal on or have been unable to locate while conducting field surveys via telemetry.

An additional report summarizing breeding metrics (nesting, brooding, and survival) and telemetry statistical analyses will be provided by January 31, 2022.

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Table 1. Summary of sharp-tailed grouse (STGR) lek attendance near the Projects during the 2020 and 2021 breeding seasons.

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

[a] Range of counts in parenthesis.

[b] Located via helicopter survey and was unable to obtain landowner permission for subsequent visits

[c] No landowner permission

Table. 2. Summary of sharp-tailed grouse (STGR) captures during the 2020 and 2021 breeding seasons.

Lek number	# Females	# Males	Capture Dates
		2020	
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
		2021	
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

Figure 1. A Female sharp-tailed grouse (STGR) captured at the Projects and fitted with a Global Positioning System Unit.

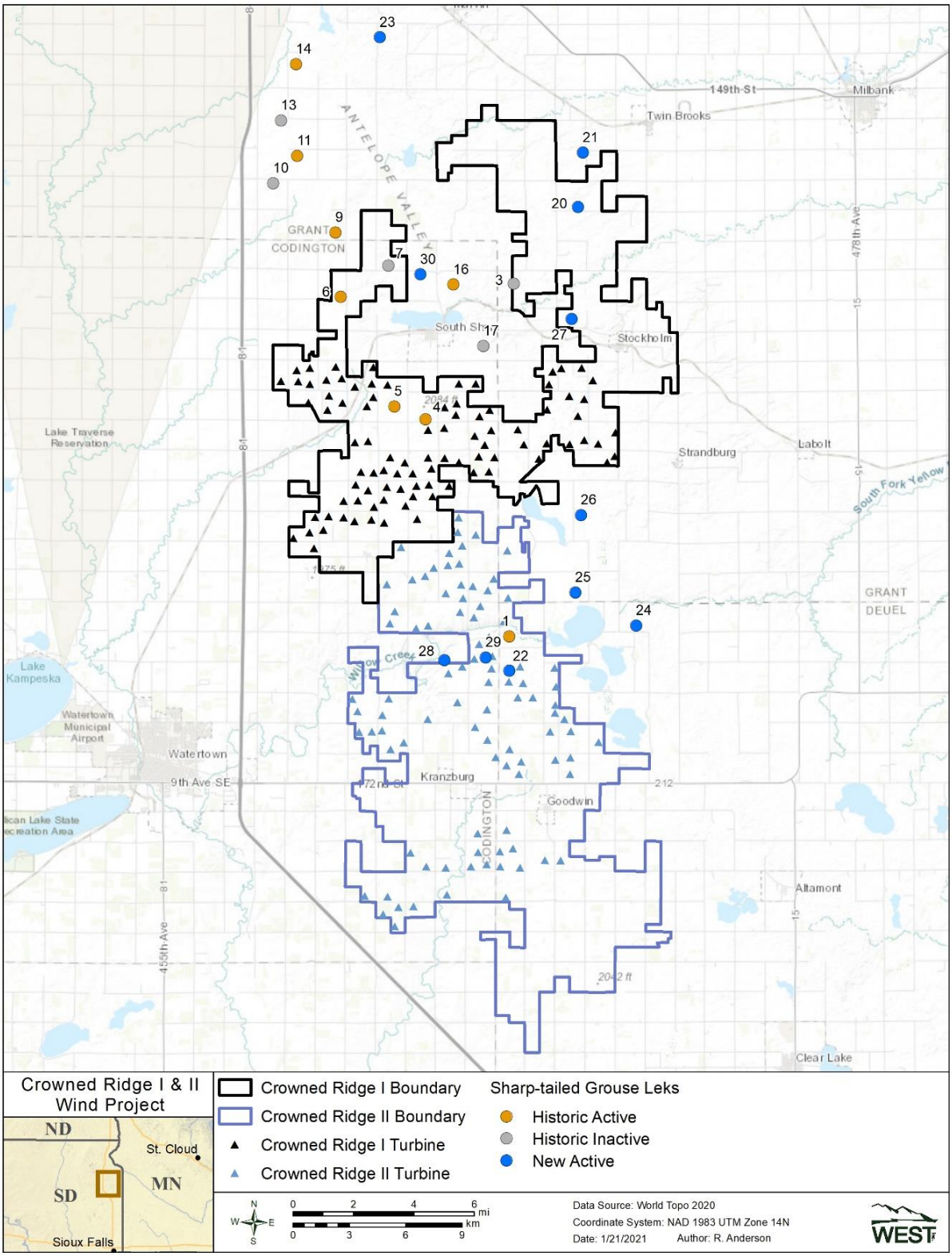

Figure 2. Known historic active (orange circles), historic inactive (grey circles), and identified in 2020 (blue circles) sharp-tailed grouse (STGR) leks within Crowned Ridge I and Crowned Ridge II Wind Project boundaries surveyed during the 2021 breeding season.

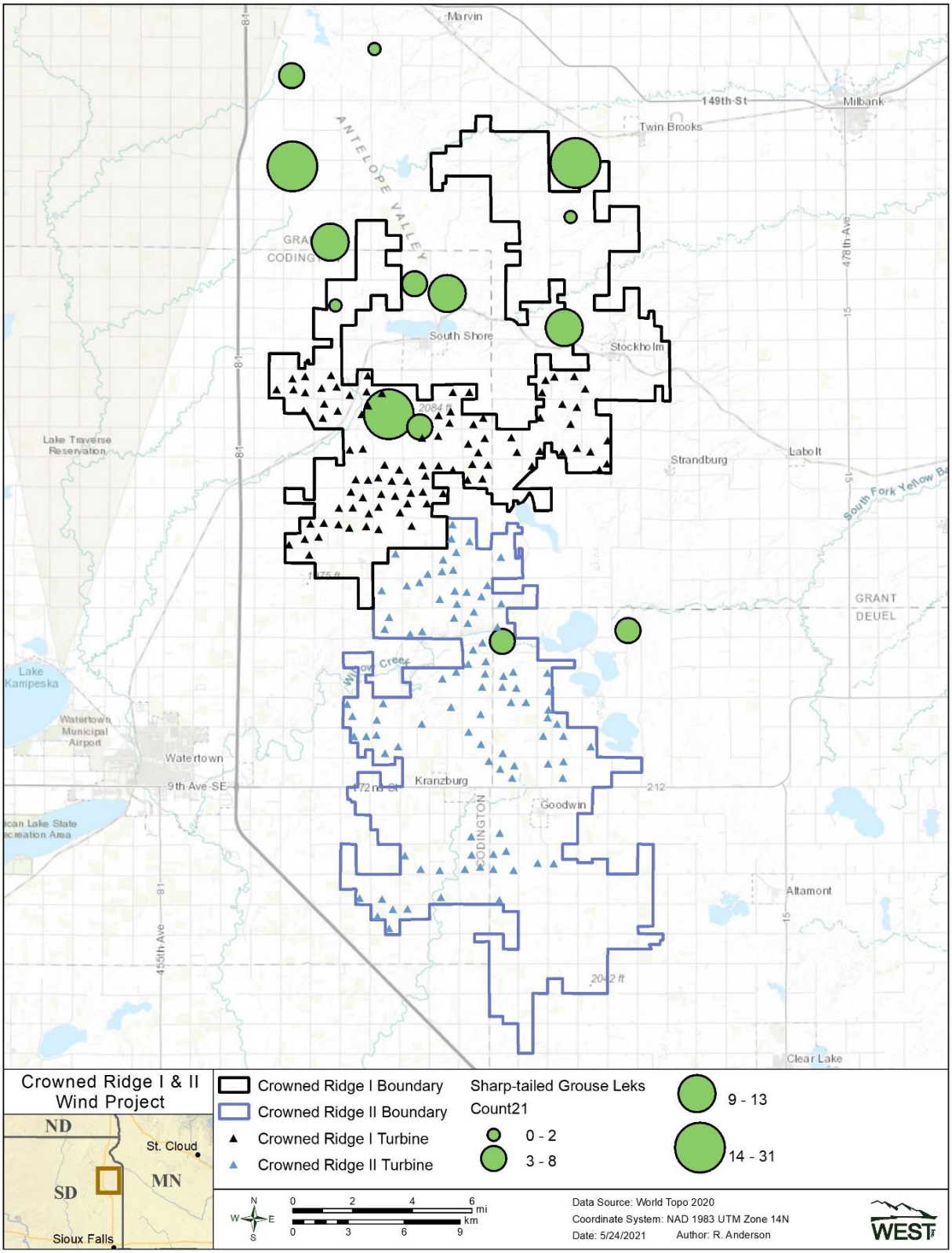

Figure 3. Maximum lek counts at sharp-tailed grouse (STGR) leks within Crowned Ridge I and Crowned Ridge II Wind Project boundaries surveyed during the 2021 breeding season.