# APPENDIX K

# Prairie Grouse Lek Survey Report

# Prairie Grouse Lek Survey

# Philip Wind Project

# Haakon County, South Dakota

## Final Report

## March – May 2023

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# 1 INTRODUCTION

Philip Wind Partners, LLC (Philip Wind) is proposing to develop the Philip Wind Project (Project) in Haakon County, South Dakota. Philip Wind contracted Western EcoSystems Technology, Inc. (WEST) to conduct aerial and ground lek surveys for prairie grouse (sharp-tailed grouse [STGR; *Tympanuchus phasianellus*] and greater prairie-chicken [GRPC; *T. cupido*]) throughout the August 2022 Project Area and the Study area, a separate 2.0-mile (mi) buffer around the Project Area (Figure 1.1). Surveys were conducted following guidance from the South Dakota Department of Game, Fish, and Parks (SDGFP) *Management of Prairie Grouse in South Dakota* (SDGFP 2022) and aligned with objectives in the *Prairie Grouse Action Plan for South Dakota 2023-2027* (SDGFP 2023a), and written guidance provided by SDGFP on March 13, 2023, prior to the start of surveys.

Two species of prairie grouse reside within South Dakota, the STGR and GRPC (SDGFP 2023a). Both species are known for their charismatic breeding behavior in which male prairie grouse congregate at communal mating grounds (leks) to perform elaborate displays for females. Male prairie grouse typically return to the same lek annually, making counts of leks a useful index for monitoring changes in population abundance from year to year (SDGFP 2022). Lek activity peaks during late March to mid-April, nesting begins early to mid-April, and the brood-rearing period is June and July (SDGFP 2022).

Both species require large amounts of grassland in the landscape to persist and are sensitive to habitat fragmentation (Bakker 2020). Grasslands with a diversity of plant types, including grass, shrubs, and forbs, provide the best nesting habitat, whereas broods depend on areas with abundant forbs and insects and a mix of cover types for protection. STGR inhabit open grasslands mixed with shrubs and wooded draws. GRPC use areas with taller grass within mixed-grass prairies and pastures. Due in part to their sensitivity to habitat fragmentation, GRPC are designated a Species of Greatest Conservation Need and both GRPC and STGR are considered conservation Priority Level I species by SDGFP (Bakker 2020).

The objective of the survey was to locate prairie grouse leks within the Project and Study areas and, to the extent possible, record the species and number of birds observed at each lek. Results from this survey provide baseline information on the location of prairie grouse leks. This report presents results of the lek surveys conducted for Philip Wind during March–May of 2023.

# 2 PROJECT AREA

The Project is located approximately 14 mi north of the city of Philip in Haakon County, South Dakota (Figure 1.1). The Project Area encompasses approximately 68,318 acres (ac) within two level IV ecoregions: the Sub-humid Pierre Shale Plains and the Rivers Breaks (U.S. Environmental Protection Agency [USEPA] 2012). These ecoregions, historically dominated by grasslands, have been extensively converted for agricultural use (e.g., row crops and livestock grazing; USEPA 2012), and contain semi-permanent and seasonal wetlands, often referred to as

prairie potholes. Topography within the Project and Study areas is gently rolling to flat. The land cover is primarily grassland/herbaceous and cultivated crops (National Land Cover Database [NLCD] 2019). Wetlands are relatively evenly dispersed throughout the Project Area and are primarily classified as freshwater emergent and freshwater pond (U.S. Fish and Wildlife Service [USFWS] National Wetlands Inventory [NWI] 2023).

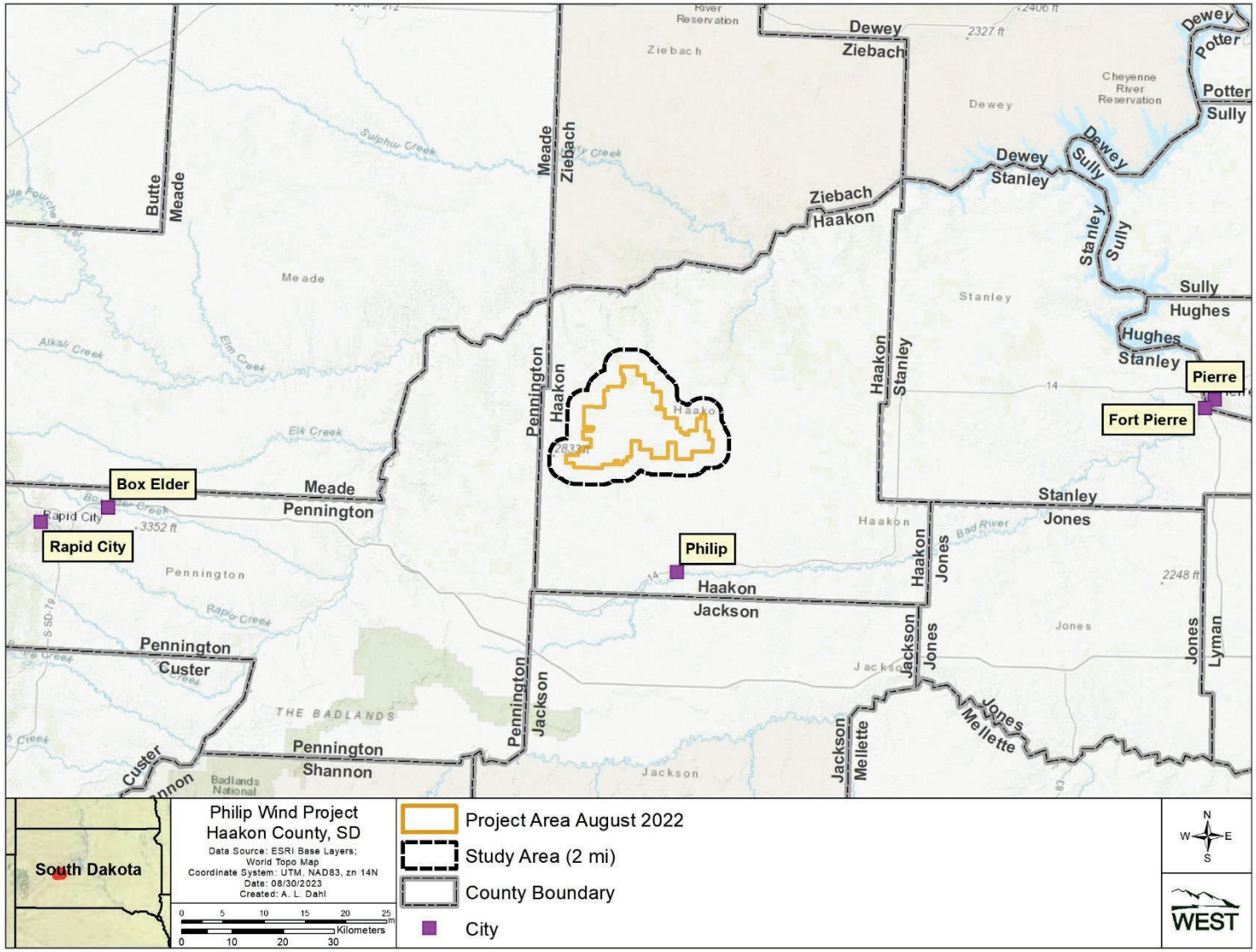


**Figure 1.1 Location of the Philip Wind Project in Haakon County, South Dakota, 2023.**

# 3 METHODS

Survey methodology was drawn from methods outlined in Martin and Knopf (1981), guidance from SDGFP (SDGFP 2022), and written guidance from SDGFP provided on March 13, 2023. Survey methods built on previous methods used for prairie grouse lek surveys Project in 2022, and pre-survey planning included a review of leks previously documented in 2022 (Piorkowski 2023). Leks were surveyed using a combination of ground surveys and aerial surveys. One aerial and three ground surveys were conducted during the typical lekking timeframe for prairie grouse, 30 minutes before sunrise until approximately 1.5 – 2.0 hours after sunrise (SDGFP 2022). To the extent possible, all surveys were conducted on relatively calm mornings (winds less than 15–20 mi per hour) and on days with no precipitation. The combination of ground and aerial survey types allowed for a census of leks in the Project and Study areas, as well as a count of prairie grouse attending leks. A lek was defined as "a group of two or more displaying male grouse in one or more years" (SDGFP 2022). Aerial surveys were conducted during much of the same time as ground surveys; however, aerial surveys did not overlap ground survey efforts on the same day.

## 3.1 Ground Surveys

For ground surveys, five WEST biologists surveyed for prairie grouse and their leks at proposed locations that were spaced approximately 0.5 mi apart along publicly accessible roads within both the Project Area and Study areas. At each location, WEST biologists visually scanned and listened for prairie grouse for up to five minutes. Three ground surveys were conducted during the season. If an active lek was detected, a count was conducted to quantify the number of grouse, their sex, and species if possible.

## 3.2 Aerial Surveys

Prior to the survey, biologists reviewed aerial imagery (U.S. Department of Agriculture [USDA] 2022) land cover data (NLCD 2019, Bauman et al. 2020), and previously documented leks (Tetra Tech 2018, Piorkowski 2023) to identify suitable lek habitat in the Project and Study areas. The flight route was developed using transects oriented in a north-south direction to increase visibility due to sun positions in the early morning hours. Two experienced WEST biologists and a pilot flew aerial transects spaced approximately 0.25 mi apart, at approximately 150 – 200 m above ground level using a fixed-wing aircraft (Cessna 172). Survey flights occurred during calm weather (wind speeds less than 20 mi per hour) with no or very light rain and were conducted approximately 30 minutes before sunrise until two hours after sunrise. The aerial survey covered areas that did not have public road coverage in the Project and Study areas (Figure 4.1) and supplemented ground survey efforts following SDGFP guidance (*pers. comm.* H. Morey, SDGFP, March 13, 2023). Five out of the seven survey days needed to complete these aerial surveys were targeted during presumed peak lek attendance within the first two weeks of April (*pers. comm.* H. Morey, SDGFP, March 13, 2023) and after the majority of the first ground survey was

completed. An onboard Global Positioning System unit was used to ensure the Project and Study areas were covered adequately by tracking flight paths and was used to collect lek locations (i.e., approximate center point of the lek) when detected.

### 3.3 Data Collection and Terminology

When grouse were observed, the location, species, number of birds of each sex, activity, and courtship behavior were recorded. Each lek was assigned a unique identification (ID) number and location. Additional data collected for each survey included start and stop time, cloud cover, temperature, and precipitation.

Leks were considered active if two or more displaying male prairie grouse were observed (SDGFP 2022, Runia et al. 2021). Displaying is characterized as inflation of air sacs and associated sounds (including "booming" for GRPC), aggressive face-off behavior between males, and rapid foot stomping and tail vibration (for STRGR; SDGFP 2022). Locations where two or more male prairie grouse were observed, but were not displaying, were not considered active. For all active leks, lek data were summarized by reporting the maximum count of birds at each lek, across all surveys.

## 4 RESULTS

One aerial and three ground surveys were conducted between March 29 and May 5, 2023. Throughout the Project and Study areas, 274 points were surveyed three times from the ground and one complete survey was conducted from the air resulting in approximately 1,254 mi of survey transect (Figure 4.1). Five out of the seven aerial survey days needed to complete the effort were conducted between April 10, and April 18, 2023. Surveys occurred during the following dates:

- Survey 1 (ground) – March 29 – April 13
- Survey 2 (aerial) – April 10 – May 2
- Survey 3 (ground) – April 15 – April 26
- Survey 4 (ground) – April 17 – May 5

During the surveys, 69 active prairie grouse leks were located and counted in the Project and Study areas (Table 4.1 and Figure 4.2). Of these, 37 were GRPC leks, 30 were STGR leks, and two were mixed species leks, comprised of both GRPC and STGR. Thirty-two prairie grouse leks were located in the Project Area and 37 leks were in the Study Area (Table 4.2). Leks appeared to be generally located in the western and eastern areas of the Project and Study areas, with fewer leks in the central area (Figure 4.2).

For GRPC, 211 birds (146 males, 29 females, and 36 unknown sex) was the maximum count of individuals across all leks and surveys. Counts for each lek ranged from 2–20 birds (males, females, and unknown sex; Appendix A). For STGR, 386 birds (158 males, 33 females, and 195 unknown sex) was the maximum count of individuals across all leks and surveys (Appendix A). Lek counts ranged from 3–30 birds (males, females, and unknown sex; Appendix A). Mixed

species leks had 4–9 birds (including males, females, and unknown sex GRPC and STGR). A complete list of active lek locations and counts can be found in Appendix A, Table A-1.

**Table 4.1. Number of active prairie grouse leks in Project and Study areas at the Phillip Wind Project, Haakon County, SD. Based on surveys from March 29 – May 05, 2023.**

| Lek Location | STGR | GRPC | Both Species | Total |
|---|---|---|---|---|
| Project Area | 12 | 19 | 1 | 32 |
| Study Area (only) | 18 | 18 | 1 | 37 |
| **Sub-total** | **30** | **37** | **2** | **69** |

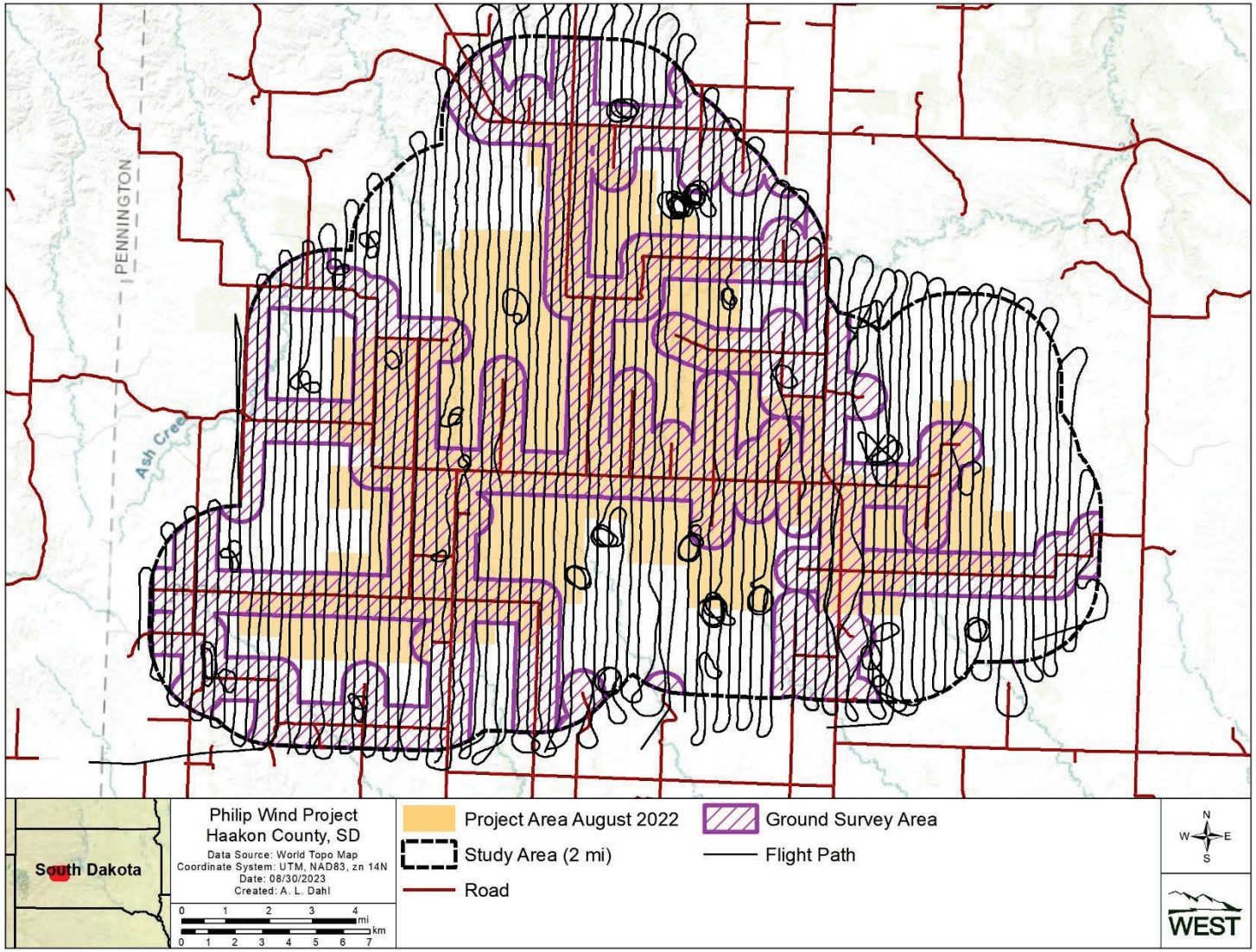


**Figure 4.1. Aerial and ground survey efforts for prairie grouse within the Project and Study areas at the Philip Wind Project in Haakon County, South Dakota, from March 29 – May 05, 2023.**

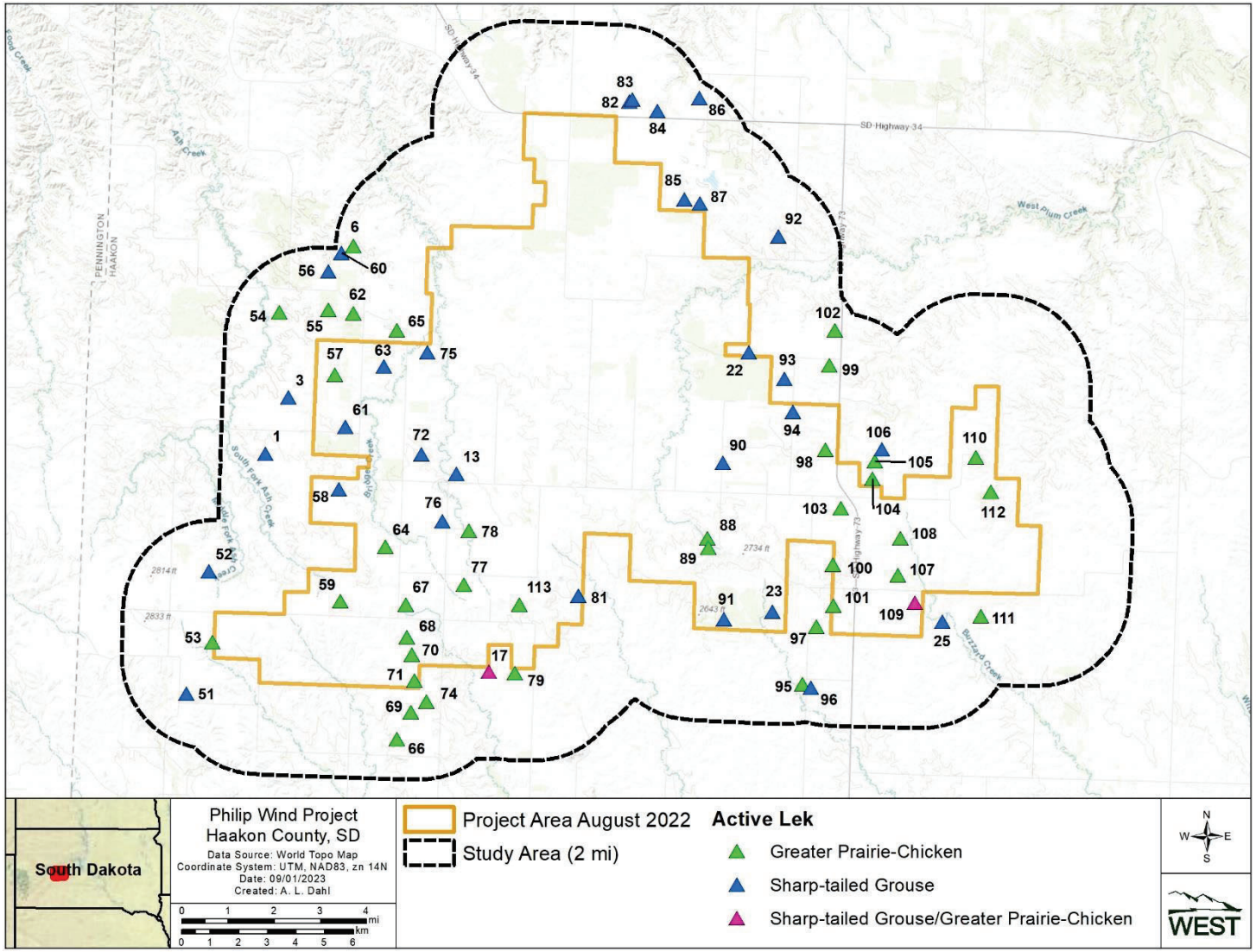


**Figure 4.2. Location of prairie grouse leks within the Project and Study areas at the Philip Wind Project in Haakon County, South Dakota, from March 29 – May 05, 2023.**

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## Appendix A. Lek locations and number of prairie grouse counted during surveys for the Phillip Wind Project, Haakon County, South Dakota, March 29–May 05, 2023

**Appendix A-1. Locations and number of birds counted at active prairie-grouse leks during surveys conducted for the Phillip Wind Project, Haakon County, South Dakota, March 29–May 05, 2023.**

| Lek ID | Species | Number Males[1] | Number Females[1] | Number Unknown Sex[1] | Total Birds[1] | Easting[2] | Northing[2] | Location |
|---|---|---|---|---|---|---|---|---|
| 13 | STGR | 3 | 0 | 25 | 28 | 273069 | 4907689 | Project Area |
| 23 | STGR | 4 | 0 | 1 | 5 | 284142 | 4902855 | Project Area |
| 57 | GRPC | 3 | 0 | 0 | 3 | 268821 | 4911148 | Project Area |
| 58 | STGR | 2 | 1 | 0 | 3 | 268954 | 4907146 | Project Area |
| 59 | GRPC | 6 | 2 | 1 | 9 | 269011 | 4903226 | Project Area |
| 61 | STGR | 13 | 10 | 0 | 23 | 269192 | 4909335 | Project Area |
| 63 | STGR | 2 | 0 | 8 | 10 | 270539 | 4911448 | Project Area |
| 64 | GRPC | 2 | 0 | 0 | 2 | 270594 | 4905120 | Project Area |
| 67 | GRPC | 6 | 1 | 0 | 7 | 271296 | 4903105 | Project Area |
| 68 | GRPC | 3 | 1 | 1 | 5 | 271342 | 4901956 | Project Area |
| 70 | GRPC | 4 | 0 | 0 | 4 | 271515 | 4901346 | Project Area |
| 71 | GRPC | 3 | 0 | 0 | 3 | 271601 | 4900440 | Project Area |
| 72 | STGR | 5 | 0 | 0 | 5 | 271845 | 4908367 | Project Area |
| 75 | STGR | 7 | 0 | 0 | 7 | 272050 | 4911942 | Project Area |
| 76 | STGR | 4 | 0 | 11 | 15 | 272589 | 4906025 | Project Area |
| 77 | GRPC | 2 | 0 | 11 | 13 | 273345 | 4903804 | Project Area |
| 78 | GRPC | 4 | 0 | 0 | 4 | 273516 | 4905694 | Project Area |
| 81 | STGR | 12 | 0 | 10 | 22 | 277356 | 4903407 | Project Area |
| 88 | GRPC | 2 | 0 | 2 | 4 | 281873 | 4905431 | Project Area |
| 89 | GRPC | 3 | 7 | 0 | 10 | 281904 | 4905094 | Project Area |
| 90 | STGR | 2 | 0 | 3 | 5 | 282412 | 4908079 | Project Area |
| 91 | STGR | 3 | 0 | 13 | 16 | 282441 | 4902583 | Project Area |
| 94 | STGR | 5 | 3 | 5 | 13 | 284868 | 4909859 | Project Area |
| 98 | GRPC | 3 | 0 | 0 | 3 | 285992 | 4908536 | Project Area |
| 101 | GRPC | 6 | 4 | 0 | 10 | 286282 | 4903058 | Project Area |
| 103 | GRPC | 4 | 0 | 2 | 6 | 286550 | 4906476 | Project Area |
| 107 | GRPC | 3 | 4 | 0 | 7 | 288541 | 4904128 | Project Area |
| 108 | GRPC | 5 | 0 | 0 | 5 | 288625 | 4905419 | Project Area |
| 109 | STGR/GRPC | 4 | 3 | 3 | 9 | 289145 | 4903163 | Project Area |
| 110 | GRPC | 4 | 1 | 0 | 5 | 291268 | 4908256 | Project Area |
| 112 | GRPC | 2 | 0 | 0 | 2 | 291798 | 4907059 | Project Area |
| 113 | GRPC | 6 | 1 | 0 | 7 | 275286 | 4903105 | Project Area |
| 1 | STGR | 3 | 0 | 0 | 3 | 266389 | 4908394 | Study Area |
| 3 | STGR | 2 | 0 | 13 | 15 | 267194 | 4910358 | Study Area |
| 6 | GRPC | 6 | 0 | 14 | 20 | 269461 | 4915666 | Study Area |
| 17 | STGR/GRPC | 4 | 0 | 0 | 4 | 274210 | 4900742 | Study Area |
| 22 | STGR | 3 | 4 | 0 | 7 | 283312 | 4911940 | Study Area |
| 25 | STGR | 2 | 8 | 0 | 10 | 290106 | 4902504 | Study Area |
| 51 | STGR | 2 | 3 | 2 | 7 | 263617 | 4899983 | Study Area |
| 52 | STGR | 5 | 0 | 7 | 12 | 264397 | 4904262 | Study Area |
| 53 | GRPC | 5 | 0 | 0 | 5 | 264527 | 4901788 | Study Area |
| 54 | GRPC | 5 | 0 | 0 | 5 | 266874 | 4913347 | Study Area |
| 55 | GRPC | 2 | 0 | 1 | 3 | 268585 | 4913435 | Study Area |
| 56 | STGR | 0 | 0 | 30 | 30 | 268593 | 4914772 | Study Area |
| 60 | STGR | 7 | 0 | 4 | 11 | 269046 | 4915426 | Study Area |
| 62 | GRPC | 2 | 1 | 0 | 3 | 269471 | 4913316 | Study Area |
| 65 | GRPC | 4 | 0 | 0 | 4 | 270985 | 4912721 | Study Area |
| 66 | GRPC | 6 | 0 | 0 | 6 | 270990 | 4898385 | Study Area |
| 69 | GRPC | 4 | 0 | 0 | 4 | 271487 | 4899329 | Study Area |
| 74 | GRPC | 6 | 0 | 0 | 6 | 272029 | 4899706 | Study Area |

**Appendix A-1. Locations and number of birds counted at active prairie-grouse leks during surveys conducted for the Phillip Wind Project, Haakon County, South Dakota, March 29–May 05, 2023.**

| Lek ID | Species | Number Males[1] | Number Females[1] | Number Unknown Sex[1] | Total Birds[1] | Easting[2] | Northing[2] | Location |
|---|---|---|---|---|---|---|---|---|
| 79 | GRPC | 3 | 0 | 1 | 4 | 275124 | 4900691 | Study Area |
| 82 | STGR | 12 | 0 | 10 | 22 | 279128 | 4920729 | Study Area |
| 83 | STGR | 12 | 1 | 0 | 13 | 279244 | 4920798 | Study Area |
| 84 | STGR | 3 | 0 | 0 | 3 | 280113 | 4920409 | Study Area |
| 85 | STGR | 8 | 0 | 17 | 25 | 281068 | 4917307 | Study Area |
| 86 | STGR | 8 | 2 | 1 | 11 | 281591 | 4920865 | Study Area |
| 87 | STGR | 2 | 0 | 3 | 5 | 281598 | 4917155 | Study Area |
| 92 | STGR | 6 | 0 | 2 | 8 | 284349 | 4916014 | Study Area |
| 93 | STGR | 6 | 1 | 6 | 13 | 284565 | 4911016 | Study Area |
| 95 | GRPC | 2 | 1 | 1 | 4 | 285195 | 4900308 | Study Area |
| 96 | STGR | 11 | 0 | 15 | 26 | 285484 | 4900190 | Study Area |
| 97 | GRPC | 4 | 3 | 0 | 7 | 285683 | 4902321 | Study Area |
| 99 | GRPC | 4 | 1 | 0 | 5 | 286148 | 4911481 | Study Area |
| 100 | GRPC | 4 | 1 | 0 | 5 | 286265 | 4904495 | Study Area |
| 102 | GRPC | 7 | 0 | 0 | 7 | 286326 | 4912705 | Study Area |
| 104 | GRPC | 5 | 1 | 0 | 6 | 287642 | 4907516 | Study Area |
| 105 | GRPC | 4 | 0 | 2 | 6 | 287726 | 4908120 | Study Area |
| 106 | STGR | 4 | 0 | 9 | 13 | 287984 | 4908539 | Study Area |
| 111 | GRPC | 2 | 0 | 0 | 2 | 291440 | 4902694 | Study Area |

[1] Counts from survey with the highest number of birds counted (males, females, or unknown sex)

[2] Projection for Easting and Northing is UTM, NAD83, zone 14N, units are in meters

GRPC = greater prairie-chicken (*Tympanuchus cupido*), STGR = sharp-tailed grouse (*T. phasianellus*)